



CHAPTER 11

SAFE AND FAR MORE EFFECTIVE PEST CONTROL OVERVIEW

WHAT ARE PESTISAFES®?

At the 2006 NPMA Pest World Conference in Nashville, Tennessee, Dr. Faith Oi noted a recent nationwide survey that found 83% of the respondents would pay more for a service that uses less pesticide. When Rebecca Baldwin conducted her own survey of 600 pest control consumers in Florida, she found 87% would be satisfied with an effective pest control strategy that could control pests without spraying pesticides.

“Pest problems, including diseases, are really indicators that your yard or local area or eco-system is out of balance, sick, deficient or needs repair - volatile, synthetic pesticide poisons will surely not heal or address much less correct the real problem - they only can contaminate and/or mask it temporarily at best. Often the use of these *registered* poisons actually exasperates the pest problem and creates resistance and makes the pest situation worse. Pest infestations are only symptoms of your real problem not the cause or the problem - as long as you continue to ‘treat’ just the symptoms - and do not correct the real cause or problem - you will be on a chemical tread mill that never ceases to make the ‘banksters’ and the poison ‘industry’ rich and well and yourself poor and sick and your pests prosper and increase.” – SLT in a 1993 speech.

Elroy L. Rice, writing in [Pest Control with Nature’s Chemicals](#) (1983) noted: “Two basic problems have been encountered in the use of insecticides that were developed in the past: 1. Insecticides are toxic not only to the pests, but also to many other insects and animals as well. 2. Target insects rapidly develop resistance to them.

This chapter contains only a few of the Author’s favorite alternative tools or Pestisafes®, some safe alternatives to medicine and some common herbal recipes and/or tools he warns you not to use, some of which are only mentioned here. The Author believes only pesticides (poisons) and “medicine” need to be registered because they are or they contain dangerous volatile poisons and legally these poisons can not be called safe or non-toxic. Obviously, if any product used to control pests is a food or GRAS and/or non-toxic, it is not logical or possible to call it (or register it as) a pesticide poison. The Author’s favorite Pestisafes® contain only naturally occurring materials that are all either food-grade or non-toxic or (GRAS) Generally Recognized as Safe. (http://en.wikipedia.org/wiki/Generally_recognized_as_safe) Some “regulators” believe that under FIFRA anything that controls pests must be *registered* as a pesticide (poison); based on their *logic* all of my following Pestisafes® would have to become *registered* and/or have poisons added to them! Virtually everything on earth can be used as a “pesticide”! Obviously, many manufacturers do not want their food or cleaning products to be called or “registered” as pesticide poisons. The Author’s Pestisafes® will safely control even pesticide poison resistant pests. Remember to use even these Pestisafe® materials with caution as there are about 30,000 times as many beneficial organisms on earth as there are harmful ones, e.g., mice and ants will eat up to 95% of all weed seeds deposited in no-till agricultural plots, making them safer, more efficient and more important than chemical herbicide poisons. **Remember, even the safest spray or dust or product can be abused and/or misused. Always remember to choose the safest alternative or Intelligent Pest Management® control possible.**

INTELLIGENT PEST MANAGEMENT®
ECOLOGICALLY BASED PEST MANAGEMENT
BASIC PEST CONTROL OVERVIEW

“We hold these truths to be self-evident: that all men are created equal, that they are endowed by their Creator with certain unalienable rights, that among these are life, liberty and the pursuit of happiness.” In the Author’s opinion, volatile, synthetic pesticide poisons are destroying these rights of ours. Yet our current government pest control policy focuses almost entirely on the use of volatile, synthetic pesticide poisons and their “registration” and/or extension rather than on pest control. EPA and the various state regulatory agencies need to expand their horizons and include support (not harassment) for the development and diffusion of alternative pest control methods and products for urban and agricultural pests. While there are literally thousands of ways to safely and effectively control pest problems - each situation is different and even a Pestisafe® control that works may not be the most efficient, effective, safest, or most economical. Maybe your best control method will be a combination of various controls - the choice is up to you. The economics, the entire situation, the people and “pest” involved, the size of the area, the allergies, the sensitivities, the action level, the politics and the emotions involved, the long-term goals, the environment, the season and time, the stage of development, the species, the degree of infestation, the conditions conducive, the weather, the safety and the “whims” of all concerned - all play a part in your choice. The Author leaves others to evaluate what was expedient, judicious, and/or practical. He will always try any Pestisafe® or alternative to any poison as long as it does no harm - preferring always to err (if he must) on the side of safety, not on the side of “control”. **The Author will always try to do more good than harm.**

While we must protect our homes from invaders, those on two legs, four legs, six or eight or more legs, remember, most of the insects that buzz around us in the yard or invade our homes are beneficial or often just a nuisance, only a few are damaging to us, our food, or possessions. For every person earth there are about a million insects. This means that one square mile of rural land has more insects than there are people on the entire earth. A few simple preventative measures stop most pest problems before they begin. Even when pests do get in, the most effective pest control is usually the simplest: step on them, or vacuum them up and/or remove their food and moisture supply and breeding sites. This includes such steps as changing exterior lighting, caulking, managing garbage so that it is less attractive, cleaning up spilled food, especially pet food, and eliminating damp conditions around the house. Sometimes, however, you may have to be a detective to find the source of an infestation. Insects can see clearly for about one yard - beyond that everything begins to blur. Pests, such as clothes moths, carpet beetles and flour moths can breed in a mouse or squirrel nest, an old yellow jacket nest or a bird nest, out of sight in a wall, an attic or the eaves. Try also to try to develop some “pest” tolerances - before you know it you might find and make some fascinating “pets” out of former pests.

When the Author drove in the jungles of Costa Rica and Brazil, no insects splattered his vehicle’s windows. Here in the U.S.A. his vehicle’s windows are covered with insect debris as he drives in the summer. He believed the reason is very simple: They do not spray synthetic pesticide poisons in the jungles of Costa Rica and/or Brazil and the natural predators that are there do their job better than “registered” poisons could ever do here.

PREVENTION - This is the Very Best Control or Defense. It is the beginning of Intelligent Pest Management®.

To an insect or creature, your home or building and its surroundings is a macro-environment consisting of thousands of micro-environments; many with their own “climate”, moisture, temperature, food and/or conditions conducive to their invasion or infestation. All creatures have four requirements for survival: food, water, shelter, and warmth. Most structure invading pests are controlled when you simply control water (moisture for drinking and the relative humidity) because water is their most critical survival factor. So allow the beneficial creatures to do their job and properly ventilate, install and maintain dehumidifiers, fans and/or air conditioners and quickly correct/repair all moisture/crack problems.

Manage moisture: Properly install and maintain vents, vapor barriers, fans, air conditioners, and/or dehumidifiers. Moisture is the major destructive factor to homes and the major key to pest control elimination. Control moisture and you control pests and damage to your building.

Seal cracks: The first defense is making sure pests don’t get into your home. Crawling pests enter through cracks in or around the foundation or siding or doors and windows, while flying insects usually come in through open doors and windows. An annual inspection of the foundation and siding to caulk cracks (use good quality

silicone sealant) is a good idea. Be particularly careful to seal around exterior plumbing and electrical outlets. Make sure that door thresholds have good weather stripping under them and that the door and windows seal well when shut. Check that screens on windows, crawl space vents, and attic vents are intact and sealed around the edges. **Remember 80-90% of all insect infestations migrate from the outside into your structure. Only 4 types of pests are generally carried inside buildings to create infestation; they are German cockroaches, fleas, stored product pests and Pharaoh ants, so inspect for them.**

Use screens: Window screens are excellent for keeping insects out of a house, but screen doors are not very effective. This is because flies and mosquitoes are attracted to people or food odors so they hang around outside screen doors and whisk inside every time the door is opened. Try to ventilate the house adequately without screen doors, at least on heavily used entrances. If screen doors are used, they should have strong spring closures that shut the door quickly and tightly.

Use glueboards and repellents: Prevent many pest invasions by properly using glueboards and by sprinkling dry Tide laundry soap powder and/or talcum powder or medicated body powder as a barrier inside and outside.

Manage lights: Good design and management of exterior lighting is important to prevent insect problems.

- Avoid leaving porch lights on all evening to collect a cloud of moths and other insects and/or predators, e.g., bats. Every time the door is opened, the insects swirling around the light are swept into the house. Minimize the attraction time by turning porch lights on only when they are needed. Sensor lights that switch on in response to motion are ideal because they light the area for arriving guests, but switch off after a few minutes (saves energy too).
- When designing the lighting around the exterior of a new home, don't put light fixtures directly above the doors, especially over doors to decks or patios that might be used a lot in the evening. Place flood or spot lights a few feet away from the door and direct the light onto porches and stairs. This illuminates them safely, while keeping the mesmerized insects away from the door.
- Use yellow bulbs in yard light fixtures; flies and moths are not as attracted to yellow as they are to ordinary white light bulbs, or try sodium vapor lighting.

Manage garbage: Keep garbage in sturdy, tightly covered containers and wash them out regularly with enzyme cleaners and borax. This prevents flies from breeding and reduces the attraction for ants, yellowjackets and other insects. If the kitchen food garbage can be composted daily, the trash will contain little that is attractive to insects. Where composting is not possible, tightly wrap up kitchen garbage, take it out frequently to a covered trash can, and dispose of it in sealed plastic bags. Avoid letting old clothes, newspapers, paper bags, cardboard, empty cans, and other trash accumulate in storage rooms, garages, etc., as these provide breeding sites for many household pests.

Manage soil: Healthy soil prevents many pest and weed problems.

A FEW OF THE AUTHOR'S FAVORITE OFFENSIVE WEAPONS OR PEST CONTROL "TOOLS" OR PESTISAFES®!

Before beginning, please note that just because something is natural does not mean it is safe. Rhubarb and oleander leaves are very toxic to people and pets, especially small children. Even foods like peanuts can cause severe poisoning symptoms in some people. ALWAYS USE THE SAFEST ALTERNATIVE (PREFERABLY FOOD-GRADE MATERIALS) YOU CAN! ANY MIXTURES YOU MAKE AND USE SHOULD BE CLEARLY MARKED AND PROPERLY STORED.

If the Author asked you to roll around and/or climb on concertina (razor) barb wire - you would think the request absurd - yet ants can climb all over it without harm - you can powder your baby's bottom with talcum powder, but ants will leave an area where talcum is sprinkled. Volatile, synthetic pesticide poisons were basically invented to kill man - why try using them on insects? Unlike the "professional" pest control industry that only has one "tool" to control pest problems - volatile, synthetic pesticide poisons - the Author wants you to begin to understand his "tool box". The following are only a few of his favorite things or "tools" or Pestisafes® to control or repel even the *registered* pesticide resistant insects that annoy man and the 1,000 or so insect pests that damage his crops and/or the other nuisance wildlife that "bug" him. The industry and "some" regulating people want to make these Pestisafes® "pesticides" because they kill, repel and/or control pests better than "their" *registered* economic

pesticide poisons do - to them the Author asks the simple question, "If I kill a resistant ant with an ice cube and then the ice cube melts is the moisture and/or vapor still a 'pesticide'?" It is the Author's understanding that all materials generally recognized as safe (GRAS) and/or naturally occurring things and/or food products do not need to be legally registered unless you want to make medical claims and/or make them all proprietary products. We **know** that if we kill a pest with "their" volatile, synthetic pesticide poisons - "their" poisons and *inerts* remain behind to contaminate and harm us, our pets, food, water, homes, children and environment for a long time - the toxic pesticide poisons that remain to contaminate and create pesticide resistance are not simply moisture or vapor, but dangerous poisons! It seems simply amazing and implausible to the Author that *his* (basically non-volatile) techniques and Pestisafes® that are safer, less expensive, more effective, scientifically provable, field tested and result oriented would meet such *resistance* - especially from "open-minded scientists." But, to them, the Author would say you can not serve the public and your own selfish, archaic interests. You either love your fellow man or you love money and power more. **Note: Registered, volatile, synthetic pesticide poisons may be used to control any and all pests in any and all areas unless the pest or area is specifically excluded on the registered label; therefore, unless the Pestisafe® label specifically excludes the use of the product to control pests, the Author believes that all such uses are far more legal than the poison label. Note: Some of the following tools or weapons do not appear in any other chapter and some of the "tools" described in other chapters may not be included in this one. Always remember that even the Author's alternatives may negatively effect some plants, some people and some pets - so use even these tools very carefully! Safety should be the first and last thing you apply.**

Acetaminophen (APAP) PM - can be ground and mixed with aspartame and used as a rodent bait. An adult person can not exceed 6 grams (8 extra-strength pills) of acetaminophen per day.

Acetic Acid or White Vinegar - can be used as an effective herbicide and it can be used to preserve hay and grain. It can be used to disinfect empty combs that have been exposed to European foul brood, Nosema or the Amoeba Disease.

Acne Bacteria - can be killed with heat so frequently take a steam bath or sauna or wash twice a day with Safe Tweetmint Enzyme Cleaner with Peppermint.

Acoustic Emitters - are used by golf courses during spring flights to attract and trap mole crickets. They can be contaminated, e.g., with nematodes, and the infected crickets can be released to contaminate and infest others.

Activated Charcoal Filters and Fans - remove dust mites, mold and mildew spores, odors, pesticides, allergens, pollen, etc. from the ambient air.

Adhesives - like Scotch 77 can be sprayed on plastic tennis/badminton racquets, yellow bags, white or yellow cards, paper, etc. to catch flying and crawling insect pests.

Adhesive Tapes - can be used to trap insects and temporarily seal cracks and other openings.

Adjuvants - are materials that, when added to a spray solution, facilitate or modify the action of a pesticide. In 1889 there was a work that indicated that adding soap increased the toxicity of arsenical insecticides. Before the turn of the 20th century whale oils and fish oils were commonly used as adjuvants. Today there are more than 3000 chemicals being marketed as adjuvants.

Advice - You do not know everything; seek proper advice and then double check your research.

Aeration - Air is needed to give soil fertility and optimum plant root growth and to oxidize mineral matter and to reduce carbon dioxide, thatch, acidity and plant debris. Many pests, e.g., wireworms, die when you properly aerate the soil and/or compost. Provide good air circulation. Overcrowding plants can cause weak growth and an increase in foliage diseases. Staking, caging, trellising and pruning all help to increase air circulation.

After Shave - It may smell great to you and your lady, but when squirrels invade your chimney or attic, after shave is repulsive (whether lotion or cologne) to squirrels and they move out. Perfume, especially old perfume, or after shave will also repel many ground dwelling mammals and ants. Many people now are chemically sensitive and will react badly to fragrances.

Agricultural Practices - If you plant the same crop year after year you are bound to fail.

Air - A blast of air from an aerosol can, bicycle pump, or straw or air compressor can be used to *flush* roaches from their hiding spots instead of using a can of aerosol poison; then you can vacuum them up. Fans left on 24 hours, 7 days a week will control roach and bat infestations and desiccate many insects and will repel many flying insects, e.g., flies. Hot air can be used to quickly control spot roach infestations and help dry out fungal infestations. Air circulation should also be encouraged in garden plantings to help control many diseases. Air containing less than 2.5% oxygen protects stored commodities by stopping insect and fungus activity.

Air Doors - To be effective against flying insects, the minimum velocity of the air stream must be 1600 feet per minute.

Air Guns or Varmint Guns or Pellet Guns - if legal can remove pest birds and squirrels and other varmit.

Alcohol - In laboratory rats, drinking alcohol compromises the skin's barrier to toxic chemicals.

Alcohol Anti-Insect Spray or Mist:

- 2 c. vodka
- 1 T. citronella essential oil
- 1 T. eucalyptus essential oil
- 1 tsp. geranium essential oil
- 1 tsp. rosemary essential oil
- 1 tsp. orange essential oil
- 1 tsp. lemon essential oil

Mix all ingredients and shake well. Spray or mist into the air to repel flying insects and some people and pets. **Be very careful when you use essential or fragrance oils.**

Alcohol Plant Rub - Soak a cotton ball in rubbing alcohol solution to wipe aphids and scales off resistant plants.

Alcohol Spray - Combine 1 to 2 cups rubbing alcohol (isopropyl alcohol or ethyl alcohol) with 1 quart water. Alcohol will quickly kill wasps, aphids, roaches and other pests. **Always test spray a small area on one plant.** Wait a day to check for damage before spraying entire plants. You can add between ½ and 1 cup rubbing alcohol to 1 quart insecticidal soap or horticultural oil sprays or vegetable oil as a “kicker” to increase their effectiveness. **Keep mix away from children or pets and your eyes!**

Alfalfa - has natural weed-suppressing effects when rotated in (crop rotation) with corn and other crops. Alfalfa fields provide a tremendous vareity of beneficial insects to provide natural control when pests invade nearby crops.

Algae - are some of the most important microbes in the soil.

Alka Seltzer® - pieces of Alka Seltzer® thrown into the air and swallowed by sea gulls will quickly kill them. Lightly cover it in peanut butter or grease to kill rats and mice. Put an Alka Seltzer or two in a bowl of soapy water to catch insects, e.g., fleas and mosquitoes. Use them on damp sponges to attract bed and kissing bugs.

Alum - Used to control fungal diseases, e.g., on bananas.

Aluminum Foil - Protect young trees form mice and rabbits - wrap the trunks loosely to a height of 18” with glittering, rattling aluminum foil. Place a 30”-wide strip shiny-side up on the ground to repel aphids and thrips and reflect light upward to speed food/flower production by two weeks and to help retain ground moisture. Hang aluminum foil from plants, trees or your home to keep birds away. You can also use it to increase winter light for house plants. Aluminum foil collars can also be used to protect plant seedlings from cutworms. Aluminum foil repels some cats. Aluminum foil lightly wrapped 2” below the soil and 2” above the soil surface will deter southern blight on tomato and pepper plants.

Aluminium Plates - Birds hate the sound and appearance of pie plates blowing in the breeze and sunlight.

American Beautyberry (*Callicarpa americana*) - The crushed leaves repel ticks, mosquitoes and other biting bugs.

American Cornflower - The roots of this plant contain an oil that repels and/or kills flies.

American Plum (*Prunus americana*) - Leaves and flowers are toxic to insects.

Ammonia - Can be used to control weeds in the Spring - later on it acts as a fertilizer. You can later kill weeds with calcium nitrate or potash (4 cups per gallon of water) or 1 gallon of ammonia to 4 gallons of liquid urea with 2 oz. of a sticker. You can kill slugs with 1 part non-sudsing ammonia and 1 part water. Rags soaked in ammonia and dropped in gopher holes or rat holes etc., if you seal all of the openings - usually repels the pests in a hurry. Pour some in garbage cans to repel raccoons. Termites avoid anything that has ammonia/nitrogen on it. Many pests die when you spray them with ammonia. If you have no concrete or asphalt, you can use ammonia to compact soil. That is why ground fertilized with ammonia can make the soil hard. Ammonia neutralizes the epoxide in mold. **Never mix ammonia and chlorine bleach.**

Ammoniated Soap of Fatty Acids - Can be diluted and used as a weed and vegetation killer.

Anise - People use anise to add a hint of licorice to everything from holiday cookies to robust bottles of ouzo and raki. Now Agricultural Research Service (ARS) has isolated 22 compounds in *Pimpinella*'s essential oils and find high levels of organic mixtures called phenylpropanoids in anise. Phenylpropanoids are found in a wide variety of plants, and some are thought to have health-boosting benefits. However, the chemical structure and the biological activity of the *Pimpinella* phenylpropanoids are unique. Some phenylpropanoids the team found have only been found in *Pimpinella* and four of the compounds they isolated had never before been identified in any plant. The compounds were evaluated for their activities against the plant fungus *Collectotrichum*, which causes anthracnose diseases worldwide. One unique compound was especially effective against strawberry soft rot and leaf blight. In addition, *Pimpinella isaurica* essential oils were more effective in controlling aphids than isolated *Pimpinella* phenylpropanoids. These compounds were also tested for their activity against various major and minor microbes. A few showed some effectiveness against *Plasmodium falciparum*, the parasite that causes malaria in humans, and *Mycobacterium intracellulare* a bacterium that can cause illness in immunocompromised patients. Some phenylpropanoids exhibited anti-inflammatory activities. *Pimpinella* essential oils also showed estrogenic effects in a yeast model and were considered to have phytoestrogen properties. These results suggest that *Pimpinella* essential oils may be a source of potent compounds that could be used in developing powerful new pharmaceuticals and agrochemical agents.

Anise Oil - Repels dogs and cats and will kill spider mites and aphids.

Annual Tillage - is probably the most important weed management practice.

Ant Lions - They resemble damsel flies but they have longer and blunter antennae; they are weak fliers. Adults and larvae eat ants, ticks, small insects.

Antibiosis - Some plants, e.g., garlic and marigolds, produce volatile oils, known as phytoalexins, that can repel, injure or even kill pests, e.g., insects and/or fungi. Some plants even react by killing the tissue around the area of the infestation, as well as killing the pathogen. Some plants encase repellents in vacuoles (little cellular packages) that rupture when the insect or animal bites into the plant.

Antibiotic - All antibiotics come from the soil and are substances produced by some microorganisms that inhibit other microorganisms; used properly they save lives. Used too often they create super bugs and resistant species.

Antibiotics - e.g., Flagyl®, tetracycline, etc. Even 250 ml. soaked into cardboard as a bait station will kill an entire colony of termites in days by destroying the microflora and/or bacteria in their guts. Flagyl also kills the protozoa in their guts. There are several natural antibiotics in this chapter, e.g., goldenseal.

Ants - In 324 B.C.E. the Chinese introduced ants (*Acephali armaragina*) to their citrus groves to control caterpillars and large boring beetles. If you follow ants up the tree, you will find the aphids, scale and/or disease.

Aphid Lions - See green lacewings.

Aphid Midges - are tiny, bright orange maggots feed on more than 60 species of aphids. The adults are mosquito-like flies with long legs and delicate bodies. The adults lay eggs at night.

Aphidiid Wasps - are tiny black wasps with long antennae. They have only one specific host. They lay their eggs in aphids where the larvae hatch and consume the aphid host.

***Aphytis melinus* (Armored Scale Parasite)** - is a small yellow wasp which will control scale insects, especially in citrus groves.

Apple Cider Vinegar - Mix 3 tablespoons of natural apple cider vinegar to a gallon of water - spray during the cool part of the day for black spot on roses and other fungal diseases - or try baking soda as another safe fungicide alternative or fungisafe. Boil to purify the air and control airborne bacteria, etc. To relieve arthritis symptoms, drink a glass of water with 2 teaspoons of apple cider vinegar and 2 teaspoons of unprocessed honey; do this 3 times a day for at least 3 - 4 weeks to alleviate arthritis symptoms. You can also soak in warm, diluted apple cider vinegar to hasten the results. Garlic supplements will also help. Mix straight apple cider vinegar and baking soda to help cure insect bites and stings. Want to kill ringworm? Soak a rag or paper towel with apple cider vinegar and cover the ringworm for 15 minutes several times a day.

Apples - An apple a day is particularly good for your lungs. Organic apples are more effective than other fruits and vegetables in reducing the risk of serious diseases, including lung cancer and chronic obstructive pulmonary disease (COPD).

Aromatic Cedar - Cedar wood, its shavings and/or mulch or oil made from the eastern red cedar or aromatic cedar tree, *Juniperus virginiana* (L), has long been known to possess pesticidal or repellent properties. All stages of clothes moths and the black carpet beetle can be controlled with cedarwood or its oil or shavings. German cockroaches are repelled, but not killed by aromatic cedar. Ants do not like aromatic cedar mulches and Argentine ants are killed for at least 4 months.

Aromatic Plants - like garlic, chilies, mint, common rue and/or lavender will repel ants and many other pests - plant them in "troubled areas" and by entrances.

Arrestants - are chemicals or pheromones used to bring about aggregations of insects and/or animals.

***Artemisia tridentata* Nutt. ssp. *Vaseyana* (Rydb.) Beetle** - The volatile fraction from mountain big sagebrush is an effective fumigant. The main component of the volatile fraction is 1,8-cineole.

Asparagus (*Asparagus officinalis* var. *altilis*) - This plant has root exudates that reduce plant-parasitic nematodes in the soil. Plain asparagus juice will kill virtually all nematodes.

Aspartame - contains about 40% neurotoxic aspartic acid. Aspartame is a very powerful ant and mouse killer. Carpenter ants and mice will eat the powdered aspartame, but small black ants are best controlled when you mix the aspartame in apple juice and/or honey. To control fire ants, sprinkle aspartame on the mound; then slightly moisten the powder with water. Try it in juice to control yellow jackets. When handling any toxin protect your skin and keep it out of your mouth. Aspartame is 10% methanol; when ingested or at any temperature over 86° F. it converts to formaldehyde and then formic acid - the same substance used to strip epoxy urethane coatings. (Formic acid causes metabolic acidosis.) Formic acid is the poison found in the sting of fire ants. The methanol toxicity mimics health problems, e.g., multiple sclerosis and systemic lupus. The other 90% of aspartame is comprised of phenylalanine and aspartic acid, amino acids which, when separated from the other amino acids in your body, can become neurotoxic. In the 1970s FDA refused to approve aspartame for human consumption due to studies linking it to brain tumors, neurological disorders and even death in laboratory animals. Strings were pulled by powerful men like Donald Rumsfeld and aspartame was approved by the FDA without further ado. If you are using aspartame (NutraSweet, Equal, Spoonful, etc.) and you suffer from fibromyalgia symptoms, spasms, shooting pains, numbness in your legs, cramps, vertigo, dizziness, headaches, tinnitus, joint pain, unexplainable depression, anxiety attacks, slurred speech, blurred vision or memory loss...you probably have aspartame poisoning. See Excitotoxins. See Equal® or NutraSweet®. Will kill ants and/or mice that eat a few

packets in 4 days or less. Aspartame triggers gross obesity, suicide, diabetes, behavioral problems and learning disorders and many other diseases and symptoms. <http://www.sweetpoison.com/aspartame-side-effects.html>
See Acetaminophen (Tylenol), Tagamet and Ibuprofen (Advil).

Aspirin - Solutions of aspirin when sprayed on plants will help protect against pathogens and insects. Placing 2 aspirins in your cut flower water will keep them fresh longer.

Assyrian Apple (*Malus assyria*) - Pliny in Book 12 of his Natural History noted that the fruits and leaves of this plant, also called citron, have an exceptionally strong scent that “penetrates garments stored with them and keeps off injurious insects.”

Assassin Bugs - Depending on the species, they will eat flies, bees, leafhoppers, Japanese beetles, tomato hornworms, caterpillars and the like; they are fierce hunters and even may bite you.

Assume - When you assume you make an ass out of u and me.

Attention - Learn to pay proper attention so you can acquire knowledge and proper controls.

Attic Vents - should all be screened.

Attractants - Use these chemicals to bring in beneficials or to bring in pests or to monitor your controls. Pheromones, lures:

- **Advantages:** Non-hazardous to humans or other animals; no residues; targets specific insects while leaving beneficials unharmed.
- **Disadvantages:** Variable results due to weather, physical conditions, etc; effectiveness limited to very specific adult insect populations; expensive, more useful for monitoring the presence of insects rather than for control purposes in most cases.

Automobiles - kill many insects as they travel. Put a net out one window and you can do mosquito counts; you can drive over fire ant colonies repeatedly to kill or move them, and you can use the exhaust to euthanize animals in tunnels or in (bagged) traps.

Augmentation - When natural predators or enemies are too few in number or missing, their numbers and the resulting control can be increased by releases.

Avocado - A good source of unsaturated fat, fiber, vitamin C and B₆ and folate; folate is a nutrient that neutralizes heart risks by neutralizing excess levels of heart attack-causing homocysteine. Florida avocados have less fat and fewer calories than those from California.

Avocado Oil - Can be used to repel insects.

Avoidance - You can till the soil to control volunteer or host plants to help reduce early season insect pests and/or you can plant resistant species, practice crop rotation and/or plant cover crops and change planting dates to continue to help avoid pest problems and/or to reduce plant damage.

Azadirachtin Extract - See Neem.

Baby or Food Oil - will kill ear mites in cats and dogs.

Bacillus popilliae - A bacterial control agent used to control Japanese beetles.

Bacillus thuringiensis (BT) - A bacterial pathogen first used to control flour moth larvae; named in 1911 for the German province Thuringia where a European Researcher first encountered this pathogen. It was discovered a decade earlier by the Japanese. Early products were replaced by more effective ones in the 1960s when pathogenic strains were discovered with activity against different types of insects. BT is stable during storage, but loses strength in sunlight. It is believed that a strain of gut bacteria (*Enterobacter* microbes) turns Bt toxin into a killer.

Bacteria and Viruses - Bacteria and viruses often work as living “pesticides”.

Bagging - Putting bags (paper or plastic) over the fruit will protect it from sunburn and pest attacks.

BAITS - Why baits?

- Make the pests help do their own control by taking the toxin where it will kill the others
- No or low odor
- Little or no volatility
- Low % active ingredient
- Low volume application
- High % mortality
- Good service life
- **Safety - less risk - Caution: Any time you make a toxic bait add green food color to the bait to indicate it is poisonous to people and pets too!**

Baiting for German cockroaches:

- Perform a thorough inspection. You will need a “red or yellow” flashlight at night.
- Put bait as close as you can to the cockroaches. Make it easy for them! Bait detection zone is about 12”; apply small amounts of bait in many places.
- Use enough bait to feed the entire cockroach population. For example: A baiting program wasn’t “working”, and the PCO still saw cockroaches. But when he checked, the PCO found the bait was all gone. He didn’t use enough bait to feed/kill off all the population.
- Do a follow-up evaluation on any bait’s performance - 10 - 14 days.
- **Out of sight out of reach means out of trouble.**

Termite baits are just starting to be introduced and be used. As more people use them, that’s when you start seeing if they’re really going to work. Any termite bait station to be effective must be half in and half out of the ground. Virtually any diluted antibiotic will quickly kill a feeding colony of termites. As EPA and environmental concerns limit traditional termiticides, people will rely more on baits. Trying to get a feel for the colony is important for treatments, especially baits. Worker termites are the ones most treatments key on for bait treatments. Termites go back to the soil every 24 - 48 hours; that’s when baiting comes in, try to catch them when going back to the soil. **Placement is important.** Use ½% - 5% disodium octoborate tetrahydrate as the maximum amount of toxin in your (moist cardboard or cellulose insulation) baits, or use Flagyl® or goldenseal which also kills the protozoa and bacteria in their guts.

Baits containing artificial sweeteners/pain killers - You can kill rodents with beer or pop that has not lost its fizz or with aspartame, Tagamet and/or acetaminophen.

Baits using cellulose and other absorbent materials - can be used to hold diluted Safe Solutions, Inc. (2% - 4%) Tweetmint enzyme cleaners and (10%) sucrose water solutions for ant, roach, earwig, termite, wasp and fly control.

Baits containing yeast and sodium bicarbonate, e.g., NaHCO₃ or baking soda, when ingested by insects cause CO₂ to be released in the gut and the pests die.

You can make your own baits out of any food source your pest prefers, for example, boiled raisins, raw potatoes, bread and beer for the German cockroach (*Blattella germanica*), greasy ham skins and bacon for the red-legged ham beetle (*Necrobia rufipes*), cheap red wine for fruit flies (*Drosophila* sp.), soft moist cat food for mold mites (*Tyrophagus* sp.), grenadine or lemonade concentrate or beer or blue Hawaiian Punch® for yellowjackets, (*Vespula* sp.), dead cockroaches for silverfish (*Ctenolepisma* sp.) and old fish meal for hide beetles (*Dermestes maculatus*), or you can make a liquid bait out of non-chlorinated water (and 10% sucrose) using 5% or less (try 1%) boric acid or 3% or less (try ½%) sodium borate - keep out of the reach of children, pets and/or wildlife. Baits containing even 66% or more food-grade diatomaceous earth or aspartame as an active ingredient are still considered to be non-toxic to people. Add a little diluted Tagamet to your baits. Whatever bait you make, color it **green** and note on it clearly - **“Not for human consumption”**.

Baking Soda - Baking soda or sodium bicarbonate or bicarbonate of soda comes from the mined alkaline mineral, Trona, from Green River, WY. It helps prevent microbial growth, is a leavening agent, absorbs many odors and neutralizes acidity. It is registered with the EPA as an active ingredient against plant fungi, e.g., powdery mildew, and is known to inhibit the growth of yeast and bacteria. When ingested it neutralizes acid and releases carbon dioxide bubbles that can kill insects. Baking soda can be used as a fire extinguisher for small grease or electrical fires. It is an excellent toothpaste. A paste of baking soda will give immediate relief for insect bites or stings. (Diluted vinegar should be used for wasp stings.) It will tenderize meat in a few hours (sprinkle on meat, then rinse before cooking) and remove the fishy taste from fish in 30 minutes (soak fish in 2 tablespoons of baking soda in a quart of water). If you cook a little in baked beans you will eliminate gas problems later. Baking soda in water will stop steel wood pads from rusting. To destroy ant mounds outside, sprinkle baking soda on a damp mound (about 1 - 2 cups), wait 30 minutes or so and pour a cup of vinegar on the ant hill. The combination is deadly to ants. Put 1 rounded teaspoon of baking soda (sodium bicarbonate) and several drops of vegetable oil or horticulture oil in a quart of water - shake and spray every other day until all the signs of fungus are gone and the weather becomes drier - the mix will control powdery mildew, black spot and many fungus problems or try hydrated lime or try apple cider vinegar. To prevent the baking soda spray from being washed off and obtain thorough coverage add a drop or two of Safe Solutions Tweetmint Enzyme Cleaner with Peppermint.

Caution: Oils and/or soaps can burn some leaves. If foliage shows browning or burning, exclude those plants from further treatment. Try simply sprinkling the baking soda powder around your home, inside and outside and around pet dishes, as a safe way to control and/or repel ants, roaches, and other pests or make a bait of baking soda and powdered sugar bait to control ants, roaches, and other pests. Regular baking soda is a great, inexpensive deodorizer. Add a pinch or two of cinnamon or your favorite spice and sprinkle over the carpet and wait 60 minutes and then vacuum. Sprinkle it on pet messes and stains, even on concrete. Bathe your skunk-sprayed dog in a tub of hot water with 1 cup of lemon juice and 1 box of baking soda and ½ cup of shampoo. Put a tablespoon in your vacuum before you vacuum up pests to kill them inside the dry vacuum. You can also mop with baking soda to control ants temporarily. You can also safely wash your baby clothes in sodium bicarbonate. Baking soda (paste) is alkaline and will soothe the acidic sting of a bee. All flower species which thrive in alkaline soil produce wonderful flowers when watered with a weak baking soda solution. Tomato plants also like this treatment and it discourages pests. Sodium bicarbonate will kill (fire) ants that walk on it and are exposed to it. Baking soda also will kill slugs when they walk on it or are dusted with it. Lightly sprinkling baking soda will often repel rabbits from nibbling. Sprinkle it into cracks in the driveway and sidewalk so the sodium will kill unwanted grass and weeds or directly on to moss. Various dilutions for pest control include ½ cup baking soda, 1 teaspoon liquid dish soap or detergent in 1 quart water, 2 tablespoons baking soda per 1 gallon water and/or add 1 teaspoon of vegetable oil per 1 quart water to kill pests, e.g., spider mites, whiteflies and aphids. One of the best all-purpose mixes to control insect and fungal problems and diseases is to take 1½ tablespoons of baking soda, 1 tablespoon dish detergent (or Murphy's Oil Soap), 1 tablespoon canola oil in 1 gallon water; then add 1 tablespoon vinegar. Shake and spray once a week. Note: Water sprays can burn plants, on sunny days especially. Dip cut flowers into baking soda to extend their life. Put baking soda in baits to kill pests. Flush pet ears with a solution of baking soda and warm water to kill ear mites and help stop pet itching. Baking soda helps control mold. **See Vinegar. See also Chapter 41.**

Balance - Nature uses predators and/or parasites and/or diseases to keep everything in suitable balance so no one species becomes too plentiful. Everything on earth eats and is eaten.

Balls - See Tennis Balls.

Baltimore Orioles - One Baltimore Oriole will eat up to 17 tent caterpillars per minute when it finds a nest.

Banana Peels - Mulch them into the soil to strengthen plants, e.g., rose bushes and ward off aphids. A banana peel will also kill warts. Just rub it on the wart.

Banding Traps - Bands of sticky material, e.g., Tanglefoot, wrapped around tree trunks at a waist-high level are horizontal fly paper for many crawling pests, e.g., cankerworms, beetles, ants, climbing cutworms, caterpillars, etc.

Barbeque Bugs? Throw sage or rosemary on the coals to stop mosquitoes from bothering you.

Barley Straw - A bale of barley straw placed in well-aerated water will (if you float the bale) succumb suspected algae forms in 6 - 8 weeks as it rots in the sunlight. Filamentous or stringy algae (blanket weed) control may

take a lot longer than 6 -8 weeks and may even require another season. The presence of mud in the water will inactivate the important chemicals so remove the mud precipitants first; 6 barley straw bales will treat 1 surface acre of water. Well aerated water and rotting barley straw will produce traces of hydrogen peroxide. It is best to add the barley straw before the algae begins to row. **See Tadpoles.**

Barriers - Anything that will keep pests off and out of an area, e.g., door sweeps, fences, caulk, garlic, duct tape, double-sided tape, Vaseline, screens, doors, air curtains, chalk, ditches, moats, sound, lights, shields, covers, fragrances, chemicals, DE, repellents, temperature, microwaves, edging, essential oils, pepper, talcum powder, cinnamon, steel wool, sand, lime, copper, ashes, plants, cloves, corn gluten meal, glass, visquine, tapes, etc.

Basil - The essential oil of basil can repel mosquitoes and has insecticidal, antibacterial and fungicidal effects and may act as an antifeedant or repellent. Basil planted among tomato plants will control tomato worms. Try boiling shredded leaves in a covered container and separating the oils found in the water and on the lid. The oil is almost half linalool. Basil is a mild sedative, antiseptic and helps digestion. **See also Lemon Basil and Sweet Basil.**

Bathing - In 1491 Johann Pruss advocated regular bathing and changes of clothing to control body lice.

Bats - The little brown bat eats almost its weight each night in mosquitoes, moths, caddis flies, midges and/or beetles.

Bay Leaves - Add bay leaves to cereal, flour and sugar tins and shelves to help keep ants and grain moths and weevils away. Bay leaves, cloves and eucalyptus wrapped in sachets will repel flies if hung by open windows and doors.

Bazooka Bubble Gum - will deter weevils. Add some cloves and/or peppercorns for a “kicker”.

Beaaveria bassiana - is a common soil-borne fungus that occurs worldwide. It can be used to control butterflies, moths, spider mites, true bugs, beetles, whiteflies, aphids, leaf hoppers, ants, bees, wasps, etc. Fungal spores contact the pest directly (via sprays or mists) and penetrate the cuticle. The fungal spores then use the insect's body as a nutrient source. Mortality occurs from both desiccation and nutrient loss.

Bear Hops (*Humulus lupulus*) - Its powdered leaves are toxic to southern armyworms, melonworms and other insects.

Beaver - See the Author's beaver letter at <http://www.getipm.com/personal/dam.htm>.

Bee or Wasp Stings - Quickly scrape or flick off the stinger, then mix a little water with meat tenderizer (not Ac'cent, it's too spicy) to make a paste and apply it to the stung area. Papain, an enzyme in tenderizer breaks down the proteins that make up insect venom. An ice pack on the stung areas will keep down swelling and help prevent the venom from spreading. If tenderizer or ice isn't available, apply your own urine (gross as this may seem) to a cloth. It has natural antibodies that can neutralize the insect's venom. If you have trouble breathing, reoccurring pain, nausea, dizziness or swelling over a large area, seek emergency care immediately!

Bee Hives - will deter even the mighty elephant.

Beer - can be used to attract and kill slugs, snails, roaches and rats - you can add tobacco juice and spray the mix to kill insects, etc., but remember nicotine is still a deadly poison and should only be used with great caution. Take a one pound empty coffee can or empty milk jug and put 1 or 2 pieces of bread in the bottom of the can or jug and soak thoroughly with beer. Place in areas known to have roach infestations. Be prepared to view a can ¼ to ½ full of roaches the next day! Beer in wasp traps will suffocate them as it gives off CO₂. Budweiser beer also conditions the hair. If you find slugs and snails are taking a beer break and then leaving, mix a little flour into the beer to make a sticky mixture. **CAUTION: Tobacco can be deadly if ingested. See baits.**

Bees' Wax - is used as a pruning agent.

Behavior - Education and behavior changes can create/increase effective prevention, e.g., the risk of many

vector-borne diseases can be significantly reduced by modifying outdoor activity, housing, clothing and/or timing.

Beneficials - Beneficial insects are classified into three major groups: 1) **Predators** that attack, kill, and eat their prey and 2) **Parasites** which lay eggs in or on a host which later hatch and kill the host. 3) **Pathogens** are a third group of beneficial organisms e.g., bacteria, viruses, and/or fungi which invade the host and cause disease. Insects, nematodes, BT, milky spore, decollate snails, microbial fungicides, streptomycin bacteria, lacewings, predatory mites, lady bugs, praying mantis, earwigs, yellow jackets, and/or predator wasps, mealy bug destroyers, etc. The costs are varied and the types of beneficials extremely varied, e.g., the lacewing is not mobile at the time of application and must be applied directly to the infested area, while adult lady bugs can be released to find their own target pests, but lady bugs are captured and not raised and may be out of stock. There are many suppliers and, as with most trends, you can expect more to come on line. Many of the companies who supply beneficials also employ consultants. These consultants typically have a wealth of knowledge regarding specific traits and tendencies that each beneficial is capable of demonstrating. The 5 listed below are just a fraction of what is out there:

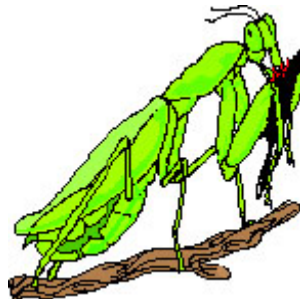
IPM LABORATORIES
Main Street
Locke, NY 13092-0300
1-315-497-3129
<http://www.ipmlabs.com>

ARBICO Environmental
P. O. Box 4247CRB
Tucson, AZ 85738
1-800-827-2847 (BUGS)
<http://www.arbico.com>

Kunafin
Rte. 1 - Box 39
Quemado, TX 7877
1-800-832-1113
<http://www.kunafin.com>

Rincon-Vitova Insectaries, Inc.
P. O. Box 1555
Ventura, CA 93002-1555
1-800-248-2847 (BUGS)
<http://www.rinconvitova.com>

Koppert Biological Systems, Inc.
28465 Beverly Rd.
Romulus, MI 48174
1-800-928-8827
<http://www.koppertonline.com>



Beneficials - Ladybugs, praying mantis, green lacewings, syrphid flies, trichogramma wasps

Advantages: Non-toxic to mammals or wildlife. If established, may provide control in subsequent pest generations or seasons.

Disadvantages: Variable results; careful handling required; some beneficials are very limited in the kind of insects they will eat; some pests must be allowed to remain in order to provide a food supply for the beneficials.

Better Way - There will always be a better way to do something.

Bilberry - A potent antioxidant and anti-inflammatory, the berry can help slow or prevent deterioration of the eyes. They can be eaten fresh or dried or as a liquid or powder. Blueberries work also.

Bergamot Oil - Repels dogs and cats

Big-eyed Bugs - One big-eyed bug can eat dozens of spider mites in one day. The adults and nymphs eat a wide variety of insect eggs, mites, aphids, chinch bugs and grasshoppers. Their eggs have a distinctive red spot shortly after being laid. The average size of a big-eyed bug is only 1/8".

Bioderivatives - are substances which are by-products of biological activity such as fermentation. See Enzyme Cleaners.

Biodiversity - Plant diversity will support and/or attract your allies, the birds, insects, nematodes and arachnids that will control your pest problems for free.

Biofuels - The rich burning the food of the poor.

Biological Control - or the aiding of the balance of nature. The first record ants were used in China's citrus groves in 300 A.D. to control caterpillar and beetle pests. The Chinese even constructed bamboo bridges to help the ants move from tree to tree. Biological Control or fighting nature with nature - has had some spectacular failures. Biologists estimate over 4,000 plants and 2,300 animals have invaded the U. S. from abroad, introduced by accident, or through good but misguided intentions. Alien species come by sea riding in cargo holds and in the ballast water that ships use to stabilize themselves, by air in shipments of fruit, plants, lumber and soil and they come overland by rail and/or car. A few come hidden and undeclared in suitcases, boxes and even in underwear. Their natural predators are normally "left behind" so there are few natural controls. A few dozen of the "meaner" ones have cost the U. S. economy an estimated \$97 billion from 1906 to 1991.

Take the cane toad for an example. Imported by Australia in the 1930's to oblige sugar cane growers - against the dire advice of a naturalist named Walter W. Froggatt - the poisonous cane toad was meant to get rid of a beetle that was devastating the sugar cane crops. However, herpetologist Walter Meshaka, Jr., supervisory curator at the Everglades Museum noted, "Beetles fly at night and were inaccessible to the toads." So the voracious toads ate everything else, having a field day in an under-exploited niche. Soon 102 "beneficial" toads turned into a trillion pests.

Remember the Indian mongoose, which Hawaii imported to eat rats that were overrunning their cane fields? Between 1883 and 1885, the mammals were brought in, leading not only to a small drop in the rat population but to the destruction of all ground-nesting native birds and poultry throughout the islands.

There is the tamarisk, a plant introduced by Western settlers in the 1800s. It has spread across the Western and Southern states, where it guzzles water so efficiently that it can dry up entire streams!

Then there was Kudzu. Although not technically a biocontrol agent, this Japanese plant was planted across the American South during the 1930's for erosion control. It now blankets whole landscapes, covers homes and is ruining native habitats. Or recall the arrival of tilapia, a fish meant to take care of hydrilla, a runaway exotic aquatic plant that clogs Florida waterways: The tilapia didn't make a major dent in the problem they were supposed to solve but they did manage to drive out native fish, especially large-mouth bass, the prime Florida freshwater sport fish.

Even so, biological controls such as predatory and parasitic insects, plant and insect diseases, viruses and/or microbes are gaining more importance as pest control methods for certain insects in structures and outside. For instance, parasitic *Steinernematid* nematodes are occasionally effective in controlling some species of termites and fleas and grubs. Cockroach populations have been successfully reduced in certain locations by introducing parasitic wasps.

Biological control of pests involves the use of one living organism to control another. For example, most arthropod pests have natural enemies or disease organisms that control or suppress them effectively under some conditions or in some situations. Occasionally insects or microorganisms contribute to the control of certain weeds. Over 20 million individual insects are released yearly to control insects or weeds naturally. More than 200 arthropod species are imported in the U. S. every year. Many microorganisms also provide natural control of pest birds and rodents. Sometimes biological control can be an important component of a Intelligent Pest Management® program by taking advantage of or conserving these helpful organisms. **When natural enemies or microorganisms are present, efforts can be made to protect them so they may increase in number and help safely control pests more effectively.** For example, lady bug beetles do better where there are dandelions.

One of the first references to natural pest control comes from J. C. London (1850) in his "Encyclopedia of Gardening (Book III, pg. 819) when he suggested a toad kept in a mushroom house will eat worms, ants and other insects,

but to most people the idea would be disgusting of a toad crawling over anything intended for the table.”

Large numbers of the beneficial organism may also be introduced into an area to control a pest. There are several commercial companies that specialize in producing beneficial organisms for pest control programs. There is a natural balance outside - leave it alone and you control pests naturally, without any “tools”, costs or dangers! **Remember, biological control of pests simply involves the use of one living organism to safely control another. Biological controls are sustainable and quite safe!**

Most arthropod pests have many natural enemies or disease organisms that can often be used to control or suppress them for free. About 1/3 of all insect species are carnivorous (they eat meat). Some species eat decaying meat and/or dung or plants, but most carnivorous insects hunt for their food. House centipedes, earwigs and spiders are predators of the pest insects and should be conserved and nurtured. They are called beneficial insects. In horticulture and agriculture, there are certain insect predators that may be introduced that will eradicate or reduce the population of a pest insect or weed to acceptable levels. These insects are often available commercially. There are many natural parasitoids and microorganisms that can be used to help control many pests. One of these products is milky spore (disease) which is deadly only to white grubs, e.g., June bug grubs and Japanese beetle grubs, with no ill effects on earthworms or bacteria. People and pests are also not effected adversely. Milky spore does need a year to build up killing levels in the soil. Once this level is reached, the spore will kill grubs for 20 years. A weevil from South America, *Neochetina eichhorniae*, helps to control the growth of water hyacinth, an aquatic weed that chokes waterways. A flea beetle from South America, *Agasicles hygrophila*, helps to contain alligatorweed, another invasive plant. A flea beetle from Italy, *Longitarsus jacobaeae*, the caterpillars of the cinnabar moth from France, *Tyria jacobaeae*, together suppress tansy ragwort, a plant that takes over U. S. pastureland and is poisonous to cattle. Dung beetles from South Africa help clear pastureland littered with cattle manure in Texas. Horn-faced bees from Japan help U. S. honey bees to pollinate apple orchards. A ladybug from Australia, *Rodolia cardinalis*, controls the cottony-cushion scale, a pest of U. S. citrus orchards. Note: You can still fertilize and use a fungicide on your lawn, but insecticides will kill this spore. If you use NutriGanics or organic fertilizers, they will provide your yard with nutrients and restore the microbial activity. We do not recommend you use “organic” fertilizers that contain human sewage, chlorine or use dangerous synthetic fungicides. You can also purchase gecko lizards, grasshopper semaspore baits, lady bugs, trichogramma and/or fly parasite wasps, lacewings, minnows, nematodes, Bt, praying mantis egg cases, traps or bait stations with the fungi -*Metarhizium anisopliae* (strain ESF1), owl and falcon decoys, etc. **When natural enemies or organisms are already present, try to protect and nourish them so they may increase in number and attack the pests more effectively, efficiently, safely, and more economically than any other control!** Professional pest control probably will not utilize biologicals much because they do not stay where they are released, but go elsewhere and do their thing for free. Caution: biological controls do not work quickly - often farmers will release biologicals, still see a few pests after a few weeks and then spray volatile synthetic pesticides and kill all their beneficials or “hired killers” in the process. Understand how they work before you use them. Remember, you have to leave some “pests” around if you want their natural enemies to stick around and safely help you keep the pests under control. Biologicals need to be registered only when they have been genetically altered. When the Author drove through the jungles of Costa Rica, no insects splattered on his car’s windshield; only here in the U.S.A. where we continually spray volatile, synthetic pesticide poisons do the insects splatter his car’s windshield.

Biology of the Pest Species - If you know this you can design the proper control(s).

Bio Path® bait stations from Eco-Science - are biological control agents because they contain living organisms (fungus) which virtually eat the roaches or termites.

Biopesticides - Natural materials that are used to control pests that are not synthetic chemical (poison) preparations, e.g., fungi, bacteria, viruses and enzymes. Mixed plant compounds lessen resistance and use the heightened control effects that synergism creates.

Bird Slopes - Anti-perching and anti-roosting devices. <http://www.birdgone.com>

Bird traps and netting (<http://www.birdx.com>) - will safely control birds without harming them or the environment. They are avisafes™.

Bird feeders - will attract more than birds; they can attract squirrels, rabbits, skunks, raccoons, opossums, deer and even bears into your back yard and into your buildings.

Birds - Encourage birds to stay with bird houses, bird baths, plants they like and/or bird feeders. Birds eat many insect pests. Birds are one of the leading predators of insects. For instance, more than a dozen species of birds are known to feed on codling moth larvae. Raptors or birds of prey remove pigeons and rodents away from your property. See Spiders.

Bitter - Bitter tasting and less fragrant plants are less likely to be eaten than those that contain any sweetness.

Black Indian Hemp (*Apocynum cannabinum*) - Extract of twigs and stems controls codling moth larvae.

Black (or Ultraviolet) Light - can be used to fluoresce scorpions and rodent urine. It can be used to attract flies, moths, cutworms, ladybugs and other beetles and other flying pests to a trap or into an area where you can vacuum them up or spray them with diluted enzyme cleaners or peppermint soap.

Black Locust, False Acacia (*Robinia pseudo-acacia*) - Beautiful ornamental loaded with white fragrant flowers. An excellent shade tree with acacia type foliage. The fragrant flowers can be smelled for hundreds of feet in the spring. The bruised foliage mixed with sugar will attract and kill flies.

Black Pepper - and other freshly ground peppers sprinkled around repel many mammals and ants - they are organic, "safe" and inexpensive. Mix in sweet milk to kill flies.

Black Plastic Bags - Put infested materials in a sealed black plastic bag out in the sun for 3 - 4 hours on a warm day for a really inexpensive heat treatment; nothing inside can survive the heat.

Black Strap Molasses - Dissolve 1 gallon in 50 gallons of water and spray plants and trees; sparrows and the other birds love to eat "sweetened bugs".

Black Walnut (*Juglans nigra*) - The odor of the leaves repels insects. The bark is toxic to mosquitoes.

Blazing Star (*Spicata*) - A beautiful plant often raised for its ornamental appeal. Has rosy purple spikes of flowers up to 15" long. The dried roots of the plant have a soft vanilla smell and will repel moths when placed among clothes. A hardy perennial that is easy to grow from seeds reaching 3'- 6' tall.

Bleach - Kill weeds and grass growing in sidewalk cracks by dousing with undiluted bleach. Use bleach to help break down organophosphate pesticides. Bleach also kills many pests and bacteria. **Be careful...many people react to chlorine bleach negatively and never mix this product with ammonia.**

On January 22, 2007: EPA Okays "Cause Marketing" Labels for Pesticides and Poisons—Precedent Entangles EPA in Promotional Campaigns at Risk of Consumer Confusion

WASHINGTON—The U.S. Environmental Protection Agency has approved display of promotions for causes or charities on labels of pesticides, disinfectants and other commercial poisons, according to agency documents released today by Public Employees for Environmental Responsibility (PEER). As a result, these products may now feature tie-ins with charitable organizations and marketing slogans on their labels which are otherwise supposed to be devoted primarily to consumer safety and usage information.

The policy change came in response to a request from the Clorox Company to advertise a pledge that it will donate a small percentage of the retail purchase price of its bleach products to the Red Cross. EPA dropped earlier objections following a meeting in July between top agency and corporate officials, according to an EPA briefing provided in early December to state pesticide agency officials.

At Clorox's urging, EPA will allow placement of the phrases "Dedicated to a healthier world" and "Help Clorox raise \$1M for the Red Cross", as well as the use of the Red Cross logo on both the front and back panels, on five Clorox products.

“Thanks to EPA, even the most dangerous chemical can now wrap itself in a cloak of wholesomeness, featuring claims that it helps the planet, benefits sick children or even saves the whales,” stated PEER Executive Director Jeff Ruch, noting that the new agency cause marketing option will be open to every manufacturer of regulated products. “EPA is squandering its limited regulatory resources to referee promotional slogans rather than protecting consumer health.” http://www.peer.org/news/news_id.php?row_id=808

Blood Meal - repels many herbivores, e.g., deer, mice, squirrels, rabbits, etc. and is an excellent nitrogen fertilizer. Mix it in vegetable oil so that it lasts longer.

Blueberries - An extremely good way to get some antioxidant power and boost your immunity. See Bilberry.

Boiling Water - will kill ant colonies, bacteria, weeds and many pests without endangering the environment - **be careful** not to spill on yourself or anyone else. You can also carefully use steam. **Be careful not to burn yourself of any beneficiaries!**

Bon Ami® - contains calcium carbonate. See Calcium Carbonate.

Bone Meal - Border gardens or your home with steamed bone meal to keep out ants and it is a source of phosphorus.

Borage - This 18-inch — 3-foot tall blue and pink annual is a self-sower that repels tomato hornworm and attracts bees to your garden. The leaves can be used for coughs and poultices.

Borates - See sodium borates. Insect and fungal pests do not have kidneys to secrete borates.

Borax, or sodium tetraborate decahydrate or hydrated sodium borate is an organic salt - and is a combination of sodium, boron and oxygen, and is mined from the soil in its crude form. Borax has been used as a cleanser and as a shampoo for over 100 years. It does not lather, but it will remove sweat and oil. It is anti-bacterial and anti-fungal. Boric acid is a crystalline material derived from borax. Caution: Remember, boric acid acts as a stomach poison when ingested. While 20 Mule Team Borax® is extremely effective in controlling or eliminating mold, odors, ants, termites, weeds, lice, medflies, fleas, spiders, roaches, etc., the Dial Corporation notes, “This product has not been tested nor received approval from the EPA for use as a pesticide.” Even so if you mop or spray the floors, voids, sill boxes, tunnels, backs of furniture, appliances and other areas where you see insect pests - you will be surprised on how great the material controls pests. It has been used for years to make cellulose insulation insect free and fire retardant. It also is great for removing odors in urinals, etc. - so mop to remove odors and to help clean - in doing so you will also control pests “accidentally”. In their 1920 - 1928 Burroughs Welcome & Co. (USA) Inc. catalogue they note borax (*Sodii borax*) is an antiseptic, used for lotions, mouth-washes, and gargles. Also given internally for epilepsy. Note: Chroma Trim Gum® includes 200 mcg of boron (as sodium borate) as a “food supplement”. We have used it as a bait toxin in anything the pest eats. Dilute it to 1% - 5% or less. We have also seen people control scabies by bathing in it. It is the reason that Death Valley will always be death valley. Putting exactly 5 teaspoons of borax in a quart of water for every 25 square feet of lawn and then spraying in late spring or early summer will kill Creeping Charlie. It may also cause yellowing of nearby grass. If you make it too strong, you will kill the lawn. Mix 1 cup borax and ¼ cup black pepper in a bowl; finely dice ¼ cup bay leaves and then stir them into the bowl. Sprinkle a small amount into corners of cupboards and pantry shelves to kill/repel roaches and other kitchen pests. Be careful not to contaminate food or dishes. May cause stains and rust. Borax is insoluble in acids, soluble in glycerol, and slightly soluble in alcohol. **See Caution in Chapter 36.**

Boric Acid, a/k/a boracic acid, borofax and orthoboric acid - Boric acid and its salts have been used as an insecticide, herbicide and fungicide for over a hundred years, and in folk remedies for more than 1000 years. Boric acid baits have been used since the late 1800s. Boric acid has been used in medicine since the time of Lister in the 1800s. It was first used to protect wood in the U. S. in the 1920s against blue stain fungi. The fire retardant properties of boric acid were discovered in the 1930's. Celcure® was patented in 1933 to prevent wood fungi decay. These substances are various forms of boron which also routinely is found normally circulating at low levels in our blood streams. Boric acid and other insecticidal dusts are inorganic pesticides that have other uses besides their insect killing power. For example, boric acid is a wonderful pesticide as a 99.95% pure dust formulation, but in a 1% - 5% water solution, it is commonly used as an eyewash. Most dust formulations have

an abrasive action on the insect which removes the waxy coating on the exterior of the insect's body. The waxy coating is used to retain water and without it the insect quickly dies from dehydration. When mixed in baits it controls houseflies by sterilizing female flies and/or kills adult flies that eat the bait.

Common boric acid powder, e.g., for use against cockroaches, is ground to a very small particle size and combined with an anti-caking agent. The most effective formulations exhibit an electrostatic charge that makes the powder adhere more readily to insects and surfaces. **If swallowed or otherwise ingested boric acid can be harmful. When inhaled, boric acid powder can irritate the nose, throat and lungs; it can also be absorbed through skin lesions and burns.** You should wear a dust mask, gloves and eye protection when applying it. Keep boric acid in its original container and store in a safe place. Boric acid is virtually vaporless. Although slower acting initially, boric acid is certain to work. If you can keep the boric acid dry, a single application will continue working for years. **Boric acid is most commonly sold as a dust or powder**, but it can also be bought as an aerosol spray, as a paste, in small plastic discs or baits, in tablets that can be glued to walls or placed in hard-to-reach areas, as a water soluble product for washing floors and walls and as a wood preservative. To make boric acid easier to apply, particularly in crevices and other hard-to-reach places, use a power duster or if you have to, use an aerosol formulation which normally contains 20% boric acid, a CO₂ propellant, and carrier and a silica-aerogel stabilizer or better still avoid the 1, 1, 1 - trichloroethane and use a power duster that imparts an electrostatic charge or make up a (peanut butter) bait and fill the crevices with it. **Boric acid is a registered pesticide.**

Boric acid is considered a dual action (non-volatile) insecticide poison. It will cause desiccation, similar to the other materials mentioned, as well as being a stomach poison. The insect ingests the material while grooming and subsequently dies. Boric acid will remain effective indefinitely in a dry environment. **Preferably, removal and reapplication of the material should be conducted every other year. Boric acid is thought to kill insects by inhibiting their various enzyme systems.** Roaches exhibit erratic behavior, consistent with nervous system poisoning. Borate compounds kill termites and wood-boring beetles through starvation, possibly by affecting their digestive enzymes and protozoa. **Applying too much powder/dust causes roaches and other target insects to avoid treated areas and can harm you.**

We like to first try baits with only ½% - 3% (or less) boric acid, then increase the percentage of toxin only as a last resort. One of the best (carpenter) ant baits is made with 7 tablespoons of sugar and 3 tablespoons of boric acid in a quart of boiling water - then put the cooled, very strong solution in cotton stoppered vials. Dry insecticide formulations generally contain a desiccant to prevent it from absorbing moisture, as caked powder adheres poorly to roaches. Boric acid is more effective than borax for roaches and roaches seem to have a higher tolerance for higher levels of boric acid in their baits. Boric acid derivatives, e.g., the sulfate-activated sodium polyborate, are now being used to control flea larvae in carpets. Boric acid may be added to any bait the pest species you are dealing with eats - you can mix it in ground hamburger for wasps, peanut butter for ants and roaches, syrup/sugar water/mint jelly or honey for ants, and cornmeal etc., but be sure only the pest has access to these types of baits that are also attractive to people and pets. Boric acid and borates do not cause mutations, cancer, birth defects or allergies, but can be very acutely toxic to humans, pets and/or wildlife, or lower sperm counts if eaten or drunk, and humans who are frequently exposed to large amounts of the dust form should wear respiratory protection to avoid possible adverse effects when used as baits or correctly applied as powders, building occupants normally should not have any exposure to boric acid which does not volatilize. **Do not use medical-grade boric acid for pest control.** Remember the "less is more rule" - baits should not contain more than 5% boric acid. Bait with toxin in it should be labeled and colored with red or green food color to alert people not to eat it. When vacuumed, only particles greater than 10 microns in size are trapped in the bag; the smaller particles float until you breathe them or until they fall. A 1-micron particle takes 2-3/4 hours to fall 1 foot; if the particle is 0.1 micron; it takes 1-1/2 days to fall one foot. **See Caution in Chapter 36.**

Boron - Boron is probably best known for the compounds borax and boric acid. Borax and hot water have long served as a mild antiseptic and fungicide to clean and disinfect surfaces, and boric acid is commonly used as an eyewash. The Scientific Committee for Cosmetic Products and Non-Food Products Intended for Consumers does not advocate the use of boric acid, borates and tetraborates for use on children under 3 years of age, or unhealthy or damaged skin and advises to avoid ingestion and to rinse thoroughly. **A powdered sugar and borax bait was used against cockroaches as early as 1882 in New York City.** These compounds have also been used as antiseptics, and to protect fruit from molds. Boric acid acts as a stomach and contact poison. When insects walk through the powder, some of it sticks to their bodies. By grooming themselves they ingest

this slow-acting poison which can take up to 10 days to kill them. Boric acid is very lethal to roaches; 20 ug (one ug = one million part of a gram) can kill a 50 mg German roach. Boric acid can stay effective indefinitely. **Do not contaminate food, dishes, toys, or water supplies with this toxin - it can kill people and pets.**

Boron use risky (News-Press, Thursday, March 26, 1992, pg. 21A) ...In a November 1982 article in "Pest Control Technology," Dr. (M.S.) Quraishi cites a number of cases of children dying from boric acid poisoning. C. Brooke and T. Boggs wrote in "the American Journal of Child Diseases," (82:465, 1951), that "boric acid and sodium borate are sufficiently poisonous to cause severe symptoms and death when used in amounts commonly considered to be perfectly harmless." Boron and its compounds should not be touted as safe. George R. Campbell, Fort Meyers. See Caution in Chapters 16 and 36.

Botanical Insecticides - Rotenone, pyrethrum, sabadilla, ryania, neem

Advantages: Rapid breakdown, rapid action, low toxicity to mammals and plants.

Disadvantages: Rapid breakdown requiring more precise timing and/or more frequent application; cost and availability; lack of test data; lack of state registration of some materials

Botanical Pesticides - **Just because a pesticide is derived from a plant does not mean that it is safe** for humans, e.g., the botanical insecticide nicotine is a very poisonous compound that impedes normal neuro-muscular functioning, causing insects and humans to convulse and die. Ryanodine, is 20 times more toxic to mammals than to most insects. Strychnine, a botanical widely used against gophers and birds, is very dangerous if ingested. Regardless of how poisonous they are initially, botanicals tend to break down into harmless compounds within hours or days in the presence of sunlight. In 1200 B.C.E. botanical insecticides were being used for seed treatments and fungicides in China. Also at this time, the Chinese were using arsenical compounds and/or mercury to control lice. **Just because something grows or is natural does not make it safe - see the Blood Feeders Overview and Natural Plant Caution in the Flea chapter. Some aromatics are quite hepatotoxic.**

Botanicals - virtually a whole new field; some edible plants repel pests others can kill pests - more and more botanicals will be planted and used commercially as time goes on - including neem, peas and Persian lilac.

Bottle - Bury a beer bottle (2/3 empty) in the ground with the neck just slightly exposed - slugs will fall in and drown. Bury it halfway in the ground with the top up - as the wind blows over the top the sound may cause gophers to leave or be repelled by the vibrations. Use ketchup or mustard (plastic) bottles to "shoot" diluted enzyme cleaners into nests, voids, cracks, crevices, etc.

Bounce - Bounce or other fabric softener sheets for the dryer can be used to repel mosquitoes and flies: Tie them to your horse's halter or your belt or outside your doors. **Caution: They make some people ill.**

Boxes - The June 2001 issue of Pest Control magazine noted: Large pizza boxes having one- to one-and-a-half-inch diameter holes cut into opposite edges can be fitted with super-size, paper-backed sticky traps and placed along walls near where the snake was sighted. In cool environments these box traps can be made even more attractive to snakes by covering each with an electric heating pad, hot water bottle, or a layer of exothermic pocket warmer packs (available at sporting goods stores during football season). Conversely, a pile of damp towels on a basement or garage floor will entice a heat-stressed snake to seek relief within (them). Snakes can be released from sticky traps by adding a little mineral oil or vegetable oil to the adhesive and snake. Within minutes, a healthy snake will wriggle free and slither off.

A snake that has wedged itself into a tight place can be motivated to move out into the open by directing an uncomfortably hot air flow toward it from a portable electric hair dryer or tile softener..

Braconid wasps - Tiny (1/10" - 1/2") brown or black wasps that often resemble flying ants. Depending on the species, braconid hosts include cabbage worms, tomato hornworms, army worms, gypsy moths and other insect pupae and adults.

Brakish Water - is detrimental to weeds, so use it whenever you have tolerant grass like Paspalum.

Brassicacs - some of which are called "cole crops" including kale, broccoli, cabbage, brussel sprouts, cauliflower, turnips, rutabagas, etc. - fresh residues produce sulficides that stop fungal growth and thiocynates that kill

pathogens - volatiles produced during composition of this “green manure” kill detrimental microorganisms - when teamed with soil sterilization they prevent weed growth for months.

Brussel sprouts contain a large amount of vitamin K. People with liver problems are often deficient in this vitamin. Vitamin K is essential for the presentation of internal bleeding and hemorrhages. Vitamin K will reduce excessive menstrual flow in women and is involved in the energy producing activities of the tissues, particularly those of the nervous system.

Buffalo Gourd (*Cucurbita foetidissima*) - The powdered root is somewhat toxic to cucumber beetles

Bug and Bird Barrier - Allows ventilation and excludes birds and bugs. <http://www.gatewayindustrial.com>

Bug Juice Cocktail - Blend ½ cup aphids or 1 cup infested leaves and 2 cups water strain and spray. If you see a handful or two of your garden’s cabbage loopers are chalky white and weak - they are infected with nuclear polyhedrosis virus (NPV) - put loopers in blender with water, strain and spray over crops. The remaining pests will die in several days - try a mixture of bugs, strain, and spray. Collect ½ cup of any specific pest and mash well. Mix with 2 cups water, and strain. Mix ¼ cup of this bug juice and a few drops of soap with 2 cups of water, and spray. Don’t make yourself sick, too! Use nonfood utensils and wear plastic gloves. “*Betelgeuse...Betelgeuse...Betelgeuse!*”

Bug Zapper - I don’t generally recommend electric bug zappers. A study done by the University of Delaware at Newark analyzed 13,789 insects zapped by electric traps and found that only 31 less than ¼ of 1% - were pests or biting bugs “seeking blood meals at the expense of homeowners or their pests”. You can change the light source to attract Asian or wood roaches to the zapper. Beneficial insects are destroyed by these zappers and we need them - insects can be described as the “glue” that holds the ecosystem together. **When you kill a beneficial, you inherit its work.**

Butterfly net - Virtually every stinging insect (wasp, hornet, etc.) you see in the spring is a queen. Everyone you catch (and kill) in a butterfly net or trap wipes out an entire nest. One spring yellowjacket represents 3,000 to 5,000 potential stinging insects in the summer, so get them early. The use of a butterfly net can eliminate many (potential) individual flying uninvited guests.

Buttermilk - Mix ½ cup of buttermilk, 3½ cups of wheat flour and 5 gallons of water to control virtually all mites.

“**Buzz Cuts**” - Probably the quickest and safest way to remove head lice and nits.

Cabbage - White cabbage leaves contain rapine, an antibiotic active against some fungi.

Cabbage Leaves - An inverted cabbage leaf makes a good trap for snails and slugs.

Caffeine - can relieve headaches and asthma symptoms and is a diuretic and is useful in treating attention deficit disorder and hyperactivity and helps burn fat. Caffeine is one of the chemicals called xanthines which stimulate the central nervous system creating feelings of restlessness and nervousness. Caffeine is excreted in urine as methylxanthine and methyluric acid as a product of metabolizing caffeine. Caffeine has several effects on the cardiovascular system. With diuretics you actually lose more fluids than you gain. Caffeine can, therefore, be useful in pest control by helping to desiccate/dehydrate and/or over-stimulate the pests. Caffeine will kill snails and slugs and tadpoles and frogs. Water-soluble caffeine penetrates the mucous membrane. **See Coffee.**

Cages and Mechanical Barriers - can be used to safely exclude virtually every pest imaginable. The Author has even seen photographers in shark cages and polar bear cages safely filming these dangerous man-eaters.

Calcium Carbonate - Finely ground limestone or calcium carbonate controls/kills insects because it has wonderful desiccant properties; it produces a different kind of insect mortality when it is formulated as a pottery glaze. It occurs naturally in shells, bones, etc. and is chiefly used as an antacid in its natural form for people and animals; also called precipitated chalk. You can finely grind materials in a coffee or pepper grinder even in the field. **See Bon Ami®, Comet® and chalk.**

Calcium Hydroxide - can be used as a fungicide.

Calcium Sulfate - Plaster of Paris is also a wonderful desiccant dust/caulk. Mix with oatmeal for a bait.

Calendula Ointment - is an excellent insect repellent and counterirritant. The ointment contains the dried florets of the common garden or pot marigold (*Calendula officinalis*).

California Buckeye (*Aesculus californica*) - **CAUTION: Flour made with the meat hulls of nuts is toxic to larvae and adults of the Mexican bean beetle; parts of plant are toxic to humans.**

Camphor Oil - is toxic to clothes moths and will repel some pests.

Canadian Fleabane or Horseweed (*Erigeron canadensis*) - Can be ground up to make melonworm and/or Japanese beetle repellent.

Candles - mosquitoes and fleas are drawn to the carbon dioxide or light, mosquitoes can be killed by the flame and fleas can be killed by the flame, soapy water or glue boards. Citronella candles and/or oil repel mosquitoes.

Canola Oil - Originally called rape seed oil. When used in a water emulsion, it can be used as a dormant and growing season spray to kill all stages of mites and insects, including their eggs. It will attract grasshoppers, so use it as a bait. When heated to high temperatures, canola becomes a transfat. **See Rape Seed Oil.**

Cans - Garbage cans, coffee cans, pails and many other containers can be used to trap a wide variety of animals and/or insects.

Canvas or a Sheet - Spread it under stone fruit trees, e.g., cherries and plums. Pound the trunk of the tree if you have plum curculio beetles; they will fall on the canvas and "play dead" until you can safely dispose of those that fell! This trick also works on the pecan weevil.

Capsaicin - Hot peppers are loaded with capsaicin which gives a fiery chemical burn to mammals and kills some soft-bodied insects and repels many creatures. Capsaicin can be applied topically to treat diabetic neuropathy, psoriasis, muscle pain, fibromyalgia, nerve pain after shingles and arthritis pain.

Capsaicinoids - or the oleoresins of capsaicin, the fiery active ingredients of hot peppers, will repel many insects and/or mammals.

Capsicum and Castor Oil - Diluted 1% or less capsicum pepper, 5% castor oil in 94% vegetable oil can be sprayed to repel mammals, e.g., rabbits and squirrels. Capsaicin $C_{18}H_{27}NO_3$ present in capsicum is a very bitter compound.

Carbamates, e.g., $NaHCO_3$ (baking powder) and yeasts when ingested by insects cause CO_2 to be released in the gut and they die.

Carbon Dioxide (CO_2) - will attract ticks, houseflies, mosquitoes, termites, etc. and can also be used as a fumigant in the ground and in traps where it literally "takes their breath away" in seconds. The ants or animals quickly go to sleep and then painlessly die of asphyxiation. It can also be used to safely fumigate pests in stored food/commodities and/or to kill bagged and sealed creatures, e.g., roaches in food carts, in an environmentally safe fashion without the use of any poison. When CO_2 is placed in traps, tunnels/runways, mounds, etc., it will quickly kill all living creatures in those underground areas because it is one and a half times heavier than air. As the CO_2 moves downward throughout the tunnels, mounds, runways, etc. it also pours into all connecting mounds or tunnels or nests very effectively, very quickly and very safely. Without giving any warning or odor, it replaces the air, killing the occupants, whether insect or animal, and then slowly dissipates back into the atmosphere to be used by the plants. CO_2 can be used virtually anywhere and is non-toxic to lawns and plants and its pest control results are immediate. The Author believes it is possible to fumigate homes with CO_2 by tenting them and "pouring" carbon dioxide in from the top, allowing the regular air to exit from a "chimney"; test the escaping air and once you find enough CO_2 , stop "pouring". This should be used in combination with sodium borate for residual control. Carbon dioxide could/should replace volatile fumigant poisons in homes and buildings,

ground, grain and stored product applications. It can be purchased as dry ice, in pressurized containers or in fire extinguishers. When you use a CO₂ container, 12' of hose and pipe you can put a large Tupperware bowl over the nest upside down and inject CO₂ through a 1" hole you can drill on the top or simply inject the gas into the tunnels and/or holes. **6% carbon dioxide can destroy your kidneys! The air normally contains .03% carbon dioxide. Carbon Dioxide Caution:** <http://wasg.iinet.net.au/Co2paper.html>

Carbon dioxide fire extinguishers - can be used to freeze pests, e.g., an entire hornet or wasp nest, which can then be safely removed and placed inside double plastic bags, frozen for several days or buried. You can also *freeze* other insects, e.g., roaches. **Carbon dioxide fumigation** has been widely used to treat stored grain. Grain bins and other structures have also been routinely treated with carbon dioxide to eradicate insect infestations. We believe the insect opens up its breathing apparatus when exposed to high levels of CO₂ and then suffocates from the lack of oxygen. Concerns have been raised regarding the production of carbonic acid from the CO₂ and the water in the chamber and its subsequent danger.

Carbon dioxide attractants - CO₂ can also be used to trap and/or attract termites, mosquitoes and ticks and fleas. Use dry ice or carbon dioxide cylinders to fumigate burrows and carpet pests, ant/wasp nests, etc.

Carbon monoxide - also is heavier than air and can be used to fumigate burrows or individual pests you can not safely or legally release. Use lit charcoal briquets and place them in the tunnels and/or openings.

Cardamom - contains an oil rich in healing chemicals called terpenes. Chewing on the seeds is said to ease indigestion while sweetening the breath.

Cardboard - You can trap roaches, earwigs, termites and other pests in cardboard, e.g., reduce codling moth infestations and stop cut worms by installing a collar of corrugated cardboard around the trunk. Remove the collar periodically, burn it and then replace it with a new collar. When you remove cardboard from a building you generally reduce roach populations. It is the ideal termite bait with its "preformed mud tubes." Rolled virgin cardboard has been used for over 20 years to control subterranean termite infestations. You can lay cardboard down on pathways or between raised beds and then cover the cardboard with wood chips. The cardboard will smother the weeds and slowly deteriorates over the summer gardening season. You can even cover a (raised) bed with cardboard and cover the cardboard with leaves, grass clippings, straw, cocoa mulch, etc. After mulching in early spring, wait 2 weeks (when the danger of frost is over) and then cut a hole in the cardboard with a trowel wherever you want to place a plant; then push the mulch close to but not touching the plant stem. The few weeds that manage to poke through your holes are easy to pull by hand. By next year the cardboard will have decomposed, but you should now have another season of basically weed-free gardening.

Cartenoids - are a class of antioxidants that produce the red, orange, yellow and green colors of vegetables and fruits. They include lutein, lycopene, beta-carotene and zeaxanthin, all of which have been found to have a number of health benefits.

Cashmere Goats - love to eat noxious (non-native) weeds like Canada thistle, knapweed, leafy spurge and Russian olive. As a rule of thumb, 100 goats eat the noxious weeds on one acre of land per day. Herbicide poisons may kill noxious weeds, but they also kill native plants, deplete wildlife, contaminate and are health hazards. Cashmere goats prefer noxious weeds to native grasses.

Castor Bean Plants, *Ricinus communis* - native to tropical Africa, effectively reduce soil nematode populations, but the seeds and the entire plant are toxic.

Castor Oil - will repel chipmunks, gophers, squirrels, rodents, moles, armadillos, pocket gophers and other burrowing/tunneling animals when sprayed in their tunnels and/or on lawns in spring, summer and fall at a rate of 1 quart 100% castor oil USP per 5,000 square feet mixed in water. The castor oil covers their food and disrupts the animal's digestive system. Chiggers drown in castor oil. Degummed castor oil is a penetrating solvent that immediately penetrates rusted and gummed-up parts, insects and arachnids. If you have chigger bites, shower and rub pure castor oil on your infected skin. You can also rub the bites with a moist aspirin tablet.

Castor Oil/Mineral Oil Mix - Castor beans have been used medically at least since the first century A.D. Mix 3 parts castor oil with 1 part mineral oil. Fill an eye dropper and put 1 - 2 drops of this mix on the top of an ear of

corn (when the silk is just about to come out) to prevent egg-laying/hatching of corn earworms. When the corn starts to make silk, put 2- 3 drops inside the silk on each ear of corn. Do this at least 3 - 4 times per season.

Castor Oil/Mole Formula - In your blender, whip 3 oz. of castor oil and 3 tablespoons liquid detergent. Blend till frothy. Add 8 tablespoons of water and blend again till frothy. Using a 15 gal. Ortho hose-end sprayer, put 15 tablespoons of castor oil mix in jar. Fill remainder of jar with water. Attach sprayer to your hose and spray castor oil solution to the entire lawn and garden area. Apply while walking at a slow pace. After you've finished spraying, set up your lawn sprinkler and water the solution into the soil (about 20 min. to an area). Repeat when you observe new mole activity. One to two applications per year are average. Spring is the best time to apply as the ground is usually soft.

Cat Litter - Well used cat litter will repel woodchucks and moles. Fresh cat litter sprinkled at the bottom of garbage containers will keep them smelling fresh - change weekly or when damp. Take well used (dark) cat litter and put in water, strain and spray the stinky solution to repel Canadian geese and other herbivores.

Catnip - is a perennial herb (*Nepeta cataria*) that grows 2' tall and it can be used to repel/control many insect problems. Catnip oil contains at least 23 compounds, but commercially-available cat nip oil can be 80% - 90% nepetalactone. Catnip oil is probably a CNS depressant. Catnip is an antifeedant for many vertebrates, including deer, rabbits and squirrels. Catnip's active ingredient, nepetalactone, is an aphid pheromone that can be used to trap aphids. Catnip interplanted with collards reduced the flea beetle infestations. Brew some as a tea: Fill a jar with leaves and then add water and leave it out in the sun for 3 - 4 hours. Repels roaches, ants, mosquitoes and many pests, including the Colorado potato beetle, but it still will attract cats. Nepetalactone, the active ingredient, found in catnip oil repels roaches 100 times better than poisons. Catnip oil will repel/kill termites until it breaks down. Catnip makes a soothing tea for stress or sleeplessness. Use the flowering tops for colds and/or bronchitis. There are more than 250 species of catmint genus *Nepeta*. Not all contain nepetalactone; some that do are *Nepeta cataris*, *N. mussinii*, *N. nepetella* and *N. citridora*.

Cats - A good "mouser" will control mice and rats by patiently hunting them down. The Author's old cat, Charlie Bow Tie, kept his farm rodent free.

Catawba Grapes - attract Japanese beetles and are used in vineyards to protect other grape varieties. Note: In the 1930s, in one study alone, 56 plant species showed good repellent qualities to use against Japanese beetles.

Caulk - Seal all visible cracks, crevices, voids, and other openings (that you can insert a business card into) to prevent and/or control many pest problems. **See Silicone Caulk.**

Cayenne - If you cut your finger with a paring knife, try sprinkling powdered cayenne pepper on the wound. It will help your blood to clot and it won't burn, as you might imagine. Cayenne contains a pain-relieving chemical called capsaicin, which appears to work by interfering with the action of Substance P, a chemical in the peripheral nerves that sends pain messages to the brain. Powdered cayenne repels most mammals and a liquid formulation can be used as an alternative insecticide to destroy mosquito larvae; as an alternative molluscicide to control zebra mussels and as an alternative fungicide to control mildew. Cayenne peppers also contain a particular saponin that breaches fungal cell membranes, creating little tears or holes that destroy fungal pathogens that adversely affect strawberries, blueberries and other small fruits. The chili pepper has been used to treat stomach aches, cramping and gas. It helps burn fat and reduce appetite and will often normalize blood pressure and oxygenate blood. **See Capsicin.** Please read Chapter 41 for other health information. Cayenne pepper can also be used to repel ants and squirrels.

Cedar - A solar tea made from cedar sawdust or chips will repel squash bugs, bean, potato and cucumber beetles, red spider mites, mealybugs, etc., or simply work the sawdust or chips into the soil. Sifted cedar sawdust will control chiggers in lawns and will often act as a barrier to many crawling insects. Aromatic cedar mulch can repel ants and other pests.

Cedar Oil - Red cedar oil has been used as a fragrance carrier; it will repel insects and spiders.

Cedarwood and Cedarwood Oil - Anti-fungal, anti-infectious, antiseptic, astringent, diuretic, calming effect, etc.; repels larvae of clothes moths and carpet beetles. Sifted cedar sawdust will control chiggers in lawns. Cedar oil

repels many insects, including flies, mosquitoes, fleas, beetles, mites, ticks, moths, ants, roaches, spiders, stinging insects, silverfish, stink bugs, etc., but avoid contact with the eyes; **too strong a mix will kill plants**. The way to apply a cedar oil barrier is to add enough dish soap to make the water cloudy and then add some cedar oil.

Celery Seed - With nearly two dozen anti-inflammatory compounds, it helps ward off gout and alleviates arthritis pain.

Cellulose - 90% ground up newspaper or sawdust, 10% molasses and just a touch of corn oil will quickly kill all rodents - you can pelletize this bait or compress it in bees wax (or paraffin) so it can be used in moist or damp areas like sewers. Treat it with sodium borate 5% or less and spray it on the ground, e.g., in crawls to kill termites. Walnut sawdust will kill horses - so don't use it on stall floors.

Cement - can be used to patch openings or mixed in with corn meal 50/50 to kill mice; hydraulic cement works best. **CAUTION: Do not let children, pets or animals eat this mix.**

Chalk, talcum powder, baking soda and medicated powders - all control or repel ants quickly and many other insect pests - add these (or any dust) to your dry vac, or simply draw a line or sprinkle them around where you have pests. Chalk is calcium carbonate; Tums® and Comet® also contain calcium carbonate.

Chamomile Spray - will help prevent mildew and damping-off fungus on seedlings. Mix 1 cup of dried chamomile flowers in 1 quart of boiling water. Allow the mixture to steep and cool for about 1 hour; then strain and spray on a daily basis.

Chamomile Tea - Splashed on all uncovered skin repels mosquitoes. The sweet apple smell also repels gnats and summer flies. Effective (when drunk) in the treatment of worms. Do not use if you are allergic to ragweed.

Change the Conditions Conducive to Infestation - and you will safely and effectively solve most disease and/or pest problems.

Changing Perceptions - Reduce the weeding problem by changing your idea of what is a weed. Many people like the look of English daisies, Indian paint brushes, chicory, or even the *common* dandelions and these *weeds* do attract beneficial insects to the garden. Weeds with deep roots break up compacted soil and bring nutrients to the surface. White Dutch clover, in particular, should not be considered a weed because it is of long-term benefit to turf. **Not every insect, plant or animal is "bad" or a "pest." Learn to appreciate all life.**

Charcoal - Activated charcoal filters can remove dust mite and cockroach allergens and/or odors and clean chemicals out of the air when you put one on both sides of a running window fan.

Charcoal Briquettes - Lit briquettes create carbon monoxide and when placed in tunnels - carbon monoxide is heavier than air - and all living things die that breathe this gas. Be careful if you try this control and check regarding any ordinances that would prohibit it's use.

Cheesecloth - Cover plants with cheesecloth to prevent insect pests from feeding or laying their eggs on plants.

Chemical Coding - When you alter this, ants will kill each other.

Chemical Pest "Control" - We do not recommend its use. Chemical pest "control" has been in vogue since World War II. In fact, since then pest "control" has been almost totally chemical. These poisons have killed our allies, the beneficial insects, and created even more pest problems. The cost of "control" skyrocketed and polluted our air, water, food, soil and our bodies. These chemicals have created resistant pests, secondary and even tertiary pests. For disrupting the balance of nature, we lose our crops, property and we are lost as well.

Chickadee - One chickadee may eat as many as 500 caterpillars in a single day, and more than 60% of a chickadee's winter diet is aphid eggs.

Chicken Manure - Composted chicken manure will change the soils so that grubs disappear in a few weeks, moles disappear in a few months and weeds disappear in a few years. Do not use any synthetic pesticides or

fertilizer or you will once again kill all of the beneficial microorganisms.

Chickens - will eagerly hunt out and scavenge scorpions, cutworms, wireworms and grubs and eat hundreds every day.

Chili Peppers - The hot ingredient in chili peppers is capsaicin; it is an effective weight loss tool that speeds up metabolism and reduces or suppresses the appetite, so you eat less. Capsaicin also relieves sinus congestion by stimulating mucous membrane secretions.

Chili powder or pepper - Wash kitchen surfaces with vinegar solution and sprinkling bone meal, talcum powder, chili powder and/or powdered charcoal in and around suspected points of ant entry. Pour a line of any of the following where ants are entering the building: cinnamon, cream of tartar, red chili pepper, salt, dried mint or sage, or cucumber peelings, and they will not cross it.

Chili-vinegar Spray for Fruit Trees:

4 jalapenos, habaneros or other hot chilies, seeded and chopped
2 cloves garlic
1½ quarts water
2 oz. beer
½ cup vinegar

Mix chopped chilies, garlic, water and beer. Cover and bring to a boil for 5 minutes; then let the mixture steep in the pot for 24 hours. Add the vinegar, strain well and pour into a sprayer. Spray leaves, but not blossoms.

Chimney Caps - Keep out raccoons, squirrels, birds and bats without harming them.

Chinaberry tree (*Melia azedarach*) - A handsome and dense shade tree. It is repellent to grasshoppers and locusts. A repellent tea can be made with the leaves. The profuse berries are used to make necklaces and insectisafes. Also called Lilac Tree, Pride of India, and Bead Tree. To make flea repellent for lawns, mix 1 tablespoon of dry, powdered berries with 1 teaspoon of dishwashing detergent to a gallon of water and spray on lawns with a sprayer. This will also repel flying insects as well.

Chinese wingnut (*Pterocarya stenoptera*) - The powdered leaves are fairly toxic to Mexican bean beetle larvae and will control other insects.

Chinese wisteria (*Wisteria sinensis*) - An acetone extract of seeds is somewhat toxic to codling moth larvae.

Chive vinegar - Take a bottle of white vinegar; add white onion chive blossoms when they are about a third of the way open. (They bloom in about August.) Let vinegar "steep" for 2 weeks in a well-lit area, but not in the direct sunlight. The finished product will be pink with an onion flavor; mix 1 oz. per quart of water to spray or soak produce. The mix safely kills most pests instantly.

Chives - Plant chives among your roses and you will never have aphids. Chive leaves may relieve rheumatism.

Chocolate and Cocoa - contain a little caffeine but more theobromine which helps stop bronchospasms and helps open constricted bronchial passages. The theobromine in chocolate can also be used as a cough medicine and also to help lower blood pressure, and helps keep the blood flowing and the heart healthy. Cocoa helps the body process nitric oxide and the flavanols it contains prevent fat-like substances in the bloodstream from oxidizing and clogging the arteries and make blood platelets less likely to stick together and cause clots. Dark chocolate is higher in flavanoids than milk chocolate. The way cocoa powder and chocolate syrups are processed removes most flavanoids. Flavanoids are compounds with potent antioxidant properties. The flavanoids in chocolate are called flavanols.

Chloroseptic - stopped the infection in the Author's ears and saved his hearing.

Chrysanthemum - plants are effective in reducing soil parasitic nematode populations. Chrysanthemums have

been used medically since at least the first century A.D.

Cider Vinegar - Make a mix of 1 part cider vinegar to 7 parts of water and put some in a small glass or baby food jar and lure fungus gnats and fruit flies to a death by drowning.

Cinnamaldehyde - A food flavoring can be used as a fumigant for some beetles and weevils.

Cinnamon - There are around 250 species of this tree in the genus *cinnamomum* throughout Asia and Australia. Japanese researchers have discovered that this common food spice contains a substance that kills fungi, bacteria and microorganisms, including those that cause botulism and staph infections. When three cinnamon species were extracted, the main constituent was cinnamic aldehyde, which is an effective insect fumigant, antifeedant and has contact insect toxicity. Ground cinnamon will repel ants and silverfish.

Cinnamon may help alleviate gas, bloating, diarrhea and nausea. The Author's Mother gave him cinnamon toast when he was ill as a child. One teaspoon of cinnamon per day can reduce blood sugar and triglycerides.

Cinnamon oil - can be used to control/repel aphids, mosquitoes, spider mites and powdery mildew. The various oils possess a range of antibacterial, antifungal and insecticidal properties. Four of them, cinnamaldehyde, cinnamyl acetate, eugenol and anethole, are more effective at killing mosquito larvae than DEET. Both cinnamon and cinnamon oil are on EPA exempt lists. Cinnamon oil at 10% or less will safely control antibiotic-resistant strains of bacteria, e.g., staphylococcus and E. coli **See Thieves Oil.**

Cinders - "Fresh" black coal cinders put down on a track will prevent weeds from penetrating. Try using them along fence lines and other areas where you want the acids and color to kill off all vegetation without using any herbicide poisons.

Citric Acid, or *Citricum acidum* in Latin - is effective in controlling several pest species. 100% pure anhydrous citric acid is derived from crystallized fruit sugar. Citric acid is an excellent preservative it prevents rancidity and bacteria growth. Direct contact can result in skin and eye irritation. **See Vitamin C.**

Citriodora (Eucalyptus) - Can be used to repel insects. It has beautiful, shiny, round silver-gray leaves. Makes excellent cut foliage. Can be container grown. Will stand cold to -17°. Outside it will grow as a tree to 50 ft. See essential oils.

Citronella Beads - Put some in dumpsters and garbage cans to help repel pests, e.g., stinging insects.

Citronella Oil - Attracts fruitflies, males only. Repels insects and ticks from humans and their clothing, homes and outdoor areas. Repels dogs and cats from ornamental plants and garbage dumps. It was the most widely used mosquito repellent during the first one-third of the 20th Century. It is extracted from a grass (*Andropogon nardus*) and contains geraniol as its primary component with lesser amounts of citronellol, citronellal, borneol and other terpenes. Some people may adversely react to this oil.

Citrus Oil - Citrus oil soap can be used to control a wide variety of insects and fungus problems. You can make your own citrus oil by grating the rinds of lemons, oranges or grapefruit, but the more sour the fruit, the better the citrus oil. Put the grated peeling in 1 pint of boiling water that has been removed from the heat. Let the mixture steep overnight and strain the mixture. Used as a spray, the mixture will quickly kill insects with soft bodies and will repel ants for awhile.

Citrus Peels - will act as an insect barrier - chop or grind them up and scatter them around your home.

Claw Hammer - Use a claw hammer to pull weeds out root and all - the deeper you grab the root the better.

Cleaning - In 1602, Ulysses Aldrovandi reported bed bugs were worse in poor homes than rich homes that simply were kept cleaner. Whenever you clean or spray with Murphy's Oil Soap, natural soap, peppermint soap, enzyme cleaners, etc. you control pests. Routinely remove and properly dispose of waste, debris and garbage. Remove early fallen (unripe) apples and burn them to control codling moth in apple orchards.

Clear Plastic - can be used to solarize or burn weeds and their seeds to death. Till the area, water it and cover with unbroken, clear plastic for 2 months during the summer.

Clothes Dryer - Kills most pests when you dry your clothes.

Clove Oil - relieves pain and is a strong germicide, more powerful than carbolic acid. Cloves repel ants. Steam distilled clove buds are 90% eugenol; foliage is 45% - 60% eugenol. Use 4% - 8% eugenol and 1% sesame (as a synergist) in a spray and you can kill insects by blocking octopamine, a neurotransmitter found in insects but not in humans or their pets. Eugenol is an exempted ingredient as is sesame oil. The Author has found 5% - 15% clove oil when blended with 8% - 10% sodium lauryl sulfate and 1% - 4% sodium chloride and glycerin will quickly kill plants, especially if you drop the pH using vinegar and/or citric acid.

Clover (sweet) - The attractive "weeds" contain a broad spectrum antibiotic.

Cloves - Dry cloves repel ants and when stuck in oranges repel moths and other insects, but you might be allergic to cloves (*Eugenica caryophyllata*). Grandma was right. You can kill the pain of an aching tooth by swabbing it with clove oil. Researchers attribute the remedy's effectiveness to eugenol, a pain-relieving chemical found abundantly in cloves. Cloves and/or clove oil can be used as biopesticide alternatives.

Coal Tar Pitch - is also known as pitch oil, topped coal tar and creosote. The Author does not recommend its use.

Coca Leaves - Are natural insecticides.

Coca-Cola - Spray this soft drink (with aspartame) on insect pests or feed it (with its fizz intact) to mice and rats and see what happens. Pour 2 - 2-liter bottles into a hole you have made in a fire ant mound. Pour some in the center of weeds on a hot, sunny day and wait at least a week before reapplying Coca-Cola. It will remove grease and blood stains from the driveway overnight and will take corrosion from batteries.

Cocoa Shells - are an attractive mulch that is nicely scented and can discourage cats from digging in the garden.

Coconut Oil - is known for its ability to penetrate skin.

Coconut Oil Soap - Can be diluted and sprayed to control slugs and snails. **See Soap.**

Cockroach Poop - This is the "secret ingredient" that determines if your roach trap and/or bait will be successful. Their defecation contains the aggregation pheromone.

Coffee (Coffee arabica [L.]) - Put some leftover coffee in a bottle trap to quickly capture wild Mediterranean fruit flies, *Ceratitis capitata* (Wiedemann), both male and females, or spray it on plants to control red spider mites and repel snails and slugs. (Note: If you want to kill snails and slugs using coffee you will need to make strong coffee.) Cocaine and caffeine are closely related. Coffee contains caffeine which helps stop bronchospasms and helps open constricted bronchial passages, especially if you add chocolate and/or cocoa that contains more theobromine, which also helps asthma attacks. Drinking coffee regularly helps prevent gall stones, especially if you eat nuts. Regular coffee drinkers also lower their risk of diabetes, Parkinson's disease, colon cancer and dental cavities. Coffee lifts your mood and can be used to treat headache. People who smoke and drink coffee on a regular basis have less heart disease and liver damage than those smokers who do not drink coffee on a regular basis.

Coffee Can Traps - Bury a tin container in the soil of your garden so the lip of the can is flush with the surface of the soil. Crawling bugs and slugs and snails will fall into your tin can trap; empty as needed.

Cold - Another safe and very effective control; observe winter in Michigan.

Collars - Cut a piece of paper one foot square and fit it snugly around the stem of the plants and press into the soil an inch or so deep. Use a paper clip to hold it in place. This collar will prevent cut worms and other burrowing insects from getting into the soil and destroying your young plants.

Collateral Damage - When you spray a broad spectrum pesticide poison, you kill your allies, the beneficial insects and creatures including yourself and many other non-target organisms.

Colloidal Silver - and other colloids are very effective in controlling viruses, molds, bacteria and insect pests. The Author has used colloidal silver to remove candida and/or infections in people and plants. Use pure water.

Colors - can be used to find or attract or repel pests. **See mulch.**

Combs - Metal nit combs or metal flea combs and a little patience, a bright light, a little baby oil and soapy or enzyme cleaner/water will safely control fleas and/or lice and/or ticks.

Comet® Cleanser - Try lightly dusting this cleaner in areas where you want to control or repel pests.

Comfrey - Bruise a few comfrey (*Symphytum officinale*) leaves and lay them over a bruised area to remove the bruise. **If you are pregnant, do not try this poultice and remember that comfrey is also considered unsafe for internal use by people. Be careful.**

Common Oleander (*Nerium oleander*) - is effective against codling moth and many other insect pests. The bark can be used to kill rats and mice. **It is poisonous to people. Be careful!**

Common Sense - The greatest tool and one of the rarest.

Communicate Constantly - Keep everyone informed and ask for input and assistance.

Communication - No one will know if you do not tell them what you saw, did and or know.

Companion Planting - Seemingly random plantings can produce better growing plants that are relatively free of pest and diseases, e.g., planting marigolds with tomatoes and potatoes will help ward off Mexican bean beetles and nematode worms. Planting onions and garlic throughout your garden will also help reduce insect pests.

Competitive Vegetation - Plant groundcovers and/or more aggressive competitors than the weed you wish to control. Native plantings work best.

Compost - prepared from certain recipes can suppress or control destructive root rot organisms with their fungicidal properties. They also improve soil and increase microorganisms. Composting can also help eliminate yard and garden waste and pesticides. **Caution:** Soluble salts are naturally created during the decomposition process as organic debris is broken down and reduced in bulk. High levels of soluble salts can kill exposed plant roots. "One aker well compost is worth akers three, at harvest thy barne shall declare it to thee." – Thomas Tusser (1557)

Compost Tea - will help control any fungal blight problems your plants have. Making this tea is easy: Take 80% vegetable matter and 20% animal or poultry manure and make a compost pile. (You can even use straight manure, but don't use this blend on edible plants as manure can contain coliform bacteria.) Fill a 5-gallon bucket half-full with a good quality finished compost; then fill to the top of the bucket with water. Stir every other day for 9 days. Then pour through a fine screen and spray on your plants twice a week. The material acts as a foliar fertilizer and controls fungus problems.

Composted Chicken Manure - The Author developed Get Set Grow and found that using composted chicken manure restored the microorganisms in the earth so that in days the grubs were gone, in weeks the moles were gone and in years the weeds were gone. Synthetic fertilizers and pesticide poisons literally sterilize (kill) the soil.

Composting - Proper composting destroys fly breeding sites and creates wonderful fertilizer. If large additions of compost or manure are added to the soil, the population of eelworms and viruses are greatly reduced.

Conditions Conducive to Infestation - Remove these and you usually prevent potential pest problems.

Conduit - Can be used as a vacuum hose extension to vacuum up stinging insects. Cut a 4' length and about 10 feet of coated 14 gauge electrical wire or cable. Double the wire or cable and slide it through the conduit;

leave a loop at the top end and install a hand grip at the bottom. You will have created a quick and efficient tool to grab “critters”. Simply slide the top loop over its head and pull tight on the bottom wire or cable.

Consistency - The only way you can learn from your research; do not compare apples to oranges.

Constant Vigilance - will prevent a major pest infestation or disease outbreak.

Containers - Properly sealed containers will keep your food and your pet’s food and your garbage pest free and reduce the incidence of insect and rodent pests.

Controlled Burns - will remove several pest and disease problems and helps renourish the soil.

Controlling Carriers - By controlling insect carriers of diseases and/or viruses which cannot be controlled by spraying you can reduce the spread of diseases and/or viruses.

Cooking Oil - Any cooking oil placed around the base of plants will repel ants and other pests; additionally, 1 teaspoon mixed in 1 quart water with 1 tablespoon dish soap will kill many insect pests if sprayed with this mix.

Copepods, e.g., *Macrocyclus albidus* - Common in Florida waters are tiny crustaceans with a voracious appetite that virtually kill any mosquito larvae they find.

Copper - Copper is a powerful, nonspecific fungicide that kills disease organisms. It damages beneficial soil microorganisms and beneficial insects alike, and is more toxic to plants than sulfur is. Copper sulfate has been used as an herbicide to control annual weeds on land or in water. Repeated applications of any copper product will stunt plants and can accumulate in the soil. **Copper sulfate is classified as very toxic to humans, so we do not use this product; only the copper barriers to control slugs and snails.**

Copper Gauze - Copper gauze or mesh will not deteriorate like steel wool, so use it to seal and/or cover cracks and other openings.

Copper Soap - can be diluted and used as a fungicide.

Coriander, a/k/a cumin - An annual herb, 2-feet tall. Drinking a tea made from this plant will help to soothe an upset stomach. A poultice made from crushed seeds relieves rheumatism pain. Coriander adds an exotic flavor and is used as a digestive, for colic, gripping and flatulence. Coriander contains an oil used in an emulsion spray to kill spider mites and cotton aphids.

Corn - Dried corn can be placed in cloth bags and either heated or cooled in the freezer to provide relief from aches and pains.

Corn Gluten Meal - 100% corn gluten meal acts as a natural herbicide and prevents weeds. Use 20 pounds of corn gluten meal for every 1000 square feet; spread the gluten over your lawn; then apply again at right angles. Apply evenly in spring, late summer or early fall yearly. Be patient; it takes several years to work dramatically. Don’t fertilize for 2 - 4 weeks after a gluten application because the gluten provides a lot of nitrogen. Corn gluten prevents all seed germination for months after it is applied, so it is not wise to sow seeds in the treated area. Water activates the gluten.

Corn Meal - Wet corn meal with 1% sodium borate solution; dry and place where insects can contact but people, pets and wildlife cannot. This bait will kill virtually anything that eats corn meal. The sodium borate will also keep it “fresh” in damp areas longer. “Straight” corn meal or bran sprinkled by plants will kill cut worms that eat it.

Corn Starch - Placing 2 tablespoons of corn starch in a dry vacuum’s bag before vacuuming up insects will quickly incapacitate the insects. Sprinkle it where you see them crawl to desiccate them. Corn starch will also cure athletes’ feet. If you have a burn, sprinkle it with corn starch; the pain should subside in 10 minutes.

Cotton Swab - dipped in alcohol can remove many light pest infestations.

Cottonseed Meal - is a source of nitrogen.

Cottonseed Oil - will kill aphids, scales, mites and mealybugs.

Cover Crops - help suppress weeds and/or plant pests naturally. Cover crops support macro and microfauna, e.g., parasitoids. One example is the corn earworm will devastate the bolls of a cotton plant, but it prefers corn; so if you plant rows of corn for every 500 feet or so of cotton, the corn earworm will attack the corn and leave the cotton alone.

Crab/Shrimp Shells - will control nematodes when incorporated into the soil.

Creativity - Think. Define the problem. Develop as many solutions as possible. Choose the safest. Then act.

Cricket Chirping - Count the number of chirps in 14 seconds, add 40; the total will equal the air temperature in Fahrenheit within 1 degree 75% of the time.

Crickets - Freshly ground crickets are the preferred food source/bait for pharaoh ants, fire ants and ghost ants.

Crisco, Butter Flavor All-Vegetable Shortening - will attract ants, so when you are trying various materials to attract ants, e.g., syrup, applesauce, honey, etc., you may want to try this shortening. If the ants are attracted to these materials, you can add aspartame, food-grade DE or some other toxin to kill the ants.

Crop Rotation - will culturally control most pests, e.g., weeds and insects and give life back to the soil.

Cucumber - Dried and crumbled cucumber rinds or fresh cucumber slices will often repel ants. Bitter cucumber works best.

Cucumber, Cantaloupe and Pumpkin - An acetone extract of seeds (and aqueous extract of pumpkin seed) is toxic to mosquito larvae.

Cucurbit Family - Members of this family, e.g., pumpkins and squash have leaves that are effective fly repellents. Pick leaves carefully from strong growing vines, crush them and rub them on animal heads/back to repel flies.

Cultivation and Hand-picking - The least expensive of all control practices. Must be used long before pest damage becomes apparent and at the proper stage of development of the insect.

Cultural Controls and/or Practices - These are the oldest means of controlling insect and mite pest problems. They include such things as parasitoids, resistant species or varieties, cultivation, crop rotation, soil and water management, a diversity of crops, planting and harvesting schedules, pruning or mowing methods, proper plant selection, nutrition, reducing plant stress, improving soil condition, removal of crop residue and sanitation, all of which can and/or do help and/or provide pest control or reduce and/or prevent pest problems. In 1500 B.C.E. there were writings about cultural control, e.g., manipulation of planting dates. In 950 B.C.E. burning was discussed as a cultural control.

Cup of soapy water - If you slowly bring up a cup of soapy water directly under a fly resting on the ceiling, it will fly into it and drown.

Curiosity - If the Author had not been or remained curious, none of this book would have been possible.

Curry - This bright yellow spice or herb is named for the aroma of its leaves. It is used to keep moths out of woollens. Make a paste out of the powder to relieve the pain and itching of insect bites and stings. The poultice will also reduce swelling and inflammation. Curry powder contains curcumin, a substance similar to non-steroidal anti-inflammatory drugs. Curry helps decrease the symptoms of arthritis, tendonitis, auto-immune diseases and will help shrink colon polyps and can help ward off prostate cancer.

Cutworm bait - Mix 1 pint of hardwood sawdust (not cedar or pine) with 1 pint of wheat bran and 1 quart of molasses. Slowly add cupfuls of water until the sawdust and bran are moist and all ingredients are well mixed.

Spread a handful of bait around each transplant or sprinkle evenly on long rows of corn seedlings. Molasses attracts the cutworms to the sawdust and bran, which cakes on their bodies and prevents them from burrowing into the soil for protection from sun or birds. Destroy any cutworms you see on the ground each morning, and renew the baits after heavy rains. You can also make enzyme (protease) or DE molasses bait. Tansy, crushed egg shells, damp wood ashes, pine sawdust, chicken manure or oak leaf mulch will repel cutworms.

Cutworm collars - Cut 2-inch-long sections from a paper towel tube or toilet paper tube. Slip one section over each small seedling and press the collar lightly into the soil. Or cut a strip of lightweight cardboard or aluminum foil, curve it around the base of the seedling, and fasten the ends with a paper clip. Make the collar 2 to 3 inches tall and about 2 inches in diameter. Don't forget to mow the grass and remove the clippings.

Cutworm repellent - Sprinkle a mixture of chopped wormwood leaves (*Artemisia spp.*) and sharp sand in a wide circle around the base of each plant. They will die if they eat cornmeal because the cutworms cannot digest it.

Cyanogens - Over 1000 species of plants are known to produce the very toxic hydrogen cyanide (HCN).

d-Limonene - is the major component of the oil extracted from citrus peels and other essential oils. It has a lemon-like odor. Used as a shampoo it will kill fleas; used as a spray it will kill ants and other insects. Very little is known about health effects on people.

Damsel bugs - Adults and nymphs prey on insects, e.g., aphids, small caterpillars, thrips, leafhoppers and other soft-bodied insects.

Damsel Flies - are predators that will eat mosquitoes and nearly every other insect.

Dandelions - A healthy abundance of dandelions will act as an excellent habitat for lady bug beetles. They will move from their overwintering places under the bark of trees to the dandelions and then onto vegetable crops, etc. to control aphids as the weather warms up.

Dead Leaves - If you let dead leaves lie where they fall, orange and reddish fritillary butterflies will feed on them as readily as they do goldenrod and violets.

Deer Deterrents - Smelly work clothes, dog blankets, rotting eggs, dogs and invisible fencing, human hair, bars of scented soap, urine, etc. to control aphids. One good spray mix is 1 tablespoon of kelp, 5 tablespoons of fish emulsion and 1 tablespoon of liquid Dial hand soap in 1 gallon of water; spray as needed.

Decoys - can be used to repel birds.

Defence - Chalk barrier is your home's first defense. Defence by Safe Solutions, Inc. has DE with or without some pyrethrum formed in a piece of sidewalk chalk.

Dehumidifiers - When properly installed, dehumidifiers reduce moisture and many pest problems including termites, mold, carpenter ants, mildew, roaches, sow bugs, earwigs, fungus, etc. are eliminated, or at a minimum, greatly controlled. Air conditioners, fans, vents and/or dryers also help reduce the relative humidity; most insects/spiders/termites/fungus/mold/etc. need high levels of humidity to survive; often if you just reduce the humidity you can control all of these pests. Add a fan to increase the desiccant action. **See Humidity Reduction.**

Deodorizer - Place a saucer of diluted Safe Solutions Tweetmint Enzyme Cleaner with Peppermint in the return air duct(s). The furnace fan will draw the enzymes into the central duct and circulate them throughout the building. Musty areas or items can be deodorized with enzyme cleaners or crumpled newspaper - repeat with fresh newspaper or enzyme cleaners until musty odor is gone. Fresh cat litter (and activated charcoal or baking soda) will also remove odors especially in small (enclosed) areas in one day. **See also Fans.**

Derris or Tuba Root - was used by early Chinese to stupefy fish. Derris can be used on both plants and animals for insect control and to control mosquito larvae, lice and ticks. It is eliminated rapidly from the body and is not known to be stored in animal tissue.

Desiccants - Hot air, dehumidifiers, fans, food-grade DE, silica, talcum powder, medicated body powder, lime, clothes dryers, saunas, hair dryers, calcium sulfate, salt, calcium carbonate, sun, etc. all kill mold, insects and arachnids.

Detection - Find the pests early before they become a major problem.

DetectionTools - can be used to find moisture problems, termites, carbon dioxide, methane, radon; to see behind and into voids, etc. and many more will be developed.

Detergent Builder - Any substance, including another surfactant, that helps the first or “main” surfactant work, e.g., potassium salts, sodium borate.

Detergents - are surfactants, or surface active agents, basically washing compounds that mix with grease and water; they form a “bridge” between lipophilic substances and water-soluble substances and thus enhance penetration of water, insecticides, oils, or enzymes. Richards and Korda (1948) found that detergents disrupt not only the lipid layer of the epicuticle but also the protein layers of the endocuticle. The properties rendering a detergent most effective are (1) enough liposolubility to penetrate and emulsify the epicuticular wax, (2) sufficient solubility in water (i.e., not excessively lipophilic), and (3) ability to penetrate the outer cement layer of the epicuticle. Obviously, once the cuticle is comprised by the detergents - insecticide poisons are not necessary to control the insects. Make sure your detergent does not have any hazardous or prohibited “inerts”. While detergents are synthetic, some of their ingredients can be natural. Detergents were developed during World War II when the oils needed to make soap became scarce.

Deterrents - One of the most successful feeding deterrents is still the Bordeaux mixture developed in France over 10 years ago as a fungicide. It is produced from copper sulfate, hydrated lime and water in a 6-10-100 mixture. Deter pests before they become a problem.

Detoxification - See Chapters 40 and 41. “The world has become intoxicated.” — S.L.T.

Devices - Fly swatters, traps, (e.g., snap, live, fungus, poison, sticky, electric, pheromone, etc.), screens, hair dryers, tile softeners, decoys, caulking, repellents, negative ion plates, sticky strips, vacuums, pressure washers, and the like can not be tested accurately in a laboratory, but are very effective in field tests. **Negative ion plates** are the safest, easiest alternative to pesticides. When properly installed, we have controlled most insects including termites for up to 2 years. Occasionally the plates will “burn out” or be torn down and need to be replaced and/or a “pocket of resistance” may need further Intelligent Pest Management® control work, but they work far better than many of the volatile, synthetic pesticide poisons I previously used and are non-toxic.

Deworming Concoction - This is an old time remedy for deworming dogs and cats. Use full amount on dogs and ¼ amount on cats. Mix 1 teaspoon of dried, powdered rosemary and 1 teaspoon of wormwood with ½ teaspoon of fresh ground garlic. Mix well and divide into 4 portions. Give pet a portion mixed in with food or pet treat four times a day. Repeat this for 3 days and pet should be completely dewormed. **Caution: there may be a toxic/allergic reaction to this concoction, so I suggest you use food-grade DE or Not Nice to Toxins.**

Diagnosis - Proper diagnosis is the first step to find a proper remedy. Make a proper diagnosis before you start any control program.

Diammonium Phosphate - can be used in traps as an attractant.

Diatomaceous Earth (DE) - If you use this product, be sure you only use Safe Solutions, Inc. food-grade quality DE that has been properly milled and wear a cotton face mask and goggles. “If you see white, it ain’t right.” Keep warm and dry. We do not normally choose to use DE. There is a definite difference between fresh water vs. marine diatomaceous earth - use only the high purity fresh water (food-grade) product (with ½% or less silica) if you can get it. It is labeled GRAS or Generally Regarded As Safe and kills insects better. Diatomaceous earth (DE) is mined from the fossilized silica shell remains of unicellular or colonial algae or one-celled phytoplankton in the class Bacillariophyceae, better known as diatoms that converted the silica they ingested to form their shells. Diatoms are animals that are related to the crustaceans of today. They produced shells that are now ground up and used as a powder or dust for insect control. **Caution:** Diatomaceous earth can also be impregnated with

pyrethrins for faster kill; we do not use this type. The main hazard associated with the use of diatomaceous earth is from inhalation of the materials and silicosis of the lung tissue. It has both abrasive and absorptive qualities. Like the silica aerogels, although to a lesser extent, diatomaceous earth absorbs the waxy layer on the surface of insect skins, causing the insect to desiccate (dry out). DE also controls slugs and snails. In addition to its desiccant action, it works abrasively to rupture insect cuticles, allowing cell sap to leak out. **DE can be a registered pesticide or a food-grade product used as an anti-caking agent. It can also be used to remove odors - it simply "grabs them"**. Food-grade DE has other uses including cleaning and polishing metal and soaking up spilled oil and grease. **Do not use DE outside until you know the pest life cycles or you may kill all the beneficials and vacuum up all residue (inside) after a few days. Make sure your DE does not contain crystalline silica which is a dangerous respiratory hazard.**

Like silica aerogels, diatomaceous earth (DE) consists of silica and does not break down or leave harmful residues. The effective insecticidal form absorbs up to 4 times its weight in moisture - so it takes the oils from insects' skin, causing dehydration and death. Food-grade DE also controls mildew and brown rot. This *least-toxic* insecticide is considered harmless to humans and is used in stored grains. Mix ¼ cup of food-grade DE in a gallon of vinegar and spray pests with the mix or pour into individual ant colonies as a drench. Food-grade is sold as "fossil shell flour" and is approved by the FDA to be added to livestock rations at a rate not to exceed 2% . The beneficial control is said to be gentle and normal without toxic shock. It can be rubbed into your pet's fur starting from the neck down - spending particular attention to the tail area; this will generally control fleas until the pet is bathed. As a livestock feed additive at 1% to 2%, it can kill worms and other internal parasites. I know of people who feed their emus, cattle, dogs and horses 2% food-grade DE as an additive to their feed to control internal parasites and to reduce the number of flies in the excrement/manure. You can mix sugar and food-grade DE and feed it to people with E-coli contamination. The sugar attracts the E-coli and the DE absorbs the toxins. It is best applied as a dust using a duster that imparts an electrical charge, but it can also be hand dusted and/or thoroughly mixed 2 oz. in a gallon of water and sprayed. You can make a very good pest barrier by applying Tanglefoot (or petroleum jelly) to the area, e.g., trunks of trees, and then lightly dusting the adhesive with food-grade DE. People also use it for garden pest control, though it will also kill beneficial insects (especially Hymenoptera parasitoids) - especially at higher application rates. **Do not buy or use DE sold for swimming pool filters.** This form is not effective as an insecticide and may also contain a high level of crystalline silica which, **when inhaled, can cause silicosis, a deadly lung disease.** Diatomaceous earth is abrasive to lung and eyes - so use proper personal protection when using this product. Chinese used DE for pest control 4,000 years ago, compare with (synthetic) silica gel. Use food-grade DE to dust pets, livestock, bedding, barns (inside and outside), windows and foodstuffs to deodorize, preserve and for its absorption qualities as a benefit you also will control internal and external pest problems. Rats fed a daily diet containing 5% fresh water DE showed no abnormalities after 90 days. Japanese workers chronically exposed to DE showed significant serum increases of the protease enzymes that correlate with emphysema. Always remember when using diatomaceous earth - less is truly more - try a pinch on a piece of paper and then blowing this tiny amount towards the infested area or simply dust cracks, crevices, and/or voids. **Diatoms in the lungs will not dissolve and may harm like asbestos. Swimming pool DE is considered a carcinogen.**

Advantages: Nontoxic to mammals and birds; works by dehydration rather than poisoning; contains beneficial trace minerals.

Disadvantages: Affects both beneficials, e.g., ladybugs, and pests; thorough application needed; less effective in humid weather.

Dietary Supplements - See Herbal Remedies.

Disease - Not at ease. Stress, worry, fear and depression are killers.

Dishwashing Detergent - Quickly breaks down an insect's outer covering, ectoskeleton or cuticle. It also washes away the grease, wax, oil and/or dirt from the outer covering.

Diversity of Plants - A diversity of plants will create a diversity of insect species, attract beneficial insects for natural control, and provide more nectar, pollen and/or alternative host insects for them to feed upon.

Dog Spray - Mix apple cider vinegar (or wine) half and half with water in a spray bottle; add the juice of 1 crushed garlic clove, 1 T. dish soap, 1 tsp. canola or olive oil and 1 tsp. salt; shake and spray into the fur. Reapply as needed. This spray removes fleas, dog odors and gives your dog a shiny coat.

Dogs - have been trained to sniff out bed bugs, termites, drugs, bombs, rabbits, deer, fugitives and mold, but, remember, the termite-sniffing dogs trained in the 1980s had a false-positive rate of almost 30%.

Dollar Bill - Need a measuring device? A dollar bill is 6-1/4" long, folded in half it is 3-1/8", folded in half again it is almost exactly 1-1/2". The 2-5/8" wide bill folded lengthwise is very close to 1-1/4". From the tip of a man's middle finger to his elbow is a cubit or about 18". From (extended) fingertip to fingertip is about 6 feet.

Dormant Oils - can be sprayed on trees before the leaves emerge to smother (overwintering) scale, spider mites and insect eggs - some varieties will not harm leaves, but will kill caterpillars and many other pests - read the label. There are no reported oil-resistant pests. **Check for prohibited or dangerous inert**s. The Author has also used vegetable oil as an alternative. Another formula for a dormant miscible oil spray for use on dormant trees is to mix 1 gallon light-grade oil, 1½ pounds of fish oil soap (or 2 pounds of regular soap) and 1 gallon of water. Bring to a boil and stir. The soap will act as an emulsifier and allow the oil to blend with the water. Dilute with 10 gallons of water and spray immediately. If your mix separates, reheat and restir and then mix again.

Double-check - If you do not bother to double-check, you will really waste time and money correcting your mistakes and newly created problems.

Dragon Flies - Favorite prey: flies, mosquitoes and bees.

Drains - need to be cleaned routinely and covered or screened. **See Tennis Ball.**

Drills - The hidden space behind walls, the toe kick and underneath the base of kitchen and bathroom cabinets can all be easily treated with dusts and/or enzymes - if you drill a 3/8" to an 1" hole through either the wall or the toe kick or the cabinet floor. Plug with a furniture dowel button or wood dowel plug or an insulation plug.

Dry Bran - Sprinkle dry bran on plants, e.g., potatoes, and the potato beetles will eat it and drink dew to slack their thirst and then die from the expanding and/or drying bran.

Dry Cleaning - Kills adult stages of insects, but may not kill eggs.

Dry Ice and/or Carbon Dioxide fire extinguishers can be used to kill nuisance wildlife and insect pests by fumigation and/or freezing. Dry ice can also be used to attract fleas, termites, mosquitoes and ticks into traps. Dry ice can also be used to fumigate burrows, homes and grain.

Dryer - A dryer can be used to kill dust mites, ticks and many pest problems. **See Clothes Dryer.**

Duct Tape - can be used to trap ants, bed bugs, crickets, scorpions, spiders, cockroaches, flies, etc. Just place it sticky-side (glue-side) up wherever you have small pests. You can add some bait or the insects' fecal matter to make it attractive. You can add a little masking tape on the edges to hold it in place. Crickets cannot climb up the silver (non-sticky) side. Put down 2 tracks to see which side of the room has the bulk of the infestation.

Dung Beetles - Up to 10,000 horn flies can creep onto a bull's back and suck its blood until it dies. Dung beetles will eat horn fly eggs until they have wiped out this pest in several areas.

Dusts - e.g., soot, finely ground chalk, talcum powder, food-grade DE, baking soda, activated charcoal, talc, siliceous materials, finely powdered alumina, kiln dust, ashes or even road dust have been used to control insects effectively since ancient times. Caution: Most dusts are over-applied. You should only have a fine coating over the treatment area. Keep all dusts dry and warm. Cold dusts absorb moisture which makes them clump together. Many birds and animals dust themselves in areas where there is fine silt to remove ectoparasites. Primitive farmers noted they had less pests in areas next to dusty roads than they did in those further back. One mode of action of dusts involves withdrawal of body water and lipids from the insect, i.e., desiccation through abrasion of the cuticular surface or through a continuous adsorption of the lipid elements. With hygroscopic materials (soot, activated charcoal, etc.), the moisture is directly adsorbed onto the dust particles with nonhygroscopic materials (e.g., alumina) the cuticle is lacerated, allowing moisture to be lost to the surrounding air. Another mode of action is due to the fact that insects don't breathe through their mouths. They expand and contract their bodies like bellows, inhaling and exhaling air through a series of small openings called spiracles along the sides

of their bodies. Fine dust clog the spiracles. Dusts are ineffective at 100% relative humidity and their efficiency increases in direct proportion to the dryness of the air. Abrasion facilitates the entry of contact insecticides, so dust preparations of many contact insecticides are common. **Caution: Dusts deposited on plants in some cases may inhibit the activity of natural enemies and actually favor the increase of pests. Some dusts are toxic and/or may cause allergic reactions. Always wear a respirator and goggles. Never spray an open flame. Use hand lotion to keep your hands from drying and cracking. If you see white, it is not right, so remember to lightly dust.**

Dusters - The Author has used power dusters and has controlled cockroaches in school kitchens for years using only talcum powder. Never load a manual duster more than half way to the top!

Duty - The word is derived from the French word “deu.” Our word “debt” is also derived from this word. When we become intellectually and morally aware, we discover that in real life we have a duty to help others live and to protect them and the environment. Do your best to protect all life. **Keep on, keep keeping on.**

Dwarf or Red Buckeye (*Aesculus pavia*) - The flowers attract and kill Japanese beetles. Bedsteads made of horse chestnut are said to be free from bugs.

Dyes - can be used to attract or repel pests. Red food dye diluted and sprayed on leaves or other food sources can kill (insect) pests that feed on them. The amines in the dye quickly destroy the liver. Try red dye foliar sprays and baits. A photoactive dye used in drugs and cosmetics called D& C Red #28 by Warner Jenkinson has an active ingredient called phloxine B-Mazoferm which is as effective as malathion in controlling fruit flies (and other pests). When placed in sugar formulations it controls flies and other pests that eat it. Add aspartame as a “kicker”.

Earthworms - aerate and pulverize the soil, create top soil and destroy the larvae of several noxious insects.

Easter Lily - is toxic and often fatal to cats, so be very careful of this plant.

Echinacea (*Echinacea angustifolia*) - has powerful antiseptic and antibacterial properties. Use with fresh garlic to protect against colds, flu and even cancer. See Herbal Remedies.

Ecological Balance - Leave nature alone and insect pests and diseases will be naturally held in check. You can not have beneficials if you have no pests.

Economic Threshold of Damage - Do nothing until the level is reached.

Education - Never come to the point you are no longer “teachable” or willing to learn a better or safer way to control pests. The continued successful control of any pest is a “learning process”.

Effort - You must put forth some effort for any plan to work. Will Rogers once noted, “Even if you are on the right track, you will get run over if you just sit there.”

Egg - Mix 1 teaspoon dish washing detergent, 1 egg and 1 quart water - spray as needed to repel deer.

Egg Shells - To repel slugs and snails, edge the area with coarsely crushed egg shells. To make an interesting trap for flies, grind the egg shells into a fine powder. The (cluster) flies get stuck and die when they get mired in the powder. We are working on a find dust made from egg shells.

Egg Yolks - Separate and pierce an egg yolk and put the material on a piece of wood and float it on top of the water to kill mosquitoes. The yolk creates a very thin film of protein across the water surface which clogs the mosquito larvae’s breathing apparatus. The egg breaks down in a day or two, so reapply as necessary.

Elder - In 1870 [Dick’s Encyclopedia of Practical Receipts and Processes](#) advised spraying cucumbers and melon plants with a decoction of elder leaves to control thrips or on other plants to control mildew.

Elderberry - usually is free of disease and insect damage of all kinds, so spray your plants with a concoction of

elderberry leaves to protect them from insects and disease. See Plant Product Insecticides and/or Fungicides.

Electric Fence - A single strand of electric wire 4" - 6" off the ground should put an end to virtually any animal pest invasions, except deer (as they may easily jump over the barrier).

Electricity - There are electrocuting rat traps, electro-guns and electrical bird repellents, etc.

Electrocuting Insect Traps - Use these with great discretion because we have a great concern about the danger of disease-causing viruses surviving on the insect parts that explode from these units.

Eliminate Competition - Remove weeds and grass from the growing site since they compete for nutrients and water.

Encarsa formosa - are not native to North America. These wasps are sold to prey on greenhouse whiteflies and sweet potato whiteflies.

Encasement - Encasement of the mattress and box spring will deny bed bugs access to inner and hard to reach areas. Bed bugs have been surveyed and 90% of the infestation is found living inside beds, sofas and/or reclining chairs, so encasing these objects will kill all bed bugs living inside and will prevent others from infesting inside these tightfitting covers. You can also see any remaining bed bugs on these covers more easily. Use a quality, zippered bed (dust mite) encasement cover.

Endophytes - are fungi that infect some grasses and live symbiotically in the leaves. They benefit the grass by producing toxins that kill and repel insects and confer some disease resistance. Turfgrass varieties with endophytes are generally more vigorous, more tolerant of heat and drought and more competitive than the same varieties without endophyte infections. Several varieties of perennial ryegrass and fescues with high levels of endophyte infections are now available from turf seed suppliers. When buying, check the lot numbers to make sure seed is fresh because the endophytes may die after prolonged storage even though the grass seed itself remains viable. Do not plant endophyte infected grasses where horses or other livestock might reach it as the endophytes are harmful to grazing animals.

Entomopathogenic Fungi - Several mold fungi are natural insecticides and will kill insects and use their dead bodies to launch spores. These spores can be used to repel and/or kill ants, termites, flies, crickets and grasshoppers.

Enzyme Cleaners - The 5th Edition of Truman's Scientific Guide to Pest Control Operations described "The Ideal Pesticide". "Ideally any pesticide will act rapidly on pests, yet be completely harmless to people, domestic animals, wildlife, and other aspects of the environment. Its residues would only last as long as was necessary to create the desired effect, usually for very short periods. It would also be inexpensive and readily available in necessary quantities, chemically stable (before application), non-flammable, and otherwise safe to use around homes or industrial sites. It would be easily prepared and applied, non-corrosive and non-staining, and it would have no undesirable odor. Unfortunately, no such (synthetic) pesticide exists." Purdue University and Advanstar Communications (Pest Control Magazine) worked on this 1997 Pest Control Manual, but they were, obviously, **still** unaware the Author had begun patenting and using and field testing the perfect (pesticide) or Pestisafe® based on natural pest control. In addition to being on the (perfect pesticide poison descriptive) list, Safe Solutions Tweetmint enzyme cleaners, shampoos or soaps with enzymes will never create any pest resistance problems, are truly the perfect "pesticides" and the entire compounds contain only ingredients that are considered non-toxic or GRAS (Generally Recognized as Safe) and they are active as long as they are liquid and can be used virtually everywhere, even when people are sick, under 1, over 60, pregnant and/or chemically sensitive to control even pesticide-resistant pests. In addition, these Safe Solutions, Inc. products can be diluted/applied in such a way that only the pest species are killed, leaving the beneficial species alive! The U. S. EPA prohibits any/all claims that any *registered* pesticide poison is either safe or non-toxic. That is just another reason why we call enzyme cleaners, soaps and shampoos natural biological controls and/or Pestisafes® rather than pesticide poisons. Maggots produce enzymes to help soften up their food so they can eat it. Insectivore plants produce and also use protease enzymes to digest their insect prey. Spiders and scorpions produce and inject protease enzymes to predigest their prey and all molting insects produce a small amount of protease enzyme to serve as a chemical "zipper" so they can split open their exoskeletons when they molt and increase twice their size;

without the protease enzyme they would be trapped inside their own exoskeletons and be crushed to death by their own growth. Fogging and/or spraying enzymes in or on gardens, lawns, orchards, fields, swamps, and/or directly on insects, washing floors, linen, clothing, pets, hair, etc. will quickly and safely result in virtually instant pest control. We strongly recommend you only use diluted Safe Solutions Tweetmint enzyme cleaners or Not Nice to Lice® or Pet Wash®, Lice R Gone®, etc. (patented process) enzyme products (that contain protease enzymes, various surfactants and peppermint oil) to control virtually all insects, fungus, mildew and mold pests. Most enzyme products or cleaners available at swimming pool supply or cleaning or janitorial supply houses use bacteria to create “their” enzymes, e.g., pet mess cleaners, drain openers and septic tank cleaners - some of the bacteria may be harmful to you and none of them are patented for this use. If the enzyme cleaner contains more than 1% protease enzymes and/or has a low pH, this product can be harmful to the skin and eyes. **Too much protease can bring on anaphylactic shock and/or occupational asthma (in the Author’s opinion).** Use the patented and patented process (commercial strength) Safe Solutions Tweetmint enzyme cleaners at a rate of 1 oz. per quart to control virtually all pests or 1 - 3 oz. per gallon as a soak for ant nests or for their use as a floor cleaners. The body surface of insects consists of a hard skin known as the cuticle - the major pesticide pathway is cuticular penetration. The insect cuticle is hydrophobic so that it can resist desiccation and drowning but the protease enzyme and/or surfactants quickly and safely cut through this protective shell. Synthetic pesticide poisons use light oils, dusts and/or volatile solvents to help penetrate this same cuticle. **Caution: Remember, Safe Solutions Tweetmint Enzyme Cleaners, Pet Wash and/or Lice R Gone® shampoos all have less than 1% protease and all of them will kill all insects, including beneficials, so use them outside with great discretion!** (See also protease enzymes.) Note: You can adjust the dilution rate (1 - 500 or about ½ oz. enzyme cleaner per gallon water) when spraying for soft-bodied pests, e.g., aphids; lady bugs and other beneficials will not be destroyed at this rate. For some pest species, e.g., spiders, ticks and yellowjackets, we recommend you only use Safe Solutions Tweetmint Enzyme Cleaner with Peppermint at a rate of 1 oz. per 1 quart water. You can purchase enzyme shampoos or cleaners or soaps from Safe Solutions, Inc. by phoning 1-888-443-8738. Gabriel Cousins, M.D. has stated, “All life depends on enzyme function. When our enzymes are depleted, so is our vital force and health.” Enzymes, therefore, (in the Author’s opinion) do not need to be “registered”; they are naturally occurring, biological controls that have been controlling insects since the beginning of time.

Epsom Salts - Not a salt as the name would imply; it is a naturally-derived compound called magnesium sulfate - a combination of magnesium and sulfur. Diluted in hot water and then cooled will soothe mosquito bites and will kill insects and plants when sprayed on them. When sprayed **lightly** (½ cup per gallon water) on plants it encourages leaf and flower production and improved resistance and is a great source of magnesium for plants. Magnesium is the central atom of chlorophyll, which is what makes plants green and enables photosynthesis. Sulfur helps in the uptake and efficiency of nitrogen and plays an important role in the formation of plant vitamins and enzymes. It will not replace organic fertilizers, but will truly enhance your feeding program.

Epsom Salts Bath - Please read Chapter 16.

Equal® - Try using a packet of Equal® to control sweet-eating ants and mice.

Eretmocerus mundus - After selecting a suitable whitefly nymph, the female of this parasitic wasp chemically marks its back with lipids or marking pheromones that alert other females this particular nymph already has a wasp egg/larvae feeding inside.

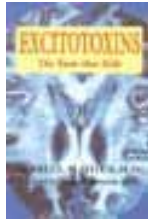
Essential Oils - The essential oils of peppermint and rosemary will control lice (Veal 1996). A number of essential oils have insect-repelling properties and/or are antifungal, such as oils of cedarwood, camphor, citrus peel, clove, cinnamon, menthol, mint, oregano, tansy, tea tree, lavender, lemongrass (citronella), limonene, eugenol, pennyroyal, neem, eucalyptus (1,8-cineole), patchouli, rosemary, orange, peppermint, terpineol, thyme, anise seed and bergamot - these can be diluted and applied to the skin, clothing and/or bedding - never applied undiluted oils to the skin and always check to see if you are allergic or sensitive to them before treating large areas. Rosemary oil may cause contact dermatitis and contribute to occupational asthma (Lemiere 1996). Pregnant women should never use pennyroyal internally or even topically. **Always check to see if you react to a small diluted amount first. All oils, especially essential oils, must be used at rates less than 1.5% to 2% to avoid phytotoxic burning of plants and/or harming pets.**

Eucalyptus - Herb annual. Aromatic flea repellent. Eucalyptus oils will also control insects; it is said to repel flies, mites, fleas, cockroaches and mosquitoes. Eucalyptus (pure castile) soap is another great Pestisafe® that

controls pests and acts as a deodorizer and disinfectant. The oil brings soothing relief to sore muscles and lessens pain. **CAUTION: It may attract certain biting midges. Make sure you are not sensitive before using this oil. Eucalyptus oil must have a minimum of 70% cineole content to effectively repel mosquitoes. See Citriodora.**

Evaluation - Be honest; how did your control efforts actually result in safe effective and economical pest control? Were the objectives met? Are there better choices? What needs to be "fine tuned"? What more needs to be done? Who has or what are possible better alternatives? What kind of follow-up is needed? What went wrong? What was done right?

Evening Primrose - helps reduce prostatic inflammation when taken with saw palmetto.



Excitotoxins - will kill insects and rodents, but there are books called - **EXCITOTOXINS: THE TASTE THAT KILLS**, written by Dr. Russell Blayblock (Health Press 1-800-643-2665) and **DEFENSE AGAINST ALZHEIMER'S DISEASE**, written by DR H. J. Roberts (diabetic specialist)

These two doctors will be posting a position paper with some case histories on the deadly effects of Aspartame on the Internet. According to the Conference of the American College of Physicians, "We are talking about a plague of neurological diseases caused by this deadly poison."

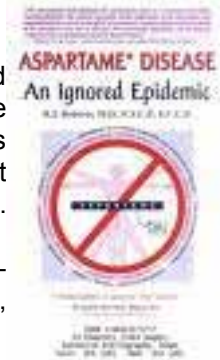
Aspartame in diet soda is truly NOT a diet product! It is a chemically altered, multiple SODIUM (salt) and ASPARTAME containing product that actually makes you crave carbohydrates. It is far more likely to make you GAIN weight!

These products also contain formaldehyde, which stores in the fat cells, particularly in the hips and thighs. Formaldehyde is an absolute toxin and is used primarily to preserve "tissue specimens." See Formaldehyde. Many products we use every day contain this chemical, but we SHOULD NOT store it IN our bodies!

Dr. H.J. Roberts stated in his lectures that once free of the "diet products" and with no significant increase in exercise; his patients lost an average of 19 pounds over a trial period.

Aspartame is especially dangerous for diabetics. We found that some physicians, who believed that they had a patient with retinopathy, in fact, had symptoms caused by Aspartame. The Aspartame drives the blood sugar out of control. Thus diabetics may suffer acute memory loss due to the fact that aspartic acid and phenylalanine are NEUROTOXIC when taken without the other amino acids necessary for a good balance. Treating diabetes is all about BALANCE.

Especially with diabetics, the Aspartame passes the blood/brain barrier and it then deteriorates the neurons of the brain, causing various levels of brain damage, seizures, depression, manic depression, panic attacks, uncontrollable anger and rage.



Consumption of Aspartame causes these same symptoms in non-diabetics, as well. Documentation and observation also reveal that thousands of children diagnosed with ADD and ADHD have had complete turnarounds in their behavior when these chemicals have been removed from their diet. So called "behavior modification prescription drugs" (Ritalin and others) are no longer needed. Truth be told, they were never NEEDED in the first place! Most of these children were being "poisoned" on a daily basis with the very foods that were "better for them than sugar." **See Aspartame.**

Ex-Lax® - When fed to rodents, laxatives will literally make them defecate themselves to death.

Exclusion - Keep pests from entering with screens, properly fitting doors and windows, caulk, cement, rodent guards, etc. You can fill large voids/cavities with aerosol foam insulation. **Screening Caution:** Screening will severely restrict air flow into vents, so if you need to screen vents, build a box with a surface area large enough to allow proper air flow. Your screen manufacturer will provide you with tables that determine how much the air flow will be restricted.

Exosect Auto-confusion Mating Disruption System - lures male pest insects into a trap where, using electrostatic powder technology, they are covered with pest specific female pheromones and powder. Males pass

the gender-confusing powder onto other males who are attracted to the sex pheromone and the cycle continues on and on.

Black's Law Dictionary defines "intoxication" as a situation where, by reason of taking intoxicants, an individual does not have the normal use of his physical or mental faculties, thus rendering him incapable of acting in the manner in which an ordinary, prudent and cautious man, in full possession of his faculties, using reasonable care, would act under like conditions. About 6,000 new synthetic chemicals are added to our environment in just the U. S. every year! Today we have 500 chemicals residing in us that were not there in 1920; we have become full of toxins - intoxicated - only apparently we can't sober up! To add even more toxic, volatile poisons to this cesspool we carry is truly absurd! Especially if these volatile poisons do not even control the target pests! Obviously, we no longer have the normal use of our faculties. **It is time to get clean and sober and use some Pestisafes®!**

INTELLIGENT PEST MANAGEMENT®

The Art of War - In any war, one must have a sword (an offensive weapon) and a shield (defensive protection) - when we choose to only use volatile, synthetic pesticide poisons to "control" pests, we have no shield, no protection and our only "weapon" is attacking us and not our enemy.

In our ongoing war against home and garden pests, over 70 million American households make more than 4 billion pesticide applications each and every year. At least 85% of Americans or 84.5 million households maintain a poison arsenal of at least 3-4 synthetic poisons ranging from no pest strips, pesticidal shampoos, aerosols, granules, liquids and dusts. There are over 21,000 different over-the-counter household synthetic pesticide poison products containing over 300 active ingredients and as many as 1,700 "inert" ingredients per a 1990 EPA study prepared by Research Triangle Institute. The "National Home & Garden Pesticide Use Survey" found at least 75% of all American households use insecticide poisons, and consider cockroaches and ants as their leading pest enemies.

In 1993, there were over 140,000 reported pesticide poison exposures; 93% of these involved home poison use reported nationwide to poison control centers - about 25% had (acute) pesticide poisoning symptoms (over half involved children under 6).

The Chinese Sage, Sun Tzu's "The Art of War" written in China 500 B.C. clearly warned: "There has never been a protracted war from which a country has benefited."

Since the 1940s advent of volatile, synthetic pesticide poisons we have waged a protracted war against pest populations and now our air, water, food, mother's milk, blood, and adipose tissue all "normally" contain significant residues of these poisons, their metabolites, their "inerts" and contaminates! We have suffered an ever-increasing array of health effects, damages, and deaths - yet our pest "enemy" continues not only to flourish, but to increase. We have continually killed our own allies (the beneficials), poisoned our own water, air, and food and, thereby, sickened, wounded or killed ourselves and our own forces and continually ignored our enemy's natural weaknesses and engaged in warfare using only one (useless) weapon! We have totally forgotten how to protect ourselves and how to successfully wage war on our pest enemy. In 1950 fewer than 20 species of insects showed signs of synthetic pesticide resistance. In 1960 Rachel Carson had documented 137 species were resistant to at least one pesticide poison and noted it was the early rumblings of an avalanche of synthetic pesticide resistance. By 1990 the number of documented pesticide-resistant insect and mite species was 504 and, obviously, is still increasing. In addition to insects and mites, we have many other pesticide resistances developing, e.g., bacteria, fungus, weeds, etc.

In 1993, 1 in 7 Americans got cancer. We now have spent \$25 billion on cancer research (a river of gold), now 1 out of every 2 (or more) Americans will get cancer breast; cancer will be the #1 killer and prostate cancer will be the #2 killer of Americans! When I wrote this at least one in eight women was doomed to get breast cancer. Since 1960 - 2000, more than 950,000 women had died from breast cancer and almost half of these deaths had occurred in the last 10 years! Putting this in perspective - only 617,000 Americans have died in all the wars our country has fought during the 20th Century! Unless we desire death of our own race, we must stop releasing tons of virtually untested, unstable, synthetic pesticide poisons that are creating a synergistic

contamination that no one can honestly say they can truly assess all of the human health risks for and which still does not even control our pest enemy! Some of the “inerts” can continue to contaminate for much longer than the active poison ingredients, e.g., some *inerts* have a half-life of greater than 880 years!

Yet, the U. S. annually **still** blasts itself with about ½ million tons of volatile, synthetic pesticide poison active ingredients which cost \$4.1 billion and provide fewer and fewer benefits. Since synthetic pesticide poisons were introduced into agriculture at the end of World War II, total crop losses due to insect damage (despite a tenfold increase in insecticide poison) have almost doubled - from 7% in the 1940s, when all agriculture was essentially organic, to 13% by the end of the 1980s. In 1945 almost no insecticide poison use was used on corn and the USDA noted insect damage only averaged about 3.5%. Despite more than one thousandfold increase in the use of synthetic insecticide poisons on corn, losses to insects now average 12%! Entomological Journals are filled with pesticide resistance problems developing all over the world - obviously, synthetic pesticides quickly create resistant or immune pests. **Pestisafes® normally do not!**

The clarity of Sun Tzu's thought is still acted upon by Chinese generals of today; it is **“The supreme art of war is to subdue the enemy without fighting.”** This supreme art is what the author has continually developed upon in his intelligent pest management® manual, *The Best Control*,® and this book. The Author, like Sun Tzu, believes “The skillful strategist should be able to subdue the enemy's army without engaging it, to take his cities without laying siege to them, and to overthrow his State without bloodying swords”. One of Sun Tzu's admirers was Mao Tse Tung - in Chiang Kai-Shek's army - most of the younger officers considered Sun Tzu's thoughts to be out-of-date and hardly worth study in the era of mechanized weapons. Chairman Mao Tse-Tung disagreed with his enemy and in May, 1928 wrote “on protracted war”, selected works Vol. II page 156 that “The object of war is specifically to preserve oneself and destroy the enemy” (to destroy the enemy means to disarm him or “deprive him of the power to resist”, and does not mean to destroy every member of his forces physically).

This “truth” taken from the “Little Red Book”, contains the essence to true IPM. To use toxic, volatile poisons that do not preserve us, but rather destroy our own people, pets and natural allies without even diminishing, much less destroying our pest enemy, but which in truth actually preserve our pest enemy and even prosper our pest enemy is to ensure the annihilation of those living things (including yourself) you are trying to protect and preserve!

All of the guiding principles of military operations grow out of this one basic principle: to strive to the utmost to preserve one's own strength and destroy that of the enemy . . . to release nerve gases, hormonal disrupters, carcinogens, mutagens, etc. (poisons) into or onto one's own ambient air, food, or water is to ensure our own defeat or destruction - while preserving that of our resistant enemy, and totally ignores the basis of all successful military principles! The communist Chinese Red Army defeated General Chiang Kai-Shek using this very principle and Mao noted that “without preparedness - superiority is not real superiority and there can be no initiative either. Having grasped this point, a force which is inferior, but prepared can often defeat a superior enemy by surprise attack.” I warn you our “inferior” pest enemy is already resistant to our “superior” pesticides and is already winning the war - common sense (which is not too common) and the use of true IPM as detailed in the Intelligent Pest Management® manual, *The Best Control II*® and this book will yet turn the tide in our favor.

EPA Exempted Ingredients - The EPA is convinced that the deregulation of low risk products is wise. Exempted products should not require significant monitoring and it will not be difficult for states to identify properly exempted products. **You must, however, not add any safe product (like detergent) that is not specifically on the exempted lists.** Producers are now free to sell these materials as pesticides without prior approval or registration with the EPA. In developing the exemption list, consideration was given to availability of the pesticidal substance, whether it is a common food or food constituent, whether the mode of action is non-toxic, and whether the substance is recognized by the Food and Drug Administration (FDA) as safe. Other considerations were absence of information showing significant adverse effects, low probability of significant exposure and probably lack of persistence in the environment.

EPA exempted least-toxic pesticides - You can not add 1% or less of anything other than these specific active and inert exempted ingredients to your least-toxic or non-toxic formula or you will make your Pestisafe® product an “unregistered pesticide”.

There are several restrictions. Among these are:

- The exempted pesticide product label must specifically identify all the exempted inert ingredients of the product and other the percent by weight of the exempted active ingredient must be listed.
- No false or misleading statements about the exempted product can appear on the label.
- The product can not claim either to “control or mitigate microorganisms that pose a threat to human health, including, but not limited to, disease-transmitting bacteria or viruses, or claim to control insects or rodents carrying specific diseases, including, but not limited to, the ticks that carry Lyme disease.” (Poison can legally still make these unsubstantiated claims.)

Exempted Pesticide Active and Inert Ingredients — On May 6, 1996 a number of least-toxic pesticide ingredients were exempted from EPA registration. These pesticides have become Pestisafes®. They include:

Exempted Pesticide Active and Inert Ingredients			
Acetic Acid	Corn starch	Lemongrass oil	Rice hulls
Agar	Corn syrup	Lime	Rosemary/rosemary oil
Alfalfa	Cotton	Limestone	Rubber
Alfalfa meal	Cottonseed meal	Linseed oil	Rye flour
Almond hulls	Cottonseed oil		
Almond shells	Cracked oats	Malic acid	Safflower oil
Alpha cellulose	Cracked wheat	Malt flavor	Sawdust
Apple pomace		Meat meal	Seaweed edible
Attapulgate clay	Dextrin	Meat scraps	Sesame/sesame oil
	Dextrose	Medicated feed	Shale
Beef fat	Dolomite	Mica	Soapstone
Bees wax	Douglas fir bark	Milk	Sodium bicarbonate
Beet powder	Dried blood	Millet seed	Sodium chloride (common salt)
Bentonite		Mineral oil USP	Sodium lauryl sulfate
Bone meal	Edible fish meal	Mint/mint oil	Sorbitol
Bran	Edible fish oil	Molasses	Soy flour
Bread crumbs	Eggs	Montmorillonite clay	Soy protein
	Egg shells		Soybean hulls
Calcareous shale	Eugenol	Nitroen	Soybean meal
Calcite		Nutria Meat	Sucrose
Calcium carbonate	Flour	Nylon	Sugar beet meal
Canary seed	Fuller's earth		Sunflower seeds
Cane syrup		Oatmeal	
Carbon dioxide	Garlic/garlic oil	Oats	Tallow
Cardboard	Gelatin	Olive oil	Thyme/thyme oil
Carrageenan	Geraniol	Onions	
Carrots	Geranium oil	Orange pulp	Vanillin
Casein	Glue (depolymerized animal collagen)	Oyster shells	Vermicullite
Castor oil	Glycerin		Viitamin C
Cedar oil	Granite	Paper	Vitamin E
Cheese	Grape pomace	Paprika	

Chlorophyll	Graphite	Parrafin wax	Walnut flour
Cinnamon/cinnamon oil	Ground oats	Peanut butter	Walnut shells
Citric acid	Guar gum	Peanut oil	Water
Citronella/citronella oil	Gum arabic	Peanut shells	Wheat
Citrus meal	Gum ttragacarth	Peanuts	Wheat germ oil
Citrus pectin	Gypsum	Peat moss	Whey
Citrus pulp		Pecan shell flour	White pepper
Cloves/clove oil	Hydrogenated vegetable oils	Pectin	Wintergreen oil
Cocoa	Honey	Peppermint/peppermint oil	
Cocoa shells		2-Phenethyl Propionate (2-phenylethyl propionate)	Xanthangum
Cocoa shell flour	Invert sugar	Polyethylene film	
Cod liver oil	Invert syrup	Polyethylene pellets	Yeast
Coffee grounds		Potassium sorbate	
Cookies	Kaolinite clay	Potatoes	Zinc metal strips (consisting solely of zinc metal and impurities)
Cork		Pumice	
Corn	Lactose	Putrescent whole egg solids	
Corn cobs	Lanolin		
Corn flour	Lard	Raisins	
Corn gluten meal	Latex	Red cedar chipa	
Corn oil	Lauryl sulfate	Red dog flour	
	Lecithin	Rice	

In the following pages you will find tables for the Active Ingredients Exempted Under 25(b) of the Federal Insecticide, Fungicide, & Rodenticide Act and Inert Ingredients Eligible for FIFRA 25(b) Pesticide Products, Last Updated December 20, 2010

Active Ingredients Exempted Under 25(b) of the Federal Insecticide, Fungicide, & Rodenticide Act

* indicates exempt active ingredients that are also exempt from pesticide residue tolerance requirements

Castor oil (U.S.P. or equivalent)*	Linseed oil
Cedar oil	Malic acid
Cinnamon and cinnamon oil*	Mint and mint oil
Citric acid*	Peppermint and peppermint oil*
Citronella and Citronella oil	2-Phenethyl propionate (2-phenylethyl propionate)
Cloves and clove oil*	Potassium sorbate*
Corn gluten meal*	Putrescent whole egg solids
Corn oil*	Rosemary and rosemary oil*
Cottonseed oil*	Sesame (includes ground sesame plant) and sesame oil*
Dried Blood	Sodium chloride (common salt) *
Eugenol	Sodium lauryl sulfate
Garlic and garlic oil*	Soybean oil
Geraniol*	Thyme and thyme oil*
Geranium oil	White pepper
Lauryl sulfate	Zinc metal strips (consisting solely of zinc metal and impurities)
Lemongrass oil	



Inert Ingredients Eligible for FIFRA 25(b) Pesticide Products Last Updated December 20, 2010

Provided below are the inert ingredients that are eligible for inclusion in pesticide products under the [Federal Insecticide, Fungicide, and Rodenticide Act \(FIFRA\)](#)'s [Section 25\(b\)](#). This listing of minimal risk inert ingredients updates what has been historically referred to as "4A" under [Pesticide Registration Notice 2000-6](#).

1. Commonly consumed food commodities, animal feed items, and edible fats and oils as described in [40 CFR 180.950](#)(a), (b), and (c) may be used as inert ingredients in FIFRA Section 25(b) pesticide products applied to food use sites (e.g., food crops, animals used for food) and in FIFRA Section 25(b) pesticide products applied to nonfood use sites (e.g., ornamental plants, highway right-of-ways, rodent control). Specific chemical substances listed under [40 CFR 180.950](#)(e) that are also acceptable for use as inert ingredients in FIFRA Section 25(b) pesticide products are included in the table below.

2. In addition to (1) above, the following inert ingredients are also eligible for inclusion in FIFRA Section 25(b) pesticide products. These ingredients are listed by CAS Registry Number and chemical name (common names are given, with systematic names included as synonyms in brackets where applicable). In addition, this listing has two columns to indicate whether the inert ingredient can be used in FIFRA Section 25(b) products applied to food use and/or nonfood use sites.

CAS Reg. No.	Chemical Name	Food Use ^{1/}	Nonfood Use
77-90-7	Acetyl tributyl citrate [Citric acid, 2-(acetyloxy)-, tributyl ester]	✓	✓
9002-18-0	Agar		✓
N/A	Almond hulls		✓
N/A	Almond shells		✓
10016-20-3	alpha-Cyclodextrin	✓	✓
1327-36-2	Aluminatesilicate		✓
1327-43-1	Aluminum magnesium silicate [Silicic acid, aluminum magnesium salt]		✓
12736-96-8	Aluminum potassium sodium silicate [Silicic acid, aluminum potassium sodium salt]		✓

CAS Reg. No.	Chemical Name	Food Use^{1/}	Nonfood Use
1335-30-4	Aluminum silicate		✓
1344-00-9	Aluminum sodium silicate [Silicic acid, aluminum sodium salt]	✓	✓
12003-51-9	Aluminum sodium silicate (1:1:1) [Silicic acid (H ₄ SiO ₄), aluminum sodium salt (1:1:1)]		✓
1863-63-4	Ammonium benzoate [Benzoic acid, ammonium salt]		✓
1002-89-7	Ammonium stearate [Octadecanoic acid, ammonium salt]		✓
113894-85-2	Amylopectin, acid-hydrolyzed, 1-octenylbutanedioate	✓	✓
125109-81-1	Amylopectin, hydrogen 1-octadecenylbutanedioate	✓	✓
N/A	Animal glue	✓	✓
137-66-6	Ascorbyl palmitate		✓
12174-11-7	Attapulgate-type clay	✓	✓
8012-89-3	Beeswax	✓	✓
1302-78-9	Bentonite	✓	✓
85049-30-5	Bentonite, sodian		✓
7585-39-9	beta-Cyclodextrin	✓	✓
68409-75-6	Bone meal		✓
N/A	Bran		✓
N/A	Bread crumbs		✓
34451-19-9	(+)-Butyl lactate [Lactic acid, n-butyl ester, (S)]	✓	✓
138-22-7	Butyl lactate [Lactic acid, n-butyl ester]	✓	✓
123-95-5	Butyl stearate [Octadecanoic acid, butyl ester]	✓	✓
N/A	Calcareous shale	✓	✓
13397-26-7	Calcite (Ca(Co ₃))	✓	✓
62-54-4	Calcium acetate		✓
5743-26-0	Calcium acetate monohydrate [Acetic acid, calcium salt, monohydrate]		✓
2090-05-3	Calcium benzoate [Benzoic acid, calcium salt]		✓
471-34-1	Calcium carbonate	✓	✓
7693-13-2	Calcium citrate [Citric acid, calcium salt]	✓	✓
6107-56-8	Calcium octanoate		✓
12168-85-3	Calcium oxide silicate (Ca ₃ O(SiO ₄))		✓
1344-95-2	Calcium silicate [Silicic acid, calcium salt]	✓	✓
1592-23-0	Calcium stearate [Octadecanoic acid, calcium salt]		✓

CAS Reg. No.	Chemical Name	Food Use^{1/}	Nonfood Use
7778-18-9	Calcium sulfate		✓
10101-41-4	Calcium sulfate dihydrate		✓
10034-76-1	Calcium sulfate hemihydrate		✓
N/A	Canary seed		✓
7440-44-0	Carbon		✓
124-38-9	Carbon dioxide		✓
9000-11-7	Carboxymethyl cellulose [Cellulose, carboxymethyl ether]	✓	✓
N/A	Cardboard		✓
8015-86-9	Carnauba wax	✓	✓
9000-40-2	Carob gum [Locust bean gum]	✓	✓
9000-07-1	Carrageenan	✓	✓
9000-71-9	Caseins		✓
8001-79-4	Castor oil	✓	✓
8001-78-3	Castor oil, hydrogenated	✓	✓
N/A	Cat food		✓
9004-34-6	Cellulose	✓	✓
9004-35-7	Cellulose acetate	✓	✓
51395-75-6	Cellulose, mixture with cellulose carboxymethyl ether, sodium salt	✓	✓
65996-61-4	Cellulose, pulp	✓	✓
68442-85-3	Cellulose, regenerated	✓	✓
N/A	Cheese		✓
479-61-8	Chlorophyll a	✓	✓
519-62-0	Chlorophyll b	✓	✓
N/A	Citrus meal	✓	✓
77-92-9	Citric acid	✓	✓
5949-29-1	Citric acid, monohydrate	✓	✓
9000-69-5	Citrus pectin		✓
68514-76-1	Citrus pulp	✓	✓
N/A	Clam shells		✓
8002-31-1	Cocoa	✓	✓
N/A	Cocoa shell flour		✓
N/A	Cocoa shells	✓	✓
8001-69-2	Cod-liver oil	✓	✓
68916-18-7	Coffee grounds	✓	✓
N/A	Cookies		✓
61789-98-8	Cork		✓
N/A	Corn cobs	✓	✓
N/A	Cotton		✓
68424-10-2	Cottonseed meal		✓
N/A	Cracked wheat		✓

CAS Reg. No.	Chemical Name	Food Use^{1/}	Nonfood Use
26402-22-2	Decanoic acid, monoester with 1,2,3-propanetriol	✓	✓
9004-53-9	Dextrins	✓	✓
49553-76-6	Diglyceryl monooleate [9-Octadecenoic acid, ester with 1,2,3-propanetriol]		✓
12694-22-3	Diglyceryl monostearate [9-Octadecanoic acid, monoester with oxybis(propanediol)]		✓
27638-00-2	Dilaurin [Dodecanoic acid, diester with 1,2,3-propanetriol]	✓	✓
26657-95-4	Dipalmitin [Hexadecanoic acid, diester with 1,2,3-propanetriol]	✓	✓
3609-96-9	Dipotassium citrate [Citric acid, dipotassium salt]	✓	✓
144-33-2	Disodium citrate [Citric acid, disodium salt]	✓	✓
7727-73-3	Disodium sulfate decahydrate		✓
61790-53-2	Diatomaceous earth (less than 1% crystalline silica) [Kieselguhr; Diatomite]	✓	✓
27215-38-9	Dodecanoic acid, monoester with 1,2,3-propanetriol	✓	✓
16389-88-1	Dolomite	✓	✓
N/A	Douglas fir bark	✓	✓
N/A	Egg shells		✓
N/A	Eggs		✓
687-47-8	(+)-Ethyl lactate [Lactic acid, ethyl ester, (S)]	✓	✓
97-64-3	Ethyl lactate [Lactic acid, ethyl ester]	✓	✓
68476-25-5	Feldspar		✓
N/A	Fish meal		✓
8016-13-5	Fish oil (not conforming to 40 CFR 180.950)		✓
8031-18-3	Fuller's earth		✓
110-17-8	Fumaric acid	✓	✓
17465-86-0	gamma-Cyclodextrin	✓	✓
9000-70-8	Gelatins	✓	✓
71010-52-1	Gellan gum	✓	✓
68476-37-9	Glue (as depolymd. animal collagen)		✓
56-81-5	Glycerin [1,2,3-Propanetriol]	✓	✓
111-03-5	Glycerol monooleate [9-Octadecenoic acid (Z)-, 2,3-dihydroxypropyl ester]		✓
36354-80-0	Glyceryl dicaprylate [Octanoic acid, diester with 1,2,3-propanetriol]	✓	✓
53563-63-6	Glyceryl dimyristate [Tetradecanoic acid, diester with 1,2,3-propanetriol]	✓	✓

CAS Reg. No.	Chemical Name	Food Use^{1/}	Nonfood Use
25637-84-7	Glyceryl dioleate [9-Octadecenoic acid (9Z)-, diester with 1,2,3-propanetriol]		✓
1323-83-7	Glyceryl distearate	✓	✓
27214-38-6	Glyceryl monomyristate [Tetradecanoic acid, monoester with 1,2,3-propanetriol]	✓	✓
26402-26-6	Glyceryl monooleate [Octadecanoic acid, monoester with 1,2,3-propanetriol]	✓	✓
25496-72-4	Glyceryl monooleate [9-Octadecenoic acid (9Z)-, monoester with 1,2,3-propanetriol]		✓
31566-31-1	Glyceryl monostearate [Octadecanoic acid, monoester with 1,2,3-propanetriol]	✓	✓
11099-07-3	Glyceryl stearate [Octadecanoic acid, ester with 1,2,3-propanetriol]	✓	✓
N/A	Granite	✓	✓
7782-42-5	Graphite		✓
9000-30-0	Guar gum	✓	✓
9000-01-5	Gum arabic	✓	✓
9000-65-1	Gum tragacanth	✓	✓
13397-24-5	Gypsum	✓	✓
1317-60-8	Hematite (Fe ₂ O ₃)		✓
1415-93-6	Humic acid	✓	✓
68334-00-9	Hydrogenated cottonseed oil		✓
84681-71-0	Hydrogenated rapeseed oil		✓
8016-70-4	Hydrogenated soybean oil	✓	✓
9004-62-0	Hydroxyethyl cellulose [Cellulose, 2-hydroxyethyl ether]	✓	✓
9004-64-2	Hydroxypropyl cellulose [Cellulose, 2-hydroxypropyl ether]	✓	✓
9004-65-3	Hydroxypropyl methyl cellulose [Cellulose, 2-hydroxypropyl methyl ether]	✓	✓
12068-86-9	Iron magnesium oxide (Fe ₂ MgO ₄)		✓
1309-37-1	Iron oxide (Fe ₂ O ₃)	✓	✓
12259-21-1	Iron oxide (Fe ₂ O ₃), hydrate		✓
1317-61-9	Iron oxide (Fe ₃ O ₄)		✓
1345-25-1	Iron oxide (FeO)		✓
67-63-0	Isopropyl alcohol [2-Propanol]	✓	✓
110-27-0	Isopropyl myristate	✓	✓
1332-58-7	Kaolin	✓	✓
63-42-3	Lactose	✓	✓
64044-51-5	Lactose monohydrate		✓
8006-54-0	Lanolin	✓	✓

CAS Reg. No.	Chemical Name	Food Use ^{1/}	Nonfood Use
N/A	Latex rubber		✓
143-07-7	Lauric acid	✓	✓
8002-43-5	Lecithins	✓	✓
68916-91-6	Licorice extract	✓	✓
12001-27-3	Lime (chemical) dolomitic		✓
1317-65-3	Limestone		✓
8001-26-1	Linseed oil		✓
546-93-0	Magnesium carbonate [Carbonic acid, magnesium salt (1:1)]	✓	✓
553-70-8	Magnesium benzoate		✓
1309-48-4	Magnesium oxide	✓	✓
12207-97-5	Magnesium oxide silicate (Mg ₃ O(Si ₂ O ₅) ₂), monohydrate	✓	✓
1343-88-0	Magnesium silicate	✓	✓
1343-90-4	Magnesium silicate hydrate	✓	✓
14987-04-3	Magnesium silicon oxide (Mg ₂ Si ₃ O ₈)		✓
557-04-0	Magnesium stearate [Octadecanoic acid, magnesium salt]	✓	✓
7487-88-9	Magnesium sulfate	✓	✓
10034-99-8	Magnesium sulfate heptahydrate	✓	✓
6915-15-7	Malic acid		✓
8002-48-0	Malt extract		✓
N/A	Malt flavor		✓
9050-36-6	Maltodextrin	✓	✓
9004-67-5	Methylcellulose [Cellulose, methyl ether]	✓	✓
12003-38-2	Mica	✓	✓
12001-26-2	Mica-group minerals		✓
8049-98-7	Milk		✓
N/A	Millet seed		✓
8012-95-1	Mineral oil (U.S.P.)	✓	✓
142-18-7	1-Monolaurin [Dodecanoic acid, 2,3-dihydroxypropyl ester]	✓	✓
589-68-4	1-Monomyristin [Tetradecanoic acid, 2,3-dihydroxypropyl ester]	✓	✓
53998-07-1	Monomyristin [Decanoic acid, diester with 1,2,3-propanetriol]		✓
26657-96-5	Monopalmitin [Hexadecanoic acid, monoester with 1,2,3-propanetriol]	✓	✓
866-83-1	Monopotassium citrate [Citric acid, monopotassium salt]	✓	✓
18996-35-5	Monosodium citrate [Citric acid, monosodium salt]	✓	✓
1318-93-0	Montmorillonite	✓	✓

CAS Reg. No.	Chemical Name	Food Use^{1/}	Nonfood Use
544-63-8	Myristic acid	✓	✓
37244-96-5	Nepheline syenite		✓
7727-37-9	Nitrogen		✓
N/A	Nutria meat		✓
N/A	Nylon		✓
764-71-6	Octanoic acid, potassium salt		✓
1984-06-1	Octanoic acid, sodium salt		✓
8007-69-0	Oils, almond		✓
68917-73-7	Oils, wheat		✓
112-80-1	Oleic acid	✓	✓
N/A	Oyster shells		✓
8002-75-3	Palm oil	✓	✓
68514-74-9	Palm oil, hydrogenated		✓
57-10-3	Palmitic acid [Hexadecanoic acid]	✓	✓
N/A	Paper	✓	✓
8002-74-2	Paraffin wax		✓
N/A	Peanut butter		✓
N/A	Peanut shells		✓
N/A	Peanuts		✓
N/A	Peat moss		✓
9000-69-5	Pectin		✓
130885-09-5	Perlite		✓
93763-70-3	Perlite, expanded		✓
26499-65-0	Plaster of paris		✓
9002-88-4	Polyethylene	✓	✓
9007-48-1	Polyglyceryl oleate	✓	✓
9009-32-9	Polyglyceryl stearate	✓	✓
127-08-2	Potassium acetate [Acetic acid, potassium salt]		✓
1327-44-2	Potassium aluminum silicate, anhydrous	✓	✓
582-25-2	Potassium benzoate [Benzoic acid, potassium salt]		✓
298-14-6	Potassium bicarbonate [Carbonic acid, monopotassium salt]	✓	✓
7447-40-7	Potassium chloride	✓	✓
7778-49-6	Potassium citrate [Citric acid, potassium salt]	✓	✓
68514-28-3	Potassium humate [Humic acids, potassium salts]	✓	✓
13429-27-1	Potassium myristate [Tetradecanoic acid, potassium salt]		✓
143-18-0	Potassium oleate	✓	✓

CAS Reg. No.	Chemical Name	Food Use ^{1/}	Nonfood Use
	[9-Octadecenoic acid (9Z)-, potassium salt]		
7492-30-0	Potassium ricinoleate [9-Octadecenoic acid, 12-hydroxy-, monopotassium salt, (9Z, 12R)-]		✓
24634-61-5	Potassium sorbate [Sorbic acid, potassium salt]	✓	✓
593-29-3	Potassium stearate [Octadecanoic acid, potassium salt]	✓	✓
7778-80-5	Potassium sulfate	✓	✓
7646-93-7	Potassium sulfate [Sulfuric acid, monopotassium salt]		✓
108-32-7	1,2-Propylene carbonate [1,3-Dioxolan-2-one, 4-methyl-]	✓	✓
1332-09-8	Pumice		✓
N/A	Red cabbage color (expressed from edible red cabbage heads via a pressing process using only acidified water)	✓	✓
N/A	Red cedar chips		✓
N/A	Red dog flour		✓
9006-04-6	Rubber		✓
N/A	Sawdust		✓
N/A	Shale		✓
112945-52-5	Silica, amorphous, fumed (crystalline free)	✓	✓
7699-41-4	Silica, amorphous, precipitated and gel	✓	✓
7631-86-9	Silica (crystalline free)	✓	✓
63231-67-4	Silica gel	✓	✓
112926-00-8	Silica gel, precipitated, crystalline-free	✓	✓
10279-57-9	Silica, hydrate	✓	✓
60676-86-0	Silica, vitreous	✓	✓
13776-74-4	Silicic acid (H ₂ SiO ₃), magnesium salt (1:1)	✓	✓
N/A	Soap (The water soluble sodium or potassium salts of fatty acids produced by either the saponification of fats and oils, or the neutralization of fatty acid)	✓	✓
1393-03-9	Soapbark {Quillaja saponin}	✓	✓
308076-02-0	Soapstone	✓	✓
127-09-3	Sodium acetate [Acetic acid, sodium salt]	✓	✓
9005-38-3	Sodium alginate	✓	✓
532-32-1	Sodium benzoate [Benzoic acid, sodium salt]	✓	✓
144-55-8	Sodium bicarbonate	✓	✓
9004-32-4	Sodium carboxymethyl cellulose [Cellulose, carboxymethyl ether, sodium salt]	✓	✓

CAS Reg. No.	Chemical Name	Food Use^{1/}	Nonfood Use
7647-14-5	Sodium chloride	✓	✓
994-36-5	Sodium citrate	✓	✓
68131-04-4	Sodium humate [Humic acids, sodium salts]	✓	✓
143-19-1	Sodium oleate		✓
5323-95-5	Sodium ricinoleate [9-Octadecenoic acid, 12-hydroxy-, monosodium salt, (9Z,12R)-]		✓
822-16-2	Sodium stearate [Octadecanoic acid, sodium salt]	✓	✓
7757-82-6	Sodium sulfate	✓	✓
50-70-4	Sorbitol [D-glucitol]	✓	✓
N/A	Soy protein		✓
8030-76-0	Soya lecithins [Lecithins, soya]	✓	✓
N/A	Soybean hulls		✓
68308-36-1	Soybean meal		✓
68513-95-1	Soybean, flour		✓
57-11-4	Stearic acid [Octadecanoic acid]	✓	✓
7704-34-9	Sulfur		✓
68425-17-2	Syrups, hydrolyzed starch, hydrogenated	✓	✓
71012-10-7	Tetraglyceryl monooleate [9-Octadecenoic acid (9Z)-, monoester with tetraglycerol]		✓
813-94-5	Tricalcium citrate [Citric acid, calcium salt (2:3)]	✓	✓
77-93-0	Triethyl citrate [Citric acid, triethyl ester]	✓	✓
866-84-2	Tripotassium citrate [Citric acid, tripotassium salt]	✓	✓
6100-05-6	Tripotassium citrate monohydrate [Citric acid, tripotassium salt, monohydrate]	✓	✓
68-04-2	Trisodium citrate [Citric acid, trisodium salt]	✓	✓
6132-04-3	Trisodium citrate dehydrate [Citric acid, trisodium salt, dehydrate]	✓	✓
6858-44-2	Trisodium citrate pentahydrate [Citric acid, trisodium salt, pentahydrate]	✓	✓
57455-37-5	Ultramarine blue [C.I. Pigment Blue 29]	✓	✓
57-13-6	Urea	✓	✓
121-33-5	Vanillin [Benzaldehyde, 4-hydroxy-3-methoxy-]	✓	✓

CAS Reg. No.	Chemical Name	Food Use^{1/}	Nonfood Use
1318-00-9	Vermiculite	✓	✓
8028-52-2	Vinegar (maximum 8% acetic acid in solution)	✓	✓
50-81-7	Vitamin C [L-Ascorbic acid]	✓	✓
1406-18-4	Vitamin E	✓	✓
N/A	Walnut flour		✓
N/A	Walnut shells		✓
N/A	Wheat		✓
N/A	Wheat flour		✓
8006-95-9	Wheat germ oil		✓
92129-90-3	Whey		✓
8042-47-5	White mineral oil (petroleum)	✓	✓
68917-75-9	Wintergreen oil		✓
13983-17-0	Wollastonite (Ca(SiO ₃))		✓
N/A	Wool		✓
11138-66-2	Xanthan gum	✓	✓
68876-77-7	Yeast		✓
1318-02-1	Zeolites (excluding erionite (CAS Reg. No. 66733-21-9))	✓	✓
68989-22-0	Zeolites, NaA		✓
12063-19-3	Zinc iron oxide		✓
1314-13-2	Zinc oxide (ZnO)	✓	✓
557-05-1	Zinc stearate [Octadecanoic acid, zinc salt]	✓	✓

1/ Inert ingredients eligible for FIFRA 25(b) pesticide products having tolerance exemptions under one or more of the following sections of 40 CFR Part 180: 910; 920, 930, 950(a), 950(b), 950(c), 950(e), 960

Revised 12/20/10

Experiment - There will always be something new. Your efforts to find a better way have to precede all your other efforts - then share what you discover with others. Einstein noted that “the process of scientific discovery is in effect a continual flight from wonder,” and that “everything that is really great and inspiring is created by the individual who can labor in freedom.”

Extracts - of pumpkin, cucumber, garlic and many hundreds of other plants have been found toxic to nematode parasites and other pest species in animals and the soil. Extracts from plants have great pesticidal value and potential as killers, repellents and/or inhibitors.

Fabric Fences - Simply laying a lightweight polypropylene material, e.g., Reemay®, over crops will keep most 4-legged pests from eating the vegetables underneath. Floating row covers keep woodchucks and rabbits away - they make no effort to dig under the floating fabric or even push it aside.

Fabric Softener Sheets - Bounce® Fabric Softener Sheets worn on the belt or sticking out of your pockets may repel mosquitoes - a lot of old retirees in Florida swear by them. Liquid fabric softeners often contain formaldehyde, limonene, benzyl acetate, benzyl alcohol, ethanol and/or a-terpeneol. **Be careful if you have allergies.**

Fallowing - or simply allowing the ground to rest is just one more agricultural technique or way to control pest problems without using “registered” poisons. It is advised that when you allow the land to lie fallow you allow it to do so under a green manure crop. G-d was the first to mandate and/or advise the use of this technique.

False Hellebore - Acts as a stomach poison for insects, but remember, it was also used to dip arrow heads into to make slight wounds fatal.

False Indigo (*Amorpha fruticosa*) - An acetone extract of flowers is repellent to chinch bugs and striped cucumber beetles. Powdered mature pods with seeds are moderately toxic to Mexican bean beetle larvae. A sugar derivative, amorpha is effective as dust against chinch bugs, cottonaphids, squash bugs, tarnished plant bugs, potato leafhoppers, blister beetles and spotted cucumber beetles. The fruit is more insecticidal than roots.

Fans - will control roaches and fruitflies in kitchens (and other areas) if left on 24 hours a day and when used outside safely keep mosquitoes and biting flies at bay. To control dust and dust mites take a (square box) window fan, using duct tape attach two furnace filters (cut to size) to the fan grills on both the intake and exhaust sides. Turn on the fan and it will filter dust and mites from the air - use activated charcoal filters and you also remove odors, pesticides and increase filtration results. Change charcoal filters as needed. **See also Deodorizer.**

Fatty Acids of Soap (soft soap) - kill insects quickly.

Fencing, Screens and Chicken Wire - all keep many pests under control. Cover rain barrel tops with a fine screen 14 to 18 wires per inch - rain water will pass through but mosquitoes can not. Use invisible fencing to keep dogs inside an area to control deer. **Fencing can be used to safely and effectively keep creatures in or used to keep creatures out.**

Fenugreek seeds (*Trigonella foenum graecum*) - In two small studies of individuals with either type 1 or type 2 diabetes, fenugreek seed powder lowered blood glucose and improved levels of blood cholesterol and triglycerides, among other beneficial effects. The active ingredient responsible for the antidiabetic properties of fenugreek is in the defatted portion of the seed, which contains the alkaloid trigonelline, nicotinic acid, and coumarin.

Feverfew (*Chrysanthemum parthenium*) - Simply chew on a leaf to stop a (migraine) headache. You can make a mosquito and fly repellent by grinding a fine powder out of feverfew (looks like clumps of miniature daisies), then apply the powder to your face and body. To make a lotion, steep 2 teaspoons of feverfew powder in a cup of brandy for 2 weeks. Add a few drops of your tincture to cold water and apply to the face and body; be sure to try this mix on a small area first. **Some people are sensitive to this plant and if you are pregnant you should avoid this plant. Side effects include canker sores and gastrointestinal distress.**

Files - Nothing can help more than keeping proper records of all your inspections, treatments, monitoring, etc. in a file that does not forget.

Film Capsule - The plastic capsule in which 35 mm film is packaged can be made into a liquid ant bait station by drilling a 1/4" or smaller hole as close to the lip edge as possible on opposite sides. The capsule is then filled with 2/3's of an ounce of 83% apple juice, 16% honey or light Karo syrup and 1% disodium octoborate tetrahydrate to just below the punch holes. Snap the lid in place and quickly invert the container. If you have done this properly, no liquid bait leakage will occur if the container remains vertical. The liquid bait will flow into the "trough" lid only as it is consumed by foraging ants. Place at least 8 to 10 bait stations in all areas where carpenter ants have been observed, but out of the reach of children and pets.

Fire or Flaming - destroys weeds, ticks, insects, fungus, and old vegetation, but also buildings and biologic life usually only exists in any quantity in the top few inches of the soil, **so be careful!**

Fire Extinguishers - Take an old (rebuilt) 2½-gallon stainless steel, rechargeable fire extinguisher and fill it with 1½ gallons of water and any water soluble alternative; pump it up to 110# of pressure and you have a wonderfully powerful sprayer.

Fireflies - Fireflies are great predators of snails and slugs.

Firewater - Mix two to four jalapeno, serrano, or habanero peppers, three cloves of garlic, and 1 quart of water in a blender, or chop the peppers and garlic and let them steep in a clear quart jar of water set in the sun for several days. Strain through cheesecloth, and carefully spray as needed; repeat after rain.

Firewood - Store it outside (not inside) until it is needed, away from the building and 6" above ground.

Fish Oil - Omega-3 fatty acids heal arthritis in many people as well as helping prevent colds and flu or any other autoimmune diseases.

Fishberry (*Anamirta cocculus*) - The berry can be used as insecticide and to kill mosquito larvae and fish. **Be careful!**

Flagyl® - Lightly spray a mix of water and Flagyl® on virgin cardboard and this will kill all of the microorganisms in a termite's gut and the whole colony will starve in a few days.

Flannel - Put on some homemade knee-high white flannel socks and walk through the house; fleas jump on and get caught in the nap of them; remove them with a vacuum. Flannel can be used to catch other insects. Try it on bed bugs. See duct tape.

Flea Collar - For dogs only: Mix ½ c. rosemary oil, ¼ c. citronella, 2 T. white cedar oil, peppermint oil and eucalyptus oil in a covered bowl. Soak a natural fiber rope for a few hours; allow the rope to dry and then use as a dog collar.

Flicker - A flicker can eat a few thousand ants per day.

Floating Row Covers - Help to protect plants from insects and weather.

Flour - Dusting plants that are being eaten by grasshoppers or beetles with all-purpose flour (Get some on the insects too.) in the morning when the plants are still wet with dew will cause the insects to ingest so much flour their mouthparts become so gummed up they cannot eat anything, and/or they will eat so much flour they will get sick and die. After 2 days remove the flour with a fine spray of water. If you use self-rising flour, or leave all-purpose flour on plant leaves for more than 2 days, you can kill the plants. If you are trying to kill plants, add some salt.

Flowering Mustard Plants - are used as a trap crop in fields of cole crops because flea beetles prefer mustard which has high concentrations of attractive oils.

Fluoride - Fluoridation is linked to bone cancer (osteosarcoma) in young boys. Many studies now link fluoride use to cancer and shortened life spans. Fluoride has been linked to many deaths, especially in children and old people. Fluoride can cause DNA damage and even kills human cells. The currently accepted estimate for the

minimum lethal dose of fluoride is 5 milligrams of fluoride for each kilogram of bodyweight. Fluoride toothpastes sold in the U.S.A., including those marketed to children, contain this minimum lethal dose of fluoride. Each year Poison Control gets thousands of reports related to excessive ingestion of fluoride. Early symptoms of acute toxicity, e.g., gastrointestinal pain, nausea, vomiting, diarrhea, excess salivation, fever, can be produced at doses as low as 0.1 to 0.3 mg/kg. A dose as low as 5 mg/kg may be fatal for some children. This means the ingestion of a tube can kill the average 9-year-old child and half a tube can kill a 2-year-old child. The number of ingested fluoride supplements with vitamins necessary to kill a 2-year-old is 60 tablets and 90 tablets could kill a 5-year-old. Concentrated fluoride treatments from a dentist can be used to kill rodents when mixed in a bait. That is why it was so dangerous when we used 1080; not only could it kill by ingestion, there was no antidote and inhaled fluoride is implicated in acute respiratory failure. Grand Rapids, Michigan was the first city to add fluoride to the drinking water. NOTE: When the fumigant sulfuryl fluoride breaks down it forms fluoride in the soil, in your home or on your food.

Fly Paper - Make your own: Mix ¼ c. syrup, 1 T. granulated sugar and 1 T. brown sugar in a bowl. Cut strips of brown kraft paper and soak them in this mixture. Let dry overnight. Put a small hole in the top and hang the strips wherever you see flies.

Fly Swatters - Often the best and safest way to control a fly or individual. The main line of defense in any Pestisafe® tool box; you can whack many pests including pets and kids with a (clean) fly swatter.

Fly Tapes - An old reliable way to control a lot of flies (or bats or fleas); can now be purchased in many different forms/shapes. Some have “flies” imprinted on them, or are now in “color” to increase their initial acceptance as a “safe” resting place.

Fly Traps - <http://www.catchmaster.com/> and Safe Solutions Fly Traps, <http://www.safesolutionsinc.com>.

Foam - Aerosol foam cans or better yet guns quickly caulk; fill; seal voids, cracks, crevices; around pipes, doors, and/or windows excluding many spiders, mites, insects and mammals and/or making many habitats inaccessible or unusable. When injected into carpenter ant, bee or hornet nests, foam insulation will quickly “encapsulate” them all and turn them into instant “fossils”.

Foil - Foils can be used to repel insects. Foil potato chip bags can be taped open on a wall and cockroaches will climb into the bag but will be unable to climb out.

Folic Acid - helps prevent birth defects (especially of the spinal cord), heart disease and osteoporosis in adults. Pesticides are a folic acid antagonist.

Food-grade DE - This pure diatomaceous earth product from Safe Solutions, Inc. contains less than ½% silica and is used to stop flour from caking and is what the Author recommends to kill insects, e.g., ear mites. Adding it to animal feed increases flow and decreases mold, stops insect damage, prevents maggots and increases digestibility of the feed and, thereby, increases food production.

Formaldehyde - causes schizophrenic-type condition. **See Notes in Chapter 13 and Aspartame.**

Formula 409 - can be used as a spray to kill insects almost immediately.

Four (4) Thieves Oil - can be used as an insect repellent.

Fragrance and Herbs - Place tansy near your kitchen door or where flies tend to cluster. Other repellents include oil of cloves and mint springs. Set a sponge in a saucer and soak it with oil of lavender to repel flies. A pot of basil set on a window sill or table will help reduce the number of flies in the room. Mix ½ pound rosemary, ½ pound mint, ¼ pound thyme, ¼ pound ginseng and 2 tablespoons cloves and put in cheesecloth bags to be used as a sachet, or sachets of any of the following: dried lemon peels, dried lavender, bay leaves, whole cloves, cedar chips, dried rosemary and mint or whole peppercorns will repel fabric pests. Rub citronella oil on exposed areas or burn citronella candles to repel mosquitoes. Dried or fresh marigolds repel insects too. Pennyroyal, rubbed on the skin, tansy planted near a door, or basil plants will repel mosquitoes. Eucalyptus, rosemary, citronella, pennyroyal, garlic on pets to keep fleas off. Try bayberry leaves as a flea repellent on cats.

Repel roaches with bay leaves and eucalyptus.

Fragrance Oils - which are a mixture of monoterpenes and/or essential oils act as insect growth regulators against fleas. When mixed with finely crushed calcium carbonate, they can kill cockroaches. Dust formulations get fragrance oils closer to the nervous system sites and make them more lethal. Fragrance oils also are highly repellent.

Frankincense - Anti-bacterial, antiseptic, holy oil used in ancient times to improve communication with G-d. Enriched extract of the Somalian frankincense herb *Boswellia carteri* has been shown to destroy bladder cancer cells.

Freezing - kills insects by exposing them to rapid temperature change. Remember the first killing frost in the fall when all of the outdoor insects stopped making noise and hitting your windshield? Why? Mother Nature killed them quickly and safely. In winter months put infested items outside in a secured or locked area in summer, put them in freezers or meat lockers and/or refrigerated trucks called "reefers" - zero degrees Fahrenheit will kill all stages of insect life. Insects are cold-blooded and they are extremely sensitive to even slight temperature changes! **This technique is inappropriate for many composite or painted objects.** Most animal skins, books, papers and textiles can be frozen safely. Temperatures in the freezer should be around -20° to -40° C. A deep freeze unit rather than a common household freezer should be used, and self-defrosting freezers should never be used due to their low Relative Humidity. If the items have been previously stored in a cold climate or are frozen too slowly, the insects will become acclimated and may not succumb to freezing - so drop the temperature as rapidly as possible. The object to be frozen should first be sealed in a plastic bag. Place the object in the freezer for at least 2 weeks. Objects thicker than one foot should be left in 1 week longer. The interior will freeze and thaw at a slower rate than the exterior of the object. During freezing and thawing care should be taken to observe for any condensation inside the bag or on the object. Liquid nitrogen can be injected.

Fresh Bay Leaves and Peeled Garlic Cloves - are natural pest repellents. Dried thyme in sachets will give your home a fresh aroma and when properly placed will repel silver fish and other pests.

Fuel Alcohol - You can make your own fuel: http://www.ttb.gov/industrial/alcohol_fuel.shtml

Fungicides - sulphur, copper, Bourdeaux mixture

Advantages: Provides fungicidal action and disease control.

Disadvantages: Toxic to mammals, wildlife, and many beneficials. Timing of application is critical.

Sulphur should not be used within a month of oil sprays or when temperature is above 80 ° to 85° F. Unsafe levels may build up in soil after years of use.

Fungisafes - 1 gal. warm water, 2 T. vegetable oil, 2 T. dish soap and ½ c. baking soda; mix and spray and drench affected plants. This mix will normally not harm plants. **Another recipe:** 3 cloves crushed garlic, 1 minced onion and 1 tsp. crushed jalapeno pepper; steep in 1 qt. warm water for several hours. Strain through a disposable coffee filter or cheesecloth. Add 1 gallon warm water and a dash of dish soap and 2 T. canola or vegetable oil. Spray this mix wherever you see rust, blackspot or any other fungus problem. Fungus problems can also be controlled with compost tea, liquid seaweed, blackstrap molasses, apple cider vinegar, potassium bicarbonate or garlic juice (diluted about 1 T. per 1 gal. water). You can add various combinations of these fungus-fighting ingredients at 1 T. each, but test a few leaves first and always spray **lightly** during the cool part of the day. **Clean your sprayer after each use. See Antibiosis.**

Fungal Disease Control

1. A mixture of ash (2-3 kg) and 1 litre of castor oil is spread on a seed bed of a size of about 100 m². The application is repeated 2-3 times at intervals of 7-10 days. This provides protection against soil borne diseases in tobacco nurseries.
2. 2 kg of turmeric powder and 8 kg of wood ash is mixed well. This is applied over plants during early morning hours for treatment against powdery mildew.
3. Ginger can be used at the concentration of 20 gms / litre of water and sprayed thrice at intervals of 15 days. This provides protection against powdery mildew and other fungal diseases.
4. A small handful of slaked lime can be applied at the base of the tomato plant. This combats damping - off disease.
5. Cattle and goat urine have fungicidal properties. Urine from animals with a vegetarian diet is said to be

preferable. Two cups of cattle urine with 5 ml peppermint oil and 10 litres of water can be used to control fungal diseases on grapes.

Furrows - Deep (dusty) furrows can be used to stop armyworms, chinch bugs, wingless May beetles, crickets and other crawling pests as they move from field to field. The loose dirt keeps them for escaping and you physically smash them in the furrows or bury coffee cans with soapy water dug at intervals along the bottom of the furrow.

Galerucella Beetles - can be released to attack the purple loosestrife plant. One stalk of loosestrife can reach 7' in height with 30 stems and produces 2.5 million seeds. Purple loosestrife is beautiful to look at, but really useless as far as wildlife is concerned.

Garbage - Keep in tightly sealed containers that are routinely washed.

Garlic - is one of the best-researched medicinal plants, its use dating back before Hippocrates in ancient Greece. Christopher Columbus found the Native Americans harvesting it, and Louis Pasteur described the wonderful antibacterial properties of garlic extracts. More than 1200 scientific papers have been published in this century alone that suggest a wide variety of uses for garlic preparations. Whether consumed in the U. S. as a food or in a pharmaceutical-type form, garlic remains extremely popular, with annual U. S. sales of over \$100 million. Recent studies on garlic's cardiovascular effects have focused on the sulfur compounds called *thiosulfinates*. It is suggested that these compounds are primarily responsible for garlic's potency and for its effectiveness in decreasing the production of cholesterol and lowering blood pressure. Studies suggest that garlic may inhibit fatty acid synthesis and decrease cholesterolgenesis in liver cells, and may reduce total cholesterol, triglycerides and LDL-cholesterol levels. In some cases it may also improve levels of HDL-cholesterol, the so-called "good" cholesterol. Garlic decreases the risk of developing colorectal, prostate, liver, breast, skin and digestive tract cancer. For maximum benefit you need to ingest 3 medium cloves of fresh garlic daily. Garlic boosts the immune system and helps reduce the pain of arthritis and contains sulphur which helps your liver detoxify a wide range of poisonous compounds.

Garlic improves the taste of food. Garlic repels most insect pests. When it is diluted with water, garlic can be sprayed on plants weekly to prevent many pest infestations. Garlic contains a sulphur compound that is an excellent natural antibiotic and a fungicide (Controlling rust, blackspot and other fungal diseases.). Don't forget to properly weed, organically fertilize, water and space your plants. Puree 5 - 6 garlic cloves with 2 cups of water and a few hot chili peppers in a blender, strain, add a few drops of liquid soap - spray to repel a wide variety of pests including deer and to kill or prevent fungal diseases. To make **garlic/pepper** tea, liquefy 2 bulbs of garlic and 2 hot peppers in a blender 1/2 to 2/3 full of water. Strain the solids and add enough water to make 1 gallon of concentrate. Mix at a rate of 1/4 cup of this concentrate per gallon of water. As a "kicker" - add 2 tablespoons of vegetable oil or horticultural oil per gallon of the mix. To make **garlic tea** - simply omit the hot peppers and add another bulb of garlic. Garlic keeps insects off your plants without dangerous synthetic insecticide poisons. Garlic is highly systemic for translocating nutrients. Garlic normally will not wash off plants because of the systemic or absorption factor. Garlic can be applied in furrow, foliar, or as a transplant solution. Approved for organic use. Safe for people, animals, and the environment. Synergistic with other liquid materials-blood meal, bone meal, sulfate of potash, seaweed, fish emulsion, biologicals, corn syrup, molasses, etc. Increases health and yield. Works naturally to repel insects and/or kill others, especially caterpillars and larvae. Insects never become immune to garlic. Scent disappears from human detection in minutes. Garlic preserves beneficial insects so they can do their job, and does not leave a hint of garlic taste on food crops. Repels mosquitoes for 1 - 2 months. One gallon of 100% garlic juice will cover 20 acres - when diluted and sprayed. "One clove of garlic, one onion, one tablespoon of cayenne pepper and a quart of water. Steep for one hour, add a tablespoon of liquid soap and spray it around the house" for ant and roach control. Garlic may slow bladder cancer in mice and improves the taste of many food items, and is said to repel some blood-feeding insects when eaten. Garlic has been used as an antibiotic to control wounds before World War I and has been used in herbal medicine for millennia. Garlic barriers repel ants, earwigs, spiders, aphids, grasshoppers, loopers, etc. Growing garlic also creates an aroma around vulnerable plants that creates a fungus-free zone. **CAUTION: Garlic will also kill and repel some beneficial insects, e.g., lacewings and syrphid flies which prey on pest insects, and is phytotoxic to Littleleaf Linden leaves.**

Plant garlic next to peach trees as close to the trunk as possible to keep peach borers from killing your trees. At the first sign of a cold or flu, pop a garlic clove in your mouth and chew. You may not be the most popular

person in your house, but you'll feel a lot better. Scores of studies confirm garlic's ability to create a fungus-free zone, to kill germs, lower cholesterol and blood pressure, and prevent blood clots. The allicin in garlic confuses the sensory receptors in insects and repels deer, rabbits and geese.

Garlic Oil - Garlic (*Allium sativum*) a member of the lily family, has been used for thousands of years in treating coughs, colds, chronic bronchitis, toothache, earache, dandruff, high blood pressure, arteriosclerosis and other ailments. In addition, garlic has been used as an insect and bird repellent on plants. Gardeners have been using homemade garlic preparations as insecticides for many years to protect flowers, greenhouses, gardens, lawns, ornamentals, trees and vine crops. Simmer several cloves of garlic in cooking oil for about an hour, cool, strain and spray. Although garlic does kill pest insects and some pathogens, it also kills many beneficial insects and microbes. Garlic oil also contains the volatile compounds allicin, citral, geraniol and linalool, which are known to have insecticidal properties. Garlic solutions have been reported to destroy four species of larval mosquitoes, as well as boll weevils, aphids, the cabbage-butterfly caterpillar and larvae of the Colorado potato beetle. Garlic oil sprays also repel many insect pests including white flies, thrips, grasshoppers, spiders, spider mites, leaf loopers, leafhoppers, ants, aphids and mosquitoes - spray every few days - the odor goes away in minutes and leaves no aftertaste on produce - spray before the bugs arrive! Garlic oil also repels slugs and snails, or causes them to create so much mucus they literally dry up. There are now commercial garlic oil dispensers that can be hung 4-6 feet apart to repel deer and rabbits from an area. To make your own garlic oil: finely chop or crush 10 -15 garlic cloves and soak them in one pint of mineral oil for 24 hours. Strain and spray as is, or dilute with a few drops of soap in water. Garlic will protect the kidneys and help eliminate heavy metals.

Garlic/Pepper Spray - Smash 6 unpeeled garlic bulbs and place them in a 1 quart jar with a lid; add 1 tablespoon powdered/crushed hot peppers. Cap. Set in the sun for a few days. Another variation is to dissolve a half cake of Octagon Soap in a gallon of hot water, add 2 mashed garlic bulbs and stir in 4 teaspoons of red pepper for an added control. Strain liquid and spray to control flea beetles and other pests. Remember, water-based sprays can damage plant leaves if applied on a sunny day.

Garlic Powder - 2 tablespoons of garlic powder in a horse's food per day will keep the flies off that horse.

Gatorade - Drinking 2 glasses of Gatorade can relieve headache pain, almost immediately, without the unpleasant side effects caused by traditional pain relievers.

Geese - have been used for generations to selectively weed gardens and orchards of narrow-bladed plants. They will "mow" your yard. Contain them with 3-foot tall chicken wire fence. **See Chapter 35.**

General Pest Spray - 1 c. grated or liquid castile soap, 1 c. coarsely chopped tobacco leaves (fresh or cured), 3 c. boiling water (divided), 1 entire bulb (not just 1 clove) garlic (peeled, crushed/chopped), 1 c. chopped fresh tansy (optional). In a bowl: Dissolve soap in 1 c. boiling water; set aside. In a blender: Pour remainder of boiling water over tobacco leaves; let set for 10 minutes or so. Add garlic and tansy (if available) and whirl until smooth. Strain through cheesecloth; discard solid materials. Add liquid soap to mixture and stir; pour into a spray bottle. To use: Spray the herbal liquid at early morning and dusk for 3 days in a row. Apply as needed, **but be very careful.**

Geotextile Fabric - will control weeds in gardens, along fences, under decks, etc. while allowing water and air to reach the soil.

Geranium Oil - will attract Japanese beetles and repel mosquitoes and other biting insects.

Get the Facts - Find out exactly what the problem is before you start to work your plan.

Gin - Mix 1 ounce gin, 1 ounce apple cider vinegar, 1 tablespoon baby shampoo in 1 quart of water and spray unwanted weeds on a hot, sunny day. Repeat as needed.

Ginger (*Zingiber officinale*) - Wild ginger contains a broad-spectrum antibiotic active against both fungi and bacteria. Ginger root tea relieves nausea and motion sickness. Did your mother give you ginger ale when you had an upset tummy? If so, her instincts were medically sound. Ginger contains chemicals similar to digestive enzymes, which calm stomach spasms and break down proteins. 1 oz. fresh ginger in a cloth bag can be put in

a pool to control algae and keep the pool fresh smelling and silky. Ordinary powdered ginger destroyed human ovarian cells in a laboratory experiment of the University of Michigan.

Ginkgo - Protects and preserves the brain as well as peripheral circulation.

Glass - Put pieces of glass over a plowed field; they act like mini-greenhouses; when you see sprouting seedlings emerging under the glass, you are 3 - 4 days away from field emergence. This is the best time to flame the field. A flamer in Europe costs about \$6,000 to buy and \$2,000 to ship and about \$30 an acre to use. Small plots can use a propane torch which costs under \$50. Securely place a piece of plate glass or a clear glass bowl over a yellowjacket nest entrance hole at night using only a red light. The yellowjackets will not be able to get out; they still can see the blue sky during the day so they usually will not try to dig out a new entrance hole and will starve to death in a few weeks.

Glueboards - can be used to safely and effectively catch rodents, bats, stinging insects and crawling creatures, even snakes.

Glycerol - A/K/A glycerin or glycerine, glyceritol and glycol alcohol is colorless, odorless, hygroscopic and sweet tasting liquid. Glycerol is a sugar alcohol that is soluble in water. Safe Solutions uses only pure vegetable glycerol that is specifically labeled for use in food (E422). It attracts insects and has been used as a livestock teat dip and to soften skin and delay the evaporation of water and keeps the hair moist. Insects produce glycerol, which prevents ice crystals from forming in their cells. It acts as a surfactant.

Goats - Grazing goats actually relish eating toxic "weeds" like poison sumac, poison ivy and poison oak.

Gold - The color gold attracts flies; add some glue and/or food-grade DE and you will have an excellent trap.

Gold fish or Koi or Gambusia Minnows or Tilapia or Guppies - will feed on mosquito larvae.

Goldenseal (*Hydrastis canadensis*) - The root of goldenseal contains berberine, an antibiotic with broad spectrum anti-bacterial and anti-protozoa activity. Try to use it in termite bait stations (or mud tubes) for non-toxic termite control. You can make a goldenseal liniment by adding 1 T. goldenseal root powder, 1 T. myrrh powder, 1 T. oak bark powder to 2 c. isopropyl alcohol in a sealed glass jar. Shake daily and let steep for at least 2 weeks; then strain and put mixture in a sealed bottle. The liniment will last virtually indefinitely and will alleviate poison ivy, insect bites, ringworm, rashes and/or abrasions.

Gopher Spurge (*Euphorbia latyrus*) - The plant is said to produce an acrid milky juice in its roots that gophers cannot stand. It is said one should plant several of these plants in the yard and garden to discourage the pests.

Grapefruit juice - will kill even pesticide-resistant species. Naringenin found in grapefruit inhibits a group of enzymes called cytochromes P450 which are primarily responsible for metabolizing toxic substances and by removing toxins from the blood, but it can also adversely affect you if you are exposed to some medications or pesticide poison.

Grass Clippings - are 85% water, decompose rapidly, return nutrients to the soil with no thatch buildup. They actually return 20% of their nitrogen to the soil so using a mulching mower cuts down on lawn maintenance and makes your grass greener..

Gravel - rodents that tunnel will not penetrate a wall (buried) of gravel or small stones.

Grazing - with sheep and goats and ducks can suppress many undesirable plants.

Grease - Pour bacon grease or hamburger fat into empty tuna cans until 25% full. Place outside and catch earwigs who crawl in but not out. Grease can also be used to attract raccoons into your live traps.

Green Lacewings (*Chrysopa carnea*) - Are delicate, broad winged insects of pale green color with eyes of bright, metallic gold and wings of transparent green membrane. Adults are ½" to ¾" in length! They have a characteristic fluttering flight. They rise in great numbers when crops are disturbed. Their larvae are called "aphid lions" that feed on virtually every pest that moves on the crop. The larvae are broad and squat and have

slender sickle-shaped jaws. They approach aphids, plunge their jaws into them and suck out all of their juices. They are active searchers. They destroy aphids, spider and red mites, leafhoppers, thrips, moth eggs, whiteflies and caterpillars.

Green Manure Crop - Green manure plants are one of the best ways to economically build and/or improve your soil's fertility and organic matter content. One of the most important sources of organic matter is plant roots, so plant alfalfa, barley, beggarweed, clover, buckwheat, cowpea, rye grass, field peas, kudzu, soybeans, rape, oats, millet or any number of plants or even weeds and then plow them under.

Green Tea - *Camellia sinensis* has tea tannins or polyphenols that are strong anti-carcinogens that protect against oxidation and have anti-bacterial, anti-inflammation, anti-microbial and anti-viral properties. Use green tea to control ear mites; flush the ears with green tea and then add a few drops of olive oil. Cleaning products containing green tea are better able to permeate the skin and can help relieve and improve skin conditions and will even remove dandruff.

Grits - Sometimes if you feed ants and other insects some instant grits they will expand in ant bodies and kill them.

Ground beetles - can live for 2 - 3 years; the larvae feed on other ground living larvae and insect eggs. They are partial to cutworms, gypsy moth larvae, root maggots, slugs and snails. They are nocturnal hunters.

Ground Covers - e.g., artemisias, lilies of the valley, ferns, iris, daylilies, violets, pachysandra, crownvetch, myrtle and vinca, are helpful in smothering weeds.

Ground-up Coconuts - When used as soil, ground-up coconuts have no destructive nematodes to inhibit growth or cause disease. Replace the soil with ground-up coconuts when you grow strawberries and tomatoes or in greenhouses, etc. and you will never need to resort to soil fumigation.

Guinea Hens or Guinea Fowl - The domesticated Guinea hens (cousins of pheasants) are often used for pest control. Guinea hens are meat eaters and will rid your property of many pests, e.g., ticks, slugs, Japanese beetles, grasshoppers, mice, rats, snakes and most bugs in the garden or yard. They have an acute awareness of predators and will act as watch dogs day or night to alert you of predators or unfamiliar people within their habitats. Guinea hens do all this and still leave your plants, vines and garden foliage basically unharmed. Try a pair today.

Gum - It has been said that an unchewed stick of Juicy Fruit® gum placed in a tunnel may kill a mole or a mole cricket, but I have never seen it work.

Habitat Reduction - Remove the conditions conducive to pest infestation, humidity, food, hiding places, access, etc. Remove diseased plants a.s.a.p. and do not let branches touch or overhang the buildings.

Hair - Human and dog hair repel many animals, e.g., deer, and, when cut into very small pieces, it can kill snails and slugs.

Hair Dryers - can be used to control fungus and roaches and other pests - simply direct the hot, dry air at them or where they hide and see what happens next.

Hair Spray or Spray Adhesive - When sprayed directly on most insects will kill them but be careful not to breathe the fumes yourself. **Caution: The spray is also very flammable.**

Hand Removal - When I was a very young man I kept our potato patch free of potato bugs by hand removal of the eggs, larvae and adult stages. **When you hand pick pests, be sure you wear gloves.**

Hand Sanitizer - will attract and kill vinegar/fruit flies and will preserve small soft-bodied insect and arachnid specimens.

Hawaiian Kava - Make a tea (strained) and reduce your tension level.

Hawthorne Extract - will guard your heart. Heart disease is the number one killer in America. **See Chapter 41.**

Healthy Plants - Purchase stocky, dark green transplants, certified virus-free seed, potatoes and fruit. All healthy plants contain compounds that naturally make them resistant and/or toxic to many pests. Healthy, strong plants resist stress, pests, diseases, etc. better than sick, weak plants.

Healthy Soil - In the rush to plant, this important step is often overlooked; yet it can make the entire difference between a productive and a so-so garden. Many insects are attracted to unhealthy, poorly growing plants. Poorly growing plants also recover more slowly from insect injury. Have a soil test and follow the recommendations to supply a full range of nutrients. Adding extra fertilizer won't create healthy soil, because excess nitrogen or phosphorus can promote insect and disease injuries. Add organic matter to the soil each year in the form of soil amendments or mulch.

"I suspect that the insects which have harassed you have been encouraged by the feebleness of your plants... produced by the lean state of your soil... When earth is rich, it bids defiance to droughts [and] yields in abundance." *Thomas Jefferson, 1793, in a letter to his daughter.*

Heat - It has been estimated that for every 10 degree Celsius increase in temperature insects must increase their respiration and activity 10 fold! When insects are exposed to high temperatures, death normally is caused by this increased energy output, by the coagulation of soluble proteins in the body tissues and when the body fluids are dehydrated. **Turn up the heat and kill your pests.**

Heating - is similar to freezing in that an infested item is exposed to a temperature extreme that will kill insects. Heating refrigerated trucks or "reefers" outdoors up to 60° F. internally while there are sub-below temperatures outside will effectively fumigate them. **Heating is not recommended for all materials.** Any insect can be killed by subjecting it to high temperatures for an extended period of time. **Temperatures over 140° F. for 1 to 4 hours will kill most insects.** Wood infested with powder post beetles can be killed by heating the wood to 185° F. for 10 hours. However, many materials are easily damaged by high heat. For bulk paper supplies such as copier paper and similar materials, this treatment is very effective. Copier paper boxes are often infested with silverfish. Infested boxes can be heat treated prior to using the contents. Treatment procedures may include sealing the infested materials in a black plastic garbage bag (and then placing that inside another black bag to increase the ability of the container to hold heat). Each bag should be individually sealed. The bagged materials can then be placed in the sun for 8 hours on a hot summer day. Once the materials cool down, they may be removed from the bag. Treatment using an oven should never be attempted. Propane or blow torches and/or boiling water or steam control weeds without contamination. **Be careful not to get burned.**

Hedgehogs - a/k/a urchin, hedgepid and furze-pig. There are 165 species of hedgehogs in 5 genera. They are primarily nocturnal. They are insectivores, but are virtually omnivorous. A single hedgehog will eat up to 200 grams of insects each night from your garden and/or home. They will also eat worms, snails, toads, frogs, snakes, bird eggs, carion, mushrooms and fruit.

Hedgerows - A natural border of trees and brush between fields create bird havens, act as windbreaks and prevent wind erosion. Birds provide marvelous insect control.

Heinz Vinegar to Heal Bruises - Soak a cotton ball in white vinegar and apply it to the bruise for 1 hour. The vinegar reduces the blueness and speeds up the healing process.

Hemlock Oil - like that found in Ced-O-Flora plant spray, controls mealybugs, spider mites, scales and aphids.

Hemp - Naturally resistant to pests, it repels cabbage maggot/cabbage moth, but attracts law enforcement people.

Herbal Cautions - As a general rule, pregnant women should avoid herbs. Watch for any side effects you may experience with any new food, herb or medicine. Unpleasant reactions can include dizziness, headache, nausea, etc. Beware of the dangers some interactions may cause you such as drug/drug, drug/herb, drug/food, herb/herb, herb/food, even food/food. Try not to get dependent on any substance. Pulse treatments are usually the best.

Herbal Mosquito Repellent - T Bhuvaneswaramma, a resident of Chennai, claims to have developed a mosquito

repellent that contains only natural materials and not any chemicals. The leaves of the plant *Vitex negundo* (commonly known as *sambhalu*) are dried and powdered. About 100 grammes of broken rice and one litre of water is cooked and left to cool. This solution is mixed with the powdered leaves. Sugarcane waste (baggase) and charcoal powder is added to this dough, which can be made into different shapes and then again dried in the sun. According to Bhuvaneshwaramma, the effect of the repellent can ward off mosquitoes for around seven hours. He adds that since the materials used are available locally, villagers can themselves prepare this repellent.

Herbal Remedies - Most have been used successfully and safely and economically for over 4000 years, but:

ESSAY; Diet Supplements and Safety: Some Disquieting Data

By DAN HURLEY

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Since 1983, the American Association of Poison Control Centers has kept statistics on reports of poisonings for every type of substance, including dietary supplements. That first year, there were 14,006 reports related to the use of vitamins, minerals, essential oils — which are not classified as a dietary supplement but are widely sold in supplement stores for a variety of uses — and homeopathic remedies. Herbs were not categorized that year, because they were rarely used then.

By 2005, the number had grown ninefold: 125,595 incidents were reported related to vitamins, minerals, essential oils, herbs and other supplements. In all, over the 23-year span, the association — a national organization of state and local poison centers — has received more than 1.6 million reports of exposures to such products, including 251,799 that were serious enough to require hospitalization. From 1983 to 2004 there were 230 reported deaths from supplements, with the yearly numbers rising from 4 in 1994, the year the supplement bill passed, to a record 27 in 2005.

The number of deaths may be far higher. In April 2004, the Food and Drug Administration said it had received 260 reports of deaths associated with herbs and other nonvitamin, nonmineral supplements since 1989. But an unpublished study prepared in 2000 for the agency by Dr. Alexander M. Walker, then the chairman of epidemiology at the Harvard School of Public Health, concluded: "A best estimate is that less than 1 percent of serious adverse events caused by dietary supplements is reported to the F.D.A. The true proportion may well be smaller by an order of magnitude or more."

The supplements with the most exposures in 2005, according to the poison control centers, were ordinary vitamins, accounting for nearly half of all the reports received that year, 62,446, including 1 death. Minerals were linked to about half as many total reports, 32,098, but that number included 13 deaths. Herbs and other specialty products accounted for still fewer total reports, 23,769, but 13 deaths. Essential oils were linked to 7,282 reports and no deaths.

Among herbs and other specialty products, melatonin and homeopathic products — prepared from minuscule amounts of substances as diverse as salt and snake venom — had the most reports of exposures in 2005. The poison centers received 2,001 reports of exposures to melatonin, marketed as a sleep aid, including 535 hospitalizations and 4 deaths. Homeopathic products, often marketed as being safe because the doses are very low, were linked to 7,049 exposures, including 564 hospitalizations and 2 deaths.

But most other types of herbs and specialty supplements also appear in the annual report. In 2005, the poison centers received 203 reports of exposures to St. John's wort, including 79 hospitalizations and 1 death. Glucosamine, with or without chondroitin, was linked to 813 exposures, including 108 hospitalizations and 1 death. Echinacea was linked to 483 exposures, including 55 hospitalizations, 1 of them considered life-threatening. Saw palmetto was not listed on the report.

Injuries to children under 6 account for nearly three-quarters of all the reports of exposures to dietary supplements, according to the poison centers. In 2005, the most recent year for which figures are available, 48,604 children suffered exposures to vitamins alone, the ninth-largest category of substances associated with exposures in that age group.

Major medical groups and government agencies do not generally recommend vitamin or mineral supplements

for children who are otherwise healthy. However, an analysis of the National Maternal and Infant Health Survey, published in the journal Pediatrics in 1997, found that 54 percent of parents of preschool children gave them a vitamin or mineral supplement at least three days a week.

Advocates of the products correctly point out that the poison centers' figures do not prove a causal link between a product and a reaction and that, in any case, far more people are injured and killed by drugs. Painkillers alone were associated with 283,253 exposures in 2005, according to the poison centers, more than twice as many as with supplements. But only 3.5 percent of those exposures occurred when people took the prescribed amount of painkiller; most were from overdoses, either accidental or intentional. The same was true of asthma drugs (3.6 percent of exposures were associated with the prescribed dose) and cough and cold drugs (3.1 percent).

While problems with vitamins, minerals and essential oils occurred at similarly low levels when people took the recommended amounts, exposures linked to the recommended levels of herbs, homeopathic products and other dietary supplements accounted for 10.3 percent of all exposures to those products reported to the poison centers — about three times the level seen for most drugs.

Drugs marketed in the U.S. go through a rigorous F.D.A. approval process to prove that they are effective for a particular indication, with the potential risks balanced against the benefits. While the approval process has come under attack in recent years as unduly favorable to drug companies, it remains among the toughest in the world.

There is no comparable requirement for supplements. Even so, hundreds of millions of tax dollars have been spent since the early 1990s on hundreds of studies to test the possible benefits of supplements. The National Center for Complementary and Alternative Medicine, established by Congress in 1991 to “investigate and validate unconventional medical practices,” has a 2007 budget of more than \$120 million.

Since April 2002, five large randomized trials financed by the center have found no significant benefit for St. John's wort against major depression, echinacea against the common cold, saw palmetto for enlarged prostate, the combination of glucosamine and chondroitin for arthritis, or black cohosh and other herbs for the hot flashes associated with menopause.

A new source of data on exposures to dietary supplements will soon become available: in December, Congress passed a measure requiring the manufacturers of dietary supplements and over-the-counter drugs to inform the F.D.A. whenever consumers call them with reports of serious adverse events. The bill was signed by President Bush the day after Christmas. It is a welcome acknowledgment that “natural” does not always mean “safe.” The supplements linked to the most reactions in 2005, according to the poison control centers, were ordinary vitamins, accounting for nearly half of all the reports received that year, 62,446, including 1 death. Minerals were linked to about half as many total reports, 32,098, but that number included 13 deaths. Herbs and other specialty products accounted for still fewer total reports, 23,769, but 13 deaths. Essential oils were linked to 7,282 reports and no deaths. Always test a small area before you treat the entire area and always test a small amount before you ingest or apply larger amounts. **It is known some people are allergic to peanuts and milk. As a general rule, pregnant women should avoid contact with herbs.**

Herbal Tea Sprays - After preparing the following plants in a water solution:

Burdock - Has been used against June beetle grubs.

Camomile - Against damping-off in greenhouses and cold frames.

Cayenne Pepper - Against caterpillars and fleas.

Chive - Against leaf and fruit scab.

Elderberry Leaves - Controls blight, caterpillars and flea beetles.

Garlic and Onion - Against late blight on tomato and potato and brown rot of stone fruit; red spiders and aphids. This mix is also a powerful antibacterial product that destroys many plant diseases.

Gooseberry - Against mildew.

Horseradish - Against fungi.

Horsetail (*Equisetum arvense*) - Against mildew and other fungi, especially on grapevines, vegetables, fruit trees and rose bushes.

Hyssop - Against bacterial diseases.

Pumpkin or Squash Leaves, Freshly Cut, a decoction of black walnut leaves soaked overnight or an

infusion of pignut leaves, rubbed on horses or cattle will repel flies

Rhubarb - Against club root, greenfly and blackspot.

Stinging Nettle - Against plant lice (aphids).

Tomato Leaves - Against aphids, grasshoppers, caterpillars and flies.

Wormwood - Against leaf-eating caterpillars on fruit trees and aphids.

NOTE: Many herbs, through their essential oils, have natural insecticidal, fungicidal and bactericidal properties.

Herbivorous Fish - Julien (1992) lists eleven species of fish that have been introduced for the biological control of water weeds and algae.

Herbs/Herbal Pillows - can be used to repel flies, fleas, mice, roaches and many other pests. Horsebalm, cardamon, tea tree, spearmint, rosemary, eucalyptus and sage are herbs that **can and do naturally inhibit cholinesterases in mammals, so be very careful.**

***Heterorhabditis bacteriophora* (HP 88):** Among the most important beneficial nematodes, *H. bacteriophora* attack insect larvae especially root weevils. This "cruiser" specie is less effective in cooler temperatures, so use above 20 degrees C. The main beneficial nematodes are *Steinernema carpocapsae* and *Heterorhabditis bacteriophora*. If you have these two handy to spread on your property then most of the harmful insects will be taken care of. However, there are others that seem to specialize as to insects they parasitize. Although there is a right beneficial nematode for that varmit you want out of your lawn and garden, there is not a way right now to get them all commerically.

High Places - German cockroaches like high places, so put your baits on top of kitchen cabinets.

Hike or walk - around the exterior and inspect the vents, weep holes, seals, screens, doors, caulking, siding, gutters, downspouts, exterior and ground and pretend you are a pest trying to invade the structure.

Hoes - A very ancient and extremely effective way to remove weeds from your garden or yard.

Hollow Tubes - Paint 1-foot long hollow tubes, straws or bamboo green and place them side by side under low growing shrubs and bushes to catch earwigs, cutworms and other pests. In the morning, empty the tubes into soapy water.

Home-made "Pesticides" - Make your own by blending ½ cup hot peppers and/or garlic with 2 cups water and spraying it on infested plants; another mix could be 1 cup enzyme cleaners in water or 2 teaspoons of dish washing liquid with a few drops of vegetable oil in 1 gallon of water; or use a blender and blend 1 quart of water, 2 - 4 hot peppers and 3 - 5 cloves of garlic, blend, strain and spray on plants - thoroughly wash vegetables before eating. See also mint, soap, rhubarb, stinging nettle, baking soda, buttermilk, vinegar and plain water. **We prefer to call these mixes Pestisafes®.**

Honey Remedy for Skin Blemishes - Cover the blemish with a dab of honey and place a Band-Aid over it. Honey kills the bacteria, keeps the skin sterile and speeds healing. Works overnight. Honey has been shown to have an anti-microbial effect against many bacteria and fungi and will attract most sweet eaters to your baits/traps. Honey does not spoil because there is so much sugar in it that bacteria cannot grow. Use it to help heal a wound or to make irresistable baits. Honey will heal infected wounds and is effective against antibiotic-resistant bacteria. Honey releases low levels of hydrogen peroxide and some honeys have an additional phytochemical, anti-bacterial component. Honey has been an ancient remedy for treating infested wounds. When diluted by water or wound exudate, honey contains an enzyme that now produces hydrogen peroxide. Honey will also help heal burns; sugar does not work as well. *Staphylococcus aureus* wounds are quickly rendered sterile. Allergic reactions to honey are attributed to a reaction to a specific pollen in some honeys.

Honor - For honorable human beings, doing what is right and necessary is dearer than life itself. "What is not done for love is done for money." Psalm 55:12-16

Hopperdozer - consists of a long, narrow, shallow trough filled with soapy water with a vertical shield at the

back of the trough, mounted on runners and is drawn across fields to catch grasshoppers who fly up to avoid the hopperdozer, hitting the shield and falling into the soapy water to drown. 8 bushels of grasshoppers have been caught per acre. A smaller version can be used for flea beetles in vegetable gardens.

Horizontal Transfer - Secondary kill or horizontal transfer occurs when a pest, e.g., a roach, eats a slow-acting "poison" bait and then dies inside a harborage area that you can not reach to treat. The other pest will cannibalize their former colleague and die.

Horse Chestnut - Helps keep painful varicose veins from forming and helps prevent swelling of arthritic joints.

Horseradish - mixed in water will repel potato bugs. Achy muscles from a bout of the flu? Mix 1 tablespoon horseradish in 1 cup olive oil. Let the mixture sit for 30 minutes; then apply it as a massage oil for instant relief for aching muscles.

Horseradish leaves - are known to have fungus-fighting properties, especially against brown rot on fruit trees. Mash the leaves or blend them to extract their juice, then strain and spray on plants and trees. You can use them in salads in spring when they are tender.

Horsetail - (*Equisetum arvense*- L.) An infusion of Horsetail sprayed on plants may help prevent fungal diseases.

Horticultural Oils - include dormant oils, suffocating oils and summer oils. They are used as insect smothering or suffocating agents. Horticultural oils are summer oils. Several things distinguish summer oils from dormant oils. Summer oils leave more unsulfonated residues and are less likely to burn tender plants. Summer oils are mixed with wax and can be used as a leaf polish and have good "spreading" properties and are safer and easier to use.

Hose-end Sprayers - can be used to spray diluted enzyme cleaners or peppermint soap or dish soap to control earwigs around the foundation, to spray lawns, hornets, trees, bushes, etc. with diluted enzyme cleaners to control fungus, insects, mold, etc. wherever the spray will reach.

Hot Air - quickly kills many insects, e.g., roaches - take a hair dryer or commercial tile softener and direct the hot air into cracks and crevices and watch what happens to the roaches. You can destroy non-subterranean termite colonies with hot air if you can locate the nest and treat the galleries with hot air. Other (moisture loving) insects and wood decay may also be quickly controlled, but be sure you don't start a fire and **remember to at least wear a mask** to protect you from the asbestos and other flying debris. **Caution: If you use a heat gun, use it with a PVC collar to help prevent burns.**

Hot Pepper - Blend ½ c. of hot peppers with 2 c. of water. Strain and spray. **Caution: Hot peppers can burn skin and eyes. Pepper sprays used to repel bears may actually attract them.**

Hot Sauce - Mix half and half with water and spray to repel roaches.

Hot Water - Dip fruit into plain hot water (43 - 49° C.) for a few minutes and you can safely and cheaply control or kill the larvae and the eggs of many species of fruit fly and other fruit pests.

House Plants - provide oxygen and are the quickest and most effective filters of common, dangerous air pollutants, e.g., mold, bacteria, mildew, formaldehyde, benzene, xylene and ammonia. They act as the lungs and kidneys of the building. If you grow the plants hydroponically in soil-free pebbles and water or cover the soil with gravel, you eliminate soil mold and mildew spores and fungus gnats.

Hover Flies - or syrphid flies or flower flies, the adults resemble bees and help pollinate. The hover fly's slug-like maggots can consume an aphid a minute for extended periods of time.

Human Enablers - will feed the pest and release trapped pests and provide pests with shelter; they must be trained not to do so.

Human Hair - cut in small pieces will stop slugs and snails. Human hair will usually repel deer and squirrels. Get some from a barber shop.

Humidity Reduction - Virtually all wood destroying organisms and many other pest problems will be controlled in a direct proportion to your reduction of the humidity and moisture content/problems. **See Dehumidifiers.**

Humor - Studies prove that teaching effectiveness is significantly related to how funny the teacher is perceived.

Hunt's Tomato Paste - is said to be a boil cure. Cover the boil with tomato paste as a compress. The acids from the tomatoes soothe the pain and bring the boil to a head.

Hydrated or slaked lime (Calcium hydroxide) - will kill snails and slugs - use a coffee can with small holes punched in the base - fill with hydrated lime (mist plants) and sprinkle this caustic pesticide and fungicide on the moist plants or try baking soda.

Hydraulic Cement - Use this material to patch holes even with water coming in; mix with corn meal 50/50 to kill mice.

Hydrogen Peroxide - The human body produces hydrogen peroxide in the immune system as the first line of defense against various microorganisms that have invaded it. H_2O_2 has been described in medical literature as a disinfectant, antiseptic and oxidizer. H_2O_2 increases the flow of blood and oxidizes the sick, weakened and dying cells while simultaneously strengthening healthy cells. The human body uses H_2O_2 in metabolizing fats, vitamins, minerals, proteins and carbohydrates. Anaerobic microbes are unable to live in an oxygen-rich environment. H_2O_2 is an antimicrobial agent that reduces or kills viruses, bacteria, pathogens, fungi, parasites, yeast, algae and endospores in and out of the body. The USDA has approved H_2O_2 as a food additive in some foods. H_2O_2 can be used to purify drinking water and water so treated also will kill parasites in the digestive system. H_2O_2 is so powerful in killing bacteria and viruses that it is routinely added to residential and industrial sewage and waste water to make them safe enough to return the treated water to the natural environment. Note: Chlorination in drinking water decreases the oxygen in the water. Excessive use of synthetic antibiotics destroys the beneficial oxygen-creating bacteria of the intestinal tract. It is obvious to the Author why asthma, emphysema and lung disease are on the rise, especially when you consider our atmosphere was 35% oxygen just 200 years ago, and today it is a mere 19%! Add a little H_2O_2 to your water today. Mix 8 oz. black strap molasses or white sugar and 8 oz. of 3% H_2O_2 in 1 gal. water and spray as an insecticide spray; it can also be used for odor control. Feeling bad? The Author has been told to try the following: Put 1 pt. 3% H_2O_2 in a 1 gal. (steam) vaporizer; fill the rest of the reservoir with water. Plug in and breathe the vapors overnight. A constant low level of hydrogen peroxide in the water will control many algae problems. Also read the use of vinegar and hydrogen peroxide to disinfect.

- Try taking 1 capful of 3% hydrogen peroxide as mouthwash and holding in your mouth for 10 minutes daily; then spit it out. Your canker sores will be healed and your teeth will be whiter.
- You can use 3% hydrogen peroxide to kill salmonella and other bacteria.
- To remove fungus, spray a 50/50 mixture of 3% hydrogen peroxide and water on your feet and the toes every night and let dry - .
- Spray 3% hydrogen peroxide on trees and plants as a natural fungicide, insecticide and as a weed killer.
- You can lessen the pain of a toothache by putting a capful of 3% peroxide into your mouth and hold it for ten minutes several times a day.
- You can add 4 oz of of 3% hydrogen peroxide in your bath to help rid boils, fungus, or other skin infections.
- Hydrogen Peroxide is described as an effective anti-viral, antibacterial and anti-fungal, and can be used for anthrax decontamination.
- You can gargle with hydrogen peroxide and/or put drops in the ear and nose to end colds, flu, chronic sinusitis (including polyps], and infections.
- When you clean with hydrogen peroxide you can remove toxic mold.
- You can saturate any infections or cuts in 3% peroxide for 5 to 10 minutes several times a day to heal them. It has been said even gangrene can be healed by soaking a ganrenous wound in 3% hyrogen peroxide.
- Put 2 capfuls of 3% hydrogen peroxide into a douche several times a week to cure even chronic yeast infections.
- Throughout the world hydrogen peroxide is used instead of chlorine as a safer and eco-friendly municipal water purifier. Some use H_2O_2 in pools and spas.

Dr. Edward C. Rosenow, author of 450 published medical papers and associate at the Mayo Clinic for over 60 years, proved that bacteria could be found consistently in the lymph nodes that drain joints (J.A.M.A., April 11, 1914) and he postulated that H₂O₂ would help arthritis because of its ability to supply oxygen to oxygen-hating organisms causing arthritis (*Streptococcus viridans*).”

Your body naturally makes hydrogen peroxide to fight infection which must be present for our immune system to function correctly. White blood cells are known as Leukocytes. A sub-class of Leukocytes called Neutrophils produce hydrogen peroxide as the first line of defense against toxins, parasites, bacteria, viruses and yeast. Hydrogen peroxide is the oxygenation of the body. Sickness and tumors are generally oxygen-hating growths which thrive in oxygen-poor bodies.

Medical use of hydrogen peroxide was first noted in the March 3, 1888 issue of the Journal of American Medical Association. In the last 25+ years more than 7,700 articles have been published in standard medical journals. In the 1960's, etc. In the early 1960's, Baylor University Medical Center (Texas) conducted major studies in the medical uses of hydrogen peroxide. One of the things these researchers discovered was that H₂O₂ has an energizing effect on the heart. Specifically, they learned that myocardial ischemia, (lack of oxygen to the heart) was relieved by H₂O₂. The Baylor researchers found that plaque buildup in arteries was removed efficiently, and that the effect was long lasting.

Note: One pint of hydrogen peroxide per 100 gallons of water can be used to control both suspended and string algae. **See Barley Straw and Tadpoles.**

Hydrolyzed Proteins - Used as an attractant.

Hyssop - a perennial herb used in the Bible to prevent the plague; it is anti-viral, anti-infectious, anti-asthmatic, anti-spasmodic, antiseptic, etc. W. Coles writing in 1657 noted the oil from hyssop (*Hyssopus*) “killeth lice.” Hyssop is used in cooking to aid in the digestion of fats.

Ichneumon Wasps - There are over 3,300 species in North America. They parasitize caterpillars, the larvae of other insects and spiders and/or sometimes spider egg sacs. The wasp larvae develops inside the host, feeding on it and eventually killing it.

Ideal Pesticide - http://www.safesolutionsinc.com/Enzyme_Cleaner_Pest_Control.htm and/or <http://www.thebestcontrol.com/ideal-pesticide.htm>

Identification - You need to make a proper identification to make the proper control choices.

Imagination - this is the greatest pest control “tool” ever - some people have no imagination and are doomed to only use poison to “control” their pests. Look around, think, ask and develop new tools all of the time. Imagination combined with intelligence can not be beaten. Imagination is more important than knowledge. Knowledge is very restrictive; imagination is unlimited. **Your brain is 200,000 times bigger than an insect's, so use it!**

Immunity - Insects, arachnids, plants, etc. all quickly develop resistance or immunity to all dangerous, synthetic pesticide poisons, so why use them? See Resistance.

Improve Air Circulation and Soil Drainage - and you will cure a host of pest and disease problems. See hydrogen peroxide.

Indian Aloe (*Aloe borbadens*) - Leaf extracts of this plant inhibit larval hatching of root-knot nematode (*Meloidogyne incognita*).

Infra-red - techniques can be used to kill weeds.

Insect bites - In the jungle when someone is bitten by a poisonous insect, the people look for it and make a paste of it to rub on the burn or wound. It usually heals fast.

Insect Diseases - In 1836, Agostino Bassi of Lodi, Italy first suggested liquids from putrefied cadavers of diseased insects could be mixed with water and sprayed on foliage to kill insects.

Insect Extracts - "Bug juice", etc. has been used for years to safely control insects. See above.

Insect Growth Regulators - Insect growth regulators (IGR's) are the insect hormones (or their synthetic substitutes) that supposedly interrupted only an immature or young insect's maturation processes and other vital functions. It was initially thought IGR's would only affect the biochemical processes unique to arthropods, so that the potential negative effects on humans and other mammals would be minimized. Because mammals do not molt or metamorphose as insects do, the chemical compounds in IGR's were thought unlikely to affect mammals, but **they still were and are pesticides, so we advised that everyone should use them only as a last resort according to the label and only after proper notification.** Sumitomo developed Nyilar, a photostable IGR called Pyriproxyfen. **Methoprene** - Methoprene impedes young insect maturation, causing "sterility" and death before insects can mature. The primary hormone controlling molting is ecdysone. Methoprene is an altosid product manufactured by Zoecon. According to Mary Pacholke, as reported in June, 1996 Our Toxic Times, people, pets and birds can be made ill and/or die from exposure to methoprene. Methoprene is suspected of causing all the frog deformities in the Midwest - this has been replicated in lab studies. **Hydroprene** - Hydroprene is marketed specifically for cockroach control. After being applied to young roaches, this IGR eventually produces "sterile" adults with twisted wings. **Fenoxycarb** - Fenoxycarb also caused distortion of the wings and other parts of a young insect, which indicated that it had caused the insect to become "sterile." Part of fenoxycarb's molecular structure resembles a carbamate, but it supposedly did not inhibit cholinesterase (nerve transmission) as do carbamate insecticides. It was labeled against cockroaches, fire ants, fleas and stored-product pests. It was suspected of causing tumors and was removed from the market. **Diflubenzuron, Hexaflumuron, Lufenuron and Cyromazine** - These materials inhibit the action of the enzyme, chitin synthetase. Chitin, a polysaccharide similar in structure to cellulose, is the main protein ingredient of insect skin. EPA has already restricted the use of IGR's to licensed pest control "professionals". We believe they all will be pulled eventually as they may be a real threat to humans and do not work. Home Guard's Glenn Gordon has noted viable offspring can still be generated from the twisted wing/deformed adults - 50% of the offspring are normal and 50% are deformed. The deformed species can cross Vaseline® barriers the normal roaches cannot.

Insect Pathogens and Nematodes - There are more than 1,500 species of pathogens that include a wide range of bacterial viruses, fungi, microsporidia, protozoa and nematodes known to attack arthropods. Bacterial groups have the most successful for cultivation and commercial use. Prime examples are the various varieties of *Bacillus thuringiensis* - Some Bt products contain live bacteria and associated toxic proteins. There are about 30 subspecies of Bt and more than 700 strains have been isolated. At least 16 families of viruses have been used as pathogen insects. The majority of viruses used in pest control are either nuclear polyhedrosis or granulosis viruses; both are in the family Baculoviridae. Most fungi that attack insects are in the family Entomophthoraceae, with the subdivision Zygomycotina or in the Deuteromycotina. Various protozoa attack insects including the microsporidians and the eugregarines. Nematodes that show the greatest potential for insect control are found in the families Steinernematidae and Heterorhabditidae, which are mutualistically associated with bacteria that kill the nematodes's host through septicemia.

Insect Pests - are not the cause of plant disease or the real problem. They are indicators that something is wrong with the plant or the natural controls and/or the soil. G-d has provided predators to remove the unfit.

Insect Predators - In 1752, Carl Linnaeus wrote, "Every insect has its predator which follows and destroys it. Such predatory insects should be caught and used for disinfecting crop plants." **Predators** generally consume several or more prey to complete their development. **True parasites** harm but generally do not kill their hosts, e.g., fleas, ticks, mosquitoes, tapeworms, etc. **Parasitoids** are parasitic arthropods that kill their hosts. Parasitoids have been the most common natural enemy introduced for biological control of insects. At least 26 different families of parasitoids have been used. There are between 100,000 to 1,000,000 species of parasitoids and at least an equal number of predators to help us battle *our* pests, if we don't pesticide poison them first! **See Spiders.**

Insect Repellents - You can make an effective insect repellent using 75% coconut oil, 15% water, 4% soybean oil, 3% geranium oil and 3% vanillin. You can also lightly rub Noxema®, menthol, camphor, eucalyptus, cedar oil, lavender oil, pennyroyal oil, peppermint oil, citronella oil, eucalyptus oil or scented geraniums on your body and clothes. Dilute all fragrant oils in coconut oil, vegetable oil or almond oil first. A strong infusion of chamomile tea

can be applied to the skin or fur to repel insects. **Always test a small area of your skin (with a small amount) to see if you get a reaction before treating the entire area or body or your clothes with any substance.**

Insect traps - These are the simplest, least-toxic way to control many insects; there are many different kinds, including our 2-liter bottle and/or sticky traps.

Insecticidal Soaps or Enzyme Cleaners - Insecticidal soaps, which are sodium or potassium salts combined with fish or vegetable oil, have been used as registered insecticides since the late 1700s. A soap is a substance made from the action of an alkali such as sodium or potassium hydroxide on a fat. The principal components of fats are fatty acids. When pesticidal soap washes away the oils, waxes and other debris and reaches the cuticle (outer body) of a susceptible insect, the fatty acids penetrate the insect's covering and dissolve into the membranes around its cells, disrupting their integrity. The cells leak and collapse, resulting in the dehydration and death of the susceptible insects. Soap can also penetrate the protective coating on plant tissue and fungi, causing dehydration and death. Soaps show relative selectivity in the range of insects they affect.

Advantages: Rapid breakdown, rapid action, low toxicity to mammals and other animals; low toxicity to most plants; selective, doesn't harm most beneficial insects.

Disadvantages: Rapid breakdown—effective only against insects that come into direct contact with the spray before it dries; phytotoxic to some ornamental plants and houseplants.

Soft-bodied mites and sucking insects such as aphids, scale crawlers, white flies and thrips are the most susceptible. Slow-moving insects are more susceptible than highly mobile ones. Enzymes kill most insect pests safely. Please note even beneficials die if they are sprayed with enzymes. Enzymes are what spiders inject into their prey to predigest them; when insects, fungus, molds and mildew are sprayed with enzyme cleaners they are all quickly controlled. When dry, the enzymes are gone. Enzyme cleaners are also wetting agents - they make water wetter - fish can drown in water with too much enzyme cleaner so be careful. Enzyme cleaner has also been called citrus wash or fruit and vegetable rinse; mixed at a rate of 1 part cleaner to 500 parts of water you can wash off (with mechanical scrubbing) powdery mildew and general fungus, bacteria, parasites (protozoans and worms) waxy coatings and surface pesticides. Enzyme cleaners are not sold as pesticides. Enzyme cleaners with peppermint and sodium borate can be purchased from Safe Solutions, Inc. at 1-888-443-8738, <http://www.safesolutionsinc.com>.

Insectisafe® - 1 gal. warm water, 2 T. of vegetable oil, 2 T. dish soap and 1 T. cayenne pepper or peppermint oil. Mix ingredients and pour in spray bottles. Shake continuously as you use to spray and drench insect pests thoroughly. Normally this mix will not harm plants.

Inspection - Inside: In order to do a proper inspection to ensure adequate control. Outside: Inspect the entire garden at least weekly. Check the undersides of leaves and bark. Catch any problems when they first develop so they can be more easily controlled. You will need an assortment of tools and equipment: magnifying glass, lights (regular, black and red), monitoring traps, investigative and communication skills, binoculars, mirrors, spatulas, flushing equipment (compressed air aerosol) and protective clothing. Remove and examine all goods from cardboard and paper packages before bringing them inside. Bury, burn or return any infested materials immediately. Remember the old adage, "measure twice, cut once?" "Inspect twice; control once." **You will need to bend, climb, kneel, crawl and think! Remember, 90% of your problem will be found in 10% of the area. Do not forget to write it down.**

Instant Grits - Put instant grits on ant hills and/or near ant path ways. The grits, if still dry, will expand in the ant's bodies and finish them off.

Intelligence - You have an unfair advantage over the beasts of the earth, the fowls of the air and the creeping things; you have greater intelligence. Use it and you win; use pesticides and you lose!

Invisible Fencing - can be used to keep dogs contained in a grove, field or orchard so the dogs can chase out nuisance wildlife.

Iodine - can be used as a disinfectant and to prevent fungal growth.

IPM - True IPM stimulates the natural ecosystem so it takes care of itself.

Irrigation Management - Improper irrigation can wash off your treatments and spread infections and create other pest problems.

Isolation - Immediately isolate infected plant areas, materials and supplies to stop the spread of the pest/disease. Isolate areas with dangerous pest problems to keep children and pets out of them.

Japaca, Yellow Oleander (*Thevetia peruviana*) - All parts, except the leaves and fruit pulp, can be used to make cold water extractions effective against a number of pests, especially aphids.

Japanese beetle traps - Cut the necks off of 1-gallon plastic milk jugs and fill 1/3 full with fermenting mixtures of water, sugar, crushed fruit and yeast. Strain out the beetles regularly and simply reuse your "beetle brew".

Jasmonic Acid - and other naturally occurring plant substances can induce resistance to plant pests.

Jello Powder and Dry Milk - Mix any Jello powder with dry milk and lightly sprinkle this mix on the top of your seeds and then lightly cover with dirt. Moisten the soil and then cover with damp newspaper for 4 days; then remove the newspaper and watch your plants grow. You can also dust your plants with (lemon) Jello to help fight fungal diseases; the gelatin holds moisture and the sugar feeds the microorganisms.

Jewel Weed (*Impatiens capensis*) - Crush a large handful of jewel weed and place it in a large glass jar with a plastic lid. Pour in 1 qt. apple cider vinegar and let steep for several days. Strain the brew and add ½ tsp. pennyroyal oil, 1 tsp. eucalyptus oil, 1 tsp. orange oil (or geranium oil) and 1 tsp. citronella oil and spray the mix on skin and clothing to repel pests. Do not spray your face. Spray your hat or cap or scarf. Do not use if you are pregnant because pennyroyal may increase the risk of miscarriage. **As with all mixes, first test a small area of skin and wait at least 15 minutes for any allergic reaction.** Then, if everything is o.k., spray as needed. Jewel weed juice can also be used by itself to alleviate poison ivy, stinging nettle and/or insect bites.

Jojoba Oil - Kills/repels whiteflies on all crops. Kills powdery mildew on grapes and ornamentals.

Juniper - berries naturally contain antibiotic and detoxification properties.

Kaolin - clay dust will suffocate insects. Kaolin particle film forms a protective, physical barrier on fruit trees.

Keep On, Keep On Keeping On - e.g., **Keep the plants growing vigorously.** Rapidly growing fruits and vegetables can better tolerate or outgrow damage from insects and diseases, but they also quickly use up available nutrients. Applying fertilizer (and water) at critical times during maximum plant growth is essential for producing pest- and disease-resistant plants. Refer to the K-State Research & Extension publication, *Fertilizing Gardens in Kansas*. **Keep it clean.** Remove plants and debris after harvest to avoid harboring insects and diseases. Remove weeds which may provide shelter for pests. Dispose of or burn diseased plants, fruits and vegetables. Composting is seldom thorough enough to eliminate disease-causing fungi and bacteria.

Kentucky Coffee Tree (*Gymnocladus dioica*) - A large shade tree with long leaves that are pinkish in spring, green in summer and yellow in fall. The seeds can be roasted and eaten like nuts or made into a coffee substitute. The bruised foliage when sprinkled with sweetened water will attract and kill flies. Can be raised in containers.

Kitty Litter - Well used kitty litter will repel skunks, woodchucks, squirrels, chipmunks and many burrowing creatures who dislike the idea of a hungry cat waiting nearby for its next meal. Even geese dislike an area sprayed with kitty litter tea. Unfragranced, fresh clay kitty litter put in a large bag or container can be used to remove odors from smaller objects that are off-gasing.

Knotweed - Extracts and pharmaceuticals isolated from giant knotweed (*Polygonum sachalinense*) or its relative Japanese knotweed (*Polygonum cuspidatum*) have been shown to protect against cancer, lower blood cholesterol, protect against diabetes, improve cardiovascular health and are anti-inflammatory. One of the extracts is resveratrol which has extended the average lifetimes of fish, nematodes, mice and yeast up to 58%! These plants produce many defensive chemicals that help protect against disease, insects and other plant species.

Know Your Enemy - To solve a pest problem you need to know everything you can about your enemy so you can properly control it.

Knowledge Drought - is worse than a water drought and is unnecessary. **See Imagination.**

Knowing when to Ask for Help - An important skill is to know when to ask for help, education, advice, time and/or support from other professionals and/or consultants.

Label - When you use any alternative, be sure you follow all the precautions and/or warnings on the label and labeling.

Lacewings - e.g., Green and Brown lacewings. Brown lacewings are smaller than Green lacewings and are predacious as adults and as larvae; their larvae have been called “trash carriers” and/or “aphid wolves”. Only some species of Green lacewing adults feed on insects, but their larvae are always voracious aphid predators and have been called “aphid lions”.

Ladybugs or Lady Bird Beetles (*Hippodamia convergens*) - Of some 300 species of lady beetle, the ladybug is found most beneficial in habit, number and adaptability. Attract them with dandelions, marigolds, angelica, tansy, scented geraniums, butterfly weed, yarrow, roses, goldenrod, cucumbers, peppers, eggplants, and tomatoes. Pile dead leaves, straw, hay or other organic mulch at the base of plants or fencing in fall to serve as winter lodgings to hibernate in. They eat aphids, cotton-cushion, cornborer, roaches, scale, mealybugs, alfalfa weevil, Colorado potato beetles, spider mites, thrips and whiteflies. When there is an aphid explosion, you can expect a similar ladybug explosion to follow. They can eat 30 - 40 aphids per day. When wine grapes were attacked by aphids in Europe, the farmers prayed to the Virgin Mary to save their crops. Shortly after their prayer red beetles with black spots arrived and ate the aphids. In Mary's honor the farmers named the beetles “Merienkafer” or “Mary's beetles” which soon became “Ladybug”.

Larinus minutus - Larvae of this weevil feed on knapweed flowers and seed to provide biological control of this weed.

Larkspur (*Delphinium* sp.) - Powdered roots are toxic to bean leafrollers, cross-striped cabbage worms, cabbage loopers and melonworms. Some varieties produce a juice that will kill ticks, lice, mosquito larvae and maggots.

Lasers - are very effective in dispersing birds.

Latex Paint - can be used as a tree seal.

Laundry/Drying - will kill more fabric pests and bed bugs and dust mites and ticks.

Lavandin Oil - Repels clothes moths.

Lavender (*Lavendula angustifolia*, formerly *vera*) - is a perennial herb 1' - 2' tall, purple flowers from July to November. Flowers have been used for relieving sprains or rheumatic pain. It has estrogenic and anti-androgenic properties. Fragrant sachets used to repel household insects. Mosquitoes and midges hate the smell of lavender, so plant these plants near windows and doors or spray the exterior decks, swimming pool areas or patio with lavender water or soap or dip pieces of cloth or cotton balls in lavender and carry them with you on your hat, belt, etc., or hang them on patio chairs, tables and/or decks. Traditionally, lavender has been used to balance the body; anti-infectious, anti-toxic, anti-depressant, anti-spasmodic, anti-inflammatory, etc., **so try using lavender soap!**

Lavender Oil - Dr. Gattefossé gave the research to Dr. John Valnet who was a medical doctor in Paris, France. Valnet did nothing with it until the post war years (World War II) when he was working with war victims from shrapnel wounds and losing them to gangrene because the antibiotics wouldn't work. Dr. Gattefossé sent him some [lavender] oils and said “try the oils”. He started using the oils and he saved every single patient.

Lawn Mowers - Simply cutting with sharp blades at the right height and/or frequency of mowing and removing the clippings and properly disposing of them will culturally control many weeds, fungus and pest problems, e.g.,

black cutworms.

Laxatives - Chocolate laxatives, e.g., Ex-Lax®, will totally destroy rats and/or mice. Put a strong laxative, in their favorite food, and they will definitely defecate themselves to death.

Leaf Mulch Compost - applied around cabbages, turnips and carrots, etc. will inhibit the root maggot pests. When the leaves fall, thoroughly mulch with your lawn mower right into your lawn. **See Grass Clippings.**

Learn - Isa. 28:9-10 - Whom shall he teach knowledge? And whom shall he make to understand doctrine? (Them that are) weaned from the milk (and) drawn from the breasts. For precept (must be) upon precept, precept upon precept, line upon line, line upon line, here a little (and) there a little.

Leaves - Use them for green manure/compost, make tea. Mulched maple leaves will help prevent dandelions.

Lecithin - can be used as a fungicide. Lecithin is a fat known as phospholipid, which is known to help prevent the formation of cholesterol gallstones.

Lemon - Pour boiling water over a couple of sliced lemons with the peel and steep for 24 hours; place in a spray bottle and use to kill fleas and other pests. Spray dogs and allow to dry. Lemon peel will repel clothes moths.

Lemon Basil (*Ocimum*) - An aromatic tender annual with small pretty flowers and lemony fragrance. An attractive plant that is easy to grow. When planted in the garden close to tomatoes, it not only improves the taste of the tomatoes but deters white flies as well. **See Basil.**

Lemon Juice - A high school student discovered straight lemon juice would kill plants like acid rain. When you put lemon juice squeezed on an area and leave the lemon peels there too, this will repel most ants. Straight lemon juice will help alleviate the pain and discomfort of many bites and stings. CAUTION: Lemon juice will also dissolve calcium so wash or rinse your mouth after using straight lemon juice. Lemon juice will also dissolve kidney stones. **See Chapter 40.**

Lemongrass Oil - Repels dogs, cats and mosquitoes.

Least toxic pesticides - Growth hormones, baits, fungus, salts, desiccating dusts and the like should be used only as necessary. **Never use volatile, synthetic neurotoxins/pesticide poisons.**

Light Karo Syrup or Sucrose Water (1 cup sugar and 4 cups of water brought to a boil) - This clear sweet liquid is very similar to honeydew (and/or honey) and will lure ants, roaches and many sweet loving insects including wasps to your bait station or trap as it is an attractant and a moisture source, so use it in your traps or add a little borax or boric acid and make your own bait, but use less than 3% boron product and **be careful to keep any boron product away from kids and pets and wildlife.**

Light Traps - Put a light over a bucket of soapy water and leave on all night. Shut off all other lights and you will attract flies, kissing bugs, swarming ants/termites and many other flying pests to their deaths.

Lightning - provides the intense energy needed to combine atmospheric nitrogen and oxygen into nitrates. Nitrates enrich the soil as free fertilizer.

Lights - Many mammals, insects and/or pests are attracted to or repelled by lights - change the lighting to control pests. Blue-white lights attract the most insects; yellow is less attractive and red seems the least visible to insects. Leave a small light or a strobe light burning in your attic and bats will leave in about 1 week; turn them on when bats are hibernating and they will die. You can control cluster flies, flying ants, beetles, etc. with lights and you can repel other nocturnal invaders with different lights, e.g., strobe or motion detector lights. Hit a hornet nest at night and they will fly to the (car) lights where you can spray them.

Lime - (calcium oxide; CaO); can be used to disinfect outhouses, livestock facilities or to clean processing plants where adequate rinsing is provided. Sprinkle a little in the bottom of garbage receptacles. It can be used to control fungus, insects, frogs, toads, mosquitoes, slugs, sowbugs, algae, duck weed, and as a repellent and a

desiccant. **Be careful not to get burned!**

Lime Sulfur - (calcium polysulfide; calcium sulfide (Ca(Sx))); used as an insecticide, acaricide and fungicide. It will control anthracnose, peach leaf curl, Oriental fruit moth, brown rot and peach and cane borers, etc. It will also kill crickets; contains citric acid and also is a deodorant and can be used to clean glass and remove stains on aluminum.

Limonene and Linalool (Citrus Peel Extracts) - Contain insecticidal compounds that kill many insect pests, e.g., fire ants, and fleas, but may be of low toxicity to mammals. There is some controversy as to their safety and should, therefore, only be used with discretion and proper notification. The two most effective insecticidal compounds are d-limonene, a terpene that constitutes about 90% of crude citrus oil, and linalool, a terpene alcohol. Terpenes are hydrocarbons found in essential oils. They are used as solvents, fragrances and flavors in cosmetics and beverages. Linalool can also be extracted from pine wood. Citrus oils have a fresh floral odor and an oil consistency. Limonene and linalool are contact poisons that heighten sensory nerve activity in insects, causing massive over-stimulation of motor nerves that leads to convulsion and paralysis. Some insects, such as adult fleas, can recover from the initial paralysis unless limonene is synergized by piperonyl butoxide (PBO), or formulated with sodium borate - not done commercially as yet. It has been determined that linalool is not a cholinesterase inhibitor (a nerve poison), but it is when formulated with the questionable piperonyl butoxide. Limonene and linalool are available in aerosol and liquid products. They are currently marketed primarily as flea dips and shampoos but are also formulated with insecticidal soap for use as contact poisons. When applied topically to some laboratory animals both compounds can irritate the skin, eyes and mucous membranes. Both moderate and high doses of these substances can cause tremors, excess salivation, lack of coordination and muscle weakness. However, the symptoms are usually temporary, lasting several hours to several days, and the animals usually recover fully. **Limonene has been shown to cause sensitivity in cats and some people, especially with repeated exposures, contact dermatitis and can promote tumor formation in mouse skin (carcinogenic), so use these products sparingly and with proper notification.** Limonene and linalool are currently registered for use against fleas, aphids and mites, but, these compounds also kill fire ants, houseflies, stable flies, black soldier flies, paper wasps and house crickets. In a field test using grated limes, all the fruit flies were immobilized in 15 minutes, and all were dead in two hours. Citrus oils (commercial or homemade), therefore, have the potential for much wider use, including treatments for livestock and human ectoparasites, fumigation of food handling and storage facilities and household pest control. Limonene is a terpene that dissolves the wax protecting the exoskeleton. It is a GRAS product that also repels flies, dogs and cats. See orange juice.

Linoleum - helps prevent and/or control microbial growth because of the ongoing process of linoleic acid oxidation.

Linseed Oil - is a vegetable oil produced from flax seeds, but it is quite different from flax seed oil. Linseed oil is not safe to consume but it may protect you from poison ivy if you apply it heavily to all exposed skin prior to exposure.

Lint Roller - quickly will pick up the stray ant, tick, earwig, pantry pest, flea, spider or "bug".

Listen - You will never learn anything if you do not learn to listen.

Listerine® Mouthwash - has been diluted and sprayed on the lawn to control insects and grubs. It will destroy dandruff and some external parasites and will disinfect a broken blister; it is a powerful antiseptic. Listerine therapy for toenail fungus: Get rid of unsightly toenail fungus by soaking your toes in Listerine mouthwash. It will leave your toenails looking healthy again.

Locks - Keep all hazardous materials safely stored in locked areas.

Low-till and/or Fallowing - lessens soil disturbance and promotes soil microbiotic and nutrient cycles.

Magnesium - In early 2003, scientists with the U. S. Department of Agriculture isolated a virus that in tests killed 95% of Culex mosquitoes after they added magnesium to the water. Hypo-magnesium or magnesium deficiency causes a decline in health that leads to cancer, heart attack and to a physiological decline in cells. Hundreds of enzymes and ion transport systems require magnesium to work properly. The lack of magnesium will cause the heart muscle (and other muscles) to develop a spasm or cramp and stop beating. Without proper magnesium

we die. **Check out magnesium in Chapter 41.**

Magnifying Glass - Useful in inspections, diagnosis and bad boys use them for “burning ants.”

Maintenance - Proper maintenance prevents pests from entering and removes conditions conducive to infestation inside and outside.

Manage - Take charge; make a plan and then implement it to correct the problem(s).

Manroot, Wild Cucumber (*Echinocystis fabacea*) - Powdered root is toxic to European cornborer larvae and other insects.

Manual and/or Mechanical Removal - can be an extremely effective tool in your IPM toolbox. Remove pests by hand. Control weeds by hoeing and/or mulching. Use vacuums to simply suck up pests.

Manure - One of the oldest and most effective fertilizers known to man. The problem is not insufficient manure, but its misuse and/or contamination. **See Composted Chicken Manure, Get Set Grow.**

Manure Tea - Healthy, well nourished plants resist disease and insects better than sick, hungry ones.

Margosa (*Azadirachta indica*) - Roots of this plant are toxic both to soil nematodes and the larval hatch of nematodes.

Marigolds - The non-herb marigolds and African marigold (especially *Tagetes patula*, *T. patula*, *T. erecta*) roots may kill or repel (root lesion) nematodes, wireworm, *verticillium* wilt, potato eelworm and other pests. All marigolds are excellent companion plants to repel insects, e.g., asparagus beetle and Mexican bean beetles, from your garden. The marigold blossoms attract hover flies which attack aphids and the blossoms are attractive. W. Coles writing in his book *Adam in Eden or Nature's Paradise* published in 1657 noted the juice from marigold flowers (*Tagetes*) “dropped into the ears, killeth worms.” When marigolds are planted as a rotation crop, they leave secondary compound residues that act as phytoalexins. Plant marigolds around your home or in your garden and many flying insects will avoid these areas. **See Calendula.**

Marshmallows - (*Althaea officinalis*) Any wild mallow flower is an excellent compress for a wasp sting. Marshmallows can be used to trap armadillos.

Mayonnaise Jar - use a large 1-gallon mayonnaise jar with a screw top lid; install/secure a 1/2" - 1" plastic or copper crook neck pipe (an upside down j) through the top of the lid extending into the jar 2" - 3" and above the jar 5" - 6"; put 1 egg mixed in 1 cup of milk into the bottom of the jar - you will catch flies usually without odor.

Mealy Bug Destroyers - Look like black, 1/8" ladybugs with orange-red heads. Adult mealy bug destroyers will eat certain stages of scale insects, aphids; they are very partial to mealy bugs.

Measure - Do not simply pour out a “glug” or assume or guess - measure. Measure twice — cut once.

Mechanical Barriers - can be used to prevent the access of many pest species.

Mechanical Pest Controls - Use natural or physical controls first, e.g., hoes, swatters, traps, caulking, exclusion, repairs, decoys, sanitation, step on the bugs, birds, bats, toads, handpicking, fences, sanitation, screens, doors, doorsweeps, bacteria, mowers, fans, vents, predators, parasites, washing, drying, vacuuming, etc. to kill or remove pest problems. In 1763, Linnaeus won a prize for an essay he wrote under the name C. N. Nein on how caterpillars could be removed from orchards. He suggested both mechanical and biological controls.

Medicated Body Powder - lightly sprinkled controls most crawling insects.

Melaleuca (*Melaleuca alterniflora*) - Melaleuca oil is anti-fungal and anti-microbial and gives relief to ache and insect bites. This oil can cause stains, contact dermatitis and can harm cats.

Menthol - can be used to kill mites and/or repel ticks. Put a line of Vapo Rub® where you do not want mites or ticks to cross. Renew as needed.

Mescal or coral bean (*Sophora secundiflora*) - Powdered seeds of this flowering shrub are toxic to armyworms and other insects.

Metal Nit or Flea Combs - and a little patience and baby oil or soapy water will safely control lice and/or fleas.

Methyl Carbitol - Make a wax or paraffin slurry with 5% - 10% methyl carbitol to repel imported fire ants, other insects and vertebrate pests.

Methylene Blue - $C_{16}H_{18}ClN_3S \cdot 3H_2O$ used as a dye, as a bacteriological and biological stain will sterilize termites (and other insects) that eat it.

Microbial Pesticides - are alternative control products whose active ingredient is a living organism, bacteria, viruses, fungi and nematodes; some 1500 such agents have been found, e.g.: *Agrobacterium radiobacter* - This bacterium is used to prevent the development of bacterial crown gall (*Agrobacterium tumefaciens*). The "good" microbe colonizes roots and stems, supposedly preventing infection for 1 - 2 seasons. *Bacillus popilliae* - (better known as milky spore) is a popular agent used against the larvae of Japanese beetle. *Bacillus sphaericus* - is a microbe used for mosquito control in dirty water habitats. *Bacillus subtilis* - is used as a seed inoculant to prevent damping-off in cotton, peanuts and beans. *Bacillus thuringiensis* - is probably the oldest and best known of biological pesticides. There are many strains of this bacterium. *Beauveria bassiana* - This fungus is used to control aphids, leafhoppers, thrips, whiteflies and mealybugs. *Collectotrichum gloeosporioides* spp. *aeshynomene* - This species of anthracnose is used to control northern jointvetch. *Collectotrichum gloeosporioides* spp. *malvae* - is used to control mallow in various field crops. *Entomophaga maimaiga* - This Asian fungus is used to control gypsy moth populations. *Nuclear Polyhedrosis Viruses* - This series of viruses is used to control many types of caterpillars. *Phytophthora palmivora* - This water mold is used to control strangler vine in Florida's citrus groves. *Puccinia cannliculata* - This rust species is used to control yellow nutsedge. *Streptomyces griseoviridis* - This microbe, discovered in Finnish peat bogs, is used as a fungicide and try to prevent several root diseases. *Trichoderma harzianum* - In the soil it colonizes roots and is used to control *Pythium* and *Phytophthora* rot. *Verticillium lecanii* - can be used to control aphids and whitefly.

MICROBIAL INSECTICIDES *Bacillus thuringiensis*, (Dipel, Thuricide, Attack, Catapiller Killer), M-One

Advantages: Selective; non-toxic to wildlife and humans; may establish and provide control in the future.

Disadvantages: Controls only one certain species or group of insects; broken down by the elements so timing is critical; special storage or application procedures may be necessary.

See Enzyme Cleaners.

Microbial Plant Inoculants - including rhizobia bacteria, *Mycorrhizae azolla*, Axotobacter, etc. Make sure they do not contain any prohibited substances.

Microbes - Safe Solutions, Inc. microbes (liquid/freeze-dried) can be extremely helpful in controlling pest problems, removing muck and odors, but be careful when you mix them as they are easily killed by chlorine, fluoride and other disinfectants.

Microwave - Nuke 'em. While this may seem very satisfying to us humans and is environmentally sound, the method is not recommended. The reasons are as follows: The microwaves heat up the infested material and the subsequent heat could damage the object. To kill an insect, there must be at least 75% relative humidity in the oven. To increase the humidity to such a level would also risk severe damage to the infested article. You can sterilize fully soaked rags and sponges in a microwave for 2 minutes, but some sponges can burst into flames. See Clothes Dryer.

Milk - If you spray fresh milk twice a week, diluted one part milk to nine parts of water, it will stop powdery mildew, e.g., *Sphaerotheca fuliginea*, faster and better than "registered" fungicide poisons. Milk can also be used to control various mosaic viruses, a broad spectrum of bacteria and fungi.

Milk Jugs - The top half of a plastic milk jug makes a funnel or a scoop or use the top half as a mini-greenhouse; the cap can be removed to make a vent.

Milk Thistle - is a proven detoxifier that guards against the deterioration of the liver and should be the first thing you take if you are diagnosed with hepatitis C. The health benefits of Milk Thistle seed (*Silybum marianum*) have been known for more than 2,000 years. Milk Thistle is a herbaceous plant with a dense-prickly flower head and reddish-purple tubular flowers. It is native to the Mediterranean area and is now grown in Central Europe, North and South America, and Southern Australia. Milk Thistle a/k/a Marian Thistle, Mary Thistle, and Lady's Thistle, is a member of the *Asteacea* family. Historically, milk thistle was used for relieving congestion of the liver, kidneys and spleen and by lactating women to stimulate the production of milk. Currently, standardized milk thistle seed extract is used to maintain and regain liver health, especially those who consume excessive amounts of alcohol. This use was validated by studies using between 200 mg and 420 mg of silymarin per day (usually in three separate doses). Milk Thistle has an extensive history of use as an edible plant. In the 1st century AD, Pliny the Elder reported its use for supporting liver health. Theophrastus (IV century BC) and Dioscorides (1st century AD) also wrote of its value. The English herbalist, Nicholas Culpeper (1650) claimed it was effective for supporting the normal functioning of the liver.

Research suggests that this herb is beneficial in protecting, detoxifying and strengthening the liver. Certain diseases that occur in the liver may also benefit from milk thistle seed. Those suffering from hepatitis and liver cirrhosis may benefit from this herb. It also shows promise in improving overall liver function. Many clinical studies have demonstrated that this herb supports healthy liver function and provides powerful antioxidant protection, particularly from free radicals and other toxins that normally enter into the liver and cause damage. A primary constituent of silymarin called silibinin also helps to support healthy liver function, encouraging healthy cholesterol synthesis by the liver. In addition to its well-recognized role in promoting liver health, key constituents in milk thistle also help to maintain normal kidney function and promote optimal immune function. Limited research suggests that this herb may also support healthy prostate function, and encourage a vital gastrointestinal tract by protecting it from free radical damage.

Those who suffer from acne may benefit from milk thistle seed. The high level of antioxidants in this herb are good for the entire cardiovascular system. However, research suggests that milk thistle seed may help to control cholesterol issues. It may help to lower bad cholesterol and increase good cholesterol. Research suggests that this herb may help to control a person's diabetes. It shows the most promise in those who are not insulin dependent. This herb is said to possess the most benefits for diabetes when combined with a healthy diet and exercise.

Milk Thistle seed is said to possess many benefits for digestive system. It is said to help soothe some of the symptoms associated with irritable bowel syndrome and Crohn's disease. It may also be beneficial in treating and preventing gallstones. Milk thistle seed is also said to be a power anti-inflammatory so it is said to be quite beneficial to those suffering from intestinal inflammations. Milk thistle is also said to be beneficial to those suffering from certain types of cancer. It is also said to help the liver function "normally" when it is stressed out from medical treatments such as powerful drugs, chemotherapy and radiation. Milk thistle seed is an important natural treatment for COPD, or Chronic obstructive pulmonary disease. It counteracts much of the stress that's placed on the liver as a result of the disorder, and is generally considered safe when used properly.

How to use:

Grind whole milk thistle seeds in a coffee grinder or spice mill. Add the freshly ground seeds to hot cereal, muffins, rice, or other grains. This is an easy way to consume milk thistle seed and can be supplemented with other milk thistle seed formulations.

Caution:

If you are considering adding this herb to your diet, you should consult a physician first. Some herbs will interact with certain medications and medical conditions and this could be dangerous. Milk thistle may occasionally cause a mild, transient laxative effect, which normally passes within 3 days of use.

Milky Spore Disease - will control Japanese beetles.

Milorganite - Composted Milwaukee sewage; the Author will not use nor recommend this product.

Mineral Oils - can be used as insecticides and fungicides. A small amount will control ear mites in pets.

Mineral Oil and Liquid Sulfur and Liquid Soap - Take equal parts to make a concentrate; then put 3 T. less of the mix in 1 gal. water to control scale. You can use less mix to control other pests, e.g., aphids, zebra swallowtail, etc. Spray not less than once a week. Dip a Q-tip in mineral oil and gently insert in a baby's rectum to cure constipation in about one-half hour Older folks should have the Q-tip inserted the full length 2 - 3 times for about a half-hour; this allows the oil to soften the stool.

Mineral Oil and Vinegar - Solutions kill insects by preventing the development of the insect's cuticle. Mineral oil, with or without vinegar, can be sprayed on corn ears as soon as the silks are out - will control corn ear worm. Mineral oil on water controls mosquitoes, but may kill fish and **chronically may be considered a carcinogen**.

Mint - Plant mint around entrances, garbage cans, dog pens, dumpsters, etc. to help keep ants, cabbage pests, aphids and flies away on hot, summer days. A few stems of dried mint will keep many insects, e.g., flies and fleas, from invading doorways, kennels, seeds, beans and rice. In a blender mix 8 oz. mint leaves in 1 qt. water, strain, add a few ounces of liquid soap and spray every 10 days. Try just using a few ounces of peppermint (pure castile) soap or Safe Solutions Tweetmint Enzyme Cleaner with Peppermint in water and see how many insects quickly succumb to these Pestisafes®.

Mint Tea Bags - will repel ants. You can make mint tea and spray decks, porches, sidewalks and ant hills.

Minute Pirate Bugs - are very small (1/8") predators with tiny heads on black bodies with a very distinctive white chevron pattern on their backs. It only takes one bug per plant to remove thrips, aphids, spider mites, corn ear worms, leafhoppers, nymphs, whiteflies, insect eggs, etc.

Mirrors - Useful for inspecting "hidden areas" and under things.

Mites - Adults are only about 1/50" long; very tiny; some species of predator mites change color in response to their prey that can range from spider mites to thrips to termites. Adults have tear drop-shaped bodies and 8 legs. They can go into places and kill pests where your sprays can not reach.

Mixed Cropping - Plants have a better chance of survival if they are integrated into a wide variety of plant life. This reduces the signals to the pests and encourages a healthy variety of beneficial organisms.

Modify the Environment - and reduce the pest population size so it is acceptable and/or more easily handled. Adding flowers to attract beneficials is one way to modify the environment, as is companion planting, mixed cropping, repellent planting, and the use of protective herbs and plants. Inside one can caulk, adjust the temperature, practice proper sanitation, properly store food and garbage and control moisture.

Moist - Keeping the hair moist for a half-hour or more causes each hair to swell and crack lice nit glue.

Molasses - can be used to catch and kill cutworms, grasshoppers and other pests. Hanging containers half-full of a weak mixture of molasses (½ c. per gallon of water) in plum trees will (virtually) eliminate black-knot. See Chapter 37. Spraying 1 c. sulfured molasses in 1 gal. warm water will quickly destroy fungal diseases. The plants virtually absorb the molasses instantly.

Mold - e.g., *Metarhizium anisopliae*, can be used to kill cockroaches and termites.

Monitoring - for pest activity on a weekly basis quickly controls pest problems as they begin and not when there has been a population explosion and/or significant damage. Visual monitoring is supplemented with sticky tapes, traps, dogs, etc.

Monosodium Glutamate (MSG) - Processed glutamic acid is the neurotoxic component in monosodium glutamate. Neuro-scientists have found in animal studies that both glutamic acid and aspartic acid load on the same receptors in the brain, cause identical brain lesions and neuro-endocrine disorders and act in an addictive fashion. Try using them in your baits, but not in your food.

Moon Flower (*Datura ioxia*) - Do not eat the seeds or drink tea brewed from the seeds or you risk anticholinergic signs and symptoms, including dilated pupils, tachycardia, hallucinations and/or urinary retention. Signs and symptoms last 24 - 48 hours with supportive care and benzodiazepine administration. *Ipomoea muricata* might cause hallucinations and cholinergic health effects, e.g., diaphoresis, salivation, lacrimation and/or diarrhea.

Mosquito Netting - has been used for years to keep mosquitoes and black flies off people. Solutions, 1-800-342-9988, <http://www.solutions.com> has a hat made in Canada with a full head covering insect net hidden in a special pouch on the bill. Hung over your bed and tucked in all around the mattress will also protect you from stinging insects, kissing bugs, flies, spiders, ticks, centipedes, mosquitoes and bed bugs (if the mattress is not infested).

Mosquito Repellent - Mosquitoes are very sensitive to certain scents, chamomile and citriodora especially. Both are easy to grow and both are used in dry flower arrangements. Citriodora is also used in potpourri. To make mosquito repellent, take 1 oz. of green leaves from both plants and boil in 1 gal. water. Strain and place in the refrigerator. Before going outside, splash the mixture liberally over your face and exposed parts of your body (test on a small area first to see if you are sensitive). You will enjoy the fresh, citrus smell but the mosquitoes will stay far away. Sweet basil also repels mosquitoes. Try Bite Blocker® made of soybean oil, coconut oil and geranium oil. Scented geraniums and Noxema will repel mosquitoes. **Try Safe Solutions Insect Repellent and see Chapter 42.**

Moth Crystals - placed in an attic or closet will repel brown recluse spiders and spread along a fence line or in tunnels, etc., will keep out snakes, rabbits, skunks, woodchucks and pets - replenish as needed - but remember if "pest" mammals are repelled by poisonous moth crystals - you and your pets may also be harmed. Moth crystals or mothball odors can be reduced by first removing them **all** and then scrubbing every inch of the area with equal parts of white vinegar or naphtha or mineral spirits or lemon juice and rubbing alcohol - repeat as needed, follow the label directions exactly and air out thoroughly. According to the manufacturer, moth balls are only to be used a moth deterrent, and it is a violation of federal law to use these (registered) volatile, synthetic pesticide poisons in a manner inconsistent with their package labeling! See Naphthalene. **We do not use or recommend these volatile materials that are registered pesticides.**

Mounded Soil - Mound soil over squash vines you think are infested with squash vine borer to control this pest.

Mountain Dew - works great to attract yellowjackets to your trap.

Mountain Mint - A natural tick-repellant herb; rub your legs and pets with the leaves in tick season.

Mountain Tobacco (*Attenuata*) - A graceful and ornamental species with white inch long flowers flushed pink outside. It is a night blooming annual that grows to 4' - 5' with pointed leaves. A very popular tobacco with the Navajo Indians. It is an all purpose plant. You can use it as an ornamental, filler and pesticide base. To make garden pesticide, mix 1 tsp. powdered dried leaves with 1 tsp. dishwashing detergent into 1 gal. water. Apply with sprayer. **Remember nicotine is a deadly poison to people and pets.**

Mowing - Proper mowing decreases flower and seed production and controls many diseases and pests. For example, mowing poison ivy closed to the ground in midsummer, followed by plowing and harrowing and/or by grazing will control this noxious pest. Mowing can remove over 90% of the black cutworm, *Agrotis ipsilon*, but remove the clippings and remember the cutworm larvae will survive about half of the time and crawl 75' or more to reinfest. Mowing before sunrise catches the peak cutworm activity and can remove 100% of cutworm larvae. Proper mowing also helps destroy ticks.

Mulch - Nearly any organic material can be used as mulch. Mulch 3" - 4" deep will safely suppress and/or smother many weeds, especially when used in combination with a geotextile fabric. Some mulches may be acid or alkaline, causing problems with the soil's pH. Sawdust will use up nitrogen as it decomposes, so mix in some grass clippings if you use sawdust. The color of plastic mulch can affect plants. Basil developing above red mulch had better succulence and fresh weight and greater area than basil plants grown above black mulch. When basil is grown above green or yellow mulches, the basil plant develops significantly higher concentrations of aroma compounds and phenolics than basil plants grown above white or blue mulches. Red mulch produces larger tomatoes and sweeter, tastier strawberries. Color can and does affect the roots, stems, leaves, seeds,

fruits and/or vigor of many food and/or crop plants. Mulches help control weeds and reduce moisture evaporation from the soil surface. They also help to prevent rot caused by fruit coming in contact with bare soil. When tilled under, organic mulches become valuable soil amendments.

Multiple Controls - Often one control will not work, so use several in order to eliminate pest problems. To only use one control is like a prize fighter only using one type of punch.

Music/Noise - Loud music/noise will often repel bats, nuisance wildlife and/or birds until you have a chance to permanently exclude them. Birds singing or special music playing 20 minutes before a foliar nutrient application can increase plant growth up to 400%! It is said the sound opens the plant's pores. **See Radios and Lights.**

Mustard - You can use a crop rotation of mustard as an alternative to chemical fumigants. Plant mustard after a wheat harvest in August or September. The mustard will quickly give you a green and yellow crop in 2 - 3 weeks. After 6 weeks of growth you incorporate the entire crop back into the soil. Mustard plants produce small amounts of MITC, the same active fumigant which is produced when metam sodium reacts with water. The incorporated mustard plants give off small amounts of MITC over the entire (potato) growing season. Mustard MITC curbs nematodes and the green manure helps hold soil in place, enhances soil percolation and helps stop "early die" in potatoes.

Mustard Oil (a/k/a allylisothiocyanate) - Repels dogs, cats, wildlife such as deer and raccoons. Repels and kills insects, spiders, centipedes, etc.

Mustards - are known to kill or repel some pest insects while attracting beneficial ones. A poultice of mustard seeds is a time-honored cure for a congested chest. Seeds also relieve arthritis, rheumatism, toothaches and sore muscles. That's because mustard contains a number of healing chemicals that stimulate circulation.

Myrrh - Anti-microbial, anti-fungal, antiseptic, astringent, disinfectant, promotes spiritual awareness.

Napthalene - will repel birds, bats, squirrels, rabbits, and many other animals. The precautionary statements and hazards to humans and domestic animals that this toxin is a *registered* pesticide that can only be used as labeled. May be fatal if swallowed. Keep out of reach of children. Avoid breathing vapors and avoid contact with the eyes. Rooms should be well ventilated before occupancy. Do not contaminate water by cleaning of equipment or disposal of wastes. **The Author does not use nor recommend this volatile poison.**

Nasturtiums - will repel/control cucumber beetles, cabbage moths, Colorado potato beetles, white flies, squash bugs, and woolly aphids. They trap aphids who prefer to eat them than other crops. Put a few in your salad; they look and taste great.

Native Species - Plant (resistant) native species and not exotics or you will increase your pest control problems.

Natrum muriaticum - is the fancy schmancy way of saying sodium chloride, table salt. This simple product will kill lice and scabies. Common salt is one of the most important elements in the world. It occurs naturally, in sea water, as crystals of rock salt and as large deposits formed by evaporating lakes and seas. It is the conduit in our body's neurological system. Salt was a form of money to the Roman soldiers (Salarium) and the word 'salary' was derived from this Latin word. Possible side effects include depression, irritability, congestion, loss of smell and taste, canker sores, heartburn, nausea, aches and pains, etc. An ounce of salt in a gallon of water will kill spider mites. A tablespoon of salt in 2 gallons of water will kill cabbage worms. For some pest control uses: **See Sodium Chloride.**

Natural Enemies - The best control of pest populations are their natural enemies. In the Central Valley of California, after widespread applications of DDT to citrus and other crops in 1946, the Vedalia beetle, which preys on cottony-cushion scale, was practically destroyed. The cottony-cushion scale was not destroyed by DDT and increased greatly. Only after the DDT residues were no longer toxic to the Vedalia beetle and this beneficial was once again established in the citrus groves, was the natural balance once again restored.

Natural Herbicides - Black walnut, tree of heaven, spotted knapweed, rye, sweet clover and sunflowers synthesize their own "natural herbicides" that help them decrease weed growth. This ability is called "allelopathy". Note:

Spotted knapweed begins producing catechin whenever you stress (tap on) the plants and will kill weeds; grass and wheat are resistant.

Needs - All living organisms have 5 basic needs: air, water, temperature range, food and shelter. Deprive any living thing of 1 or more of these basic needs and it will die.

Neem - Neem is a broad-leaved evergreen related to mahogany and has been worshipped as the goddess Neemari Devi in India. Neem has been used for over 4,000 years. Its medicinal qualities are mentioned in the earliest Sanskrit writings. It has been called the "village pharmacy" to treat a wide variety of disorders. Neem has strong antiseptic, anti-viral and antifungal ingredients. The tropical neem tree (*Azadirachta indica*) has lacy Grevillea-like leaves, and is being spread to missionaries all over the world by ECHO located in Fort Meyers, Florida <http://www.echonet.org/>. Neem oil extracts (especially from the seeds) have been used as medicinal preparations and pest control products in Asia and Africa for centuries. Neem oil is composed of a complex mixture of biologically active compounds. Neem has a strong, unpleasant odor and a bitter taste. Its various active ingredients acts as repellents, feeding inhibitors, egg-laying deterrents, growth retardants, sterilants and/or direct toxins. These multiple modes of action make it unlikely that insects or pathogens will develop resistance to neem compounds because they affect the pests in so many different ways. Neem has both contact and systemic action in plants. Seed dust can irritate your lungs, but in most forms, neem is not irritating to human skin. The active ingredients biodegrade rapidly in sunlight and within a few weeks in the soil. Neem oil is an excellent registered insecticide and insect repellent and fungicide. Put 20 leaves and 5 slices of bread into a blender with 1/4 teaspoon of vegetable oil. Blend until you have a good mixture. Remove the mix and form into balls 1" in diameter each. Place balls in corners and cupboards. Replace every month for best results of non-toxic roach control. You will initially see only small roaches produced which eventually die out. Neem is usually harmless to the natural enemies of insect pests, because the beneficials are not exposed normally the way the pests are. This has been attributed to neem's requirements for oral ingestion, lack of toxicity to adult insects, systemic activity, limited persistence, and anti-infectant and/or repellent properties (Schmutterer, et al 1990).

Neem Oil - Neem oil is considered to be non-toxic and yet it affects more than 200 species of insects. Neem repels mosquitoes, biting flies, sand fleas and ticks and helps heal wounds, mange, poison ivy and poison oak and has antibacterial, antifungal and antiviral properties.

Negative Ions - in the air repel insects; in the water kill insects (termites) that are sprayed directly.

Negative Ion Plates (including Earth Cards) - are made of anodized aluminum that is completely natural and never need recharging - they can be effective for two years or more and when placed in a proper grid pattern will repel and remove many pests within 3 - 30 days. You may also notice the air is fresher and your plants will grow better. **Note:** There are several manufacturers (or providers) of purple anodized aluminum or negative ion plates that create or focus natural energy. Earthtek Corporation has the trademark names Earth Cards and Bug Banishers and advertises these are useful in pest control. There has been previous literature, e.g., Vibrational Medicine and Linda Goodman's Sun Signs and Star Signs and studies that *other* anodized aluminum plates also repel insect pests and create useful natural energy. The other plates have been used in the space shuttle and elsewhere to reduce depression and create a feeling of well being and/or euphoria. Some doctors use them to "heal" people. Some of the literature states the plates usually contain fragmented granite and the reoriented crystalline granules are embedded in a polyester resin sealed in plastic creating a single "crystal" that constantly emits positive energy, capable of penetrating any material. The Advanced Level Urban and Industrial IPM - Purdue University correspondence course (see pages 373 and 198) calls the use of Earth Cards "absurd". The *advanced* course then goes on to discuss the use of various volatile pesticide poisons, etc. to *control* pests. Pesticides have never truly controlled, much less eliminated, pests; they have, however, poisoned many people including this Author. Someone should tell these *IPM experts* that IPM does not mean "Include pesticides monthly" or "integrated pesticide management," and that hundreds of schools and thousands of people have found these "absurd" devices work better than volatile poisons in controlling pests.

Nematodes - are microscopic; pest nematodes attack plant roots; beneficial or entomopathogenic nematodes (depending on the species) attack soil-borne pests, e.g., cutworms, caterpillars, bill bugs, fleas, termites, grubs, iris borers, cabbage root maggots, strawberry root weevils, Japanese beetle grubs, etc. Commercially available beneficial nematodes - tiny insect-attacking worms - attack termites, fleas, grubs, and some garden pests; find them in garden catalogues etc.

Other safe controls for nematodes include:

1. Root knot nematodes can be destroyed by planting a season-long “garden” of lana or hairy vetch seed and elbon or cereal rye seed. The seeds should be a few inches apart. Then just before the rye blooms, cut it down (letting it decompose) and let the vetch and rye grass grow together until the end of the season.
2. Add compost to increase the organic matter content of the soil.
3. Add sugar or molasses at a rate of 1 pound per 50 feet. **(Also see: Mustard.)**

Neozygites fresenii - is an aphid-killing fungus and can be used on control cotton aphids, *Aphis gossypii*.

Netting - will protect plant crops, trees, people, homes and animals from many pest attacks, e.g., cats, birds, deer, rabbits, chewing insects, and will prevent flying insects from laying eggs.

Newspaper - wet several sheets to help them cling together, anchor the edges with rocks or soil - top with wood chips (for appearance sake) - the newspaper mat will smother weeds. Roll some up for a disposable fly swatter. Mix torn-up newspaper with water in a barrel or pail and stir it every day for a week or two. It becomes a slurry; pour the slurry around the base of plants, It hardens into a mat no cutworm can penetrate.

Niacin - Vitamin B₃ (nicotinic acid) mixed in a bait disorients many insects. **NIACIN FIGHTS CARDIOVASCULAR DISEASE** (January 2007) The New York Times reported (1) that inexpensive vitamin B-3, niacin, “can increase HDL as much as 35 percent when taken in high doses, usually about 2,000 milligrams per day. It also lowers LDL . . . (and) triglycerides as much as 50 percent.” The Times quoted Steven E. Nissen, M.D., president of the American College of Cardiology, as saying: “Niacin is really it. Nothing else available is that effective.” (Most of the cholesterol in your body is made by the liver from the saturated fats you eat.) Niacin was first used to successfully lower serum cholesterol in 1955. (2) Since then, placebo-controlled studies have confirmed that niacin prevents second heart attacks, and niacin also reduced strokes. One study showed that after 15 years, men taking niacin had an 11 percent lower death rate. Although a warm “flush” is a common side effect of niacin, the vitamin is safer than any drug.

Nicotine - Once a widely used insecticide, its high toxicity is proof that “natural” does not always mean “safe”. Some of our other more infamous poisons, hemlock and cyanide, also come from nature. **Studies stress the need to wash immediately after making any nicotine applications and require the use of protective clothing.**

Night Shade (*Atropa belladonna*) - commonly known as deadly night shade or belladonna is an extremely toxic, deadly killer, but atropine, an extract from the same plant, can be used as an antidote to nerve gas/pesticide poison exposure.

Night Vision Glasses - especially with infrared can be used to conduct nighttime inspection and control operations for nocturnal pests, e.g., bed bugs, roaches, rats, mice, carpenter ants, etc.

Nitrogen - can be used in a controlled atmosphere storage and package flushing operations.

Noise - There are gas cannons, radios, 12 gauge shotgun scare shells, pistol launched pyrotechnics, electronic bird repellents, etc. that you can use to scare animal pests away from your property over to your neighbor’s.

Non-target Species - The things you kill or injure other than the pest whenever you spray broad-spectrum pesticide poisons.

No-stick cooking spray - stop grass build-up under your (clean) lawn mower by spraying food release or cooking spray there before you mow.

Not Nice to Lice®, **Lice R Gone®**, **Safe Solutions Pet Wash and Insect Repellent**, **Not Nice to Bugs®**, **Not Nice to Skin Irritations®**, **Not Nice to Odors®**, **Not Nice to Scabies®**, **Not Nice to Dust Mites®**, etc. - are all perfect Pestisafes® that quickly kill pest with EPA exempted ingredients, or microbes or with protease enzymes and surfactants and will never create pest resistance and are considered either to be non-toxic and/or GRAS (Generally Recognized As Safe) to people and pets. Call 1-800-221-6188 for a dealer or supplier near you.

Nothing - Doing nothing is a choice. We have repeatedly proved that if you stop spraying pesticides for a few years there is less damage because the natural predators can reestablish themselves.

No-till Farming - Leaving all crop residue on top of the field will stop year-round solar radiation from scorching the ground in tropical settings. No-till greatly minimizes soil disturbance and thereby greatly improves the health of the soil and actually saves labor and costs. Without ground cover, up to 90% of rain can be lost. Decaying plant residue is green manure and makes excellent mulch to help suppress weeds and improve the soil structure.

Noxema® - Lightly cover exposed skin to repel biting insects, e.g., mosquitoes. Noxema® will also repel some crawling insects, e.g., ants, temporarily.

Nutmeg Oil (*Myristica fragrans*) - Has caused some beetles and grubs to just stop feeding. Nutmeg topically alleviates muscle aches and arthritis pain. **Never take essential oils internally. Ingestion can be toxic.**

Nutrasweet® - See Aspartame.

Nutrition - Proper nutrition protects plants from pests, diseases and viruses.

Oak Leaves - repel insects in a green house by slow burning oak leaves in a large metal can punched with aeration holes - put can in a charcoal grill first - so you don't burn down the greenhouse. Oak leaf mulch will repel snails and cutworms.

Oats - The oat plant is toxic to sawfly larvae.

Observe - Many people see but they do not observe or look at something very carefully. You may have seen something thousands of times, but you can not describe exactly what you have seen because you really were not paying close attention. For example, how many steps are there to your own porch or front door? **Start to observe and not merely see.**

Occupants - Often your greatest source of pest control data and information; the occupants can tell you what and where *they* are, where *they* have been, what *they* are in, how many of *them* you have to deal with, etc.

Odors - can be used to attract or repel pests.

Oils - Have been used for years as adjuvants and for pest control. In 200 B.C.E. the Roman, Cato the Censor, advocated oil sprays for pest control. Diluted oils that are plant-based (canola, castor, coconut, corn, etc.), mixed at a rate of 1 tsp. oil and 1 tsp. soap or Safe Solutions Tweetmint Enzyme Cleaner in 1 gal. water (You can add some chamomile or compost tea) will help prevent fungus and pest and disease problems. You lightly spray daily for the first week; then weekly and/or as needed. **DO NOT SPRAY ON FUZZY LEAF PLANTS OR THEY WILL BURN!**

OILS: dormant oils, horticultural superior oils, Volck

Advantages: No residues on fruit when applied prebloom. Effectively controls many overwintering pests.

Disadvantages: Must be applied while tree is dormant, though lighter weight oils are being developed that can be used in spring and summer. Must be applied when temperatures are above 40° F but below 80° F for several hours to avoid injury.

Oils can be used to control insects, mites or plant pathogens. Oils are generally effective against soft-bodied insects such as aphids, scale crawlers, mealybugs, spider mites and whiteflies. Small larvae of some caterpillars and sawflies may also be controlled with oils. Dormant oil sprays are also used against overwintering eggs and scales. Horticultural plants oils are commonly used to suppress certain fungal diseases like powdery mildew and black spot on roses. When applied to the plant, a thin film of oil must thoroughly cover the target insect or mite. The oil plugs the spiracles or pores through which the insect breathes and the insect dies by suffocation. Oils can also disrupt insect membrane function or structure and can also disrupt feeding by the insect. When used against plant pathogens, oils may smother fungal growth and reduce spore germination on treated surfaces. Apply dormant oil sprays only after winder hardening has occurred. Some neem oil products contain an additional active ingredient, azadirachtin, which is an insect anti-feeding agent and insect growth relator. When applying oils, it is best to agitate hand pump sprayers frequently and keep tank spray agitators running to reduce the

risk of oil separation. Remember, oils can injure susceptible plant species. Symptoms include leaf scorching and browning, defoliation, reduced flowering and stunted growth. Do not treat stressed plants and apply when conditions are lower than 85° F. and 90 percent humidity. The longer wet oil sprays remain on foliage, the greater the chance of phytotoxicity.

Olive Oil - Olive oil is known for its smothering abilities and it will kill lice and scabies and many other insects and can be added to soap water solutions to help control pests. Olive oil health benefits are: Reduces LDL (bad) cholesterol; lowers blood pressure; decreases blood sugar levels; increases the absorption of vitamins, e.g., A, D, E and K; stimulates the bladder to secrete bile, which helps prevent gallstones; promotes cellular growth; speeds healing and helps the metabolism. No wonder why olive oil is so present in the scriptures. *Helicobacter pylori* is linked to a majority of peptic ulcers and to some types of gastric cancer, and resistance of the microorganism to antibiotic treatment is now found worldwide. Virgin olive oil is an unrefined vegetable oil that contains a significant amount of phenolic compounds....that are stable for hours in this acidic environment. They exert a strong bactericidal activity against eight strains of *H. pylori*, three of them resistant to some antibiotics. Among the phenolic compounds, the dialdehydic form of decarboxymethyl lignostyrene aglycon showed the strongest bactericidal effect at a concentration as low as 1.3 g/mL. So, virgin olive oil is a potential chemopreventive agent for peptic ulcer or gastric cancer, but this bioactivity should be confirmed in vivo in the future. Source: Journal of Agricultural and Food Chemistry Volume 55, Pages 680-686, "In vitro activity of olive oil polyphenols against *Helicobacter pylori*" Authors: C. Romero, E. Medina, J. Vargas, M. Brenes, A. de Castro
<http://www.healthsalon.org/69/helicobacter-pylori-is-linked-to-a-majority-of-peptic-ulcers-olive-oil-helps-2/>

Onion and Garlic (*Allium cepa* and *Allium sativum*) - Onion and garlic have significant blood sugar lowering action. The principal active ingredients are believed to be allyl propyl disulphide (APDS) and diallyl disulphide oxide (allicin), although other constituents such as flavonoids may play a role as well. Onion extract was found to reduce blood sugar levels during oral and intravenous glucose tolerance. The effect improved as the dosage was increased; however, beneficial effects were observed even for low levels that used in the diet (e.g., 25 to 200 grams). The effects were similar in both raw and boiled onion extracts.

Onion and Mint - are natural flea/beetle repellents.

Onions - have historically been known to have antibacterial action and will also repel mites, borers and rose chafer. Onion sprays (simmered or juiced) control fungus and many disease organisms on plants. Stems of wind onions tied to susceptible plants will control cutworms. If you plant onions around your cabbage, brussel sprouts, broccoli and cauliflower plants (as a companion planting), you will confuse cabbage loopers and cabbage worms. The sulfur in onions may be helpful in controlling some fungal diseases.

Open-ended Coffee Cans - can be used to keep rabbits from destroying your seedlings. You can cover with a clear plastic lid on the top end until the plants get too tall.

Orange Juice - 1 gallon of orange juice diluted with 2 gallons of water and a dash of soap will kill fire ant colonies when poured into the soil. Check our herbicidal qualities. See Vitamin C.

Orange Oil - Repels dogs and cats and some insects. Controls many insect and fungus problems.

Orange Peels - have pectin, a type of carbohydrate that has "prebiotic" properties. These prebiotic carbohydrates, also known as oligosaccharides, are found in certain fruits and vegetables, and while they are nondigestible, they increase the growth of probiotic bacteria in the large intestine, which stimulate health and prevent foodborne pathogen growth.

Orange Skins - Half an empty orange skin set out in the garden will trap snails and slugs.

Oregano - A perennial herb used in cooking that is anti-viral, anti-bacterial, anti-fungal, anti-parasitic, anti-microbial, immune stimulant, etc. Oregano is fairly volatile and can burn leaves if not diluted properly.

Organic Fertilizer - Properly composted chicken manure like Get Set Grow® rebuilds the soil. Increases microorganisms and naturally controls grubs, moles and weeds. Plants grown on rich, organic soil without synthetic

fertilizers and sprays will normally not be attacked because most pest insects do not like their taste.

Organic Gardening/Farming - Organic is defined by a list of “don’ts,” mainly the avoidance of chemical pesticides, herbicides and fertilizers. The “do’s” are more numerous and complex. They include basic practices such as compost-making and crop rotation as well as far-reaching efforts such as growing mixed crops, promoting a diverse ecosystem around the farm or garden, providing trace elements, and preventing erosion. Other efforts embrace philosophies as well as practices: maintaining healthy and contented livestock grazed outdoors on pasture rather than fed indoors on grain; using on-farm inputs or sourcing them locally; ensuring safe and fair labor practices; preserving seed diversity; saving farm communities; and putting freshness, nutritiousness and flavor ahead of profit. This is true organic gardening or farming.

Organic Mosquito Repellents - Buzz Away® is a non-toxic, outdoor protection formula of natural ethyl alcohol from plants, pure essential oils of citronella, cedarwood, lemongrass, peppermint and eucalyptus. Kiss My Face® contains Citronella Oil and Rhodinol (from grasses grown in Sri Lanka) and Terpineol (from pine trees), along with moisturizers and botanicals. Neem oil/Azadirachtin are excellent insect repellents. Crushed leaves from scented marigold, lemon thyme, citronella grass, peppermint, eucalyptus, sweet basil, and/or sassafras all have also been used to repel insects - **but before you cover your body with these volatile oils** - always test a small area (1” square) to see if you too, are repelled (or allergic) to them. **Try Safe Solutions Insect Repellent and read Chapter 42.**

Osage Orange (*Maclura pomifera*) a/k/a the hedge apple - A fast growing shrub often grown as a hedge because of its density and thorns. Pretty foliage with greenish flowers. Good as a background or border plant. The roots, wood and bark will repel insects and the wood resists rot. The crushed fruits of this plant are said to attract and kill spiders and cockroaches and can be used to repel many arthropods, mice and other rodents. From the mulberry family.

Overseed - Overseed the lawn and properly apply compost for healthy turf growth to prevent weeds.

Oxidants - See spotted knapweed; these may be the quickest way to kill plants.

Ozone - is a powerful oxidizer that can control spaces with mold contamination and second-hand smoke problems. Ozone in 30 minutes purifies the air and can also be used as a soil fumigant and for disease control in orchards and greenhouses.. When used at high levels, ozone has been used to control bed bugs, but the bed bug control results vary.

Paecilomyces fumosoroseus - is a fungus that is a biological pesticide, effective against spider mites, thrips, whiteflies and other insect plant pests. The fungus penetrates their bodies to feed and grow. New spores emerge to infect other pests, sparing non-host species.

Painted Surfaces - are more resistant and/or repellant to cockroaches, powder post beetles and carpenter bees.

Pantyhose - You can use pantyhose or nylon stockings to keep pests off almost every vegetable. Wrap corn and melons in “socks” made of pantyhose so that as they grow the “socks” expand with them. Cut a section, tie one end, and slip it over the plant, fruit, or vegetable and then tie the other end shut.

Paper bags - Spray the inside with 3M Super 77 or Scotch 77 adhesive and drop in some roach feces and/or attractant and strategically place your large, disposable (pheromone) roach trap.

Paraffin Oil - can be used as an insecticide and acaricide.

Parsnip Roots - Make a diluted puree of parsnip roots to kill mosquito larvae, fruitflies, Mexican bean beetle, pea aphid, etc.

Passion - Often was the only thing that kept the Author going.

Patience - When the destroyer sends a pest to destroy the crops, e.g., aphids, G-d responds and sends beneficial organisms, e.g., ladybugs, to control the pests. Sadly most people then complain about their free pest solution

and ask me what to use to spray and kill their answer.

Peace of Mind - The main ingredient in Pestisafes® and Safe Solutions, Inc. products.

Peach (*Prunus persica*) - The leaves and flowers are toxic to many insects. Note: A peach tree can grow from a nectarine pit and a nectarine tree can grow from a peach pit.

Peanut Butter - attracts ants, crickets, squirrels and rodents and may also attract people seeking to avoid diabetes and/or heart disease. A great source of fiber and monounsaturated and polyunsaturated fats that both improve glucose and insulin stability as well as protect against heart disease. **But, remember, 1.5 million Americans are allergic to peanuts with over 100 deaths each year!**

Peanut Oil - Put ¼ cup in a hot bath; soak for 1 hour and keep the water moving. Dry off and put a light covering of peanut oil on the skin to control scabies and other mites. Do not use if sensitive to peanuts.

Peas - A diet of peas will sterilize mice. Pea protein is repellent, toxic and sterilizes some insects.

Peat Moss - helps plants grow but could cause lung infections. **Be careful.**

PEG - Polyethylene glycol comes as solid or oily liquid. The Author has worked with the oily liquid, which is very effective as a non-volatile solvent because of its high boiling point. Every PEG-type surfactant has excellent hygroscopic property and as the degree of condensation increases, the hygroscopic property is increased, and, therefore, is wonderful for killing insects and arachnids.

Peladow® - Sprinkled on ice will melt the ice, sprinkled on gravel or playgrounds will keep down the dust and kill weeds and when sprinkled in crawl spaces, etc. will kill termites permanently or until flushed away.

Pennyroyal (*Mentha pulegium* [in Europe] or *Hedeoma pulegioides* [in the New World]) - A small leaved perennial herb that has spikes of lavender, fragrant flowers. Pliny the Elder named the plant because of the common practice of covering the floors to control “pulex” or “pulices” (fleas) (Stuart 1979). Pennyroyal relieves toothaches and is thought to heal the bites of snakes and serpents. The plant will repel many insects, e.g., fleas, flies, ticks, mosquitoes, ants, kissing bugs, gnats and flies. Take some fresh leaves; crush them and rub them on your skin and clothes. The oils have a minty fragrance that repels ticks, chiggers, flies, mosquitoes and gnats. Ground pennyroyal is one of the most effective tick deterrents available. Dust powder made from the leaves can be scattered around areas where the pet sleeps and plays. It can be used as a biting insect repellent when rubbed on skin or clothes. **It was used to cause abortions in the past and often killed the mother. See if you react to a small amount first. It has often caused toxic problems in people and pets. Do not use internally!**

Pepper - Black pepper extracts discourage insect pests from laying eggs on leaves and will control many pests that are soft-bodied in the larval state because the pepper extract can easily penetrate their bodies. Pepper oil and/or dust will protect grain supplies and dwellings from insect and some rodent pests.

Pepper and Salt Water - Put 2 oz. table salt (sodium chloride) and 1 oz. white pepper in 1 pint water and spray the mixture around areas inside the home wherever ants have been seen. This mixture is also very effective when applied around the foundation walls outside to repel ants - you can add a little soap as a “kicker”.

Pepper Sprays - work best when made from fresh or frozen peppers and can be used to control ants, mites, caterpillars and to control some plant viruses, e.g., ring spot and cucumber mosaic.

Peppermint - Crushed dried peppermint leaves securely tied in small sachets or bags will make your summer home/cottage smell better - toss them in closets, drawers, dishwashers, stoves, under crawls, beds and furniture to repel mice. Peppermint inhaled or eaten will also keep you more alert. Peppermint soap diluted in water makes an excellent insect spray. Peppermint is a natural hybrid of the garden spearmint and the water mint. The principle components of peppermint oil are menthol, menthone and menthyl acetate, although analysis of peppermint’s volatile oil will typically show more than 40 different compounds. Peppermint oil (and tea) have been used to fight the common cold and have demonstrated significant anti-viral activity. We have found when

added to enzyme cleaners or when used alone peppermint oil and/or soaps are excellent pest control chemicals. All these natural components of peppermint oil give a wonderful wax stripping ability. Isn't it interesting the outside of insects is covered in wax, and peppermint soap quickly kills most insects. Crickets sprayed with 1 oz. peppermint soap per 1 qt. water die in 75 seconds or less. Mice are repelled for months by a few drops of peppermint oil.

Peppermint Oil - controls and/or repels many rodent and insect pests, e.g., lice. Peppermint oil is bacteriostatic and anti-spasmodic. Put 1 - 3 drops in a glass of water and it can be used as an antiseptic mouth rinse and it will relax breathing. It counteracts fainting and dizziness sensations. Add 2 - 3 drops of peppermint oil to your tea or water and sip it during the day during flu and cold season.

Peppermint Soap - especially with added enzymes, e.g., protease, quickly destroys even those insects, e.g., yellowjackets that seem "immune" to enzyme cleaners and/or protease enzymes. Peppermint oil kills on contact and even has a fumigating-type action. Try using them to kill drywood termites, fleas, carpenter ants, and even powder post beetles, because they penetrate deeply into the wood. Our laboratory tests show that 2 oz. peppermint soap per 1 qt. water kills crickets in 45 seconds. Fermented enzyme cleaners diluted at that ratio killed the same number of crickets in 1½ minutes. Safe Solutions Tweetmint Enzyme Cleaner with peppermint and sodium borate diluted at a rate of 1 oz. per quart water killed them in 15 - 25 seconds.

Peppers - One of the world's hottest chili peppers, the red habanero pepper, is about 60 times hotter than its fiery cousin, the jalapeno, and 10 times hotter than cayenne. Mexican and America's southwest produce chili piquin or bird's eye peppers which have 140,000 heat units. Dunderbush from Pakistan have 55,000 to 65,000 heat units. All of these peppery ingredients can be diluted in soapy water and sprayed or misted or the juice can be mixed into caulk, paint, glue, Vaseline, honey, lard, oils and/or rubber coating materials, and any mammal or mollusk unfortunate enough to be sprayed or to take a nibble will get a burning surprise. Sprinkle some freshly ground hot pepper on ant hills or where you want nuisance wildlife to vacate. If you have any doubt these peppers work, pick a few and then wipe the sweat from your eyes...you will be in absolute agony. Pepper sprays are even used to stop people "dead in their tracks."

Pepsi® - or another pop or beer will kill mice and rats if they drink it before it loses its "fizz" (it will blow up their stomachs) - just one example of a Rodentisafe®.

Perfect Pesticide - <http://www.thebestcontrol.com/ideal-pesticide.htm> and/or http://www.safesolutionsinc.com/Enzyme_Cleaner_Pest_Control.htm

Perfume - Apply perfume, aftershave or cologne to any entry point to stop ants.

Perwinkle (*Vinca major*) - Perwinkle leaves are for stopping bleeding; simply crush the leaf and press it into the wound or into your nose to stop a nose bleed.

Persian Lilac or the Chinaberry Tree - *Melia azedarach* (Linnaeus) is a close relative of the neem tree and also represents a promising source of natural/botanical pesticides or Pestisafes® which offer safer, more environmentally friendly and more efficient alternatives to volatile, synthetic pesticide poisons. This tree's extracts may even be safer than neem and equivalent to neem's pesticidal qualities. Crushed rape fruits can be ethanol extracted and/or simply soaked in water for several days in the dark and then sprayed on plants.

Persistence - What works in one situation may not work in another for some unknown reason, so be persistent and utilize an ever-changing variety of control or repellent strategies.

Peruvian Ground Cherry (*Nicandra physalodes*) - The crushed leaves repel flies. Plant them near the barn to keep your animals free from flies. Plant in a green house to remove whitefly.

Pesticides - Any poison capable of killing "pests" is capable of killing off all beneficial insects and you and yours. No synthetic insecticide poison has ever been (or ever will be) developed to which insects failed to develop immunity. Globally, over \$31 billion is spent each year on pesticides. During 1998, approximately 1.1 billion pounds (\$7.4 billion) of pesticides were sold in the United States. Unfortunately, pesticides do not control pests and they pose formidable health risks for children, people, pets and wildlife.

Pestisafes® - Using a safe product to control pest problems. Normally, the Author believes, there is no need to register food and/or GRAS items or techniques that can not harm the public or the environment, but provide safe and far more effective pest control.

Pest-proof Your Building - An enormous amount of time and money can be saved if you pest-proof your building. This preventative control is non-toxic, sustainable and very effective in reducing all pest invasions.

Pest-resistant Plant Species - Use plants that the pests will not readily attack.

Pest-resistant Trash Receptacles - help control insect and rodent infestations.

Petroleum Jelly - Many insects are attracted to yellow, white, or blue colors - use an index card as a trap by covering it with petroleum jelly or honey - other insects, e.g., roaches and earwigs are repelled by petroleum jelly. You can also use petroleum jelly to make your roach traps escape proof. **Most insects and/or arachnids will not cross over petroleum jelly barriers.**

Petunias - will repel aphids, leafhoppers and rose chafers.

Pheromones - are volatile chemical odorants that are released into the air by insects to communicate information, often over large distances. Once emitted, a pheromone depends upon the wind for its transmittal. Insects use pheromones in many ways: for example, they may signal danger or they may attract male insects to mate with virgin females. This attractiveness is especially important for some insects like the gypsy moth because the female does not fly, and their procreation depends largely upon the ability of the female to “call” a male for mating. Since many insect pheromones have been identified and synthesized by biochemists, the prospect of using synthetic pheromones to jam communications and thus disrupt insect mating is an attractive means of biological control currently under study. Effective use of pheromones requires a basic understanding of the behavioral responses of insects to the amount of pheromone as well as an understanding of the its physical dispersion and dilution by the atmosphere. Control pests with their own perfume.

Physical Barriers - Row covers, netting

Advantages: Non-toxic, no residues. Allows water, air, and sunlight to pass through.

Disadvantages: Row covers prevent pollination of fruits and vegetables by insects; durability varies from 1 to 3 seasons; considerable damage may result from pests that emerge under row covers.

Physical or Mechanical Controls - such as flyswatters, screens, doorsweeps, aerosol foam, insulation, duct tape, hot air dryers or guns, steam, rinse-and-vacs, vacuums, water-blasting cannons and/or guns, traps, caulking, cement, boiling water, hoes, rakes, flame weeders, mulches, sanitation, removal of infested items, geotextiles, hand pulling, mechanical cultivation, competitive and allopathic planting to control, displace and/or weaken weeds, etc. will keep many pests in check.

Pictures - You need to compare your pest specimen with pictures so you can properly diagnose what you have and to take pictures of damage so you can see if there is subsequent infestation.

Pest pictures: <http://www.ent.iastate.edu/list/directory/92/vid/4> or <http://www.ivyhall.district96.k12.il.us/4TH/KKHP/1insects/bugmenu.html> or <http://www.lancaster.unl.edu/pest/resources/>

Pine Oil - Mix 1/8 oz. of essential oil of pine in a cup of liquid Castille soap and use as a flea shampoo for your pet.

Piperine - an alkaloid found naturally in plants belonging to the *Piperaceae* family, such as *Piper nigrum* L, commonly known as black pepper, and *Piper longum* L, commonly known as long pepper. It can be used as used as flavoring, a medicinal and as an insecticide. Piperine stimulates the body's natural ability to generate heat and assists in the absorption of selenium, vitamin B, and β -carotene. Piperine has been used to treat athletes and elderly people whose ability to absorb nutrients through their intestinal lining has been impaired. Piperine is the major pungent substance in these plants and is isolated from the fruit of the black pepper and long pepper plants. Piperine comprises 1 to 99% of these plants. The term black pepper is used both for the plant *Piper nigrum* and the spice that is mainly in the fruit of the plant. Piperine is a solid substance essentially insoluble in water. It is a weak base that is tasteless at first, but leaves a burning aftertaste. Piperine is a pale

yellow to yellow crystalline solid with a pungent odor and a burning aftertaste. It is slightly irritating to skin and eyes. Piperine is structurally related to capsaicin, the chemical responsible for making chili peppers hot. Although this active ingredient has been extracted from dried black peppercorns, it is manufactured synthetically for commercial uses. It is often added to prepared food to enhance aroma and flavor. Black pepper and long pepper have been used in Ayurvedic medicine for the treatment of various diseases. One such preparation is known by the Sanskrit name *trikatu* and consists of black pepper, long pepper and ginger. Another preparation, known by the Sanskrit name *pippali*, consists of long pepper. It is thought that piperine is one of the major bioactive substances of these Ayurvedic remedies. Black pepper has also been used in traditional Chinese medicine to treat seizure disorders. A derivative of piperine, antiepilepsirine, has also been used in China to treat seizure disorders. Some recent research suggests that piperine may enhance the bioavailability of some drugs and nutritional substances. Piperine is contraindicated for those who are hypersensitive to any component of a piperine-containing preparation. Pregnant women and nursing mothers should avoid piperine supplementation.

Pitch - Variable pitch ultrasonic and sonic sound waves can repel pests. Putting gravel around your home/garage and making sure your entire home/garage will help keep the soil drier and helps prevent termites from tunnelling into your property. See Coal Tar Pitch.

Pitfall or Blunder Traps - Any large container, 1 - 5-gallon size, with a hole in the bottom for drainage can be sunk into the ground-up to its lip. Crawling insects, scorpions, spiders and other arthropods will fall into the pit so you can monitor their presence. Putting a cover over it (but not sealing it) prevents people from falling in and makes the pit fall trap more attractive to pests.

Plain Water - A strong stream is effective in destroying aphids, mealy bugs, mud dauber nests, and red spider mites. It also makes cats and dogs leave your yard quickly. Some city water is so toxic it kills sprayed crickets in less than a minute.

Plant Extracts - Plants produce extracts that repel insects and other pests, deter feeding and oviposition and have delayed effects on growth and reproduction. Plants can not get up and run away, or swat their attackers, or even yell or scream for help. Plants in natural ecosystems are entirely dependent on these defenses to protect themselves against insects and other herbivores. Plants have survived quite well without synthetic pesticides since the beginning of time. The most effective control measures against plant pests and diseases are natural and can be enhanced by proper selection and breeding of resistant plant species resistant to the various pathogens. Parts of plants can be used for pest control or to increase plant fertility, e.g., marigolds, sesame chaff and equisetum (horsetail). Companion planting also can be used to control or limit pest problems. Taking the extracts or juices or oils of a plant or weed not being bothered by a particular pest problem, e.g., insect, arachnid, fungus, mold, disease, and then spraying a diluted preparation on plants you wish to protect often will control the pest problem.

Plant Product Fungicides or Insecticides - Any person who has studied plant-insect interactions knows how many natural insect toxins and/or repellents are found in many plant species and how effective they are against pests. Common sense will tell you that is why our plants survived in the natural world. **Many of these natural toxins also are harmful to animals and people, e.g., poison ivy, so you must be careful with plant toxins.** The following compilation represents a portion of the work under Project 999 of the Pennsylvania Agricultural Experiment Station, begun during World War II in an effort to find new insecticides and fungicides to replace those made scarce by war restrictions on shipping and other disruptions of the normal flow of commercial materials.

Covering as it does the results of biological testing on a group of approximately 10,000 materials, we have only picked out a few examples of natural controls. The abbreviations used for both plant fungicides and insecticides are as follows: In Stating the results of the toxicity tests, ST, MT, HT and NT indicate slight toxicity (10-30%), medium toxicity (30-80%), high toxicity (above 80%), and no toxicity (below 10%), respectively. Where the authors gave no indication of the degree of toxicity, T (toxic) has been used. The concentrations of chemicals tested have been given where known; thus "HT *Sclerotinia* at 1%" indicates that the compound when tested at 1 per cent concentration was highly toxic to *Sclerotinia*. The Rigveda, an ancient Indian religious book, the composition thereof is conventionally dated before 1500 B.C.E. Some writers note astronomical references in the Rigveda dating it as early as 4000 B.C.E. The Rigveda was the first book to mention the use of poisonous plants for pest control.

Plant Product Insecticides and/or Fungicides - The 1948 edition of "A Catalogue of Insecticides and Fungicides" compiled by Donald E. H. Frear, Ph.D., Volume II noted these and others:

***Acacia catechu* Willd. (Catechu; cutch).**

Exts. were not repellent to Japanese beetle; used as insect repellent in a paint or coating for application to underwater structures to prevent decay and ravages by marine life, insects, vermin, and rodents; oil of aromatic cachou "A" T. *Lucilia cuprina* larvae.

***Acacia longifolia* Willd. (Sydney wattle).**

Commercial ext. was repellent to Japanese beetle.

***Acalypha indica* L. (*A. spicata* Forsk.)**

In India the powdered leaves mixed with common salt were applied externally for scabies; powder of dry leaves used in wounds attacked by worms; 5% aich. ext. of stem bark killed caterpillars.

***Achilles nobilis* L. (Camphor yarrow).**

Flower heads have an action on insects similar to that of insect powder.

***Acorus calamus* L. (Sweet flag; calamus).**

T as mothproofing agent. Oil T *Lucilia cuprina* larvae.

***Acorus gramineus* Soland.**

In India the roots were stated to be used as an insecticide and insectifuge.

***Adina cordifolia* (Roxb.) Benth. and Hood. ex. Brandis (*Nauclea cordifolia* Willd.)**

In India the bark, ground into paste with water, was considered to be antiseptic and prevented generation of worms in sores; juice used as insecticide.

***Aesculus pavia* L. (Red buckeye).**

Bedsteads made of horse chestnut are said not to be infested by bugs.

***Aesculus pavia alba*. (Dwarf buckeye).**

Flowers attract and kill Japanese beetle.

***Agauria salicifolia* Hook. f. (Mgagana).**

Listed as insecticidal in East Africa.

***Agave americana* L. (Centuryplant).**

Infusion of leaves can be applied as an insecticide.

***Ajuga bracteosa* Wall.**

In India on the Salt Range it was used to kill lice; plant was known to have insecticidal or repelling properties.

***Albizzia procera* (Rosb.) Benth.**

Used as fish poison and insecticide in India.

***Aleurites fordii* Hemel. (Tung-oil tree).**

Ext. of leaves 40% T mosquito larvae, ext of stems 5% and ext. of roots NT; used to trap stink bug nymphs in southern China by banding; oil T cockroaches, Colorado potato beetle, and Mexican bean beetle eggs.

***Allium ampeloprasum* var. *porrum* (L.) Regel. (Leek).**

In Belgium an infusion, made by keeping small pieces of plant for one week in water, was said to repel flies.

***Allium ceps* L. (Onion).**

Odor of onions stunned mosquitoes in 4 to 6 hrs. but they recovered.

***Allium sativum* L. (Garlic)**

Garlic bulbs stored with grain NT weevils; odor stunned mosquitoes in 5 to 10 min. and killed them in 5 hours.

***Allium schoenoprasum* L. (Chive.)**

Water ext. of whole plant 70% T mosquito larvae.

***Aloe ferox* Mill. (Cape aloe).**

Bitter sap, used for dressing wounds, keeps off flies very effectively.

***Aloe succotrina* Lam.**

In Germany a weak soln. of tincture of aloes recommended to rid plants of scale insects.

***Aloe* spp.**

Strong decoction with soap added gave good results against certain lepidopterous larvae and aphids; T clothes moth.

***Althea officinalis*.**

Acetone ext. of root T mosquito larvae.

***Aureolaria virginica* (L.) Pennell. (*Dasystema flava*).**

Plant was reputed to prevent attacks of flies on horses.

***Azolla caroliniana* Willd.**

Recommended in Austria as good plant to raise in stagnant waters to prevent development of mosquitoes.

***Balsamodendron playfairii* Hook. f.**

Opaque, whitish gum resin, used by Arabs and Somalis as soap to kill lice.

***Bandeiraea simplicifolia* Benth. (Kagyaw).**

Leaves used to kill lice in hen houses in Gold Coast, Africa.

***Baptisia tinctoria* (L.) R. Br. (*Sophora tinctoria* L.; yellow wild indigo).**

Plants placed in harness keep flies from horses.

Bark, unspecified extracts of.

Injected into chestnut trees for blight control.

***Barringtonia acutangula* (L.) Gaertn.**

Juice of leaves mixed with oil was made into an ointment for scabies.

***Berberis aristata* DC.**

Bark used in India as fish poison and as insecticide.

***Berberis* sp.**

Acetone ext. of root 70% T mosquito larvae.

***Blumes lacera* (Roxb.) DC. (Numurdi).**

Natives of Konan, near Bombay, used plant to drive away fleas and other insects; it was suggested as possible source of insect powder.

***Bocconia frutescens* L.**

Juice effective against injurious insects and ticks.

***Brauneria* sp. (Echinacea).**

Acetone ext. of root 100% T mosquito larvae.

***Brassica campestris* L. (Rapeseed or canola oil).**

Oil T *Sphaerotheca humuli* at 0.5%.

***Brassica* spp. (Mustard).**

Oil of mustard A NT at 0.25% but T at 0.5% *Sphaerotheca humuli*; at 0.5% mustard B gave same fungicidal effect as with 0.5% oil of mustard A.

***Callilepis laureola* DC.**

Powdered roots used as insecticide.

***Calopogonium vellutium* Benth. (Catinga de macaco).**

Alch. ext. of this fish poison plant used in Brasil against lice and ticks.

***Capparis spinosa* L. (*C. murrayana* Graham; common caper).**

In India juice of fresh plant was dropped into the human ear to kill worms.

***Capasicum frutescens* L. (*C. annum*; African pepper; chillies; bird pepper; cayenne pepper; common red-pepper).**

Acetone ext. of fruit T mosquito larvae.

***Carissa carandas* L. (*C. congesta* Wight).**

In India used to keep off flies, and when pounded with lime juice and camphor as remedy for itch.

***Carum bulbocastanum* (L.) Koch.**

Used in India to protect clothes and skins against ravages of insects.

***Carum carvi* L. (Caraway).**

Ext. of seeds T ants and 90% T mosquito larvae; oil T *Lucilia cuprina* larvae.

Carvone (oil ov carvol).

Oil T. *Lucilia cuprina* larvae.

***Carya glabra* Spach. (*C. porcina* Nutt.; *Juglans glabra* Mill.; *Hicoria glabra* (Mill.) Britton; pignut).**

Horses washed with infusion of leaves in water prevent the annoyance of flies.

***Cassia acutifolia*. (Alexandria senna; senna).**

Acetone ext. of pods T mosquito larvae.

***Cassia angustifolia* Vahl. (Congo senna).**

Acetone ext. of leaves and pods T mosquito larvae.

***Cassia stipulacea* Ait.**

Leaves used as insecticide.

***Cassytha filiformis* L.**

Used as insecticide in India.

***Castanea dentata* (Marsh.) Borkh. (American chestnut).**

Water exts. of bark and blight cankers used as tree injections for blight control.

***Castanes dentata* (Marsh.) Borkh. (American chestnut).**

Commercial ext. effective repellent against Japanese beetle.

***Celastrus angulatus* Max. (Bitter tree).**

Powdered leaves and root bark T cabbage beetle.

***Centaureum umbellatum* Gilib. (Centauray gentian).**

Decoction of whole plant T lice and cured the itch.

***Centipeda orbicularis* Lour.**

Used in Sind, India as insecticide.

***Ceratonia siliqua* L. (Algarroba; carob bean).**

Used in Venezuela for killing insects.

***Cereus* sp. (Cactus).**

Leaves, made into paste and spread over surface of water, kill larvae of mosquitoes by asphyxiation.

***Chara foetida*.**

T mosquito larvae.

***Chara fragilis* Desv.**

T mosquito larvae.

***Chrysanthemum cinerariæfolium* (Trev.) Vis. (*Pyrethrum cinerariaefolium* Trev.; Dalmation insect flowers).**

When reduced to powder, all parts of plant are active; powders, used as dusts, T silkworms, flies, potato-beetle, larvae, aphids, grasshoppers, and tent caterpillars.

***Chrysanthemum frutescens* L. (Marguerite).**

Flowers can be substituted for insect powder.

***Chrysanthemum majus*. (*C. balsamita* L.; costmary).**

Acetone ext. of leaves and stems T mosquito larvae.

***Chrysanthemum marschallii* Aschers. (*Pyrethrum roseum* Bieb.; caucasian insect flowers).**

Produces genuine insect powder.

***Chrysanthemum myconis* L.**

T dog fleas.

***Chrysanthemum* sp. (Azaleamum).**

Acetone ext. of leaves, stems, and flowers T mosquito larvae.

***Cimicifuge foetida* L. (Fetid bugbane).**

Root said to be poisonous; used in Siberia to drive away bugs and fleas; used in India as insecticide or repellent.

***Cinnamomum camphora*. (Camphor tree).**

Oil of camphor 99-80% T *Lucilia cuprina* larvae; wood T clothes moths.

***Cinnamomum zeylanicum* Nees. (Cinnamon).**

Oil considered on of best repellents against screwworm; acetone ext. of bark T mosquito larvae.

***Citrullus colocynthis* (L.) Schrad. (*Cucumis colocynthis* L.; *Colocynthis vulgaris* Schrad.; colocynth; bitter apple, gourd, and cucumber).**

T as mothproofing agent.

***Citrullus vulgaris*. (Watermelon).**

Acetone ext. of seeds T mosquito larvae.

***Citrus medica* L. (Citron).**

Fruit was put among clothes to keep away moths.

***Citrus sinensis* (L.) Osbeck. (Orange).**

Orange poultice recommended in some skin affections, such as psoriasis; oil strongly attractive to oriental cockroach.

***Claviceps purpurea* (Fries) Tulane.**

Water ext. T aphids, psylla, thrips, also other sucking insects, and those unprotected by hairs.

***Cleistanthus collinus* (Roxb.) Benth. and Hook.**

Used for fish poisoning; inner bark placed on sores of sheep and goats is efficacious in healing them and in destroying maggots.

- Clematis vitalba* L. (Honduras fish poison).**
Repellent to weevils in France; efficient against silkworms.
- Comandra umbellata* (L.) Nutt. (Comandra).**
Exts. from entire plant were repellent to Japanese beetle.
- Commiphora myrrha* and species. (Myrrh gum).**
Acetone ext. of gum NT mosquito larvae; myrrhic acid T as mothproofing agent.
- Commiphora* sp.**
Used as insecticide in Sind, India.
- Conium maculatum* L. (Poison-hemlock).**
Infusion of flowers, leaves, and stems T various insects.
- Convolvulus arvensis* L. (Sap from bindweed).**
T downy mildew of hops.
- Coptis trifolia*. (Alaska gold thread).**
Acetone ext. of whole plant T mosquito larvae.
- Coriandrum sativum* L. (Morocco coriander).**
Acetone ext. of seeds T mosquito larvae.
- Croton* spp.**
Croton used in China as insecticide; T aphids; croton resin more toxic to goldfish than rotenone.
- Cucumis sativus* L. (Cucumber).**
Juice was said to banish wood lice and kill cockroaches; acetone ext. of seeds T mosquito larvae.
- Cucurbita maxima* Duchesne. (Turks' turban gourd).**
Acetone ext. of seeds T mosquito larvae.
- Cucurbita moschata*. (Striped cushaw pumpkin).**
Acetone ext. of seeds T mosquito larvae.
- Cucurbita pepo* L. (Pumpkin).**
Acetone ext. of seed 100% T mosquito larvae.
- Cucurbita pepo* L. var. *ovifera* Bailey. (Gourd).**
Acetone ext. of seeds T mosquito larvae.
- Cuminum* sp. (Also oil of cummin Eng.).**
Acetone ext. of seeds T mosquito larvae; oil T *Lucilia cuprina* larvae.
- Cupressus sempervirens* L. (Cypress).**
Oil (50 p.p.m.) 90% T mosquito larvae.
- Cydonia* sp. (Quince).**
Acetone ext. of seeds T mosquito larvae.
- Cynanchum macrorhizon* Carr.**
Blossoms contain a viscous substance in which all visiting insects are unable to extricate themselves.
- Cynodon dactylon* (L.) Pers. (*Capriola dactylon* Kuntze; Bermuda grass).**
In India fresh juice was applied for scabies.
- Cytisus scoparius* (L.) Link. (Scotch broom).**
Infusion made from fresh crushed tops T larvae of cabbage butterflies, also effective for removing *Cochylis* larvae from vines and various caterpillars from apple trees.
- Daphne mezereum* L. (Spurge laurel).**
Plant is well known in medicine; frequently dead beetles, flies, and wasps were found beneath it.
- Datura innoxia*.** See Moonflower.
- Datura metel* L. (Angel-trumpet).**
Used in Sind as insecticide; commonly pounded and used to smear floors of houses to kill lice and other vermin, especially "jiggers." in Gold Coast, Africa.
- Datura stramonium* L. (Jimsonweed; thornapple).**
Leaves, used as fumigant, T bedbugs, roaches, etc.
- Delphinium ajacia* L. (Rocket larkspur).**
Acetone ext. of seeds T mosquito larvae.
- Delphinium brunonianum* Royle. (Musk larkspur).**
Juice used to destroy ticks on animals.
- Delphinium coeruleum* Jacquem.**
Roots T maggots.
- Delphinium consolida* L. (Field larkspur).**
Tincture T lice on human heads; effective poison on insects.

***Delphinium elatum* L.**

Used to destroy maggots in wounds.

***Delphinium staphisagria* L. (Stavesacre larkspur; lousewort).**

Acetone ext. of seeds T mosquito larvae; T lice and itch mite.

***Delphinium vesticum* Wall.**

Used to destroy maggots in wounds.

***Delphinium* sp. (Larkspur)**

T shortnosed ox louse; ext. of ground seed T fly larvae.

***Derris* sp.**

Exhausted roots, powdered, T black scale; emulsion T Mediterranean fruit fly; mothproofing agent; commonly used insecticide.

***Dichapetalum toxicarium* (G. Don) Engl. (Wet African ratsbane).**

In Sierra Leone used to destroy head lice.

***Digitalis ambigua* Murr. (*D. grandiflora* Lam.).**

Leaves T aphids and flea beetles; used as substitute for nicotine in France.

***Digitalis purpurea* L. (Foxglove).**

Decoction T aphids on nut trees.

***Dioscorea cylindrica* Burm. (*D. hispida* Dennet.; nami).**

Roots used for killing maggots infesting wounds of animals.

***Diospyros malacapai* A. DC.**

Wood used as insecticide.

***Diospyros* sp.**

Wood used as insecticide.

***Dolichos pseudopachyrrhizus* Harms. (Mhayo).**

In East Africa roots listed as insecticidal; in Kenya roots of this fish poison plant used for removing ticks from sheep and goats; alch. exts. T bean aphid.

***Dryopteris filix-mas* (L.) Schott. (*Aspidium*; *A. filixmas* (L.) Sw.; male fern).**

Acetone ext. of rhizome 100% T mosquito larvae.

***Duranta repens* L. (*Dplumiera* Jacq.).**

Berries, when macerated, exude juice lethal to all anopheline and culicine mosquito larvae in dilutions up to 1 in 100.

***Echniops echinatus* Roxb.**

Roots T head lice, also powdered roots applied to wounds in cattle destroy maggots.

***Erigeron canadensis* L. (Horseweed).**

Exts. of fresh leaves and heads were repellent to Japanese beetle.

***Eriosema psoraleoides* Don. (*E. cajanoides* Hook. f.).**

In tropical West Africa leaves used to rub on dogs as remedy for or preventative of lice, etc.

***Erythronium americanum* Ker. (Trout lily; deer's tongue).**

Powdered leaves considered one of best repellents against screwworm.

***Erythroxylum coca* Lamarck. (Coca).**

Folia coca and hydrochlorax cocaini (10% in flour) NT caterpillars; in Brazil tincture of coca leaves recommended as remedy for lice on poultry; spray solns. of cocaine hydrochloride against bean aphid required a concentration greater than 1 gm. to kill 95%.

***Eucalyptus globulus* Labill. (Blue gum; Australian fever tree).**

Branches T mosquitoes and other insects; oil T gnats and *Lucilia cuprina* larvae.

***Eucalyptus* spp.**

Smoke from burning fresh leaves stunned mosquitoes in 3-5 min. and killed them in 3 hrs.

***Euonymus americana* L. (Brook euonymus).**

Seeds used to destroy vermin in hair.

***Euonymus europea* L. (Spindle tree; European burning-bush).**

Berries when powdered and dusted into hair of sheep, destroyed lice; fruit, made into ointment, used for destruction of Pediculidae; listed as insecticide.

***Eupatorium hyssopifolium* L. (Thoroughwort).**

Exts. of leaves and flowers were repellent to Japanese beetle.

***Euphorbia antiquorum* L.**

Juice used to kill maggots in wounds.

***Euphorbia bicolor* Engelm. and Gray.**

Juice of plants used to brand cattle in Texas as screwworms would not infect the fresh scar and spot healed readily.

***Euphorbia biglandulosa* Desf.**

Decoctions recommended as insecticides.

***Euphorbia cyparissias* L.**

In Crete plants were collected, crushed, and expressed juice, and then diluted with water to make a 2 to 4% soln. After an hr. liquid used for watering gardens in which melons, cucumbers, etc. were planted, in order to destroy mole crickets.

***Euphorbia dendroides* L.**

Decoctions recommended as insecticides.

***Euphorbia thymifolia* L.**

Used as insecticide in India.

***Excœcaria agallocha* L. (Blinding tree; babooter).**

Malays used sap to kill maggots infesting sores on buffaloes.

***Exogonium purga*. (*E. jalapa*; *Ipomoea j.* (L.) Pursh; jalap).**

Acetone ext. of root T mosquito larvae.

***Ferula assafœtida* L. (Asafetida).**

Strongly repellent to cornfield ant; oil 100% T *Lucilia cuprina* larvae.

***Fœniculum vulgare* Miller. (French fennel).**

Acetone ext. of seeds T mosquito larvae; oil T *Lucilia cuprina* larvae and codling moth.

***Gardenia companulata* Roxb. (Bihomna).**

This fish poison plant grows profusely to in Assam; juice was evidently an efficient larvicide in dilution up to 1 in 80; larvicidal action due to a saponin.

***Gardenia gummifera* L. f.**

In India the gum was used to keep insects from sores on cattle; strong-smelling gum resin used extensively in European hospitals and veterinary work to keep flies from sores.

***Gardenia lucida* Roxb.**

Strong smelling gum resin from wounds in the bark and from leaf buds of this tree was used in cutaneous diseases and to keep off flies and worms.

***Gelsemium elegans* Benth.**

In China this plant was used against all kinds of insects.

***Gloriosa superba* L.**

Juice of leaves used in India for destruction of lice in hair.

***Glycine soja*. (*G. hispida*; *Soja max* (L.) Piper; soybean).**

Oil, crude and refined, T cockroach, Colorado potato beetle, and Mexican bean beetle eggs; eggs immersed in oils for prolonged periods collapsed, apparently through loss of water.

***Gossypium* spp.**

Oil (soluble) T cockroach, Colorado potato beetle, and Mexican bean beetle; oil (sulphonated) T as mothproofing agent.

***Gossypium* spp. (Cottonseed oil).**

Oil T *Sphaerotheca humuli* at 0.5%

***Grewia carpinifolia* Juss.**

Women in west tropical Africa used sap in washing the hair to remove or prevent lice.

***Gymnocladus dioica* (L.) Koch. (*G. canadensis* Lam.; *Guilandina dioica* L.; Kentucky coffee tree).**

Leaves and fruit pulp, when rubbed with milk, T flies.

***Gymnosporia montana* Benth. (*Celastrus montana* Roxb.)**

Bark, ground to a paste, applied with oils to the head to destroy *Pediculidæ*.

***Gymnosporia senegalensis* (Lam.) Loes.**

Bark, ground to a paste, applied with oils to the head to destroy *Pediculidæ*.

***Gynandropsis gynandra* (L.) Briq. (*G. pentaphylla* (L.) DC.).**

Used in India as insecticide; seeds, rubbed with oil, used as vermicide in dressing the hair.

***Haplophyton cimicidum* A. DC. (Cucaracha).**

T several species of insects.

Harshara.

Only vegetable insecticide found in Madagascar; decoction from roots were stated to be an excellent insecticide and much employed by the natives to destroy parasites of the scalp.

***Hedera* spp.**

In India ivy leaves have, from remote antiquity, been reputed to possess remedial virtues, especially as dressing for ulcers and to destroy vermin on the body.

***Hedychium spicatum* Hamilt.**

In India this plant was said to protect clothes from insect attacks.

***Helenium* sp. (Yerba de la pulga).**

Plant possesses exceptional insect-repelling qualities, and not only contains but actually exudes sufficient quantities of rotenone to make a single growing specimen of the plant repellent to practically all forms of insect life in an area of some 15 to 23 sq. feet.

***Hibiscus vitifolius* L.**

In Africa a preparation from roots used to kill head lice.

Hoorooasha.

Decoction of bark was employed to destroy pediculi.

***Hydnocarpus anthelminthica* Pierre.**

Seeds used as insecticide.

***Humulus* sp. (Hops).**

Sap T downy mildew of hops.

***Hydnocarpus venenatus* Gaertn.**

Fruit used as fish poison and as insecticide.

***Hydrangea aborescens*. (Hydrangea).**

Acetone ext. of root 90% T mosquito larvae.

***Hydrastis canadensis* (Goldenseal).**

Water ext. of root 70% T mosquito larvae.

***Hyoscyamus albus* L.**

Decoction recommended as insecticide in Germany.

***Hyoscyamus alger* L. (Henbane).**

T aphids.

***Hyptis spicigera* Lam.**

In Africa plant is burned in rooms to get rid of mosquitoes, and is placed in layer below bundles of millet to keep away termites.

***Hyssopus officinalis* L. (Hyssop).**

Acetone ext. of flowers and stems T mosquito larvae; ext. of whole plant T mosquito larvae.

***Inula helenium* (Elecampane).**

Acetone ext. of root 100% T mosquito larvae.

***Inula viscosa* (L.) Ait. (*Erigeron viscosus* L.).**

Fumes of burning plant has stupefying effect on mosquitoes.

***Ipomœa hederacea* Jacq.**

Decoctions of fresh leaves and young shoots used against aphids, scale insects, caterpillars and flea beetles.

***Ipomœa muricata* Jacq.**

Juice used to destroy bugs. (See Moonflower note.)

***Ipomœa purpurea* (L.) Roth.**

Decoctions of fresh leaves and young shoots used against aphids, scale insects, caterpillars and flea beetles.

***Juglans nigra* L. (Black walnut).**

Infusion from leaves used to kill plant lice and certain caterpillars; decoction of leaves poured on woolly aphid and in soil about roots of orchard trees gives good results; acetone ext. of bark T mosquito larvae.

***Juniperus oxyedrus* L. (Cade oil)**

Oil T as mothproofing agent; cade oil T *Lucilia cuprina* larvae.

***Juniperus sabina* L. (*Sabina officinalis* Garcke; savin).**

Aqueous exts. of young shoots used for mothproofing.

***Juniperus virginiana* L. (Red cedar and other species of cedar).**

Aroma from volatile oil contained in wood is the insecticidal principle; cedar dust, leaf oil, and wood oil T as mothproofing agent.

***Juniperus* sp.**

Acetone ext. of berry 70% T mosquito larvae.

- Justicia adhatoda* L. (*Adhatoda vasica* Nees.; malabarnut).**
T flies, fleas, mosquitoes, and pupae of aquatic insects.
- Justicia gendarussa* L. f. (*Gendarussa vulgaris* Nees.).**
5% Ext. 100% T caterpillars of *Prodenia litura* and *Euproctis fraterna*; leaves scattered among clothes preserve them from insects.
- Karaya gum.**
T red spider, thrips, mealy bug, and aphids.
- Koelreuteria apiculata* Rehd. and Wilson.**
Ext. seeds T mosquito larvae.
- Koelreuteria paniculata* Laxm.**
Ext. of seeds and leaves T mosquito larvae.
- Laburnum anagyroides*. (*Cytisus laburnum* L.; laburnum).**
Too toxic to human skin to be considered as practical louse remedy.
- Lactuca virosa*. (Bitter lettuce).**
Ext. of leaves T mosquito larvae.
- Lagendandra ovata* (L.) Thw. (*L. toxicaria* Dals.).**
Used as in insecticide in India.
- Lasiosiphon eriocephalus* Decaisne.**
Bark used as fish poison and as insecticide in India; exts. of fruit in Mysore had varying toxic properties against aphids.
- Lavandula officinalis* Chaix. (*L. angustifolia* Mill.; *L. spica* L.; *L. vera* DC; true lavender).**
Oil 51-80% T *Lucilia cuprina* larvae, T clothes moth, and strongly repellent to cockroach.
- Lavandula* spp.**
Used with success in war time against infestations of lice and mites; in Belgium use to repel mosquitoes.
- Ledum groenlandicum* Oeder. (*L. latifolium* Ait.; Labrador-tea).**
T lice, insects, etc.
- Ledum palustre* L. (Crystal-tea).**
Leaves and twigs used as insecticide.
- Lepidium ruderale* L. (Peppergrass).**
Recommended against flea beetles in Austria; used as insecticide in Japan; used as fumigant against aphids and mites in hothouses.
- Leucas cephalotes* (Roth) Spreng. (*L. capitata* Desf.).**
Used in India as external application for scabies.
- Leucas martinicensis* R. Br.**
In Nigeria plant is burned for purpose of driving away mosquitoes.
- Linum usitatissimum* L. (Flax).**
Linseed oil is derived from flax seeds which are nonpoisonous, although when oil is properly used it has some insecticidal properties; boiled linseed oil is attractant for *Lasioderma serricorne*; sulphonated linseed oil T as mothproofing agent.
- Linum usitatissimum* L. (Linseed oil).**
Oil NT at 0.5% but T at 1% to *Sphaerotheca humuli*.
- Litsea glaucescens* H. B. K.**
Powdered leaves used against ants.
- Litsea guatemalensis* Mez.**
Powdered leaves used against ants.
- Lomatia silaifolia* (Sm.) R. Br. (Parsley fern).**
Reported in New South Wales that flowers were poisonous to flies, the number in room being greatly diminished when a bunch of flowers was put in fireplace.
- Lupinus* spp.**
Used as mothproofing agent.
- Lycium balifolium* Mill. (Common matrimony-vine).**
Used as dust T roaches; used as stomach poison T grasshoppers.
- Lycopersicum esculentum* Mill. (*L. lycopersicum* Karst.; *Solanum lycopersicum* L.; tomato).**
Tomato foliage may be placed round fruit trees to prevent access of insects; infusion of herb serves as insecticide for syringing.

***Lycopodium complanatum* L. (Ground cedar).**

Decoction T lice.

***Lycopus virginicus* L. (Betony; bugle weed).**

Acetone ext. of leaves T mosquito larvae.

***Lysimachia nummularia* L. (Moneywort).**

Leaves and flowers, steeped in oil, destroy insects and worms which infest granaries.

Mace oil.

Effective attractant for codling moth.

***Macleaya cordata* (*Bocconia cordata* Willd.; pink plume-poppy).**

Decoction used in Japan as insecticide.

***Maclura pomifera* (Raf.) Schneid. (*Toxylon pomiferum* Raf.; Osage-orange).**

Commercial ext. was repellent to Japanese beetle.

(Editor's note: The fruit has been used as an insect repellent for years. Pioneers used it in their cupboards to repel cockroaches and other insects. The wood resists termite attacks and is antifungal. The fruit also has antimicrobial activity.)

***Madhuca butyracea* (Roxb.) Macbride. (*Bassia butyracea* Roxb.).**

Bark used in India as fish poison and as insecticide.

***Madhuca longifolia* (L.) Macbride. (*Bassia longifolia* L.; mowrah meal; mowa-mahua tree).**

Decoction of bark used as remedy for itch; T earthworms.

***Mallotus philippinensis* (Lam.) Muell. Arg. (Kamala tree; monkeyface tree).**

Acetone ext. of hairs of capsules T mosquito larvae.

***Malus sylvestris* Mill. (Apple).**

Oil strongly attractive to cockroaches and is attractive bait.

***Mangifera indica* L. (Mango)**

Gum resin, mixed with lime juice or oil, used as cure for scabies and powdered flowers used for fumigating mosquitoes.

***Meibomia laburnifolia* (Poir.) Kuntze. (*Desmodium laburnifolium* DC.).**

Leaves used as insecticide.

***Malaleuca leucadendron* L. (Also other species of *Melaleuca*, oil of cajuput).**

Oil T *Lucilia cuprina* larvae.

***Melia azadirachta* L. (*Azadirachta indica* Juss.; *Azedarach deleteria* Medic.; nin tree).**

Furniture made from its wood is not attacked by insects.

***Melia azedarach* L. (*Azedarach commelini* Medic.; *A. odoratum* Noronha.; chinaberry).**

Decoction of berries prevents depredations of black grub or cutworm; poultices of flowers T lice.

***Melia dubia* Cav. (*M. superba* Roxb.; *M. robusta* Roxb.).**

Juice of green fruit, with sulfur and curds, used as application for scabies and sores infested with maggots.

***Melilotus altissima* Thuill. (Clover).**

Mosquitoes in Egypt fed on juice of highly scented blossoms which contain coumarin. This might be responsible for immunity from malaria in these areas.

***Melinis minutiflora* Beauv. (Molasses grass).**

Whole plant reported insecticidal in East Africa; fresh leaves are covered with glandular hairs, which exude viscid oil, said to repel mosquitoes and tsetse flies; probably useful as tick eradicator.

***Mentha longifolia* (L.) Huds. (*M. sylvestris* L.).**

Tested in Russia against red spider and cotton aphid. Toxicity increased with concentration, and oil was repellent to aphids.

***Microsechium helleri* (Peyr.) Cogn.**

Useful in destroying lice and underground insects.

***Millettia suriculata* Baker.**

Root used as insecticide.

***Millettia nitida* Benth.**

Leaves and seeds used for insect control.

***Millettia piscidia* (Roxb.) Wight.**

Powder of bark and flowers used as fish poison and insecticide in India.

***Mollugo cerviana* Ser.**

Plant mixed with oil made into ointment for scabies and other cutaneous diseases.

Momordica charantia L. (Balsam-pear).

In India whole plant mixed with cinnamon, pepper, rice, and oil of *Hydnocarpus inebrians* used as ointment for psora, scabies, and other cutaneous diseases.

Momordica schimperiana Steud. (luru).

Fruit listed as insecticidal in East Africa.

Mundules serices (Willd.) A. Cheval. (*M. suberosa* Benth.; "Supli").

Bark, debarked stem, leaf, and root 100% T chrysanthemum aphid; stems (bark) reported to contain rotenone.

Musa sapientum L. (Banana).

Oil attractive bait and attractive to cockroaches.

Myrica gale L. (Candleberry myrtle).

The Swedes employed strong decoction to kill bugs and lice, and to cure itch problems.

Myristica fragrans Houtt. (Common nutmeg).

Oil T *Lucilia cuprina* larvae; odor of nutmeg fatal to mosquitoes if air is saturated.

Nelumbo lutea (Willd.) Pers. (*Nelumbium luteum* Willd.; American lotus).

T cockroaches.

Nerium indicum Mill. (N. odorum Soland; sweet oleander; kaner).

Water exts., macerated juices, and dusts of leaves tested against citrus psyllas, aphids, lucerne weevil grubs, and adult beetles. Ext. roots more poisonous than leaves; 5% alch. ext. leaves 80% T *Prodenia litura*, *Euproctis fraterna*, and *Pericallia ricini*, and 70% T *Crocidolomia binotalis*.

Nerium oleander L. (Common oleander).

Bark used for the destruction of rats and insects.

Nicandra physalodes Pers. (*Atropa physalodes* L.; *Physalodes peruvianum* (Mill.) Kuntze;

P. physalodes Britton; Peruvian groundcherry).

Used as fly poison.

Nicotiana rustica L. (Aztec tobacco).

Effective stomach poison against *Malacosoma neustria*.

Nicotiana sylvestris Speg. and Comes.

This weed contains nornicotine, an alkaloid of proved insecticidal value and of greater potency than nicotine for control of certain insects.

Ocimum basilicum L. (Sweet basil; common basil).

Oil 95-100% T mosquito larvae; acetone ext. of leaves and stems T mosquito larvae; acetone ext. of leaves and stems T mosquito larvae.

Ocimum gratissimum.

Used in Haiti as general insecticide.

Ocimum sanctum L. (Sacred basil).

Dried leaves were effectual means of dislodging maggots in India.

Oldfieldia africana Benth. and Hook. f. (African oak).

Bark and leaves used in Liberia as remedies for hair lice and crab lice.

Olea europaea L. (Olive).

Oil recommended in elimination of head lice; sulphonated olive oil T as mothproofing agent.

Olea europaea L. (Olive oil).

Oil T *Sphaerotheca humuli* at 0.5%.

Opomœa purpurea (L.) Roth.

Decoctions of fresh leaves and young shoots used against aphids, scale insects, caterpillars, and flea beetles.

Oryza sativa L. (Rice).

Oil was attractive to oriental cockroach in 35 counts and repellent in 40 counts.

Ostrya virginiana. (Ironwood).

Acetone ext. of wood 65% T mosquito larvae.

Ostryoderris gabonica Dunn. (Bolemba).

5% Exts. of stems and roots paralyzed 100% of bean aphid.

***Pachygone ovate* (Poir.) Miers.**

Used as insecticide in India.

***Pachyrhizus tuberosus* (Lamb.) Spreng.**

Tubers and beans contain poisonous resin which is active fish poison; seeds, in decoction or powder form, T vermin.

***Pandanus tectorius* Parkins. (*P. odorifera* (Forsk.) Lyons; breadfruit tree).**

Flowers placed among clothes to repel moths and similar insects, as well as perfume them.

***Papaver* spp. (Poppy).**

Acetone ext. of flowers and stems T mosquito larvae; acetone ext. of seeds of Dutch poppy T mosquito larvae.

***Parthenocissus quinquefolia* (L.) Planch. (*Hedera quinquefolia* L.; *Vitis hederacea* Willd. (Kew); Virginia creeper).**

Leaves rubbed on infested area of apple tree, a week later tree was entirely free of woolly aphids.

***Peganum harmala* L.**

Roots used to kill lice in hair in India.

***Pelargonium* spp. (Geraniums).**

Rose geranium oil repellent to screwworms; flowers more attractive and more toxic to Japanese beetle than foliage; 2% concentration 51 to 80% T common red spider and cotton aphids.

***Perilla frutescens* (L.) Britton. (Perilla).**

One of constituents of a patented insecticide was dried ground parts of this plant.

***Petiveria alliacea* L.**

Used in Haiti, Nicaragua, and Central America as insecticide against bedbugs and plant lice.

***Phellodendron amurense* Rupr. (Amur cork or velvet tree).**

Fruit T mosquito larvae, housefly, and codling moth.

***Phellodendron lavalli*.**

Fruit has insecticidal properties.

***Phyllanthus niruri* L.**

Leaves (bruised) were applied for scabies in India.

***Physostigma venosum* Balf. (Calabar bean).**

Eserine (physostigmine), alkaloid in calabar beans, very poisonous to higher animals; physiological action similar to that of nicotine; 0.2 and 0.1% emulsion 100% and 56.6% T bean aphids.

***Picramnia pentandra* Swartz.**

Used in Haiti as general insecticide.

***Picrasma excelsa* Planch. (*Aeschrion excelsa* (Swartz) Kuntze; *Simaruba excelsa* DC; *Quassia excelsa* Swartz; *Picraena excelsa* Lindl.; Jamaica quassia; bitterwood).**

Wood used as insecticide.

***Picrasma napalensis* Benn.**

Powdered leaves and twigs used to kill mosquito larvae in Assam, India.

***Pieris jamponica* (Thumb.) D. Don. (Asebo; asemi).**

Used as insecticide in Japan.

***Pimenta racemosa* (Mill.) Moore. (*P. (Myrica) acris*; bayrum tree).**

Oil of leaves (50 p.p.m.) 100% T mosquito larvae and (25 p.p.m.) 55% T; 99-80% T *Lucilia cuprina* larvae and other insects.

***Pimpinella anisum* L. (Spanish anise).**

Acetone ext. of seeds T mosquito larvae; oil T *Lucilia cuprina* larvae and gnats.

***Pinus* sp. (Pine oil).**

T cockroach, Colorado potato beetle, Mexican bean beetle eggs, and as mothproofing agent.

***Pinus* spp. (Pines).**

Exts. from needles were repellent to Japanese beetle; certain combinations of fractions of pine oils, when sprayed on bark of rustic furniture and log cabins made of white cedar, were very effective in killing larvae of wood borer.

***Piper aduncum* L.**

Used in Haiti as insecticide, particularly T ants in seed beds.

***Piper cubeba* L. fil. (Cubeb).**

Acetone ext. of berries T mosquito larvae.

***Piper nigrum* L. (Black pepper).**

Strong ext. T cotton caterpillars; acetone ext. of dried berries T mosquito larvae; alch. ext. black pepper, used as repellent.

***Piscidia piscipula* Sarg. (*P. erythrina* L.; *Ichthyomethia piscipula* (L.) Hitchc.; Jamaica fish poison).**

Powdered bark T fly larvae; roots and stems (inner bark) contain rotenone.

***Pistia stratiotes* L. (Waterlettuce).**

In India plant was reported to destroy bugs that infested a jail.

***Plantago* sp.**

Acetone ext. of seeds T mosquito larvae.

***Plectranthus regosus* Wall.**

In India plant used as bedding to keep off fleas.

***Plumbago roses* L. (*P. coccinea* (Lour.) Boiss.).**

Used for ulcers and scabies.

***Plumbago zeylanica* L. (*P. auriculata* Blume).**

5% Alch. ext. of roots 100% T caterpillars and 80% T beetle grubs; 5% ext. of stem bark 100% T caterpillars and beetle grubs.

***Pogogyne parviflora* Benth.**

Indians placed culled plants about their houses to drive away fleas.

***Pogostemon heyneanus* Benth. (*P. patchouli* Pellet; patchouli).**

100% T (100 p.p.m.) mosquito larvae and 85% T (50 p.p.m.); oil 19-0% T *Lucilia cuprina* larvae, and listed as insecticide, particularly to exterminate moths.

***Polygonum hydropiper* L. (*Persicaria hydropiper* Opiz.; water-pepper).**

T flies.

***Prangos pabularia* Lindl.**

Roots remedy for itch; decoction of fruit employed as wash to cure "rot" in sheep.

***Prunus amygdalus* Batsch. (*Amygdalus communis* L.; *A. amara* Hayne; bitter almond).**

T head lice and a twig of tree kept in a room was said to dispel flies; oil 100% T *Lucilia curpina* larvae, strongly repellent to oriental cockroach.

***Prunus spinosa* L. (Blackthorn).**

Insects are not liable to attack this species.

***Prunus* spp. (Peach).**

Peach-kernel oil T *Sphaerotheca humuli* at 0.5%.

***Ptelea trifoliata*. (Wafer ash).**

Acetone ext. of root bark T mosquito larvae.

***Pterocarya stenoptera* C. DC.**

Used in control of insects; used as dust.

***Pterospermum acerifolium* (L.) Willd. (*P. aceroides* Wall.).**

In India flowers used as disinfectant and to keep away insects from bed clothes.

***Pueraria yunnanensis* Fr.**

Used in control of insects.

***Pulicaria dysenterica* (L.) Gaertn. (*Inula dysnterica* L.; fleawort).**

Herb insecticide.

***Quassia* sp.**

T mosquito larvae and as mothproofing agent.

***Rauvolfia obscura* K. Sch.**

Decoction of leaves used in West Africa as remedy for parasitic skin diseases, yaws, and hair lice.

***Rauvolfia vomitoria* Afz.**

Decoction of leaves used in West Africa as remedy for parasitic skin diseases, yaws, and hair lice.

***Rheum officinale* Baill. (Rhubarb).**

Water ext. of root 70% T mosquito larvae.

***Rheum rhaponticum* L. (Garden rhubarb).**

Water ext. of root 70% T mosquito larvae.

***Rhododendron hunnewellianum* Rehder and Wilson. (Nao-yang-wha).**

Plant g $\frac{1}{2}$ rows in China, and the compounds (andromedotoxine and an unidentified substance) present in it are effective as insecticides; recommended especially as stomach poison for insects.

***Ricinus communis* L. (Castor oil).**

Oil T *Sphaerotheca humuli* at 1%.

***Ricinus communis* L. (*R. vulgaris* Mill.; *R. medicus* Forsk.; castor-bean plant; castor-oil plant; Turkey red oil).**

Powdered beans and husks, free of oil, T bees; acts as mosquito repellent; T when used in combination with pyrethrum against flies; castor oil, hydrogenated, T as mothproofing agent; sulphonated castor oil used to increase floatability on water of Paris green for killing Anopheline larvae and as mothproofing agent.

Rotenone.

T as mothproofing agent and will kill fish.

***Roylea elegans* Wall.**

Leaves used as insecticide.

***Ruta graveolens* L. (Common rue; oil of ruta).**

Strong decoction obtained by macerating leaves of plant in soap and water, stated to be successful remedy for American blight; oil 99-80% T *Lucilia cuprina* larvae.

***Salvia bicolor*. (Oil of Spanish sage).**

99-80% T *Lucilia cuprina* larvae.

***Salvia sclarea* L.**

Oil applied in 2% emulsion sprays, 51-80% T red spider and cotton aphid.

***Salvia* sp. (Sage).**

Odor of sage had no effect on mosquitoes, but smoke from burning leaves stunned them in 8 to 10 min. and killed them in 36 hours.

***Sambucus nigra* L. (European elder).**

Acetone ext. of flowers T mosquito larvae; leaves are noxious to insects, moles, etc.

***Santalum album* L. (Santal; sandalwood).**

Oil ext. 100% T (50 p.p.m.) and 65% T (25 p.p.m.) mosquito larvae; oil T *Lucilia cuprina* larvae; acetone ext. of wood T mosquito larvae.

***Santolina* sp.**

Small quantities of plants put in containers holding herbarium collections were reported to kill the insect pests.

***Sapindus marginatus* Willd.**

Repellent to grain weevils and other insects.

***Sapium ellipticum* (Hochst.) Pax. (Msharaka).**

Branches used on maggot-infested wounds.

***Sapium indicum* Willd.**

Seeds used in India as fish poison and as insecticide.

***Sarcostemma brevistigma* Wight and Arn. (*Asclepias acida* Roxb.).**

In India water passed through a bundle of these plants and a bag of salt is used to extirpate white ants from a field.

***Sassafras albidum* (Nutt.) Nees. (*S. officinale* Nees. and Eberm.; *S. sassafras* Karst.;**

***S. varifolium* (Salisb.) Kuntze; *Laurus sassafras* L.; sassafras).**

Powdered bark T chicken lice and dog flea, but not recommended against these insects; oil plus petrolatum one of best repellents against screwworm and is attractive to cockroaches.

***Satureia hortensis* L. (Summer savory).**

Oil repellent to cotton aphids; smoke from burning dried leaves stunned and killed mosquitoes.

***Sauromatum guttatum* Schott. (*Arum venosum* Ait.).**

Plant was observed during blooming period to attract in 2 days more than 100 flies which were found dead in bottom of flowers.

***Saussurea lappa* (Decaisne) C. G. Clark. (*Aucklandia costus* Falconer; costus root).**

Insecticide for moths.

***Schkuhria abrotanoides* Roth.**

Flowers used in Peru for same purpose as genuine insect powder.

***Schoenocaulon officinale* (Schlecht. and Cham.) A. Gray. (*Veratrum officinale* Schlecht. and Cham.; *Helonias officinalis* Don; *Asagraea officinalis* Lindl.; *Sabadilla officinarum* Brandt and Ratzed.; *sabadilla*).**

Used as dust, T grasshoppers, roaches, etc.; used as insecticide against lice; T mosquitoes.

***Selaginella scandens* Spring.**

Leaves were put on fires to keep ticks away from houses in Gold Coast, Africa.

***Sesamum indicum* L. (*S. orientale* L.; sesame; benne or teel oil).**

Acetone ext. of seed T mosquito larvae and houseflies; acetone ext. of flower tops and leaves T mosquito larvae.

***Sesamum indicum* L. (Sesame oil).**

Oil T *Sphaerotheca humuli* at 0.5%.

***Sesbania aculeata* Poir.**

In West Africa natives claimed that animals washed in water in which leaves of this shrub had been pounded could safely traverse a tsetse fly belt.

***Sesbania punctata* DC. (Sabral).**

Natives in Africa used decoction of leaves for washing animals to prevent bites of tsetse fly.

***Simarouba vesicolor* St. Hil.**

Bark reduced to powder used as insecticide.

***Solanum tuberosum* L. (Potato).**

Concentrated potato water T lice on animals.

***Sophora flavescens* Ait.**

Decoction of stems and leaves used in Japan as insecticide.

***Sophora griffithii* Stocks (*Keyserlingia griffithii* Boiss.).**

Powdered seeds mixed with oil T lice in hair.

***Sophora mollis* R. Graph.**

Used as insecticide in India.

***Spilantes acmella* (L.) Murr.**

Fruit used in India as fish poison and as insecticide.

Squash, blue hubbard.

Acetone ext. of seeds T mosquito larvae.

Squash, Connecticut straight-neck.

Acetone ext. of seeds to mosquito larvae.

Squash, golden summer crook-neck.

Acetone ext. of seeds to mosquito larvae.

Squash, winter.

Acetone ext. of seeds to mosquito larvae.

***Strychnos ignatii*.**

Seeds used in mothproofing.

***Strychnos nuxvomica*.**

Seeds used in mothproofing.

***Styrax officinalis* L. (Storax tree).**

Solution of styrax containing sulfur or tar recommended as remedy for mites on man and animals.

***Synandropadix vermitoxicus* Engl.**

Poisonous bulbs serve for destruction of injurious insects.

***Syzygium aromaticum*. (*Eugenia caryophyllata* Thumb.; *E. aromatica* Baill.; *Caryophyllus aromaticus* L.; clove tree)**

T chicken lice, dog fleas, body lice, and clothes moths; oil of clove buds and powder strong repellents against screwworm and attractive to codling moth; powdered cloves T carpet beetle larvae; acetone ext. of flower buds T mosquito larvae and ants.

***Tamus communis* L. (Black-bryony).**

Powdered root T hair lice.

***Tanacetum vulgare* L. (Tansy).**

Flowers have stupefying effect on insects; acetone ext. of whole plant 10-30% T mosquito larvae; oil 99-80% T *Lucilia cuprina* larvae.

***Tectona grandis* L. F. (Teak).**

Tar extracted from wood was applied to sores of draft cattle to destroy maggots; teak-wood tar remedy for white ants.

***Tephrosia ambigua* M. A. Curtis (*Cracca ambigua*).**

Insecticidal content found in roots.

***Tephrosia diffusa* (E. Mey.) Harv.**

Zulus used decoction of roots to destroy head lice.

***Tephrosia heckmannia* Harms.**

Infusions of fresh leaves were reported to be toxic to bedbugs and larvae of maize stalk borer.

***Terminalia catappa* L. (*T. moluccana* Lam.; Indian almond).**

Juice of young leaves was employed in Southern India in an ointment for scabies; commercial ext. effective repellent to Japanese beetle.

***Theobroma cacao* L. (Cacao; cocoa).**

A chocolate manufacturer mentioned an odd experience in connection with disposal of cocoa shells. Some shells were used as bedding for dogs, later the keeper credited the shells with having caused the disappearance of fleas infesting the dogs.

***Tilia tomentosa*. (Silver linden tree).**

Powders and volatile constituents of flowers T ants.

***Tragia* sp.**

Insecticidal plant occurring in Nicaragua.

***Trichilia cuneata* Radlk.**

Infusion of leaves T itch mites and other parasites of skin.

***Tripterygium wilfordii*. (Chinese thunder god vine).**

Roots T codling moth and several other lepidopterous insects.

***Triticum* sp. (Wheat).**

Used as insecticide against red spider.

***Tropæolum majus* L. (Common nasturtium).**

Acetone ext. of leaves and stems T mosquito larvae.

***Tylophora fasaciculata* Ham.**

Leaves and roots T rats and other vermin.

***Umbellularia californica* (Hook. and Arn.) Nutt. (*Orodaphne californica* Nees.; California laurel).**

Leaves appears to be valuable repellent to fleas.

***Urtica lyallii* (Wats). (Sap from nettles).**

***Vanilla planifolia* Andrews. (Vanilla bean).**

20% T body louse.

***Vateria indica* L.**

An effective and cheap viscous adhesive for banding to prevent ants from reaching crowns of trees was prepared with 10 oz. powdered Manila gum copal (gum of this species), 1 pt. castor oil, and 1 oz. beeswax.

***Veratrum album* L. (White false-hellebore).**

T roaches and silkworms. This plant is a hardy herbaceous perennial of the lily family. Early Greeks used to mix with milk to kill flies. Early Romans used this plant against mice and rats. It controls leaf-eating insects.

***Veratrum viride* Ait. (*V. album viride* Baker; American false-hellebore; green hellebore).**

This species contains alkaloids which are very toxic to a number of insects.

***Veratrum* spp.**

Powdered roots (*V. album* and *V. viride*) have been proved to prevent the emergence of houseflies from horse manure, being 95.5% T maggots exposed to its action. See tobacco note in this Chapter.

***Verbascum phlomoides*. (Clasping mullein).**

Acetone ext. of flowers T mosquito larvae.

***Verbascum thapsiforme*. (Wool mullein)**

Acetone ext. of flowers T mosquito larvae.

***Vernonia anthelmintica* (L.) Willd.**

Bruised seeds employed as means of destroying pediculi.

***Vetiveria zizanioides* (L.) Nash. (*Andropogon zizanioides* Urb.; cuscus grass; vetiver).**

In Gold Coast, Africa, dried roots of grass when placed among clothes, prevented insect attack; an ointment prepared from oil was employed in removing pediculi from hair; roots used as insecticide.

***Vitex negundo* L. (Negundo chaste tree; nochi).**

Leaves scattered among clothes are said to preserve them from attack by insects; 5% alch. ext. of leaves 90% T *Plutella maculipennis*, 50-75% T *Prodenia litura*, 20% T *Crocidolomia binotalis*, and 100% T *Euproctis fraterna*, *Pericalia ricini*, and *Achaea janata*.

***Walsura piscidia* Roxb. (*Trichilia trifoliata* Wall.).**

Arabs used fruit in hair wash to kill vermin and in an ointment to cure itch.

Weeds. (Species not stated.)

Powder kills mechanically rather than by poisoning larvae of mosquito.

***Xanthorrhoea hastilis* R. Br. (Black-boy tree).**

An Australian patent recommends washing sheep with mixture of 100 parts oil obtained by destructive distillation of black-boy or yacca-gummi, and 50 parts of fish oil.

***Ximenia americana* L. (*X. inermis* L.; *X. spinosa* Salisb.; tallow-nut; tallowwood).**

Applied to sores of domestic animals to keep off flies.

***Zanthoxylum americanum* Mill. (Prickly-ash).**

Exts. from dried bark were repellent to Japanese beetle; acetone ext. of berries 60% T mosquito larvae.

***Zanthoxylum clava-herculis* L. (*Z. carolinianum* Lam.; *Z. frazinifolium* Walt.; *Z. tricarpum* Michx.; *Fagara clava-herculis* Small; hercules-club).**

Acetone ext. of bark T mosquito larvae; HT houseflies; powdered leaves obnoxious to cotton caterpillars.

***Zanthoxylum hamiltonianum* Wall. (Tez-moora).**

Roots used as fish poison; boiled fresh solution of roots T mosquito larvae.

***Zea mays* L. (Indian corn).**

T downy mildew of hops. 1051.

***Zea mays* L. (Maize or corn oil).**

Oil T *Sphaerotheca humuli* at 1%.

***Zingiber officinale*. (Jamaica ginger).**

Acetone ext. of root T mosquito larvae; oil MT *Lucilia cuprina* larvae.

Note: Virtually all plants produce chemicals insects do not like. In 1964 Gardening without Pesticides by Beatrice Trum Hunter noted: "There are more than three thousand known species of plants which have insecticidal properties. While there have been plants used for pest control for centuries, that does not guarantee they are safe. Plants contain many toxins, some of which can harm non-target species like people and/or animals. Even so, most plants are toxic to mammals only when ingested.

In January 2001 the FDA office in Washington, DC threw out the 1948 catalogue which listed the above-mentioned plants. The Author would like to point out that there are many safe and effective alternatives in the partial list to the dangerous, volatile pediculicides, e.g., pyrethrin, pipernoil butoxide, permethrin, lindane and/or malathion. Obviously, FDA knew for over 50 years there were safer, more effective alternatives for lice and other pest problems and did nothing to promote their use. All he can ask is, "Why?"

Plant Flowers - This will help encourage many beneficial insects, e.g., flower flies and parasitid wasps.

Plant Oils - e.g., mint oil, pine oil, caraway oil, act as an insecticides, acaricides, fungicides and sprout inhibitors; they work because they are neurotoxic to insects, targeting octopamine receptors in their brains, so the insects become hyperactive, erratic, stop eating and/or convulse. People and animals do not have receptors or a system octopamine, so most plant oils do not harm most of us.

Plant Resistance - Pick a variety of plant that not only is a native species but resistant to disease and pest attack and then keep it healthy.

Plantain (Common) (*Plantago major*) - Use the bruised/chewed leaves to relieve the itch, burn and/or pain of bee, wasp and hornet stings, stinging nettle and poison ivy. You can also chew up some leaves and place them around a toothache to alleviate pain. Chewing a leaf also may stop the effects of a bee sting or a splinter.

A plantain oil infusion is a handy aid to have when suffering from hemorrhoids, bruising, splinters or minor wounds because of its ability to staunch blood flow, soothe and repair damaged tissue. If you want to make an oil to use for salve, pick some fresh leaves and either hang in a breezy spot out of the direct sun, or place on a screen to dry. Turn daily until moisture is gone. Place crushed leaves in a clean jar and cover with oil. Most oils are suitable for ointments and salves. Olive or sesame oils are well suited for skin products and readily available. Then you get to be a medicine maker extraordinaire. Strain your infused oil into a large glass measuring cup. For each cup of oil you will need ¼ c. grated beeswax and 1 T. vitamin E oil as a preservative and skin enhancer. Place your measuring cup in shallow water in a pan and heat gently. Add the grated beeswax, stirring until melted. Stir in the vitamin E oil after removing from heat. Wipe all water off cup before pouring into sterilized containers for your salve. Allow to cool before capping, then label, date and voila - your wild foods garden medicine is made. Congratulations on your dedication to your own natural healing.

Planting Times and Spacing - can be used to environmentally control and/or prevent insect pests.

Plants - Garlic, spurge, tansy, pennyroyal, eucalyptus, peppermint, yarrow, wormwood, southern wood, lavender, sage, marigolds, scented geraniums, fritillaria, etc. are all known to have animal and/or insect-repelling qualities and have been used in companion planting or by themselves to control pests.

Plastic Sheeting (Black) - Covering the soil surface under the hot sun will sterilize the soil and kill plants indiscriminately.

Plowing - Simple plowing helps control many kinds of weeds, diseases, insects and other pests.

Poison Ivy - If you know you just brushed up against poison ivy and can get to cold water within three minutes, wash away the nasty stuff. But don't use soap - it may seal in the poison-ivy oil. If the three-minute clean-up window is over and the itching is unbearable, reach for some Not Nice to Skin Irritations® or a slice of watermelon. Eat or cut off most of the fruit, leaving about a half-inch on the rind. Rub the rind over your rash-ridden body parts. Let dry naturally. Or you can try plaintain balm; juice 1 c. plaintain leaves in a blender or food processor with 3 - 4 c. water to make a slurry; then dab it on the affected areas. Dilute 1 part of the slurry with 3 parts water or apple juice and drink it. The leaves of the plaintain can be used internally and externally to draw out toxins. You can also freeze the slurry/juice in an ice cube tray for emergencies. Add the slurry to a warm bath and soak for ½ hour. Place the juice on any remaining problem areas. You can also use the juice of a jewelweed stem to alleviate poison ivy. Once again, you can take a pot of jewelweed stems, leaves and flowers and cover with water; simmer for 30 minutes; then freeze into cubes. You can use the cubes directly on the skin to relieve poison ivy, stinging nettle and/or insect bites. You should be considerably better the next day; if not, **see a doctor**.

Poisonous Plants - Four - o'clocks, Jimson-weed (*Datura stramonium*) dwarf and red buckeyes and delphiniums attract and kill pests like Japanese Beetles, but they are toxic to humans and pets as well.

Polaroid Glasses - Allow you to see into the water and in white-out snow conditions

Police Tape - "Do not cross" tapes can be used to keep most people out of an area; they do not work on children or pets.

Polycultures - Nematodes, weeds, insect pests and diseases are generally less abundant in polycultures than monocultures. Even if some plants die, they all will not die. Plant a variety of crops with different growth habits.

Polyethylene Terephthalate Sheets - Sheets of this material and other plastic surfaces can be used to prevent beetle larvae, e.g., lesser mealworm and hide beetle larvae, from climbing. These barriers can be used to prevent passage of emerging beetle larvae.

Polymers - have been used for years in aquatic pest control, primarily for drift control because of their long-chain carbon molecules (up to 40,000 per polymer strand). Polymers like nitrile which kills cells by continually releasing a toxic substance into the culture medium. The toxicity of polyurethane varies considerably due to the manufacturing process. There has been research on the emission of toxic sulfur gases from polymers coming in contact with food products and infants, so "we" stopped all further research on polymers early in 1998.

Polypropylene Bird Netting - will keep birds out of fruit trees and many other areas. Span bat entry ways with netting (several feet on each side) and allow the netting to taper and hang down at least 3 feet below the opening(s); using staples and duct tape secure the tops and sides (be sure to taper the sides) of the netting to the building. Be sure to leave an (unfastened) opening no more than 15" wide at the bottom. After several days the bats will leave and you can permanently seal all of the openings.

Polysorbate 80 - is a nonionic surfactant and emulsifier and dispersant that is relatively inert and is readily absorbed by the skin, it is derived from sorbitol, which comes from fruit and berries used as a dispersing agent - mixes oil and water, stabilizer and lubricates. Polysorbate 80 is known to increase the absorption of drugs, vaccines, mineral oils and other fat soluble materials. Personal note: You may want to compare the effectiveness of glyceryl cocoate, which is derived from coconuts.

Pomander - Repel moths and other insects with a clove petard by studding an orange, apple, lemon, lime or kumquat with the aromatic buds from the evergreen clove tree, then place it in cupboards, drawers and closets.

Population Prevention - One female aphid can produce 6 billion in one summer. One female flea can lay 5,000 eggs in her lifetime. One female tick can lay 7,000 eggs at a time. One female fruit fly can lay 800 eggs in her lifetime. Early reduction of even one pregnant female pest can substantially effect future population densities.

Potassium bicarbonate - 1 T. mixed in 1 gal. water controls fungal diseases like black spot and powdery mildew.

Potato - Trap wire worms which are the larvae of click beetles by scooping out several small holes in the garden soil. Toss in sliced potato and cover with boards - the "nests" will attract wireworms - collect the infested potatoes every other day and drop them into soapy water to kill the pests safely.

Potato Starch Spray - Mix 2 T. - 4 T. of potato flour and a dash of liquid soap in 1 qt. water to safely control fungal diseases and insects.

Potato Water - Concentrations of potato water have been rubbed on cattle, and clove on chickens and dogs to repel lice.

Power Dusters - impart an electrical charge to talcum powder, food-grade DE, boric acid, humates or any dust, making them excellent pest control devices.

Powdered (Non-fat dry) Milk - Lightly sprinkle on tomato plants and on the ground directly underneath to prevent many diseases.

Powdered Sugar - Dusted on wet cabbages will repel worms.

Power Washers - are tremendous tools, especially when used with Safe Solutions Tweetmint Enzyme Cleaners - do not use cleaners that contain active bacteria or unknown quantities of protease enzymes. Follow the label.

Prayer - Prayer changes things.

Praying Mantids - should be called preying mantids because they will eat just about any insect including each other.

Predator Urine - will repel many herbivores and some carnivores. A drop or two of fox urine (on a cotton ball) will often cause raccoons and squirrels to vacate your attic space.

Predators and Parasites - Without these beneficial insects (the most populous form of life on this planet) nothing man could possibly do would stop the pests from taking over this planet. At least 65% of all pests are controlled by other insects.

Predatory Arthropods - Linnaeus wrote about controlling pest problems using predatory arthropods in 1752. Insects have been controlled since the beginning of time by other insects, arachnids and/or diseases of insects. See Spiders.

Predatory Mites - can be used to control pest mites.

Preformed Enzyme Cleaners - or salmonella-free enzyme cleaners are what we previously recommended be used as an all-around cleaner, insectisafe and fungisafe or Pestisafes®; now we only recommend Safe Solutions, Tweetmint Enzyme Cleaner is used at 1 oz. per quart to control pests and 1 oz. - 2 oz. per 3 gallons of water to clean and/or flood ant colonies - you may add a "kicker" of a teaspoon of vegetable or canola oil, a tablespoon of borax, ½ of a grated lime, a few drops of liquid soap or garlic oil, 1 teaspoon of alcohol or hydrogen peroxide, a few drops of glycerin per quart of mix for quicker or better control of virtually all insects, fungus, mold and/or mildew. Unlike volatile, synthetic pesticide poisons, you can adjust the enzyme (pest-killing) application rate. A 1 to 500 ratio kills garden, lawn, orchard, grove and field pests, e.g., mites, aphids, leaf miners, etc. but leaves (harder-bodied) biological/beneficials, e.g., ladybugs and *Aschersonia*, a beneficial fungus (that destroy white

fly nymphs) intact. The content of the performed enzyme cleaners varied greatly each batch and had a 3.5 pH and no one knew the ingredients. http://www.licergone.com/Lice-R-Gone_Ocular_Sensitivity.pdf

Preparation H - relieves chigger bites and puffy eyes.

Preservatives - Some natural preservatives are thyme and/or tea tree essential oils, grapefruit extract and D-Alpha tocopherol acetate (vitamin E).

Prevention - is the best control and your first line of defense. "An ounce of prevention is worth a pound of cure."

Probiotic Microbes - or bacteria in the large intestine stimulate health and prevent chronic stress-induced abnormalities, e.g., foodborne pathogen growth; these probiotic microbes also remove odors and help heal skin irritations.

Propane - Propane is a gas that is heavier than air, unlike natural gas that is lighter than air - that means propane seeks out the lowest areas. Propane does not kill vegetation like natural gas does - so if you take a propane torch on top of a small canister of propane and gently push the tip into pest, e.g., ant, wasp, mole, runways and tunnels and turn on the gas so it comes out slowly and leave it on until you smell propane permeating out of nearby runs - you will have flooded the tunnels with gas - do this to all tunnels and runways and you will have killed all tunnel occupants. Don't smoke or light any fires around this area for a week to be safe. You can also use propane torches to control weed and roach problems with the flame. **Be extremely careful!**

Proper and Thorough Inspection - If you do not find the cause, location and problem, you have already lost.

Proper Nutrition - Healthy plants and animals resist pest damage. Remember, too much fertilizer/nutrient can be as harmful as too little. You can often encourage fruiting by cutting back on fertilizer "use".

Proper Plant Choice - Choose native species; place them in their natural preferred location, e.g., in shade or sun; plant them properly - at the correct depth, in the right soil, remove burlap, fertilize and water properly and use proper landscape design to decrease maintenance, moisture loss and stress.

Proper Pruning - will open up the tree to allow sunlight in and air movement and proper drying conditions and removal of diseases and spot pest infestations.

Proper Sanitation - Start your control programs with this simple procedure.

Proper Selection - Select a control that harms the pest and not the beneficials or natural enemies.

Proper Soil Nutrition and pH - is essential for healthy plants. Healthy plants naturally fight off diseases and pests. Adding soil inoculants, organic fertilizer, compost, aeration, earth worm castings, colloidal minerals, green manures, etc. all help build healthy soils.

Proper Time - Seeds planted too early will rot. Plant too late and you will not harvest. You need warm soil for rapid germination and growth of young plants.

Propionic Acid - are being reviewed as mold inhibitors in hay.

Propylene Glycol - is being reviewed as a treatment for ketosis.

Protease Enzymes - Safe Solutions Tweetmint Enzyme Cleaners contain protease and are virtually non-toxic - yet they quickly and safely destroy insect exoskeletons - when insects molt they inject a very tiny amount of protease into the "seam" of their exoskeletons - creating a "zipper" - so they can "step out". Obviously, protease enzymes will never create immune or resistant insects like synthetic pesticide poisons do. If you were to describe the perfect pesticide you would want an inexpensive chemical, that left no poison residual, created no contamination, was non-toxic to people and pets, was broad-spectrum and controlled virtually all insects, fungus, mold, mildew, bacteria, plant diseases, would not create resistant species and could be applied in numerous ways - you have thus described Safe Solutions Tweetmint enzyme cleaners and shampoos - which are sold as non-toxic cleaners

by Safe Solutions at 1-888-443-8738 or 1-616-677-2850, <http://www.safesolutionsinc.com> - you can also add a “kicker” with their peppermint soap or alcohol, hydrogen peroxide, garlic and other essential oils. The Author has a patent in Australia and the U. S. A. and several patents pending on the use of protease and other enzymes and surfactants for use as pesticides, fungicides, etc. According to the 1994 Journal of Clinical Epidemiology, the enzyme protease, found naturally in raw pineapple, papaya and other unprocessed and unheated foods, has also been shown to prevent cross-linking. Cross-linking is a process that occurs when collagen becomes hard, cross-links with other collagen fibers and prevents the skin from holding water and remaining elastic. Yoshihide Hagiwara, M.D. has said, “Enzymes are involved in moving our hands and legs, and even in the process of thinking. If enzymes were lost, all the functions of our (human) body would fail.” **Remember, protease enzymes should never be more than 1% of a product or you risk causing occupational asthma problems and/or anaphylactic shock. (See enzyme cleaners and Safe Solutions Enzyme Cleaner.)**

Pruning - Simply cut off any infested, dead, dying, winter-injured and diseased branches, leaves, stems, shoots, limbs or plants and then burn, bury or remove them from the yard, field, lawn or garden. Prune properly and at the right time.

Pumpkin Seeds (known as pepitas) - can be eaten raw or roasted or ground up and made into a tea and eaten or drunk to remove tapeworms and other parasites in animals. Winter squash, e.g., butternut or other squash, seeds share the same qualities and are high in zinc and omega-3 fatty acids..

Purification - is the opposite of intoxicification or self-poisoning. **See the detox chapters 40 and 41.**

Purple Plates - will safely repel many insect pests until they need to be replaced with fresh plates.

Purslane (*Portulaca oleracea*) - is an edible (vitamin rich) weed that can be used to control other weeds. Munch on the leaves to rehydrate and re-mineralize your tired body.

PVC Pipe - Sections of PVC pipe can be used to make permanent termite bait stations; to enclose rodent glue boards and/or catch armadillos.

Pyrethrum - is one of the most important botanical insecticides ever developed; it is made from flower heads of chrysanthemum species. Only a specific variety of this flower can be used to yield the desired commercial grade of the material. Pyrethrins are a combination of 4 different chemical constituents (pyrethrums) derived from this process. The pyrethrins cause rapid knockdown (unconsciousness) in insects. They will also cause death in some insect species. Their usage is very limited though due to the rapid degradation of the material when exposed to ultraviolet light. Pyrethrum was first used in the U.S.A. in 1858. **Pyrethrum** refers to the dried, natural powdered flower heads of the plant. **Pyrethrin** refers to the active ingredient compounds that occur in the flowers. **Pyrethroid** refers to synthetic compounds that resemble pyrethrins in chemical structure. Some synthetic formulations persist in the environment longer than either pyrethrum or pyrethrin, often lasting 10 days for more, compared to a few hours or days for the natural botanicals, **so be very careful.** In general, we do not recommend the use of any aerosol formulations; the mist created by an aerosol is composed of very fine particles that stay suspended in the air, causing unnecessary respiratory problems and human exposure. And the “unknown volatiles” and the repeated contact with dusts may cause skin irritation or allergic reactions in humans. Pyrethrin can be toxic to cats at any dose above 0.04%. **CAUTION: Some commercial pyrethrum insecticides also contain organophosphate or carbamate insecticides and/or pipernoil butoxide all contain “inerts” - Don’t use them.** These *inerts* are included because the rapid paralytic action/effect of pyrethrum on insects is not always fatal. (EPA 3/89 540/9-88-001 pg. 25). **Pyrethrin and pipernoil butoxide are now considered to be carcinogenic.** Many people are sensitive or allergic to these sprays. **Pyrethrum is a registered pesticide.**

Pyrethrum plant - A beautiful daisy that is hardy and blooms throughout the spring and summer. It’s dried and crushed flower heads are used to make probably the best natural pesticide available - that instantly kills flying and crawling insects on contact but should do no harm to mammals or birds. This brown powder will kill or stun the insects the moment it touches them but no harm to pets when sprinkled on their coats. This member of the daisy family is a beautiful ornamental and will compliment any garden or flower bed. While very effective, the dried powder only lasts for a few days. You can prolong its use throughout the year by freezing fresh flower heads in zip-lock bags and drying and crushing them as needed or encapsulating the oils in sodium borate.

You may be highly allergic to this plant.

Quaker Oats - for past pain relief. Mix 2 cups oats and 1 cup water in a bowl; warm in the microwave for 1 minute. Cool slightly and apply the mixture to your hands for soothing relief from arthritis pain.

Quarantine and Exclusion - Quarantining materials in an area to exclude unwanted pest organisms is an Intelligent Pest Management® concept of long standing. Quarantining pest infested areas until you can deal with proper control is a vital tool.

Quartz Sand - can be used as a repellent.

Quassia (*Quassia amara*) - Used as an insecticide and/or repellent. Boil ¼ cup quassia clips in 1 gal. water for 2 hours; cool and use as an insecticidal spray; it will kill mosquito larvae and can be used a moth-proofing agent.

Radiant Heat Weeders - Radiant heat or infrared weeders have a lethal head capable of reaching temperatures of 1800 degrees. Some models use combinations of air, water and radiant heat. The most common setup uses a ceramic heating element capable of reaching extremely high temperatures. When you direct the heat towards the weed, the intense heat boils the liquids in the plant's/pest weed's cells causing them to literally burst. The weeds do not even need to be scorched. The leaves wilt immediately. The element needs to be ½" above the weed and will kill not only the weed but wind-borne seeds and bacteria on or just below the soil's surface. The time to kill is generally 1 - 2 seconds. You can see when you are through, the leaves wilt and turn a darker green. They run on propane and weed control costs about 2¢ to 7¢ per 100 sq. ft. **There are no open flames, but you must be extremely careful.**

Radio Waves - May repel some pests initially, but may also be harmful to humans and pets.

Radios - can often keep many mammals away from specific areas. **See music/noise.**

Radishes - Plant radishes or nasturtiums with your cucumbers to control cucumber beetles. Pliny in his Book 19 emphasized the "great antipathy between radishes and vines, which shrank away from radishes planted near them. Note: Grape vines will also not grow near cabbages. Radish juice in the soil completely inhibits some species.

Ragweed (*Ambrosia artemisiifolia*) - The pollen causes allergies, but if you chew on a leaf it may alleviate your symptoms instantly. **If it does not stop the symptoms immediately, do not continue chewing.**

Rape Seed Oil - See The Great Can-ola. Rape seed oil is toxic because it contains significant amounts of a poisonous substance called erucic acid. Canola oil is a poisonous substance, an industrial oil that does not belong in the body. It contains "the infamous chemical warfare agent mustard gas," hemagglutinins and toxic cyanide-containing glycosides; it causes mad cow disease, blindness, nervous disorders, clumping of blood cells and depression of the immune system. This is what detractors say about canola oil.
<http://www.westonaprice.org/knowyourfats/conola.html>

Rat-proofing - In 13 B.C.E. the first rat-proof granary was built by the Roman architect, Marcus Pollio.

Rattlebox (*Crotalaria* spp.) - Plants will reduce the numbers of a wide number of parasitic nematodes in the soil.

Rayless Chamomile (*Matricaria matricarioides*) - The powdered heads are fairly toxic to diamondback moths.

Read the Label - Read the label. Read the label and then know all of the information before you use any product.

Record Keeping - is essential to monitor trends and patterns in pest problems.

Red - Some insects avoid the color red because it registers as a black void in their field of vision.

Red Croquet Balls - coated with Vaseline® or STP or Tanglefoot or a commercial insect adhesive hung at eye level just within the apple tree canopy but not totally obscured by the leaves will trap egg-laying female apple maggots. Use one ball per dwarf apple and/or 4 - 8 per full-size apple tree. Paint old burned-out light bulbs

bright red and cover them with petroleum jelly.

Red Food Dye - Will kill many insects including medflies when they ingest leaves and other food materials that have been sprayed with diluted dye. They die from the amines.

Red Lights - let you get close enough to roaches, carpenter ants and other nocturnal pests to “pet” them, so simply vacuum them up. Put corn starch (1 tablespoon) in a dry vac or 4 oz. of enzyme cleaner in a quart of water in a wet vac to kill the pests you vacuum up.

Red Packing Envelopes - with glue on the back can be stuck on a wall and/or behind an appliance, etc. on a 45° angle. Stick open and baited with light Karo syrup and a ½% sodium borate bait.

Reflective Tape - will scare away birds.

Refuge Habitats - Just one more alternative pest management practice. Allows for growth of beneficial organisms.

Registered Pesticide (Poisons) - is just another oxymoron for many reasons. Often only 1% or less of the poison compound/formula is *tested* or *extended* rather than *registered*. Other times different federal agencies look at the poison from far different perspectives and issue completely opposite “warnings” and “directions”. Often the exact same product is a poison for one use and a non-poison for the next use, e.g., disodium octoborate tetrahydrate or sodium borate; when sold as a wood fire retardant, Poly-bor[®], it is not a *registered* pesticide; when it is sold as a wood treatment for wood destroying organisms, Tim-bor[®], it is a *registered* pesticide; when sold as a fertilizer, Solu-bor[®], it is not a *registered* pesticide; when it is sold to mop floors, Mop-Up[®], it once again magically becomes a *registered* pesticide poison. Confused? The Author is too; there, obviously, is no logic behind *registration*.

Regular Maintenance Checks - Walk around the entire area to inspect previous infestation sites and to ensure all pest-proofing measures are still intact. Reduce moisture and many pest problems are also reduced.

Relative Humidity - Reduce the relative humidity and you control many pests, e.g., dust mites, roaches and bed bugs. Reduce moisture and many pest problems will also be reduced.

Remove Plant Debris - and you help to remove disease and pest problems.

Repair and Replace - Preventative and ongoing maintenance programs prevent future pest invasions and, if done properly, prevent costly major repairs.

Repellent and/or Deterrent Chemicals - can be used to protect people, plants and/or animals from parasites and predators.

Repellent Planting - Many plants naturally repel pests. Put some in a blender with some water and some soap to make your own repellent spray or scatter their leaves around to repel pests. Garlic repels most insects.

Research - Every day the Author learns another alternative control; research must be constantly performed.

Resistance - The ability of the pest to become immune to a particular pesticide poison or microorganism to become immune to an antibiotic. At some point all synthetic pesticides/medicines will fail to control pest/infection problems. Resistance is the natural, inherited ability of a living organism to adapt in order to survive a particular pesticide/medicine that would normally give effective (but not safe) control. As early as 1993 greater than 504 insect species were known to be resistant to at least one formulation of insecticide and at least 17 species of insect species are resistant to all major classes of insecticide. 150 fungi and other plant pathogens are resistant and several plant pathogens are resistant to nearly all systemic fungicides used against them. Five kinds of rats are known to be resistant to the chemicals that are used against them. Resistance to herbicides have been documented in over 100 weed biotypes and 84 species (Cate and Hinkle 1994).

The green peach aphid, *Myzus persicae* (Homoptera: Aphidae), is resistant to more insecticides than any other insect. Two other agricultural pests that are notoriously resistant, the Colorado potato beetle, *Leptinotarsa*

decemlineata (Coleoptera: Chrysomelidae) and the diamondback moth, *Plutella xylostella* (Lepidoptera: Plutellidae), are strong runners-up. Resistance to synthetic pesticide POISONS will continue to increase in pest species, but not in people who are exposed to these dangerous toxins. At some point, resistance makes farming uneconomical. Eventually, in order to survive, man will have to think rather than apply ever-increasing amounts of pesticide POISONS and use the safe and far more effective controls in this free IPM manual and/or find other alternatives. **See also Immunity.** A Friend of the Author in an Israel kibbutz said when he began farming he had to spray maybe once after planting before harvest; now he has to spray over 40 times! In January 2010 the Grand Rapids Press noted Norway had controlled MRSA (see Chapter 41) by simply not routinely prescribing antibiotics.

Resistant Species - Often increase the quality of the crop. These species can even decrease insect populations in adjacent fields or yards. When insect pests feed on resistant species of plants they are often less vigorous and are more easily killed by natural controls, e.g., beneficials and adverse weather and/or other environmental stresses.

Resistant Varieties - You can simply avoid many plant diseases and pest species by growing only resistant plant species.

Resolve to Persist until You Succeed - Never, never, never give up; unleash your stamina and mind and creativity. Continue on!

Results never lie.

Review - Never stop reviewing your IPM strategies, especially your failures to see how you can better and more safely control various pest problems.

Rhubarb - Soak 3 pounds of rhubarb leaves in 1 gallon of water (in the dark) for at least 24 hours. Bring the water to a boil, let simmer for 30 minutes - add 1 oz. of liquid soap and/or soap flakes - cool and spray the rhubarb mix - it's fun to see how many different pests, e.g., aphids, Japanese beetles, June bugs and fungal diseases, this natural spray will control. **Be careful; oxalic acid is harmful to you, too! If ingested, your heart will stop and you will die!**

Right Stuff® - Clean per the label with this stuff and insect pests die quickly.

Rinse-and-Vacs and or Vacuums - The quickest and most effective way to remove pests, debris and food is to vacuum or rinse-and-vac. Do not forget to put Safe Solutions Tweetmint Enzyme Cleaners in the water and/or dust (corn starch or talcum powder) in the dry vac to kill the captured insects.

Risk - Always consider the risk to non-target species; everything you do creates some degree of risk.

Road Dust - will kill insect pests, e.g., striped cucumber beetles and cabbage worms.

Robber Flies - Maggots live in soil or decaying wood and feed on beetle larvae. The adults come in various body styles and are voracious predators that catch flies, beetles, bees and grasshoppers by dropping down on them from above. They usually have bearded faces and are very strong.

Rodent Baits - See baits containing artificial sweeteners/pain killers.

Rodent Traps - They can be used to control rodents without resorting to the use of dangerous poisons, but still, be careful.

Roofing Paper - Sticky bands of roofing paper wrapped around trees will prevent the ascent of ants, worms, caterpillars and other pests or will allow you to remove or turn the paper and control any pests hiding under the roofing paper.

Rooibos - (pronounced "Roy-Bose"), a plant native to South African plant, has started to gain popularity throughout the world for its significant health benefits. From 1999-2001, consumption increased by 500%. Rooibos contains

a wide variety of antioxidants called aspalathin, chrysoeriol, orientin, isoorientin, vitexin, isovitexin, quercetin, isoquercetin and rutin. It is thought that these components of Rooibos tea are responsible for its growing reputation as an “antiaging tea” as well as promoting cell health and helping maintain healthy blood sugar and inflammation .

Research has found that Rooibos tea helps with irregular heartbeats, colic and diarrhea . Now a new study has built upon previous research showing that Rooibos may be effective for asthma and high blood pressure by helping decrease muscle spasms in blood vessels and lung airways.

Rosary Pea - called Black-eyed Susan, Weather Plant, Precatory Bean, Crab’s Eye Vine or Jequirity Bean; the scientific name is *Abrus precatorius*, and is found growing all over Florida on Sabal palms, shrubs, fences, and undisturbed areas. The seeds contain abrin, one of the most toxic principles known. Less than one masticated seed can kill an adult human - **Abrin is a thousand times more toxic than arsenic. Be very careful!**

Rosemary (*Rosemarinus officinalis*) - Evergreen aromatic shrubs from the Mediterranean. Grows 2’ - 6’ with pale blue ½” flowers and attractive foliage. Powdered Rosemary leaves are used as a flea and tick repellent. Simply dust the powder onto the pet or areas where the pet sleeps. Rosemary oil will control lice. An effective and safer repellent. Rosemary is one of nature’s most powerful anti-oxidants and is helpful with memory loss and cancer prevention. You can also bring a quart of water to a boil and add 4 teaspoons of rosemary; let soak for 20 -30 minutes . Drain and cool the solution and then spray your pets with the herbal rinse. Keep the pet inside until the spray has dried. Use as needed to repel ticks and fleas.

Rotation - Developing a good crop rotational plan is the first and most important step in the transition to Intelligent Pest Management®, sustainable agriculture, low-input or organic farming. Certain crops, like tobacco, potatoes and corn, are heavy feeders and should not be grown too often on the same soil, yet the Author has watched farmers ignore this sage advice year after year after year. This literally mines the soil rather than husbanding it. Planting the same crop in the same place year after year invites losses due to soil-borne diseases and overwintering pests. Follow a crop rotation of at least 3 years for the four major vegetable plant families—Solanum (tomato, potato, pepper, eggplant); Cucurbit (melons, squash, cucumbers); Cruciferous (broccoli, cauliflower, cabbage, Brussels sprouts); and Allium (onion, garlic, leeks).

Rotenone - extracted from *Derris spp.*, *Lonchocarpus spp.* and/or *Terphrosia spp.* can be used as an insecticide. derris roots contain rotenone and crushed roots will kill fish when rotenone is thrown into the water. Rotenone has been used since the 18th century.

Rove Beetles - Most rove beetles and their larvae prey on aphids, fly eggs and maggots, mites, nematodes, springtails, etc.

Rubbing Alcohol - will instantly kill most insects on which you spray it, including stinging insects, **but be very careful of your eyes and keep out of the reach of children and pets.** You can also mix 1 T. - 3 T. of rubbing alcohol in a quart of water to kill most weeds, but put in 5 T. - 6 T. to kill poison ivy.

Rue - Plant *Ruta graveolens* as a garden border or scatter shredded leaves to deter Japanese beetles. The oils from the leaves can be extracted and used as a spray to control or repel many insects. Rue is a flea and insect repellent. It has been used to treat rheumatism, epilepsy and skin disorders. **Caution: The oils give some people a rash similar to that of poison-ivy and are toxic in large amounts!**

Rust Control - Take ¼ cup of shredded paper and place a thin layer of this paper at the base of the plant, e.g., roses, snapdragons, hollyhocks, etc. and light the paper with a match; the quick flame will last 5 - 10 seconds and then can be extinguished if necessary. Check again in a few weeks and repeat the fire treatment only as needed.

Ryania - Puts insects into a state of “flaccid paralysis”. Roots and stems can be used to make a botanical insecticide.

Rye Flour - Sprinkling rye flour over and around plants wet with dew will cause the resulting dough to cling to the bodies of moths and worms so that they will bake in the sun and die.

Sabidilla - Seeds are toxic to houseflies. It has been used as an insecticide since the Sixteenth Century. The

entire plant, except the mature seeds, is non-toxic. When heated or treated with alkali, the seeds become toxic to many insects, **but the dust is very irritating to mucous membranes.**

Safe Solutions Tweetmint Enzyme Cleaner (with or with peppermint) - is formulated to exact specifications with a normal pH and always less than 1% protease.

http://www.safesolutionsinc.com/Enzyme_Cleaner_Pest_Control.htm

http://www.safesolutionsinc.com/Non-Toxic_Pest_Control.htm

<http://www.getipm.com/thebestcontrol/ideal-pesticide.htm>

Safety - should be the first and last thing you apply!

Sage (*Salvia officinalis*) - Every garden should have a little sage. It's used as a food seasoning, and its medicinal values have been known for centuries. Sage can improve memory. In 1597 John Gerard wrote about saying, "It is singularly good for the head and brain and quickeneth the nerves and memory." It may be used to treat Alzheimer's. In the garden, it should be planted next to cabbage as it will improve the taste of the plant and repel cabbage worms, maggots and/or moths. Scarlet sage repels nematodes.

St. Johns Wort - Induces a whole family of enzymes in the liver. These enzymes break down prescribed drugs, including the birth control pill, anticoagulants, anti-rejection drugs and possibly toxins. Serves as an immune system and mood booster, especially for those who suffer from lack of sunshine (SAD). **See Herbal Remedies.**

Salt - Put some in your vacuum to desiccate pests you vacuum. Salt sprinkled on weeds that sprout in paved areas, along fence lines, driveways or wherever you want - salt will kill all plants including "weeds"; salt or salt water sprays will also quickly kill snails and slugs. Salt will kill many insects, e.g., fleas and termites in protected areas, e.g., crawl spaces, or directly on the wood or it can be sprayed as salt water to control numerous pests - but check a few leaves first to see how badly it will damage plants. Many salts can be used to pretreat soil and wood for termite control, but some salts will also destroy ferrous metals. Salt poured on wine stains in the carpet will absorb the wine. When Imperial Rome wanted to punish its enemies, it plowed salt into the ground and no plants grew in that soil for years. We could have killed all the vegetation in Vietnam with salt that would not have hurt the people. Instead, we used/misused herbicides that sickened our own troops, harmed their future children and still are destroying the people of Vietnam. Now we are spraying the people of Columbia rather than just saying, "No!"

Salt Water - Zapping salt water with low voltage electricity a couple of powerful, nontoxic cleaning agents. Sodium ions are converted into sodium hydroxide, an alkaline liquid that cleans and degreases like detergent without sudsing. Chloride ions become hypochlorous acid, a potent disinfectant known as acid water which 10 times more effective than bleach. This electrolyzed water can treat wounds, kill microbe spores, anthrax spores, bacteria, foot fungus, bed sores, etc., all without harming people or the environment. To read more, see the Electrolyzer Corporation at <http://www.electrolyzercorp.com>.

Sand - sand blasting sand will provide a permanent termite barrier when properly applied. Sharp sand will repel cutworms and other insects. Putting clean sand under lettuce plants will help prevent rot.

Sanitation - Improve your sanitation; store food and garbage properly; use heavy-duty trash bags; move dumpsters away from buildings; refrigerate trash and recycle rooms; steam clean garbage receptacles routinely; remove all debris, garbage, spilled food, garden refuse, trash, boards, branches, wood piles, lumber, weeds, rocks, etc. and you can virtually eliminate most pest problems inside and outside. This is usually the number one problem.

Saponins - Saponins are found widely in plants and they have detergent properties that cause them to foam when shaken in water. These same detergent properties can be used to help control insects, mites, various fungi and molds and plant diseases.

Sassafras and Sweet Basil - Plant them to repel mosquitoes. Sassafras oil will attract the codling moth.

Sauna - Dry saunas may be used to safely kill or control lice, scabies and bed bug infestations and many other insect infestations. Saunas can also be used to detoxify people. See Not Nice to Toxins at Safe Solutions, Inc.

Sawdust - Sawdust can be treated with sodium borates to be used as termite bait, or mixed with 10% molasses (or aspartame) and a touch of corn or sardine oil to control rodents. Traps, e.g., pots, bags or boxes, filled with sawdust will be filled with earwigs in a few days if placed where you see these creatures. **Some sawdust is very toxic.** Check with your doctor or veterinarian before using any sawdust.

Scarecrows - old fashioned straw people in clothes with shiny or reflective streamers, still work at keeping birds away - if you frequently change their position, location, pose and clothing.

Scented Geraniums, Sassafras, Sweet Basil Plants and/or Eucalyptus Trees - planted near doors, windows, gardens, decks and patios all help keep mosquitoes away, especially when the leaves are crushed. Eucalyptus trees will even dry up boggy areas.

Scent Trails - Remove these with Safe Solutions Tweetmint Enzyme Cleaner and/or cover them with medicated powder, food-grade DE, vinegar, bleach, essential oils, smoke and/or fragrances (if no one is chemically sensitive) and you will totally confuse and demoralize ant colonies.

Scentless False Chamomile, Mayweed (*Matricaria indora* or *M. chamimile*) - The flower heads are effective as commercial pyrethrum in controlling face flies; may well have applications in the garden.

Scillas (sometimes called Squills) - Gophers shy away from plantings of scilla bulbs.

Scotch Guard - Very lightly spray Scotch Guard (used for exterior purposes) on cardboard and feed it to termites. They quickly die. If you spray it on wood (per the label), termites are repelled and will not eat it (for some indefinite period of time), so use a very small amount for a "bait".

Screens - Properly installed, self-closing screen doors and window screens will safely and effectively keep out many insect and rodent pests.

Seeding - Proper seeding is your lawn's best defense against the invasion of weeds and other pests.

Seeds - Rats and mice prefer seeds over pellets, especially large pellets, so remember this when you make rodent baits.

Seltzer Water - can be used to moisten termite baits; the carbon dioxide will attract termites to your baits.

Sesame (*Sesamum indicum*) - This is an effective synergist for pyrethrins. Acetone extracts of seeds are toxic to most mosquito larvae and houseflies. An acetone of the leaves is toxic to mosquito larvae.

Shaking and Beating - Starting in the Renaissance, professional shakers and beaters were employed to beat and shake furs and woolen carpets and drapes to control fabric pests, e.g., moths and carpet beetles. Periodic shaking bean seed containers will control the weevil *Acanthoscelides objectus*. Mechanical agitation, disorients and/or destroys the weevils. Shaking works to control several other pests.

Shingles - Roofing shingles can be cut into 3 (1-foot) pieces, folded into "tents" and used to cover jar lids filled with beer to trap slugs and snails.

Shock - Electric fencing keeps nuisance wildlife out. Invisible fencing keeps dogs in. There are electronic pet training mats, e.g., Scat Mat® that keep animals off any restricted area. The Rat Zapper® will electrocute rats and mice. **Mammals learn very quickly to avoid any electrical shock!**

Shoes - can be used to simply step on "bugs" and/or if smelly enough repel many mammals from a small area. **See Smelly Sneakers.**

Shoo-fly plant (*Nicanda physalodes*) - A vigorous bushy annual, 2 - 5 ft. tall, with sky-blue bell flowers an inch wide, followed by unusual, papery 5 wing pods that are excellent for dried arrangements. A beautiful ornamental that is raised around greenhouses for its possible fly repelling and killing properties. Said to attract and kill flies, e.g., white flies.

Shower - Fewer mosquitoes attack a person after a shower, especially one with anti-bacterial soap.

Silica Aerogels - Amorphous silica gel is a dust made from sand used as a registered insecticide, effective for many household pests and stored grain pests. The primary mode of action is as a desiccant. Silica aerogels are formed by a reaction of sodium silicate and sulfuric acid to form fluffy aerogels, whose small particles, and large, porous surface can absorb three times their weight in linseed oil - a substance similar to the waxy material on the exoskeleton or cuticles of insects - and 5% to 100% of their weight in water. These aerogels absorb lipids, the waxy protective coating on an insect's exterior surface, causing the insect to lose vital moisture, dehydrate and die. Silica aerogels, particularly Drione (silica aerogel impregnated with pyrethrum or pyrethrin) are particularly useful against pests in confined areas, including cockroaches in sewers and wall voids, drywood termites in attics and adult and larval fleas on pets. It also works around the yard. Because the formulated product is toxic to fish, **it should never be used where it can contaminate air, aquariums, lakes, streams or ponds.** Silica aerogels may be eaten without toxic effect, but prolonged breathing of these substances are not recommended without respiratory protection. Some plants, including rice, absorb soluble forms of silica from the soil and convert it to amorphous silica in their cells. Silica gel is routinely added to our flour products as an anti-caking agent. The various forms of silica differ in their oil absorption capacity and are produced using different industrial processes, though they all start with sand as the raw material. Silica gel works best when moisture and humidity are relatively low and control is more complete when food is not available to the target pests. Crystalline silica is a mineral dust. In laboratory animals, inhalation of crystalline silica induced significant increases in the incidence of lung cancer. Injections induced lymphomas in the thorax and abdomen. In humans, a number of studies have shown that lung cancer occurs more frequently in workers who are exposed to silica, so use these materials with great caution. This synthetic has yet to be added to the National List of Approved Synthetics before it can be used in organic agriculture - and it is rated as a foreign substance by government grain inspectors - USDA states diatomaceous earth (DE) is not considered to be a foreign substance. **Silica (crushed sand) in the lungs will not dissolve and may harm like asbestos. The Author does not use or recommend silica aerogels.**

Silicon Dioxide - Also called diatomaceous earth; the Author only recommends the use of food-grade DE.

Silicone Caulk - Use the one with a scent rather than the low odor version (if no one is chemically sensitive). The odor confuses insect pests, e.g., ants and most pests are unable to chew through the silicone.

Skin-so-soft® - can be used as an insect repellent. It helps relieve itching caused by insect bites and dry skin. Mix 5 parts water and 1 part Skin-so-soft and mist on show animals, then brush - it makes their coats gleam and it repels insects and/or fleas. Mix in your pet's bath water to remove fleas. Sponge it around doors, windows, and on screens to help keep bugs outside. After you remove a hornet nest - keep the area sprayed with Skin-so-soft to keep them from rebuilding in that area. Mix in water and spray to keep ants away.

Skunk Odor - Remove it with 1 c. water, ½ c. baking soda, 1 tsp. dishwashing soap and 1 qt. 3% hydrogen peroxide or use Safe Solutions Tweetmint Enzyme Cleaner with Peppermint or their Pet Wash.

Smelly Sneakers - an old pair of smelly sneakers (strategically placed) will often repel (nocturnal) mammal invaders.

Smoke - In the 16th and 17th centuries orchard pests were fumigated with smoke from fires built on the windward side of the trees. Smudge smoke from burning mango leaves or from rice straw greatly reduces fruitfly populations. Greenhouses can be safely fumigated by taking a pail, putting newspaper at the bottom of the pail, then a metal grate and a layer of straw; then wet oak leaves, the stems and leaves from canna plants, or the leaves of peppergrass. Light the newspaper and the damp material will smolder rather than burn, producing a thick smoke. Close the greenhouse door and smoke for a half-hour; then ventilate. This treatment will kill aphids, ants and mites. **Be careful the fire does not get away from you.**

Smoke Bombs (Revenge® Rodent Smoke Bombs) - will kill gophers, moles, rats, snakes, skunks, woodchucks, and/or ground squirrels, but are not for mole use in Indiana and North Carolina. Light one of these sulfur, potassium nitrate, or charcoal smoke bombs and slip it into the pest's burrow. Smoke and carbon monoxide displaces air in the tunnels destroying the pest. The animal dies underground. The Author would like to note that

lit charcoal in the tunnels would also kill pests, but check with the authorities first. See <http://www.modfarm.com>.

Smothering - Smother poison ivy and other weeds under black visquine, heavy straw or mulch, tar paper, plywood or cardboard.

Snails - Issac Kanoa on Maui is using black ducks from Cayahoga Lake in Washington to eat snails, slugs, ants and bugs in his organic gardens because they do not eat his plants.

Snakes - They help keep many insects, gophers, moles, mice and other rodents in check.

Snow Fence - The plastic kind can be used to catch and kill or exclude snakes. Snow fencing, wood or plastic, will also exclude many mammals.

Soap - Soaps are also surfactants, but they are made with natural ingredients; they may be used as insecticides, algicides, de-mossers, large animal repellents and herbicides. Soap kills insect pests because of the insecticidal power of fatty acids, which destroy cellular membranes and the soap solution creates a film that prevents the insect from breathing through its spiracles. Soft-bodied insects are most susceptible. Mix 4 ounces of virtually any soap - mild (unregistered) dish soap or a natural soap or a commercial cleaner or a degreaser or better yet an eucalyptus or citrus oil or citronella or lavender or peppermint soap (with or without protease enzymes) in 1 gallon of water and spray as an insecticide to quickly control most insect pests or use an (registered) insecticidal or herbicidal soap, e.g., Safers® or Ringer®. Be sure your cleaner does not contain alkylphenol polyethoxylate - which is a hormone disrupter. Spray floors and yards to control ants and fleas. This mix will also control many insects, e.g., white flies, mites, aphids, etc. Spray a few leaves and wait at least 48 to 72 hours; if there is no ill effect, then spray your plants (treat the bottom as well as the top of the leaves) every 2 - 3 days for several weeks. **Some plants are sensitive even to mild/diluted soap.** Mix 1 cup cooking oil with 1 tablespoon non-detergent liquid soap as an alternative "brew" - use 1 tablespoon of this "brew" for each cup of water and spray to control aphids, spider mites, scales, some caterpillars and mealy bugs - this "brew" is effective against eggs as well as adults. If the temperature is over 85° F. the oil will damage some foliage. Deodorant soaps, especially Dial®, can repel deer and other animals. Sprinkle dry soap into garbage cans after they have been washed and allowed to dry; it acts as a fly repellent. Sprinkle or spray Tide laundry soap around the foundation of your home to keep ants out. At 40° F. or less spraying birds with soapy water will quickly kill them. Soap as it melts adds alkalinity to the soil. The "original" Pestisafe®. Soaps act by impairing the waxy covering of insect and arachnid exoskeletons; this results in desiccation and death of the pest.

Soap Plant, Soap Root (*Chlorogalum pomeridianum*) - Grows from California north to Oregon. Powdered bulbs are toxic to armyworms and melonworms.

Soap and Water - Soap and water beat all of the various anti-bacterials. When Grandmother finished washing the dishes she threw the soapy water on her plants and flowers controlling most insect pests quickly and safely. Fill a quart sprayer with water and a tablespoon of soap and try it yourself - you can add a "kicker" by including enzyme cleaners, garlic, alcohol, mineral oil, vegetable oil, hydrogen peroxide, glycerin and/or borax to your mix! Compare various types of soaps for differing control results e.g., dish soap; degreasers; commercial cleaners; natural soaps; peppermint, lavender, eucalyptus or citrus oil soaps; insecticidal soaps; neem soaps; strippers; or try various combinations with or without a "kicker". Be sure you use a salmonella-free enzyme cleaner. **Remember, even natural soap burns the eyes and may also burn squash, cauliflower, cabbage and other leaves.**

Socks - Stretch a darkly colored (red) man's sock over the exterior of a quart mason jar to assist the roaches and other pests in climbing up the exterior to enter your trap.

Soda Pop Bottles - 2-liter clear soda bottles can be cut at the curve and the tops can then be inverted and taped back so the top is now a "funnel". You can use various attractants to lure stinging insects, flies, slugs and mice to their deaths. **See photo - Chapter 39.**

Sodium Bicarbonate - (baking soda) works very well as an alternative pest control chemical. Arm and Hammer has a good grade Rumen Buffer 46011. Bicarbonate occurs naturally in saliva, but occasionally when acids increase in stomachs or swimming pools, sodium bicarbonate rapidly lowers the acid. When sprinkled about,

this Pestisafe® quickly controls ants, roaches and many other pests. Baking soda also has fungicidal qualities, especially with black spot and powdery mildew.

Sodium Borate - Works as a dust, liquid and/or foam. Boron in the form of sodium salt has been used as an embalming agent by the ancient Egyptians, and as a flux for welding gold. Boric acid and borax have been used as mild antiseptics, especially for burns and the eyes. For the last 200 years boric acid was used to preserve food, but this use has been stopped because it could be used to "cover up" food unfit for consumption. Boric acid has been used to alleviate burns and stings and as a powder to prevent rash. Patients have been given 10 gm. per day for extended periods, and then excreted boron after 7 weeks. The acute boron dose for an adult is 20 - 60 mg. in a single dose and infants have died with 5 gm. In many countries, boron is given as a food supplement with the claim it heals 80% - 90% of all arthritis, cardiopathies have been corrected, vision has improved, balance has been restored, cases of psoriasis have also been improved. Dogs, horses, cattle, deer and goats have all been healed of arthritis. Today western societies (like the U. S. A.) ingest about 2 mg. boron daily; early in the 1900s we ate about 8 mg. boron per day. It is thought 5 - 6 mg. boron per day will prevent arthritis, but a higher dose may be needed for treatment. It is a registered (non-volatile) pesticide and a lumber preservative and as a micronutrient. The disodium octaborate ($\text{Na}_2\text{B}_8\text{O}_{13}\cdot 4\text{H}_2\text{O}$) product (DOT), e.g., Tim-bor®, has been used by Stroz Services, Inc., Get Set, Inc. and many countries for years as a wood preservative and as a remedial control of wood destroying pests. Boric acid (H_3BO_3) and its salts, the borates, borax ($\text{Na}_2\text{B}_4\text{O}_7\cdot 10\text{H}_2\text{O}$) and disodium octaborate tetrahydrate ($\text{Na}_2\text{B}_8\text{O}_{13}\cdot 4\text{H}_2\text{O}$), DOT, have been used for wood protection in Australia and other countries since the 1940s. Liquid borate sprays protect the wood against decay, carpenter ants, wood boring beetles and termites. **Sodium borate is currently coming into wide use as a wood preservative here in the U. S.** These compounds make wood permanently resistant to fungal decay and insect damage, and also act as fire retardants. Borates are slow-acting stomach poisons to insects and contact poisons to wood destroying fungi. Borates are not directly lethal to an organism. Borate reduce the intestinal flora which allow insects to digest food. Borates deactivate enzymes by cross-linking the enzyme's hydroxyl groups. Although borates are highly toxic to insects, they are less toxic to mammals because mammals excrete boron faster than insects. Borates are biostats rather than biocides. On fungi borates work on contact, since disrupting the enzymes in fungi make them stops them from extracting nutrients in the wood. Sodium borates inhibit necessary oxidative metabolic activity at the cellular level - a constant energy-producing process necessary for life. Over time inhibition of fundamental biochemical activity results in death. Tests for termite control in the 1930s had shown promise, but more toxic chemicals were introduced and these naturally occurring controls were simply ignored by the poison applicators here, in favor of the extremely dangerous and carcinogenic termiticide poisons, e.g., chlordane, aldrin and heptachlor. To apply Tim-bor as an aqueous solution, use two applications of 10% Tim-bor solution or a single application of 15% Tim-bor, the 15% solution is created by mixing 1½ lb. of the insecticide per gallon of water and applying immediately and/or a surfactant/foaming agent can be added to create a dry foam. The Tim-bor foam may be applied directly to wood surfaces or injected into insect galleries or wall voids. Sodium borate may be applied in two ways for general control of roaches, silverfish, ants and other insects: (1) in powder form to insect harborage areas or as a crack and crevice and void treatment, or (2) as an aqueous solution for crack and crevice treatment only. The product is highly toxic to both wood-destroying organisms and general insects but has low acute mammalian toxicity and is normally excreted quite rapidly. It is environmentally sound and can be used around children and pets, with no need for evacuation. It is easy to handle and mix, requiring no harsh chemical solvents. TIM-BOR® is not absorbed through unbroken skin and washes off easily with soap and water. It is also odorless and non-flammable. When you use/substitute sodium borate to create baits, use about 1/2 the amount you would with boric acid. If you mix a tablespoon of sodium borate, 1/8 teaspoon of tea tree oil or emu oil and 1/2 teaspoon of fish oil with a capsule of Not Nice to Arthritis in a cup of body lotion. Stir and heat ingredients in a microwave oven for 25 - 30 seconds until thoroughly mixed; this mix will greatly help as a topical treatment for arthritis.

Active Ingredient		
Generic Name	Trade Name	LD ₅₀ Value
sodium octaborate	Tim-bor	2,000
boric acid	several products	>3,160
silica aerogel	Tri-Die	>3.160
limonene & linalool	several products	4,000
insecticidal soap	Safer Insecticidal Soap	>10,000
neem oil	Margosan-O	>13,000
<i>Bacillus thuringiensis</i>	several products	>15,000
pyrethrum	many products	>18,000
ivermectin	Avert	>75,000

> = greater than

Caution: While borates are not known to bio-accumulate in humans or pets, and are not absorbed through intact skin, all dusts should be applied using adequate personal safety protective gear. A dust mask should be worn to protect the applicator from inhaling dust, especially in areas of poor ventilation. Rubber gloves and long sleeves are also recommended to prevent skin abrasion and dermatitis. When applying a dust, care should be taken to apply only a thin layer of the material on the surfaces being treated. When completed, the areas treated should look as if they are in need of a dusting. Dust applications should be done only in wall voids, under cabinets and shelving units and in other dead air spaces where it will not be contacted by people or animals. If you can get any insect to ingest DOT you will kill them. The dead sea will always be the dead sea - salts do not break down but they keep on killing - Death Valley is death to all because of the Borax. So use sodium borates to permanently control wood destroying insects, fungus, termites and molds. **Caution: sodium borate's LD₅₀ is more toxic than boric acid,** but remember boron (as sodium borate) is also a food supplement, e.g., in Chroma Trim Gum®. We, like many people, believe that baits made with 3% or less sodium borate work better than baits made with boric acid. Sodium borate can be used for "pretreatment" baits to pretreat or control termites. **In order to ensure the best control - make them at ½% to 3% and monitor them yearly.** When sprayed on concrete we believe DOT becomes calcium boron and will not leach - killing many pest, e.g., roaches, termites and fungus permanently. The same sodium borate formula is also sold as Solu-bor®, a fertilizer (or as an essential micronutrient to plants) and as Poly-bor®, a fire retardant. DOT also will "microencapsulate" some pesticides, e.g., pyrethrum, and keep them around in crystals for generations. When any insect rests on them it quickly dies. The Author knows of route men in Florida who routinely add sodium borate to their sprayers, that already contained (several) volatile, synthetic pesticide poisons, and have all reduced the use of volatile, synthetic pesticide poisons up to 75% the first year and up to 90% the second year. **See Caution in Chapter 36.** U. S. borates were being tested for termite control at least since Cel Cure® was patented to protect wood in 1933, but research was shelved in favor of more toxic substances like the cyclodiene chlorinated hydrocarbons, e.g., chlordane, heptachlor, aldrin and dieldrin. Already in the 1940's borax and boric acid and sodium borate were routinely being used to protect wood in Australia, New Zealand and Europe. Lumber was protected on a commercial scale by the dip-diffusion method in Australia in the mid 1940's and sodium borates with greater water solubility were being used in Australia and New Zealand in the 1950's. By the 1970s hundreds of research papers noted how great borates protected wood. Only after aldrin, dieldrin, chlordane, heptachlor and mirex were banned or removed in the U. S. in the 1980s did the U. S. allow these wonderful U. S. Pestisafes® to be used here. As of this writing, several states **still** will not allow them to be *legally* used to protect wood safely; these *regulators still* insist that the maximum rate of far more volatile and, therefore, more dangerous/toxic termiticide poisons, that do not last (any where as long) or work as well (even when they are contaminating us), **still** be "used" to *protect* people and their property - no matter what the people want! It is a sad fact that most U. S. homes *treated* with volatile, synthetic termiticide poisons or fumigants have to be routinely monitored and *retreated*. Not only do the volatile termiticide poisons not work, they are killing us. These *regulators* did not learn anything about safe termite control - now about 75% of all U. S. homes built before April, 1988 are permanently contaminated with significant levels of chlordane! When you compare this simple fact with another one - that with no contamination problems, borate-treated construction lumber in New Zealand has "effectively eliminated damage caused by all wood destroying organisms" in homes built there since the 1950s when standards for non-volatile borate treatments were first developed - you must

ask the obvious question - **Who is getting paid off there?** Sodium borate or borax will completely denude a forest and kill any rodent or insect that eats it.

Sodium Chloride - Common table salt will kill weeds, ants, fleas, termites and most other pests; it can be sprayed directly on the pests or on the ground and wood, etc. The Dead Sea will always be dead because of its (non-volatile) salt. **See Natrum muriaticum.**

Sodium Chlorite - at 0.17% (0.0017) by weight, kills bacteria, mold, mildew and odors.

Sodium Hypochlorite (in chlorine bleach) - if mixed with ammonia, releases toxic chloramine gas, causing asthma symptoms and even death.

Sodium Laurel Sulfate - is on the EPA exempt list. It kills insects in 30+ seconds at a 1% rate and in 10 - 15 seconds at a 3% rate all by itself. It kills/repels ticks, fleas and lice, and can be blended to help kill weeds.

Sodium Silicate - Is the simplest form of glass and can be used as a fungicide.

Soft Coal or Humates - are registered for foliar fertilizers. Apply them with an electrical charge and they will not only cover all of the plant's surfaces, they will suffocate any insect that is in the area at the time.

Soft Drink Bottles - have been set in mole holes with the top left above ground to make a "whistle" as the breeze passes over the mouth, sending vibrations through the mole's chamber. Use them as wasp, slug, roach traps, etc.

Soil Amendments - An agricultural IPM technique to help reduce the need for pesticides.

Soil Improvement or Fertility - Improving the soil produces vigorous plants with increased resistance to pests and diseases. The less fertility in the soil, the more insect pests.

Soil Quality - The first control for all plants is to improve the soil quality — organically!

Soil Sterilization - Try a combination of brassicas tilled into the soil and then cover the freshly tilled soil with clear polyethylene plastic to trap solar radiation and heat the soil. You can also pasteurize soil with applications of hot water into the soil to a depth of 12" and using a rotovator to distribute the heat through the top foot of soil - this procedure not only manages pests but irrigates the field. Cover crops can be used to reduce soil pathogens (mainly nematodes), and to provide organic matter that will lead to improved yields (Peacock 1995). You can also kill weeds, nematodes and many insect pests when you cover the soil for several days in the sun with black polyethylene plastic.

Soil Tests - Use a soil sampler and conduct proper soil tests **before** you fertilize. Use organic fertilizers.

Soil Thermometer - Use this to test soil to see when it is best to plant and/or to release nematodes.

Solanine - is a steroidal glycoalkaloid (C₄₅H₇₃NO₁₅) naturally found in nightshade plants including the green in potatoes; it is very similar to malathion. On hydrolysis it yields solanidine and 3 sugars. Its aglycone portion is considered most toxic; it is a naturally occurring insecticide poison - **use only with great caution.**

Solar Treatment - During warm summer days insects, e.g., bed bugs, can be solarized outdoors to kill them all.

Solvents - quickly kill insect and arachnid pests but, if they are volatile, they can also harm people, pets and plants.

Soot - Old soot and agricultural lime, which has a strong, repulsive smell, can be placed in containers set on the ground to keep flea beetles from the crops.

Sound or Sound Waves - can be used to repel pests. When sounds 50,000 cycles per minute were broadcast over a corn field, the number of cornborer moths infesting the crop was cut in half. Ultra sound vibrations 200,000 per second passed through water suffocated mosquito larvae by shattering their windpipes.

Sour Milk - sprays will loosen scale on small trees and plants so you can wash them off with water later.

Sour Sop (*Annona muricata*) - Powdered seeds are toxic to armyworms and pea aphids.

Southernwood - will repel ants (and the aphids they carry), cabbage moths and fruit tree moths.

Soybean Oil - Kills mites. Kills beetles and other insect pests. Repels mosquitoes.

Spanish Dagger (*Yucca shidigera*) - Powdered leaves are toxic to melonworms, bean leafrollers, celery leaf-tiers and other insects.

Spearmint - will repel ants and mice.

Sponges - Compressed sponge pieces with an attractant will kill any rodent that eats them. **Caution: this may also harm other mammals and kills slowly, so use only when safe and legal.**

Spot Treatments with Pesticide Poisons - The only suggested (non-volatile) pesticides we “recommend” be used as a last resort - usually we will not apply even least-toxic pesticides unless it has an LD₅₀ value of over 5,000 **and** does not volatilize! While I know it is against the federal law to compare a pesticide’s LD₅₀ value with any food product, I do believe that you as a reader should be aware some materials we daily ingest do have an LD₅₀ value; for example, table salt has an LD₅₀ value 3,500. The only reason I mention this is that just because a product has an LD₅₀ value for its active ingredient does not in and of itself indicate the danger or risk you are assessing when you use that product:

Registered Pesticide Poison Note: It is O.K. to say a generic (unregistered) product will control pests - but, if you say **your** product controls pests - it “magically” becomes an unregistered pesticide! When pepper spray used to discourage muggers (people) was used to successfully ward off bear attacks - EPA classified it as a pesticide poison. Apparently unregistered products or Pestisafes® that control pests better and safer than *registered* poisons are an embarrassment not only to the poison “industry” but also to the “regulators”. **Use registered toxins only as a last resort and, by law, only according to labeled directions! Never use the volatile ones!**

Intelligent Pest Management® (IPM), prioritizes any treatment methods by always using the least hazardous and least intrusive means first, in order to effectively eliminate pests indoors, at the lowest possible health risk to the customer and the applicator. It is always best to error on the side of safety rather than on the side of control.

Before you agree on even a spot treatment; thoroughly review the pesticide and application method with the customer to be sure he or she understands the entire process. Be forthright about any conditions or problems that might result due to a treatment, including lingering odors. Always inquire about heart or respiratory problems, allergies, pregnancy and other medical conditions and/or medications that may prohibit treatment.

When in doubt, provide the homeowners or other occupants with the **current** pesticide label and material safety data sheet (MSDS) and let them decide. You should suggest that they consult their physician if they have medical questions relating to the treatment.

SAFETY FIRST. Safety guidelines should always permeate every aspect of pest control - especially any pesticide (poison) applications. You should always inspect and troubleshoot before each job in order to protect yourself and your customers. Whether the treatment is inside or outside, all possible alternative Intelligent Pest Management® techniques should always be attempted before making any pesticide poison application.

Spray Bottle Cures - Non-toxic “pesticide” sprays that can be made from ingredients readily available in the home. See also old fashioned spray mixes under Ants and/or Roaches in **The Best Control®** and also in this chapter, e.g., apple cider vinegar, castor oil, buttermilk, eggs, hydrogen peroxide, rhubarb, stinging nettles, sugar, urea, vinegar and wormwood. The Author prefers to call them Pestisafes®.

1. **All-purpose** - Take an empty spray bottle and fill about 3/4 of the way with water, then add a few drops of Ivory liquid soap, some hot peppers or hot pepper sauce and some garlic. This works well, but needs to be reapplied after every storm and/or every couple of weeks.

2. **All-purpose** - Grind together three hot peppers, three large onions and at least one whole clove of garlic. Cover mash with water and place in a covered container. Let container stand over night. Strain mixture through cheesecloth or a fine strainer and add enough water to make a gallon of spray.
3. **All-purpose** - Mix one tablespoon of a mild dish washing detergent plus one teaspoon of a vegetable cooking oil with one quart of water. This can be sprayed on all plants. Remember to spray both the top and the underside of the leaves. You can also add 1 teaspoon (rounded) of baking soda if you have fungus problems.
4. **All-purpose** - Finely chop 10 to 15 garlic cloves and soak in 1 pint of mineral oil for 24 hours. Strain and add enough water to make a gallon of spray. Test on a few leaves to see if the plant is damaged and spray as is, or add a few drops of soap for extra stickiness.
5. **All-purpose** - Blend ½ cup of hot peppers with 2 cups of water. Strain and spray.
6. **All-purpose** - Combine 1 to 2 cups of rubbing alcohol with 1 quart of water. Test spray and let stand overnight to see if damage occurs to plant.
7. **Orange trees and rosebushes** - Soak macerated tomato leaves in water and apply as spray onto leaves and branches. **Do not allow any pet or person to drink this spray.**
8. **Red spider mites, spiders, cabbage worms, and weeds** - An ounce of table salt to a gallon of water has been shown to stop these pests. Use a tablespoon of salt to two gallons of water for the worms. Be careful salt damages plants! Straight salt, especially in non-garden areas can stop weeds and termites in protected areas, e.g., crawl spaces.
9. **Species specific** - Collect ½ cup of a specific pest and mash well or blend. Mix this with two cups of water and strain. Mix ¼ cup of this “bug juice” with 2 cups of water and a few drops of soap and spray. Whether the soap or the dead bugs are killing the pests, the Author can not tell, but the mix works very well.

Caution: Some sprays can damage, discolor, kill or scorch foliage - always test a small, inconspicuous area first.

Spiders - The weight of insects eaten by spiders every year is greater than the total weight of the entire human population.

Spindle Tree (*Euonymus europaeus*) - The fruit has paralyzing action on aphids and will kill lice.

Spotted Knapweed - uses a l-catechin stereo-isomer to establish its dominance as a weed so quickly. While d-catechin is a well known antioxidant, in some fruits its mirror image, l-catechin, is a potent oxidant that can kill off whole roots in an hour and most plants in days. This l-catechin will probably also act as a fungicide and soil sterilant.

Spray Starch - Some of the ingredients in spray starch may include phenol formaldehyde and penta-chlorophenol.

Spring Cleaning - When the Author was a young man, he and his Mother would clean every surface, every crack, beat every carpet and rug and clean everything else in their home every spring, and they never saw any insect or arachnid pests.

Sprinklers - If a neighborhood dog or cat frequents your yard - turn the sprinklers on - or spray them with a hose or Super Soaker® - most animals quickly become “trained” to leave your yard alone. Sprinkle ground pepper to repel them or plant common rue (*Ruta graveolens*) anywhere dogs are a problem - but, remember rue can also cause human allergenic (skin) reactions.

Spurge - will repel moles and the decorative plant is self-sowing.

Squirt Guns - will safely deter cats and a super soaker will even deter dogs from entering your space. **See Super Soaker.**

Stalking the Enemy - Who is really guilty? Holes in tomatoes may house earwigs, sowbugs and cutworms, but the holes were found during a nighttime inspection to be caused by slugs and the others were there hiding. Controlling the slugs solved the holes in the tomato problem.

Stay Calm - Take a deep breath and refuse to become upset or angry. You can't fight properly if you let your emotions run wild. Listen and think. All stress is self-created.

Steam Iron - Don't have a steamer? Use a steam iron to steam/kill your bed bugs and then iron the mattress to help dry it out.

Steam Vapor - Steam vapor too hot to touch will kill bed bugs and their eggs, bacteria and many other insect and arachnid pests. Use a large brush head or attach a small towel to the steamer head.

Steamers - can heat water up to 265° F. and will kill roaches, bed bugs, fruit flies, etc. on contact.

Steel Wool - Use coarse steel wool to exclude mice and rats in interior voids and openings. If mice eat steel wool and peanut butter they will die. Use copper mesh as an exterior tool in rodent exclusion work. **See Copper Gauze.**

Steinernema carpocapsae - A beneficial nematode that destroys immature fleas.

Steinernema feltiae - These nematodes are very effective at infecting and killing fly maggots.

Steinernema spp. - Many beneficial nematodes can be used to control pests, e.g., termites.

Sterility - Releasing sterile insect pests or specimens with genetic defects can safely control many pest species. Gamma radiation is used to sterilize the males who are then released.

Stethoscope - Can be used to hear many different pest infestations.

Sticky Tape - Double-sided sticky tape, e.g., Mr. Sticky®, can be used to make traps, escape-proof barriers or make a pest-proof area. **See Duct Tape.**

Sticky Traps - There are all kinds of commercial sticky traps available and more are always coming. There are small sticky traps, large sticky traps, blunder traps, rat traps, rat mats, mouse traps, sticky tapes, fly paper and tapes, white or blue or yellow colored sheets or rolls of sticky traps - elm bark beetle pheromone traps, roach pheromone traps, wing trap kits, sticky red spheres, sticky cards, duct tape, etc. - for use in the home, orchard, forest, field, crops, green house, etc. In addition to the sticky traps, you may add an ever-increasing list of pheromone lures, food scents, and other attractants to the "regular" sticky traps monitor or control flies, scale, borers, loopers, weevils, worms, moths, beetles, roaches, rodents, caterpillars, leaf rollers, etc. You can also make your own sticky traps from wood, cardboard, or stiff plastic. Paint the base with a coat of primer and two coats of bright yellow or medium blue paint. Coat with a sticky compound using a paintbrush, or spread it on with a knife. Use stiff adhesives like Tanglefoot® for large insects and thinner glues such as Stiky Stuff® or STP oil treatment for small insects. Scrape off insects and recoat as needed. Croquet or plastic balls or light bulbs can be painted red to make apple maggot traps. Plastic soda bottles make good cherry fruit fly traps - paint the shoulders of the bottle yellow and fill the bottle with lure. A partial bottle of syrup will catch ants.

Stinging Nettles (*Urtica dioica*) - Wear leather or rubber gloves and pick up the leaves from the bottom of the stem upwards - steep 1 pound of nettle leaves in 1 gallon of water for at least a week - strain and water or spray plants with the solution - it is a rich fertilizer and a natural pest repellent, **but it will also give you a burning sensation.**

Storage Pest Controls from India -

1. Custard Apple (*Annona reticulata*) leaves have insecticidal and antifeedant properties. Fresh or dried leaves mixed with the produce or placed in layers between the produce gives effective control against rice moth and bruchids for 3-4 months.
2. Finger Euphorbia (*Euphorbia tirucalli*) provides protection against a wide range of grain pests. Branches of the plant are burnt to obtain its ash. One tea cup full of ash is mixed with 20 litres of grains. This provides protection against grain pests.
3. Coconut oil, peanut oil and sesame oil can be used for protection from bruchids. 5 ml of the oil is mixed with

1 kg of grain legumes. This provides protection upto six months from bruchids.

Store Food - in air tight containers or in the refrigerator. Never allow any food to remain in the open.

STP® - Oil Treatment or Vaseline® can be used to trap small insects.

Straining Mixtures - Strain any of these mixes through multiple layers of cheesecloth and/or a disposable coffee filter.

Straw Mulches - Putting straw mulches under plants like watermelon and muskmelon prevents the fruit from rotting from ground contact. The mulch also retards weed growth.

Straws - Blowing through a straw will make roaches run from a crack. Straws can be used to make bait stations and to trap earwigs.

Stream of Water - will wash off aphids and spider mites from plants.

String - Properly positioned - string (wire or dental tape) will keep birds off an area or roof. Most birds hate to have anything rub against their legs when they are roosting. So nail two end brackets on either gable end (or wherever you see birds roosting) and string a piece of wire or waxed twine about 4" above the ridge. This simple control works for most birds and is non-toxic and inexpensive.

String Trimmers - mechanically manage weed problems and kill or injure some trees.

Stripper - A little floor stripper in water provides quick insect control.

Strobe Lights - Place a bright strobe light in dark areas where you have bats, birds, rats, squirrels, feral cats, raccoons, skunks, etc. in attics, storage buildings, barns, crawl spaces, etc., and watch them all leave in a few hours or days. The pupils of their eyes can not tolerate that much exercise. The strobe light is also highly annoying to people and pets, so make sure you can turn it off before you re-enter these areas. **Caution: Strobe lights can trigger seizures in people with photo sensitive epilepsy.**

Structural Heating - can be used to kill drywood termites, roaches, bed bugs and many other pests.

Sugar - High concentrations of sugar, e.g., honey, will not allow the growth of bacteria. Cane sugar incorporated into soil at a rate of 5# per 100# of soil will kill all nematodes in 24 hours. (Some plants do not like sugar, so you may need to flush the sugar out before planting.) Cut the top off a 2 liter plastic pop bottle, invert it inside the bottle to make a "funnel" (secure it with duct tape). Pour sugar water, fruit juice or pop 2 - 3 inches in the bottom (with a few drops of soap or enzyme cleaner) to attract and kill hornets and wasps. Sprinkle fly paper with granulated sugar and hang in trees, dumpsters, or wherever you want to trap hornets and wasps. Dissolve a teaspoon each of lemon juice, sugar and jam in a glass of water - pour the mixture in a can, with 2 - 3 (half-round) openings on each side - push the sharp edges inward - attracted to moisture and sweets, slugs will crawl in and be killed by the acidic lemon juice. Half upturned grapefruit rinds will also kill slugs - the juice is acidic. Mix: 1 part active yeast, 2 parts molasses and 1 part sugar. Mix the ingredients well. Drop a teaspoonful on several small squares of white paper. Place the paper squares along ant trails where they will not be disturbed. How does it work? The ants are attracted to the sugary feast and will consume it readily. The action of the yeast, however, will produce gas in their bellies which they cannot rid themselves of. They essentially will pop. The best part of this method of pest control is that it utilizes no volatile poisons which could harm you or your family. A fruit tree spray can be made by dissolving 2 pounds of granulated sugar in 5 gallons of warm water. Let the mixture stand for several hours and spray any fruit tree or grape or rose plant after a dormant oil spray. Mix 1/4 cup of confectioner's sugar and a tablespoon of borax with 2 tablespoons of water. Soak cotton balls in mixture and place on low lids. Or mix 2 tablespoons boric acid, 2 tablespoons sugar and a cup of water. Soak paper towels, place on dishes (or in shallow screw-top jars with 6 - 8 holes punched in the lid), and set out for ants. Keep any and all borax controls out of reach of children and pets. Mixing baking soda with powdered sugar and applying to infested areas to control ants and/or roaches. Equal amounts of oatmeal flour and plaster of Paris or equal amounts of borax and brown sugar will kill roaches, but keep out of reach of children and/or pets. Combine 8 parts powdered rodent chow, 3 parts granulated sugar, and 1 part boric acid crystals. Add water

to make the mix about the consistency for good mud pies and add green food coloring to avoid unintentional misuse as animal feed. Roll the mix into balls about 1 inch in diameter. Place balls of bait in locations used by roaches for raceways and harborage. The bait needs to be made up fresh every 3 months. **Keep all borax, boric acid, or sodium borate baits out of reach of children and/or pets.**

Adding sugar or other sweet material to fertilizer tends to make the plant “too sweet” for insect pests to eat, so they move on to the neighbor’s field.

Sugar Apple - When the seeds and roots are extracted with ether, they are converted to a resinous substance to make a contact poison for aphids. It is toxic and repellent to diamondback moth larvae. Hot-pressed and heat-extracted oils of seeds are highly toxic contact poisons to several pests.

Sugar Substitutes - like Splenda® and Equal® kill insects when they are consumed by insects. Splenda® attracts red-eyed fruit flies and is compounded with chlorine as a base. (Chlorinated water will also kill insects.) See the web site located at <http://www.proliberty.com/observer/20031112.htm> to see how dangerous Splenda® is to you.

Sulfur - can be used as a fungicide, acaricide and repellent; it will control mites, thrips, chiggers and several diseases in ornamental and fruit crops. Sulfur and naphthalene will repel several species of snakes. (The two-spotted mite is resistant to sulfur.) Sulfur, especially with a little lime, will control fungus. One of the first Pestisafes®; the Romans used it to fumigate/control roaches. Homer first mentions its use for pest control in about 1000 B.C.E. About 2500 B.C.E. Sumerians first used sulfur to control pests. Sulfur acts by competing with oxygen in the blood stream.

Sulfuric acid (10% v/v) - has been used as a selective herbicide since the early 1900s when it was discovered that dicotyledonous weeds would absorb the acid, whereas cereal grains (grass) etc., having a smooth, waxy monocotyledon surface would not. **Be very careful not to touch any acid.**

Sun - Placing infested objects in black garbage bags and then setting them outside in the sun on a hot day will kill virtually any enclosed pest infestation.

Sunburn “Cure” - Fill a pitcher or pail with equal parts of milk and ice. Soak enough washcloths or towels in this to cover your sunburned skin and place them on affected areas for about 15 minutes. Repeat several times over the next 24 hours. Cold milk protein soothes skin and helps draw out the heat.

Sunny Location - Choose a sunny location away from large trees. Eight to ten hours of direct sunlight per day are necessary for proper growth, flowering and fruiting of most vegetable and fruit crops. Sunlight also helps to dry foliage and reduce many fungal and bacterial diseases.

Super Slurper - has starch-based polymers that “drink” water up and turn it into a gel. It can dry wet books in a few minutes; stop mold growth that can begin in 48 hours. It can also be used as an alternative to vacuum freeze-drying. Put some in powdered sugar as a bait and watch what happens. In dry areas it can be used as a tracking powder. Blow some into drywood termite colonies.

Super Soaker® - Model 2500 or another very powerful water gun or soaker or rechargeable fire extinguisher with constant pressure can be used to discipline dogs and cats and birds, “tree rats” and other nuisance wildlife, etc. Put diluted enzyme cleaners in the soaker and blast hornet nests and other pests.

Surfactants (or surface-active agents) - Are slightly viscous, clear amber substances or colloids that work as (“magnetic”) cleaners and degreasers. Surfactants can be used as household, industrial and marine cleaners, personal hygiene products, insect repellents and insect, arachnid and bird pest control compounds. A micelle is a colloid, microscopic particle formed by an aggregation of small biodegradable molecules. Each molecule has a hydrophilic (water-seeking) pole and a hydrophobic (water-repelling) pole. The hydrophobic poles attract each other, forming the interior of the micelle and the hydrophilic poles form the outer surface. When a single micelle or surfactant molecule comes in contact with a hydrocarbon molecule (grease, oil, wax, binders, etc.), the hydrophobic center of the micelle or surfactant quickly bonds via homologous attraction to the hydrophobic hydrocarbon site, locking it into a colloidal suspension, pulling the hydrocarbon into the micelle and lifting the hydrophobic hydrocarbon molecule from its original surface. This emulsification process easily penetrates highly

viscous, dirty and/or sticky materials, lifting them off. Unregistered surfactants are used in pesticide poison formulations, but we have found they work better alone, but then they become “unregistered pesticides”. Because the exoskeletal structures, wax and joints of insects are basically all comprised of hydrocarbon molecules, insects, gnats, mosquitoes, flies, etc. may avoid surfaces upon which diluted surfactants or (colloidal) micelles have been sprayed for two days or more. When sprayed directly with surfactants, (which cause the micellation) insects, mites, mold, bacteria, etc. will all die quickly because of the lifting of hydrocarbon molecules (they literally are dismantled)! Surfactants are considered to be biodegradable and basically innocuous to people and pets, but will often kill fleas, lice, spiders, ticks and other pests while washing or upon contact. If ingested, they may cause diarrhea primarily due to the emulsification of grease and oil in the digestive tract. A detergent builder can simply be the second surfactant. **Some natural surfactants** are castile soap, yucca extract, soapwort and quillaja bark extract. The Author has found that blending simple surfactants can kill insects and arachnids faster and more safely and effectively than any synthetic pesticide ever could and the insects and arachnids can not become resistant. One of the Author’s earlier formulas in 1997 was a cleaner that used 2.5% SLS, .5% Polysorbate 80 (polyoxyethylene sorbitan monooleate), 5% glycerin, 2% PEG, 1% peppermint oil, 2% sodium borate and 1% protease. It was incredible and safe. Even greatly diluted this formula not only outcleans, but this basic formula is very economical and easy to produce. Safe Solutions sells this formula as a basic cleaner. The use of various surfactant combinations, especially with variations of the Author’s many pestisafes®, will undoubtedly be the pest control products of the future. If you need permission or help, call the Author — S.L.T.

Surgery - Cut off all diseased and infested limbs and burn them. Remove the nest (eggs) and you remove the pest.

Syrup - Use or put 1/2” of syrup into an (uncapped) old syrup bottle wherever you see “sweet” ants; when they get into the syrup they can’t get out. When you no longer see any ants, cap the bottle and throw it away.

Swags - Gather herbs such as pennyroyal, tansy, wormwood, peppermint, scented geraniums, tomatoes, southernwood, yarrow, lavender, and sage and arrange them in a swag secured with rubber bands - add a few stems of cocks comb for color, wrap with ribbon to cover the rubber bands and hang upside down in your closet - your clothes, blankets, and towels will smell great and the bugs will stay away.

Swallows - will “swallow” massive amounts of flying insects each day.

Sweet Basil - Plant *Ocymum basilicum* in vegetable or flower gardens or chop and scatter the leaves to repel aphids, mosquitoes and mites. Sweet basil also acts as a fungisafe and slows the growth of milkweed bugs. Plant basil in a pot by a door to keep flies away. Basil will relieve the pain of insect stings and may be added to insect repellent preparations. **See Basil.**

Sweet Basil and Clove - will help repel flies.

Sweet Peppers - The juice of sweet peppers will protect several plants from several viruses; while the juices of sweet peppers and other succulent plants do not kill the viruses, they change the plants so they are not susceptible.

Sweet Flag, Calamus (*Acorus calamus*) - The alkaloid root works as contact poison to insects and is used in mothproofing, even though it is edible for humans. It grows commonly in swamps and along brooks.

Synergism - Harmless levels of chemicals can become extremely toxic together.

Synthetic Pesticide Poisons - “A worm in a jar of horseradish thinks its life is the sweetest of all,” Jewish Proverb. It is time to crawl out of the jar and experience other “flavors”; don’t be a shmendrik (fool) or a lemming...try all of the Pestisafes® or the other Intelligent Pest Management® alternatives **first!** The application of volatile, synthetic pesticide poisons is the most common, useless and dangerous pest control method routinely used in and around buildings, enclosed areas and vehicles. Pesticide poisons are used in a futile attempt to provide chemical *barriers* to prevent insects from getting in. **Synthetic poisons simply do not work.** Most people believe that if something is for sale - it is “safe”. Pesticide poisons are also routinely used to *treat* soil, wood, fabrics and other items in a vain attempt to prevent pest damage. The Author has proved over 90% of their use is “preventative” and need never be applied. **Even when applied according to the label, synthetic**

pesticides have never controlled or eliminated all of the pests. The Best Control II® is better, safer and more permanently done by caulking and screening and the use of IPM techniques. If you must use a (least-toxic) poison, use only boric acid, IGR's, sodium borate, silica gels, insecticidal soaps, diatomaceous earth, neem sprays, and pyrethrin aerosols, but **DO NOT USE** any (even least toxic) synthetic pesticide poison until **every** safer alternative has been attempted. **The pest control "industry" has historically considered all volatile, synthetic pesticide poisons as the only real control tool they have available in spite of the fact they have never really controlled any pests inside or outside using these volatile poisons.** We now lose more of our crops to insects than we did before pesticide poisons were used, only now we, the animals and earth are contaminated. Historically the *regulatory* people have only been concerned if *enough* poison was applied... never if the toxins contaminated, or the poisons were misapplied or misused. We do not recommend their use except in rare circumstances and then **only when all parties know all of the facts, dangers, risks and agree in writing. If you must use any pesticide poison, first carefully: choose the proper product, read labels carefully before you buy and then use only as directed, and buy only what poison you need rather than discard the chemicals.** Store poisons in their original containers with the labels intact and legible. If stored properly, most pest control poisons will be effective the following season, so you don't need to throw leftover poisons away. **Tighten lids on liquid containers.** Paper bags and boxes containing dust, granules or wettable powders should be closed and resealed with tape. Dry products can also be stored, container and all, in a clean, sealable plastic bag. **Lock pesticide poisons in a cabinet or storage room.** This area should be separate from food supplies and protected from freezing temperatures or extreme heat. **Dispose of pesticide poisons with damaged containers. Never save empty containers. Check to see if your area has an authorized method of pesticide disposal. Do not put empty containers in an outdoor trash receptacle.** Make sure animals and kids cannot get at these toxic containers. **Carefully triple rinse, mutilate, puncture, and crush all containers and dispose of rinsate and containers properly. Wrap glass containers in newspaper before discarding. Do not burn any containers. We do not use these volatile toxins and we do not recommend their use! Synthetic pesticide poisons are also deliberate components of some clothing, shampoos, drugs, paints, wallpaper, shower curtains, rugs, blankets and mattresses - so even if someone is not routinely spraying your area - you still may be routinely poisoned.** True IPM or Intelligent Pest Management® should also attempt to remove all of these risks. **Never use any volatile poisons!**

Syrphid Flies - a/k/a hover flies for their ability to hover in flight, are common predators of aphids and other soft bodied insects. Adults are usually bee mimics. Three of the more common species are *Syrphus rectus* (Osten Sacken), *Allograpta obliqua* (Say) and *Eupeodes* (formerly *Metasyrphus*) *americanus* (Weidemann). *A. obliqua* may complete development from egg to adult in less than 21 days. Various stages overwinter, depending on species, giving rise to adults in spring. Adults feed on pollen, nectar and aphid honeydew. Females must feed on pollen for proper egg maturation. Females oviposit in the midst of aphid colonies, using honeydew as an ovipositional stimulant, and laying hundreds of eggs each. Eggs are often the first sign of aphid predators seen in the spring. Eggs are white, elliptical, and about 4/100 inch (1 mm) in length. There are three larval instars. Larvae are elongate, tapering gradually toward the head end. Larvae search for prey by casting the forward end from side to side; prey must be contacted directly to be detected. Larvae pierce aphids with their mouth hooks, sucking fluids from the bodies before moving to other prey. Each larva may consume hundreds of aphids during its development. Larval feeding success influences future fecundity. Third instar larvae have the greatest impact on aphid numbers. Larvae of some species are relatively plump. There may be 5 - 7 generations per year. Multivoltine species overwinter as adults, univoltine species as third instar larvae. These are among the most voracious of aphid predators.

Tachnid Flies - Females lay eggs on the bodies of the host insect or on plants to be ingested by the host. The larvae or maggots mature inside the host, feeding on and eventually killing it. They resemble houseflies, but usually are mottled rather than brightly colored. There are hundreds of tachnid fly species in North America that are terrific against caterpillars. They can be attracted by tansy, spearmint or dill plantings.

Tadpoles - and algae-eating fish and snails are very effective algae consumers.

Tagamet® - Add a little diluted Tagamet and some aspartame and/or acetaminophen to your baits to make them more effective killers.

Talcum Powder and/or Medicated Body Powders - Control and/or repel many pests when sprinkled around. Some people consider talcum powder to be carcinogenic and/or dangerous, but, given the opportunity to choose

using a little talcum powder that actually stops most ants and roaches (when power dusted) immediately or using diazinon or some other volatile poison that does not work as well, the Author would choose talcum powder - my answer is very simple when you consider the question in reverse would you prefer to dust baby's bottom with talcum powder or diazinon? Actually there are grades of talcum powder - some contain asbestos and are not safe - as far as I know baby powder does not contain asbestos. Rabbits do not like to eat talcum powder or hot pepper, so dust the leaves of susceptible plants like beans and dahlias. Talcum powder quickly dries out the insect and/or clogs the spiracles and, thereby, kills many insects. A light dusting of talc will stop pests, e.g., bed bug from climbing. Talc (non-asbestiform) does typically contain crystalline silica at levels greater than 0.1% but less than 1.0%. Silica has been determined to be a Class 2A carcinogen by IARC. **Repeated exposures can cause talcosis, a pulmonary fibrosis, which may lead to severe and permanent lung damage, possibly leading to disability and death, so use it with care.** The Author would also mention that talc is an ingredient in Tums Antacid/Calcium supplement. Talcum powder will repel/control fire ants and other insect pests and nuisance wildlife. Try to use corn starch as a replacement in vacuums; **always pick the safest alternative.**

Talk - to your plants and animals; tell them to grow big and tall; don't believe in the power of words? Praise some plants and curse and yell at some other and see the difference this "good care" attitude makes in your harvest.

Tanglefoot® - can be used to repel birds and to trap large insects and ants. <http://www.tanglefoot.com>

Tannic Acid Powder - will neutralize the allergens in dust mite and animal dander.

Tansy - *Tonacetum vulgare* is a perennial herb 2' - 3' tall. Tansy is an insect repellent and when used fresh or dry or as a mulch it may repel ants (and the aphids they carry), Colorado potato beetles, cutworms, Japanese beetles, cucumber beetles and squash bugs, but it will attract imported cabbage worms. Tansy has been used to flavor meats, salads, eggs, and pancakes. It helps digestion and has been used as a roundworm treatment. **Caution: Large quantities are harmful.**

Tape - Properly placed tapes can be used to trap. Place one piece of duct tape upside down (sticky-side up) and then put some on each edge to hold the sticky trap in place. The best tape is double-sided carpet tape.

Tea - As the second most commonly consumed beverage in the world after water, the antioxidants in tea called flavonoids, especially epicatechin, catechin and gallic acid, give tea many of its healthful properties, especially in helping prevent the formation of free radicals by inhibiting xanthine oxidase. It is this property of tea that "strongly associates" it with a decreased risk of chronic disease. Tea may also play a role in the digestive tract by inhibiting the growth of bad bacteria in the body.

Tea Tree (*Melaleuca alternifolia*) Oil - contains phenols and has antiseptic, anti-bacterial, anti-fungal, anti-inflammatory and insecticidal qualities. In Australia Captain James Cook found the Aborigines using a tea made of tea tree leaves for insect bites, cuts and wounds. The oil made from its leaves today is used to cure abrasions, cuts, warts, athlete's foot and cold sores. Tea tree oil will also treat poison ivy irritations.

It will immediately penetrate outer skin layers and mixes with body oils to treat ringworm, insect bites, cuts, burns, infections, bruises, boils, sprains, arthritis, yeast infections, fungi, eczema. You may want to dilute it with a carrier oil or shampoo since the pure essential oil can be very irritating, especially to sensitive areas. It is added to toothpaste to help fight plaque in dogs' teeth. Put a few drops of tea tree oil on a metal nit comb to remove head lice nits in the hair. Add 5 drops of the oil into your daily shampoo or conditioner to control lice and nits. **Caution: Some people and cats have a high sensitivity to the tea tree. Keep away from the eyes!**
Note: This oil has estrogenic and anti-androgenic properties.

Teach - The Author has learned that he can not teach anyone anything; he can only cause them to think. **See Think.**

Teflon® - The non-stick properties of Teflon® are now available in tapes or sprays to make effective crawling insect barriers.

Telephone - Don't be afraid to call for advice **before** you start.

Temperature - Increase or lower temperatures even 30° to 40° and you safely and quickly control many insect pests - change the temperature even more drastically and/or quickly and you can control virtually all pests. Unlike mammals, many cold-blooded organisms (insects included) are at the mercy of quickly changing temperature extremes. If climatic temperature increases occur over a developmental period of months or years - a given insect may gradually acquire the ability to survive, this is termed "acclimatization". If an insect can overcome gradual temperature stresses in days, hours, or even minutes this short-term adjustment is called "acclimation". **Insects quickly die if you quickly change their temperature.**

Tennis ball - Floor drains provide easy entry for a variety of filthy odors, crawling and/or flying pests - block the drains with a tennis (or hard rubber or plastic) ball - when the water is running, the ball will float and allow the water to drain - after draining the ball will settle back into position and seal the opening.

Test - Always test a new product, control technique, alternative medicine, food, supplement, pesticide, pestisafe®, etc. on a small area or in small amounts before you use it as directed.

Thai Lemongrass (*Cymbopogon citratus*) - This citronella is more effective than true citronella (*Cymbopogon nardus*) as an insect repellent.

Thatch Removal - helps create healthy soil that is more resistant to disease, insects, nematodes, molds, fungi and weeds.

The Best Control II® - is an ever changing Intelligent Pest Management® Manual - be sure you have the latest edition. If you have any suggestions, we can add them as we go along.

Thermal Death - It is quite easy to kill pests with heat, e.g., bed bugs die at 45° C. or 120° F. for after two hours.

Thieves Oil - Cinnamon, cinnamon bark, lemon oil and eucalyptus was used by thieves in the Middle Ages during the Black Plague who stole from the dead and did not get sick. If you diffuse thieves oil into the area for 72 hours, you can remove all stachybotrus mold spores and workers can breathe thieves oil as it is diffusing. And, best of all, the thieves oil will continue to kill mold for weeks after your treatment. Many fungus and bacteria are safely controlled using a combination of cinnamon oil, *citrus limon* (lemon) essential oil, rosemary, clove and eucalyptus oils. Lemon, rosemary and eucalyptus oils contain the essential oils D-limonene, cineol, beta-myrcene, Alpha-pinene, Beta-pinene and camphor. Cinnamaldehyde is a major compound in cinnamon essential oil. Eugenol is found both in cinnamon and clove oils. These essential oils have anti-bacterial, anti-viral, antiseptic and anti-catarthyal properties.

Think - before you act and before you accept tradition, authority and dogma or do any pest control. You have an unfair advantage (if you use it) over the pests; they can not think as well as you. But do not think to betray or destroy others or the environment for your own profit.

Thistle (and Nettle) - if left in your garden can be advantageous; the larvae of butterflies and moths will feed on them rather than your plants.

Thrips - Pest thrips eat plants; predacious thrips, e.g., six-spotted thrips, black hunter thrips and banded-wing thrips eat spider mite eggs and nymphs, other thrips, aphids and other insect eggs. They are virtually invisible to the naked eye.

Thundergod Vine (*Tripterygium wilfordii*) - is used as a garden insecticide in China. The powdered bark is mixed with liquid soap. Roots will kill codling moth.

Thyme (*Thymus vulgaris*) - Plant thyme or tomatoes with cabbage plantings to control flea beetles, cabbage worms, white butterflies and maggots. Thyme pastes have been used to control pubic lice. Thyme has also been useful to refresh the lungs as infused tea, a great insect repellent, an antiseptic, to relieve fevers, headaches and when blended with honey to heal sore throats and whooping cough. The ability of thyme to deter insects was well known to the ancient Greeks who used thyme as a fumigation tool. Blend it with lavender in a potpourris to control moths. The oil extracted from thyme contains thymol that has a pleasant odor and has a natural anti-septic action very similar to carbolic acid and/or iodine. Thyme is used in cooking. Mother of Thyme is a good

tonic and is beneficial for respiratory problems. Thyme will help heal chronic coughs; try drinking it as a tea.

Thymol and/or Eucalyptus - essential oils that can control tracheal mites that can and do kill honeybees. Thymol can be extracted from thyme and oregano. Thymol can reduce pathogens, e.g., coliform bacteria and e. coli and odor-causing, volatile fatty acids.

Tick Removal Kits - If you live in tick infested areas, you need to buy a tick removal tool. There is a comparison in the Tick chapter.

Tide Soap® - can be used to repel or to control ants and other insects.

Tiger Beetles - Over 100 species in North America; they prey on ants, aphids, small beetles, caterpillars, grasshoppers and other insects. They are about ½" - ¾" long in various colors and are extremely fast runners.

Tile Softener - See hot air.

Till - You can control some weeds by tilling, but not comfrey, mint, Jerusalem artichokes, quackgrass and tansy. Tilling these plants will break these plants and their roots and rhizomes into tiny pieces that can and do create more and more pest weeds. **See No Till.**

Tillage - Better tillage will prevent soil erosion.

Time - The correct timing of control activities is vital to preserve the natural balance between each pest and its beneficial controls. Timing is truly everything.

Timed Planting - Insects and other pest problems appear about the same time every year; by planting to avoid the heaviest feeding stages you can protect your plants. Knowing when to plant, treat, fertilize or harvest is the difference between success and failure.

Timing - It truly is all in the timing. The insects' larval stage is the most damaging and most vulnerable because most larvae are slow and typically soft-skinned. You need to know when to act to be successful.

Tin Foil or Aluminum Foil - A sheet of foil can be covered with a thin layer of jam and/or peanut butter; then another sheet of foil making a "sandwich"; when cut into 1" squares and properly placed, mice will die when they eat the metal (they also die if they eat steel wool). **Use with great caution. See also aluminum foil.**

Tires - are not supposed to be buried in a landfill - so millions of tires are "stored" in piles all over the U. S. - where they become mosquito and rat breeding sites. Occasionally the tires catch on fire and create tremendous pollution problems - grind them up and use them for mulch to prevent weeds, earwigs and other miscellaneous pests and thereby solve several problems at once.

Toads - One toad will eat 10,000 to 20,000 slugs, flies, cutworms, grasshoppers, grubs, and other pest insects in a season. "Our" use of pesticides and chemical fertilizers has virtually eliminated all of the toads and frogs. Toads can be kept as pets and can distinguish who is who between two people.

Tobacco - In 1690, tobacco extracts were first noted to be contact insecticides. In 1884, tobacco was described as one of the 3 most valuable insecticides in use - the other two being white hellebore (*Veratrum album*) and soap. **Caution: Nicotine is a deadly poison and soap is still an "unregistered" pesticide.**

Tobacco Dust - This dust is used for making a "natural" pesticide. Mix 1/8 oz. of tobacco dust with one tablespoon of black pepper and one teaspoon of liquid dishwashing detergent. Simply apply as you would a chemical pesticide. This dust is also very effective sprinkled around the base of plants. **Remember, however, that nicotine is a deadly poison to people and pets.**

Tolerance - Learn to tolerate a few pest species. Some plants have learned that rather than repelling pest species, they survive and produce a crop simply by regenerating tissue fast enough to remain healthy. Surviving plants also learn to fight off an insect or pathogen naturally. Literally surviving plants can become immune or resistant to pest problems. **See Spiders.**

Tomato Leaves - Blend 8 c. tomato leaves and 8 c. water to kill aphids and/or repel other pests, **but, remember, tomato leaves are also toxic to people and pets.** You can also finely chop tomato leaves (about 10 - 12) and 1 medium onion and ½ c. rubbing alcohol; combine and steep overnight in a sealed jar. Use cotton swabs to apply and control black spot fungal disease on roses. (Treat both sides of the leaves.) Good air circulation keeps black spot spores from taking hold. **Remember, alcohol can kill plants!**

Tomato Plants - repel asparagus beetle, cabbage maggot and flea beetle. Many pests avoid tomatoes, so using tomatoes in your formula often makes pest move off.

Toothbrush - Dampen a soft toothbrush (or soapless facial cleansing sponge) in a solution of 3 T. denatured alcohol in 1 qt. water and gently scrub away scale insects. Repeat as needed.

Torch - Tent caterpillars and other pests can be controlled by burning with a torch, but be careful!

Towels - Wrap a small towel over the steam head; this produces vapor so hot that the steam head can be moved more quickly and effectively than simply using a steamer alone. Lethal temperatures, e.g., to bed bugs, can be achieved several inches from the steam head.

Traditional Herbal Medicine (THM) - teaches us how to discover and use environmentally friendly pest and health management practices. THM emphasizes strengthening the host rather than poisoning the pathogen.

Training - Proper training in recognizing the pest, the conditions conducive and the pest's inherent weakness(es) will allow you to devise the proper control(s).

Trap Crop Systems - Just one more IPM alternative technique to safe and naturally control pest problems. Trap crop or intercropping systems naturally lessen the density of pest infestations and provide ideal cover for parasitoids. They should be planted earlier than the crop you are trying to protect; pests generally choose larger plants over smaller plants.

Trapping - Besides their benefits as monitoring devices, traps and glue boards are used to kill pests or to catch pests so they can be removed from an area. Many types of vertebrate and invertebrate pests can be controlled through trapping. Traps and glue boards do not require the use of potentially hazardous synthetic pesticide poisons, and the user can easily view the success of the trapping program. Successful trapping programs require skill, time and attention to develop workable techniques. Trapping techniques that are successful in one situation may not always work as well under different conditions or at other locations. **Traps include: buckets, carbon dioxide traps, snap traps, live animal traps, cans, 5-gallon pails, liquid traps, 3# coffee cans, 2-liter pop bottles, milk jugs, garbage cans, 55-gallon drums, pheromone traps and light traps.** You can make your own can/jar cockroach/spider traps easier to climb into by covering the outside with masking tape or an old darkly colored (red) man's sock. Make your own with Scotch 77 or another sticky, non-drying glue. or duct tape.

Traps - You can buy them and/or make your own to safely remove birds, bats, insects and wildlife. You can use traps to monitor and inspect; traps come in an infinite assortment of styles and sizes. They can come with or can be made with attractants, e.g., lights, odors, pheromones, food, colors, etc.

Traps - Tanglefoot, sticky yellow or white boards, duct tape, etc.

Advantages: No residues, non-toxic to mammals, wildlife or beneficials.

Disadvantages: Can trap both pests and beneficials; some traps are expensive; must be maintained, cleaned and recoated periodically; effectiveness varies.

Tree of Heaven - *Ailanthus altissima* produces a natural herbicide in its roots; it will kill everything but its own seedlings which are immune. An editor's note in an 1895 issue of Gardeners Chronicle noted: The bark "is intensely bitter and is used in dysentery and as a vermifuge. It would in all probability be as good an insecticide as quassia."

Trichogrammatid Wasps - These tiny (1/50") stout-bodied wasps are parasites of the eggs of over 200 species of insects. Some also are of value in controlling some insect pests. Four or five wasps can sit on the head of a pin.

True Lavender (Lavandula) - A beautiful, aromatic perennial that is hardy to zone 5 and can be raised in tubs

in colder climates. The most fragrant lavender. Beautiful lavender flowers on long stems and narrow green leaves. Sow in fall or spring. When planted in the garden, it will deter pests with its fragrance. When dried and placed in closets and drawers with clothes, it will deter moths and lend its wonderful fragrance to the clothes.

Truth - When an honest man is confronted with the truth, he will either accept it or cease to be honest.

Tumeric - is an extract found in the bright yellow curry spice. This golden spice, a cousin of ginger, which gives the zing and color to mustard and curry, long has held a place of honor among Ayurvedic gmod, , who consider it a cleansing herb for the whole body. Turmeric has been used as a digestive aid, and to treat fever and/or reduce swelling, infections, inflammations, dysentery, psoriasis, arthritis and jaundice. New studies suggest that it also may help to reduce cholesterol, prevent blood clots, fight cancer, improve heart health, ease pain and swelling. Tests by a team at the Cork Center Research Centre show turmeric can destroy gutt cancer cells in the lab within 24 hours. In the medical journal Blood, researchers noted in September 2002 that the active ingredient in turmeric (called curcumin), when added to cancer cells, suppressed most of them and stopped others from spreading. It works like expensive miracle aspirins (COX-2 inhibitors) only it is cheaper and, the Author believes, safer. Tumeric scavenges cancer-causing cells in the body and studies show it slows the progression of Alzheimer's.

Known as **HALDI** in HINDI, *jiang huang* in Chinese, *manjal* in Tamil (and just plain "yuk" as the yellow stain on a white T-shirt from the splatting of ballpark mustard), turmeric has a medicinal history that dates back 5,000 years. At that time it was a key medicament for wound healing, blood cleansing and stomach ailments in India's Ayurvedic system of medicine.

The first record in PubMed of research on the biological activity of curcumin dates back to 1970, when a group of Indian researchers reported the effects of the compound on cholesterol levels in rats. The pace of studies picked up in the 1990s; one of the leaders was Bharat Aggarwal, a former scientist at Genentech who, before turning to curcumin, had taken another approach to seeking cancer treatments. That work led him circuitously to the compound.

In the 1980s Aggarwal and his team at Genentech were the first to purify two important immune molecules—tumor necrosis factor (TNF) alpha and beta—that have been identified as potential -anticancer compounds. These molecules can, in fact, kill cancer cells when deployed in localized areas, but when circulated widely in the bloodstream, they take on different properties, acting as potent tumor promoters. The TNFs activate an important protein, nuclear factor kappa B (NF kappa B), which can then turn on a host of genes involved in inflammation and cell proliferation.

Gary Stix describes the biologically active components of turmeric—curcumin and related compounds called curcuminoids—as having antioxidant, anti-inflammatory, antiviral, antibacterial and antifungal properties, with potential activity against cancer, diabetes, arthritis, Alzheimer's disease and other chronic maladies. And in 2005 nearly 300 scientific and technical papers referenced curcumin in the National Library of Medicine's PubMed database, compared with about 100 just five years earlier.

Tung-oil Tree (*Aleurites fordii*) - Tung-oil soap is somewhat toxic to sugarcane woolly aphids. Oil is sprayed to control boll weevils.

Turkey Mullein (*Eremocarpus setigerus*) - was used by American Indians as a fish poison; it is toxic to cross-striped cabbageworms.

Turpentine - Rags soaked in turpentine and laid in small trenches along vegetable rows tend to dampen the Japanese beetle's urge to reproduce. Turpentine will kill insects, **but can burn plants and sensitive areas of the skin, e.g., testicles; it contains phenols so keep cats away.**

Two-Liter Plastic Bottle, 1 string, 1 banana peel, 1 cup sugar, 1 cup strong vinegar - Slice banana peel into strips and insert them into the plastic bottle. In a separate container, combine sugar and vinegar. Pour this mixture into the bottle, then fill it to within two inches of the neck with water. Tie the string around the neck of the bottle, then tie other end around the lower branches of a tree. Fruit and black flies, yellow jackets, and other insects find the fermenting banana, sugar, and vinegar more attractive than the fruit on the tree. Once they fly

in, they get caught in the sticky mixture and drown. **This reportedly works so well that it can make spraying fruit trees unnecessary.** You can also make a “funnel” wasp or yellowjacket trap out of a 2-liter bottle. **See Chapter 21.**

Tylenol PM - Acetaminophen has a warning that adults take no more than 4000 milligrams a day (8 extra-strength pills) and doubling that maximum daily dose for human adults can be enough to kill. What would happen to a small rodent?

Ultraviolet Light - will kill mold, germs, bacteria, viruses and the eggs of dust mites, lice and fleas.

Urea - Either straight urea, straight calcium nitrate or straight ammonia or a combination of the above with or without enzyme cleaners and water will give you excellent non-selective herbicidal action - try several combinations, e.g., 2/3 cup ammonia, 2/3 cup enzyme cleaner concentrate and/or 2/3 cup urea and/or 2/3 cup calcium nitrate or 2 cups muriate of potash in 1 quart of water. Sometimes the stronger you make the solution, the better the control, but try several combinations with or without peppermint soap, salt, alcohol and/or vegetable oil. Urea is not allowed on organic farms, and is found in many preformed enzyme cleaners, but not in Safe Solutions Tweetmint Enzyme Cleaner.

Urine - A little of your urine on a cloth has antibodies that can neutralize an insect's venom. Coyote, mountain lion, fox, wolf, tiger and even meat-eating human urine will also repel many herbivore mammals and reportedly kills plants, insects and fire ant colonies. Well-used kitty litter will repel squirrels and other small mammals and geese.

Be careful and considerate.

Vacuums - Vacuums quickly remove insects, spiders, food, debris, eggs, body parts, etc. - if you are vacuuming up live insects or pests, be sure to put a little talcum powder, corn starch or salt in your bag first - **use a HEPA filter and a red light at night to get nocturnal pests, e.g., roaches.** Use a dusting brush to vacuum up spider mites on the underside of leaves or whiteflies both from the air and on household plants. Large vacuums can be used to suck boll weevils, leafworms, hoppers and other pests from off plants and into sacks. Put soapy water in wet vacs.

Valerian Root - will put rats and other pests asleep so you can move them.

Vapor Dragon® - The Vapor Dragon superheats distilled or tap water to about 240° F. and dispenses it as a fine mist which dislodges dirt and cleans and sanitizes targeted areas. The mist or steam quickly kills dust mites, spiders, ticks, fleas, roaches, ants and other insects, mold, fungus and viral contaminations that can cause allergies, colds, flus and infections. This little unit kills bugs and sanitizes as it cleans without any dangerous chemicals and/or poisons. Robby Vapor Systems, Inc. at 1-800-888-8711, <http://www.robbyvapor.com>. There were two sizes of commercial units: Robby VS3000 Vapor Cleaning System and Robby Jr. Use any steam machine that is available.

Vaseline® Petroleum Jelly - can be used to trap insects and/or suffocate ear mites in pests and can also be used to create ant, roach and other insect barriers. Lightly smear Vaseline on all exposed areas of your skin to keep off black flies and mosquitoes.

Vegetable Oil - Cover water surfaces with vegetable oil to smother developing mosquito larvae. If you want a non-toxic wood preservative, use vegetable oil. After setting a wooden fence post in the ground, start slightly above ground level and drill a hole downwards at 45° into the wood for 2" - 3". Fill the hole with vegetable oil and close it with a cork or caulk. If the post is very thick, drill a second hole from the opposite side. To use as a spray for insects: combine 1 tablespoon of dishwashing liquid with 1 cup of vegetable oil. Add 1 to 2½ teaspoons of the oil/detergent mix to 1 cup of water and spray on infested plants once every seven days. A thorough spray of vegetable or light horticultural oil coats plant surfaces, acts as a barrier to infection. Vegetable oil seems to help prevent fungal rusts and mildews. Some water plant growers use corn oil as an insecticide in order to protect their fish populations. Canola oil can be used as an insecticide. Castor oil can be used to repel moles. Neem oil is an excellent insecticide and disease control agent. Essential oils repel pests and can be used as “herbisafes” as they kill plants when sprayed at greater than an 1½% dilution.

Ventilation - Moisture reduction by proper (basement, crawl and attic) ventilation, vents, air conditioners, fans

and/or dehumidifiers, plumbing and rain gutter repairs, roofing etc. is a primary factor in controlling most structural insects and fungal problems. Excessive moisture attracts or creates conditions favorable to many fungus and mold problems, insects, spiders and other arthropods. Most arthropods are very sensitive to moisture loss and carefully avoid (overly) dry conditions as are fungus, mold and mildew. Create dry conditions and you control **many** pest problems.

Vertebrate Predators - include chickens, bats, birds, snakes, small mammals, lizards, amphibians and fish that can be used for biological control of mosquitoes, scorpions, insects, weeds and other pests.

Vetiver Oil - Vetiver grass (*Vetiveria zizanioides*) has long been known for its pest control properties. One of the compounds in the oil is called nootkatone and can be used to repel termites.

Vicks VapoRub® - will repel many insects and ticks and removes fungus on fingernails and toenails.

Vinegar - Apple or rice vinegar is derived from apples or rice respectively. White vinegar is acetic acid. Apple cider vinegar will control appetite and maintain well being. It helps lower cholesterol and improves metabolism. It helps boost the immune system. Spray weeds and pest plants with 10% vinegar (or straight ammonia as a "kicker" or add a shot of dish soap, salt and rubbing alcohol), pull them out, sear them with fire, properly mow, properly fertilize, etc. White vinegar will also kill ants. Vinegar attracts wasps, fungus gnats and fruit flies - put 2" in a long necked bottle - add a few drops of liquid soap or Safe Solutions Tweetmint enzyme cleaner - and they will crawl in and won't be able to crawl out. To deodorize concrete, scrub with enzyme cleaners or a solution of half white vinegar and water or undiluted denatured alcohol as needed. Vinegar is an acid that can be used to soothe the alkaline sting of a wasp or a flea bite. Mix 3 parts vinegar (10% acidity) with 1 part dishwashing soap and spray weeds to kill them. White vinegar sprays repel cats and will control heavy dandruff and remove sweat stains. See White Vinegar, Baking Soda and Dog Spray.

The Use of Vinegar and Hydrogen Peroxide to Disinfect - Now, you can safely disinfect your home and food - without exposing your family to toxic synthetic chemicals. You can make your own inexpensive sprays that actually work better disinfecting than any commercial synthetic disinfectant. All you have to purchase from the drug store is some (fresh) three percent hydrogen peroxide and some plain (5%) white or apple cider vinegar from the grocery store. Put them full strength in their own clean spray bottles.

If you want to safely disinfect vegetables or fruit, just spray or thoroughly mist them with the vinegar and then the hydrogen peroxide (or the hydrogen peroxide and then the vinegar) , and then rinse them off under running water. Using first one spray and then the other, you can also safely and effectively disinfect food preparation surfaces and other washable surfaces and materials. You won't cause stains on most surfaces, nor will you have any lingering taste of vinegar or hydrogen peroxide on your food, and you will not harm you or your family or the environment.

From Our Toxic Times, May 2001: Heinz Company spokesperson Michael Mullen references numerous studies to show that a straight 5% solution of vinegar—such as you buy in the supermarket—kills 99% of bacteria, 82% of mold and 80% of germs (viruses). He noted that Heinz can't claim on its packaging that vinegar is a disinfectant since the Company has not registered it as a pesticide with the Environmental Protection Agency (EPA). In tests run at Virginia Polytechnic Institute and State University, pairing the two mists killed virtually all Salmonella, Shigella, or E.coli bacteria on heavily contaminated food and surfaces when used in this fashion, making this spray combination more effective at killing these potentially lethal bacteria than chlorine bleach or any commercially available kitchen cleaner.

The best results came from using one mist right after the other - it is 10 times more effective than using either spray by itself and more effective than mixing the vinegar and hydrogen peroxide in one sprayer. **See Chapter 41.**

Visual Aids - There are scare balloons, holographic balloons, flash tapes, whirligigs, plastic owls, holographic tape, aluminum foil and plates, etc. all available to help repel pests from your area and drive them to your neighbor's.

Vitamin C - Having more vitamin C in your blood plasma reduces your risk of stomach cancer. A natural extract of citrus, e.g., oranges, tangerines and/or grapefruit, which contains a minimum of 0.75% vitamin C (ascorbic acid, citric acid, sugars and other natural compounds) when sprayed on living plants has a tonic effect. The colors of

petals of flowers are more intense and leaves are greener. Reduces the stress plants might have. It also acts as an organic fungicide, bactericide and viricide. Improves the plant. Vitamin C causes the rupture of the cellular membranes of various insects, fungi, virus and bacteria. Vitamin C is non-mutagenic and non-carcinogenic and helps the plant and/or fruit naturally control fungal, viral and bacterial attacks. It greatly extends the shelf life of fruits, flowers and/or vegetables when they are sprayed or dipped into a mild dilution in non-chlorinated water. It helps control the pathogenic microbiological charge of such organisms as E-coli and salmonella. Citric acid is a great defoamer and glue remover. When eaten vitamin C literally suffocates insects. **See Chapter 41**

Vitamin D - When mice or moles ingest this in a bait, calcium leaves their bones and enters their blood streams and kills them in 2 - 3 days. Wash your hands when the baiting is completed. The Associated Press has reported that An abundance of vitamin D seems to help prevent multiple sclerosis, according to a study in more than 7 million people that offers some of the strongest evidence yet of the power of the “sunshine vitamin” against MS. Other studies havev linked high levels of vitamin D in the blood to lower risks of many cancers. **See Chapter 41**

Vitamin E - People who have vitamin E in their bodies live longer, according to a 19-year study of 29,092 men. National Cancer Institute researchers concluded that “Higher circulating concentrations of alpha-tocopherol (vitamin E) within the normal range are associated with significantly lower total and cause-specific mortality in older male smokers.” Vitamin E was found to reduce death from all causes, including cancer and cardiovascular disease. **See Chapter 41.**

Vitamins - See Herbal Remedies and Chapter 41.

Vulgarone B - is enriched by steam distillation of the oil of a variety of *Artemisia douglasiana*, a member of the sunflower family. Vulgarone B has shown to be effective against plant pathogenic fungi and snails, e.g., golden apple and ram’s horn snails. It can be used as a bait, a spray or placed directly into the water. Vulgarone B is nontoxic to most plants. It has not yet been tested on mammals. Note: The ram’s horn snail is an intermediate host of *Bolbophorus confusus*, a parasitic flatworm that kills smaller fish and reduces the growth of those fish who survive.

Walk-the-Plank® - Fill a bucket (or garbage can) 2/3s with water; float oats or sunflower seeds, or the preferred bait of the rodent you want to control, on top of the water (1” to 2” thick) and put a ramp from the ground to the tip of the bucket (or garbage can) and your pests will simply drown themselves. The Author has used this trap without water to live trap mice in a day care establishment.

Walnut Shells - A dozen or so walnut shells (or stones) painted bright red and scattered (round side up) through strawberry fields will teach most birds to stay away from “your strawberries”.

Wasabi - when eaten with sushi - kills bacteria and parasites that may be present in the food. As of this writing, the Author has yet to field test this Pestisafe® on the various pest insects.

Washing Machine - not only will clean your clothes but will remove odors and pests that are attached to your clothes.

Washing Soda (sodium carbonate) - Is a slightly caustic cleanser that kills insects, removes smoke, grease, soot and odors. It can be used instead of a laundry detergent and it softens hard water. At ½ cup per gallon, it will peel wax off floors, so spot test and wear gloves when you use this product.

Water - Everything you use has an inherent risk. People have drunk so much water they have literally drowned. Spraying water quickly washes away many insect and mite pests and also can be used to repel animals and/or birds. City water (with chlorine) quickly kills many insects. There is a motion activated sprayer that senses animals the way security lights detect people; movement and heat. When an animal is seen a valve opens and releases a 3-second pulsating spray of water - the sudden noise, movement and water blast frightens animals and birds away. One unit is called the Scarecrow®, and it is hooked up to a garden hose and 2 nine volt batteries (which give you up to 10,000 “activations”) and covers up to 1000 square feet. (An area 35 feet deep and 45 feet wide, with a 100 degree sensor detection zone.) Control the water or moisture and you basically control all indoor pests, including most wood destroying organisms. Plain old tap water can also be used to spray away aphids, spiders, mud daubers, etc. and clean and /or drown pests. Water can be used to attract pests like roaches, ants,

rodents, scorpions, etc. to your baits. Add sucrose and you have a double attractant. Heat the water to boiling to kill ants, etc. Heat the water to steam and you can kill weeds, dust mites, roaches, ticks, fleas, etc. Add salt and you can permanently control termites, fleas, etc. Add peppermint oil and soap and you can clean and/or kill most pests faster, safer and cheaper than dangerous pesticide poisons. Add negative ions or aspartame and you attract and kill many insects including termites. Add enzyme cleaner and you have created the perfect Pestisafe®. You can add water to traps to make them lethal. Proper irrigation controls crabgrass. Water can be used in many ways to control many pests. Many things can be added to water to make it work better in cleaning and/or controlling pests, e.g., spreaders, sticklers, surfactants, wetting agents, etc. Water can give or take life - put a seed in boiling water, plant it in fertile soil next to an unboiled (raw) seed, water both and see which one grows. By the year 2050 cities will use half of the world's water if we do not protect it now; we could starve.

Water reflecting from a bowl in a doorway safely directs birds out of a building. Rabbits in the garden: Fill a few jars half-full of water and set them around the plants. Most rabbits will stay away. Ducks or geese taking over: Float a plastic alligator or two in the water, tethered to fish lines anchored so the alligator(s) blow around the surface. Set out blue and yellow buckets of soapy water to attract Japanese beetles by the hundreds and they enter and drown.

Water Guns - can be used to drive cats and some dogs from your yard. The bigger the better. **See Super Soaker.**

Water Lilies - are not only extremely decorative plants; they can be used to absorb great quantities of heavy, poisonous metals, e.g., cadmium, through their leaves and roots.

Water properly - Plants suffering from an excess or lack of water will be less vigorous and more susceptible to diseases and pests. Consider using some form of drip irrigation, which keeps foliage dry and helps prevent foliage diseases, in addition to using water more efficiently. **Too much water causes root rot.**

Water Repellent - A simple water repellent is made from 10% - 20% varnish, 1% - 3% paraffin wax and the rest mineral spirits.

Water Restoration - Get Set, Inc., Safe Solutions, Inc. bacteria and/or enzymes and Clean-Flo products can and have been used to restore water, remove weeds, increase fish production and remove muck.

Watermelon - aids prostate health. Watermelon contains 40% more of the active cancer-fighting compound, lycopene, than do tomatoes.

Wax - Wax with hot pepper extracts, e.g., capsaicin and mineral oil, will repel animals after they take one bite. Wax can be used to create water-proof rodent baits. Bees wax can be used as a pruning agent. Paraffin oil is used as an insecticide and acaricide.

WD-40® - will kill many insects and plants and it will remove sticker adhesive. **Be careful!**

Weakness - Everything has a weakness; find it, exploit it and you have control.

Weather Stripping - will not only conserve energy, but will also help prevent pest invasions.

Weed Free Formula - This mix will treat 5000 square feet of lawn: 2 c. fish emulsion, 2 c. seaweed extract, 5 gals. water. Spray on the lawn to increase grass plants and to help them survive drought. Try composted chicken manure. If you heal the earth, you will have super plants/grass that will crowd out the weeds.

Weed Killers - Need something safe to kill dandelions, etc.? Use 1 gallon of white vinegar, 2 cups of salt and a dash of dish soap; put it in a spray bottle and apply to the leaves and the center of the plant. Repeat the process for a few days as needed. You can also use straight vinegar or bleach. Boiling water is inexpensive and almost 100% effective, but be careful! Early in the spring spraying ammonia or straight liquid urea is often effective. Later use 1 cup of borax per gallon of hot water or a propane torch and be careful.

Weeds - Find several varieties that are not being bothered by the particular pest you wish to control. Run their leaves through a grinder, juicer or blender, saving the liquid and adding an equal amount of water. Spray or

sprinkle this mix on the plants you wish to protect. Whatever organic material that was protected the weeds from pest attack will now keep your plants safe. Weeds are invaluable indicators of soil conditions. You can eat mustard greens, young dandelion greens, violets, purslane, chickweed and lamb's quarters.

Well-used Kitty Litter - will drive away moles and woodchucks when poured down their tunnel entrances or tunnels. Geese can also be repelled with a liquid derived from well-used kitty litter.

Wheat Flour and Buttermilk - 300 pounds of flour and 1.5 gallons of buttermilk will control 1 acre of spider mites in an orchard or grove by immobilizing the spider mites on leaf surfaces where they explode. **White** - The color white attracts flies and many other insects to your bait or trap.

White - The color white attracts flies and many other insects to your bait or trap.

White Alyssum (*Lobalaria maritima*) - Strips of these flowers in fields of lettuce and other vegetables provide habitat for syrphid flies and other beneficial insects.

White Distilled Vinegar (5%) - Spray to control ants and add a teaspoon of coconut oil to help remove spider webs. Use it straight to control "weeds" or in a cup to control fruit flies. Vinegar acts as a scent fence to keep cats away. Cheap white vinegar is acetic acid and not from apple or rice. Cheap white vinegar is acetic acid and not from apples or rice. **See Vinegar.**

Whitewash (Lime in Water) - Brush on tree trunks from the base up 3 feet to repel insects and disease organisms. Reapply as needed. Barns were/are painted or sprayed with whitewash to control odors and pests. See Lime.

Wild Buffalo Gourd Roots - Mix and use as a 3% sodium borate bait/spray on corn leaves at a rate of 1 ounce (active ingredient) per acre to control (adult) corn root worms.

Wild Oregano is rich in a long list of minerals that includes calcium, magnesium, zinc, iron, potassium, copper, boron, and manganese. Vitamins C and A (beta carotene) and niacin also are contained in oregano. Oregano is one of Nature's preservatives. When oregano is used with foods such as meat, eggs, milk or salad, you greatly halt the growth of microbes and, thus, reduce the risk for food poisoning.

The key element in oregano is the oil which contains carvacrol and thymol as the primary components. All of this helps make oregano oil a significant factor in treating internal and external fungi including athletes foot. Skin conditions such as psoriasis and eczema can be improved with the treatment as well. Oil of oregano outright destroys all variety of fungi and yeasts, regardless of where they reside.

In addition to fighting various fungi, oil of oregano is useful against bacteria and parasites. Oil of oregano's antiseptic powers are immense; it inhibits the growth of the majority of bacteria, something that prescription antibiotics fail to accomplish." In the case of parasites, oil of oregano has had success neutralizing worms, amoebae and protozoans.

Additional uses for oregano and oil of oregano are unlimited. They have been found helpful in combating diarrhea, intestinal gas, and digestive problems, as well as sore throat and breathing difficulties. Oil of oregano can be immediate help against bee stings and many venomous bites until medical attention can be reached. Oil of oregano has even been suggested as a treatment for dandruff, diaper rash, and other skin disorders.

The benefits of oregano have gone largely unnoticed and underpublicized for far too long. Oregano is "one of the world's finest natural medicines, that is if it is true oregano." Many studies are discovering that oregano the "pizza herb", is a powerful antioxidant. The compound in oregano, rosmarinic acid, has antibacterial, anti-inflammatory, antioxidant and antiviral properties. Of all the plants in the mint family, oregano is the richest in antioxidants.

Oregano may help prevent the cell damage caused by free radicals--highly unstable oxygen molecules that steal electrons from other molecules they find. Free radical reactions are most likely involved in inflammation, degenerative arthritis and the aging process in general. Evidence is growing that antioxidants may help relieve osteoarthritis and rheumatism.

Oregano also contains four anti-asthmatic compounds; six compounds that are expectorants; seven that lower blood pressure; nineteen antibacterial compounds and up to 8.8 percent bactericidal compounds. Loaded with antiseptic compounds, oregano is useful in treating sinusitis; try a tea and inhale as you drink. Make a tea by using one to two teaspoons of dried oregano per cup of boiling water.

According to Heinerman's Encyclopedia of Fruits, Vegetables and Herbs, Oregano helps reduce fevers and relieve cramps, bronchitis, childhood diseases such as measles and mumps, and irregular menstruations. Make this tea: bring a pint of water to a boil. Remove from heat and add one teaspoon of Oregano. Stir well, cover and let steep for about half an hour. Strain and it can be refrigerated. Warming only slightly that amount to be consumed, one cup two to three times daily.

Willpower - The opposite of willpower is addiction.

Windex® - kills insects/arachnids quickly, but do a Google search on Windex and danger.

Winter Rye - Sow winter rye in the fall, using about 1 pound per 500 square feet. When the rye grows 3 feet tall, cut it off at the ground level and cover the rye grass with cardboard and then cover the cardboard with 1 inch of mulch. In several months the rye grass and cardboard should be composted enough to till and plant.

Wireworm Spray - Crush wireworms and add some water to make a bug-juice liquid. Strain and spray on affected crops.

Wireworm Traps - Cut fresh potatoes in half and cut out the eyes. Poke a stick into each piece of potato to use as a handle. Early in the season, bury the traps 4-6" deep in the garden or flower bed, before the seeds or tubers are planted, to attract wireworms. Every day, pull out the potatoes, using the sticks as handles, and shake off the wireworms into a bucket of soapy water. Reuse the same potato for a while, then replace with a new one. Use one trap for each square yard of soil.

Witch Hazel (*Hamamelis virginiana*) - will quickly reduce the pain from any insect bite.

Wolfsbane or Scorpion Plant (*Aconitum anthora*) - About 300 B.C.E. Theophrastus in Book 9 of his Enquiry into Plants noted this plant kills scorpions if it is shredded over them.

Wood Ashes - Sprinkle over bushes and plants - they are caustic and will dehydrate and/or suffocate aphids. Rinse off after a day. Make an application of wood ashes around the base of newly set plants to control maggots, red spiders, aphids and cutworms and to help repel rabbits and deer. A barrier a few inches deep will keep snails and slugs away. Put the ashes in a box where they will stay dry and poultry can flutter in the ashes to get rid of parasites. Ashes on ice will provide traction.

Wood Fern, Shield Fern (*Dryopteris felix-mas*) - The powdered rhizome is toxic to armyworms.

Wood Pallets - Remove them; they can be a source of wood destroying insects and a source of psocids when they become wet.

Woodpeckers - will eat codling moth larvae and other pests. Hang shiny strips of aluminum foil or aluminum pans where you want to repel woodpeckers.

Woods - Wherever there are woods there will always be a higher water table. Wood also provide birds and beneficial habitat

Wool - Loosely wadded sheep wool tied around a stem of a plant will keep leaf cutter ants from crossing over. Wool has also been used as a mulch. The natural lanolin in wool repels dust mites.

Work - Anothr four-letter word. Don't just talk the talk; you must walk the walk.

Wormseed; Jerusalem Tea (*Chenopodium ambrosioides*) - Some parts are toxic as extracts or dusts on several species of leaf-eating larvae.

Wormwood (*Artemisia absinthium*) (a/k/a absinthe, absinthium, green ginger and/or madderwort) - A hardy perennial, 3' - 5' with silver-gray, silky foliage and leafy spikes of small flowers. Hardy throughout the U. S. Easy to grow from seeds. Plants repel rabbits. Has many uses as food seasoning and medicinal plant and to control internal parasites. Fresh wormwood juice mixed with apple cider vinegar can be used to repel mosquitoes, flies and other biting insects. Wormwood sprigs will also repel moths and other insects. Powdered dust from the plant sprinkled on plants and the soil will deter many insects. Brewed into a tea, it is an effective insecticide that kills aphids and also kills snails and slugs, **but it is also dangerous to people and pets, so be careful.** The glandular hairs on wormwood leaves produce volatile oils and the inhibitor absinthin. Nicholas Culpepper, in this [English Physician and Complete Herbal](#) published in 1633, advised: "Mix a little wormwood in your ink and neither rats nor mice will touch the paper written with it." Wormwood contains a-thujone (a potent neurotoxin) that was the active ingredient in absinthe. Absinthe was a popular stimulant and hallucinogen banned during the 19th Century, **so be careful!**

Wrens - One little house wren can eat 500 insect eggs, grubs and beetles in one afternoon.

Yarrow (*Achillea millefolium*) - is an old wound herb and is a great insect repellent. Make a tea and splash all over the body or simply rub the flowers on your body to repel mosquitoes. **Do not use any product until you are sure you will not react, but never use yarrow if you are pregnant; it is said to tighten the uterus and to cause contractions.**

Yeast - Feeding yeast and various combinations of food attractants will kill some insect pests, e.g., ants.

Yellow - The color yellow attracts insects (especially sucking insects, e.g., aphids, grasshoppers, whiteflies, leafhoppers, etc.) to your trap, e.g., yellow bowls with soapy water or yellow cards or plastic strips with non-drying, water-resistant adhesive (e.g., Scotch or 3M Super 77) or honey or Vaseline® or Tanglefoot® on them.

Yellow Azalea (*Rhododendron molle*) - The dried and pulverized flowers work as contact and stomach poisons. Powdered flowers can also be sprayed to control certain species of lepidopterous larvae.

Yellow Paper - covered with honey or Tanglefoot® or other sticky material will attract and trap flies.

Yellow Wild Indigo - placed on halters or harnesses will keep horses free of flies.

Yellowjackets - love to feed on many pest species, including flies, maggots, cabbage worms, etc.

Zapper - One of the more interesting controls; looks like a small tennis racquet with wires rather than strings. It has several names and includes batteries in the handle; when you press the buttons to activate the metal grid, any flying insect you hit with the "zapper" literally explodes. **The Amazing Handheld Bug Zapper**
http://www.asseenontv.com/prod-pages/bug_zapper.html

Zeasorb® - contains talc, microporous cellulose which is patented, carbohydrate acrylic copolymer, chloroxylenol, imidazolidinyl urea, aldixa and fragrance. This product absorbs 3 times more moisture than plain talcum powder and helps prevent bacteria and fungi and insects; try it when plain talcum powder does not work.

Zeolites - are natural minerals that absorb toxic fumes from chemicals, mold, gases and moisture.

Zinc - Ellie Bowron at ufda44@hotmail.com wrote that when she started to take zinc the fire ants in Arizona no longer tried to bite her feet.

Ziplock Bags - Fill them half-full of water and a few shiny pennies and hang them on exterior doors and windows to repel flies and wasps.

**Measurement abbreviations: T. = tablespoon, tsp. = teaspoon,
c. = cup, pt. = pint, gal. = gallon, oz. = ounce**

Final Comments on Pestisafes® and/or Alternative Controls - In 1994, the Harvard Medical School conducted a national survey that revealed a third of all Americans use "non-traditional" treatments for chronic health problems

like colds, and headaches and spend a total of \$14 billion a year on these products - hopefully the public will now begin to try some of these “non-traditional” pest control methods or Pestisafes®. The Author’s books, articles, letters and research on Integrated (the Author prefers Intelligent) Pest Management® list thousands of additional techniques, companies, products, controls, inspections, and/or other alternatives to toxic, volatile, synthetic pesticide poisons. The one thing that continues to amaze the Author most is that in a world dying from pollution - filled with resistant pests - the Author’s constantly asked to prove “his Pestisafes® or controls” are completely safe, *legal* and/or totally and instantly effective! Obviously “the Author’s controls” or Pestisafes® work better than and are much safer than most poisons - poisons are poisons - most of “my controls” use materials created to be eaten or to be used on or near people and pets - volatile, *registered* pesticide poisons were made to kill! Even though some of his research shows natural products can kill too, usually they are toxic only if ingested and are not volatile. **On May 6, 1996 approximately 200 least-toxic pesticide active ingredients were exempted from registration with the EPA. (See 40 CFR Part 152 and the Federal Register March 6, 1996 P.8870.)** By initiating this action, the EPA wanted to encourage the sale and distribution of least-toxic (and obviously non-toxic) pesticides. Among the newly exempted pesticides are castor oil, geranium oil, mint and mint oil, potassium sorbate, sesame, sodium chloride (common salt), garlic, rosemary, citronella, clove, cinnamon, lemongrass, peppermint, thyme, dolomite, eggs, glue, medicated feed, vermiculite, soybean, wintergreen and corn oils. Producers and/or formulators are now free to sell these materials as pesticides without prior approval or registration with the EPA. Tree Oils Comment: Hexa-hydroxyl is contained in many tree oils to protect trees from insect attack and is approved for use in food and beverages by the FDA, yet it quickly kills or repels insects for up to 2 days - encapsule it in sodium borate and you have a long-term residual Pestisafe®. Hexa-hydroxyl blocks octopamine, an essential neurotransmitter only present in insects (its like giving them LSD). EcoSmart Technologies has registered this safe material as a biological pesticide. Remember, a *registered* pesticide must be used in direct accordance with its ever-changing label and labeling - most of the Author’s favorite things/controls/Pestisafes® are not (*registered*) pesticide poisons and have no labels, so common sense must be used. Always try to use the safest poison alternatives possible so you can do the most good and the least harm. When all else fails, or if none of **The Basic Controls** or other methods of treatment are not fast enough, safe enough or appropriate enough, the hand removal of weeds, insects or pests may be necessary or simply step on them . . . simply kick them in their *posterior* sternal integumental plates!

“True IPM or Intelligent Pest Management® is an ever-changing process or learning experience in the selection, integration and implementation of all the currently available pest control strategies based on predicted economic, ecological, and societal consequences and/or it can be defined as an ever-changing process of determining if any control is even needed; how, when, and where control efforts should be used, and what Pestisafes®, pesticides (non-volatile) products, techniques, biological controls and/or tactics should be employed.” **Always choose the safest alternative possible. — S.L.T.**

Garlic Cautions - When it is crushed /squeezed or otherwise rendered the amino acid allin is enzymatically naturally converted to allicin, its primary pesticidal substance; the smellier the garlic the more toxic it is as a pesticide. Allicin is a cholinesterase inhibitor and can be lethal to plants. Garlic inhibits or repels plant pathogens, e.g., fungus, mildew, scab, bacterial, nematodes, insects, aquatic snails, ticks, wasps, houseflies and viral disease. Homogenize 2 bulbs of garlic (basically 1/4 lb.) in a blender with a quart of water and a few drops of liquid soap and then strain through cheese cloth to obtain a liquid pesticidal solution.

Chemical Caution - In the night of 8/7/44 about 1200 sheep were killed by the fumes of a poison spray drifting from an olive grove in the Saucelito district of California. What did we learn from all of this unnecessary death? According to recent surveys and reports, 5 - 10 million household poisonings occur each year due to toxic chemical (poison) exposure. Many are fatal and most of the victims are children. 150 of the chemicals commonly found in homes have been linked to allergies, birth defects, cancer and psychological abnormalities. Side effects from chemical use include respiratory problems, stuffy noses, itchy eyes and throats, ear infections, asthma, bronchitis, fatigue, headaches, seizures and death.

Enzyme Cleaner Cautions - Be sure you use Safe Solutions Tweetmint Enzyme Cleaner with or without Peppermint, Lice R Gone® or Pet Wash® products or soaps. Remember if you fertilize and use any of these enzymes 2 weeks before or after your fertilizer application - you may kill or severely damage your plants. Enzyme cleaners cause plants to grow longer roots and to become more efficient in assimilating nutrients, e.g., fertilizers. Some people are concerned that protease enzymes may cause a severe allergic reaction. Always test a small area of your skin before you apply enzymes or another product. Remember, protease enzymes

should never be more than 1% of the product; some enzyme cleaners can cause occupational asthma problems and anaphylactic shock. **Safe Solutions, Inc. has the only licensed use to a USA and Australian patent on the use of enzymes and surfactant blends to control pests.** Try their Not Nice to Bugs®.

Plant Spray Cautions - Always test a spray on a small area of foliage before spraying Pestisafes® or pesticides or fertilizers on the entire plant. Even if no contraindications are seen initially, if the foliage shows any subsequent sign of withering, discoloration, burning, etc., discontinue further treatment or at least dilute your spray until no further damage occurs to the foliage/plant.

Pesticidal Claims - Only if a complaint is filed does EPA check into an “unregistered” pesticide. You can not put anything but 100% of the specific items from the exempted active and inert ingredient lists into an exempted pesticide product, or you will have to register your entire product as a pesticide. In the September 1988 issue of Pest Control Technology, (page 18) Stoy A. Hedges, B.C.E., R.S. from Terminex International noted in part: “Although not registered with EPA as a disinfectant, household bleach, such as Dow’s Clorox®, does in fact state ‘disinfectant’ on the label, although specific directions for such use are obviously not provided on the product label. It is common knowledge that hospitals, clinical laboratories and others use household bleach as a disinfectant for blood-borne pathogens.” Mr. Hedges notes the Centers for Disease Control have several bulletins that make such recommendations.

Safety - The bottom line on personal safety is you. There simply is no substance that is totally safe for everyone or every plant. A major step toward your own safety is taken when you realize that your safety and that of your family and pets is truly your own responsibility. It is easy to blame others, e.g., the poison “industry” for harming you or yours - but that will not save them or you. **Remember, virtually any spray may burn plants or irritate someone - so test your “mix” on a few leaves or a small area of the skin first.**

How to make colloidal solutions - Pass a small electrical current through both wires/rods in a solution, e.g., use a copper wire/rod and a galvanized iron wire/rod in an ammonia nitrate solution to produce colloidal copper nitrate which is great for lawns. Use 2 silver wires/rods in a saline solution to produce colloidal silver. Use 2 iron wires/rods in a saline solution to produce colloidal iron. Use 2 gold wires/rods in a nitrate solution to produce colloidal gold.

Another alternative insect control - Pulverize in a blender a couple of whole cayenne peppers, a large onion and a whole garlic bulb with a little water. When done, mix in a gallon of water, let stand 24 hours and then strain. Spray mix as needed to control insects.

Still another alternative insect control spray is to blend grated Ivory or olive oil bar soap with either of the following: citrus, garlic, mint, rhubarb leaves, pepper, vinegar or vegetable oil in a water-based spray. Always remember that water-based sprays can burn plants on hot, sunny days!

All Purpose Weed Killers - Boil 1 qt. water; add 2 T. salt and 5 T. vinegar. Pour directly on weeds in cracks, etc. while the mix is still hot. **Second mix:** Mix 2 - 4 T. powdered citric acid and 1 T. dish soap in 1 qt. vinegar and thoroughly spray. **Third mix:** 1 gal. red or white vinegar, 2 c. table salt, 5 T. dishwashing liquid; mix and soak plants. **Fourth mix:** 1/2 c. borax per gallon water. You can add a “kicker by adding 2 c. rubbing alcohol; if you do, be careful not to get in your eyes. All of these mixes work better on hot, sunny days.

Aphid and mite repellent - Chop/mash 1 c. of hot red pepper, 2 cloves garlic and soak in 1 c. water, covered, for 24 hours. (You might want to wear disposable gloves and refrain from touching your eyes.) Strain and mist your plants with this mixture as needed.

Surfactant Note - Unregistered surfactants have been used with pesticides for years to improve the poison’s performance. They are not required to be registered even though they, obviously, help control pest problems. I firmly believe (and have also proven) that using just the unregistered surfactants and not including any of the pesticides will provide basically the same degree of pest control, but that is “illegal” to many “regulators”.

What is the world population of insects and how much do they weigh? Brian Hocking, a Canadian entomologist, estimated there were about 1 quintillion individuals at any given time - that is a one with 18 zeros after it. Based on this figure, he calculated their combined weight at 27 billion tons or 12 times the weight of the

then estimated human population. Gilbert Waldauer, Ph.D. noted humans have now doubled in number, so that the insects only outweigh us by a factor of 6. If the human population continues to grow, Gilbert, author of "The Handy Bug Answer Book" notes, there will come a time when there are not enough insects to support us. The insects pollinate our crops, aerate our soil, eliminate our wastes and help sustain the fabric of life.

Designated Eating Areas - If you expect to contain, limit and/or control pest problems, it is vital to designate appropriate areas for eating and enforce your rules about eating only in these areas.

An editorial in the first number of The Practical Entomologist, 1865 stated: "The proposed decoctions and washes we are well satisfied, in the majority of instances, are as useless in application as they are ridiculous in composition, and if the work of destroying insects is to be accomplished satisfactorily, we feel confident that it will have to be the result of no chemical preparations, but of simple means, directed by a knowledge of the history and habits of the depredators."

"We shall require a substantially new manner of thinking, if mankind is to survive." — Albert Einstein

"The important thing is not to stop questioning. Curiosity has its own reason for existing. One can not help but be in awe when he contemplates the mysteries of eternity of life, of the marvelous structure of reality. It is enough if one tries merely to comprehend a little of this mystery every day. Never lose a holy curiosity." — Albert Einstein

Step 1: Sound the Alarm

Rachel Carson's book, *Silent Spring*, outlined the dangers of DDT.



"We should no longer accept the counsel of those who tell us that we must fill our world with poisonous chemicals; we should look about and see what other course is open to us." — Rachel Carson, Silent Spring, 1962.



"All men dream, but not equally. Those who dream by night in the dusty recesses of their minds wake in the day to find that it was vanity; but the dreamers of the day are dangerous men, for they may act their dreams with open eyes to make it possible." — T. E. Lawrence

"If any man can convince me and bring home to me that I do not think or act aright, gladly will I change: for I search after truth by which man never yet was harmed. But he is harmed who abides on still in his deception and ignorance." — Marcus Aurelius Antonius

Robert Mesecher from the Michigan DOA always said "If it is not expressly forbidden on the (poison) label, you may use it." By this one statement, all of "the Author's" pestisafes are legal.

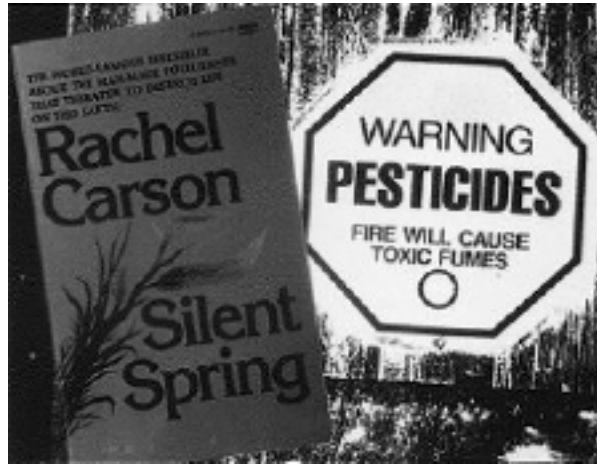
What's Next? At the time of this writing we were looking at using hydrogen peroxide for insect, fungus and mildew control. The Author hasve successfully used Noxema to repel mosquitoes. You can use

acetaminophen baits to kill snakes, but use caution as it will also kill cats. You can use sound waves or acoustic energy to kill mosquito larvae in the water. We are spraying fruit with nine packages of grape Kool-Aid per gallon of water to stop birds from eating the fruit. A clay called Kaolin can be sprayed on plants to repel insects. Ozone can be used to kill/repel insect pests. Algae bacteria and enzyme solutions can be created on location to clean, disinfect, improve soil and control pest problems. Colloidal solutions will be researched in depth. Colloidal silver, copper, etc. should work systemically in plants and/or to control various wood destroying insects and organisms. Colloidal silver may stop and/or prevent “black goo”. Ions in water, oil, air, etc. should be effective pestisafes. “Medical grade” ozone may also be useful in pest control and may be in the air, water, oils, etc. Biological controls will, obviously, be important pestisafes. Probiotic microbes and enzyme/surfactant combinations will continue to be refined, combined and/or improved. We are working on a cleaner/degreaser that will safely control vegetation. We are also working with cedar oil as an insect barrier. We are working with various ultrasonic “critter” repellents. We have also been testing and/or using other common tinctures or oils that are GRAS materials, e.g., thyme oil, clove oil, cinnamon oil, peppermint oil, orange oil, lavender oil, citrus oil, lemongrass oil, eucalyptus oil, anise oil, pennyroyal oil, etc. Many are insecticidal, especially with a surfactant they can also repel pests, can be effective as fungicides, miticides, nematocides; some are great synergists; others act as anti-feedants. Canola oil comes from the rape seed which is part of the mustard family. Rape is the most toxic of all food-oil plants. Like soy, rape is a weed that most insects will not eat. The oil from rape seed is a hundred times more toxic than soy oil. Rape oil was the source of the chemical warfare agent called mustard gas. Canola oil contains large amounts of “isothiocyanates” - cyanide-containing compounds. Rotenone comes from soy beans. Canola oil is also high in glycosides that block enzyme function. The presence of glycosides in rattlesnake venom inhibits muscle enzymes and causes instant immobilization of the prey. Several essential oils block octopamine binding in an insect’s nerves, thus creating death; humans and pets do not have octopamine receptors. We have also found that aspartame and MSG can be used to kill insects because they are “excitotoxins” that destroy neurons by over excitation when they are present in too high of a concentration in living organisms, so a “safe” dose in your food or drink will easily kill most insects. There is a natural pesticide in chicken egg whites, a food protein called avidin, which causes a biotin deficiency in insects. Acoustic stress may disrupt insects, e.g., beetles, and make it harder for them to eat through trees by disrupting their feeding and mating habits and may even cause the pests to kill each other per the ESA. As long as the Author lives, he will continue to learn, field test and report on safe and far more effective alternatives.

The following was reported in The Bell Report, Vol. 21, No. 3, July/August 2002: At the Severtsov Institute of Ecology and Evolution in Moscow, a team of scientists determined a batch of rats exposed to the smell of a cat resulted in a 40% drop in the birth rate, as compared to a control group. Litters also showed a higher male-to-female ratio than usual, reducing the amount of females able to reproduce as they reached maturity. According to Rossiiskaya Gazeta newspaper, female rats exposed to the cat scent experienced hormonal changes that lessened their ability to bear normally-sized litters. The Russian scientists said this reflected an ecological tendency for prey species to breed less when large numbers of predators are present in order to starve the predators and lessen the risk of casualties among new litters. The Author is researching into the use of alternatives to dangerous antibiotics and “medicines” to actually heal you and yours, if G-d permits. See Chapters 40 and 41.

We must learn to listen and evaluate all possible alternatives...always looking for a safer, more effective way to control pest problems. Remember, virtually any substance can be misused or incorrectly prepared; that plants are not always consistent in producing toxins and not every person or insect or animal reacts in the same way to the same material, so always be very careful!

**“You must continually build on what you learn;
each day I am amazed at what little I knew yesterday.” — S.L.T.**



“The choice, after all, is ours to make.” — Rachel Carson

I have consistently found that spraying insects with virtually any diluted cleaning product will kill the insects faster, safer and cheaper than any “registered” pesticide poison, yet our “regulators” just as consistently have tried to say these safe and effective (unregistered) cleaners must now be “registered” as “pesticides”. — S.L.T. in numerous in-service meetings.

One of the Author’s favorite jokes is: There are two requirements for success. The first is not to tell anyone everything you know.

“Inerts” – If any chemical is being used as an unregistered “inert” in any pesticide formula, how on earth can EPA decide the same exact chemical miraculously becomes an unregistered “pesticide” when it is used to control pests all by itself? If you can honestly answer that question, you will become the “regulator” of the year.

ONE LAST THOUGHT REGARDING THE USE OF UNREGISTERED PESTISAFES: QUITE OFTEN THE AUTHOR LIKES TO SIMPLY SPRAY OR MIST CRICKETS WITH TAP WATER IN HIS LECTURES; THE TAP WATER IN MANY CITIES KILLS ALL OF THE CRICKETS FASTER THAN “REGISTERED” PESTICIDE POISONS. May be the “regulators” should make the cities register their tap water as a poison.

The search for “safe” synthetic pesticide poisons that are “better, faster, easier, newer, improved, etc. is a waste of time and money. There is nothing new under the sun. G-d always has and G-d always will provide us with everything we will ever need.



Don’t find fault, find a remedy. — Henry Ford

“How wonderful it is that nobody need wait a single moment before starting to improve the world.” — Ann Frank



Kol Yisrael areivim zeh l'zeh = “We are responsible for one another.”

Today I affirm...

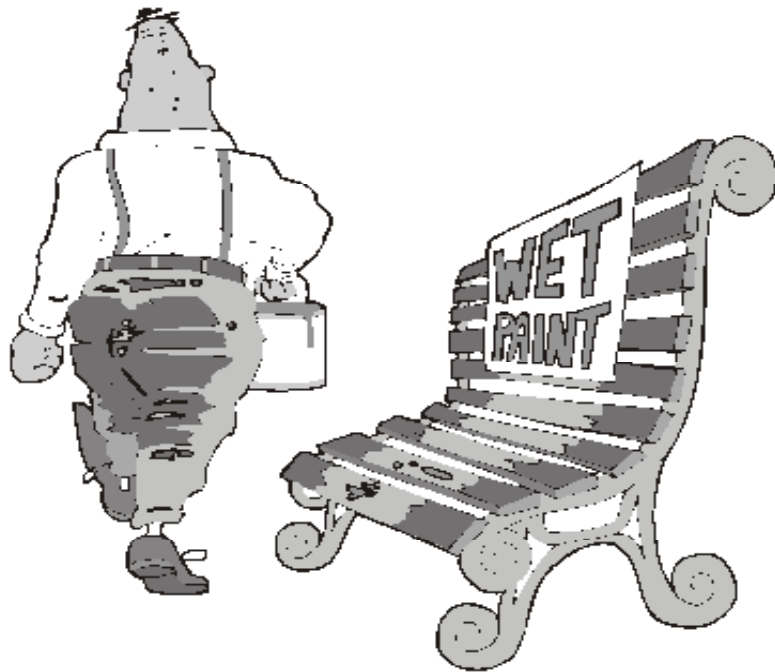
- As I make joy a way of life my limitations dissolve.
- Knowing all fears are negative, I release them all and am now open to receive G-d's blessings.
- That love is stronger and more powerful and more satisfying than hate and I, therefore, choose to love and forgive and I am now open to receive love and forgiveness.
- That all things work together for good for those that love the L-rd and their fellow man.
- That to give is better than to take and I am, therefore, able to receive in direct proportion to what I give.
- There are always safer and far more effective ways if you honestly look for them.

The word "listen" contains the same letters as the word "silent". Basta! (Enough!)

Caution: If you sell any product (that mitigates pests in any way) that is not registered as a pesticide by the USEPA and all other state regulatory agencies, or not entirely made up of 100% USEPA exempt ingredients, you are selling an unregistered pesticide and you are breaking federal and state laws. The Author can recommend these various unregistered pestisafes only if he does not sell them.

**"Medah Keneged Medah" = "Measure for measure" =
"What goes around comes around" = Law of Reciprocity**

An honest man when confronted with the truth will either accept the truth or cease to be honest.



Safe Solutions products may be purchased online at:

<http://www.safesolutionsinc.com>

or by telephone at:

1-888-443-8738