

# Earth Friendly Garden Solutions

by Dóri Németh, M.S. Horticulture

## **Green Insecticides**

**Horticultural oil** (paraffinic oil, canola oil, neem oil, herbal oils): Works on eggs, larva & adults by suffocation. Controls a wide range of insect pests, including hard-to-control scales & mites. Shiny coating on leaves will also help control & prevent fungal diseases. Spray in the evening during hot summer months.

**Insecticidal soap** (potassium salts of fatty acids): Fast acting insecticide & miticide. Works by dehydrating soft bodied insects. Plant derived forms are preferred.

**Diatomaceous earth** (silica sand): Fine white powder used to control crawling insects (ants, earwigs) & slugs. Works by damaging the exoskeleton, causing dehydration.

**Bt** (*Bacillus thuringiensis* subsp. *kurstaki*): Naturally occurring bacterium used to control leaf eating caterpillars (e.g. gypsy moth, cabbage loopers, pine sawflies). Must be applied in 1<sup>st</sup> or 2<sup>nd</sup> instar stage (before the caterpillar reaches a 1" size) to be effective. It stops feeding within hours from ingestion which will lead to death. Does not harm beneficial insects.

**Spinosad** (*Saccharopolyspora spinosa*): A metabolite produced by a recently discovered bacterium. Controls a wide range of chewing insect pests. Wider range of use than Bt. Must be ingested by the insect. Affects the nervous system. Apply after sunset to protect bees.

**Pyrethrum** (*Chrysanthemum cinerariifolium* extract) Plant extract derived from the flowers, used for centuries as a naturally occurring insecticide & insect repellent. Attacks the nervous systems of all insects. Keeps female mosquitoes from biting. Natural pyrethrum is highly photo-instable & must be reapplied frequently. Synthetic compounds based on pyrethrum, called pyrethroids, have been widely used, offering longer lasting control.

**Neem** (*Azadirachta indica* extract) Also called a "tree of 40" to indicate its many uses, neem extracts have insecticidal, miticidal & fungicidal properties. Fatty acids of neem are generally preferred to neem oil in effectiveness. The compounds cause death by altering the insect's lifestyle, stopping feeding, reproducing and molting.

**Rotenone** (extract of several sub-/tropical plant species, including Jicama): Highly toxic to insects & fish. Used as insect spray or dust in the vegetable garden. Safe up to the day of harvest.

**Milky Spore** (*Bacillus popilliae*-Dutky): A naturally occurring, host specific bacterium that targets the Japanese beetle grubs. Bacteria are ingested from the soil during the grub's normal feeding. They will reproduce inside of the grub, causing its death & re-inoculating the soil with millions more spores. Apply as a preventative. Bacteria will colonize, resulting in improved effectiveness over time.

## **Green Molluscicides**

**Iron phosphate**: Naturally occurring inorganic compound widely used to control slugs and snails. Very effective. Biodegradable. Safe to pets & wildlife. Reapply after heavy rainfall. Start applications early in the season before slug population explodes.

## **Green Fungicides**

**Sulfur**: Highly effective natural control of foliar diseases (leaf spots, powdery mildew, rust). Applied as spray or dust. Also an effective miticide.

**Lime sulfur** (calcium polysulfide): Old fashioned compound used primarily to control overwintering diseases (e.g. powdery mildew) on fruit trees & grapes.

**Copper sulfate** (Bordeaux Mix when combined with lime sulfur): Used primarily on grapes, berries & fruit trees to prevent downy mildew & other fungal diseases. It also has bactericidal properties, used to control both fungal & bacterial blights. Leaves a blue residue on leaves.

**Copper Soap** (copper octoate): Prevents a wide range of fungal & bacterial disease (e.g. blights, leaf spots, mildews, anthracnose, mold & rust). Safe on fruits, vegetables & ornamentals. Use sparingly as high levels of copper accumulation in the soil will lead to phytotoxicity.

### ***Green Herbicides***

**Corn Gluten** (corn meal): Natural properties of corn have been discovered to provide effective pre-emergent weed control. Inhibits root growth of germinating seeds. Breaks down to 10% nitrogen to slowly feed plants for 3-4 months. Use on lawns & gardens. Repeat applications once a month during the growing season.

**Herbicidal acids, soaps & oils** (vinegar, citric acid, clove oil, cinnamon oil, etc.): Provide top burn but no systemic (root) kill. Repeated applications are necessary until plant runs out of food reserves.

**Mulch** (bark, compost, paper mulch, etc.): Works by preventing sunlight from reaching germinating seeds, cutting down on germination rates. A 3" layer of hardwood mulch is recommended for trees & shrubs; a 2" layer of compost or coco shell mulch with rice hulls is recommended for flower borders & vegetable gardens. Alternatively, straw or paper mulch cover may be used in vegetable plots. In addition to suppressing weeds, the mulch cover will help conserve soil moisture, reduce the need for watering & help prevent plant diseases.

### ***Green Soil Amendments***

**Compost** (mushroom compost, composted manure, composted bark, commercial mixes): Adding compost to the soil will greatly enhance its physical characteristics.

In heavy clay soils, it will loosen the soil structure & break down clay, allowing for better drainage & air pockets for plant roots. It will help free up nutrients locked up by clay minerals & make them available for the plants' uptake.

In sandy soils, the addition of organic matter will help improve the soil's water and nutrient holding capacity, making it more fertile & productive.

The compost's nutritional value will be determined by the quality & variety of raw ingredients used to make up the compost.

**Peat Moss**: The addition of peat moss to our garden soils will improve the physical characteristics of the soil. Peat moss is slightly acidic & will lower the soil pH.

In general, the use of compost in gardens is preferred as it is made of locally produced recycled organic matter.

**Sulfur**: Added to lower a soil's pH, making it more acidic. Measurements with a pH meter or a soil test will determine the need for adjusting the pH level. A pH of 6.5 - 7.3 is considered ideal for growing most plants in our climate. This is a very important indicator as pH will determine the availability of nutrients to plants in the soil.

**Lime**: Used to raise the soil's pH level, making it more alkaline.

**Gypsum**: Helps break down clay soils. Neutralizes salt damage from deicing salts & pets.

### ***Green Fertilizers***

Organic fertilizers feed the soil; while creating a healthy, living soil they feed the plant. They generally have a lower macro element (N-P-K) content while offering a wide range of micro elements & minerals. Since traditional commercial, manufactured fertilizers focus on providing immediately available, large doses of macro elements, our foods & consequently we have become deficient in micro elements & minerals, making plants & humans susceptible to disease & environmental stress.

Today organic fertilizers are widely available. The use of multiple forms may be desired for best results.

**Plant derived fertilizers**: alfalfa, ashes, composts, cottonseed meal, corn gluten, kelp, molasses

**Animal derived fertilizers**: bat guano, bone meal, crab shells, dried blood, fish meal, fish emulsion, hoof & horn, manure, earthworm castings

**Minerals**: dolomite, Epsom salt, green sand, lime stone, potash, rock phosphate