

Safer Options

All pesticides by their nature are toxic to some organisms. There is growing evidence that common pesticides are harmful to people and the environment. Many pesticides are indiscriminate, harming birds and beneficial insects; and when washed into our waterways are harmful to fish. Before you pick up a pesticide ask yourself if it is needed.

Is the pest actually harming your plant?

Many bugs are helpful. Also, if bugs are infesting your plants, it may be an indication that the plant is stressed. Maybe your plant needs more water, less sun, a different soil pH. Always try to get to the root of the problem.

To avoid being part of the toxic contamination process now occurring, take care to:

- *Choose the least toxic methods in gardening.*
- *Diligently follow pesticide labels and recommended times of day to apply.*
- *Follow all safety recommendations when using pesticides.*

Use physical measures first, toxics last:

- **Scout** your bushes/forbs for insects and damage.
- **Visually** identify pest.
- Place **Row Covers** over crop when flying insects are in season.
- **Hand Pick** flies and beetles, drop them into pail of water, or,
- **Knock Off** pests with a **Spray of Water**
- Some gardeners **Freeze** the harvested insects and **Feed** them to birds.
- **Accept** damage that does not threaten to kill your plant.
- **Consider Options** and choose **Least Toxic** measures.

If you decide you still need a pesticide, apply with caution and use only those with active ingredients that do the least amount of harm.

LESS TOXIC INSECTICIDES

| | DERIVED FROM | USED FOR | CAUTIONS | PRODUCT FUNCTION |
|--------------------|--------------------------------|--|------------------------------|--|
| SOAPS AND OILS | | | | |
| Insecticidal Soaps | Potassium Salts of Fatty Acids | Aphids, mealybugs, thrips, mites, scales, whiteflies | May need repeat applications | Damages soft-bodies insects' protective coat |

| | DERIVED FROM | USED FOR | CAUTIONS | PRODUCT FUNCTION |
|--|---|---|--|--|
| Neem Oil | Neem (<i>Azadirachta indica</i>), an evergreen tree | Aphids, leafminers, mealybugs, spidermites, thrips, whiteflies, scales, caterpillars, lacebugs | May need repeat applications | Toxic when ingested |
| Azadirachtin | Extract of Neem Oil | See Neem Oil uses. | May need repeat applications | Feeding deterrent Growth regulator |
| Essential Oils | Cedar, cinnamon, clove, mints, rosemary, eugenol, capsaicin | Ants, dust mites, spiders, fleas, crickets | Do not use where pollinators feed or during active | Most kill on contact, quick acting |
| Horticultural Oils | Petrochemicals Summer: lighter weight oil Dormant: overwintering | Aphids, mites, scales, | Night spray only -- Do NOT spray in day 3-HOUR TOXICITY TO BEES | Blocks pests respiration, destroys waxy coats, interferes with feeding and egg laying |
| Limonene | Oil from citrus | Ants, roaches, palmetto bugs, fleas, silverfish | Night spray only -- Do NOT spray in day 3-HOUR TOXICITY TO BEES | Kills on contact |
| Garlic | Garlic | A wide variety of pests | May repel beneficials | Repellent |
| MICROBIAL INSECTICIDES | | | | |
| Bt | <i>Bacillus Thuringiensis</i> | Different strains used for different insects | Be sure to choose a product specific to your pest | Feeding deterrent |
| Spinosad | Derived from soil bacterium | Fireants, thrips, aphids, scales, whiteflies, caterpillars, leaf miners, fruit tree borers | Do NOT apply to plants in flower Apply at night WILL KILL BEES | Kills on ingestion |
| Beauvaria Bassiana | Fungus | Japanese beetles, aphids, whiteflies, caterpillars, leaf hoppers, grasshoppers, Colorado potato beetles, Mexican bean beetles, boll weevils, cutworms, sod webworms, bark beetles, cinch bugs | May kill beneficials and and ladybeetles DO NOT USE WHEN POLLINATORS ARE PRESENT | Kills mature and adult pests |
| Milky Spore - <i>Paenibacillus popilliae</i> | Made by inoculating beetle grubs with milky spore disease and extracting the spores. Applied to turf once a year in powder form. | Japanese beetle grubs (and perhaps lady beetles, and June bugs). | It may take more than one season to have impact but is active for 10 or more years. It is not poisonous to beneficial insects, pets, fish, food, or humans. | Grubs eat spores and die of milky spore disease. Grubs are infected by eating grass thatch or roots; die; and release millions of spores thus affecting more grubs with the disease. |
| MINERALS | | | | |

| | DERIVED FROM | USED FOR | CAUTIONS | PRODUCT FUNCTION |
|--------------------|--|--|--|---|
| Diatomaceous Earth | USE FOOD GRADE Powders of fossilized diatoms | Slugs, millipedes, sow bugs, cockroaches, ants, aphids | Do not use on flowering plants WILL KILL BEES | Causes abrasions on pest causing loss of body fluids, dehydrations, and death |
| Kaolin Clay | | Japanese beetles, tarnished plant bugs, thrips, leafhoppers, cucumber beetles, Colorado potato beetles | Must be applied preventatively Cannot control established pests | Host plant disguise |

Materials Consulted in Construction of above table:

1. Beyond Pesticides, www.beyondpesticides.org, "Gateway on Pesticide Hazards and Safe Pest Management"
2. MN University Extension, "Insect Pests of Roses" by K. Stroom, J. Fetzer, V. Krischik
3. NPIC, Oregon State University and US EPA, www.NPIC.orst.edu
4. OSU (Oregon) Master Gardeners Program, www.ostu.edu, "Least Toxic Options for the Home Gardener"
5. Pacific Northwest Extension, www.PNE.edu, "How to Reduce Bee Poisoning from Pesticides", by H. Riedl, E Johansson, L. Brewer, J. Barbour
6. Purdue University Extension, <http://the-education-store.com>, "Protecting Honey Bees from Herbicides" by C. Krupke, G. Hunt, R. Foster
7. University of California, www.IMP.ucdavis.edu, "Pesticide Management Guidelines: Walnut, Grapes, "
8. USDA, Agroforestry Center, www.UNL.edu/nac , "Pesticide Consideration for Native Bees in Agroforestry" by M. Vaughn, S.H Black
9. Xerces Society, www.xercessociety.org, "Organic-Approved Pesticides: minimizing risk for bees"