

GARDEN & LANDSCAPE PEST MANAGEMENT GUIDE

<i>Pest or Disease</i>	<i>Management Techniques</i>		
Ants	Prevention	Cultural	Mechanical/Physical
	<i>Barriers of DE; Tanglefoot</i>	<i>Sanitation; esp. check compost piles and mulches; turn compost piles regularly and keep them just moist</i>	<i>Repeated soaking or flooding of the nest will eventually discourage them</i>
	Biological	Last Resort	
	<i>straw itch mite (Pyemotes tritici); anteaters also do the job nicely</i>	<i>Mint and cedar oil; boric acid + sugar solutions as baits; drench of pyrethrum and IS directly into the nest area; use IS on their trails</i>	<i>Ants aren't just bad guys -- they're good guys as well: many kinds prey on caterpillars, esp. cutworms</i>
Aphids	Prevention	Cultural	Mechanical/Physical
	<i>Control ants</i>	<i>Avoid use of high-nitrogen fertilizers</i>	<i>Blast with a hard spray from the hose</i>
	Biological	Last Resort	
	<i>Aphid parasitoids (many); Ladybugs (attract them); Green lacewings</i>	<i>IS; Neem; Pyrethrum; Horticultural (Summer) & Dormant Oils</i>	<i>Use yellow sticky traps for monitoring populations; wait for <u>native</u> predators and parasitoids</i>
Black Sooty Mold	Prevention	Cultural	Mechanical/Physical
	<i>Manage aphids, scale, mealybugs</i>	<i>Prune to maximize air circulation</i>	<i>Wash off with strong blasts from the hose</i>
	Biological	Last Resort	
	<i>See above</i>		<i>Not an actual disease of the plant -- grows on the excretions of plant sucking pests</i>

PEST MANAGEMENT GUIDE

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Bristly Rose Slug (Rose sawfly)	Prevention	Cultural	Mechanical/Physical
			<i>Handpicking (squashing!)</i>
	Biological	Last Resort	
	<i>Green lacewings; ladybugs (attract them)</i>	<i>IS; Neem; Pyrethrum; NOT BT</i>	<i>Monitor roses closely; this insect is NOT the caterpillar of a moth or butterfly -- it is the larval stage of a wasp</i>
Cabbage loopers ("worms")	Prevention	Cultural	Mechanical/Physical
	<i>Use row covers</i>	<i>Rotation</i>	<i>Handpicking</i>
	Biological	Last Resort	
	<i>Mini-wasps (Trichogramma); Predaceous bugs</i>	<i>IS; Neem; Pyrethrum</i>	
Camellia petal blight	Prevention	Cultural	Mechanical/Physical
	<i>Avoid overhead watering; select early-blooming cultivars</i>	<i>Remove and replace all mulching material; Sanitation →</i>	<i>Remove ALL buds & blooms for two straight years; do not compost them</i>
	Biological	Last Resort	
Caterpillars (various "worms")	Prevention	Cultural	Mechanical/Physical
	<i>Use row covers where possible</i>	<i>Rotation works for some</i>	<i>Handpicking</i>
	Biological	Last Resort	
	<i>Mini-wasps (Trichogramma); Predaceous bugs</i>	<i>BT; Pyrethrum</i>	

PEST MANAGEMENT GUIDE

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Corn earworm	Prevention	Cultural	Mechanical/Physical
	<i>Five drops of vegetable oil in silks at early wilt stage</i>	<i>Grow healthy plants</i>	
	Biological	Last Resort	
	<i>Parasitic nematodes (Steinernema riobravis)</i>	<i>BT; AfMNPV (caterpillar virus)</i>	
Cutworm	Prevention	Cultural	Mechanical/Physical
	<i>Barriers of DE; collars</i>	<i>Control weeds</i>	<i>Handpicking</i>
	Biological	Last Resort	
	<i>Mini-wasps (Trichogramma); Parasitic nematodes; Predaceous bugs</i>	<i>Make a bait of 12% (by weight) BT and wheat bran or grape pomace -- circle plants</i>	<i>Night-feeding caterpillars</i>
Deer	Prevention	Cultural	Mechanical/Physical
	<i>Fences; many repellants (some work, many don't)</i>	<i>Use primarily deer-resistant plants, especially at landscape periphery</i>	
	Biological	Last Resort	
	<i>Dogs</i>		<i>Deer are creatures of habit and they are smarter than you think</i>

PEST MANAGEMENT GUIDE

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Earwigs	Prevention	Cultural	Mechanical/Physical
		<i>Sanitation; esp. check mulches regularly</i>	<i>Handpicking; trap with layers or rolls of wet newspaper; trap with soy sauce and/or beer in containers set flush with the soil</i>
	Biological	Last Resort	
	<i>Parasitic Nematodes</i>	<i>IS</i>	
Fuchsia gall mite	Prevention	Cultural	Mechanical/Physical
		<i>Select resistant cultivars</i>	<i>Handpicking; remove damage as soon as seen</i>
	Biological	Last Resort	
	<i>Predatory mites</i>	<i>Neem (three applications)</i>	
Gophers	Prevention	Cultural	Mechanical/Physical
	<i>Gopher-Stop™ cover crop; wire barriers for veggies</i>		<i>Traps (several kinds; Macabee may be best)</i>
	Biological	Last Resort	
	<i>Owls (attract with nesting boxes); snakes!; good dogs and cats</i>		

PEST MANAGEMENT GUIDE

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Grasshoppers	Prevention	Cultural	Mechanical/Physical
			<i>Handpicking (gotta be quick)</i>
	Biological	Last Resort	
	<i>Nosema spore bait; Parasitic nematodes</i>	<i>Neem</i>	
Hornworm, Tomato	Prevention	Cultural	Mechanical/Physical
		<i>Rotation</i>	<i>Handpicking</i>
	Biological	Last Resort	
	<i>Parasitic nematodes; Mini-wasps (Trichogramma)</i>	<i>BT; pyrethrum</i>	
Mealybugs	Prevention	Cultural	Mechanical/Physical
	<i>Control ants; Quarantine</i>	<i>Prune to maximize air circulation</i>	<i>Scrape off colonies</i>
	Biological	Last Resort	
	<i>Green lacewings; Mealybug Destroyer (Cryptolaemus)</i>	<i>IS; Pyrethrum; Horticultural (summer) oil; dormant oil (in winter)</i>	

PEST MANAGEMENT GUIDE

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Mites (including spider mites)	Prevention	Cultural	Mechanical/Physical
	<i>Quarantine</i>	<i>Grow healthy plants; Mulch to keep soil moist, dust down</i>	<i>Hose off plants regularly, especially from the bottom to keep off dust and mites</i>
	Biological	Last Resort	
	<i>Predatory mites; Green lacewings</i>	<i>Pyrethrum; Neem; Horticultural (summer) and dormant (winter) oil</i>	
Oak root fungus (Armillaria root rot)	Prevention	Cultural	Mechanical/Physical
	<i>Use resistant plants; grow healthy plants; quarantine new plants from suspicious sites</i>	<i>Avoid excessive watering in summer; keep drip emitters from the immediate vicinity of the plant; keep mulches away from plants</i>	<i>Solar soil sterilization</i>
	Biological	Last Resort	
Peach leaf curl	Prevention	Cultural	Mechanical/Physical
			<i>Pick off worst damage; hose off foliage with a "dusty" appearance in late spring/early summer -- these are the fungal spores</i>
	Biological	Last Resort	
		<i>Dormant spray: oil + lime-sulfur + copper -- apply 1. after leaf drop, 2. in January, and 3. at bud swell</i>	

PEST MANAGEMENT GUIDE

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Powdery Mildew	Prevention	Cultural	Mechanical/Physical
	<i>Use resistant species and cultivars; grow healthy plants</i>	<i>Provide plenty of sun and air circulation; Spray with kelp+fish as foliar feed during active growing season; Sanitation</i>	<i>Hose off plants early in the day</i>
	Biological	Last Resort	
		<i>Neem; baking soda mix (1 rounded tablespoon baking soda + 1 tablespoon horticultural oil per gallon of water)</i>	
Root Nematodes	Prevention	Cultural	Mechanical/Physical
	<i>Quarantine and inspection; select resistant species and cultivars</i>	<i>Use organic matter regularly; rotation -- particularly including a cover/green manure planting</i>	<i>Solar soil sterilization</i>
	Biological	Last Resort	
Root rots	Prevention	Cultural	Mechanical/Physical
	<i>Avoid overwatering, esp. during summer; Solar soil sterilization</i>	<i>Use plenty of organic matter</i>	
	Biological	Last Resort	

PEST MANAGEMENT GUIDE

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Root Weevils	Prevention	Cultural	Mechanical/Physical
		<i>Rotation</i>	<i>Handpicking (at night)</i>
	Biological	Last Resort	
	<i>Parasitic nematodes</i>		
Rust (<i>emphasis on rose and geranium</i>)	Prevention	Cultural	Mechanical/Physical
	<i>Use resistant cultivars</i>	<i>Sanitation; remove mulches</i>	
	Biological	Last Resort	
		<i>Sulfur; Neem</i>	
Scale	Prevention	Cultural	Mechanical/Physical
	<i>Control ants; Quarantine</i>		<i>Scrape off adults with fingernail or stick</i>
	Biological	Last Resort	
	<i>Green lacewings; Ladybugs (attract); Parasitoids (many); Predaceous bugs</i>	<i>IS (after scraping off adults); horticultural (summer) oil; dormant oil (in winter)</i>	
Snails, slugs	Prevention	Cultural	Mechanical/Physical
	<i>Barriers of DE (works only when dry), copper banding</i>	<i>Sanitation; avoid overly coarse mulches</i>	<i>Handpicking (at night)</i>
	Biological	Last Resort	
	<i>Decollate snails (Legal only in SB County)</i>	<i>Iron phosphate</i>	<i>Trapping with shallow pans of beer (soda, fruit juice also work well) for monitoring snail/slug populations; empty and change them regularly</i>

PEST MANAGEMENT GUIDE

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Sowbugs, pillbugs	Prevention	Cultural	Mechanical/Physical
		<i>Sanitation</i>	<i>Handpicking</i>
	Biological	Last Resort	
	<i>Parasitic nematodes</i>		
Squirrels	Prevention	Cultural	Mechanical/Physical
	<i>Don't stack wood outside</i>	<i>Control weeds in periphery areas</i>	<i>Traps -- bait with nuts, oats, barley; allow the squirrels to become used to the trap before actually setting</i>
	Biological	Last Resort	
	<i>Dogs</i>		
Thrips	Prevention	Cultural	Mechanical/Physical
	Biological	Last Resort	
	<i>Predaceous bugs; Predatory mites; Ladybugs</i>	<i>Neem; Pyrethrum</i>	<i>Monitor with sticky yellow traps</i>
Whiteflies	Prevention	Cultural	Mechanical/Physical
		<i>Prune to maximize air circulation</i>	
	Biological	Last Resort	
	<i>Parasitoids (many esp. Encarsia); Whitefly destroyer (Delphastus pusillus); Green lacewings; Predaceous bugs</i>	<i>IS; Pyrethrum; Neem -- 1. Spray early in the morning; 2. Spray THOROUGHLY; 3. Make 3 applications, seven days apart; 4. Change products</i>	<i>Monitor with sticky yellow traps</i>

WEED MANAGEMENT

1. Know what a weed is. Weeds are pioneers. They are nature's way of covering disturbed and bare ground.

2. Don't disturb the ground. Except for actually planting new plants or cultivating for a new vegetable garden or flower bed, avoid breaking the surface of the soil.

That includes avoiding pulling, digging, tilling to remove weeds. Yanking out even the tiniest weed makes two mistakes. It brings up weed seeds that have been accumulating at the deeper levels of your soil where they have been too deep to germinate. It also creates a disturbed bit of ground that new weed seeds blowing in find suitable for setting anchor. An additional note: weed pulling disturbs the roots of the desired plants nearby, interferes with the edaphon and destroys soil structure.

3. Cover the ground. Mulch newly planted areas, vegetable gardens and annual flower beds.

The best mulch for smothering weeds is a semi-composted organic material of medium diameter particles (about ½-inch) that is applied four to six inches thick. Don't skimp.

Contrary to popular belief, geotextile fabrics (plastics, "landscape cloth") do not work well in the long run and actually lead to more weeds.

Plant living groundcovers to "finish" the landscape and garden. Use low, dense, mat-forming groundcovers to truly cover the ground completely. Some of the most effective weed-suppressant groundcovers include *Acacia redolens*, *Campanula poscharskyana*, *Cerastium tomentosum*, *Dymondia margaretae*, *Gazania rigens* (gray-leafed trailing), and *Thymus polytrichus* 'Pink Chintz'.

Plant other plants (low, dense, spreading shrubs and/or full clumping perennials) densely enough to leave no room between them.

The idea is to cover the ground so thoroughly that no weed seeds can find their way to the ground. Those that do make it to the ground cannot make their way up. And those very few that do make it up can't compete well.

4. Water deeply and infrequently. When you do water, run the system or hose for enough time to provide a good amount of water that will train roots to go down deeply. This will prepare the plants for periods of infrequent waterings.

Watering infrequently allows the soil surface to dry out, hence providing no situation that encourages weed seed germination.

5. Hoe weeds. When weeds do come up in open ground, the best way to eliminate weeds for the long run is to “shave” them off with a sharp hoe. A Dutch or onion hoe is ideal; these have shallow but wide blades that work as does your razor blade.

Hoeing works on weed seedlings. The larger the weed, unfortunately, the more difficult it becomes to actually be able to scrape them off with a hoe.

Use the hoe as you would a razor, scraping toward you with the blade level from side to side against the ground and the handle tilted up enough to allow the sharpest part of the blade to cut at the base of the weeds.

It’s important that you sharpen the hoe blade regularly with a fine rasping file. You keep your best kitchen knives sharp all the time; why not your hoe.

The soil is best hoed when pretty dry. The hoe doesn’t cling to the soil and neither do the weeds.

Hoeing works for all young weeds. Young annual weeds (our most common type) once hoed, do not return.

Perennial weeds will re-sprout from storage roots, tubers, underground stems and the like. The re-sprouting does, however, use up the food in the storage organ, thereby weakening the plant and a second hoeing of these, within a week of their re-sprouting will rid the plant of its ability to photosynthesize (which puts more food back into the storage organ). With older perennial weeds, the storage organ will continue to send up a new sprout and your persistent hoeing will eventually totally exhaust the organ.

6. Snip off the awkward weeds. Where you have small weeds popping up in the mulch or in the lawn, use any sharp tool to cut them off at their very base. No need to pull, which would either disturb the mulch or interfere with the lawn. This technique also is the best method for removing weeds from containers in which you’re growing other plants.

7. Mow weeds. Where seasonal weeds have grown too tall for a hoe to scrape them off easily, mow them down with a regular lawn mower. If they continue to grow, mow them again. Repeat.

This works best if you mow them early, before they get too tall. The idea is to keep them mowed until beyond their blooming period, if you have to, so that they never set seed and become a worse problem or at least a continuing problem. Annual weeds eventually give up and peter away.

Tall-growing perennial weeds also give up and fade away. Low-growing perennial weeds, however, are persistent – maybe even more vigorous -- under this process. Hoeing (early on, of course) and mulching are better methods for such low-growing weeds as oxalis, dandelions and many clovers.

8. Cut down the big stuff. Use a special tool called a weed cutter. It's used much as you would a golf club, swinging with an easy stroke back and forth through the stems of the weeds. For those of you who are power-inclined, get out your power weed whacker.

Nine Earth-Friendly Pest Management Tools

Here are the products you are most likely to need for a landscape or garden. Note that many others are available and sometimes recommended but these are the safest and most effective for most home gardeners.

<i>Name</i>	<i>Use against</i>	<i>How it works; how long it lasts</i>	<i>How to use it</i>
1. BT Toxic primarily to caterpillars (larvae of moths, butterflies)	Many caterpillars -- the larval stage of moths and butterflies.	Bacterial toxin; caterpillars stop eating with an hour and die usually within 24 hours. Dissipates in 2 days or less.	Available as spray or dust. Apply late afternoon and reapply after rain. Mix with insecticidal soap for better coverage.
2. Diatomaceous earth (DE) Toxic primarily to soft-bodied insects, snails and slugs	Discourages aphids, mealybugs, thrips, and a good barrier against slugs, snails, some ants.	Sharp-edged diatom skeletons scratch insect exteriors, causing them to dry out.	More effective combined with pyrethrum. Use natural grade DE, not the kind used in swimming pool filters. Wear dust mask.
3. Horticultural oils (summer) Toxic to many insects and mites	Kills aphids, corn earworms, leafhoppers, mites, whiteflies.	Kills pests by suffocating them. No long-term effects.	Use highly refined summer oils. Do not apply to drought-stressed plants, or on hot, cold, or very humid days.
4. Insecticidal soap (IS) Toxic mostly to soft-bodied insects	Kills aphids, earwigs, leafhoppers, mites, whiteflies.	One of the safest insecticides. Fatty acids destroy the cellular membrane of insects on contact.	Mix with warm soft water and be sure to cover both sides of leaves. Can burn leaves during hot weather.

Garden Pest Management Tools (continued)

Nine Pest Management Tools (continued)			
<i>Name</i>	<i>Use against</i>	<i>How it works; how long it lasts</i>	<i>How to use it</i>
5. Iron Phosphate “Animal-safe” snail bait	For control of snails and slugs; use less than typical snail baits.	Attracts slugs and snails; metallic properties stop feeding activities within 8 hours and begin to die in 3-6 days.	Scatter in slug and snail prone areas. Breaks down into fertilizer after several days.
6. Neem Toxic to juvenile forms of some pests; also a repellent	Kills juvenile aphids. Repels whiteflies.	Affects growth hormones of some insects causing them to stop feeding. No quick knockdown but effect lasts about 1 week.	Apply liquid spray morning or evening when humidity is high.
7. Pyrethrum Toxic to a broad spectrum of pests	Controls most vegetable pests including flea, potato, and bean beetles.	A nerve toxin, often combined with DE. Very quick knockdown. Degrades rapidly.	Apply dust during cloudy weather or early evening. <i>AVOID SYNTHETIC VERSIONS (Pyrethroids).</i>
8. Tanglefoot Permanently sticky barrier	Ants and other crawling/climbing insects.	Stays sticky for at least six weeks. More a barrier than a “control”.	Apply as bands on edges of raised beds.
9. Beneficial Organisms Biological control -- the “good guys”	There’s a bio-control for almost everything.	Takes a while to reach appreciable management levels; many species last forever.	Release in areas of most intense pest infestation; provide special flowers or beneficial feeding formulas.