

Volume 2: Japanese Beetles to Raspberry Fruitworms

— Why Pests — Target Your Garden

(and How to Stop Them Naturally)



*Nutrient Deficiencies, Companion Plants,
and Organic Control Strategies*

by Laurie Neverman of Common Sense Home

Why Pests Target your Garden (and How to Stop Them Naturally)

Organic Pest Control Guide Volume 2

Japanese Beetles to Raspberry Fruitworms

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The Pest Control Tool Box

I've read dozens of gardening books and hundreds of articles, plus I've been gardening in some form or another for over 50 years. From helping my mom in our sprawling country garden, to container plants in college, to our raised cedar bed garden in the suburbs, to a tiny plot in the city while we were building our current home, back out to the country again, I've seen a lot of different pests. I've helped our readers troubleshoot pests in their gardens, too.

I wanted to pull together all the different techniques for organic pest management in easy to follow guides, where you could look up your pest and have a full “set of tools” for control. This guide contains:

- Tips for Identifying Pests and Their Damage
- Companion Plant Recommendations
- Barriers & Physical Controls
- Sprays & Dusts
- Natural Fertilizers and Foliar Feeds to address nutrient deficiencies that attract insects to plants

Note: Many of the pests have similar feeding habits, and are associated with similar nutrient deficiencies. Feel free to mix and match controls and fertilizers to find the solution that works best in your garden. For instance, the entries for aphids and peach tree aphids offer different options to deal with very closely related pests. Work with what you have available.

If you want to keep things simple, start with calcium as a foliar feed. It helps with just about everything.

Why have fertilizers and foliar sprays in a pest control book?

According to Dr. Arden Andersen in his book, “The Anatomy of Life & Energy in Agriculture” (and other researchers), pests are more attracted to plants when those plants are lacking in specific nutrients. Address these nutrient deficiencies, and you’ll see a dramatic improvement in plant health and vigor – and fewer pests. I combined Dr. Andersen’s list of nutrient deficiencies associated with specific pests with fertilizer and foliar feed recommendations that address those deficiencies.

Applying foliar sprays can quickly correct nutrient imbalances and strengthen plants. The fertilizers and foliar feed recommendations are based on regenerative gardening principles. To strengthen plant defenses and correct mineral imbalances, regenerative practices focus on bioavailable, organic amendments.

To use these guides, identify your insect, and then choose the strategy or combination of strategies you want to use for control. Each insect entry includes a description of the pest and the damage it does to help with identification.

When using foliar feeds, remember the following tips:

- Apply foliar sprays early in the morning or in the late afternoon to maximize nutrient absorption.

- Alternate different foliar feeds every 7-10 days to maintain a balance of nutrients and support overall plant health.
- **Avoid overusing nitrogen-based fertilizers, as excessive nitrogen can lead to weak, pest-attracting growth.**

Japanese Beetles

Japanese Beetles: Identification, Damage, and Nutrient Link



Japanese beetles are metallic green insects with bronze wing covers, approximately 1/2 inch long. They are one of the most destructive garden pests in North America. The adult beetles feed on the foliage, flowers, and fruit of more than 300 plant species, including roses, beans, raspberries, grapes, and fruit trees. The larvae, a type of white grub, feed on grass roots and can damage lawns and

crops from below.

Damage Symptoms:

- Leaves with a “skeletonized” appearance (only veins left)
- Petals and soft fruit chewed into lace-like patterns
- Premature browning and defoliation
- Root feeding by grubs causes yellowing and drought stress

Plants heavily attacked by Japanese beetles are likely deficient in **Calcium and Copper**.

Calcium strengthens cell walls and is vital for structural resilience, while Copper plays a crucial

role in enzyme systems that protect against fungal and insect stress. Deficiencies reduce a plant's resistance to chewing and contribute to chemical signals that attract pests like Japanese beetles.

Control Strategies

Companion Planting

Companion plants can deter Japanese beetles or draw them away from key crops.

- **Repellents:** Garlic and chives: High in sulfur compounds, which deter beetles when interplanted. Rue and Tansy: Strong aromatic herbs that repel many leaf-feeding pests. Catnip: Effective at repelling flea beetles and Japanese beetles.
- **Trap Crops** (use strategically): Roses, basil, and raspberries can lure beetles away from more vulnerable crops. Visit daily and handpick beetles into soapy water to reduce breeding and feeding.
- **Pollinator/Beneficial Insect Support:** Plant dill, fennel, or yarrow nearby to attract tachinid flies and parasitic wasps, which prey on adult beetles and their larvae.

Barriers & Physical Controls

- **Row Covers:** Lightweight insect netting can block adult beetles during peak feeding (mid-June to August). Only use on non-pollinated crops or remove during flowering.
- **Handpicking:** Early morning is best. Drop beetles into a bucket of soapy water to kill them.
- **Soil-Based Larvae Control:** Apply milky spore powder (*Bacillus popilliae*) to lawns and garden beds in late summer or fall. It infects beetle larvae (grubs), reducing future adult

populations. Alternatively, introduce beneficial nematodes (*Heterorhabditis bacteriophora*) to the soil, ideally in spring or late summer when grubs are near the surface.

Sprays and Dusts

- **Neem Oil (Azadirachtin-based):** Disrupts beetle feeding and breeding cycles. Spray every 5–7 days on affected plants and trap crops. Use early morning or dusk to avoid harming pollinators.
- **Kaolin Clay (brand name: Surround):** Creates a chalky barrier on foliage that deters beetle feeding and egg laying. Apply a full-coverage spray before beetle emergence and reapply after rainfall.
- **Garlic-Chili Spray:** Blend 1 bulb of garlic and 2 hot peppers in water, strain, and add a teaspoon of castile soap. Dilute to 1 gallon and spray plants weekly. Not a direct killer but discourages beetle presence through taste and smell.
- **Diatomaceous Earth:** Sprinkle around plant bases and leaf undersides. It abrades soft-bodied beetles and larvae. Reapply after rain or heavy dew.

Fertilizers and Foliar Spray Recommendations

Soil Amendments

- **Calcium:** Gypsum (calcium sulfate) provides calcium without altering soil pH. High-quality compost made with seaweed or nettles often contains trace calcium.
- **Copper:** Azomite or glacial rock dust add trace copper to soil biologically. For confirmed deficiencies, a small amount of copper sulfate may be used (very sparingly, too much can

damage helpful soil fungi). Composted seaweed or kelp is a slow-release source of copper and other trace minerals.

Foliar Feeds

- **Eggshell-Vinegar Calcium Extract:** Clean and dry eggshells. Crush and soak in apple cider vinegar (1:1 ratio by volume). Let it bubble for 3–5 days, then dilute 1:50 with water. Spray on leaves weekly to increase calcium absorption through stomata.
- **Liquid Kelp or Seaweed Extract:** Rich in Copper, Iron, and growth-promoting compounds. Use 1–2 tablespoons per gallon as a foliar mist weekly.
- **Compost Extract (not anaerobic tea):** Mix 1 part quality compost with 5 parts water. Stir occasionally for 1–4 hours. Strain and spray within a few hours to inoculate leaf surfaces with microbes and micronutrients.
- **Nettle Fermentation Tea:** Rich in minerals, especially iron and calcium. Fill a bucket with chopped nettles, cover with water, weigh down, and allow to ferment 10–14 days. Dilute 1:10 with water and spray weekly.

Leaf-Cutter Bees

Leaf-Cutter Bees: Identification, Damage, and Nutrient Deficiencies



Leaf-cutter bees (*Megachile* spp.) are solitary native pollinators that resemble small, dark bees, sometimes with light-colored hair on their undersides. They play an important ecological role by pollinating many garden plants. However, they sometimes cut nearly perfect, circular or oval notches from leaves (especially rose, lilac, redbud, and pea-family plants) to use as nesting material.

These cuts typically do not destroy the plant but may stress already weakened or nutrient-deficient specimens.

Damage Symptoms:

- Circular or oval cut-outs on the edges of leaves
- No chewing or feeding on the leaf tissue—only removal of material
- Repeated damage can reduce photosynthetic surface area, particularly in young or stressed plants

From a regenerative perspective, heavy or unusual damage by leaf-cutter bees may signal a nutritional imbalance in the plant, specifically deficiencies in:

- **Calcium** (cell wall strength, tissue integrity)
- **Phosphorous** (energy and root growth)
- **Iron and Copper** (enzyme systems, photosynthesis)
- **Cobalt** (trace element for beneficial microbes)
- **Boron** (cell wall synthesis, flower and fruit development)

Control Strategies

Because leaf-cutter bees are beneficial pollinators, the goal is not to eliminate them, but to redirect their nesting behavior and strengthen plants through improved mineral nutrition and defense signaling.

Companion Planting and Trap Crops

- **Plant Decoys:** Redbuds, roses, and lilacs are preferred nesting material sources. Strategically plant them nearby to attract bees away from delicate or young crops. Alfalfa and clover serve both as nectar sources and leaf-cutting decoys.
- **Herbal Deterrents:** Basil, thyme, and oregano have aromatic compounds that may discourage nesting behavior on nearby sensitive plants.

Barriers & Physical Controls

- **Floating Row Covers:** Use lightweight, breathable row covers (like Agribon-15) to protect seedlings or prized ornamentals during peak bee activity, especially in spring. Remove during flowering to allow for pollination, if needed.

- **Netting or Screened Cages:** Enclose small shrubs or roses that are being heavily cut, especially if young and stressed.
- **Aluminum foil collars or reflective mulch:** Some gardeners report that the reflection deters bees from leaf harvesting. Can be used temporarily around particularly sensitive plants.

Sprays and Dusts

Since bees are highly sensitive to sprays (even organic ones), avoid any broad-spectrum insecticides, including neem or pyrethrins.

Instead, use these mild and targeted options:

- **Garlic-Chili Spray (Repellent Only):** Make a concentrated tea from garlic and cayenne pepper. Apply around targeted areas, not on flowers. Acts as a mild repellent without harming bees when used sparingly.
- **Kaolin Clay Spray (Surround WP):** Creates a film that makes leaves less appealing for cutting. Mix and apply thoroughly to leaf surfaces (avoiding flower heads). Reapply after rain.
- **Dust Barriers (Minimal Use):** Use rock dusts (like basalt or granite) on soil surfaces or plant bases to boost mineral availability and create minor texture deterrents. Not recommended directly on leaf surfaces where bees land.

Fertilizers and Foliar Spray Recommendations

To resolve the underlying deficiencies associated with leaf-cutter bee attraction, focus on broad-spectrum remineralization and plant resilience through biologically available nutrients.

Soil Amendments

Calcium: Apply gypsum (for neutral pH soils) or soft rock phosphate (which provides both calcium and phosphorous). Crushed oyster shells or eggshell vinegar extract also work long-term.

Phosphorous: Soft rock phosphate is the ideal regenerative option. Bone char or bone meal can also be added for slow-release P.

Iron & Copper: Azomite, glacial rock dust, or volcanic basalt dust all contain these and other essential trace minerals. Composted seaweed/kelp is particularly useful for Copper and Boron.

Cobalt & Boron: Sea minerals (like SEA-90) or seaweed-based products often contain both. Apply small amounts to avoid boron toxicity; ideal in compost teas or diluted foliar use.

Foliar Feeds

- **Eggshell Vinegar Calcium Extract:** Soak crushed eggshells in apple cider vinegar for 3–5 days. Dilute 1:50 with water and apply weekly to plant foliage.
- **Seaweed or Kelp Extract:** Source of Copper, Boron, and trace Cobalt. Apply as foliar spray at 1–2 tbsp per gallon every 7–10 days.

- **Compost Extract or Liquid Ferments:** Use 1 part high-quality compost to 5 parts water. Stir for 1–4 hours. Strain and apply within 6 hours. Inoculates leaves and delivers minerals in microbial form.
- **Nettle or Comfrey Fermented Plant Extract (FPE):** Rich in Calcium, Phosphorous, and Iron. Ferment chopped leaves in water for 10–14 days. Dilute 1:10 and spray weekly. By combining nutrient-dense soil practices with strategic plant management, you can reduce the attractiveness of your plants to leaf-cutter bees while preserving them as pollinators.

Mites

Mites: Identification, Damage, and Nutrient Deficiencies



Mites, particularly spider mites, are tiny arachnids (not insects) that feed on plant sap. They are usually found on the underside of leaves and are difficult to see without magnification. Common signs of mite infestation include:

- Fine webbing on leaves or stems
- Speckled, yellowing, or stippled leaves
- Leaf drop or stunted growth

Plants that attract mites are often **deficient in calcium and phosphorous**. Calcium is essential for strong cell walls, and phosphorous supports energy transfer and root development.

Control Strategies (see also Spider Mites)

Cultural Controls

- **Water Stress Management:** Mites thrive in dry conditions. Maintain consistent soil moisture and increase humidity around plants when possible.
- **Prune & Remove Infested Material:** Cut off affected leaves and destroy them (do not compost), especially if webbing is visible.

Companion Planting

- **Garlic, chives, and onions:** Repel mites with their strong sulfurous odors.
- **Cilantro and dill:** Attract predatory insects like lacewings and lady beetles that feed on mites.
- **Caraway and fennel:** Support populations of parasitic wasps and other beneficial insects.

Barriers and Physical Measures

- **Row Covers:** Lightweight floating row covers can help prevent mite infestations early in the season but are less useful once the pests are established.
- **Spray Jets:** Regularly hosing down leaves (especially undersides) dislodges mites and washes away eggs. Do this in the early morning to avoid mold issues.

Organic Sprays

- **Neem Oil (0.5–1% solution):** A powerful miticide that disrupts feeding and reproduction. Spray every 3–5 days until populations drop.
- **Insecticidal Soap:** Use a commercial product or a homemade soap spray (e.g., 1–2 teaspoons of pure liquid soap per quart of water). It works by suffocating mites on contact.
- **Sulfur Dust or Spray:** Effective for mite suppression. Do not apply during high heat to avoid phytotoxicity. Sulfur also supports fungal suppression and minor micronutrient supplementation.

Biological Controls

- **Predatory Mites (*Phytoseiulus persimilis*):** These beneficial mites feed on spider mites and are highly effective in greenhouses or controlled garden environments.
- **Lacewings and lady beetles:** Encourage or release these predators to help control mite populations naturally.

Fertilizers and Foliar Spray Recommendations

Soil Amendments

- **Crushed eggshells or oyster shell flour:** Long-term calcium sources.
- **Rock phosphate or soft rock phosphate:** Offers a slow-release form of phosphorous.
- **Bone meal:** A balanced source of both calcium and phosphorous.
- **Compost rich in eggshells and banana peels:** A gentle DIY option.

Foliar Feeds

Calcium-Rich Foliar Sprays:

- **DIY Vinegar Extract:** Soak finely ground eggshells in apple cider vinegar (1:1 ratio) for 1–2 weeks. Strain and dilute (1–2 tablespoons per gallon) before spraying.
- **Comfrey Tea Spray:** Comfrey is high in calcium, potassium, and phosphorous. Ferment comfrey leaves in water for 7–10 days, strain, and dilute 1:10 with water.

Phosphorous Foliar Sprays:

- **Fish Hydrolysate or Fish Emulsion:** Apply diluted as per product instructions.
Excellent source of phosphorous and micronutrients.
- **Nettle Ferment:** Increases phosphorous and micronutrient uptake while improving overall plant resilience.

Nematodes

Nematodes: Identification, Damage, and Nutrient Deficiencies

Nematodes are microscopic roundworms. While many are beneficial, some species — like root-knot nematodes (*Meloidogyne spp.*) — are highly destructive plant parasites. They feed on plant roots, causing:

- **Swollen, knotted galls** on roots
- **Stunted growth**
- **Yellowing or wilting leaves**
- **Reduced yields**

Nematode infestations commonly occur in plants with **low calcium and phosphorous levels**.

Deficiencies in these nutrients weaken root defenses and make plants more attractive to nematodes.

Control Strategies

Cultural Practices

- **Crop Rotation:** Avoid planting susceptible crops (e.g., tomatoes, carrots, potatoes) in the same soil each year.
- **Solarization:** In hot climates, cover moist soil with clear plastic for 4–6 weeks during summer to reduce nematode populations.

- **Sanitation:** Remove and destroy infected plants after harvest to prevent nematode reproduction.

Companion Planting and Biofumigants

- **Marigolds (*Tagetes patula*):** Release nematicidal compounds (thiophenes) through their roots. Plant as a dense cover crop or interplant.
- **Mustard Greens:** When chopped and incorporated into soil, they release glucosinolates which act as natural fumigants against nematodes.
- **Sunn Hemp (*Crotalaria juncea*):** A nematode-suppressing green manure crop that also improves soil structure and organic matter.

Soil Building Cover Crops

- **Cowpeas, velvet bean, and forage radish:** Suppress nematodes while enriching soil with biomass and nutrients.

Organic Soil Amendments that Act as Deterrents

- **Crab Shell Meal:** High in chitin, which feeds chitin-degrading microbes. These microbes can reduce nematode eggs and larvae in the soil.
- **Neem Cake or Neem Meal:** Contains azadirachtin and other compounds that deter nematodes and improve soil health.

Biological Controls

- **Beneficial Nematodes (e.g., *Steinernema* or *Heterorhabditis*):** These species target insect pests, not plant roots, but introducing diverse soil biota can outcompete plant-pathogenic nematodes.
- **Mycorrhizal Fungi:** Help roots access nutrients and create a protective barrier against nematodes.

Fertilizers and Foliar Spray Recommendations

Soil Amendments

- **Crushed eggshells or oyster shell flour:** Slow-release calcium source.
- **Soft Rock Phosphate or Bone Meal:** Supplies plant-available phosphorous and some calcium.
- **Wood Ash (in moderation):** Adds calcium and raises pH slightly, which can reduce nematode pressure.

Foliar Feeds

Calcium Foliar Spray:

Vinegar Eggshell Extract: Soak clean, crushed eggshells in apple cider vinegar (1:1) for 1–2 weeks. Strain and dilute (1–2 tbsp per gallon of water) for foliar application.

Comfrey Tea: High in calcium and phosphorous. Ferment in water for 7–10 days, strain, and dilute 1:10 with water.

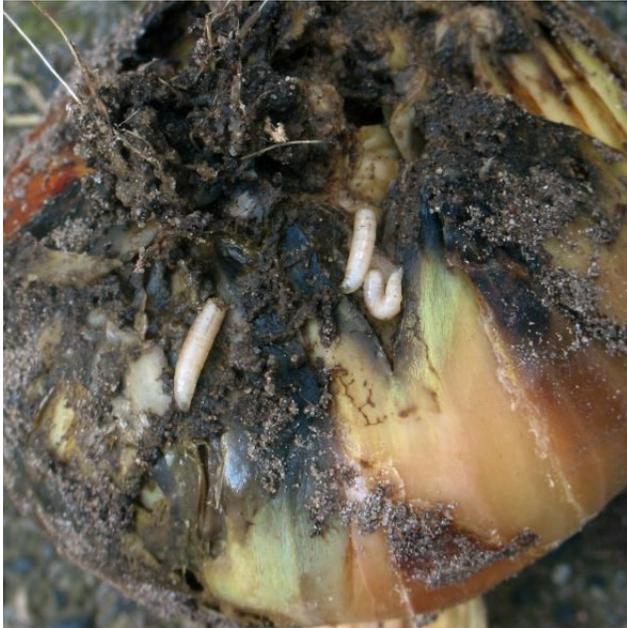
Phosphorous Foliar Spray:

Fish Hydrolysate or Fish Emulsion: Use according to label instructions. Rich in phosphorous, amino acids, and micronutrients.

Nettle Tea (Fermented): Boosts nutrient uptake, including phosphorous and calcium.

Onion Maggots

Onion Maggot: Identification, Damage, and Nutrient Deficiencies



Onion maggots (*Delia antiqua*) are the larvae of small gray flies that resemble houseflies. The adult flies lay eggs at the base of onion plants. Once hatched, the white, legless maggots burrow into bulbs and roots, feeding internally and creating slimy, decayed tunnels.

Damage signs:

- Wilting of young onion shoots
- Yellowing or collapse of foliage
- Soft, brown, rotting bulbs with visible tunnels
- Secondary bacterial rot

Their presence suggests the plants may be nutrient-deficient, particularly in calcium (vital for strong root and bulb cell structure) and phosphorous (needed for energy transfer and root vigor).

These deficiencies can leave bulbs more vulnerable to insect invasion and rot.

Control Strategies

Cultural & Preventative Strategies

- **Crop rotation:** Avoid planting onions or other alliums in the same soil for at least 3 years.
- **Remove infected bulbs** promptly to reduce breeding sites.
- **Plant in well-drained soil:** Maggots thrive in moist, compacted conditions.
- **Avoid adding fresh manure** in the current season—it attracts adult flies.

Companion Planting

- **Carrots and lettuce:** Can help mask the onion scent and reduce egg-laying.
- **Mint or rosemary:** Strong-smelling herbs that deter adult flies.
- **Chamomile:** Encourages phosphorus availability and offers some pest deterrence.

Barriers

- **Floating row covers:** Install at planting and keep tightly sealed around edges to prevent egg-laying. Remove only after the maggot flight period (typically after late June in many climates).
- **Mulching with wood ash or diatomaceous earth:** Helps deter egg laying and can desiccate newly hatched larvae.

Biological Control

- **Beneficial nematodes (*Steinernema* spp.):** Apply to the soil to infect and kill maggot larvae.
- **Ground beetles:** Encourage with mulch and cover crops—these are natural predators of maggots.

Sprays and Dusts

- **Neem oil spray (0.5–1%):** Prevents egg-laying and disrupts larval growth.
- **Garlic tea or chili spray:** Natural deterrents that confuse or repel adult flies.
- **Kaolin clay:** Forms a fine film on the soil and plants that deters egg-laying.

Fertilizer and Foliar Spray Recommendations

Soil Amendments

- **Soft rock phosphate:** A regenerative, slow-release source of bioavailable phosphorous.
- **Gypsum or oyster shell flour:** Delivers calcium without significantly altering pH.
- **Composted chicken manure:** Supplies both calcium and phosphorous organically and is well-suited for pre-planting applications.

Foliar Feeds

Calcium Foliar Spray

- *Eggshell vinegar extract*: Combine crushed eggshells and apple cider vinegar (1:1 ratio), allow to ferment for 7–14 days, then strain. Apply 1–2 tablespoons per gallon as a foliar spray.

Phosphorous Foliar Spray

- *Comfrey ferment*: Ferment fresh comfrey leaves in water (1:5 ratio) for 7–10 days, strain, and dilute 1:10 before spraying.

Onion Thrips

Onion Thrips: Identification, Damage, and Nutrient Deficiencies



Onion thrips (*Thrips tabaci*) are tiny, slender insects—pale yellow to light brown—that are difficult to see without close inspection. They feed by rasping plant tissue and sucking out cell contents. Thrips are most often found deep in the folds of onion leaves and at the base of plants.

Damage symptoms include:

- Silvery streaks or blotches on leaves
- Leaf curling, twisting, or drying at the tips
- Reduced bulb size and poor storage quality
- Increased susceptibility to fungal and bacterial disease

Onion thrips commonly attack plants that are nutritionally stressed, particularly those deficient in **Calcium** (weak cell walls and poor tissue repair), **Phosphorous** (impaired energy movement and root function), and **Vitamin E** (reduced antioxidant protection and membrane stability). These deficiencies weaken leaf tissue, making it easier for thrips to penetrate and feed.

Control Strategies

Companion Plant Recommendations

- **Carrots:** Help mask the scent of onions and reduce thrips colonization.
- **Chamomile:** Supports phosphorous availability and overall plant health.
- **Mint and Rosemary:** Strong aromatic herbs that repel thrips when planted nearby.
- **Marigolds:** Deter thrips and attract beneficial insects that prey on them.

Barriers and Cultural Controls

- **Floating row covers:** Install immediately after planting to prevent thrips from accessing young plants. Remove once plants are well established or during flowering if seed production is desired.
- **Reflective mulch:** Silver or aluminum-colored mulches disorient thrips and reduce feeding.
- **Consistent irrigation:** Thrips thrive in hot, dry conditions. Maintaining even soil moisture helps reduce pressure.
- **Remove heavily infested foliage:** Dispose of it away from the garden to prevent reinfestation.

Sprays

- **Neem oil (0.5–1%):** Disrupts feeding and reproduction. Apply in early morning or evening and repeat every 5–7 days during outbreaks.

- **Insecticidal soap:** Effective against nymphs when sprayed directly into leaf folds.
Reapply as needed.
- **Garlic-chili spray:** Acts as a repellent and feeding deterrent.

Garlic-Chili Spray Recipe

Blend 1 bulb of garlic and 1–2 hot peppers in 1 quart of water. Let steep 12–24 hours, strain, add a few drops of mild liquid soap, and dilute to 1 gallon before spraying.

Dusts

- **Diatomaceous earth:** Apply lightly around the base of plants and on dry leaf surfaces to damage thrips' exoskeletons.
- **Kaolin clay:** Apply as a spray to coat leaves with a fine film that discourages feeding and egg-laying.

Fertilizer and Foliar Spray Recommendations

Soil Amendments

- **Gypsum or crushed eggshells:** Provide calcium without excessively raising soil pH.
- **Soft rock phosphate or bone meal:** Long-term source of phosphorous to support root development and energy transfer.
- **Composted sunflower seeds or sunflower meal:** A natural source associated with vitamin E precursors and soil antioxidant support.

- **High-quality compost:** Supports microbial activity that improves mineral uptake and vitamin synthesis within plants.

Foliar Sprays

1. Eggshell Vinegar Calcium Extract

Crush eggshells and soak in apple cider vinegar for 7–10 days until bubbling stops. Strain and dilute 1–2 tablespoons per gallon of water. Spray every 10–14 days to strengthen leaf tissue.

2. Comfrey Fermented Plant Extract

Comfrey is rich in calcium and phosphorous. Ferment chopped leaves in water for 7–10 days, strain, and dilute 1:10. Apply as a foliar spray during active growth.

3. Seaweed or Kelp Extract (Vitamin E Support)

Liquid kelp provides antioxidant compounds, trace minerals, and lipid-supporting nutrients associated with vitamin E function. Apply at 1–2 tablespoons per gallon every 2–3 weeks.

4. Compost Tea with Oilseed Input

Brew compost tea using high-quality compost and a small amount of ground sunflower seed or flax meal. Apply as a foliar spray to support microbial signaling and antioxidant capacity in plants.

Potato Beetles, Colorado

Colorado Potato Beetles: Identification, Damage, and Nutrient Deficiencies



The Colorado potato beetle (*Leptinotarsa decemlineata*) is a notorious pest of potatoes, eggplants, tomatoes, and other nightshade family crops. Adult beetles are oval-shaped with distinctive yellow-orange bodies and black stripes running down their wing covers. Their larvae are reddish-orange with black spots along the sides. Both adults and larvae are voracious feeders, skeletonizing leaves and

severely weakening plants.

We used to have terrible problems with these beetles. We did a lot of hand picking and dusting with diatomaceous earth to manage them, but it was a battle. In recent years, as the soil improved, they virtually disappeared from the gardens. I know they are in the area because neighbors are still having problems, but we have no significant damage to our potatoes.

The presence of Colorado potato beetles often indicates that the affected plants are deficient in calcium, phosphorus, vitamin C, copper, and manganese. Calcium strengthens plant cell walls, phosphorus supports root and energy production, vitamin C enhances resistance to oxidative stress, copper is essential for enzyme activation and disease resistance, and manganese plays a key role in photosynthesis and plant metabolism.

Control Strategies

Companion Planting

- **Repellent Plants:** Catnip, tansy, and sage release compounds that deter Colorado potato beetles. Onions, garlic, and chives contain sulfur compounds that discourage pests. Horseradish is traditionally planted around potatoes to repel beetles.
- **Trap Crops:** Buffalobur (*Solanum rostratum*) is a wild nightshade species that can be planted away from the main crop to attract beetles. Eggplant can serve as a sacrificial crop, luring beetles away from potatoes.
- **Predator-Attracting Plants:** Dill, fennel, alyssum, and yarrow attract beneficial insects such as ladybugs, lacewings, and predatory stink bugs, which feed on beetle larvae. Sweet alyssum and buckwheat provide nectar for parasitic wasps that target Colorado potato beetles.

Barriers & Physical Controls

- **Row Covers:** Floating row covers prevent adult beetles from laying eggs on plants. These should be removed once plants begin flowering to allow pollination.
- **Handpicking:** Check plants daily for adult beetles and larvae, removing them by hand and dropping them into soapy water. This is especially effective in small gardens.
- **Crop Rotation:** Rotate potato crops each year to prevent overwintering beetles from emerging in the same area. Avoid planting potatoes in the same spot for at least three years.

- **Mulching:** Apply a thick straw or wood chip mulch around potato plants. (I prefer straw.)

This can hinder beetle movement and reduce egg-laying.

Sprays & Dusts

- **Neem Oil:** Disrupts the feeding and molting cycles of larvae, reducing their ability to grow and reproduce. Apply every 7–10 days for best results.
- **Bacillus thuringiensis var. tenebrionis (Bt-t):** A naturally occurring bacterial spray that specifically targets young Colorado potato beetle larvae without harming beneficial insects.
- **Kaolin Clay Spray:** Forms a protective barrier on leaves, discouraging beetles from feeding and laying eggs. Reapply after rain.
- **Diatomaceous Earth (DE):** Sprinkling DE around the base of plants can deter crawling larvae. Apply in dry weather for best results.
- **Garlic-Chili Spray:** A homemade spray made from crushed garlic, chili peppers, and water can repel beetles and reduce feeding.

Fertilizer and Foliar Spray Recommendations

Soil Amendments

- **Calcium:** Apply gypsum, crushed eggshells, or finely ground oyster shells. Bone meal can also provide a slow-release calcium source.
- **Phosphorus:** Use rock phosphate, bone meal, or composted manure to enhance phosphorus availability.

- **Vitamin C (Antioxidant Support):** Encourage compost-rich soils with diverse organic matter, including fermented plant extracts.
- **Copper:** Add compost enriched with trace minerals, or apply a copper sulfate foliar spray in cases of extreme deficiency.
- **Manganese:** Use kelp meal or seaweed extracts, which naturally contain manganese and other micronutrients essential for plant health.

Foliar Feeds

- **Calcium Boost:** A diluted whey spray or fermented nettle extract helps strengthen cell walls, making plants less attractive to beetles.
- **Phosphorus-Rich Spray:** Apply fermented banana peel tea or a compost tea extract to provide bioavailable phosphorus.
- **Vitamin C Support:** Use a seaweed extract spray to enhance plant antioxidant production and resilience.
- **Copper Supplement:** A diluted copper sulfate or liquid kelp spray provides a natural boost.
- **Manganese Supplement:** A fermented seaweed spray or a nettle infusion can help provide bioavailable manganese.

Potato Flea Beetles

Potato Flea Beetles: Identification, Damage, and Nutrient Deficiencies



Potato flea beetles are tiny, shiny, black or brown beetles (1.5–3 mm) with enlarged hind legs that allow them to jump when disturbed. They often appear in early spring and prefer warm, dry conditions. Adults chew small, shot-hole patterns in leaves, while larvae feed on roots and tubers.

Damage signs:

- Numerous small round holes (“shot holes”) in potato leaves
- Reduced leaf surface and photosynthetic ability
- Poor tuber development due to root feeding
- Stunted, stressed, and vulnerable plants

Potato flea beetles often attack plants weakened by nutritional imbalances—particularly those low in **calcium (cell wall integrity)**, **phosphorus (root energy transfer)**, **iron (chlorophyll production)**, **manganese and copper (enzyme function and disease resistance)**, **vitamin E (antioxidant protection)**, and **vitamin C (stress tolerance and cell health)**.

Control Strategies

Cultural & Preventative Practices

- **Early planting:** Plant potatoes early in the season to get ahead of flea beetle emergence.
- **Healthy soil:** Build mineral-rich, biologically active soil to improve plant resistance.
- **Remove plant debris:** Clear away solanaceous crop residues after harvest to reduce overwintering habitat.

Companion Plants

- **Catnip and basil:** Repel flea beetles with strong aromatic compounds.
- **Radish trap crop:** Plant radishes nearby to attract beetles away from potatoes, then remove and destroy the infested plants.
- **Nasturtiums and marigolds:** Help distract and repel flea beetles from crop rows.

Barriers

- **Floating row covers:** Use lightweight covers from planting until plants are well-established. Ensure edges are sealed to block beetle entry.
- **Thick straw mulch:** Reduces beetle movement and hinders egg-laying.

Sprays and Dusts

- **Neem oil (0.5–1%):** Interrupts the beetles' feeding and reproduction cycle. Apply in early morning or evening.

- **Garlic-chili spray:** Combine garlic, hot peppers, and soap in water, steep and strain, then spray to deter feeding.
- **Kaolin clay (Surround WP):** Creates a white film on leaves that repels flea beetles and confuses visual targeting.
- **Diatomaceous earth:** Lightly dust plants (when dry) to physically damage beetles' exoskeletons.

Fertilizer and Foliar Spray Recommendations

Soil Amendments

- **Soft rock phosphate:** Supplies bioavailable phosphorus and trace calcium.
- **Composted poultry manure:** A well-balanced amendment rich in phosphorus, calcium, and micronutrients.
- **Greensand:** Provides iron, manganese, and trace minerals.
- **Kelp meal:** A source of natural vitamin C and E, plus copper and manganese.

Foliar Sprays

Calcium and Vitamin C Foliar Spray

- *Eggshell vinegar extract:* Soak crushed eggshells in apple cider vinegar, let ferment for 1–2 weeks, strain, and apply at 1–2 tablespoons per gallon of water.

Micronutrient & Antioxidant Foliar Blend

- *Kelp ferment or tea*: Steep dried kelp in water for 24 hours, strain, and dilute 1:10. Spray weekly for trace elements and natural vitamins.

Comfrey + Nettle Ferment (Palmer method)

- Ferment fresh comfrey (high in calcium and potassium) and stinging nettle (rich in iron and manganese) in water for 10–14 days. Dilute 1:10 and apply every 7–14 days during active growth.

Iron boost option

- Use chelated iron (EDDHA or EDTA) diluted per label, or steep rusty nails in vinegar for 1 week, dilute with water, and apply cautiously as a soil drench near roots (not foliar).

Potato Leaf Hoppers

Potato Leaf Hoppers: Identification, Damage, and Nutrient Deficiencies



Potato leaf hoppers (*Empoasca fabae*) are small, wedge-shaped, light green insects about $\frac{1}{8}$ inch long. They move quickly and jump or fly when disturbed. Though tiny, their feeding causes major damage by injecting toxins into the plant as they suck sap.

Damage signs:

- Leaf “hopper burn”: yellowing and curling of leaf edges
- Stunted growth and misshapen leaves
- Reduced yields and lower tuber quality
- Increased vulnerability to disease and environmental stress

Plants heavily affected by leaf hoppers are often deficient in calcium (cell wall development), phosphorus (energy and root strength), manganese and copper (enzyme activation and disease resistance), and iron (chlorophyll production). Addressing these imbalances strengthens plant resistance and can reduce pest pressure.

Control Strategies

Cultural Practices

- **Intercrop with taller, sturdy plants** to disrupt hopper movement.
- **Practice crop rotation** and avoid planting in areas where hoppers have been a problem in the previous season.
- **Keep plants well-watered** to reduce stress and improve nutrient uptake.

Companion Plants

- **Basil and nasturtium:** Help deter leaf hoppers with strong aromatic oils.
- **Cilantro and marigold:** Attract beneficial predators such as lacewings and parasitic wasps.
- **Buckwheat:** Attracts predatory insects and provides cover for natural enemies.

Barriers

- **Floating row covers:** Use to protect young, vulnerable plants during early growth stages.
- **Reflective mulch:** Silver or aluminum-colored mulches confuse leaf hoppers and reduce landings.

Sprays and Dusts

- **Neem oil (0.5–1%):** Inhibits feeding and reproduction. Spray in early morning or dusk.

- **Garlic + hot pepper spray:** Blend garlic, cayenne, and a few drops of soap in water, strain and apply weekly.
- **Kaolin clay (Surround WP):** Leaves a white film on leaves that deters feeding and egg-laying.
- **Insecticidal soap:** Spray directly on nymphs to reduce populations. Reapply every 5–7 days.

Encourage Predators

- Beneficial insects like lacewings, ladybugs, and minute pirate bugs feed on nymphs.
- Avoid broad-spectrum insecticides that harm natural predators.

Fertilizer and Foliar Spray Recommendations

Soil Amendments

- **Soft rock phosphate:** Supplies phosphorus and calcium slowly over time.
- **Composted poultry manure:** Boosts phosphorus and trace copper levels.
- **Greensand:** A source of slow-release iron and potassium.
- **Azomite or basalt rock dust:** Offers a broad spectrum of trace minerals, including manganese and copper.

Foliar Sprays

Calcium + Phosphorus Boost

- *Eggshell vinegar extract*: Soak crushed eggshells in apple cider vinegar for 1–2 weeks. Strain and use 1–2 tbsp per gallon of water. Spray weekly.

Mineral-Rich Fermented Herbal Spray

- *Comfrey + nettle ferment*: Ferment comfrey (high in calcium and phosphorus) and stinging nettle (rich in iron and manganese) for 10–14 days. Dilute 1:10 with water and spray during active growth.

Chelated Iron or Rust Vinegar

- Soak rusty nails in vinegar for 7 days. Strain, dilute 1:20, and apply as a soil drench or foliar iron boost if deficiency symptoms persist.

Kelp tea (or fish + kelp blend)

- Supplies copper, manganese, iron, and growth-enhancing hormones. Steep dried kelp in water 24 hours, strain, and apply 1:10 dilution.
- Overall plant stress and reduced fruit yield

Raspberry Fruitworms

Raspberry Fruitworms: Identification, Damage, and Nutrient Deficiencies

Raspberry fruitworms (*Byturus unicolor*) are small, brownish beetles in their adult stage, about $\frac{1}{8}$ inch long. Their larvae are whitish, plump, and legless grubs found within developing fruit or buds.

Damage signs include:

- Chewed holes in raspberry leaves, especially in spring
- Deformed or prematurely dried flower buds
- Larvae feeding inside developing fruits, making them unmarketable
- Overall plant stress and reduced fruit yield

Plants heavily affected by raspberry fruitworms are often low in calcium (necessary for strong cell walls), phosphorus (critical for energy transfer and flowering), and vitamin C (a sign of antioxidant deficiency and poor systemic resilience). Enhancing these nutrients can help the plant resist and recover from infestations.

Control Strategies

Cultural Practices

- **Prune and thin canes** to improve airflow and sun exposure—discourages beetle activity and reduces hiding spots.

- **Remove spent fruiting canes** immediately after harvest to reduce overwintering habitat.
- **Hand-pick adult beetles** during early morning when they are sluggish.

Companion Plants

- **Tansy and chives:** Repel beetles with their strong scent and help mask raspberry plant volatiles.
- **Yarrow and sweet alyssum:** Attract predatory insects like parasitic wasps and lacewings.
- **Garlic:** Acts as a natural repellent and provides sulfur compounds that deter feeding.

Barriers

- **Floating row covers:** Use in early spring before flowering to block beetle access during egg-laying.
- **Sticky traps:** Yellow or white sticky cards near the plants can help reduce adult populations.

Sprays and Dusts

- **Neem oil (0.5–1%):** Apply during early beetle activity in spring; disrupts feeding and reproduction.
- **Garlic-pepper spray:** Blend garlic, cayenne, and soap in water. Let sit overnight, strain, and spray weekly on foliage and fruit clusters.

- **Kaolin clay (Surround WP):** Forms a white film that deters egg-laying and feeding—especially useful early in the season.
- **PyGanic or spinosad:** Use only if necessary, and always target applications in early morning or evening to avoid harming pollinators.

Encourage Predators

- Support ground beetles and birds by providing undisturbed mulched areas nearby.
- Avoid broad-spectrum insecticides that could harm beneficial insects.

Fertilizer and Foliar Spray Recommendations

Soil Amendments

- **Soft rock phosphate:** Long-lasting phosphorus and calcium source.
- **Crushed eggshells or oyster shell lime:** Boost calcium availability over time.
- **Compost rich in citrus peels or rose hips:** Adds natural vitamin C and improves microbial life.

Foliar Feeds

Calcium + Vitamin C Boost

- *Citrus peel vinegar extract:* Soak citrus peels in vinegar for 1–2 weeks. Use 1–2 tbsp per gallon of water for foliar spray. Provides vitamin C and mild calcium solubility.

- *Eggshell + vinegar extract*: Crushed eggshells soaked in apple cider vinegar for 1–2 weeks. Strain and dilute 1–2 tbsp per gallon of water.

Phosphorus Enhancement

- *Banana peel ferment*: Ferment banana peels (high in phosphorus and potassium) with a tablespoon of molasses in water for 5–7 days. Strain and apply at 1:10 dilution.

Broad-Spectrum Support

- *Nettle + comfrey tea*: Ferment or steep comfrey and nettles for 5–10 days. Dilute 1:10 and spray weekly. Supports calcium, phosphorus, and vitamin C levels, and improves plant immune response.

Bringing It All Together

Modern gardening often teaches us to fight nature. Regenerative gardening teaches us to look closer, learn, and adapt. Insects have co-evolved with plants for millions of years. When a particular pest shows up repeatedly, it's rarely random. It's information. Something in the soil—plant system is out of balance, and the insect is responding to that weakness. By shifting from “What do I spray?” to “What is the plant missing?”, you move from reaction to regeneration.

This book isn't about memorizing pest remedies. It's about developing a new way of seeing:

- Seeing insects as indicators
- Seeing soil as a living system
- Seeing plant nutrition as the foundation of resistance

When you feed the soil, support microbial life, and provide balanced minerals in plant-available forms, pests lose their advantage. Strong plants simply aren't attractive targets.

The goal isn't a sterile, completely pest-free garden—it's a resilient one, filled with life and abundance. Pests may show up to check things out, but they don't cause significant damage, and they don't get out of control. That's what Resilient Gardening is all about – working with nature instead of trying to dominate it.

I hope you've found these guides helpful, and look forward to many more years of gardening.

Laurie Neverman, Common Sense Home