

Insect and Disease Control for Fruit and Nut Trees

Organic and Synthetic Methods

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10/10/2024

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Sourced from: PNW Management Handbooks, UMN Extension, WSU Tree Fruit and Extension Center, Univ. of Idaho Extension

TERMS YOU WILL NEED TO KNOW & GENERAL INFORMATION

Integrated Pest Management (IPM) – can significantly reduce the amount of insecticides needed to control many insect problems. It includes cultural methods, tools and techniques that only utilize a chemical (organic or synthetic) when absolutely necessary and in conjunction with other techniques.

Dormant and Delayed Dormant Sprays – Dormancy refers to the time of year when deciduous trees and shrubs have lost their leaves, and are not actively growing. Evergreens are considered dormant when they are not actively growing. Dormant sprays can be used any time between leaf drop (i.e. shuck fall) in the fall and bud break in the spring.

Spraying should be done when daytime temperatures are above 45° F, and less than 85° F, and should not be done if extreme freezing conditions are expected within 24 hours. One application per season is adequate unless rain occurs within one day of spraying. The most effective time to apply sprays is just before bud break (late dormancy-delayed dormancy) when immature insects; and insect and mite eggs are most susceptible

Delayed dormancy refers to the time when buds are just starting to break, but leaf and flower buds have not yet begun to emerge. This is the application most frequently used in our area, as weather conditions are most agreeable.

One of the **copper fungicides** can be used as dormant sprays for control of some diseases of fruit trees. Dormant applications of polysul plus superior type spray oil, mixed according to the label will control some diseases and give limited insect control. Read and follow labels on both products.

Cautions: Do not use oils within 30 days of using sulfur, lime sulfur or Captan during the growing season. A chemical reaction may occur that can cause burning. Lime sulfur may stain painted surfaces. Do not use lime sulfur on apricots.

Horticultural Mineral Oils – Dormant oils are those applied for cool-season control of pests that overwinter on trees and shrubs. Often the same product at varying rates can be applied during dormancy, delayed dormancy and the growing season. Those used during the foliar period are restricted to the more oil-tolerant tree fruit cultivars and are not recommended for use on stone fruit, and only for limited use on apples. To prevent damage do not apply oil sprays to plants that are stressed. Avoid spraying when temperatures are below 30° F, or over 90° F. If higher temperatures are expected, apply early in the day. (Applications should be made during temperature rise, not temperature drop). Avoid dry windy periods, and take into consideration the oil concentration in relation to the plant surface to be covered.

Broad Spectrum Insecticides can be organic or synthetic - are effective against all insects, even the good ones. Other insecticides target certain insects. Using a targeted insecticide minimizes the risk to beneficial or non-target insects and pollinators.

Read and follow the label of all products used. Home remedies are not recommended due to the likelihood of damaging your trees.

Use pesticides and herbicides safely!

- Wear protective clothing and safety devices as recommended on the label. Bathe or shower after each use. Different body parts will absorb chemicals at different rates.
- **Read and follow the label**—even if you've used the produce before. Label change often. Follow closely the instructions on the label (and any other directions you have).
- Be cautious when you apply these chemicals. Know your legal responsibility as a pesticide applicator. **You may be liable for injury or damage resulting from incorrect use.**
- **Please be aware of application timing, weather and temperature as to not harm beneficial insect and pollinators in the area. Applying chemicals (organic and synthetic) while plants/trees are in bloom may harm beneficial insects and pollinators.**

Trade-name products and services are mentioned as illustrations only. This does not mean that the participating Extension Services endorse these products and services or that they intend to discriminate against products and services not mentioned.

Formulations explanation - B= bait, CR= controlled release, D= dust, DF= dry flowable, E, EC= emulsifiable concentrate, G= granules, L= liquid, LC= liquid concentrate, O=organic, SP= soluble powder, SC= soluble concentrate, W, WP= wettable powder, WSP= water soluble packets, ULV= ultra-low volume

COMMON INSECT AND DISEASE PROBLEMS OF FRUIT TREES

(Source used, PNW Insect and Disease Management Handbooks)- updated November 2018

General information- Good fall cleanup of leaves and fallen fruit will help reduce insect and disease problems. Remove mummy fruit from trees.

Pome Fruit-Insect Control (Apples, Pears, Quince)

Blister mite control in apples- small, whitish eriophyid mites that overwinter under bud scales and produce blisters on leaves. Fruit is sometimes russeted and deformed. Once blisters are noticed, the only effective control is the next fall or winter due to their life-cycle.

Management: Apply superior type oil spray (**O**), or superior type oil spray during dormant or delayed-dormant period (March to April). Do not use after pink appears in buds. Use enough water to cover the entire tree thoroughly including small limbs and shoots. **DO NOT** use a broad spectrum insecticide, which will kill the predatory mites (the good insects) feeding on the pest.

Cultural: Broadleaf weeds like mallow, bindweed, white clover, and knotweed enhance mite numbers. Suppression of these weeds with cultivation or grasses may reduce mite numbers. Mites may be washed from the tree with a strong stream of water. Water trees properly, as drought-stressed trees are more susceptible. Avoid excessive nitrogen applications, as this encourages mites.

Apple Maggot – Adult flies emerge mid-late June and are somewhat smaller than houseflies. Emergence time can be monitored using yellow, rectangular sticky panels placed at eye level in the tree canopy. 7-10 days after emergence, flies begin to lay eggs under the skin of the fruit. White maggots **tunnel in the flesh of apples** (generally not to the core). Mature larvae drop to the ground and pupate in the soil until the following year. Adult flies are active until October. There is usually one generation per year. Good fall clean-up is essential.

Chemical control: Apply first in early July:

Kaolin Clay (Surround at Home) applied as spray to leaves, stems and fruit **O**. It acts as a repellent to some insects; Malathion (toxic to bees, beneficials and aquatics); azadirachtin (neem oil) **O**; pyrethrins

Apple-Cherry-Crabapple-and-thorn Skeletonizer – The adult moths overwinter in crevices in the tree. Females lay eggs in small bunches on the undersides of leaves. The larvae emerge and feed on the underside of the leaves. They then move to the top surface and feed there, often tying the sides together creating a rolled effect. There is often more than one caterpillar in the roll, and the leaf ends up skeletonized. After 3 to 4 weeks, they pupate in the rolled leaf. Adults emerge after about 2 weeks to start a new generation. There are at least two generations per year.

Management: Encourage natural enemies (beneficial insects). Larvae and pupae are easily removed from rolled leaves. Remove heavily infested twigs. Fall clean-up of fallen fruit and leaves are recommended.

Chemical control: Bacillus thuringiensis (Bt) **O** biopesticide: specific target to caterpillars only; spinosad (broad spectrum, can kill beneficials) **O**.

Codling moth (feed in fruit usually near the core) – If not controlled, this insect is one of the worst pests of apples. They overwinter as mature larvae in silken cocoons spun under loose bark, in the soil, or in trash at the base of the tree. Pupation takes place in the spring about the time the first blossoms are showing pink, and adults emerge around bloom. Adults are active only at dusk and dawn and lay eggs on leaves, or occasionally on fruit. The eggs are very tiny, and rarely seen. The larvae emerge and begin feeding on fruit, and may bore to the center of the developing fruit to feed on the flesh and seeds. As they mature, they push frass out of the entry hole. After 3 to 4 weeks the larvae leave the fruit to seek a sheltered spot on the tree to spin cocoons. The larvae may overwinter in the cocoon, or they may emerge in 2 to 3 weeks as a new flight of adults. If there is a third brood, the larvae often penetrate the fruit but do not complete development before harvest or winter.

Management: Begin monitoring for adults by hanging “delta” or “yellow sticky” or “wing” traps at bloom time. Place traps at eye level in tree canopy. Note when the first codling moths are found. This allows you to decide on a control measure based on the population numbers. Then begin using Bt - kirstaki as the least toxic, organic insecticide to control the larvae. Remove and destroy infested fruit before harvest to eliminate larvae. Remove bark scales from tree to eliminate overwintering sites. Wrapping the trunk with corrugated cardboard or burlap to trap migrating larvae is also helpful. Remove the tree wraps periodically to destroy cocooning larvae. Good fall clean-up of fallen fruit and leaves helps eliminate overwintering sites.

Horticultural oil (mixed at a rate approved for the growing season) is the best strategy. Allow oviposition to occur and just prior to egg hatch make an oil application. Then follow the label instructions for frequency. Phytotoxicity can occur.

Chemical control: Beginning about 10 days after **full petal fall**, (all petals are off the flower). Bt – kirstaki **O**; Kaolin clay slurry (Surround at Home) **O**. Applied as a spray to leaves, stems, and fruit,

it acts as a repellent to some insect pests; malathion (toxic to bees, beneficials and aquatics), maintain a 10-21 day schedule); azadirachtin (neem oil) some are **O**; pyrethrins - some are **O**. **Spring and summer** – Apply about 10 days after full petal fall, or 17-21 days after full bloom. Kaolin Clay (Surround at Home); malathion (toxic to bees, beneficials and aquatics), maintain a 10-21 day schedule; spinosad (broad spectrum, can kill beneficials) **O**; insecticidal soap **O**;

Leaf roller – There are several species of leaf roller pests of tree fruits. They can be divided into single-generation moths, and two-generation moths. The larvae roll and tie leaves together for shelter and feeding. They thrash about violently when disturbed, and may drop from the leaf suspended by a silken thread. Feeding on growing points on young plants can promote undesirable branching. Larvae also feed on the surface of the fruit, causing deep, russeted scars. The single generation leaf-roller overwinters as egg masses on twigs and branches. Eggs hatch in spring as buds are opening until petal fall, where they feed for 4 to 6 weeks. They then pupate in the rolled leaves and emerge in early summer. The overwintering eggs are laid in July. Two-generation leaf-roller overwinters as immature larvae under the bark on scaffold branches. Larvae may feed during warm periods in winter but become active in spring with the onset of new growth. They feed for several weeks, and then pupate in rolled leaves. Adult moths emerge in late April to May. These lay eggs for the next generation. The next generation hatches in early summer and does the most damage.

Management: Observe early spring growth for rolled leaves and feeding damage on new growth. Very low winter temperatures significantly reduce larvae populations. Encourage beneficial insects and predators. Hand pick rolled leaves containing larvae or pupae. Removal of overwintering sites, such as rolled leaves on the ground or plastered to canes can reduce next year's population. Good fall clean-up of fallen leaves and fruit is recommended.

Chemical control: Apply superior-type oil sprays during **dormant or delayed-dormant** period (March-April), do not use after pink appears in buds. Use enough water to cover the entire tree thoroughly including small limbs and shoots.

During the growing season: Bacillus thuringiensis (Bt) **O** & most effective; kaolin clay (Surround at Home) **O** applied as a spray to leaves, stems, and fruit acts as a repellent to some insect pests; malathion (toxic to bees, beneficials and aquatics) maintained on a 10-21 day schedule. PHI (minimum days to harvest) is three days; spinosad (broad spectrum, can kill beneficials) **O**.

Pear blister mite – Adult mites are very tiny and can be seen only under magnification. Nymphs are even smaller. Feeding causes very small reddish to yellowish blisters. Later in the season the blisters turn brown or black as the tissue dies. Leaves may drop prematurely. Loss of foliage weakens trees, reduces shoot growth and interferes with fruit maturation and fruit bud formation. Feeding on the fruit causes russeted, sunken spots.

Damage to fruit is caused by feeding injury to buds before bloom—mites do not reside in the blisters on fruit. Blister mites overwinter as mature females under outer bud scales. As the buds mature in the spring they burrow inside to feed. After petal fall they move to leaves or fruit causing the characteristic blisters. Several generations a year may develop within the blisters. The mites move to growing terminals as they become more crowded where their feeding causes more blisters. Mites are moved from tree to tree, perhaps by wind, or carried on birds or insects.

Management: Scouting is not effective during the current growing season, as by the time the blisters are noticed the damage is done. Plan to take action the following fall, or winter if damage is noted. Heavy rain and cold suppress mite numbers. Weed suppression with cultivation or grass may reduce numbers. Mites may be washed from the tree with a strong stream of water. Keep trees properly watered, as drought stressed trees are more susceptible. Avoid excessive nitrogen applications.

Chemical control: Apply only during the dormant or delayed dormant season. Use enough water to cover the entire tree thoroughly including small limbs and shoots. Apply lime sulfur as buds begin to swell, or use superior-type oil.

Growing season spray- carbaryl (sevin), toxic to bees, beneficials and aquatics

Pear psylla- The adults resemble a miniature cicada, and have two distinct forms, a summer and winter form. Winter-form adults are 0.1 inch long, dark in appearance, with transparent wings held roof-like over the body. Summer-form adults are 0.08 inch long, greenish to brown with a similar wing appearance to winter form. The nymphs pass through five growth stages. All stages have conspicuous red eyes. During the first three stages nymphs are encased in a drop of honeydew. Nymphs and adults suck plant juices, producing honeydew that drips onto leaves and fruit, encouraging the growth of sooty mold. Blackening and burning of leaf tissue also is typical of psylla infestation.

Pear psylla overwinters in a dormant state as winter-form adults on a variety of fruit trees. They return to pears and begin laying eggs at bud swell. Eggs are laid at the base of buds and other rough places on small twigs. Later eggs are laid along leaf mid-veins and petioles, and on stems and sepals of blossoms. As nymphs hatch they feed on opening blossoms and young leaves, forming droplets of honeydew on both leaf surfaces. There may be two to three generations per year.

Management- Encourage beneficial insects. Avoid promoting unnecessary vigor with excess fertilizer and/or water. Remove suckers from interior of trees, which removes psylla eggs and nymphs and increases spray coverage.

Chemical- Dormant season spray- Use superior type oil or lime sulfur mixed with superior type oil. Use enough water to cover the entire tree thoroughly including small limbs and shoots. Spray timing can vary from early February to late March depending on location. Apply only during dormant or delayed-dormant period.

Growing season spray - Azadirachtin (neem oil) some **O**. If control is not satisfactory, add minimal rates of superior type oil. Some products containing neem extract may be phytotoxic to some pear cultivars. Other- carbaryl (sevin, toxic to bees, beneficials and aquatics); esfenvalerate, gamma-cyhalothrin, kaolin clay (Surround at Home) **O**, malathion (toxic to bees, beneficials and aquatics), permethrin, rotenone (dust).

Pome fruit- Disease control (Apples, Pears, Quince)

Apple scab - The key to successfully controlling scab is to apply fungicides early and thoroughly to protect new growth. The first susceptible tissues exposed in opening cluster buds are the tips of the leaves and sepals. The most critical period for scab development is from the breaking of the cluster buds until leaves are fully expanded. Apply sprays at pre-pink, pink, calyx (3/4 of the petals have dropped), and first cover (first fruit). If scab was a problem last year, begin applications at green tip.

Management: Plant resistant varieties reduce irrigation sets so leaves do not stay wet for extended periods of time. The fungus overwinters on dead apple leaves and fruit on the ground. Rake and dispose of all leaves and fallen fruit in the fall.

Chemical control: Apply during dormant or delayed dormant season, Polysul, Lily Miller Dormant Spray for Disease is registered for home use.

Captan (do not use with oils, lime, or alkaline materials),

Spectracide Immunox (do not use within 2 weeks of harvest). Do not apply more than 10 times per season.

Fire blight - During moist periods in the bloom season, spurs, blossoms and twigs may become infected, developing a darker water-soaked appearance. They turn brown to black and rapidly wilt and die. Infected blossoms frequently are distorted. Ooze often appears where infection occurs. Cankers develop on trunks, limbs and graft union. Severe cankers girdle and kill infected limbs. Tips of branches appear scorched as if burned by fire, with a tell-tale 'shepherd's crook' on the tips.

Management: Remove and immediately burn all traces of blight as noticed. Use lots of sterilizing solution on all tools and large cuts. Soak tools after every cut. Use 10% Clorox (which is corrosive) or Lysol. If used as a soak change solution every 2-3 hrs. **Do not combine pruning and blight cutting**, and do not cut when trees are wet from rain, irrigation, or dew. If early bloom is severely infected delay cutting until you determine the infections extent. In spring or summer cut 12"-15" past any visible discoloration. In fall immediately after harvest, or during dormancy inspect and remove all infections missed earlier. Cutting 4"-6" beyond discoloration is enough at this time. Prevent excessive shoot and sucker growth by using moderate amounts of nitrogen fertilizer. Avoid overhead irrigation.

Chemical control: Streptomycin sulfate is contained in several products including Agri-Mycin 17, (Fertilome), and Agricultural streptomycin, Farmsaver, Firewall and Streptrol

Prunus- Insect Control (plums, cherries, peaches, nectarines, apricots and almonds)

Cherry fruit fly - Adults are somewhat smaller than a housefly. They have a black body with white bands on the abdomen; wings are transparent with a distinctive dark banding pattern. The flies over winter as pupae in the soil. The adults emerge from the soil from mid-May (about 5 weeks before harvest) until the end of July. Peak emergence often coincides with harvest. Adults feed on honeydew on the leaves, and pollen, then after 7-10 days, females lay eggs under the skin of the fruit. The eggs hatch, and the larvae burrow toward the pit of the fruit. There they feed for 10-21 days before boring out and dropping to the ground to pupate. There is one generation per year, but repeated sprays are necessary, as all adults do not emerge from the soil at the same time. Cherry fruit fly is present mid-May to last of July

Management: Control is directed against adults to prevent egg-laying. Begin monitoring for the adult fruit fly with pheromone traps or yellow sticky boards in May. Both are available at local nurseries and garden supply centers. Yellow sticky traps hung in sunny parts of the tree will attract the adults. Make your own sticky traps by applying Tanglefoot, or petroleum jelly to bright red, or yellow balls or brightly colored cardboard. In smaller trees using multiple sticky board traps or balls to trap the adult female before egg-laying begins is an effective control.

Chemical control: Begin a spray schedule to control the adults before egg-laying begins, usually about May 20-25. Apply May to July at 10 day intervals, according to the label. Carbaryl (sevin, toxic to bees, beneficials and aquatics), esfenvalerate (a pyrethroid), gamma-cyhalothrin, imidacloprid (labeled for fruit trees), kaolin clay (Surround at Home) O, rotenone (as a mix with pyrethrins).

Peach tree borer- Adult is a steel-blue, clear winged moth. Adult flight is usually from late June through September and eggs are laid at on the base of the fruit tree. Larvae burrow in the crown and roots, girdle young trees and weaken others. A single larva is capable of girdling a newly-planted fruit tree. Presence may be detected by globs of gum mixed with a granular brown frass that appear at the base of infested fruit trees.

Management- Place a plastic or metal cone or barrier around base of tree to prevent entry before egg laying begins. Push the cone 1"-2" into the soil. Cone should fit snugly around the trunk at the top to prevent the tiny larvae from getting beneath it. In small home orchards a procedure called 'worming' may be done. Use a pocket knife, wire, or some pointed instrument to remove dirt around tree, and dig out the larvae.

Chemical control- Spray applications onto trunk of the tree to prevent newly hatched larvae from boring beneath the bark. Carbaryl (sevin, toxic to bees, beneficials and aquatics), gamma-cyhalothrin, kaolin clay (Surround at Home), malathion (peaches only and toxic to bees, beneficials and aquatics), permethrin, rotenone (dust); permethrin (peaches only), pyrethrins.

Peach twig borer- Early in the season, larvae bore into buds, flowers and emerging shoots. There are three generations each growing season. Later in the season, larvae may bore into twigs and shoot terminals causing shoot tip wilting or flagging. Occasionally, they will bore into the fruit.

Chemical control- Early sprays aimed at the newly hatched larvae before they bore into the shoot, or fruit will provide the best control. Use acetamiprid, carbaryl (sevin, toxic to bees, beneficials and aquatics), efenvalerate, gamma-cyhalothrin, kaolin clay (Surround at Home) **O**, permethrin (peaches only), spinosad (broad spectrum, can kill beneficials) **O**.

Scale insects- Best control is achieved during the delayed dormant period (bud break) using a superior type oil. These applications target and smother the non-mobile over wintering adult and egg stages. If spring and summer scale control is required, apply during the crawler period (June and July. For growing season control use carbaryl (sevin, toxic to bees, beneficials and aquatics) or imidacloprid (labeled for fruit trees and toxic to bees, beneficials and aquatics).

Prunus- Disease control (plums, cherries, peaches, nectarines, apricots and almonds)

Bacterial canker - Although bacterial canker is more serious on sweet cherry trees, it also affects peaches, prunes, plums, apricots and almonds. Most conspicuous symptoms are cankers, gum exudation, and dieback of girdled branches. Dead bud and leaf spots also can occur. In most cases, heavy gumming is associated with bacterial canker formation on branches and twigs. Gumming occurs at the cankers' margins.

Management: Plant resistant varieties, do not plant new trees with old trees which are a source of the bacteria. Provide optimal conditions for growing, including attention to frost pockets, pH and nutrition. Control weeds. Avoid overhead watering when possible. Delay dormant pruning until January or February. Summer pruning should be done after harvest, when weather is dry. In summer small cankers may be cut out by cutting away bark above and around the edges of the infected area. Use a sharp knife and leave margins smooth and neat. Sterilize all pruning tools between cuts with 10% Clorox solution or shellac thinner (70% ethyl alcohol). In sprinkler irrigated orchards cover wounds with a dressing as soon as possible. In non-irrigated orchards wounds may be left uncovered during summer, but should be treated with a wound dressing before the fall rains begin.

Chemical control: Spray thoroughly, first in October before fall rains, and again in early January. Thorough coverage is needed. Use products such as Bordeaux 12-12-100, Champ Formula 2, Nordox, or Nu-Cop WP. Some resistance, to copper products, have been detected. Read and follow all labels. These products are geared for use by growers, and are not packaged in homeowner size.

Gumming - Gum exuding from buds, twigs, branches or trunks. Pools or large deposits of gum collect beneath the bark at the crotch, on larger branches, or on the trunk. Gum eventually breaks

through to the surface and runs down the bark. Some causes are mechanical injury, winter injury, insect damage, fungal diseases, or improper growing conditions. However, gumming also may be spontaneous, especially in trees that have made a forced growth due to too much water or nitrogen fertilizer, or both.

Management: Control insect and fungus diseases. In large cankers, cut away all dead tissue until a sound surface is exposed. Treat the wound with a reliable disinfectant. Follow sound cultural practices that produce a firm, stocky, moderate growth rather than a forced growth of soft wood. Prevent trunk injury when possible. Shielding or whitewashing trunks can prevent winter injury.

Peach leaf curl - The first visibly infected leaves are yellow to reddish and somewhat thickened and crisp in texture. As they develop they produce a dusty white coating of spores. Infected twigs occasionally are distorted, and a few fruit may show a reddish growth on the surface. Defoliation from severe infections weakens trees to the point that if not controlled, they may die in 2 to 3 years.

Management: Plant resistant cultivars. Good fall clean-up is recommended.

Chemical control: Apply a delayed dormant spray before buds swell. East of the Cascades, a delayed dormant application alone should be effective. Thorough coverage is essential.

If a fungicide is needed, look for a copper-based fungicide (usually an **O**) in a wettable powder form. Bordeaux Mixture, Kop-R-spray, or Ortho Daconil Multi-Purpose Fungicide as per label.

Shothole (Coryneum Blight) - a fungus that overwinters on stone fruit buds and twigs. When moisture continues for at least 24 hours and temperatures are above 36 degrees F. infection can occur in the dormant season. When temperatures are higher during growing season, shorter periods of moisture are required for germination and infection. Leaves develop small, round, tan to purplish spots, seldom larger than 0.25 inch wide. Tissue becomes somewhat raised and scurfy and often drops out in dry, warm weather, producing a 'shothole' effect.

Avoid overhead watering; remove affected twigs during pruning if practical.

Chemical control

1. Spray at 50% leaf fall in late autumn to help protect leaf scars and again during the dormant season with Bonide Fung-onil Multi-purpose fungicide, Captan 80 WDG, or Lily Miller Microcop. Read and follow the label.
2. Spray again at shuck fall (petal fall) in spring. With Bonide Fung-onil Multi-purpose Fungicide, Captan 80 WDG, or Spectracide Immunox (may be applied up to day of harvest. Do not use more than seven times per season). Read and follow the label.

WALNUTS

Insect Control

Walnut husk fly - The adult fly is about the size of a housefly. It has a distinctive yellow spot on the midsection of the body, and a triangular band at the tips of each wing. The larvae are white when young, becoming more yellow with age, and up to 0.19" long. The larvae feed inside the husk, which destroys husk tissue. The outer husk usually remains intact, but the fleshy part is destroyed, and the nutshell is stained black. An early infestation may lead to shriveled or darkened kernels. Late infestations may not harm the kernel but may stain the shell.

Control: Remove abandoned black walnut or English walnut trees. Rake up and destroy infested nuts. Use flytraps. Sticky, green spherical traps look similar to developing nuts and attract the flies. Make first treatment within 10 days after catches in flytraps show a sharp or steady increase over a 3-day period, probably late July to early/mid-August.

Chemical control – acetamiprid, azadirachtin (neem oil) some **O**, esfenvalerate, gamma-cyhalothrin, kaolin clay (Surround at Home) **O**, permethrin, spinosad (broad spectrum, can kill beneficials) **O**.

Disease control

Walnut blight - On leaves, infection appears first as reddish brown spots on the stems as black, slightly depressed spots often girdling the shoots. Young, infected leaf and catkin buds turn dark brown or black and soon die. The disease is serious on nuts, where it causes black slimy spots of varying sizes. The organism penetrates the husk, the shell, and occasionally the edible meat. Late season infections produce black rings on husks.

Management: Prune out diseased twigs and branches, if practical.

Chemical control: Spray at early pre-bloom (when catkins begin to enlarge), late pre-bloom (when shoots begin to expand), and early post bloom. Monterey Liqui-cop is registered for home owner use.

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	Apple/Pear	Cherry	Peach/Nectarine
Mid March To Early April	Hang pheromone traps in apple trees to attract male Codling Moths. Hang high in tree (may not work if neighbors' trees are within ½ mile).		For Peach Leaf Curl, use a copper-based spray before buds open or a dormant spray earlier in the year before buds swell.
Mid to Late April	Just before buds break open, follow your label instructions and spray delayed dormant oil to deter scale, leaf rollers, mites, aphids and apple Scab disease. Temperature daily should be 45°F.		Leave 30 days between Lime-Sulfur spray and delayed dormant oil spray (or summer oil treatment on foliage). As of 2017, Line Sulfur has been removed from the residential retail market. Remove affected leaved and place in a sealed bag.
Early May	If petal fall was early in previous year, hang molasses traps now for Codling Moth.	Hang molasses traps for Cherry Fruit Fly before they and as they lay eggs.	
Mid May	If petal fall was later in previous year, hang molasses traps now for Codling Moth.	Hang yellow sticky boards, in the sunshine, in the tree to attract Cherry Fruit Fly.	If Peach Leaf Curl persists, remove damaged leaves and discard into sealed bag; new foliage will replace them.
Late May even Early June	Thin developing apple clusters to 1 apple and space 6" apart. 10 days after full petal fall, use Spinosad or Bt spray (apples ¾" in diameter, apply late in the afternoon per the label).		
Mid June Late June	2 nd Spinosad spray (7-10 days after the first), or use Bt again. Hang red sticky traps (usually a ball shape) at eye level for Apple Maggots. 3 rd Spinosad spray. Or use Bt again (10 days after the 2 nd application).		

Important: Molasses Trap: 1/3 C molasses + 1 C apple cider vinegar + 1/8 tsp ammonia + 5 C water: pour 1" of solution into 1 gallon jug. Cut 1" diameter hole, 2" above the base of the jug.

Red "Sticky" Trap: Cover red plastic ball with clear plastic wrap. Attach cord to trap. Spray trap with Tanglefoot. Hang 2 per tree at eye level. Change insect coated wrap each year.

Good for most fall... all... fruit... will...

