

IPM Series: Stone Fruits

Peaches, Plums, Apricots, Cherries, and Nectarines

Symptoms

FOLIAGE

Leaf yellowing/ browning

Green peach aphid: leaves curl, yellow and drop. Aphids excrete honeydew, which may lead to sooty mold on foliage.

Spider mites: white flecking or stippling. Leaves brown and die.

Cankers, Phytophthora and Verticillium wilt, Armillaria root rot: diseases that interrupt the vascular flow of water and nutrients and lead to wilting and leaf death.

- Primarily an early-season problem. Strong water spray directed at aphids will reduce population. Apply a dormant oil spray at bud swell.

- Apply a dormant oil spray at bud swell. Problem more severe in hot, dry weather.

- See page 5, “Rapid tree decline”.

Leaf spots/blotches

Bacterial spot (peaches): small, angular spots between veins. Spots are green, then turn purple and finally brown.

Scab (peaches and nectarines): small, olive-green spots on leaf underside.

Cherry leaf spot: small purple spots on leaf surfaces. Leaves develop holes and turn yellow. Infected leaves often drop.

Plum leaf spot: similar to cherry leaf spot but smaller.

- FOR ALL FOLIAR DISEASES:** Promptly rake up and dispose of infected leaves.

- If defoliation was severe the previous season, Bordeaux mixture (copper sulfate and lime) can be applied after harvest

White-gray powder on leaves and buds

Powdery mildew: white surface growth on leaves that may cause leaf distortion. Most noticeable in spring. Remains active during dry weather. High temperatures kill fungal colonies.

- Select resistant varieties. Remove damaged shoots and prune for improved air circulation. Spray with wettable sulfur at bloom if powdery mildew was a problem the previous year or check horticultural oil labels for powdery mildew control listings.

<p>Leaves curled and puckered</p>	<p>Peach leaf curl: fungal disease on un-folding leaves in spring. Leaves are thickened, malformed and colored bright purple, red, orange. Severe when spring weather is cool and wet. May cause significant defoliation.</p>	<p>Apply a pre-bloom spray of liquid-lime sulfur on all tree parts. If leaf curl was severe the previous year, apply Bordeaux mixture before buds swell in the spring.</p>
<p>Leaves curled, twisted or rolled</p>	<p>Aphids: also feed on buds. Black sooty mold growing on aphids' honeydew excretions may be observed.</p> <p>Herbicide injury: new growth appears twisted and curled.</p>	<ul style="list-style-type: none"> • Early season problem. A strong water spray will dislodge aphids. Reduce or eliminate nitrogen applications to reduce succulent growth favored by aphids. Apply labeled insecticidal soap or horticultural oil products to control high populations. • Don't apply herbicides near fruit trees.
<p>Leaf scorching/marginal burning</p>	<p>Pesticide burn: including soaps and oils. Stressed plants are more likely to be burned and emulsifiable concentrates are more likely to burn than wettable powders.</p> <p>Fertilizer burn: causes marginal leaf scorch and root dieback.</p> <p>Damage from lawn herbicides: new growth may be stunted, twisted or curled.</p> <p>Drought stress: marginal scorching.</p> <p>Very high temperatures</p> <p>Sunburn: yellow, brown or white areas develop on upper sides of leaves.</p>	<p>Leaf margins are affected first. Leaves are particularly susceptible to burn when temperatures exceed 80-85°F. Copper, sulfur and Captan® fungicides may cause leaf burn.</p> <p>From roots contacting excessive salts from fertilizers. Avoid "fertilizer spikes" and follow U of MD recommendations. Symptoms from fall-applied herbicides may not appear until spring.</p> <ul style="list-style-type: none"> • Irrigate during dry periods. • Damage due to excessive sunlight, heat and insufficient water.
<p>Leaves chewed</p>	<p>Various caterpillars</p> <p>Japanese beetles: Sweet and sour cherry and Japanese plum most vulnerable to attack. Japanese beetles skeletonize leaves (feed between the leaf veins).</p>	<p>Hand pick pests. Where feeding is severe, use a registered insecticide. Avoid Japanese beetle traps which attract more beetles.</p>
<p>Webbed or tented foliage</p>	<p>Eastern tent caterpillar: caterpillars found within silken tents.</p>	<ul style="list-style-type: none"> • If numerous caterpillars are present, use Bt when the caterpillars are small. Knock down or prune out webs on terminal branches and destroy caterpillars.
<p>Leaves with black sticky coating</p>	<p>Sooty mold: fungus growing on sticky honeydew which is excreted by aphids and scales during feeding.</p>	<ul style="list-style-type: none"> • Spray horticultural oil at "green tip" stage of bud development (50% of buds show some green tissue). High pest populations can debilitate trees. Do not apply oil at dormant rate if green tissue has emerged.

BRANCHES, TRUNK

Silken webs/tents in branch crotch

Eastern tent caterpillar: caterpillars found within silken tents.

If numerous caterpillars are present, use Bt when the caterpillars are small. Knockdown or prune out webs on terminal branches and destroy caterpillars.

Peach shoots with wilted leaves; shoot dies

Oriental fruit moth: 3/8 inch long larvae with brown-black head. Bore several inches into new shoots. Larvae overwinter in debris under tree. Young, rapidly growing trees more severely affected.

Peachtree borer: borers feed on cambium below the bark near base of tree, preventing food and water from flowing within the tree. This leads to wilting symptoms.

Lesser peachtree borer (upper trunk, scaffold limbs and branches)

- Prune out and dispose of wilted tips, 6 inches below visible damage. Cultivate lightly around base of tree 2 weeks before bloom. Follow U of M guidelines for early season sprays.
- See “Peachtree borer”, below.

Dark, sunken cankers

Various fungal and bacterial diseases (especially *Leucostoma* canker): enters through wounds caused by insects, lawnmowers, frost cracks and hail. Gummosis may be observed (the oozing of thick, amber colored sap).

Prune out and dispose of infected wood below visible damage. Prune on dry, warm days in early spring. Do not leave stubs. Fertilize only in late winter or early spring. Apply white latex paint to trunk and large branches after leaf fall to prevent frost cracks.

Small reddish-brown and black bumps on young wood

Lecanium scale: noticeable May through July. Crawlers feed on foliage after hatching in July.

- Apply a dormant rate horticultural oil spray before bud break.

White encrustations on large branches and trunk

White peach scale and white prunicola scale: crawlers feed on foliage. High populations can cause branch dieback.

- Apply a dormant rate horticultural oil spray before bud break. For light infestations, scrape away scales with a soft brush.

Black, gnarled swellings along twigs and branches

Black knot: fungal disease of plum and cherry.

- During dormant season, prune out and dispose of infected wood 4 inches below visible damage.

Gum oozes from holes at base of trunk or lower branch crotches (sawdust-like frass may be observed)

Mechanical injury or stress: gum is clear
Peach tree borer: gum mixed with sawdust-like frass (borer excrement). Primarily on peach and nectarine. 1-inch long white larva with brown head. Female adult is a large, blue and orange, clear-wing moth. Larvae feed in tunnels below bark and over-winter in tree, renewing activity in early spring. One or two borers can kill a tree.

Lesser peachtree borer (upper trunk, scaffold limbs and branches).

- Borers attack stressed trees. Monitor for borer holes. In May, scrape away gum and dead bark from lower trunk and large roots. Come back in one week and look for new gum and frass deposits. Make vertical cuts with a sharp knife through these entrance holes. Then, insert a stiff thin wire and stab larvae; repeat in one week and then mound soil over damaged area (if low on the trunk). Band lower trunk down below soil level with corrugated cardboard to prevent egg laying or trap larvae before they tunnel into tree. Where holes and frass are

<p>Gum oozes from holes at base of trunk or lower branch crotches (sawdustlike frass may be observed) cont.....</p>		<p>observed and no sap is oozing from tree, beneficial entomopathogenic nematodes may be used as a drench applied to the trunk or injected into borer holes.</p>
<p>Numerous small round holes in twigs and small branches (gum may be evident)</p>	<p>Shot hole borers</p>	<p>Remove and dispose of infested wood promptly.</p>
<p>Twig/branch dieback</p>	<p>Root damage, drought, or mechanical injury Wet, poorly drained soil Herbicide damage: twigs are stunted and distorted</p>	<ul style="list-style-type: none"> • Prune out affected areas and keep trees well-watered. • Select suitable, well-drained planting sites. • Avoid drift; follow label instructions carefully when applying herbicides.
<p>Foliage/twigs/limbs broken or injured</p>	<p>Ice, wind or hail damage: cankers may develop. Squirrels may prune small twigs for nest-building.</p>	<ul style="list-style-type: none"> • Prune out affected parts.
<p>Bark is cracked longitudinally, usually on south or west side</p>	<p>Frost/freeze cracks, sunscald: cracks usually occur on south or west side of tree. Caused, in part, by differential freezing and thawing of water in tree.</p>	<ul style="list-style-type: none"> • Consider painting the trunks and large scaffold branches of young trees with white latex paint. Failure of trees to properly harden off makes them more vulnerable to frost crack and sunscald injury. Avoid late summer-early fall pruning or fertilizing that encourages late season growth.
<p>Trunk bark/wood is gouged or scarred</p>	<p>Lawn mower or string trimmer injury Imbedded wires or collars from tree support apparatus.</p>	<ul style="list-style-type: none"> • Mulch around tree to within 6 inches of trunk. Stone fruits do not need physical support.
<p>Water sprouts, root suckers</p>	<p>Environmental stress Removal of large branches and limbs: prolific growth of sprouts occurs directly below large pruning cuts.</p>	<ul style="list-style-type: none"> • In all cases promptly pull or cut all water sprouts at point of attachment.
<p>Shoots chewed, trunk girdled, bark stripped from trunks and branches</p>	<p>Deer feeding and antler rubbing of bucks: more severe during very snowy, cold winters. Squirrels strip and eat bark in winter.</p>	<ul style="list-style-type: none"> • Where appropriate, electric fences are very effective. Repel deer by hanging one or more of the following from mesh bags on trees: small soap bars, human hair or blood meal. Commercial repellents are also available. Protect young trees with tree wraps or hardware cloth.

Roots and base of young trees chewed

Voies (meadow mice): nest in mulch, weeds and plant debris around trunk. More serious problem during very cold winters. Rabbits and voles gnaw wood and can girdle and kill young trees.

Keep orchard mowed and mulch pulled back from trunk. Place tree guards (18 inches high circles formed from hardware cloth) around trees and 2-3 inches below soil line. Reduce high population levels of voles by placing mouse traps at tunnel entrances.

Rapid tree decline (fungal diseases)

Armillaria root and crown rot: trees with normal foliage collapse mid-summer. More common on light soils and recently forested land.

Fan-shaped white fungal mat can be seen under the bark of infected crowns. There is no control. Do not re-plant a woody plant in the area after tree removal.

Phytophthora: weak shoot growth, small leaves and fruit. Infects roots and crown; more prevalent on heavy, poorly drained soils.

Brown tissue caused by cankers can be observed under the bark around the crown. There are no controls, except eventual removal.

Verticillium: leaf and shoot wilting; wood beneath bark (cambium) develops brown streaks.

- More severe in wet soils. Trees may recover with good cultural practices such as pruning, fertilizing, etc.

Bulging or deformity of trunk at graft union

Normal on grafted trees for scion wood to over-grow or under-grow the rootstock

- Remove all suckers that arise below the graft union. If graft union is damaged or killed, sucker growth may outgrow desired scion stock.

FRUIT AND FLOWERS

Blooms are brown and either dry or water-soaked (blasted)

Tarnished plant bug: Adults are up to ¼ inch in length with a shield-shaped thorax. Pierce and injure plant parts while feeding. Plant bugs can be a major peach and plum pest.

- Early season problem. Most active from bloom stage to one month after bloom. Control weeds around trees, especially wild mustard. Difficult pest to detect and control. Apply a registered insecticide during the pre-bloom and petal fall periods, when pest is identified as a problem.

Damaged buds (cross section reveals brown tissue)

Winter-kill of buds: sustained periods of very cold temperatures.

Spring frost damage to buds and flowers: trees may leaf out without flowering. Leaf buds are hardier than flower buds. Open blooms are more cold-sensitive than closed buds.

Misuse of dormant oil sprays or pesticide sprays: including spraying when temperatures are below 40°F.

- Buds cut lengthwise will be brown inside. Avoid planting in low areas or frost pockets. If possible, cover small trees with a tarp or other light cover if a frost is expected.
- Over-spraying of dormant oil, lime-sulfur, and other fungicides and insecticides may damage leaf and flower buds and blooms. Follow label directions.

Spraying dormant oil or Bordeaux on open blooms: May damage tender tissue.
Water stress: causes drying out of leaf and flower buds.

Irrigate during dry periods

Blossom drop

Plant Bugs: One-third of total blossom drop may be caused by plant bug feeding.
Stressful conditions: drought, wind, low temperatures.
Lack of pollinizer trees (a second variety): applies to most sweet cherries and Japanese plums, and apricot-plum crosses.

Poor pollination/fertilization: bee activity is low during cool, wet weather.

Spraying insecticides during bloom period: kills pollinators

Over use of nitrogen fertilizers prior to bloom period

- Only 7-10% of blooms are required to make a good crop.
- Plant trees in fertile, well drained soil. Avoid low areas susceptible to late spring frost.
- Determine the pollination requirements of trees before planting. Pollination charts are available in fruit tree catalogs.
- Especially a problem on cross-pollinated species (most sweet cherries and Japanese plums, apriums, and plumcots).
- Avoid spraying insecticides during bloom. .
- Reduce applications of high nitrogen fertilizers.

Failure to fruit, minimal fruit set

Winter-kill of buds: sustained sub-freezing temperatures.
Spring frost damage to buds and flowers

Low light conditions; excessive shade
Low temperature damage: trees may leaf out without flowering. Leaf buds are harder than flower buds.

Lack of pollinizer trees: (a second variety): applies to most sweet cherries and Japanese plums, and apricot-plum crosses.
Poor pollination/fertilization: bee activity is low during cool, wet weather.

Spraying insecticides during bloom period: may kill pollinating insects.
Spraying dormant oil or Bordeaux on open blooms: may damage tender tissue.

Over-use of nitrogen fertilizers

Severe pruning: will reduce number of blooms.

- Cross-section of damaged buds will reveal brown tissue.
- Avoid planting in low areas; avoid early blooming cultivars.
- Follow proper thinning and pruning guidelines. Situate plantings for optimum light exposure.
- Select late blooming cultivars.
- Determine the pollination requirements of trees before planting. Especially a problem on cross-pollinated species (applies to most sweet cherries and Japanese plums, and apricot-plum crosses).
- Avoid spraying insecticides during bloom.
- Leaf and flower buds may be killed or damaged by misuse or overuse of dormant oil sprays. This includes spraying when temperatures are below 40°F.
- Excessive nitrogen stimulates leaf and shoot growth at the expense of fruit buds and fruit.
- Do not prune out fruit bearing wood during the dormant season.

<p>Premature fruit drop</p>	<p>Feeding damage by plum curculio, oriental fruit moth, and plant bugs</p> <p>Natural thinning: “June drop” (peach)</p> <p>Spring frost: May damage or kill buds and developing fruits</p>	<ul style="list-style-type: none"> • Fruits with crescent shaped scars, small holes or gum. Promptly pick up and discard all fruit drops to break the pest life cycle • Trees over-produce fruit and thin themselves naturally. • Don't plant trees in low, cold areas prone to late frosts.
<p>Small or undersized fruits</p>	<p>Drought, cold or hot temperatures</p> <p>Failure to thin or prune properly</p> <p>Low soil fertility</p>	<ul style="list-style-type: none"> • Irrigate as needed. Especially during fruit set and fruit enlargement. • Thin to reduce number of fruit or blossoms. • Perform a soil test.
<p>Cracking/splitting</p>	<p>Scab (peach and nectarine)</p> <p>Excessive moisture during ripening (sweet cherry especially vulnerable)</p> <p>Slit pit disorder: (peach and nectarine); opening of the pit at the stem end. Physiological problem that can lead to secondary insect and disease problems.</p>	<ul style="list-style-type: none"> • Stem-end lesions enlarge and crack. (See peach scab) • Pick ripened fruit promptly and use mulches and irrigation to maintain even moisture. • Occurs more on early season cling-type peaches. Encouraged by severe thinning and excessive rainfall and fertilizer.
<p>External damage</p>	<p>Pesticide burn: spots in a pattern or russetting</p> <p>Hail: small, roughened areas on fruit.</p> <p>Mechanical damage: skin torn, gum build-up</p> <p>Sunscald: white, tan, or brown sunken areas on exposed surfaces.</p>	<ul style="list-style-type: none"> • Captan®, sulfur and oil sprays may produce russetting on sensitive varieties. • Cosmetic damage. Should not affect eating quality. • From contact with branches or rough handling. • May alter fruit flavor. Remove and discard affected fruit.
<p>Spots on fruit</p>	<p><i>(For the following diseases promptly remove and dispose of all infected fruits on tree and on the ground.)</i></p> <p>Brown rot: small, circular brown lesions that expand on ripening fruit. Tufts of gray spores can be observed under moist conditions. The most significant disease of peach trees in Maryland. Nectarines are more susceptible to brown rot disease than peaches. Occurs on all stone fruits.</p>	<ul style="list-style-type: none"> • Apply Captan®, Immunox®, Bordeaux, liquid lime-sulfur, or flowable, micro-fine sulfur sprays when blooms are 5% and 90% open; followed by cover sprays of one of these materials every 7-14 days as needed. An application 2 weeks prior to harvest is also recommended. Pick fruit when entire background turns yellow; do not allow fruit to become overly-mature and handle harvested fruit very gently. Promptly remove and dispose of all infected fruits and dried up “mummies” from tree (including fruit stems) and on the ground. A post harvest 1-2 minute dip of fruits in a 10% chlorine bleach

solution will kill surface spores. Research suggests that yard waste compost, spread as a thin mulch under trees during the growing season, may reduce brown rot incidence.

Peach scab: numerous small, greenish circular spots on fruit surface, usually at stem-end, that turn brown-black and velvety.

Powdery mildew: white circles (peaches), sometimes roughened surfaces (cherries), and deformed fruits or fruits with depressions.

Bacterial spot: small, circular, depressed lesions with water-soaked margins. European plum, sweet and sour cherry less likely to be infected.

Rhizopus rot: fungal disease that develops after harvest and is similar to brown rot. Fruit become soft and covered with whisker-like growth.

- First spray applied after petal fall.
- Select resistant cultivars.
- Select resistant cultivars.
- Pick peaches prior to full ripeness. Do not allow fruit to become overly mature.

Fruits exude gum

Oriental fruit moth: larvae bore into side or stem end and sometimes through the green stem into the fruit. A black sooty mold often develops on the gum. Brown rot disease often develops at entrance holes. The larvae produce visible sawdust-like frass (excrement).

Tarnished plant bugs and stink bugs: damage occurs from bloom time through 5-10 weeks after bloom. Adults are up to three quarters of an inch in length with a shield-shaped thorax. They pierce and injure fruits while feeding. Plant bugs can be a major peach and plum pest.

Natural ripening process

- Remove and dispose of all infested fruit. Shallow cultivation around base of tree two weeks before bloom. Control weeds around planting.
- Strings of oozing gum visible around feeding sites. Fruits are often deformed or have shallow depressions. Pull off and dispose of fruits. Control weeds around trees, especially wild mustard. Apply a registered insecticide during the pre-bloom and petal fall through shuck fall periods, when pest is identified as a problem.
- Small drops of gum often appear on healthy or stressed fruits during tree ripening.

Fruits chewed, scarred or deformed.

Plant bug feeding: Also known as “catfacing”.

Hail or frost damage

Plum pockets: fungal disease causes plums to become elongated and misshapen. Related to peach leaf curl.

Plum curculio: ¼ inch long, humped beetle with long snout. Adult females produce distinctive, crescent-shaped ovipositing scar

- See page '6'. Promptly remove fruits. Damage can lead to fruit infection by secondary fungi. Apply liquid lime-sulfur spray at bud swell
- Adults emerge from hibernation at bloom stage through six weeks after bloom. Adults mate and feed on fruits. Females insert eggs into developing fruit. Larvae feed and grow inside, causing early season cultivars to drop fruits in June. Late summer second generation

on fruit skin. Larvae are legless and cream-colored with a brown head. Damage more severe during mild, humid, overcast weather during and after bloom period and on trees with very dense foliage. Nectarines and plums are more desirable hosts than peaches.

adult feeding also causes fruit damage. Monitor by jarring branches over a tray or white tarp during petal fall. Promptly discard all affected fruit on tree and on ground.

- See above
- See above
- Possible to control adults during feeding and mating period with a labeled insecticide. Landscape fabric or pea gravel spread under tree may prevent larvae from entering soil to pupate and prevent adults from emerging in spring.
- Harvest fruit before fully ripe. Netting is often impractical. Try physical repellents like “scare eyes”, plastic predators, shiny aluminum pie pans.

<p>Insect larvae in fruit</p>	<p>Plum curculio Oriental fruit moth larvae Cherry fruit fly maggot: ¼ inch long light colored larvae; usually one per fruit.</p>	<ul style="list-style-type: none"> • See above • See above • Possible to control adults during feeding and mating period with a labeled insecticide. Landscape fabric or pea gravel spread under tree may prevent larvae from entering soil to pupate and prevent adults from emerging in spring.
<p>Fruits pecked, torn or removed</p>	<p>Bird and squirrel damage</p>	<ul style="list-style-type: none"> • Harvest fruit before fully ripe. Netting is often impractical. Try physical repellents like “scare eyes”, plastic predators, shiny aluminum pie pans.
<p>Insects hovering around ripe fruit</p>	<p>Fruit flies, yellow jackets, other wasps and hornets</p> <p>Sap beetles: small, black beetles feed on over-ripe fruit.</p>	<ul style="list-style-type: none"> • Do not allow fruit to become overly-mature. Pick up fruit drops. No chemical controls available. • Sap beetles can be trapped in open containers containing a water, yeast, and molasses mixture.

The IPM Approach to Preventing and Managing Pest Problems

Plums, peaches, apricots, cherries and nectarines belong to the genus *Prunus*, part of the rose family of plants. Their fruits are known as drupes; a single seed is enclosed in a hard pit or stone which is surrounded by edible flesh. They make attractive ornamental specimens but are subject to many problems such as insects, diseases, weather extremes, wildlife.

To grow stone fruits successfully, you must grow healthy plants and anticipate and manage problems or prevent them altogether. The appearance and severity of pest problems varies between neighborhoods, areas of the state, and growing seasons. Most diseases are generally favored by wet seasons. Two of the most significant problems, peach tree borers and brown rot disease, are ubiquitous and must be closely monitored and managed. When symptoms of a problem are noticed you must be able to accurately identify the problem (e.g. weed, insect, disease), monitor for changes (e.g. increasing severity) and be prepared to act. Preventive techniques and control

measures may be physical (e.g. hand-picking Japanese beetles), cultural (e.g. pruning to improve air circulation) or chemical (e.g. spraying liquid lime-sulfur to control peach leaf curl.)

Be aware, however, that a large number of the fruit problems observed each season by gardeners are cultural and environmental. These abiotic problems include insufficient water or nutrients, lack of space or sunlight, poor soil, low pH, temperature extremes, and root damage from cultivation. Choosing inappropriate varieties and purchasing poor quality trees also contribute to problems.

Integrated pest management (IPM) is the recommended approach to preventing or managing pest problems. It can be summarized as follows:

- 1. Correctly identify the problem. If it is insect or disease, learn the life cycle and habits.**
- 2. Learn to anticipate and prevent problems; reduce plant stress (stressed plants attract borers.).**
- 3. Monitor the problem for worsening symptoms.**

4. If the level of damage becomes unacceptable, choose a "least toxic control" (e.g. insecticidal soap, horticultural oil, B.t., neem, etc.)

Pesticides may still be required using the IPM approach, but you may reduce the number of sprays through monitoring and good sanitation practices.

Cultivar Selection and Planting

Prevent problems before you plant your first tree by following these pointers:

- Consult with neighbors who grow stone fruits. What varieties seem to grow well in your area?
- Stone fruits should only be planted on the very best sites, with excellent air and water drainage and protection from high winds. Stone fruits, particularly peaches, will not tolerate "wet feet". They must be planted in well-drained soil.
- Plan your fruit planting one year prior to planting. This will give you time to take a soil test, select a well-drained, sunny location, add organic matter to the soil over the entire eventual root zone, adjust the soil pH if necessary, and control weeds.
- Frost problems are common on stone fruits. Most stone fruits are native to warmer climates of the world and are therefore very susceptible to injury from low winter temperatures. Apricots and sweet cherries are not recommended for colder areas of Maryland. (Early blooming apricots produce a crop only once or twice every 5 years in most locations, due to late spring frost.) Plum and sour cherry are the two most winter-hardest stone fruit trees.
- A direct southern exposure should be avoided whenever possible. The warmer temperatures on a southern slope speed many stone fruits into early bloom, increasing the probability of late frost damage. Avoid planting in "frost pockets" at the bottom of hills where cold air collects.
- Avoid poor quality "bargain" plants.

Fertilizing

- Stone fruit trees, like most plants, need the nutrients nitrogen, potassium and phosphorous in the greatest quantities. The latter two are needed in relatively large amounts when the tree is young.
- One month after planting, broadcast 8 ounces of 10-10-10 fertilizer over a 2 foot circle. Keep the fertilizer 6-inches away from the trunk and broadcast it evenly. **Do not put any fertilizer in the hole before planting.** In June following planting, broadcast

another 8 ounces of 10-10-10 around your tree.

- Unlike other tree fruits, **peaches need yearly early spring applications of nitrogen.**
- Organic fertilizers, like composted farm manure and yard waste, can be substituted for chemical fertilizers.
- Most fruit plants are fertilized in early spring. Late summer and fall fertilization may interfere with the hardening-off process and lead to winter damage.
- Over-fertilization, regardless of the nutrient source, can delay fruiting and produce weak growth prone to attack by diseases and sap-sucking insect pests.

Watering and Mulching

- Stone fruits are more shallow-rooted than pome fruits and are less drought hardy. Peaches are most sensitive to drought at final swell when the fruit is rapidly increasing in size. Water the tree deeply at this time.
- Water newly planted trees to a 6-8 inch depth 2-3 times each week during the first growing season and through the fall. This amount can be reduced if rainfall is plentiful. A small ridge of soil may be pulled up around each tree to prevent runoff.
- Trees up to 4-5 years in age are also very susceptible to drought stress and need to be watered deeply during dry periods.
- Keep an organic mulch around your trees during the growing and dormant seasons. Mulch should be kept 6 inches away from fruit tree trunks to prevent vole damage and trunk diseases.

Pruning and Training Stone Fruits

Proper pruning can help prevent or minimize pest problems by:

- allowing sunlight and spray materials to enter the center of the tree canopy.
- improving tree strength and inducing branching.
- improving air circulation within the tree, thus reducing the potential for foliar disease.
- removing dead or broken branches which may encourage disease problems.

Thinning Fruit

A certain portion of the developing fruit is removed each season so that the remainder will develop adequate size and quality. Thinning also increases the plant's ability to form flower buds for the next year, provided the thinning is done early enough. Thinning reduces fruit disease

problems by increasing air circulation around fruits and also reduces the weight load on the branches, thus reducing breakage.

Hand thinning is the easiest and safest method for removing excess fruit. Begin hand thinning when the fruits are about ½-inch in diameter. Start at one end of a branch and systematically remove fruit, leaving one fruit every 6 to 8 inches. Insects and diseases are more difficult to control when fruits hang in clusters. Keep in mind that **only 7%-10% of the tree's flowers are needed to set a full crop of fruit.**

Protecting Trees From Wildlife Damage

- Protect young trees from vole damage by surrounding the lower trunk with hardware cloth which should extend 2 to 3 inches below soil level.
- Stone fruit trees must be protected from deer. Use hardware cloth to loosely enclose the trunks of trees vulnerable to deer feeding.
- Where deer pressure is heavy, try rotating various commercial repellents. Hanging small cakes of deodorant soap from branches may also be helpful. Predator urine has not proven effective in Maryland.

Anticipating and Preventing Problems

- Contact backyard fruit growers and Extension staff in your county to learn about the most common problems.
- Anything that stresses a fruit plant or creates a wound may encourage insect (especially borers) and disease problems. Stressors include drought, physical damage (string trimmer and lawn mower) to the trunk, compacted or poorly drained soil, defoliation, winter damage, poor planting stock, etc.
- Monitor and control pests and diseases in non-bearing trees. Small, young trees are more severely affected by insect and disease problems than are larger, older trees. They have fewer food reserves, less foliar cover, and are more succulent.
- Plant flowering plants around your fruit trees that will attract beneficial insects to help control a portion of some insect pests. For example, braconid wasps may parasitize the majority of Oriental fruit moth larvae in a backyard setting. Members of the aster, mint, and carrot family are especially useful to attract beneficials.
- Paint the trunks of stone fruit trees with a white latex paint to prevent frost cracks of bark.
- Prune out water sprouts and root suckers.
- Keep weeds cut down in and around your fruit plantings to remove favorable habitats for pests.
- Control insect pests, like thrips, aphids, and leafhop-

pers that vector (spread) diseases.

- Spray on a schedule for serious, predictable diseases like brown rot, and insects, like plant bugs, that appear at the same time each year.
- Blooms should be removed at least for the first two years to allow trees to develop adequate size and root growth.
- Pick your fruit often. Don't allow fruit to become over-ripe. Regularly remove and discard all diseased or infested plant parts, including leaves and fruits on the ground.
- Protect pollinators. Do not spray insecticides during the bloom period or any broad spectrum insecticides that kill pollinators.

Troubleshooting the Causes of Tree Decline in Stone Fruits

Stone fruits tend to have shorter lives than pome fruits (apples and pears). The useful life of a peach tree, for example, is 12 to 15 years, although well managed trees may be productive for 15 to-20 or more years. Gardeners with stone fruits often observe a general decline in tree vigor, reduced yields, undersized leaves that yellow and drop prematurely, wilting of shoots, and branch dieback.

When troubleshooting a declining tree examine the 6-8 inch area just above and below the soil line and look for the following:

1. **Is there evidence of vole feeding?** Voles or meadow mice, can girdle and kill a tree. Damage is more likely during a cold winter with deep snow cover.
2. **Are heavy gum deposits present?** Peach tree borers are associated with heavy gummosis along the lower trunk and extending below soil level. The gum is produced by the tree as a defensive response to the injury.
3. Scrape away some of the tree bark (especially on the most symptomatic side of the tree). **Do you notice cankers and browning of the tissue under the bark?** This indicates Phytophthora root rot or Verticillium wilt. These soil-borne fungal diseases are more prevalent on wet soils. The foliage of infected trees tends to yellow gradually and drop during the summer.
4. **With the bark scraped away, can you see white, fan-shaped fungal mats between bark and wood?** This is Armillaria root rot. Infected trees tend to collapse in mid summer. Continued on next page.....

5. **Is the bark spongy and thickened?** With the bark scraped away can you see small pits or grooves. This indicates stem pitting (tomato ringspot) virus which is spread by weeds and nematodes.

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MCE publications on fruit trees:

- HGIC # 69, Getting Started With Tree Fruits
- HGIC #76, IPM Series: Pome Fruits

Reviewed by:

Henry Hogmire, Ph.D., Extension Fruit Entomologist
Alan Biggs, Ph.D., Extension Fruit Pathologist
West Virginia University, Kearneysville Tree Fruit Research and Education Center, Kearneysville, WV 25430

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Use Pesticides and Fertilizers Wisely**

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Authors: Jon Traunfeld, Mary Kay Malinoski, and David Clement, University of Maryland Extension Specialists, Home and Garden Information Center

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