

I. PEAR

No.	Disease/Insect	Symptoms	Possible Causes	Solutions
1	FABRAEA LEAF SPOT (<i>Fabraea maculata</i>)	  <p>Initial lesions on leaves are tiny, round, purplish-black spots, which quickly enlarge to 1/8 to 1/4 inch in diameter and usually have a blackish-brown center</p> <p>Fruit lesions are larger than those on leaves and cause the fruit to crack and drop. Lesions on current season's shoots may be observed as small inconspicuous, purplish-black spots.</p> <p>Some lesions develop into superficial cankers, but most are walled-off during the next growing season, so that cankers rarely persist in two-year-old wood.</p>	<p>The four-celled conidia (<i>Entomosporium maculatum</i>), with a distinctive insect-like appearance, are spread mainly from overwintering leaf litter, and some from twig cankers, by splashing water from rains or overhead irrigation.</p> <p>The disease may advance rapidly in late summer as wind and rain distribute the conidia throughout the tree.</p>	<p>This disease is controlled with applications of protectant fungicides.</p> <p>Early-season spray programs for pear scab should also control early-season leaf spot infections.</p> <p>Where ascospores and conidia of the fungus occur after petal fall, summer fungicide treatments are needed.</p>
2	FIRE BLIGHT (<i>Erwinia amylovora</i>)	 <p>Overwintering cankers harboring the fire blight pathogen are often clearly visible on trunks and large limbs as slightly to deeply depressed areas of discolored</p> <p>As with blossom infections, the pathogen often invades and kills a portion of the limb supporting the infected shoot. The first symptom on water sprouts and shoots that are invaded systemically from nearby active cankers is the development of a yellow to orange discoloration of the shoot tip before wilting occurs</p> <p>In general, infections of any type that occur between petal fall and terminal bud set usually lead to the greatest limb and tree loss.</p>	<p>Pears tend to have more flowers per spur than apples, and these flowers tend to remain open and susceptible for a longer period than those on apple.</p>	<p>Continue to monitor for strikes and remove all blighted limbs.</p> <p>Continue to remove blighted tissues during midseason. Do not use antibiotics at this time.</p>
3	PEAR SCAB (<i>Venturia pirina</i>)	 <p>Lesions on leaves and petioles begin as round, brownish spots that eventually become velvety in appearance.</p> <p>Later in the season, small spots can be observed on the lower surface of the leaves. These are usually the result of late spring or early summer infections.</p> <p>Scab lesions on fruit occur on the calyx end and eventually on the sides of the fruit. Infected fruit often become irregular in shape.</p>	<p>The fungus overwinters in leaves on the ground and also as mycelium in infected twigs</p> <p>Ascospores are the major source of primary inoculum. Infection occurs in the spring around the green-tip stage of flower bud development. Ascospores in the overwintered leaves are released as the result of rain and are carried by air currents to young leaves and fruit.</p> <p>Conidia are the source of secondary inoculum and are produced in either the primary lesions initiated by ascospores or within pustules on infected twigs.</p>	<p>Fungicides that control apple scab will control pear scab, but fewer applications are needed since pear scab seldom is as severe as apple scab. Generally, spray applications should begin when green tissue emerges from buds and should continue until the supply of ascospores is depleted.</p>
4	STONY PIT	 <p>Begin as early as three weeks after petal fall, when dark green spots form on the fruit. Areas surrounding these spots continue to grow while spots stop, resulting in misshapen fruit with pits</p> <p>Pimpling and cracking of the bark, stunting of the trees, and chlorotic vein-banding or mottling</p> <p>Pits often become necrotic and the fruit beneath becomes sclerotized; heavily pitted fruit may become so gritty that it is difficult to cut with a knife.</p>	<p>Can be transmitted by grafting</p>	<p>Select virus-free trees for planting. Infected trees should be removed, but be aware that removing all infected Bosc trees in some orchards could reduce Bartlett pear yields because of lack of sufficient pollination.</p>

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II. PEACH and NECTARINE

1	BACTERIAL SPOT (<i>Xanthomonas pruni</i>)	  <p>Fruit infections appear as tiny purple to black flecks on the fruit surface of peaches, and as water-soaked spots on nectarines</p> <p>Later, the skin is "broken" and the flesh beneath the spot becomes sunken. Early season infections result in very deep lesions in the flesh, and infections within 30 days of harvest result in circular, yellowish spots on the fruit surface</p> <p>The leaf spots are always angular as a result of being restricted by the veins of the leaf. Initially, the spots appear as water-soaked angular spots which are generally only visible when viewed with a light source behind the leaf. In about three days, the lesion becomes visible with reflected light. Within one to two weeks, the center of the lesion is "walled off" by the leaf and drops out, resulting in a shothole or tattered appearance.</p>	<p>The bacteria multiply within the twigs during periods with favorable temperature and the bacteria ooze out of natural openings in the spring during periods of wetness.</p> <p>Leaf and fruit infections generally do not occur until around petal fall and shuck split</p>	<p>Avoiding the selection of highly susceptible cultivars</p> <p>Chemical sprays may help to reduce the levels of fruit and leaf infection. To be effective, spray applications must be applied before symptoms occur. The first spray is usually a copper compound applied just before tree growth resumes in the spring. This is followed by weekly applications of an antibiotic beginning at petal fall (alternating applications of antibiotic and copper may be effective, also, although many stone fruits are sensitive to copper and injury from copper may be difficult to distinguish from damage caused by the pathogen).</p>
2	BROWN ROT (<i>Monilinia fructicola</i>)	     <p>Rapid death of blossoms which, as they turn brown, often become affixed to the twig in a gummy mass, later becoming covered with a grayish to tan spore mass.</p> <p>Following colonization of the blossom, the fungus enters the shoot where it causes a canker on which spores are also produced. Shoot blight symptoms will occur if the fungus girdles the shoot. Leaves on such shoots turn tan to brown and may remain attached for several weeks. Cankers formed following blossom or fruit infection appear as brownish, sunken areas, that are often covered with gum.</p> <p>Brown rot on ripening or mature fruit typically develops as a rapidly spreading brown necrosis. Under optimum conditions for the fungus, entire fruit may be rotted within 48 hours of infection. The infection produces a soft dry rot, although occasionally the skin remains firm.</p> <p>On nectarines, brown rot sometimes occurs as quiescent infections which can be detected as small, circular, necrotic lesions on immature fruits. As fruits mature, decay spreads from the lesion throughout the entire fruit. Immature or mature fruit with brown rot infections will sporulate profusely, shrivel, and become tough grayish-black mummies</p> <p>These mummies may drop to the ground, where apothecia may develop, or remain attached to the tree through the winter. Decaying fruit in cold storage or transit may appear black with little or no sporulation.</p>	<p><i>M. fructicola</i> overwinters in orchards as mycelium on mummies, fruit stems, blighted blossoms and twigs, and cankers.</p> <p>Sporodochia develop under cool, wet conditions during the winter and early spring. Occasionally, cup-like apothecia of <i>M. fructicola</i> which produce ascospores can be found on fruit mummies under the tree</p> <p>Generally, conidia from mummies and cankers on stone fruit trees and other sources (for example, flowering ornamental plants of plum or quince, or wild plantings of plum) are believed to be the primary inoculum sources.</p> <p>Conidia of <i>M. fructicola</i> are generally formed during late spring when temperatures range from 55 to 77 F (13-25 C). Conidia are disseminated by wind and rain and germinate rapidly under favorable conditions.</p> <p>Insects (nitidulid beetles and honey bees) also can be important as vectors of the fungus during fruit ripening, carrying conidia to injury sites produced by oriental fruit moth, Japanese beetle, green June beetle, and other insects that injure fruit.</p>	<p>(1) Remove all remaining fruit from the tree after the final picking. This practice limits infection of fruit peduncles and twigs thus reducing the number of brown rot cankers.</p> <p>(2) Fruit thinning practices influence the carry over of brown rot during the summer months and into the fruit ripening season. In general, fruit thinned before pit hardening decompose rapidly; whereas, fruit thinned after pit hardening become infected on the orchard floor and serve as spore sources for the disease.</p> <p>(3) In spring, monitor for blossom infection and prune out any cankers and infected shoots. (4) In spring, just prior to and during the blossom period, examine the orchard floor for apothecia. Their presence requires that blossoms be thoroughly protected with fungicide sprays during wet periods.</p> <p>(5) Prune to avoid excessive overcrowding of branches to increase air circulation, promote rapid drying, and increase light and spray penetration. (6) Fertilize to maintain optimum nitrogen/potassium balance.</p> <p>(7) Avoid dumping rotten fruit in one location, which could become the starting point for disease and insect outbreaks in the following season. (8) Pick and handle fruit carefully to avoid injuries; remove field heat from the fruit promptly after harvest by hydrocooling or forced air cooling; use clean containers; keep packing areas clean.</p>
3	FUSICOCCUM CANKER (<i>Phomopsis amygdali</i>)	 <p>Infected twigs and shoots wilt and die because of elongate, brown, sunken cankers, often with a zonate pattern, at their bases</p> <p>Symptoms appear in early summer and become increasingly evident as more blighted shoots appear through late summer.</p>	<p>Darkly pigmented pycnidia (flask-shaped, conidia-bearing fruiting bodies) are produced over the surface of the cankered area. The pycnidia exude conidia in white tendrils during wet weather. Conidia disseminated by rain infect through leaf scars in autumn and through buds, bud scale scars, stipule scars and fruit scars, or directly through young shoots during the growing season.</p>	<p>Removing twigs with dieback and cankers</p> <p>Fungicides, applied just before budbreak and in autumn, may be needed in problem orchards. Some fungicides used for brown rot and peach scab control during the growing season may help prevent infection.</p>

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4	LEAF CURL (Taphrina deformans)	 <p>Infected leaves are severely deformed and often display a variety of colors ranging from light green and yellow to shades of red and purple. The fungus causes the meristematic cells at leaf margins to proliferate quickly and randomly, which results in the leaves becoming variously wrinkled, puckered, and curled Many infected fruits drop early and go unnoticed; those that remain may become crooked at the stem end like a small yellow squash, while others develop reddish to purple, wart-like deformities on the fruit surface</p>	<p>The pathogen occurs commonly almost wherever peaches are grown, and overwinters as blastospores in protected crevices in the bark and around the buds.</p> <p>The incidence of infection is greatest when rains wash the overwintered spores into the bud and cool temperatures lengthen the time that the emerging leaves are exposed to the pathogen, before they are fully expanded and can resist penetration by the fungus</p>	<p>Can be controlled with one well-timed fungicide application, either in the autumn after 90% of the leaves have fallen, or in the spring before bud swell.</p> <p>It is important to maintain tree vigor by thinning more fruit than normal, reducing drought stress with irrigation, and applying extra nitrogen fertilizer.</p>
5	LEUCOSTOMA CANKER (Leucostoma persoonii)	 <p>The first visible symptom is the exudation of gum at the point of infection. The canker starts from a small necrotic center that slowly enlarges with the collapse of the inner bark tissue. The canker enlarges more along the length than the width of the branch. Older cankers are therefore oval to elongate in outline</p> <p>In new cankers, the outer bark usually remains intact except at the points of gumming. In older cankers the bark in the center of the canker becomes torn. The gum turns black due to alternate wetting and drying and the presence of saprophytic fungi. Older cankers are surrounded by a roll of callus tissue.</p>	<p>The fungus which causes the disease overwinters in cankers and dead twigs. Small black fruiting bodies containing spores of the fungus are produced on the smooth bark covering diseased areas on dead wood. These spores are washed from the fruiting structures during wet weather.</p> <p>The fungus attacks the woody parts of stone fruit trees through any injury to the bark, pruning cuts, and dead shoots and buds.</p>	<p>Proper site selection for new peach plantings is essential if young trees are to enter their productive years free of disease. The site should have deep, well-drained soil and good air drainage to minimize the chances for winter injury. Nursery stock should be disease-free and not excessively large (greater than 11/16 caliper).</p> <p>Protect trees from peach tree borer by dipping the roots and crown of new trees in an appropriate insecticide. Newly planted trees should be pruned when their buds begin to break and trees should be headed back to about 100-115 cm to promote wide-angled branching. Trees should be inspected after growth begins and any dead branches should be removed.</p> <p>Control oriental fruit moth and peach tree borer even in the first few non-bearing years. Rodent damage should be prevented with wire or plastic guards.</p> <p>Nitrogen fertilizer should be applied in late winter or early spring to avoid inducing late, cold-susceptible growth in the fall. Balance nitrogen fertilizer application with an adequate supply of potassium.</p> <p>Cankers should be removed from the tree and burned, buried, or moved out of the orchard. The practice of covering pruning cuts in spring with a thiram-latex paint mixture provides some degree of protection against fungal infection.</p>
6	POWDERY MILDEW (Sphaerotheca pannosa)	 <p>Infected young leaves may drop or fail to elongate and unfold normally, while those of new shoots become narrow, strap-like, and distorted. Infected leaves may become completely coated with the thick, white, powdery mycelium and spores of the fungus, or the infected areas may appear as whitish patches</p> <p>This whitish growth often can be seen on infected fruit as well</p> <p>On developing fruit, the disease first appears as white, round spots two to four weeks after shuck fall. These spots increase in size until a large portion of the fruit is covered</p>	<p>The fungus overwinters as mycelium in infected shoots and dormant peach buds. As infected shoots begin to grow in the spring, the fungus within the diseased tissue produces spores (conidia). These conidia are disseminated by air currents and rain, causing new infections on expanding leaves, shoots, and young fruit.</p>	<p>Avoiding peach cultivars susceptible to powdery mildew. With susceptible cultivars, such as Redskin and Rio Oso Gem, spray treatments may be needed. Begin fungicide sprays at petal fall and continue at 10- to 14-day intervals until the pit hardening stage is reached.</p>
7	PRUNUS STEM PITTING VIRUS (Tomato Ringspot virus)	 <p>Usually in late summer, before healthy trees begin to color and lose leaves, leaves on single or multiple shoots of infected trees turn yellow, may cup upward along the midrib, may turn red to purple, and then begin to drop from the tip of the branch back toward the main branches.</p> <p>Infected trees produce large numbers of small fruit, which tend to ripen early and may drop prematurely. In the following season, the infected tree appears weak, with stunted growth</p>	<p>Broadleaf weeds act as reservoirs for infection of trees. Some weeds, such as dandelion, can spread the virus over long distances through seed.</p> <p>Tomato ringspot virus is transmitted from weeds to trees by dagger nematodes (Xiphinema spp.).</p>	<p>To avoid introducing the disease into new plantings, growers should obtain and plant trees derived from a virus certification program.</p> <p>Prior to planting, land preparation should include destruction of weeds, which serve as reservoir hosts of the virus, and, if nematode vectors are detected, fumigation should be considered.</p>

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			To separate PSP from other problems, remove a strip of bark from six inches (15 cm) above to six inches (15 cm) below the ground line on the trunk. On infected trees, bark and sapwood will be thicker than normal, and wood will have elongated indentations, swellings or pits	In the absence of dagger nematodes, the virus does not naturally spread to fruit trees, but can be transmitted through grafting and budding of infected tissue.	
8	SCAB (<i>Cladosporium carpophilum</i>)	 	Small, greenish, circular spots gradually enlarge and deepen in color to black on fruits as spore production begins. Where numerous, they often coalesce and may lead to cracking of the skin as the fruit enlarges, allowing rot organisms to enter. The overwintering twig lesions are clearly visible during the early season as small, grayish, more or less circular, slightly sunken lesions on the previous season's shoot growth.	The pathogen overwinters in small twig lesions on last season's shoots. Conidiospores, produced in these cankers during the early spring, are splashed by rain to young fruits and new shoot growth.	Proper and regular pruning facilitates air movement, reduces length of wet periods, and improves spray penetration into trees. Fungicide sprays, applied at 10- to 14-day intervals, should be made beginning at petal fall and continuing until 40 days before harvest.
9	X-DISEASE	 	Symptoms in peach are apparent after about two months of growth, when leaves on isolated branches curl inward and develop irregular yellow to reddish-purple spots, which later drop out leaving tattered leaves with a "shothole" appearance. Leaves on affected branches fall prematurely, starting at the base of the branch, until only a tuft of leaves remains at the tips of infected shoots. Fruit drops prematurely. Two to three years after initial infection, the entire tree will show symptoms	Caused by a mycoplasma-like organism (MLO), a small parasitic organism that lives in phloem cells	Disease spread can be reduced with insecticides that are effective against leafhoppers. Trunk injection of oxytetracycline can provide temporary symptom remission, and is more effective than sprays of oxytetracycline. Infected trees in nurseries should be removed and destroyed.
10	YELLOWWS		Characterized by shoot proliferation, greatly reduced growth, and leaf yellowing. Fruit that are produced tend to be of low quality and lack flavor. Affected trees survive two to three years.	Caused by mycoplasma-like organisms	Be aware of the symptoms of these diseases.