



## PEACH LEAF CURL AND PLUM POCKETS

Peach leaf curl or leaf blister is caused by the fungus *Taphrina deformans*. In home plantings, this is one of the most common and widespread diseases of peaches and nectarines, and to a lesser extent of ornamental flowering species of *Prunus* wherever these plants are grown. Commercial peach orchards are sometimes seriously damaged when a dormant fungicide application has not been made.



Figure 1. Peach leaves distorted by peach leaf curl disease. Note reddish purple areas. Leaves drop in early summer.

Plum pockets or bladder plum, caused by the closely related fungi *Taphrina communis* and occasionally by *T. Pruni*, is not as widespread or as serious as peach leaf curl. Plum pockets attacks a number of cultivated and wild species of American plums as well as the Canada plum. These diseases are less common on domestic (European) plum and are uncommon on Japanese plum.

Neither peach leaf curl nor plum pockets normally kills trees, but both may leave them in a weakened condition and, thus, more susceptible to winter injury and infection by other disease-causing organisms. The fruit crop is reduced for the following year, or even longer.

Both diseases are discussed here since control measures and the environmental conditions necessary for infection are the same. Disease development is favored by cool, moist weather (frequent light showers) as the buds break dormancy in early spring.

### Symptoms

**Leaves.** Infected leaves are severely puckered, distorted, thickened, crisp in texture, and curled downward and inward within a month after full bloom (Figure 1). Usually the whole leaf is affected. Such leaves lose their normal green color, which is replaced by red and purple tints. Later, a grayish white “velvet” spore-producing layer of the *Taphrina* fungi covers the upper surface of diseased areas. All affected leaves eventually turn yellow or brown, wither, and drop several weeks after infection. Hot, dry weather usually hastens leaf fall. Such leaves are replaced by a second growth of healthy leaves in June and July. The tree, now in a weakened condition, is under stress because of the food reserves used in producing a second crop of leaves.

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With nursery stock, successive attacks for two or more seasons usually kill the tree or stunt its growth to such an extent that it is practically valueless.

**Blossoms.** Peach blossoms also become infected. They are distorted, shrivel, and usually fall before the symptoms are well developed.

**Twigs.** The leaf curl fungus may attack young peach shoots causing the terminal 4 to 5 inches to become stunted, swollen, twisted, and pale yellow or green. Such twigs generally produce nothing but tufts of curled leaves at their tips. Many affected twigs will die back. The tips of plum shoots become greatly enlarged and are often twisted and curled.

**Fruits.** Plum leaves are deformed and curled as in leaf curl of peach and nectarine, but are not as conspicuous. Infected plums 6 to 12 millimeters in diameter develop small, raised, spongy, greenish white spots or “blisters” that rapidly enlarge and may soon cover the entire fruit. The fleshy young seed soon turns brown, withers, and dies, leaving a hollow cavity surrounded by the ever-enlarging fruit. “Bladderlike,” misshapened fruits with thick spongy flesh may be up to 10 times or more the size of healthy plums. Infected fruit are reddish at first, but later have a velvety gray appearance (Figure 2). Diseased fruit turn dark brown or black, shrivel, and usually drop prematurely. In years when plum pockets is severe, 50 percent or more of the fruit may be lost.



Figure 2. Plum pockets fruit and leaf infections.

Young peach fruit are distorted and develop irregular, raised, wartlike, colored areas. As the fruit enlarge, they commonly become wrinkled or crack open and lack the normal peach fuzz. Such fruit usually drop prematurely.

## Disease Cycle

The disease cycles of the three species of *Taphrina* are very similar. Soon after the distorted leaves or plum fruit become visible, enlarging asci of the fungi break through the cuticle (Figure 4A). A compact layer of “naked” asci appear as the powdery gray, feltlike growth on the thickened leaves and plum fruit. Each ascus usually produces eight, one-celled, oval ascospores (Figure 4B, left), which are released into the air as the mature asci rupture. The ascospores multiply by budding inside or outside the ascus (Figures 4A and 4B, right) producing blastospores (conidia) during warm, moist weather. The conidia may continue to bud and eventually produce tremendous numbers of thin- or thick-walled spores (Figure 4C and 4D). The ascospores and conidia are washed, splashed, or blown about and become lodged in the bud scales and in cracks and crevices of the twigs and bark where they germinate (Figure 4E) at once to produce yeast-like colonies. These colonies persist throughout the winter. The spores (conidia) produced by these colonies and ascospores provide the source of infection. During cool, rainy weather in early spring, (optimum 50° to 70°F or 15.5° to 21°F), from bud swell to bud opening, the spores germinate and infect the swelling leaves and flowers within the buds. The mycelium of the *Taphrina* fungi grow rapidly between the cells of the host tissues beneath the upper or lower epidermis, stimulating excessive cell growth and enlargement and producing an uneven expansion of the leaf. This results in a wrinkled and

puckered appearance. Secondary infections do not generally occur in these fungi since susceptible host tissues soon become highly resistant to invasion. The ascospores and conidia form thick, weather-resistant walls and are capable of surviving hot, dry summers and freezing winters for two years or more. Thus a year of relatively light infection may be followed by a year of severe infection. If preventive measures are **NOT** taken **before** trees break dormancy in early spring, control of peach leaf curl and plum pockets is impossible. Trees are susceptible to infection **ONLY** during the relatively short time between swelling and opening of the buds.

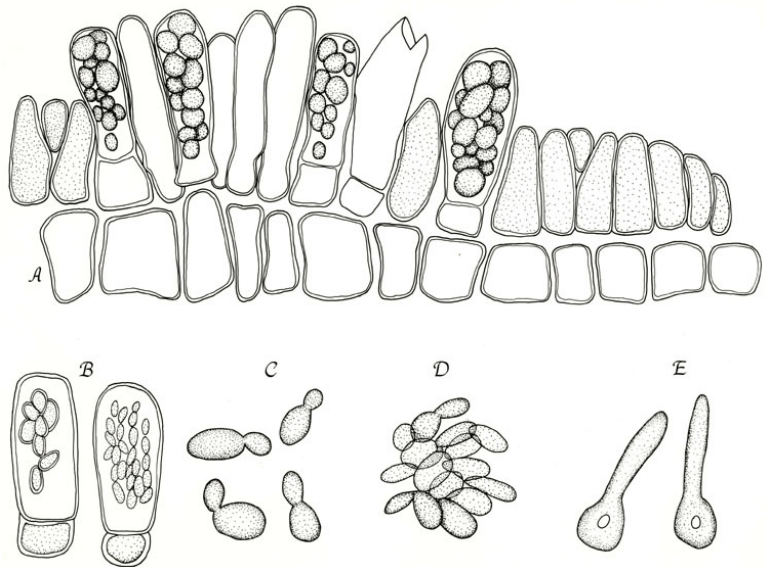


Figure 3. *Taphrina deformans*, peach leaf curl fungus under high-power lab microscope: (A) vertical section of upper surface of peach leaf showing layer of epidermal cells and compact, palisade layer of asci, some containing ascospores, which ruptured the leaf cuticle; (B) two asci, one with 8 ascospores, other ascospores are budding; (C) ascospores budding (form secondary spores or conidia); (D) late budding of ascospore; (E) two ascospores germinating.

## Control

1. Peach leaf curl and plum pockets are easily controlled. Apply any one of the fungicides listed in Illinois Homeowners Guide to Pest Management, or, for commercial growers, Midwest Tree Fruit Pest Management Handbook, to control these diseases. A single thorough, dormant spray in late fall, winter, or very early spring before the buds begin to swell should provide nearly perfect control. Once the fungi enter the leaf or fruit, these diseases cannot be controlled. Spray all buds, using high pressure. Spray on a dry, calm day when the temperature is over 40° to 45°F (4° to 7°C). Fungicide dusts will not control peach leaf curl or plum pockets. Follow all fungicide label directions regarding rates, method of application, and precautions.

Commercial peach growers normally do not apply a dormant leaf curl spray following a crop year when summer fungicides are used routinely. The frequent use of a summer fungicide destroys the *Taphrina* ascospores and conidia that would normally overwinter. Thus, a dormant fungicide is most important following a non-crop year. Non-crop years on peaches are common in Illinois and other areas of the Midwest following very cold winters.

2. If a dormant spray is omitted, and peach leaf curl or plum pockets develop, all that can be done is to maintain tree vigor: (a) fertilize with nitrogen in early spring to stimulate the growth and development of new leaves. Fertilize according to a soil test report. The amount of fertilizer should be controlled to avoid overstimulating the tree; (b) reduce drought stress by periodic irrigations (soil moistened 12 inches deep); (c) thin fruits heavily to reduce the demand on the remaining leaves.
3. Peach, plum, and nectarine cultivars are all about equally susceptible to these diseases.