

# New York's Food and Life Sciences Bulletin

New York State Agricultural Experiment Station, Geneva, a Division of the New York State College of Agriculture and Life Sciences, a Statutory College of the State University, at Cornell University, Ithaca

## BLISTER SPOT OF APPLE

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Blister spot is a disease of apple fruit caused by the bacterium, *Pseudomonas syringae* pv. *papulans* (Rose) Dhanvantari. Although over 20 cultivars of apple have been reported as susceptible to the bacterium, the disease is usually of economic importance only on Mutsu in New York State. If uncontrolled, the disease generally affects 5 to 60 per cent of the fruit in an orchard. The bacterium does not cause extensive decay of the fruit, but makes them unsuitable for fresh market use.

### DISEASE DESCRIPTION

Blister spot is first observed as small raised green blisters, which develop on fruit from early to mid July. These blisters are associated with stomata and continue to expand during the growing season. Near harvest they range in diameter from 1-5 mm and are purplish-black in color. A few to hundreds of lesions may develop per fruit. The decay will rarely extend more than 1-2 mm into the fruit.

No leaf spot or wood canker symptoms have been associated with this disease.

### THE PATHOGEN

*P. syringae* pv. *papulans* is very widespread in Mutsu orchards. The bacterium survives the winter in dormant buds. Up to 40 per cent of the dormant buds in an orchard may harbor the pathogen. The bacterium may also overwinter in infected fruit on the orchard floor.

Once tissues begin growing in the spring, the pathogen can be detected in high numbers on Mutsu leaves, blossoms, and then fruits, even though no disease may be apparent. High populations of the bacterium have also been detected on Golden Delicious leaves, and infection will occur on Golden Delicious and Jonagold. These infections, however, are much smaller in size and fewer in number than infections on Mutsu and do not cause a serious economic problem. The pathogen also survives on the foliage of some orchard weeds including: *Taraxacum officinale* Weber (dandelion), *Agropyron repens* L. (quackgrass), *Euphorbia escula* L. (leafy spurge), *Trifolium* sp. (clover), and *Malva neglecta* L. (common mallow). Because of the ubiquitous nature of the pathogen, it can be assumed that it is present at high populations in Mutsu orchards throughout the growing season. The bacterium can be spread to susceptible fruit by insects and rain. The disease cycle is shown in Figure 1.

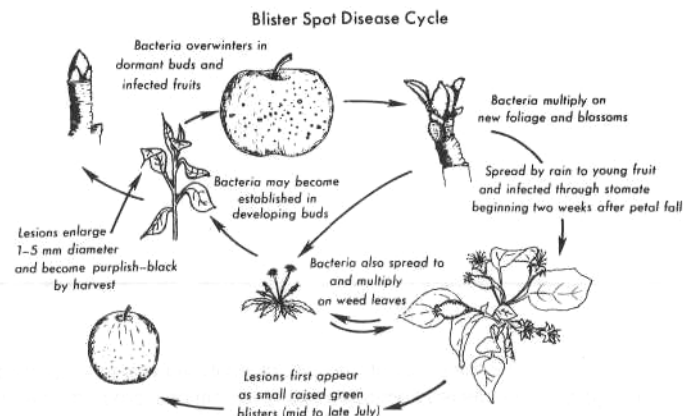


Figure 1.—Blister spot disease cycle.

## FRUIT SUSCEPTIBILITY

Inoculation studies were conducted to determine when during the growing season fruits are susceptible to *P. syringae* pv. *papulans*. It was found that the susceptibility period begins from 2 to 2112 weeks after petal fall and continues for 4-5 weeks or until stomata on fruit have developed into lenticels. Even during seasons of delayed bloom, this relationship has held. In some years, environmental conditions after petal fall may favor an increased or decreased rate of fruit development, and thus may effect the susceptibility period.

### CONTROL

Blister spot can be controlled using properly timed sprays of streptomycin. Field experiments have shown that it is essential to apply the first of these sprays prior to the onset of increased fruit susceptibility, i.e., two weeks after petal fall. If the first spray is applied after this critical period, the per cent disease control will drop as shown in Table 1. In orchard tests we have controlled blister spot with a mixture of 0.25 lb (113 g) streptomycin (17% WP) plus 1 pint (.473 L) of Glyodin per 100 gallons (379 L) of water applied at the dilute rate of 300 gal. of spray per acre. Dilute spray is recommended to assure thorough coverage of all tissue on which the pathogen may multiply. If growers wish to use a concentrate spray, no less than 100 gallons of water should be used. A total of three sprays at weekly intervals is recommended for maximum control.

### SUSCEPTIBILITY OF OTHER VARIETIES

The varieties Cortland, Delcious, Golden Delicious, Idared, McIntosh, and Rome Beauty all developed blister

**Table 1. Timing of streptomycin plus glyodin sprays for control of blister spot.**

Treatment <sup>v</sup>	Dates of spray application <sup>y</sup>								per cent <sup>w</sup> disease
	5/29	6/6	6/15	6/19	6/27	7/2	7/11	7/18	
1	X	X	X	X	X	X	X	X	2.2a <sup>z</sup>
2	X	X	X						2.6a
3		X	X	X					3.0a
4			X	X	X				4.4a
5				X	X	X			12.0b
6					X	X	X		26.4c
7						X	X	X	42.2d
unsprayed check									53.8e

<sup>v</sup> Sprays of 50 ppm streptomycin (17 WP) in a 1 pt/100 gal water solution of glyodin were applied at 300 gal/A.

<sup>w</sup> per cent disease was calculated by determining the average number of lesions per fruit on 1000 fruit from 10 trees just prior to harvest.

<sup>y</sup> Petal-fall was on 5/29.

<sup>z</sup> Values for per cent disease were analyzed using the Waller-Duncan BLSD Rule. Values followed by the same letter are not significantly different (P = 0.01).

spot lesions when they were artificially inoculated with the pathogen in the orchard. With the exception of Golden Delicious, natural infections have not been observed on these varieties in recent years in New York State. These results do imply, however, that if pathogen populations become high, blister spot might develop on several apple varieties, especially if they are planted in close proximity to Mutsu.



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