Bean Necrosis Disease

Snap beans of western Oregon are subject to substantial damage from the bean necrosis disease, caused by an aphid-transmitted, filamentous virus. All pole and bush-type beans currently grown in Oregon for processing are highly susceptible to this virus. Maximum infection rates, sometimes involving 40 to 60 percent of the plants, usually occur near field borders containing virus reservoir hosts. Infection incidence varies inversely with distance from these borders. Plants infected within 20 days of emergence usually die before pods are borne. Plants infected near bloom time may produce discolored and misshapen pods, resulting in major economic loss to growers and processors.

SYMPTOMS

Typical symptoms, appearing 10 to 14 days after aphid transmission, consist initially of flagging and greenish-brown discoloration of terminal leaves. This is followed within two days by the death of these leaves (leaves turn brown in color, and become dry and fragile) and killing of plant stems from the top downward. Finally, most or all of the plant dies and becomes brown. Some strains of the bean necrosis virus, often transmitted by aphids simultaneously with typical strains, produce plant stunting, leaf mottle, and severe leaf distortion. Mottle-inducing strains, similar to bean yellow mosaic virus, also cause plants to produce distorted, unmarketable pods.

SOURCE AND NATURAL SPREAD OF THE VIRUS

The primary reservoir of bean necrosis virus in western Oregon is white clover (Trifolium repens L.), principally New Zealand white, wild white, Louisiana white, and Ladino clovers. These clover varieties have been especially useful in pasture mixes, field roadways, ditch banks, and fence or field-border areas. They are hardy and aggressive, withstand heavy grazing, reseed themselves effectively, and provide excellent, persistent ground cover. Unfortunately, they have been the source of recent severe outbreaks of bean necrosis in the
Pods with pocking and russet rings caused by bean necrosis virus.

Salem-Stayton bean-producing area of western Oregon. Three aphid species—green peach aphid, pea aphid, and black bean aphid—have been found capable of transmitting bean necrosis virus, and all could participate in its natural spread. Only the latter actively colonizes on beans, but all three species can move from the clover reservoir as winged adults, and only a single feeding probe on bean plants will transmit the virus. Aphid flights from clover can occur at any time of the spring or summer. The major flights resulting in bean necrosis outbreaks during 1972 and 1973, however, occurred from mid-June to late July.

CONTROL

Suggestions for control of bean necrosis are listed below.

1. Where feasible, eradicate white clover varieties from border or pasture areas. Field(s) used for bean production replacing those with red clover, alsike clover, other hardy clovers, birdsfoot trefoil, or other agronomically suitable legume species.

2. Where white clover eradication is not feasible, select for bean production fields that are separated from white clover stands by at least 200 feet. This small degree of isolation will substantially reduce losses caused by the bean necrosis disease.

3. When possible, locate bean fields upwind (toward the prevailing summer breeze) from clover fields or pastures containing clover. This further minimizes infection due to aphid flights from clover to beans.

4. Avoid planting bean in fields that contained white clover varieties the previous year. Surviving or volunteer clover plants, particularly those in border areas or within bean rows, may serve as a virus reservoir.

5. Should aphicide application to beans be necessary during June or July (black bean aphid or other species), including field border areas containing numerous white clover plants may be profitable.

Bean necrosis symptoms appear suddenly. Plants on left show stunting and death of terminal leaves 10 days after infection. Plants on right appear healthy and vigorous six days after infection. All plants were dead eight days after pictures were taken.