FIREBLIGHT IN SOUTHERN ONTARIO IN 1972

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Abstract

Observations for fireblight infection were made in 25 pear and apple orchards in southern Ontario in 1972. The symptom most commonly observed was twig blight, which in the Harrow area was not preceded by blossom blight. Bacteria from infected shoots were isolated on a selective medium to confirm visual identification of symptoms. The incidence of blight was generally light; however, in 8 of the orchards damage of economic significance occurred. Frequency of blighted shoots appeared to be more related to age of orchard, soil fertility, variety, and presence of inoculum than to local climatic conditions.

Fireblight caused by Erwinia amylovora (Burr.) Winsl. et al. is the most potentially destructive disease of pear and apple in southern Ontario. The occurence of the disease is sporadic and unpredictable, but each year a few orchards have a serious outbreak. Occasionally the disease becomes widespread. In 1972, observations were made on 25 pear (Pyrus communis L.) and apple (Malus pumila Mill.) orchards in the Harrow, Arkona, Cedar Springs, Simcoe, and Vineland areas (Fig. 1). Nine orchards in the Harrow area (Essex County) were observed throughout the growing season, and the other orchards

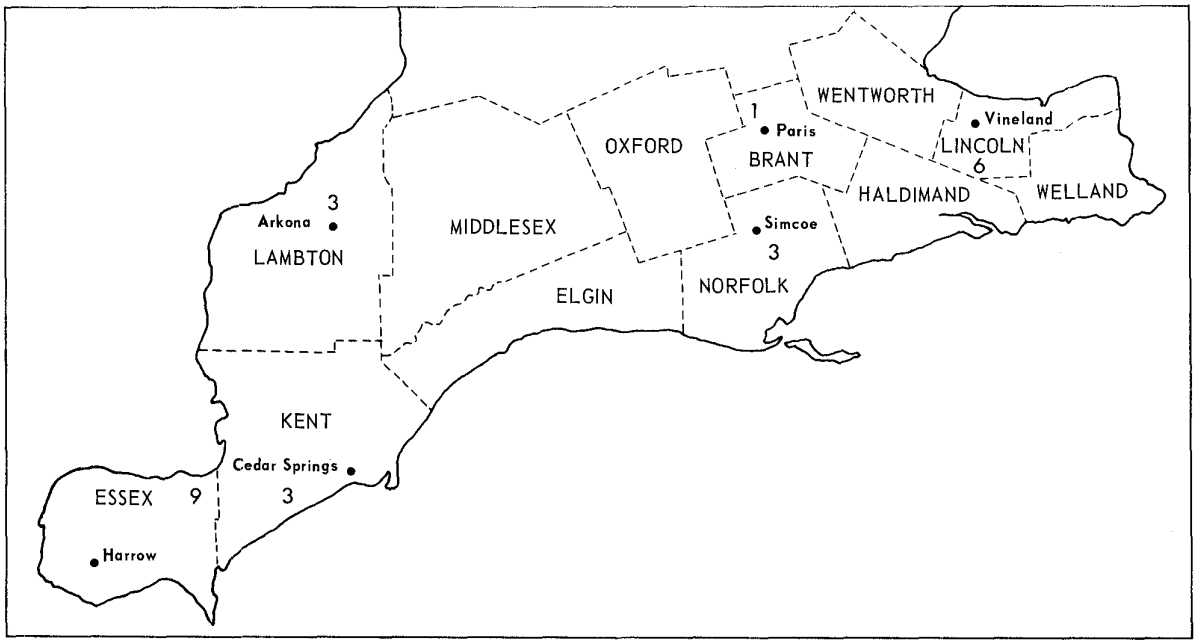

Figure 1. Location and number of orchards observed for fire-blight severity in southern Ontario, 1972.

were visited once in late July, August, or September.

Identification of fireblight was made by visual recognition of macroscopic symptoms on the trees, by the appearance of bacterial colonies isolated from infected shoots on Crosse and Goodman's selective medium (1,2), and by subsequent pathogenicity tests of single colonies on immature Bartlett pear fruitlets (Fig. 2) or on succulent shoots of potted Bartlett pear trees in the greenhouse.

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[2] Selective medium: sucrose 400 g, Difco nutrient agar 30g, crystal violet solution (0.1% W/V in absolute ethanol) 2 ml, 950 ml water, 1% actidione 5 ml (added to cool autoclaved medium).

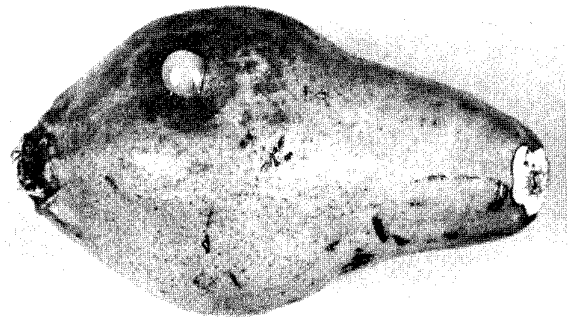
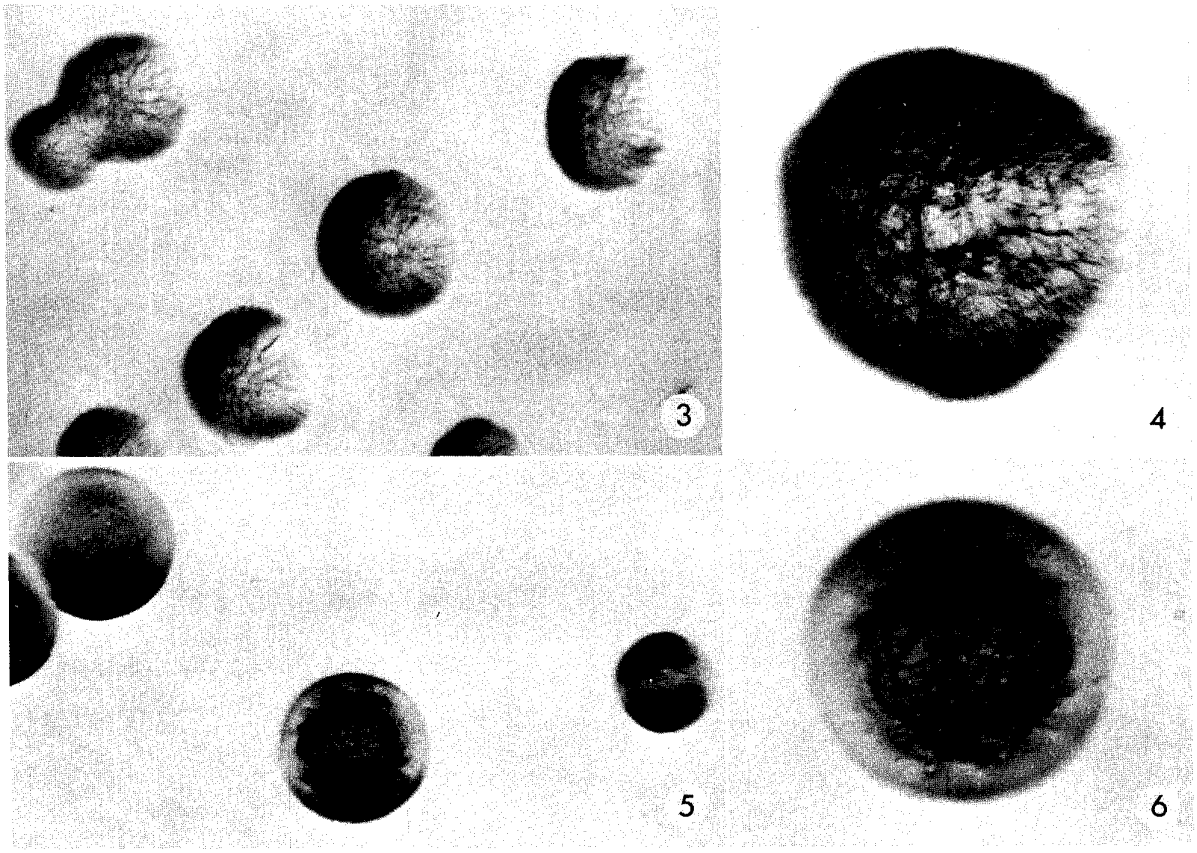


Figure 2. Bacterial ooze and watersoaking in immature Bartlett pear fruit 4 days after inoculation by stabbing with a dissecting needle dipped in a pathogenic colony of *Erwinia amylovora* and incubation in a moist chamber at 21°C.

Observations

On the selective medium colonies of E. amylovora isolates from both apple and pear were convex, round and had a smooth margin (Figs. 3-6). They appeared uniquely striated when viewed with transmitted incandescent light through a stereoscopic dissecting microscope after 48-72 h of incubation at 28 C (Figs. 3-6). Colonies of some of the isolates obtained from pear were more cone shaped than convex, had darker striations in the center, and were not striated at the margins (Figs. 5,6). The cratered appearance of colonies described by Goodman (2) was observed only in very young colonies. Colonies identified as E. amylovora on the selective medium were invariably pathogenic.

In Essex county the symptom most commonly observed is twig blight, with the characteristic production of bacterial ooze, followed by necrosis. Bacterial strands described by Ivanoff and Keitt (3) are occasionally found on infected shoots in the greenhouse (Fig. 7) but have not been observed in the field. Apparently they are not important for dissemination of bacteria in this area. Trunk cankers known to occur in 'Magness' pear (3) have been observed only in a few seedling trees in the progeny test orchard at the Research Station, Harrow. In pear, fruit may also be infected, both in the very immature stage and late in the season. Late-season fruit infection occasionally



Figures 3-6. Colonies of *Erwinia amylovora* on Crosse and Goodman's crystal violet selective medium after 48-72 hr incubation: 3,4) isolates from apple; 5,6) isolates from pear. (Enlarged)

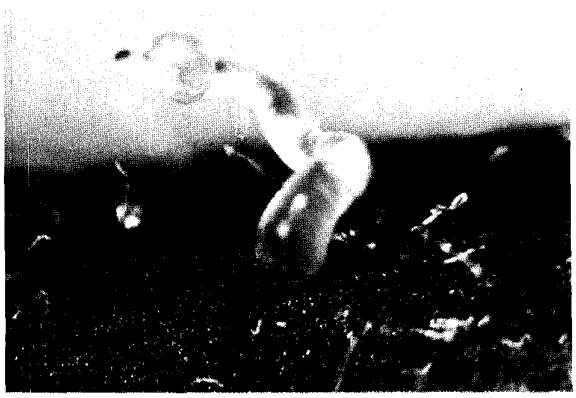


Figure 7. Crystalline bacterial strands on infected Bartlett pear shoot. Strands were highly soluble in water but insoluble in 95% ethanol and in 3% glutaraldehyde.

occurs in the absence of twig infection. Blossom blight is not a serious problem and in 1972 was observed on only one pear tree. The absence of blossom blight may be due to a low level of inoculum in spring. In an artificial inoculation experiment 99 of 100 blossom clusters became infected in 4 to 5 days when atomized with a 20-Klett-unit suspension (ca. 10^8 cells/ml) of E. amylovora during full bloom. Ninety-two of the infections developed into twig blight. These results suggest that environmental factors are not limiting to infection if inoculum is present.

The incidence of blight in the Harrow area was generally light throughout the season, with some infection occurring in 6 of the 9 orchards visited. Four of these plantings, consisting respectively of Lodi apple, Bartlett, Clapp's Favourite and Gifford pear, had damage to scaffold branches in 5% to 10% of the trees. Twig blight first appeared in the second week of June. In the Lodi orchard which had a history of fireblight epidemics, two severely blighted trees were found on July 19 in a row where no control measures had been taken. Blight continued to progress and new infections occured in these and adjacent trees through August, although growth had stopped in mid-July. Apparently in a highly susceptible variety such as Lodi, infection can occur after terminal growth has ceased. In the same orchard in a block of Bartlett pears also with a perennial blight problem, excellent control was obtained by applying streptomycin sulfate (100 ppm) in two sprays during the bloom period and one post-bloom spray.

Orchards in the Arkona area were visited because of a particularly serious outbreak of blight in a 5-yr-old high density trellised stand of Golden Delicious apples on East Malling IX rootstock. In the block of approximately 3 acres, all trees were infected, with many infections extending into 3- and 4-year wood (Fig. 5). Red Delicious trees interspersed at regular intervals in the stand showed only a trace of infection. The block was surrounded with Bartlett pear trees of which less than 25% were blighted, and only a few had damaged scaffold branches. In an adjacent nursery containing three apple varieties on the east side of the infected Golden Delicious block and surrounding pear trees, nearly all Idared trees, approximately 25% of Spartan, and less than 5% of Red Delicious trees were infected. The severity of blight decreased with increasing distance from the pear trees. Although the Bartlett pear trees were not seriously affected, they apparently served as a source of inoculum for the succulent young apple trees in both the Golden Delicious block and the nursery.

In a second orchard in the Arkona area, 75% to 100% of Idared, Lodi, Quinte, Tallman's Red, and Tydeman's Red apple trees were infected. While the incidence of blighted shoots was high, infection had not progressed into the scaffold branches because of continuous pruning of newly infected shoots. In the same orchard, Red Delicious and McIntosh trees were free of blight. A third orchard, predominantly Bartlett pear, had only a trace of fireblight.

All orchards visited in the Cedar Springs area consisted of blocks of Bartlett pear and several varieties of apples, whereas near Simcoe only apple orchards were visited. There was a low incidence of fireblight in both areas.

An orchard near Paris had a block of Bartlett pear surrounded by blocks of several varieties of apples. The pear trees were severely blighted, with nearly all trees showing some level of infection. Where infection was most severe, adjacent apple trees of the resistant variety McIntosh had a low level of infection in 1- and 2-year wood. In a 3-yr-old planting of Idared apples also adjacent to the pears, more than 50% of the trees were infected. As in the Arkona orchard, the pear trees appeared to be the source of inoculum.

Two of six pear orchards visited in the Vineland area had moderately severe blight problems. In one planting of Bartlett, 75% of the trees were infected, most of them into 2- and 3-year wood. In a second orchard 25% of Bartlett and Bosc trees were infected. Entire trees had been destroyed and the grower was having difficulty establishing replacement trees because of fireblight. In a third orchard of 6-year-old Bartlett pear a uniform infection of 5-6 shoots on every tree was observed. In the other orchards in the area zero to light infection was observed.

In general, the incidence of fireblight in 1972 was not critical. In most cases it could probably have been controlled with 4 to 6 appropriately timed applications of streptomycin sulfate and by pruning out

infected branches. It was difficult to associate any effect of climatic factors with frequency of occurrence of fireblight. Other factors affecting susceptibility such as age of orchard, soil fertility practices, varieties, and presence or absence of inoculum appeared to be of greater importance. It was apparent, however, that favorable conditions for development of serious blight problems could arise in all pear and apple growing areas of southern Ontario.

Because of its sporadic occurrence, an extensive survey would be required to accurately estimate losses due to fireblight. However, the disease can spread at an explosive rate from apparently minor infections to destroy entire orchards of susceptible pear and apple varieties. Furthermore, growers have been reluctant to use streptomycin in a control program. Instead, orchards are fertilized inadequately to reduce the amount of susceptible succulent growth. As a result, productivity is low and fruit size and quality are adversely affected. The threat of fireblight also deters growers from putting in new plantings of susceptible, but otherwise desirable varieties. Thus it is imperative to consider the disease more than in terms of current year's losses.

Literature cited

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