

Strawberry, an Experimental Host of Peach Western X-Disease

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ABSTRACT

A California strain of Western X-disease (peach yellow leaf roll) was experimentally transmitted to strawberry by means of the leafhopper vector *Colladonus montanus*. The resulting lethal disease appeared sufficiently similar to the lethal decline disease of strawberry to suggest that lethal decline might be caused by a strain of Western X-disease. *Phytopathology* 60:1527-1528.

Experimental inoculation of a given host plant species with known viruses, or other pathogenic agents, serves in the determination of host ranges and host plant susceptibilities, and often in the recognition of the disease should natural infections be observed. A California strain of Western X-disease (WX), known as peach yellow leaf roll, is here reported to infect strawberries. It is one of a number of strains causing diseases with somewhat differing symptoms in stone fruits, particularly peach and cherry. It also infects some herbaceous hosts (3). This disease was previously thought to be caused by a virus. Evidence now indicates that WX, like a number of other yellows diseases, is probably due to a mycoplasma-like organism rather than a virus (5).

Unsuccessful attempts were made in 1955 and 1956 to transmit the peach yellow leafroll strain of WX from five experimentally infected peaches to five strawberry plants of the indicator clone UC-1 (*Fragaria vesca* L.) through approach grafts of nine strawberry runners made to peach shoots. But in a recent trial in which the leafhopper vector, *Colladonus montanus* (Van Duzee), was used as the inoculating agent, transmission to strawberry was accomplished.

Although the disease that resulted on the experimentally infected strawberries did not definitely appear to resemble any natural infections observed in California, it did resemble the lethal decline disease (6, 7) that is of some concern in the Pacific Northwest.

The inoculations were made by caging 60-80 adult male *C. montanus*, reared on WX-infected celery (*Apium graveolens* L. 'Utah Green') on each of six strawberry plants. The inoculation access period was 11 days, the survival period of the leafhoppers on the strawberries. Three plants of *Fragaria virginiana* Duchesne, indicator clone 1A10 (2), and three of the strawberry cultivar Hood were inoculated. Two of the 1A10 and one Hood plant developed initial symptoms

of infection in 4 weeks. Graft inoculations, using excised leaf scions, were successful in transmitting the disease from the Hood plant to a plant of the cultivar Columbia, and from the Columbia plant to one of 2A17, a hybrid *F. chiloensis* (L.) Duchesne-type clone selected from the progeny of *F. chiloensis* × *F. virginiana* (M1 clone) parentage.

In all infections the syndrome of symptoms was the same, and all infections were lethal, but the disease ran its course more rapidly in the 1A10 plants than in the others (6 weeks vs. 3-5 months). After onset of symptoms, growth ceased or was markedly inhibited. Runners first became off-color at the tips and necrosed back to the crown. Runner plants failed to root and necrosed. Inflorescences were stunted and chlorotic. Petals were reduced, cupped, and soon became tan and necrosed. Flowers were sterile and the entire inflorescence necrosed. Newly developed leaves were progressively dwarfed, mildly chlorotic (especially at the margins), often slightly cupped, and sometimes had leaflets of unequal size. Petioles likewise became successively and severely shortened, sometimes with mild twisting, and all but the very youngest assumed a horizontal, flattened posture (Fig. 1). Crown necrosis ensued and the younger leaves necrosed with or without first wilting. The older leaves became dully chlorotic or tinged with rusty discoloration and necrosed, the necrosis starting at the base of the petiole and progressing distally to the leaflets, which frequently were the last part of the plant to die. No attempts were made to return the disease agent from strawberry to celery, but since both the WX agent and the vector were from stock cultures used in research for many years, there seems little doubt that the WX agent caused the disease in strawberry.

Western X-disease is transmitted by a number of leafhopper species in addition to *C. montanus* (4). Known vectors are *C. geminatus*, *Scaphytopius acutus*, *Fieberiella florii*, *Keonolla confluens*, *Osbornellus borealis*, and *Euscelidius variegatus*. This disease is also related to X-disease of the eastern United States which is vectored by *Colladonus clitellarius*, *Gyponana lamina*, *Paraphlepsius irroratus*, *Norvellina semimuda*, *F. florii*, and *S. acutus* (4).

Slack (8) transmitted a disease from X-diseased peaches and sand cherries to *Fragaria vesca* (East Malling clone) by dodder. It caused rugose, stunted leaves with chlorotic and necrotic streaks, and the development of numerous secondary shoots on strawberry. Slack's (8) brief summary of symptoms would seem to indicate a less virulent disease than that caused by WX, although the strawberry species used as test plants in the two experiments were not the same. Braun & Keplinger (1) reported transmission, by excised leaf graft from X-diseased chokecherry to *F. vesca*, of a disease that caused marked symptoms in the strawberry, but details of the symptoms were not elucidated.

It might be expected that different strains of X-disease and Western X-disease would cause diseases in strawberry that differed in symptom details. While the observed symptoms in strawberry caused by WX

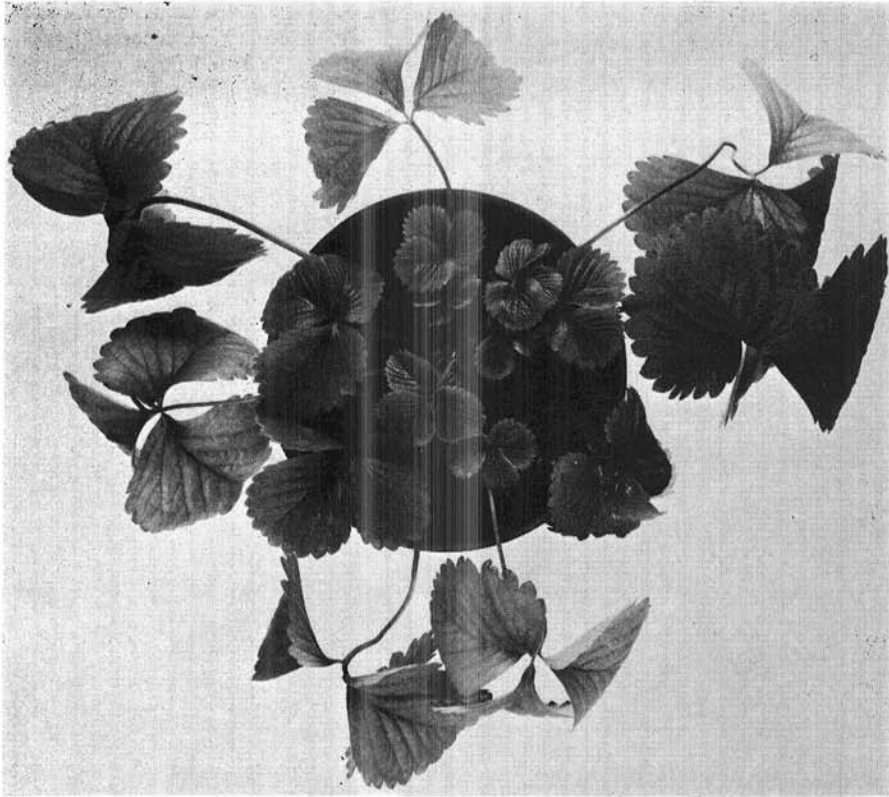


Fig. 1. Symptoms of Western X-disease in the strawberry cultivar Hood: dwarfing of young leaves and chlorotic discoloration of older leaves on horizontal petioles. Plant inoculated 19 September 1968; initial symptoms appeared 23 October 1968; photographed 6 January 1969; plant dead on 10 March 1969.

may not precisely duplicate those of lethal decline, a disease whose means of spread are not yet known, they appeared sufficiently similar to suggest the possibility that lethal decline might be caused by a strain of WX.

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