

TERMINATION REPORT

PROJECT NO: 3795

TITLE: Adapting fire blight predictive models to Eastern Washington.

YEAR INITIATED: 1990-91 **CURRENT YEAR:** 1996-97
TERMINATING YEAR: 1996-97

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REPORTING PERIOD: 1995-96

ACCOMPLISHMENTS:

1. The primary purpose of this study was to establish weather monitoring equipment to facilitate long-term investigations on the epidemiology of this disease in eastern Washington. To facilitate this process, microcomputer-based weather monitoring equipment was permanently established in several Yakima and Wenatchee area orchards with histories of fire blight. Data are available via FAX, computer bulletin board and voice bulletin board. Long-term studies based on data gathered at these sites will facilitate the improvement of fire blight prediction models. The current status of fire blight potentials is updated hourly for each site.
2. We determined the influence of temperature and duration of wetness on infection of pear and apple flowers.
3. In controlled environment studies, we determined the influence of temperature on canker reactivation.
4. Using a technique developed for the isolation of bacteria from canker and bark surfaces, we demonstrated the presence of *Erwinia amylovora* in the orchard in late winter before the breaking of dormancy.

5. We studied the Maryblyte model extensively under eastern Washington conditions and concluded that it (like most other fire blight predictive models) is overpredictive, i.e. it will forecast infection periods at times when risk is low or moderate. It provides a reasonably accurate assessment of fire blight risk under most (but not all) circumstances.
6. We isolated *E. amylovora* from pear and apple flowers over a wide range of temperatures. We demonstrated that *E. amylovora* colonization of pear flowers most frequently occurs during second bloom.

1995 Results:

Research was conducted in the three research orchards established in 1990 (Pine Flats, East Wenatchee and Blewett Pass Highway) and in two orchards near Parker, WA. Maryblyte predicted several infection periods at all five sites. Fire blight occurred in some Yakima sites and at East Wenatchee. East Wenatchee and Blewett Pass Highway had numerous overwintered cankers. Although numerous infection periods were identified at both orchards, fire blight occurred only at East Wenatchee. There were few overwintered cankers at Pine Flats, Blewett Pass Highway and the Yakima sites.

At Pine Flats, the initial infection period was predicted on 17 May. *E. amylovora* was detected on Bartlett and Anjou on 29 April. There was no fire blight in this orchard. Inoculum availability at Pine Flats was low.

At East Wenatchee, the initial infection period was predicted on 15 May. *E. amylovora* was detected on Bartlett and Anjou flowers on 11 April. Fire blight severity in this orchard was low. Inoculum availability at East Wenatchee was high.

At Blewett Pass Highway, Maryblyte predicted the initial infection period on 17 May. *E. amylovora* was not detected on flowers. Fire blight incidence in this orchard was low. Inoculum availability at Blewett Pass was moderate.

In Yakima, blossom infestation occurred as early as 14 April in the Parker area and as late as early May in several other orchards.

For the fourth year, pear blossoms were inoculated with *E. amylovora* and subjected to 0, 2, 4 and 48 hr wetness periods at 5-25°C. Infection did not occur at 5 or 10°C. Infection required 2 hrs of wetness at 15°C and 0 hours at 20 and 25°C. Therefore, the wetness period required for infection of pear blossoms by *E. amylovora* is exceedingly short, and using wetness period as one of the critical predictive components is probably not feasible, except perhaps at the infection threshold.

For the fourth year, overwintered cankers were periodically sampled (at Columbia View) from early March (dormant) through petal fall. *E. amylovora* was first detected on canker surfaces in early March. Isolates were pathogenic to seedlings and fruit.

BENEFITS AND INFORMATION TRANSFER:

Electronic communication and software development.

In cooperation with T. J. Smith, predictive models are being programmed for use with Microsoft Windows. Blight infection periods are also updated hourly and posted on the Tree Fruit Research and Extension Center electronic bulletin board.

Technical reports:

Grove, G. G. 1993. Isolation of *Erwinia amylovora* from apple and pear blossoms in eastern Washington. Western Orchard Pest and Disease Management Conference, Portland, OR.

Grove, G. G. 1993. Spring reactivation of fire blight cankers in eastern Washington. Western Orchard Pest and Disease Management Conference, Portland, OR.

Grove, G. G. 1994. Influence of temperature and wetness duration on infection of pear and apple blossoms by *Erwinia amylovora*. Western Orchard Pest and Disease Management Conference, Portland, OR.

Grove, G. G. 1994. Orchard studies on the biology of *Erwinia amylovora* on pear cankers and blossoms. Western Orchard Pest and Disease Management Conference, Portland, OR.

Grove, G. G. 1995. Summary of *Erwinia amylovora* isolation studies from pear and apple cankers and blossoms. Western Orchard Pest and Disease Management Conference, Portland, OR.

Grove, G. G. 1992. Fire blight: research progress on pears and potential for outbreaks on apple scions and rootstocks. Miller Lecture Series, Wenatchee, WA.

Extension and industry service presentations

January 1993. Pear Day, Wenatchee, WA.

January 1994. Pear Day, Yakima, WA.

February 1994. Pear Day, Wenatchee, WA.