

Research Report

Sugarbeet Conference, Fort Collins, Colorado

February 5, 6, 1974

Prepared by E. D. Whitney January 7, 1974

- A. Location of Project: Western Region
Northern California-Nevada Area
U. S. Agricultural Research Station
Salinas, California
- B. Work Reporting Unit Title: Improving Sugarbeet Varieties and
Production Practices.
- C. Work Reporting Unit: 10710
- D. SMY's for Past Year at Location: 1 SMY
- E. Names of Scientists in Project at Location: E. D. Whitney
- F. Mission of Research:

To investigate bacterial and fungal diseases of sugarbeet and interactions between them and the sugarbeet nematode. To develop information about the etiology, epidemiology, and control of these diseases.

- G. Objectives of Research:

To study host-parasite relationships of Erwinia sp., Cercospora beticola, Rhizoctonia solani and other pathogens of sugarbeet and the effects of cultural practices on these diseases. From the information derived in these studies develop practices to decrease disease incidence or methods to select for resistance. These studies involve cytological studies by light and electron microscopy, evaluation of populations of sugarbeet for disease reactions and resistance. Field studies to evaluate practices which influence disease development and sugarbeet populations will also be made. These studies will be carried out with the cooperation of scientists at this station and the University of California.

H. Research Accomplishments:

Methods were developed to hatch and surface disinfest large quantities of Heterodera schachtii larvae by chemical means for use in host-parasite studies and for greenhouse selection of resistant sugarbeets. Reported for the first time a synergistic effect between a Phycomycete, Pythium ultimum and Heterodera schachtii on seedling sugarbeet. Jointly reported the first "hormonal" effect in sugarbeet petioles in response to nematode infection. Recorded the first positive evidence that Urophylictic lepriodes occurs in North America. In cooperation with the University of California at Berkeley, reported the first serious bacterial rot of sugarbeet which is caused by a species of Erwinia and the increased susceptibility of virus yellows resistant varieties to this pathogen. In cooperation with Dr. Lewellen showed for the first time a gene-for-gene relationship between Cercospora beticola infection and Beta vulgaris immunity.

I. Impact of Research Accomplishments on Science and General Public:

Diseases are undoubtedly the greatest limiting factor in the production of sugarbeet in California. The identification of serious diseases (Heterodera schachtii-Pythium ultimum synergistic effect, bacterial rot) should lead to practices and controls which will increase yields of sugarbeet. It has been estimated that about 5% of the beets in Central and Northern California succumb to bacterial rot. The information developed on host-parasite relationships has increased our knowledge of sugarbeet diseases.

J. Obstacles to Achieving Objectives:

The greatest obstacle has been the lack of or inconsistent availability of permanent greenhouse and field help which has impeded the carrying out of plans in an uninterrupted manner.

K. Future Plans and Needs:

Major emphasis in the future will be to study the etiology, epidemiology and control of the Erwinia bacterial rot and the host-parasite relationships of Cercospora leafspot of sugarbeet. To study by light and electron microscopy the cytological aspects of resistant and susceptible plants infected by these two pathogens. The greatest need is a permanent full-time biological technician to do greenhouse and field work. Additional greenhouse space would be desirable if permanent help is available.