

RESEARCH REPORT

Sugarbeet Conference, Fort Collins, Colorado
5-7 February 1974

Prepared by C. L. Schneider, Plant Pathologist, 4 January 1974

A. Location of Project: North Central Region, Lafayette Area, E. Lans., MI.

B. Work Reporting Unit Title: Sugarbeet Production Practices

C. Work Reporting Unit: 401-3309-10710

D. SMY's for Past Year at Location: 4 SMY

E. Names of Scientists in Project at Location:

C. L. Schneider, Plant Pathologist; G. J. Hogaboam, Research Agronomist;
F. W. Snyder, Plant Physiologist; R. C. Zielke, Research Agronomist
(resigned 1 July 1973)

F. Mission of Research:

To develop means of controlling important sugarbeet diseases of the Great Lakes Area, including Aphanomyces black root (A. cochlioides); Rhizoctonia crown rot (R. solani); Cercosporiosis (Cercospora beticola), through development of resistant varieties, fungicides and cultural practices.

G. Objectives of Research:

1. Develop improved methods for screening breeding lines for disease resistance.
2. Screen fungicides, spray adjuvants and specialized spray equipment for efficacy in disease control and in environmental protection.
3. Determine pathogenic capability of pathogens in different hosts, especially in regard to existence of pathogenic races, and the effect of various crop rotations on disease.
4. In cooperation with plant breeders, screen breeding lines for resistance to the major diseases.

H. Research Accomplishments:

1. A methodology for production and employment of Aphanomyces oospore inoculum has been developed.
2. Pathogenic capabilities of R. solani sugarbeet isolates on several Great Lakes area crops were demonstrated.
3. Fungicides were identified that show greatest efficacy in controlling Cercosporiosis and crown rot.
4. Breeding lines with superior disease resistance were identified in screening tests.
5. The effect of various cropping systems on Rhizoctonia root rot was shown.

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

1. Studies on *Aphanomyces* oospores have fulfilled a need for information on production and employment of dried oospore inoculum as evidenced by enquiries from Europe as well as from USA. The methodology has reduced our labor requirements for greenhouse inoculation tests about one-half of that when other methods were used.
2. Before the advent of blackroot resistant varieties, losses in stands posed a threat to the survival of the sugarbeet industry in the Great Lakes region. Constant screening of breeding lines is necessary to maintain a satisfactory level of resistance to the disease.
3. Aerial application studies have shown substantial increases of sugar yields (50%) in southern Michigan and northern Ohio, where cercosporiosis is a factor. Techniques making aerial application more feasible - such as use of drift retardants and other adjuvants should result in substantial reduction in energy requirement because: a) aircraft require about 1/5 less fuel than ground equipment to cover a given acreage, b) the volume of spray can be substantially reduced, c) environmental protection is more readily attained.

J. Obstacles to Achieving Progress:

1. Extreme weather conditions, such as drought, affecting progress of experimental infections.
2. Temporary lack of sufficient manpower at critical times.
3. Occasional lack of sufficient greenhouse bench space.

K. Future Plans and Needs:

1. Continuation of screening tests for disease resistance.
2. Determine feasibility of controlling *Rhizoctonia* crown rot with fungicides, applied in the furrow before seeding and later, in the crowns.
3. Test *Rhizoctonia* isolates for potential ability to overcome resistant sugarbeet breeding lines.
4. Study the feasibility of using remote sensing techniques to determine disease incidence and intensity.
5. Study the importance of diseases in sugarbeets irrigated in a municipal waste water system.