

Project Title 1: *Developing fungicide recommendations for managing Cercospora leaf spot in sugarbeet.*

Project Number/Description:

Continuation of a previously funded project.

Project Leader: Mohamed Khan

Other Personnel Involved: Peter Hakk, summer interns, graduate student.

Project Location: Field research and demonstration plots will be established in the Minn-Dak factory district.

Objectives:

- (a) Evaluate the efficacy of individual and mixture of fungicides for their efficacy at controlling Cercospora leaf spot and any phyto-toxic effect to the sugarbeet plant. Field tours will be conducted to demonstrate the effectiveness of different treatments.
- (b) Conduct fungicide rotation program to include mixtures and individual fungicides and using different application intervals to develop recommendations for growers use.
- (c) Evaluate mixtures of EBDC's and copper products with triazoles, TPTH, and QoI fungicides for CLS control and compatibility.
- (d) Determine the most effective methods for managing Cercospora leaf spot.
- (e) Collect disease leaf samples from specific fungicide treatments to determine sensitivity to fungicides used in CLS control.

Materials and Methods: (Briefly describe)

A Roundup Ready variety with good resistance to Rhizomania, Aphanomyces, and Rhizoctonia but susceptible to Cercospora leaf spot will be used in the efficacy trials. , Plots will be planted to stand at 175 to 200 plants /100 ft of row. The trials will be inoculated with dried infected leaves with known resistance to QoI fungicides in late June. Treatments will commence at first symptoms or just after inoculation but prior to observations of symptoms. We will rate disease severity after each fungicide application. We will harvest, weigh, and analyze the quality for the middle 4-rows of each plot.

The experimental design will be a randomized complete block with four replicates. We will use the ANOVA procedure of the Agriculture Research Manager, version 7.5 software package (Gylling Data Management Inc., Brookings, South Dakota, 1999) to analyze data. Treatments will be fixed effects and replicates random effects for the ANOVA. The least significant difference (LSD) procedure will be used to compare treatments when the *F*-test for treatments is significant.

Time Line of Anticipated Accomplishments:

The project will continue as long as CLS continues to be present in our production areas. I will present yearly results at the sugarbeet research reporting sessions and summarize the data in the Annual Sugarbeet Production Guide. I will work with representatives of the sugar Cooperatives in developing recommendations and share with growers at winter seminars and during the 2018 growing season.

Progress Toward Objectives of On-going Projects: (Please list)

1. Field trials resulted in the approval of Eminent for a Section 18 label during the 1999 through 2004 cropping seasons. EPA approved a full label in 2005 for the use of Eminent on sugarbeet in ND and MN as well as MT, WY, NE, CO and MI.
2. Field trials data were used to procure a full label for Headline and Gem in 2002, and Enable in 2006. We used our data to support registration for Proline (prothioconazole, Bayer Crop Sciences) and Inspire XT (difenoconazole + propiconazole, Syngenta) which became available in 2008 and Topguard (flutriafol, Cheminova) in 2013. We provided field data to secure approval for mixing a restricted use pesticide, triphenyltin hydroxide, with tetraconazole (to get Minerva Duo).
3. We supported and received a 24c label for 7 d PHI for Supertin and Agritin.
4. High inoculum pressure from the 2015 crop and favorable environmental conditions in most production areas, especially from the central Red River Valley to southern Minnesota resulted in a CLS epidemic in 2016. We confirmed *C. beticola* resistance to QoI fungicides. QoI resistance resulted in field failures in over 80% of fields in Minn-Dak and more than 90% of fields in southern Minnesota in 2016.
5. We developed recommendations for CLS control in 2017 from 2016 and 2017 trials. Growers used recommendations of applying mixtures a rotation program and shortened application interval from 14 to 10 and 12 days especially during periods with regular rainfall. Although the average number of fungicide applications were high in 2017 (3 at American Crystal, 5 at Minn-Dak and 6 at Southern Minnesota), CLS was effectively controlled in most fields resulting in high tonnage, and more importantly, higher sugar concentration in the 2017 crop compared to the 2016 crop.
6. There will be a research demonstration in August 2018 for growers, agriculturists, consultants and managers.

Budget Requested Project 1: \$49,300

Labor and fringe benefits (Technician)	\$35,000
Labor and fringe (Interns)	5,500
Supplies	1,000
Travel	3,000
Land rent/preparation	4,800
Total	\$49,300