

STEWART, JAMES F.*, COREY J. GUZA, LEE A. HUBBELL, DAVID B. WISHOWSKI and MARK A. ANDERSON, Michigan Sugar Company, 2600 South Euclid Avenue, Bay City, MI 48706. **Influence of a Cercospora Tolerant Sugarbeet Variety on the BEETCAST Prediction Model.**

ABSTRACT

Cercospora leafspot is a serious disease problem in Michigan. The disease can reduce sugarbeet yield by up to 20% and can reduce percent sucrose and clear juice quality. The storability of diseased roots is also reduced. Injury to the sugarbeet plant occurs prior to visual symptoms of the disease, and cercospora leafspot development is closely linked to weather conditions. The BEETCAST model has been used in Michigan since 2004 and effectively predicts fungicide timings in most situations. However, the model needs fine-tuning with respect to varietal and regional differences. The objective of this study was to evaluate the influence of varietal tolerance to *Cercospora* on the BEETCAST model. Two trials were conducted in 2006 comparing a *Cercospora* resistant sugarbeet variety (Crystal 355) to a moderately susceptible variety (Beta 5451). The BEETCAST prediction model provided accurate fungicide timings at both locations. The resistant variety, Crystal 355, had much lower *Cercospora* infestation levels than the susceptible variety, Beta 5451. The yield and quality of the susceptible variety was lowered significantly by *Cercospora* infestations in the untreated and less effective spray treatments. By contrast, the yield and quality of the resistant variety declined only marginally in the untreated and with the less effective spray treatments.

Objective

1. To evaluate the effect of a *Cercospora* resistant variety on the BEETCAST model with respect to *Cercospora* infection levels, sugarbeet yield and quality.
2. To evaluate various BEETCAST timings compared to and in conjunction with Scouting methods.

Materials and Methods

Small plot replicated trials were conducted in Akron and Kawkawlin, Michigan in 2006. The treatments were as follows: 1. 55 DSV followed by every additional 55 DSV's (3 applic); 2. 55 DSV fb 55 DSV (2 applic.); 3. 70 DSV fb 70 DSV (2 applic); 4. 80 DSV fb 55 DSV (2 applic); 5. Scouting (1st Spot) fb 55 DSV (2 applic); 6. Scouting (1st Spot) fb 18 Day intervals (3 applic); 7. Delayed Scouting (2 weeks after 1st Spot) fb 3 week intervals (2 applic); 8. Single Spray Program (1 applic); 9. Untreated Control. The treatments were applied with a tractor plot sprayer (compressed air) at 3.5 mph, 100 psi and 20 gpa. Each plot was 6 rows wide and 50 feet long with 4 replications. The row spacing was 30 inches. The treatments were arranged in a split plot design so that both varieties received all treatments. In late summer and fall the plots were evaluated for disease symptoms using a 0-9 visual rating scale (0 = no spots, 1 = most leaves w/o spots, 2 = a few spots per leaf, 3 = up to 1 spot per sq inch, 4 = spots beginning to coalesce, 5 = ½ of leaf damaged, 6 = 60% leaf damage, 7 = 70% leaf damage, 8 = 80%+ leaf damage, 9 = total leaf dessication). At the lower end of the rating scale fractions are used to provide treatment separation, i.e., 0.5, 1.25, 2.75, 3.75 and etc. At harvest, yield in tons

per acre and recoverable white sugar per acre was determined. Percent sucrose and clear juice purity was determined using a clarified juice method.

Results and Discussion

The *Cercospora* leafspot level in the plots was lower than normal for the Michigan growing area in 2006. The untreated checks with the susceptible variety reached a level of 4.5 out of a possible 9. In previous trials the untreated check rating was generally in the range of a 5 to 6. Research investigating the effect of sugarbeet varieties on the BEETCAST model have been conducted for the past three years. Previous results have been inconclusive because the varieties used have been too similar in their susceptibility to *Cercospora*. The varieties used in this research were Beta 5451 and Crystal 355. Beta 5451 has been the most widely planted variety in Michigan for several years. It has a moderate level of *Cercospora* susceptibility. Crystal 355 is a newly introduced variety which has a very high level of *Cercospora* resistance or tolerance. The quality of the 2006 trials was good. Both locations had good sugarbeet stands and uniform disease pressure. The CV for yield (RWSA) was 6.3% at Akron and 7.5% at Kawkawlin. Significant differences existed for all parameters measured: 0-9 ratings, % Sucrose, % Clear Juice Purity, Tons per Acre, RWST (Recoverable White Sugar per Ton and RWSA (Recoverable White Sugar per Acre). All of the sprayed treatments had better disease ratings compared to the Untreated Check. The 55/55/55 treatment had the best *Cercospora* 0-9 ratings. It also tended to have higher yields (RWSA). 1st Spot fb 55, 70/70, Scouting fb label and 55/55 also provided good *Cercospora* results but were slightly less effective compared to 55/55/55. These treatments yielded similarly and slightly less than 55/55/55. Later applied treatments (80/55, Delayed Scouting and the Single Spray treatment) were less effective. All of the BEETCAST and Scouting treatments provided significantly better *Cercospora* ratings and higher yields compared to the Untreated Check plots. Sugarbeet quality (RWST) was significantly lower in the Untreated Check and the Single Spray treatment. With respect to varietal differences, it was apparent that Beta 5451 (susceptible variety) was effected by *Cercospora* leaf spot to a much greater degree than Crystal 355 (resistant variety). Crystal 355 had 0-9 ratings of 0.4 and 2.3 in the 55/55/55 and Untreated Check, respectively. By comparison, Beta 5451 had 0-9 ratings of 1.2 and 4.3 for the same treatments. When comparing the percent of RWSA and RWST lost to *Cercospora* it is apparent that the resistant variety withstood the disease pressure while the susceptible variety did not. Beta 5451 lost over 20 percent of RWSA and about 7 percent of RWST to the disease while Crystal 355 lost about 6 percent RWSA and 1 percent RWST to *Cercospora*.

Conclusions

Preliminary results indicate that a *Cercospora* tolerant variety such as Crystal 355 can withstand significantly more leafspot pressure than a moderately susceptible variety. It is probable that our growers would benefit from revised BEETCAST recommendations when growing a variety with a high level of *Cercospora* tolerance. Additional research under more severe *Cercospora* pressure will be required to further develop these recommendations.