

NEHER, OLIVER T.* and TAMARA KEETH, University of Idaho, Twin Falls R&E Center, 315 Falls Avenue, Twin Falls, ID 83301. **Integrated pest management approaches for the control of *Erysiphe polygoni*, causal agent of powdery mildew on sugar beets in Idaho.**

ABSTRACT

Powdery mildew (PM) is a re-occurring disease problem on sugar beets in many production areas of the Pacific North West. Given that the loss caused by PM is not as apparent as it can be with *Rhizoctonia* crown and root rot or other diseases, the crop might not be treated appropriately and potential yield losses could be as severe as 35%. Current control measures rely on disease monitoring and fungicide applications made before disease onset. Recently, PM tolerant sugar beet varieties became available in Idaho and could add an additional tool to an integrated pest management approach for the control of PM. The objectives of this research were to compare two varieties (PM tolerant and susceptible) under different spray regimes and to determine their performance in regard to disease resistance, yield, and ERS.

In spring 2010, a randomized split-plot study was established at the University of Idaho, Southwest Idaho Research & Extension Center, Parma, ID. Powdery mildew tolerant and susceptible varieties, PM9122RR (Syngenta Seed, tolerant) and Crystal RR929 (ACH Seeds, susceptible), were planted as main plots and with different foliar fungicide (Proline 480SC, Bayer CropScience, at 0.156 lb ai/A) application timings as subplots (1. before disease onset, 2. at disease onset, 3. before disease onset followed by a second application 21 days later, and 4. non-treated control). Plots were initially planted (16 Apr 10) at a two inch seed drop and later thinned to eight inch plant spacing for homogeneous plant stand. Individual subplots were six rows wide (11 ft) by 25 ft long and separated by a 5-ft wide alley. Treatments were applied using a backpack (CO₂) sprayer with a 6-ft wide boom equipped with 11002 flat fan spray tips at 28 psi in a total volume of 23 gal/A. Plots were evaluated 12 Jul 10, 04 Aug 10, 23 Aug 10, and 15 Sep 10 by sampling 25 leaves from rows two and five of the 6-row plots. Powdery mildew severity was assessed using a 0-5 rating scale, where 0 = 0%, 1 = 1-10%, 2 = 11-35%, 3 = 36-65%, 4 = 66-90%, and 5 = 91-100% of leaf area covered by powdery mildew. Data were used to calculate the mature leaf area diseased in percent (%MLAD) and individual ratings were used to calculate the area under disease progress curve (AUDPC). On 12 Oct 10, plots were topped, the two center rows were harvested, and root yields were determined. Approximately 8-10 beets were sampled from each plot and percent sugar content was determined by The Amalgamated Sugar Company, LLC Tare Laboratory in Paul, ID, using a polarimeter. Data were analyzed by factorial ANOVA using the GLM procedure of SAS, and by separating the treatment means using Fisher's protected LSD test ($\alpha=0.05$).

In 2010, the PM pressure was less severe and the disease onset was later than anticipated. Across all treatments, PM9122RR (Syngenta Seed – tolerant variety) showed 98% less disease (as measured by the percent mature leaf area diseased [%MLAD]) than the standard variety Crystal RR929 (ACH Seeds). When individual treatments were compared across the two varieties to the non-treated controls (NTC), Proline 480SC (0.156 lb ai/A) applied “prior to disease onset (July 12th) and followed by a second application 21 days later” had significantly ($P\leq 0.05$) lower disease ratings than the NTC. This treatment had the lowest %MLAD but was not significantly different to other treatments (Proline applied “before disease onset” or “with disease present”). Proline applied “prior to disease onset followed by a second application 21

days later” also significantly increased clean yield and estimated recoverable sucrose (ERS) by 13% and 14% respectively, when compared to the NTC.

Comparing the individual treatments at the level of the two varieties provided a better separation. For the susceptible variety Crystal RR929, the “at disease onset” and “before disease onset & 21 days later” applications of Proline significantly reduced the MLAD by 26.5% and 33.3% and the AUDPC by 61.1% and 66.8% and increased overall clean yield by 8.5% and 11.1%, and ERS by 11.8% and 14.7% respectively, when compared to the NTC. Whereas no separation of the individual treatments was observed within the resistant variety PM9122RR since its resistance was too strong to allow for good PM development.

Results indicate a possibility to control PM under less severe conditions by means of resistant varieties. Nevertheless, it is still unknown how PM9122RR would perform under severe PM pressure and if its resistance would be enough to compensate for omitted fungicide applications. Also more information are needed in regard to resistant varieties in combination with fungicide applications and their timing.