

BHANDARI, SUNIL*¹, SUSHMITA KALIKA-SINGH¹, ERIC BRANCH¹, LUIS DEL RIO¹, and MOHAMED F.R. KHAN¹, ¹North Dakota State University, Dept. 7660, PO Box 6050, Fargo, ND, 58108-6050.

Management of Cercospora Leaf Spot on CLS improved sugarbeet varieties.

Cercospora leaf spot (CLS), caused by the airborne fungus *Cercospora beticola*, is the most destructive and economically significant foliar disease affecting sugar beet. Yield losses can exceed 40% when environmental conditions favor disease development. While CLS is typically managed with fungicides on a timely basis, excessive use not only adds to production costs but also increases the selection pressure for fungicide resistance in the pathogen. Since 2021, improved sugar beet varieties with the *BvCR4* gene that confers higher CLS tolerance (CR+) have become available to producers. Since there is a history of *C. beticola* populations overcoming the effectiveness of fungicides, we conducted field research to observe the ability of *C. beticola* to infect CR+ varieties in the presence and absence of fungicides. Field research was conducted from 2022 to 2024 in Moorhead, Minnesota, using two CR+ and one standard susceptible variety, to evaluate the effectiveness of these improved varieties against *C. beticola* and revealed that their tolerance is beginning to break down. Disease infection and severity was very low and limited to a few plants in 2022. The frequency of *C. beticola* infection and disease severity increased significantly in 2023 and 2024. Initially, the disease progressed slowly, with the first spots appearing 2-3 weeks later than in a standard susceptible variety; however, disease progression eventually matched that of these susceptible varieties. In untreated CR+ controls, the area under the disease progress curve (AUDPC) steadily increased from 0.7 and 1.3 to 15 and 24 ($P < 0.05$), indicating a decline in CLS tolerance over time. In contrast, fungicide applications initiated on a calendar basis, at disease onset, and as needed significantly reduced the disease severity, with AUDPC values of 2.9, 5.9 and 6.1 respectively, ($P < 0.05$), compared to the untreated control (AUDPC = 19, $P < 0.05$). Although the calendar-based application yielded the lowest AUDPC, recoverable sugar (RSA) did not differ significantly compared to early-start or as-needed applications ($P < 0.05$), with as needed approach requiring fewer fungicide applications. These results indicate that the fungus, over a period of 3 years, was able to overcome the natural durability of the improved CR+ varieties, underscoring the importance of timely and judicious fungicide application to prevent significant economic losses and help sustain fungicide effectiveness over the long term.