SUGARBEET PLANT PATHOLOGY LABORATORY: SUMMARY OF 2022 and 2023 FIELD SAMPLE DIAGNOSTICS

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The plant pathology laboratory at the University of Minnesota, Northwest Research and Outreach Center in Crookston receives sugarbeet samples for diagnosis every growing season. These samples have problems caused mostly by plant pathogens, insects, or abiotic causes such as chemical injury (usually herbicide) or nutrient deficiencies. This report summarizes the results of samples received during the 2022 and 2023 growing seasons.

It is important to note that the number of samples received of a particular disease may not always accurately reflect the prevalence of the diseases observed during the growing season. Agricultural staff and crop consultants may be more comfortable self-diagnosing certain diseases, or they may go unnoticed if aboveground symptoms are not observed. However, similarities and differences between 2022 and 2023 were observed. Additionally, some samples had multiple pathogens/problems, so numbers add up to more than 100%.

In 2022, sugarbeet samples were received from 45 fields (224 individual roots and 87 leaves), and diagnostic results are summarized in Figure 1A. Of those fields, 33.3% had *Rhizoctonia solani*, 8.9% *Aphanomyces cochlioides*, 17.8% *Fusarium* spp., 6.7% possible chemical injury, 6.7% possible environmental causes, and 6.7% had no recovery of pathogens and/or other causes. There were no fields in 2022 where both *A. cochlioides* and *R. solani* were isolated from samples. Rainfall in April and May was much greater than the 5-year average, and June, July, and August were below average. Samples infected by *A. cochlioides* were received beginning in early June through July, with a majority of the samples received in early June (Fig. 1B). The number of samples infected by *A. cochlioides* were likely associated with the periods of excessive rainfall received early in 2022 (Fig. 3B). Samples infected by *R. solani* were received later in June through August with most samples being received in August (Fig. 1B.) The beginning of June was slightly cooler than average, but temperatures returned to average or slightly above average for the rest of June, July, and August. Despite frequent rainfall events early in the growing season, samples infected by *R. solani* were not received until temperatures increased near or above 65°F (Fig. 4). *Fusarium* spp. were recovered from samples beginning in late June through September (Fig. 1B). Additionally, leaf samples were evaluated mainly in August, of which, *Alternaria* and *Stemphylium* were recovered from 20.0% and 6.7% of samples, respectively.

In 2023, samples were received from 50 sugarbeet fields (326 individual roots and 47 leaves), and diagnostic results are summarized in Figure 2A. Of those fields, 34.0% had *R. solani*, 16.0% *Fusarium* spp., 14.0% possible chemical injury, 30.0% possible environmental causes, and 4.0% had no recovery of pathogens and/or other causes. No Aphanomyces samples were received, possibly due to low rainfall received in April and May (compared to the 5-year average), creating conditions unfavorable for the development of *A. cochlioides*. Samples infected by *R. solani* were received beginning in early June through September, peaking in early July (Fig. 2B). Compared to the 5-year average, temperatures in May and June were warmer, which likely contributed to the number of samples infected by *R. solani*, despite lower-than-average rainfall. *Fusarium* spp. were recovered from samples beginning in late June through September, also peaking in early July (Fig. 2B). The drought conditions in the later part of 2022 and 2023 resulted in several samples with severe nutrient deficiencies due to the immobilization of nutrients. Additionally, the dry conditions experienced in 2022 likely contributed to the limited breakdown of soil-residual herbicides applied prior to sugarbeet production in 2023.

R. solani continues to be the most prevalent pathogen in field samples from Minnesota and North Dakota. In recent years, *Fusarium*-infected samples have been increasing. Between the years of 2014 through 2018, only 9 field samples had been confirmed to be infected by pathogenic *Fusarium* spp., whereas, from 2019 through 2023, there were 35 *Fusarium*-infected samples. As fields and areas with a history of pathogens are documented, cultural practices, varietal selection, and the use of effective fungicides, when possible, should continue to be used to reduce losses, levels of pathogen inoculum, and the spread of pathogens into clean fields. An integrated approach should take advantage of multiple control methods to reduce the incidence and severity of disease in the field. However, control methods for

Fusarium spp. are limited to the use of sugarbeet varieties with partial resistance and cultural practices that limit the spread of infested soils. Currently, no effective fungicides are available to growers to control *Fusarium* spp.

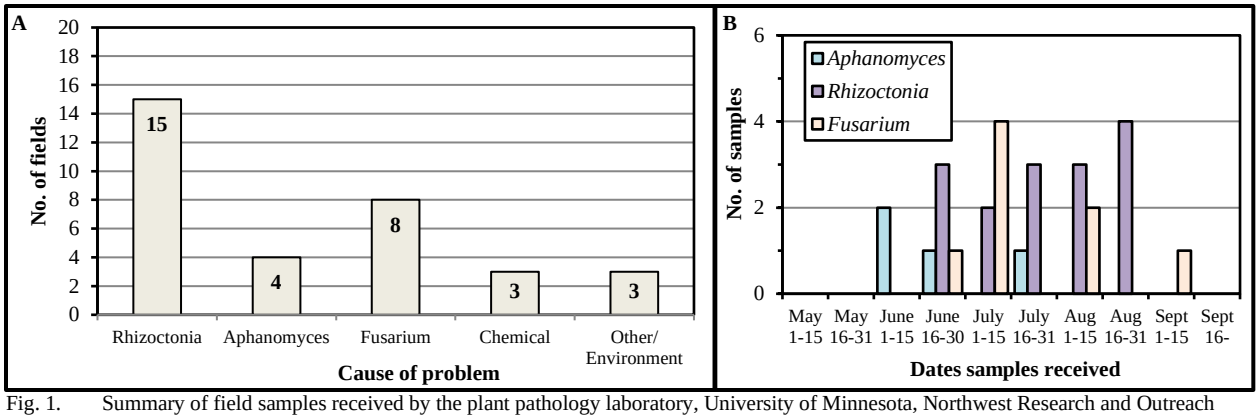

Fig. 1. Summary of field samples received by the plant pathology laboratory, University of Minnesota, Northwest Research and Outreach Center, Crookston in 2022. Results are reported by **A.)** diagnoses and **B.)** dates samples were received for *Rhizoctonia*, *Aphanomyces*, and *Fusarium*, the three most common root pathogens.

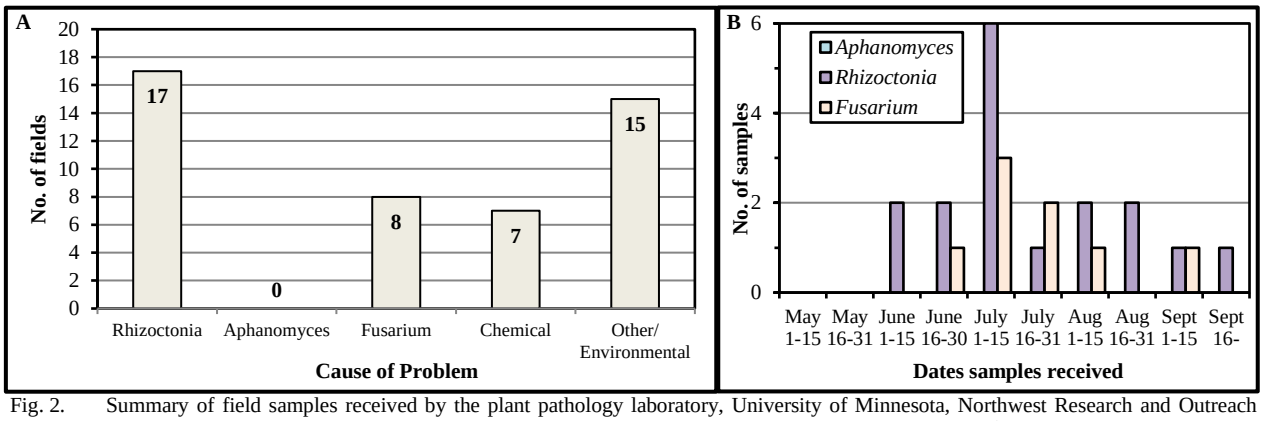

Fig. 2. Summary of field samples received by the plant pathology laboratory, University of Minnesota, Northwest Research and Outreach Center, Crookston in 2023. Results are reported by **A.)** diagnoses and **B.)** dates samples were received for *Rhizoctonia*, *Aphanomyces*, and *Fusarium*, the three most common root pathogens.

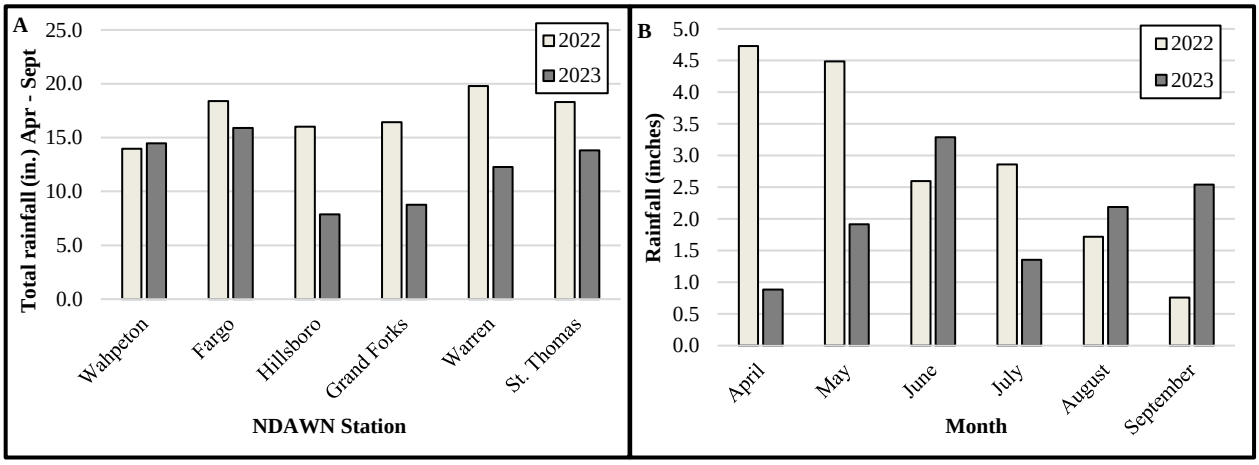

Fig. 3. Total rainfall recorded by the North Dakota Agricultural Weather Network (NDAWN) at six locations in the Red River Valley (Wahpeton, Fargo, Hillsboro, Grand Forks, Warren, MN and St. Thomas). Rainfall is reported in inches for the 2022 and 2023 growing season months of April through September. Rainfall is reported by **A.)** location and **B.)** month (averaged for all 6 locations).

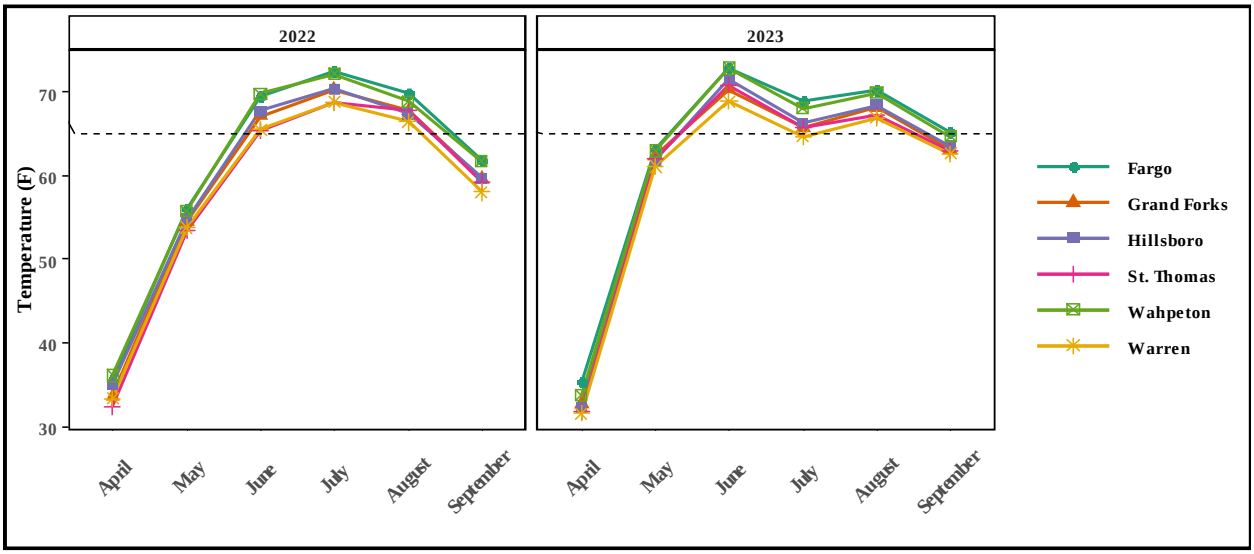

Fig. 4. Average monthly air temperatures recorded by the North Dakota Agricultural Weather Network (NDAWN) at six locations in the Red River Valley (Wahpeton, Fargo, Hillsboro, Grand Forks, Warren, MN and St. Thomas). Temperature is reported in Fahrenheit for the 2022 and 2023 growing season months of April through September. The dotted line represents 65°F.

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