PLANT PATHOLOGY LABORATORY: SUMMARY OF 2019-2021 FIELD SAMPLES

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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 results of samples received during the 2019, 2020, and 2021 growing seasons.

The number of samples received of a particular disease does not always accurately reflect the prevalence of disease. Agricultural staff and 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 2019, 2020, and 2021 were observed.

In 2019, samples were received from 89 sugarbeet fields and diagnoses are summarized in Figure 1A. *Rhizoctonia solani* was isolated from 37 fields, *Aphanomyces cochlioides* from 11, *Fusarium oxysporum* f. sp. *betae* and/or *Fusarium secorum* from 11, and chemical injury was determined in 16 fields (42, 12, 12, and 18% of fields, respectively). Both *R. solani* and *A. cochlioides* were isolated from 5 fields (6%), and in some fields, no fungal pathogens were isolated, suggesting abiotic causes other than chemical injury. Samples infected by *A. cochlioides* were received starting in early June through early September with a majority of samples being received in July and early August (Fig. 1B). Samples infected by *R. solani* were received starting later in June through early September with the number of samples peaking in early August (Fig. 1B). *Fusarium* spp. were recovered from samples beginning later in June through early August (Fig. 1B)

In 2020, samples were received from 93 sugarbeet fields and diagnoses are summarized in Figure 2A. *R. solani* was isolated from 35 fields, *A. cochlioides* from 13, *Fusarium* spp. from 6, and chemical injury was determined in 2 fields (38, 14, 7, and 2% of fields, respectively). Both *R. solani* and *A. cochlioides* were isolated from 14 fields (15%), and in some fields, no fungal pathogens were isolated, suggesting abiotic causes other than chemical injury. Samples infected by *R. solani* were received from May through September, while samples infected *A. cochlioides* were received from July through early September (Fig. 2B). Samples infected by *Fusarium* spp. were recovered from May through July (Fig. 2B).

In 2021, samples were received from 29 sugarbeet fields and diagnoses are summarized in Figure 3A. *R. solani* was isolated from 17 fields, *A. cochlioides* from 1, *Fusarium* spp. from 2, and chemical injury was determined in 2 fields (57, 3, 7, and 7% of fields, respectively). Both *R. solani* and *A. cochlioides* were isolated from 14 fields (3%), and in some fields, no fungal pathogens were isolated, suggesting abiotic causes other than chemical injury. Samples infected by *R. solani* were received from June through August, while samples infected *A. cochlioides* were received in early June and late July (Fig. 3B). Samples infected by *Fusarium* spp. were recovered late June (Fig. 3B).

The most prevalent pathogen in all three years was *R. solani* while samples infected with *A. cochlioides* alone and with both pathogens together was highest in 2020 and lowest in 2021. It is typical to see development of root rot due to either *R.* solani and/or *A. cochlioides* following periods of excess rainfall, resulting in samples being received in the weeks following excess rainfall events. Although total rainfall in 2019 was greater than 2020 and 2021 in most growing regions (Fig. 4A), most of the rainfall in 2019 was received in September (Fig. 4B). In 2020, a greater amount of rainfall was received in the months of June, July, and August (Fig. 4B), resulting in a greater number of samples infected by *A. cochlioides* (Fig. 2A and 2B). In 2021, the limited rainfall received in June and July (Fig. 4B) and the overall drought conditions that extended through a majority of the growing the season resulted in relatively few samples being received (Fig 3A and 3B). Additionally, the drought conditions in 2021 resulted in several samples with severe nutrient deficiencies due to the immobilization of nutrients. As fields and areas with a history of pathogens

are documented, cultural management, variety selection, and the use of effective fungicides, when possible, should continue to be used to reduce losses, inoculum production, and spread of pathogens.

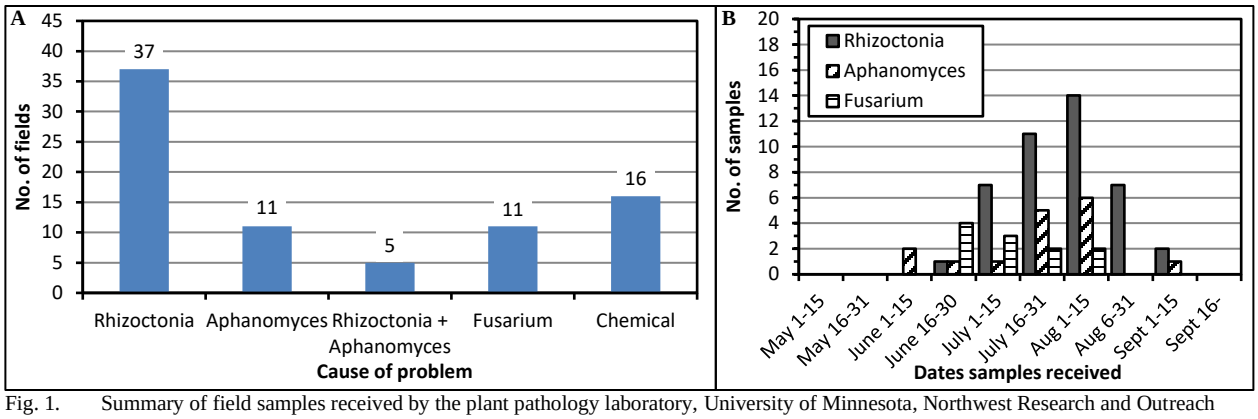

Fig. 1. Summary of field samples received by the plant pathology laboratory, University of Minnesota, Northwest Research and Outreach Center, Crookston in 2019. Results are reported by **A.**) diagnoses and **B.**) dates samples were received for *Rhizoctonia*, *Aphanomyces*, and *Fusarium*, the three most common root pathogens.

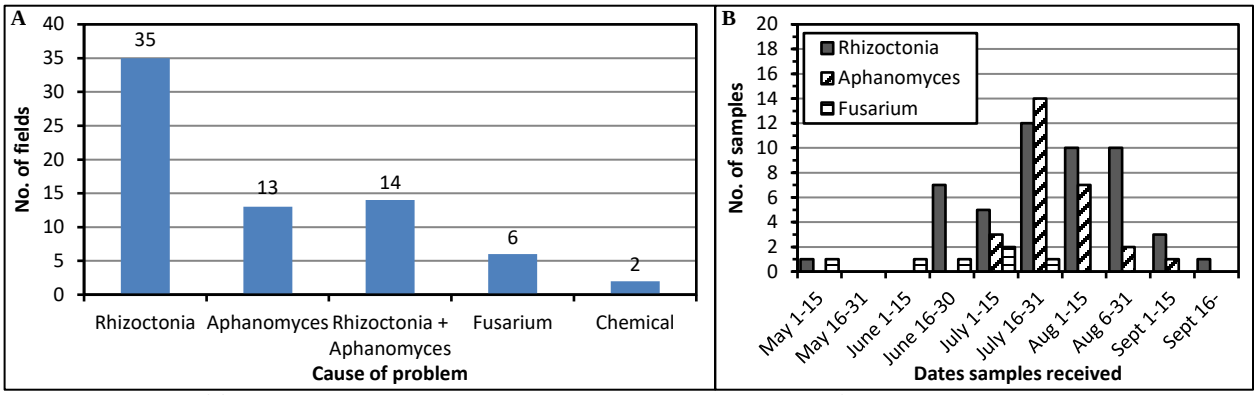

Fig. 2. Summary of field samples received by the plant pathology laboratory, University of Minnesota, Northwest Research and Outreach Center, Crookston in 2020. Results are reported by **A.**) diagnoses and **B.**) dates samples were received for *Rhizoctonia*, *Aphanomyces*, and *Fusarium*, the three most common root pathogens.

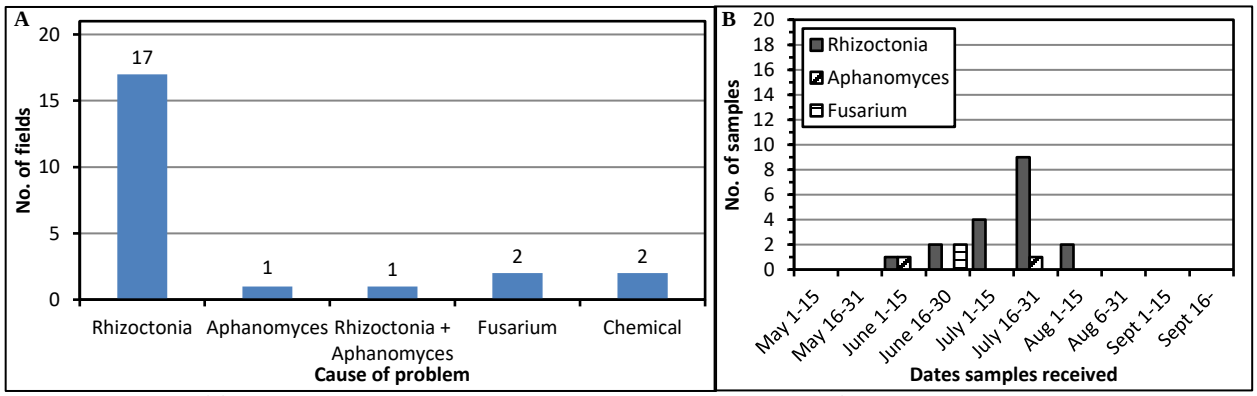

Fig. 3. Summary of field samples received by the plant pathology laboratory, University of Minnesota, Northwest Research and Outreach Center, Crookston in 2021. Results are reported by **A.**) diagnoses and **B.**) dates samples were received for *Rhizoctonia*, *Aphanomyces*, and *Fusarium*, the three most common root pathogens.

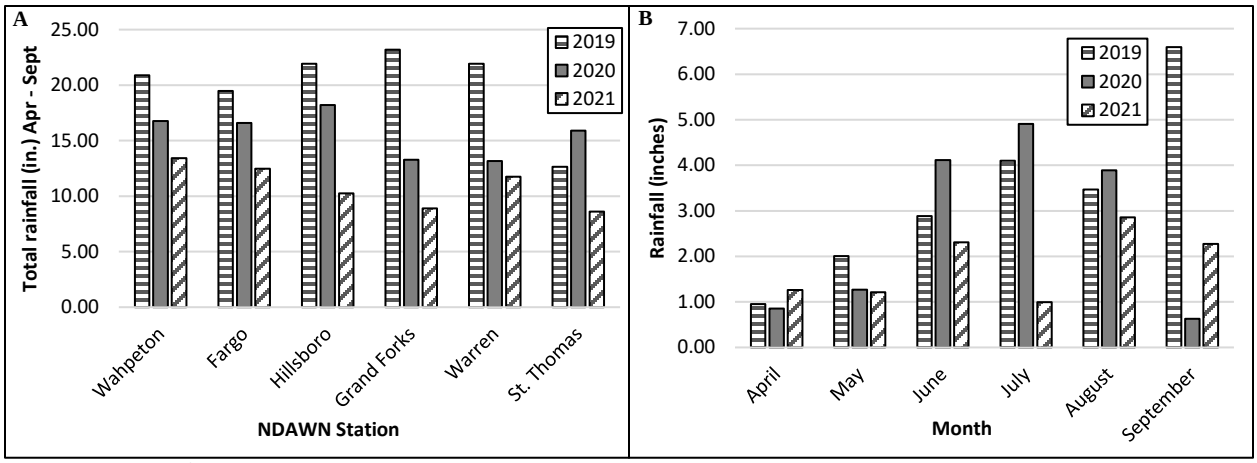

Fig. 4. Total rainfall recorded by the North Dakota Agricultural Weather Network (NDAWN) at six locations in the Red River Valley (Wahpeton, Fargo, Hillsboro, Grand Forks, Warren, MN and St. Thomas). Rainfall is reported in inches for the 2019, 2020, and 2021 growing season months of April through September. Rainfall is reported by **A.**) location and **B.**) month (averaged for all 6 locations).

ACKNOWLEDGEMENTS

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