SUGARBEET ROOT MAGGOT FLY MONITORING IN THE RED RIVER VALLEY IN 2022

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Sugarbeet root maggot (SBRM), *Tetanops myopaeformis* (Röder), fly activity was monitored at 123 grower field sites throughout the Red River Valley (RRV) during the 2022 growing season. This effort was carried out as a collaborative effort between the NDSU Department of Entomology and American Crystal Sugar Company.

The 2022 growing season was the fifth consecutive year of increasing root maggot fly activity as measured across the Red River Valley as a whole (Figure 1). Additionally, the SBRM fly levels observed in 2022 were the highest recorded by this project over the past 16 years (i.e., since the expanded fly monitoring program began in 2007). The most intense SBRM fly activity in 2022 was observed in the central and northern Red River Valley, which is somewhat typical of what is observed annually on this pest. This suggests that control efforts between 2017 and 2021 had been unsuccessful in reducing overall population levels for many producers in those areas.

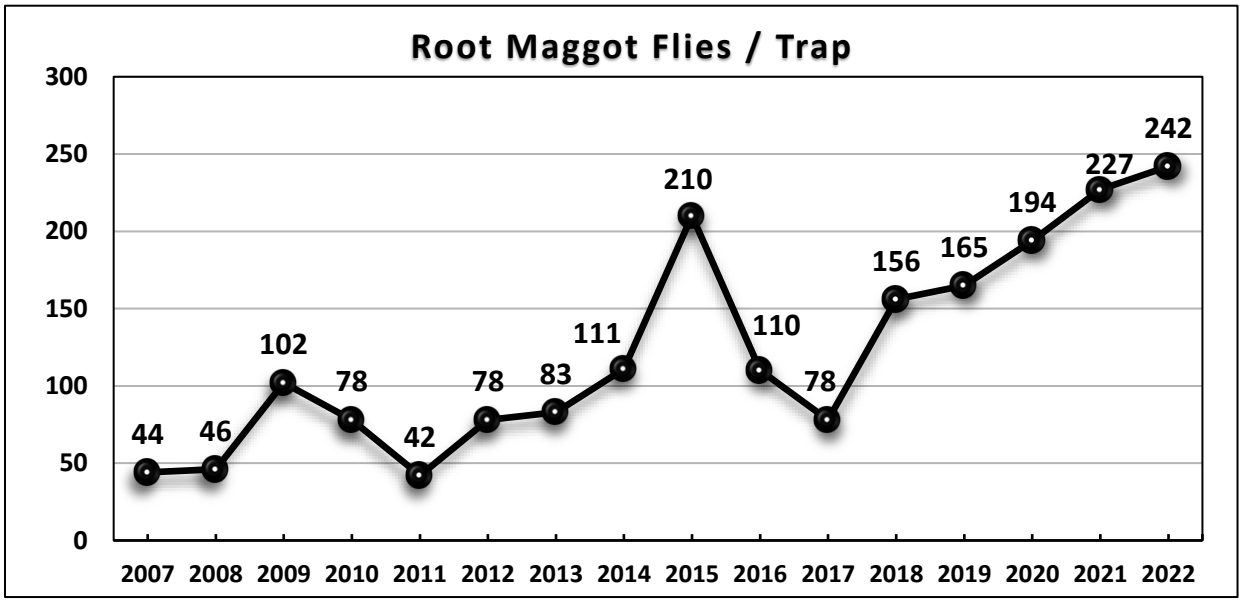

Figure 1. Yearly averages of sugarbeet root maggot flies captured on sticky-stake traps (Blickenstaff and Peckenpaugh, 1976) in the Red River Valley from 2007 to 2022.

High to severe levels of SBRM fly activity (i.e., cumulative capture of at least 200 flies per sticky stake) were observed in 2022 in fields near the following communities (cumulative flies per stake in parentheses): Auburn (1031), Bathgate (300), Bowesmont (440), Buxton (274), Cashel (388), Cavalier (324), Crystal (673), Drayton (658), Glasston (792), Grand Forks (260), Hensel (678), Hoople (261), Oakwood (532), Reynolds (743), St. Thomas (744), Thompson (301), and Voss (220), ND, as well as Angus (350), Argyle (232), Climax (484), Crookston (333), Donaldson (354), East Grand Forks (671), Eldred (385), Halma (587), Sabin (1098), and Warren (266), MN.

Moderately high levels of activity were also recorded near Ardoch (100), Hamilton (144), Merrifield (52), and Nash (127), ND, and near Ada (167), Borup (60), Climax (89), Euclid (60), Kennedy (76), Nielsville (150), Sherack (46), and Tabor (57), MN. Fly activity was either economically insignificant or undetectable in most other locations.

Figure 2 presents sugarbeet root maggot fly monitoring results from three representative sites (i.e., Sabin, MN; Reynolds and Auburn, ND) during the 2022 growing season. Adult fly emergence began in early June at all three of those sites. That was slightly later historical averages that have shown the onset of emergence typically begins within the last seven to 10 days in May. Although SBRM fly emergence began about one week later than the

historical average for the Red River Valley growing area as a whole, the Valley-wide average peak in activity during 2022 occurred precisely on the 15-year average date of June 13.

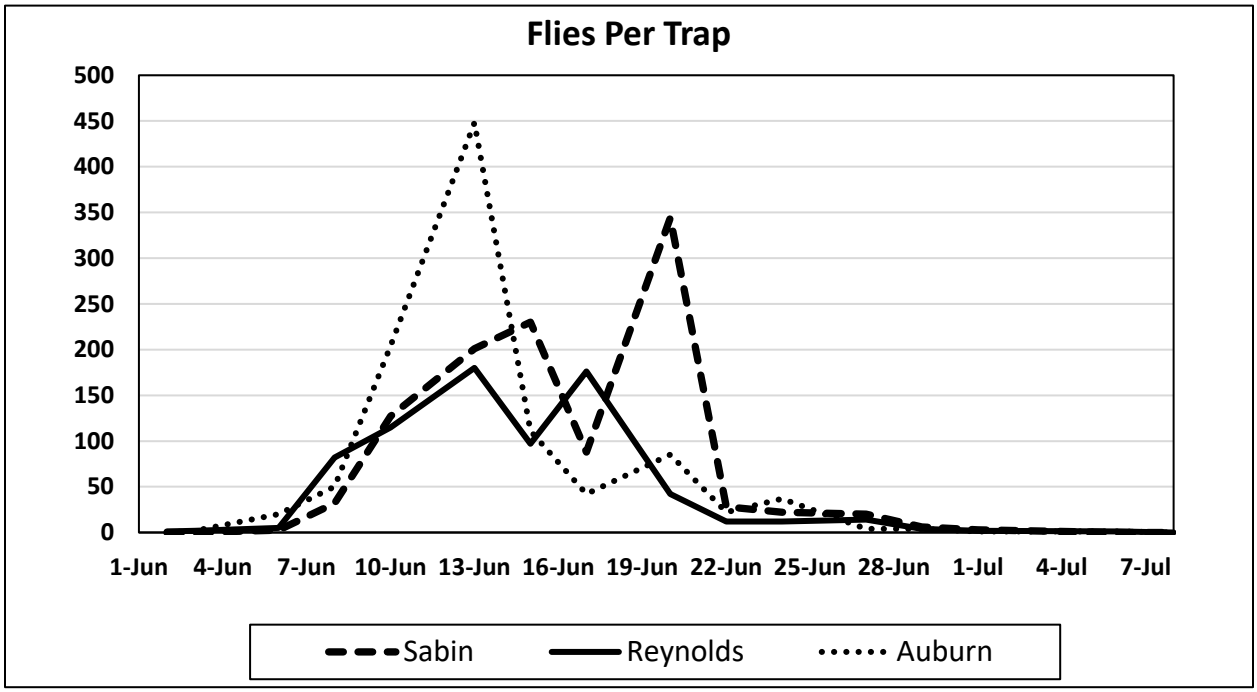

Fig. 2. Sugarbeet root maggot flies captured on sticky-stake traps at selected Red River Valley sites, 2022.

An even more unusual observation in 2022 was that SBRM fly activity in the Auburn area (northernmost of the three sites) began at about the same time as activity in the Sabin area (southern RRV), and Auburn appeared to peak earlier. Windy conditions in the Sabin area during what would likely have been the timing for peak fly activity probably kept SBRM adults down on and near the ground, thus delaying peak flight in area sugarbeet fields.

Another unusual phenomenon in 2022 involved the occurrence of what appeared to be bimodal (i.e., double peaks) SBRM fly activity patterns at many monitoring sites throughout the Valley. As shown in Figure 2 above, the bimodal pattern was very evident in fly counts from Reynolds and Sabin and, to a lesser extent, Auburn, as well as several other sites within the monitoring network. Those observations also were likely a product of unfavorable weather that included high winds, which was not conducive to SBRM flight activity. The occurrence of two SBRM fly activity peaks within the growing season is somewhat rare, but it occurs about every three to five years.

In late-August of 2022, after most SBRM larval feeding had ceased, 50 of the fly monitoring sites were rated for root maggot feeding injury in accordance with the 0-9 scale of Campbell et al. (2000) to assess whether fly outbreaks and larval infestations were managed effectively. The resulting data was subsequently overlaid with corresponding fly count data to develop the root maggot risk forecast map for the subsequent growing season (the SBRM risk forecast for next year is presented in the report that immediately follows this one).

Root maggot feeding injury, averaged across all RRV fields that exceeded the generalized economic threshold (43 cumulative flies per trap), was 0.96 on the 0 to 9 rating scale. That amounted to a 42% decrease in SBRM feeding injury when compared to that recorded in 2021. A list of RRV locations where the highest average root injury ratings were observed is presented in Table 1. Cumulative SBRM fly activity in those fields ranged from 224 flies/trap near Argyle, MN to 1,098 flies/trap near Sabin, MN. All of those fields had severely high SBRM fly infestations in comparison to most of the previous 15 years; however, the average root maggot larval feeding injury recorded for all of them was low to moderate, which suggests that the producers managing those fields were moderately to highly successful in controlling the SBRM infestations that developed in them. Other fly monitoring network fields that had a combination of high fly activity and at least moderate SBRM feeding injury 2022 included sites near Reynolds, ND (351 cumulative flies/trap; average root rating = 2.38) and Argyle, MN (232 cumulative flies/trap; average root rating = 2.18). Other areas within the monitoring network likely also sustained moderate to even high SBRM feeding injury; however, it was logistically impossible to rate all monitored fields for damage.

Table 1. Sugarbeet root maggot fly activity and larval feeding injury in Red River Valley commercial sugarbeet fields where injury exceeded 2.5, 2022

Nearest City	Township	State	Flies/stake	Average Root Injury Rating[a]
Sabin	Elmwood	MN	1,098	3.83
Cavalier	S. Cavalier	ND	224	2.98
St. Thomas	S. St. Thomas	ND	699	2.60

[a]**Sugarbeet root maggot feeding injury rating based on the 0 to 9 root injury rating scale (0 = no scarring, and 9 = over ¾ of the root surface blackened by scarring or dead beet) of Campbell et al. (2000).**

Although the collective results from root injury ratings of grower fields conducted late-summer of 2022 suggest that RRV sugarbeet growers were fairly successful in managing the sugarbeet root maggot, continued vigilance and aggressive pest management practices will likely be necessary in the coming years. Careful monitoring of fly activity in moderate- and high-risk areas (see Forecast Map [Fig. 1] in subsequent report) will help prevent economic loss in 2023. Vigilant monitoring and effective SBRM management on an individual-field basis by sugarbeet producers could also help prevent significant population increases from one year to another, because even moderate levels of root maggot survival in one year can be sufficient to result in economically damaging infestations in the subsequent growing season. That assertion is substantiated by the significant increase in SBRM fly activity that occurred in the Sabin area between 2021 and 2022.

Acknowledgments:

The authors extend sincere appreciation to the numerous sugarbeet producers that allowed us to monitor SBRM fly activity in their fields. We also are grateful to the following American Crystal Sugar Company agriculturists for collaborating with us on this project by monitoring dozens of commercial sugarbeet fields (in alphabetical order): Clay Altepeter, Andrew Clark, Thomas Cymbaluk, Todd Cymbaluk, Mike Doeden, Tyler Driscoll, Curtis Funk, Tyler Hegg, Austin Holy, Bob Joerger, Tim Kenyon, Holly Kowalski, Kody Kyllo, Kyle Lindberg, Chris Motteberg, Alysia Osowski, Travis Pederson, Nolan Rockstad, Nick Shores, Aaron Sawatzky, Nick Shores, and Dan Vagle.

Thanks are also due to the following NDSU summer aides for providing assistance with fly monitoring activities: Nick Antonoplos, Emma Harmsen, Grace Harmsen, and Margaret Huettl. We also thank the Sugarbeet Research and Education Board of Minnesota and North Dakota, and American Crystal Sugar Company for providing significant funding support for this project. This work was also partially supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under Hatch project number ND02374.

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