

2024 Western Minnesota Soybean IPM Survey

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Co-PI(s): Anthony Hanson, UMN Extension

Project Summary: The western Minnesota soybean IPM survey expands our ability to obtain field reports on crop conditions and pest activity to tailor educational outreach to crop managers through radio, digital newsletters and through print in the ag press. Should something for which additional information is needed in-person, the primary investigators will partner with company-sponsored plot tour events to provide education regarding new or emerging pest and disease issues. The goal is to provide information regarding pest and disease pressure to producers to assist them in making economical pest management decisions.

Minnesota soybean farmers continue to face new and emerging pests. This survey expands our ability to obtain field reports on crop conditions and pest activity to tailor outreach to crop managers. With the invasive soybean gall midge confirmed in 25 Minnesota counties since 2020 and a native leafmining moth (*Macrosaccus morrisella*) that was found colonizing soybeans for the first time in the US in Minnesota in 2021, understanding the range of these devastating (or *potentially* so, in the case of the leafminer) pests is critical. Without having “boots in the field” trained to look for both current and invasive pests Minnesota soybean producers would not be alerted to potential current or emerging management challenges, such as when pyrethroid insecticide-resistant soybean aphids were first observed.

PROPOSAL OBJECTIVES:

1) 2024 Western Minnesota Soybean IPM Survey (PI: A. Peltier & A. Hanson)

- a) Conduct field surveys to report soybean crop stage and pest conditions in NW and WC MN.
 - i) Partner with the NDSU IPM program in conducting and reporting field and pest conditions across a region that includes NW and WC MN and eastern ND.
 - ii) Deliver timely crop updates based on field observations with an emphasis on soybean aphid, two-spotted spider mite and other crop pest conditions as they develop.

Leveraged funding: To provide a more diverse summer experience for this program’s interns and to share costs, we also sought and obtained funding from the Minnesota Wheat Research and Promotion Council for a similar small grains-version of the soybean survey.

Project Methodology. The MSRPC-sponsored IPM Survey was funded and conducted for the first time in 2015. UMN Extension continued this project in 2023 in coordination with

similar efforts in North Dakota. As soon as MSRPC funding decisions were finalized, UMN Extension personnel began to advertise these positions to potential student interns to work out of regional Extension offices in Crookston, Moorhead and Morris, MN. We were able to identify and hire one scout to work out of the Crookston office (Katie Olson) and two to work out of the Morris office (Brett Barbeln and Logan Blanke) to work on this project this summer.

Project Deliverables:

The IPM scouts began the season scouting small grains fields, switching over to soybeans mid-season. A total of 469 soybean fields were visited throughout the scouting season, resulting in several articles, webinars and radio interviews. At each field, the scout collected data both inside and outside fields. Outside each field, grass areas that bordered fields were swept for grasshopper nymphs (**Figure 1**) and adults (**Figure 2**). Soybeans were inspected for growth stage (**Figure 3**), soybean aphid incidence (**Figure 4**), soybean aphid severity (**Figure 5**), presence of aphids colonized by parasitic wasps (**Figure 6**), number of bean leaf beetles (**Figure 7**) and the severity of chewing injury they caused (**Figure 8**), two spotted spider mite (TSSM) presence on the field edge (**Figure 9**) and inside the field (**Figure 10**), soybean gall midge presence (**Figure 11**), soybean tentiform leafminer presence within the field (**Figure 12**), soybean tentiform leafminer presence on field edge (**Figure 13**), incidence of foliage-feeding caterpillars (**Figure 14**), percentage defoliation injury caused by foliage-feeding caterpillars (**Figure 15**), percent Japanese beetle incidence (**Figure 16**), percent of foliar injury caused by Japanese beetles (**Figure 17**), frogeye leaf spot incidence (**Figure 18**), froeye leaf spot severity (**Figure 19**), Cercospora leaf blight incidence (**Figure 20**) and Cercospora leaf blight severity (**Figure 21**). Please find Figures 1 through 21 below.

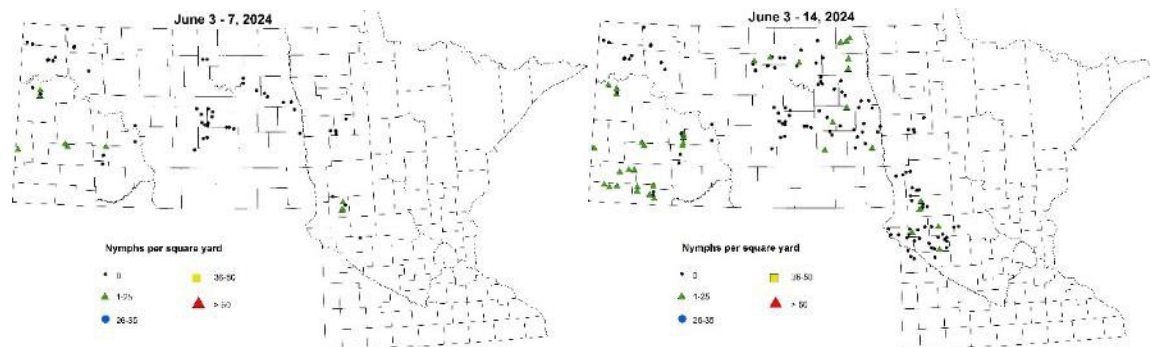


Figure 1. Grasshopper (multiple spp.) nymphs caught on the edge of scouted soybean fields over two-week periods from June 3 through July 19, 2024 and season-long final map. Redlegged grasshopper (*Melanoplus femurrubrum*) nymph, photo: Joseph Berger, Bugwood.org; Map: NDSU IPM. Continued on the next page.

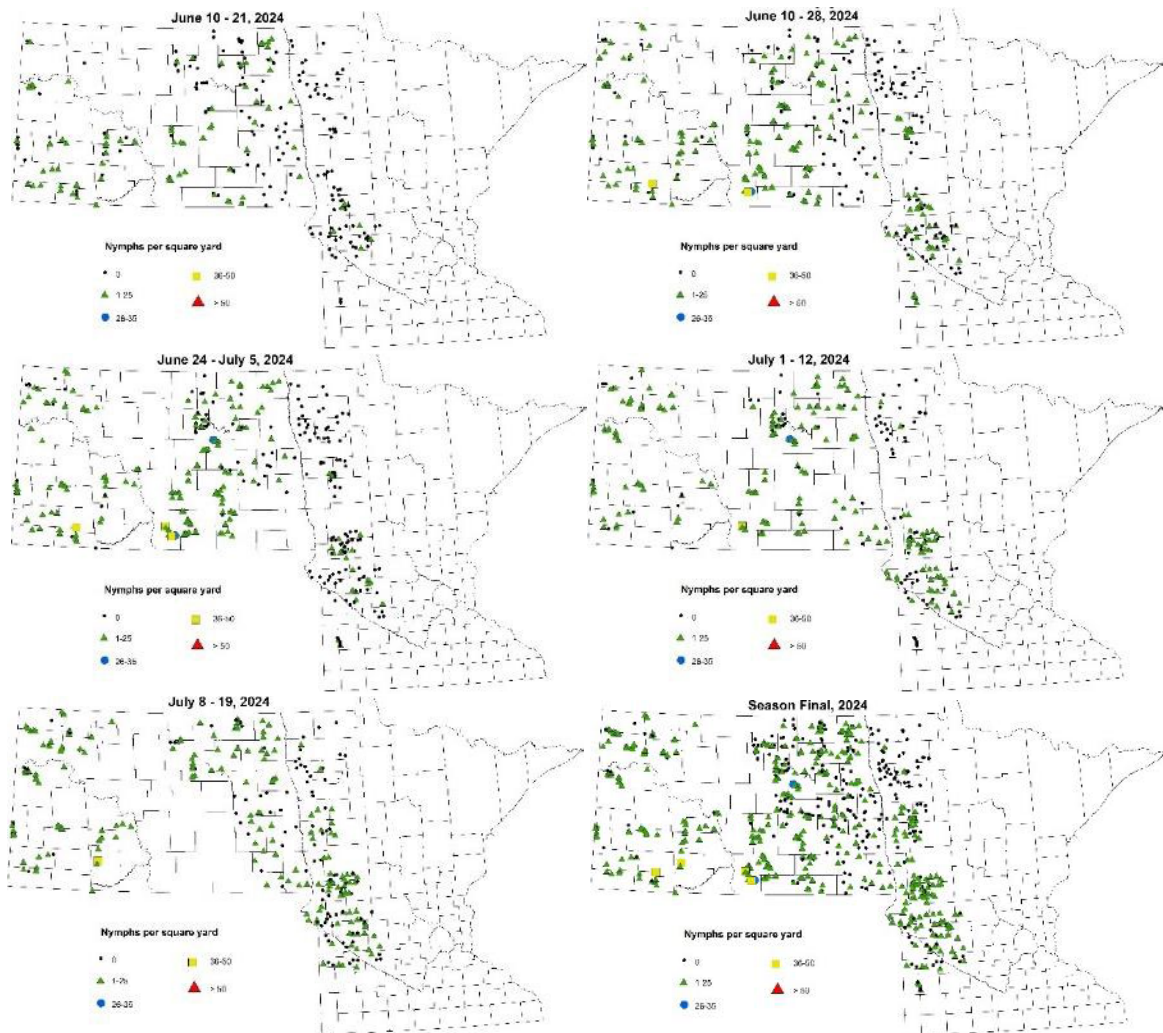


Figure 1 continued. Grasshopper (multiple spp.) nymphs caught on the edge of scouted soybean fields over two-week periods from June 3 through July 19, 2024 and season-long final map. Redlegged grasshopper (*Melanoplus femurrubrum*) nymph, photo: Joseph Berger, Bugwood.org; Map: NDSU IPM.

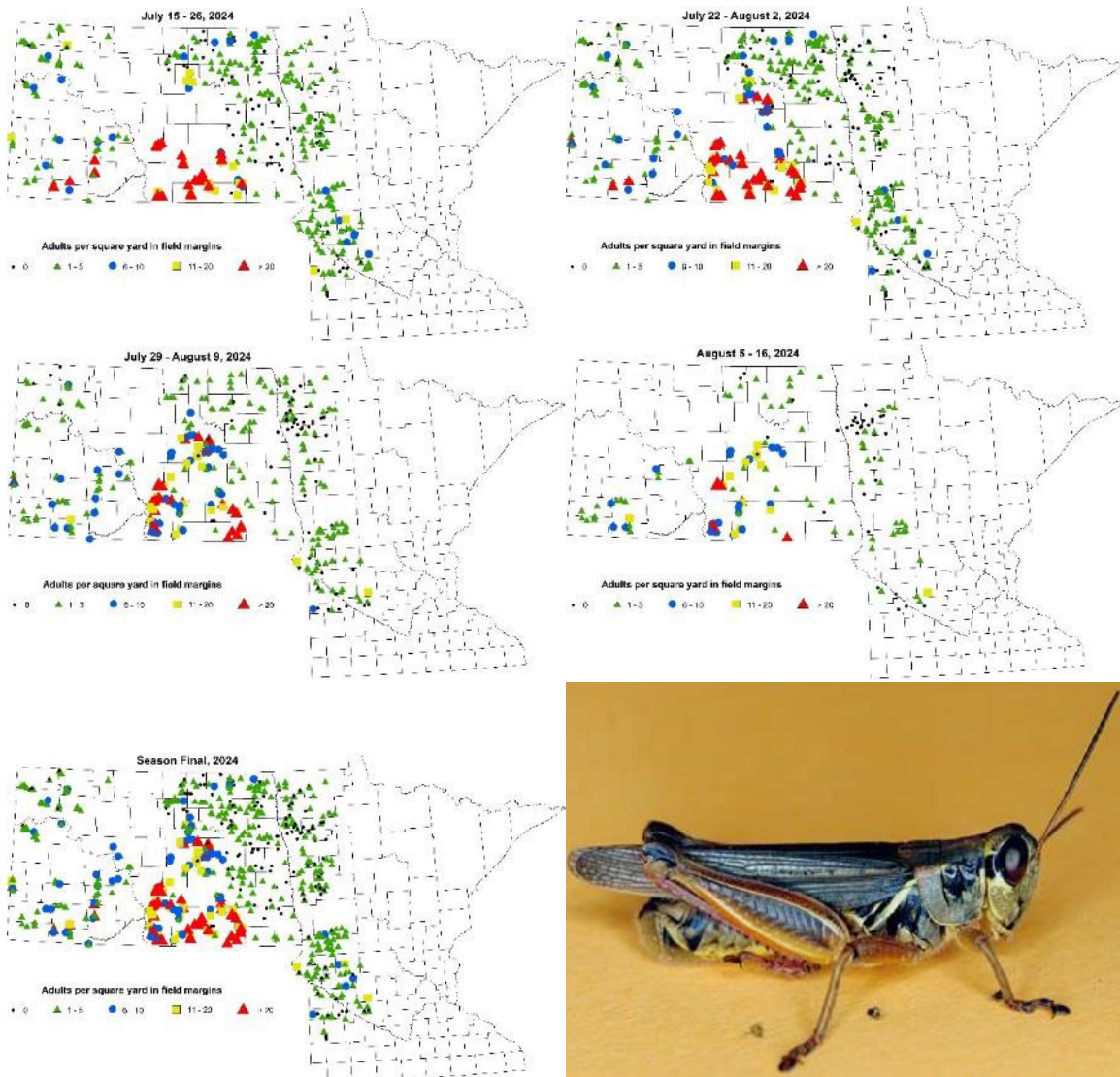


Figure 2. Grasshopper (multiple spp.) adults caught on the edge of scouted soybean fields over two-week periods from July 15 to August 16, 2024 and the season-long final. Redlegged grasshopper (*Melanoplus femurrubrum*) adult, photo: Joseph Berger, Bugwood.org; Map: NDSU IPM.

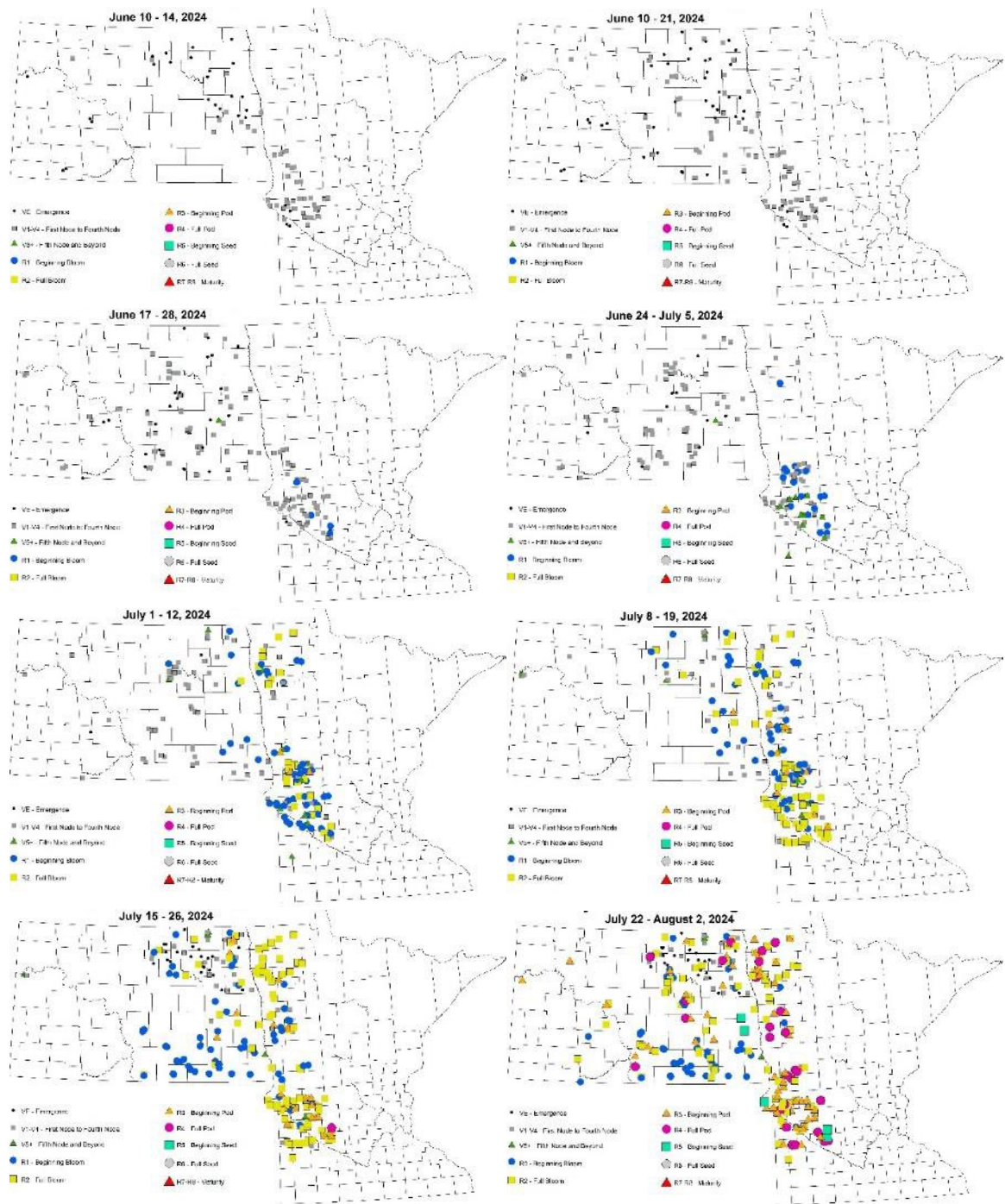


Figure 3. Soybean growth stages over two-week periods from June 10 to August 2, 2024 and season final map; Photo of R5 (beginning seed) soybeans, Angie Peltier, map: NDSU IPM. Continued on next page.

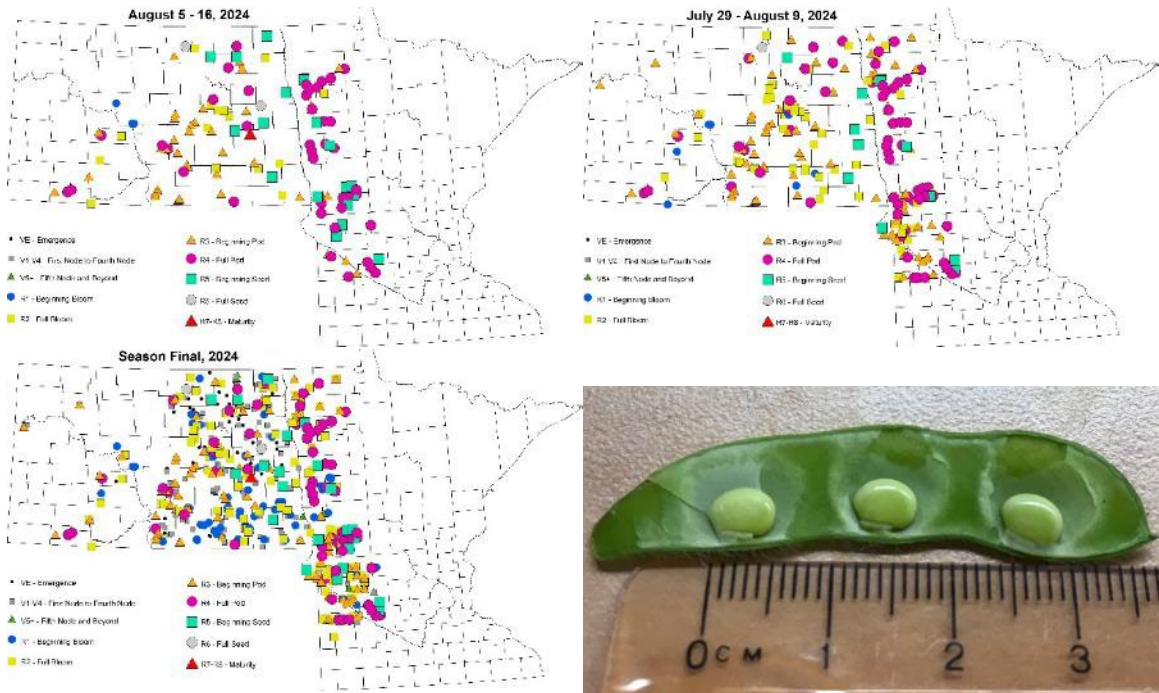


Figure 3, continued. Soybean growth stages over two-week periods from June 10 to August 2, 2024 and season final map; Photo of R5 (beginning seed) soybeans, Angie Peltier, map: NDSU IPM.

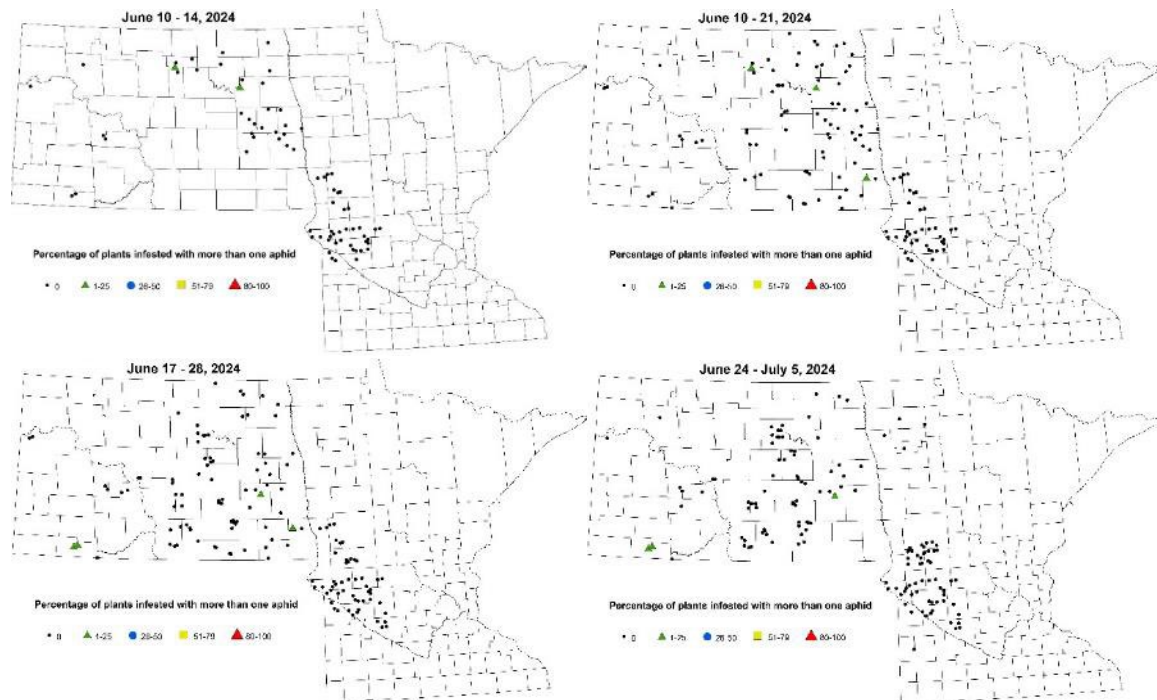


Figure 4. Soybean aphid incidence (percentage of plants infested) over two-week periods from June 10 to August 16, 2024. Soybean aphid infestation in NW MN in 2024, photo: Angie Peltier; Map: NDSU IPM. Continued on next page.

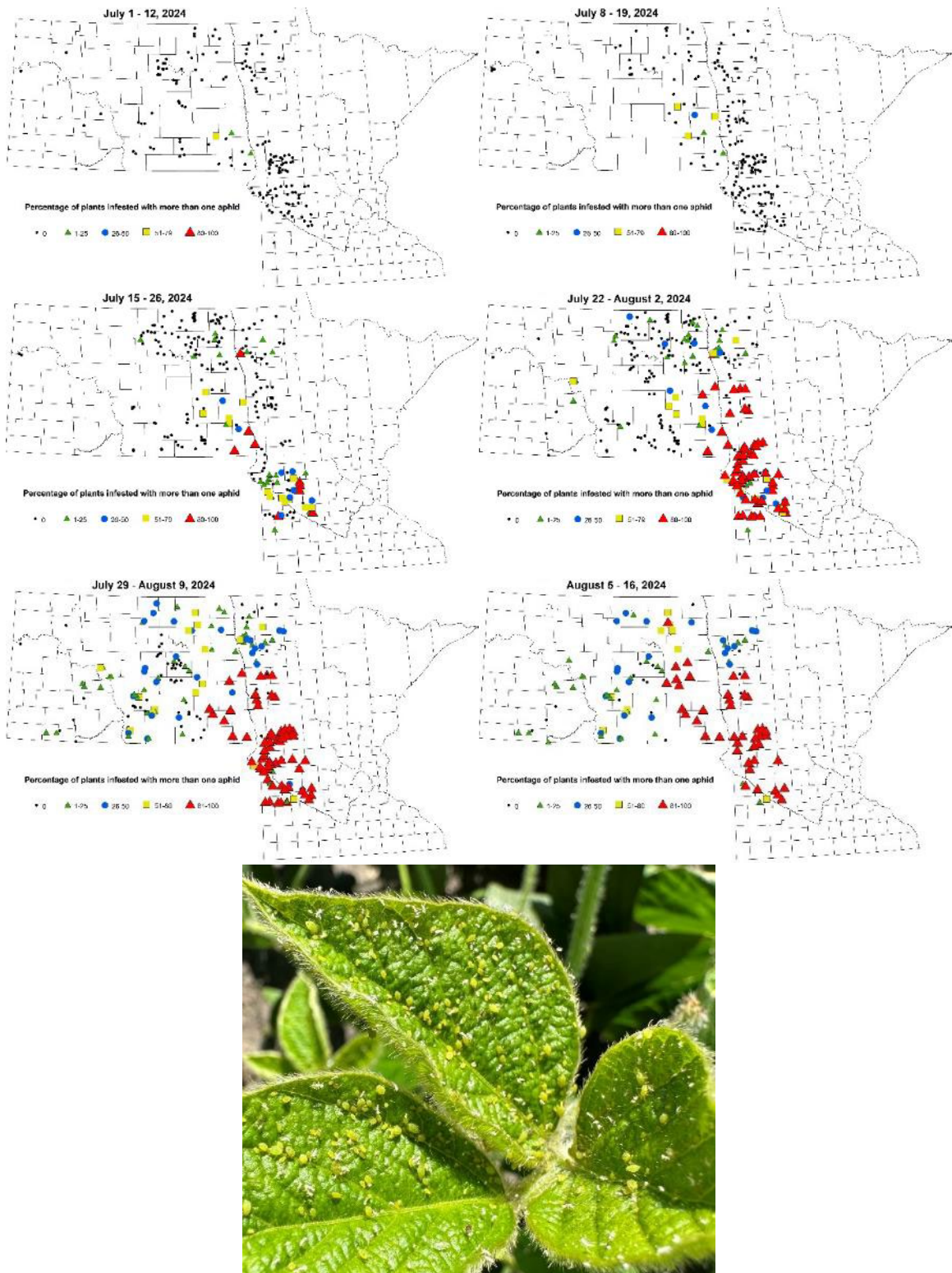


Figure 4, continued. Soybean aphid incidence (percentage of plants infested) over two-week periods from June 10 to August 16, 2024. Soybean aphid infestation in NW MN in 2024, photo: Angie Peltier; Map: NDSU IPM.

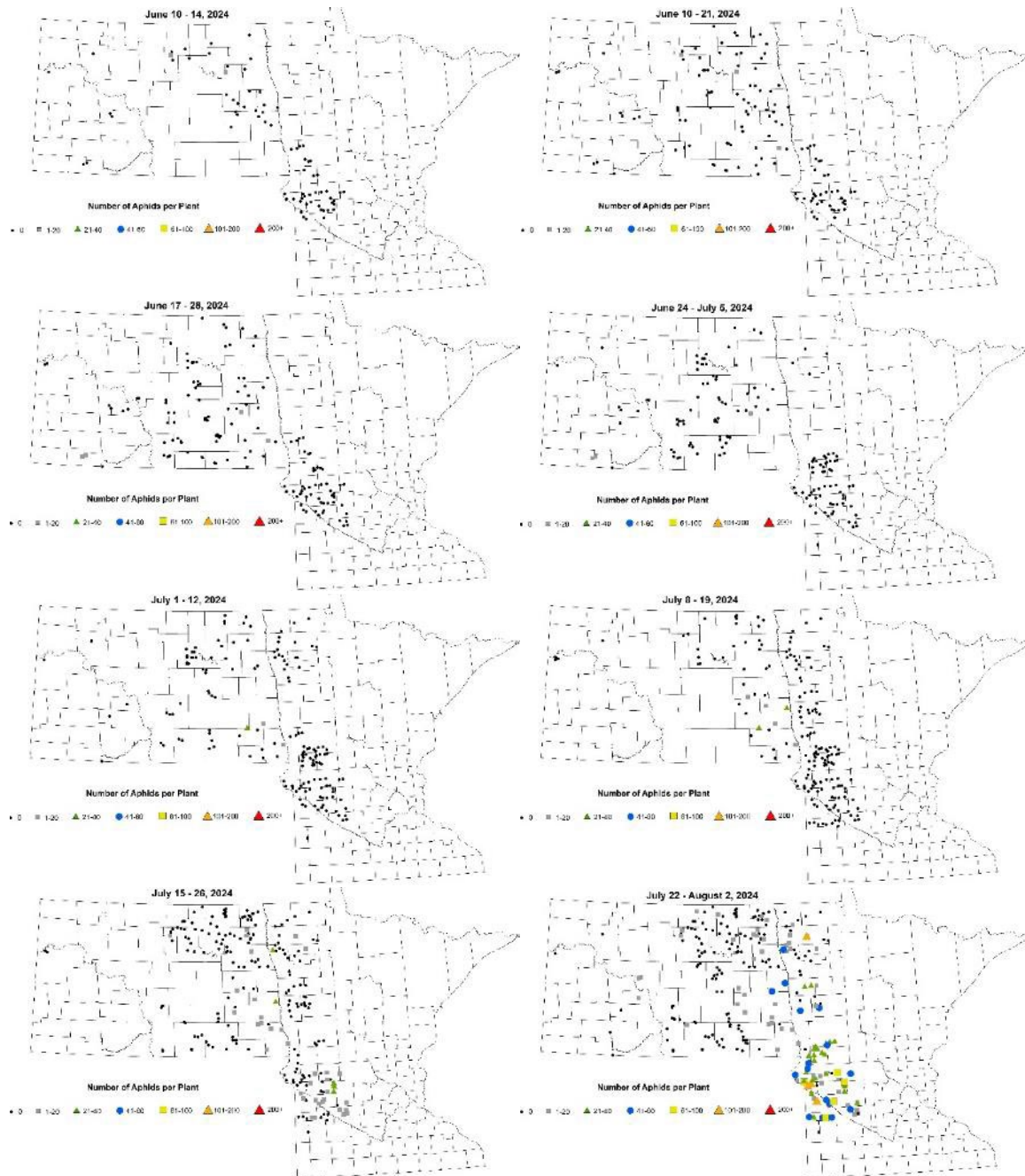


Figure 5. Soybean aphid (*Aphis glycines*) severity (number of aphids per plant) over two-week periods from June 10 to August 16, 2024; Map: NDSU IPM. Continued on next page.

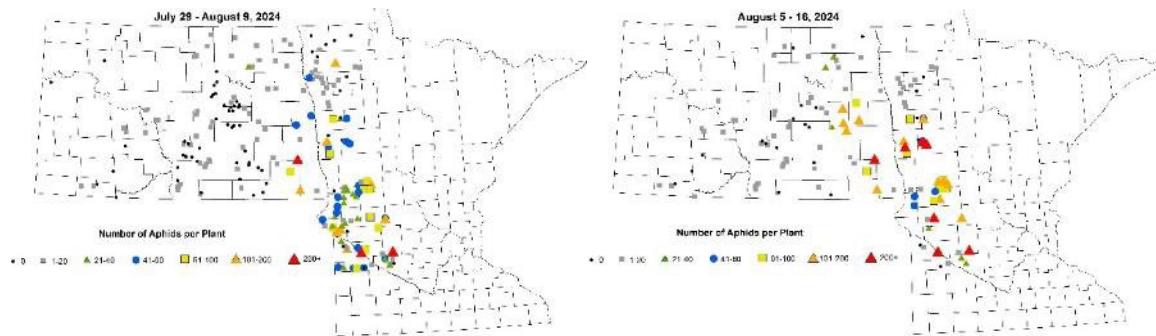


Figure 5, continued. Soybean aphid (*Aphis glycines*) severity (number of aphids per plant) over two-week periods from June 10 to August 16, 2024; Map: NDSU IPM.

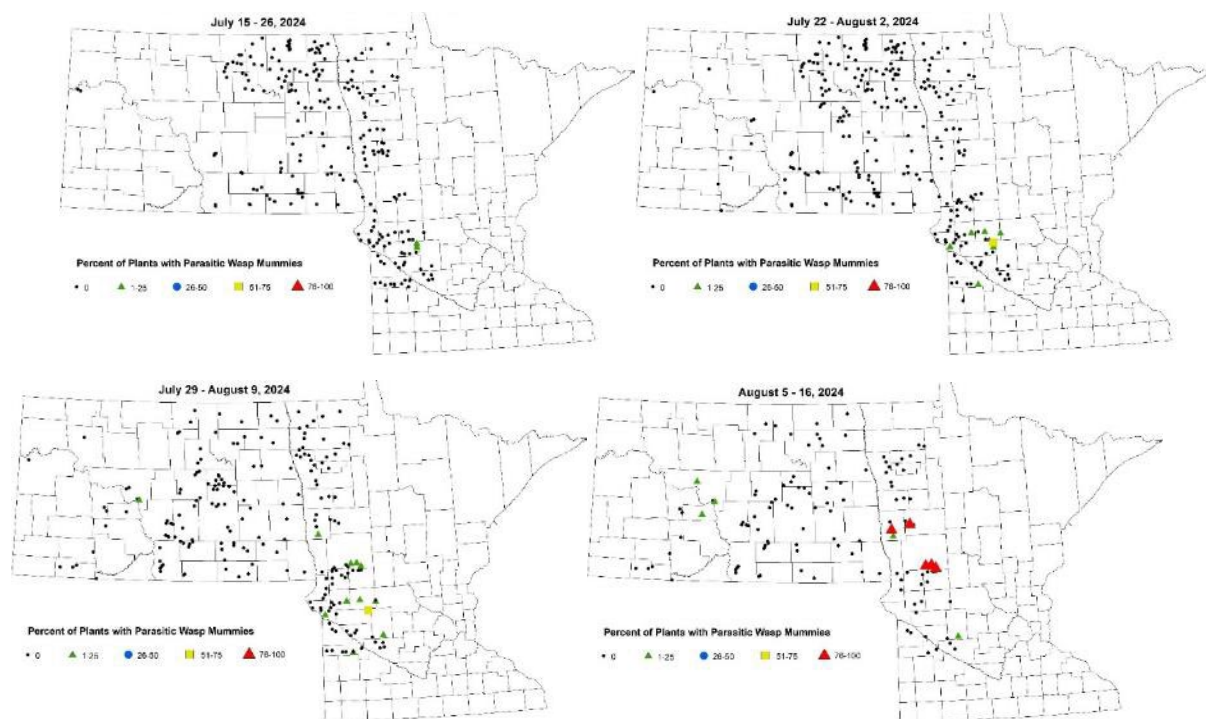


Figure 6. Percentage of plants with soybean aphids (*Aphis glycines*) that were colonized by parasitic wasps over two-week periods from July 15 through August 16, 2024; *Aphelinus* spp. colonizing an aphid, photo: Frank Peairs, Colorado State University, Bugwood.org. Maps: NDSU IPM. Continued on next page.



Figure 6, continued. Percentage of plants with soybean aphids (*Aphis glycines*) that were colonized by parasitic wasps over two-week periods from July 15 through August 16, 2024; *Aphelinus* spp. colonizing an aphid, photo: Frank Peairs, Colorado State University, Bugwood.org. Maps: NDSU IPM.

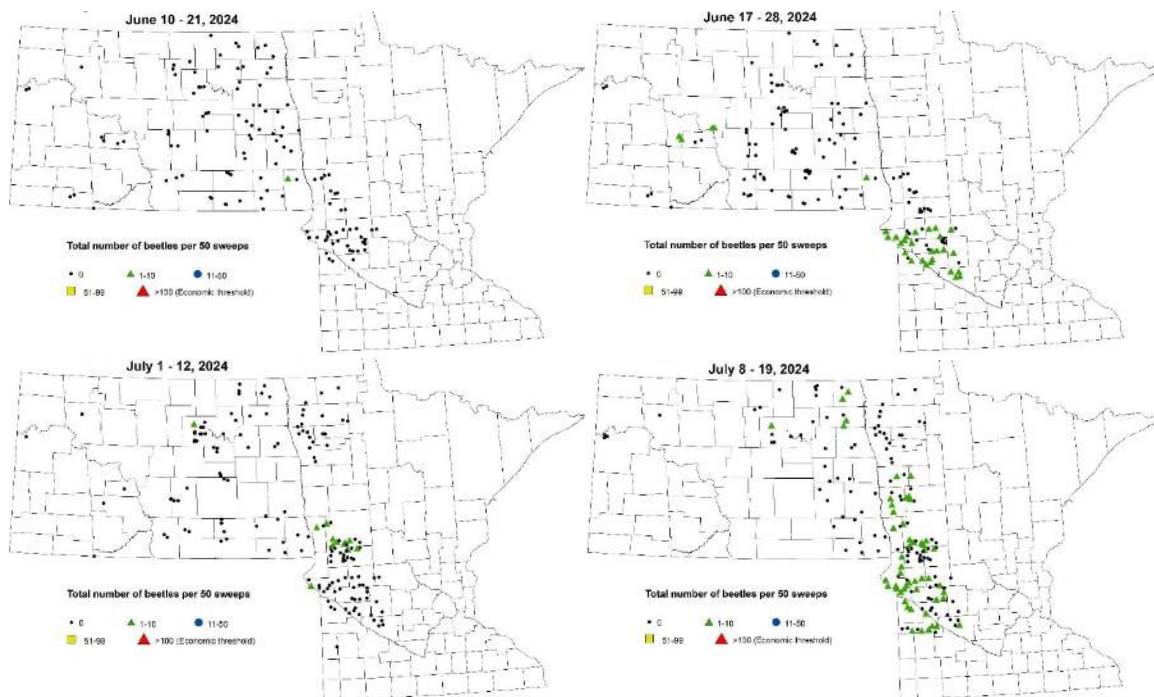


Figure 7. Number of bean leaf beetles (*Cerotoma trifurcate*) per 50 sweeps over two-week periods June 10 to August 16, 2024, Photo: Angie Peltier; Map: NDSU IPM. Continued on next page.

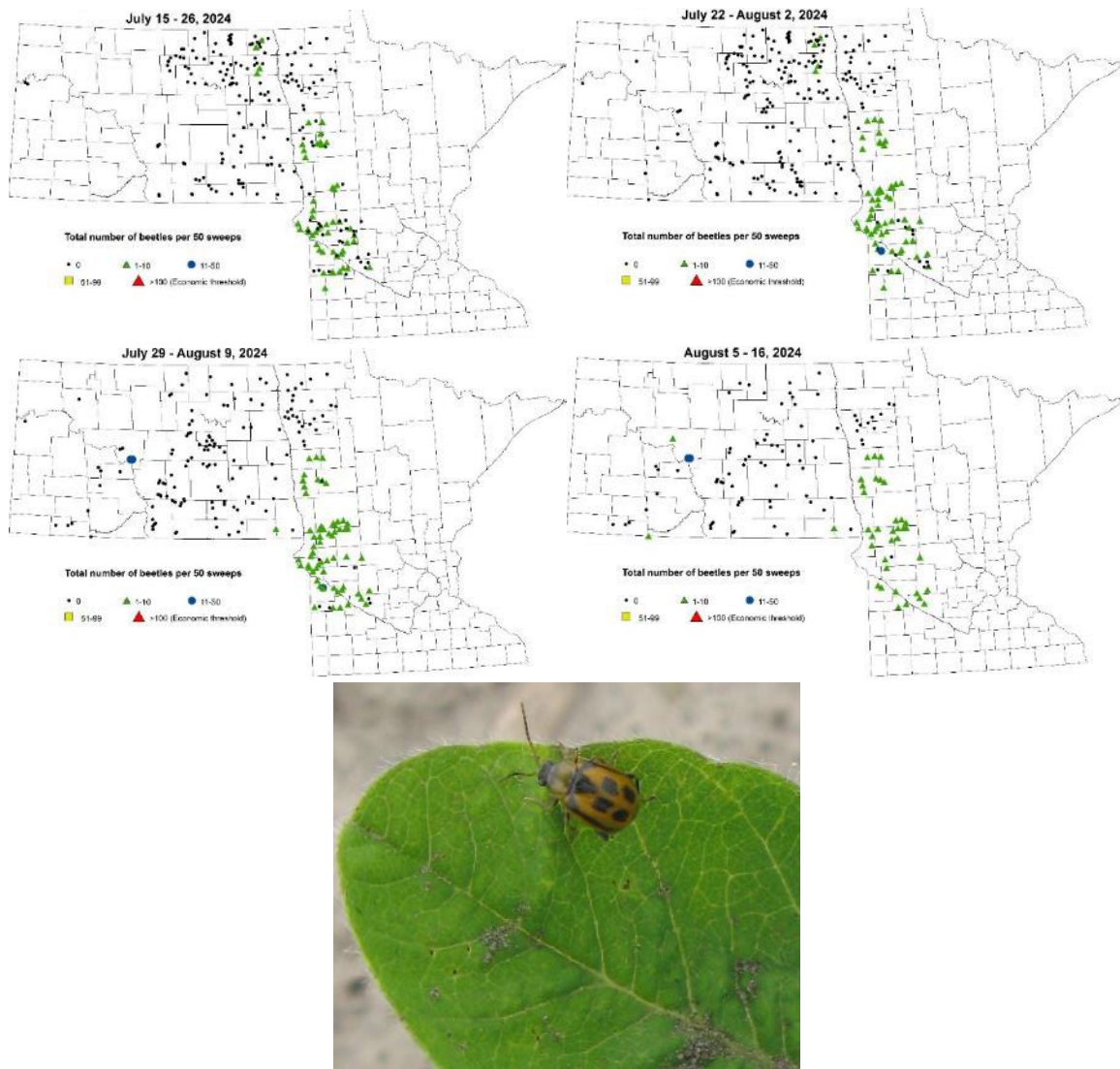


Figure 7, continued. Number of bean leaf beetles (*Cerotoma trifurcate*) per 50 sweeps over two-week periods June 10 to August 16, 2024, Photo: Angie Peltier; Map: NDSU IPM.

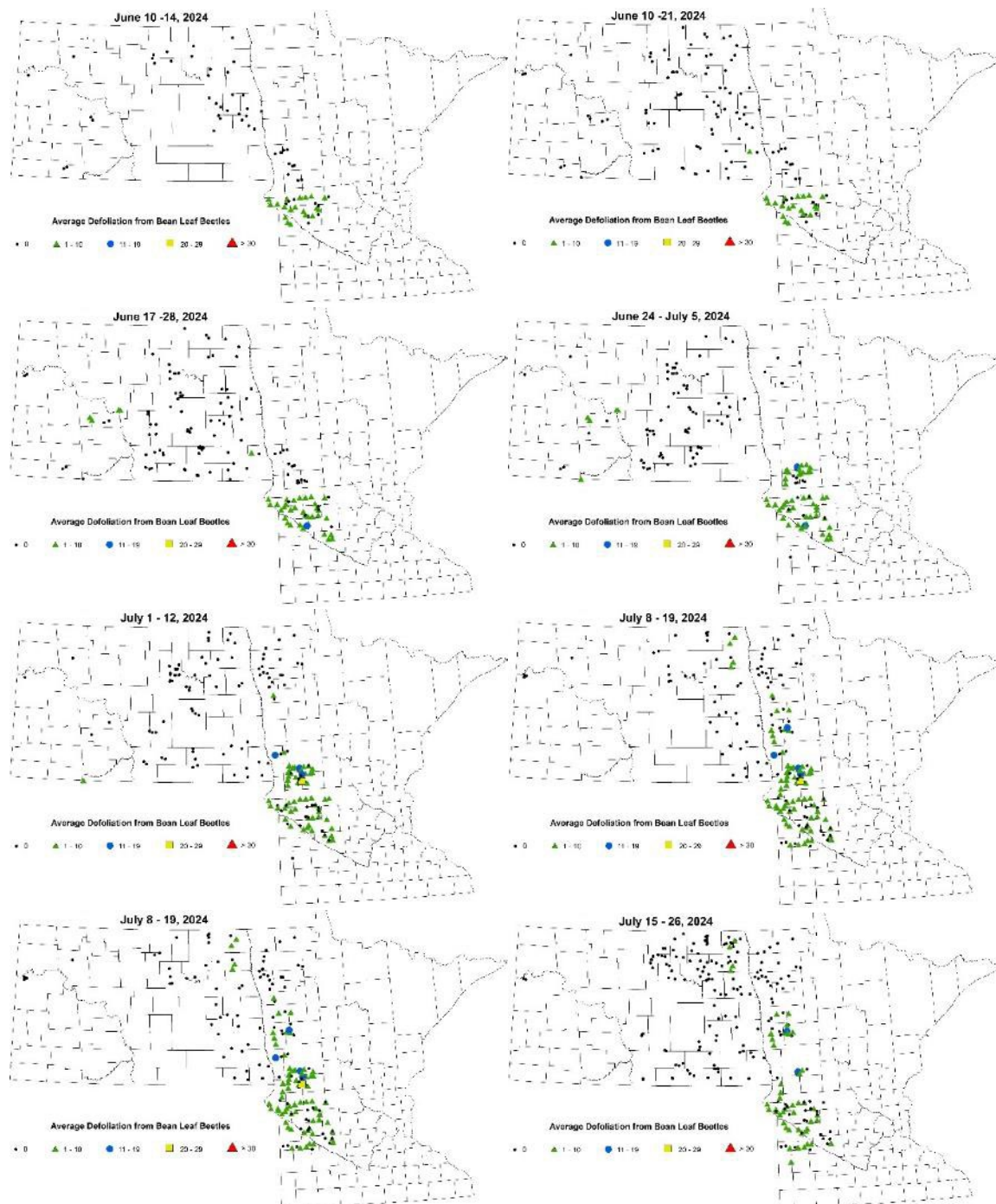


Figure 8. Average bean leaf beetle (*Cerotoma trifurcate*) defoliation injury over two-week periods June 10 to August 16, 2024; Map: NDSU IPM. Continued on next page.

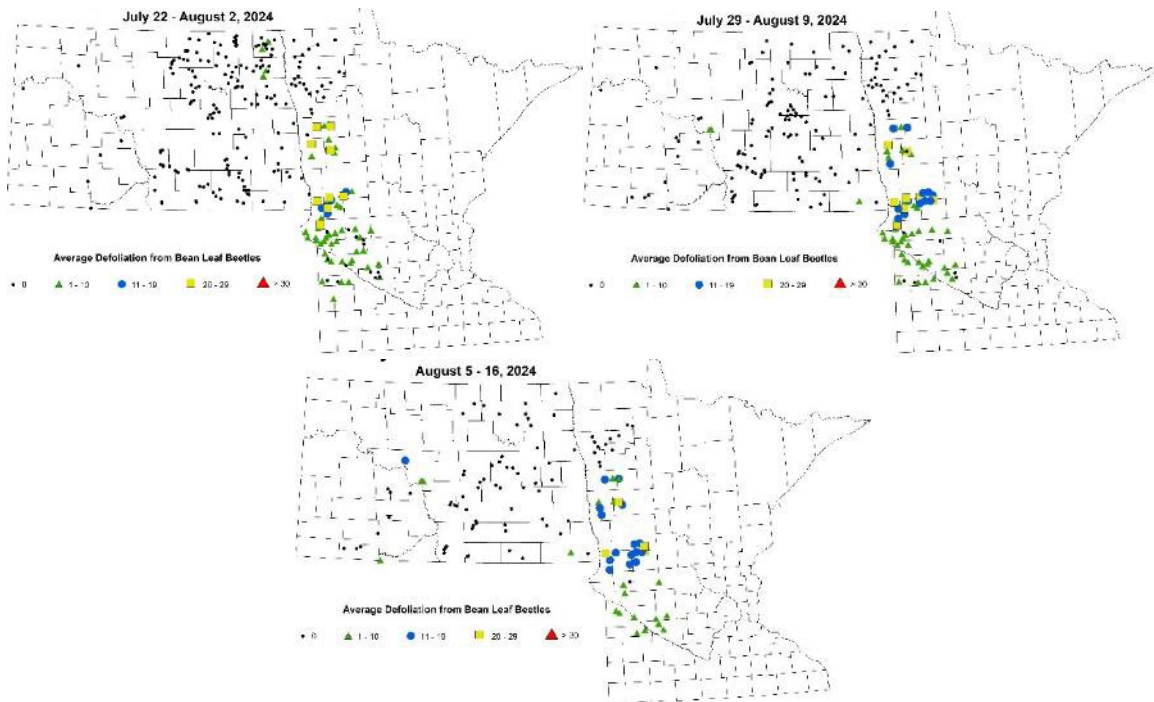


Figure 8, continued. Average bean leaf beetle (*Cerotoma trifurcate*) defoliation injury over two-week periods June 10 to August 16, 2024; Map: NDSU IPM.



Figure 9. Presence of two-spotted spider mites (*Tetranychus urticae*) on edge of field (red triangle) over two-week periods July 15-26, 2024, Photo: two-spotted spider mites (red arrows) and their eggs (blue arrows), Angie Peltier; Map: NDSU IPM.

Figure 10. Presence of two-spotted spider mites (*Tetranychus urticae*) inside field (red triangle) over two-week periods June 26 to August 11, 2023; Map: NDSU IPM.

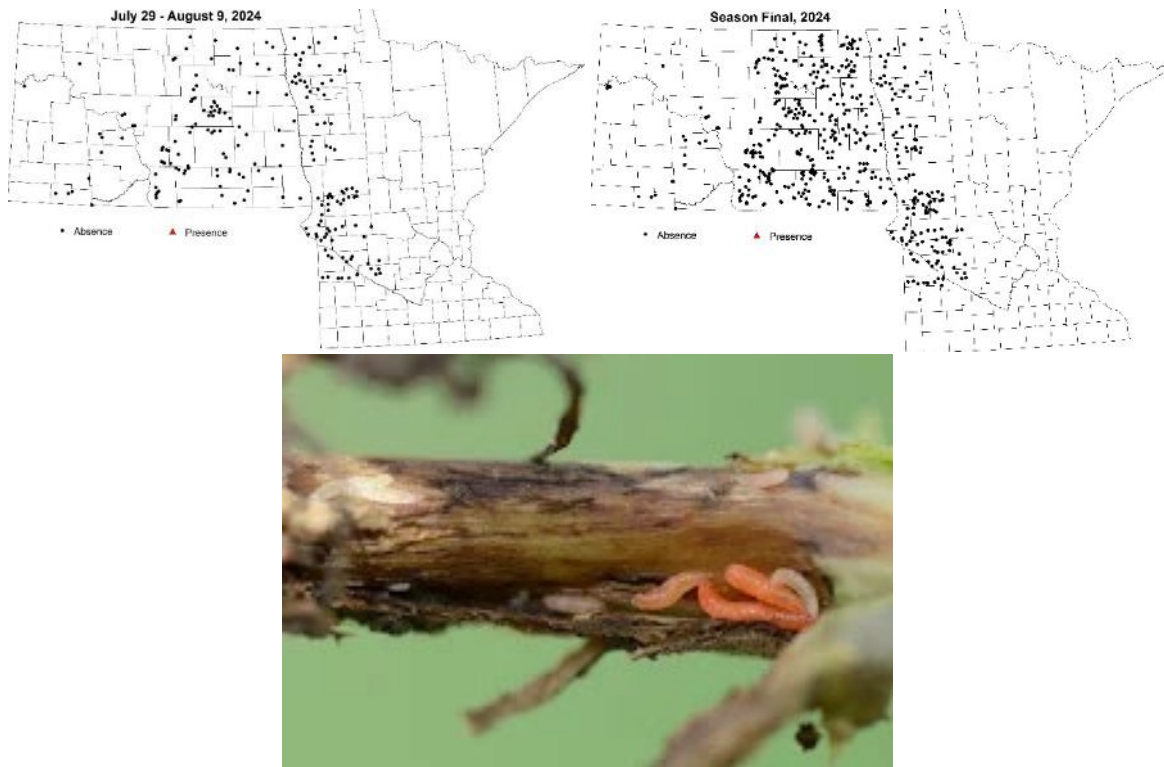


Figure 11. Soybean gall midge (*Resseliella maxima*) presence (red triangle) and absence (black dots) in scouted soybean fields July 29 - August 9, 2024 and season-long locations, Photo: soybean gall midge larvae, Bruce Potter; Map: NDSU IPM.

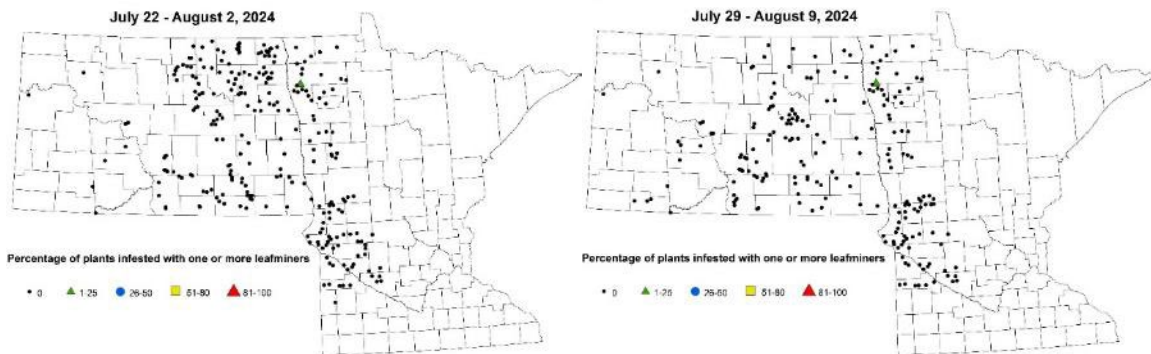


Figure 12. Soybean tentiform leafminer (*Macrosaccus morrisella*) presence (red triangle) and absence (black dots) in scouted soybean fields July 22-August 16, 2024, Photo: soybean tentiform leafminer mines, Angie Peltier; Map: NDSU IPM. Continued on next page.

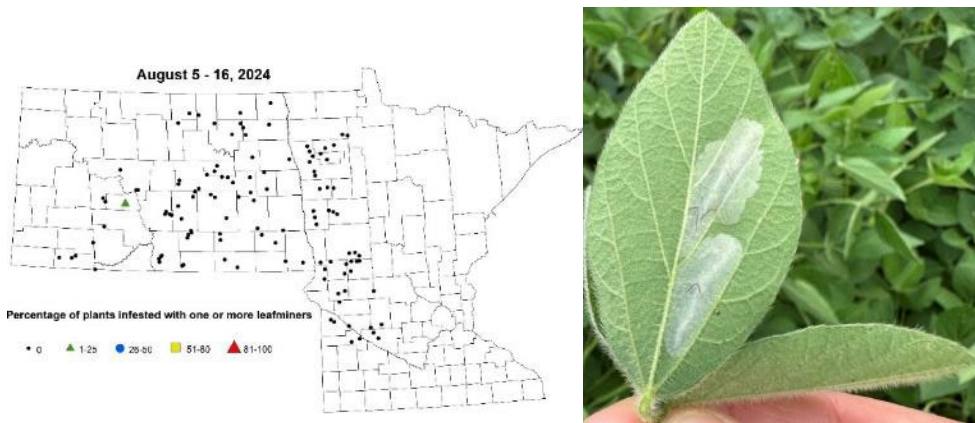


Figure 12, continued. Soybean tentiform leafminer (*Macrosaccus morrisella*) presence (red triangle) and absence (black dots) in scouted soybean fields July 22-August 16, 2024, Photo: soybean tentiform leafminer mines, Angie Peltier; Map: NDSU IPM.

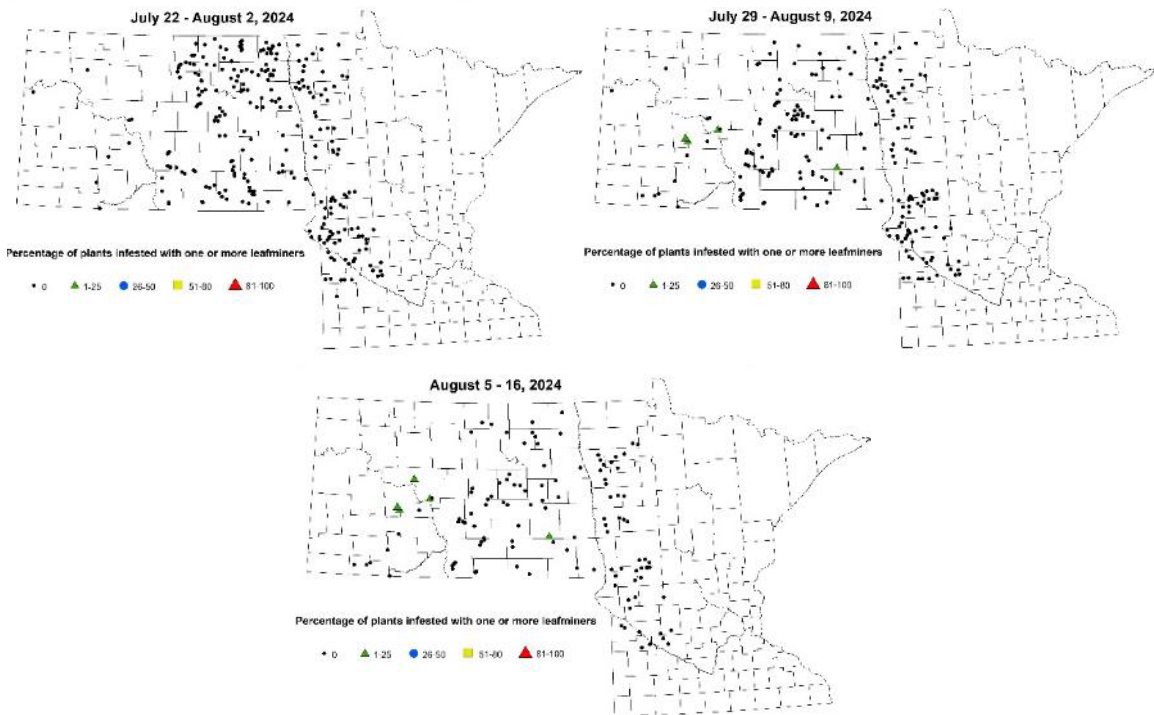


Figure 13. Soybean tentiform leafminer (*Macrosaccus morrisella*) presence (red triangle) and absence (black dots) on the edge of scouted soybean fields July 22 - August 16, 2024; Map: NDSU IPM.

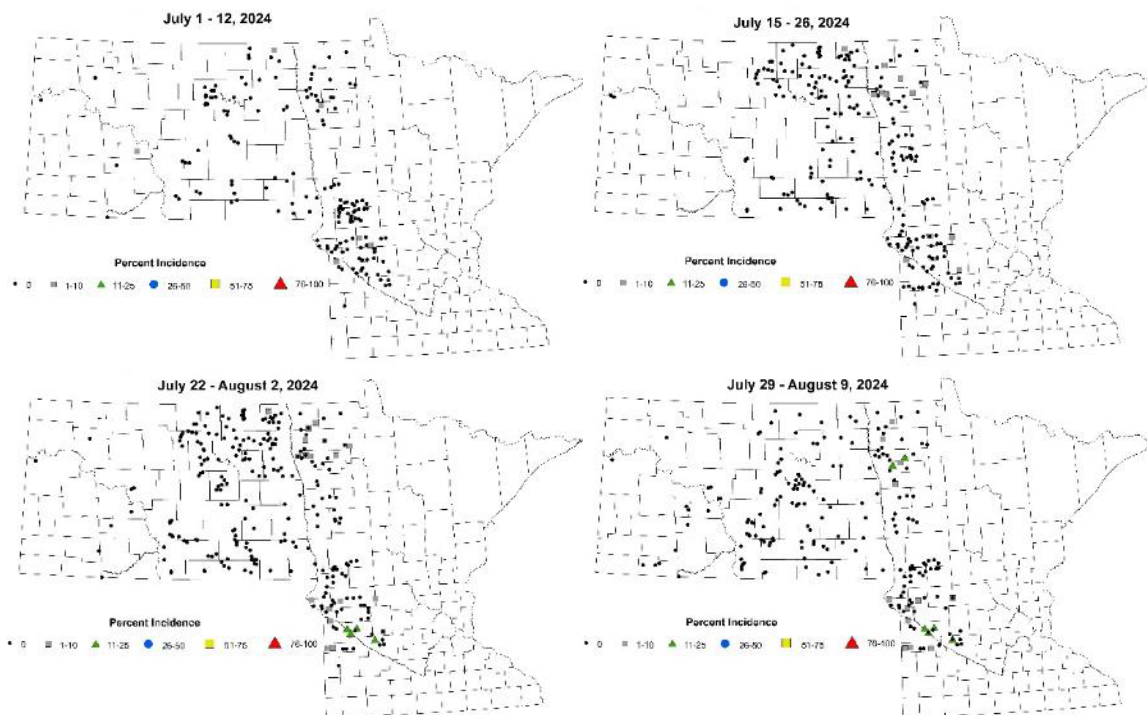


Figure 14. Incidence (%) of foliage feeding caterpillars in scouted soybean fields from July 1 through August 9, 2024. Map: NDSU IPM.

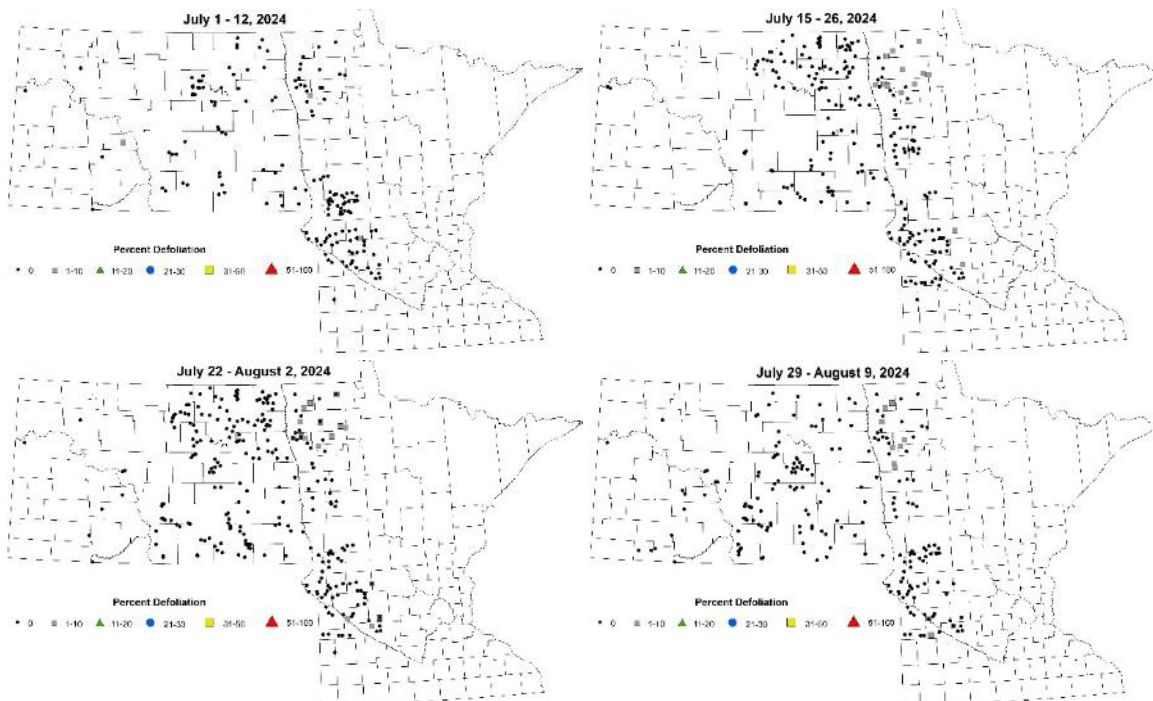


Figure 15. Defoliation injury (%) from foliage feeding caterpillars in scouted soybean fields from July 1 through August 9, 2024. Map: NDSU IPM.

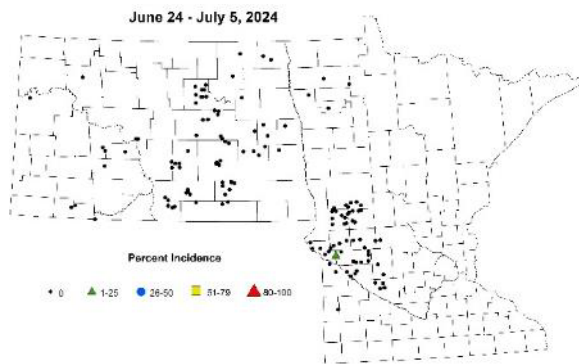


Figure 16. Incidence (%) of Japanese beetles in scouted soybean fields from June 24 through July 5, 2024, Photo: Japanese beetles, Angie Peltier. Map: NDSU IPM.

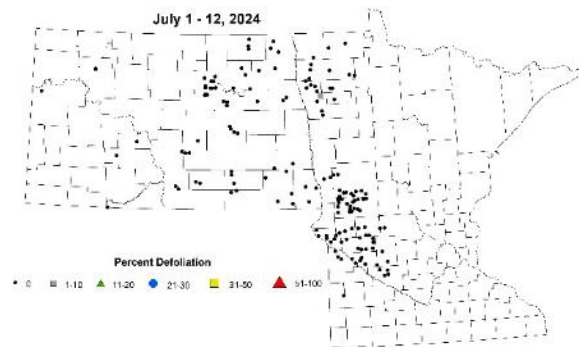


Figure 17. Defoliation injury (%) caused by Japanese beetles in scouted soybean fields July 1-12, 2024. Map: NDSU IPM.

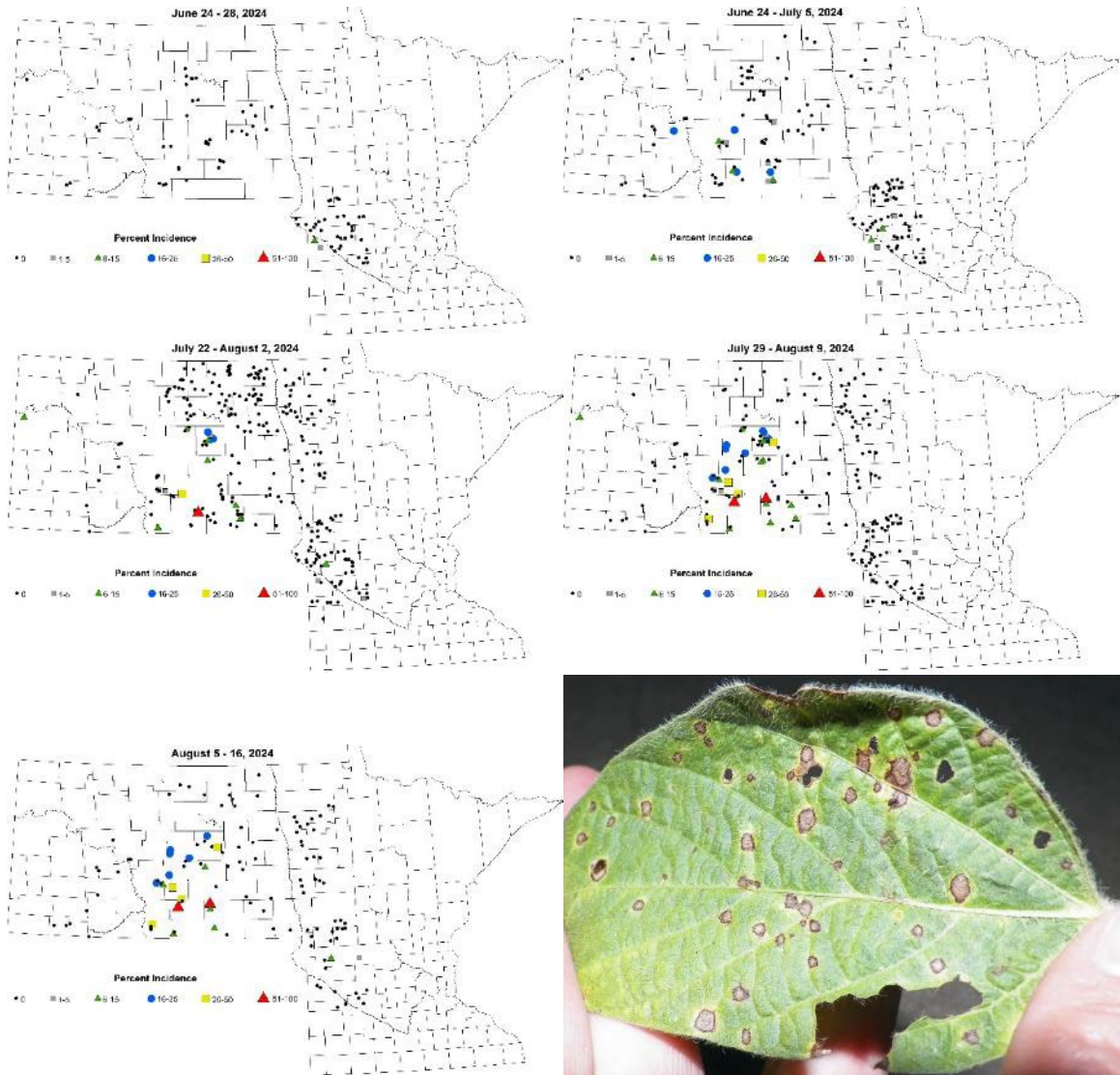


Figure 18. Incidence (%) of Frogeye leaf spot in scouted soybean fields June 24 - August 16, 2024, Photo: FLS lesions, Angie Peltier. Map: NDSU IPM.

Figure 19. Severity (%) of Frogeye leaf spot in scouted soybean fields June 24 - August 16, 2024. Map: NDSU IPM.

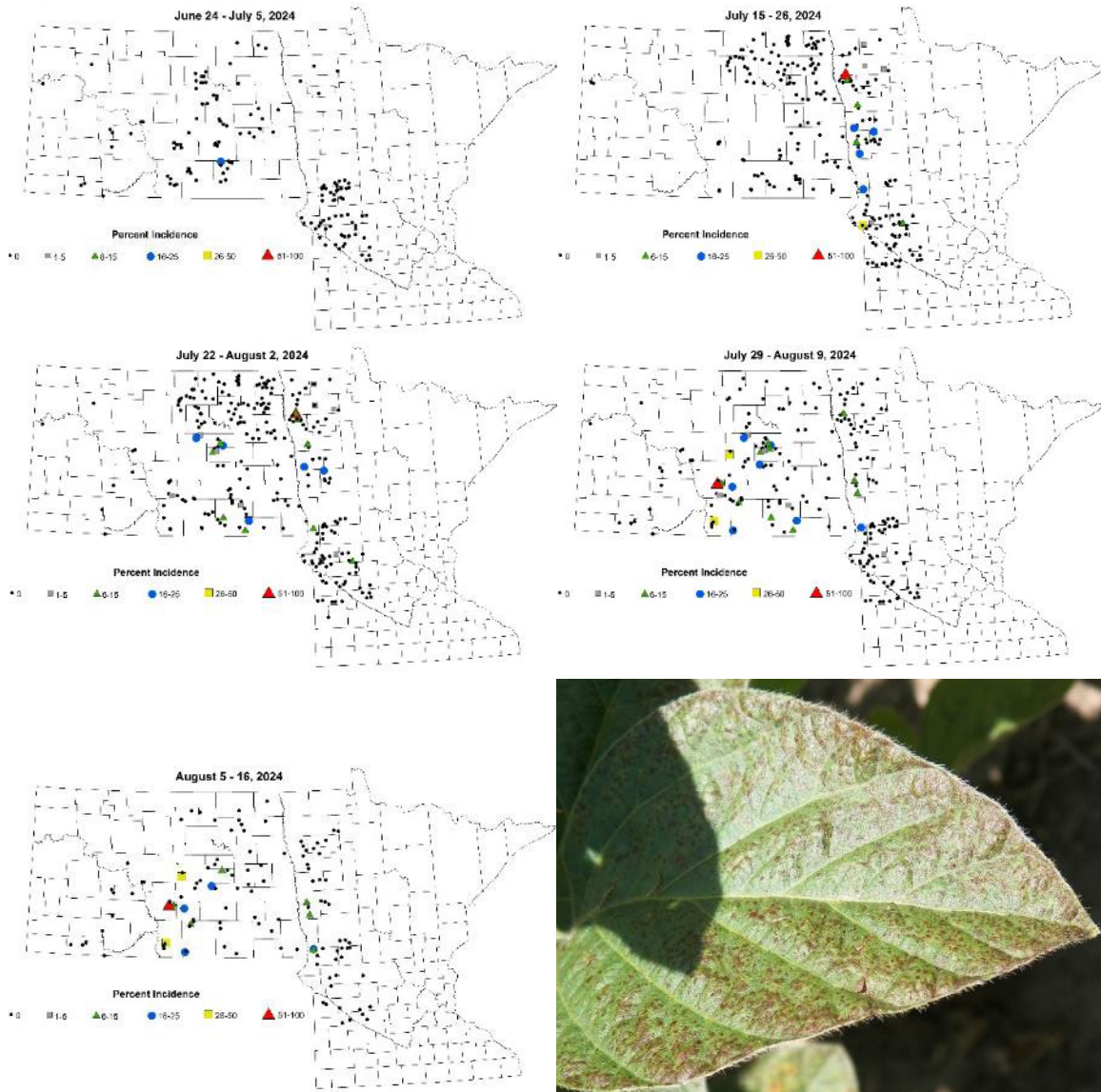


Figure 20. Incidence (%) of *Cercospora* leaf blight in scouted soybean fields June 24 - August 16, 2024: Photo: CLB, Angie Peltier. Map: NDSU IPM.

Figure 21. Severity (%) of *Cercospora* leaf blight in scouted soybean fields June 24 - August 16, 2024. Map: NDSU IPM.

Extension activities related to IPM: