

2022 Bean & Beet Diagnostic Day

Coordinators: Scott Bales, Daniel Bublitz, Tom Wenzel, and Jaime Willbur

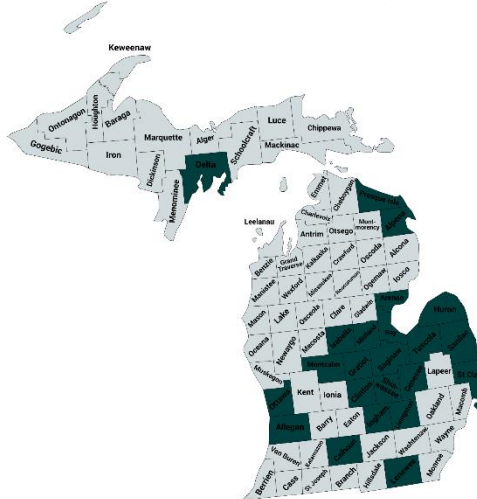
MSU ANR Event Services Coordinators: Renae Siler and Shelby Warner

Session Leaders: Martin Chilvers, Chris Difonzo, Linda Hanson, Marisol Quintanilla, Christy Sprague, Kurt Steinke (MSU Extension); Erin Hill and Angela Tenney (MSU Plant and Pest Diagnostics); Dennis Bischer and Corey Guza (Michigan Sugar Company)

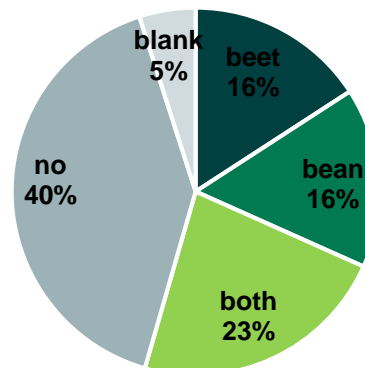
SVREC Management: Paul Horny, Dennis Fleishmann, and Holly Corder

Purpose: Michigan is the second largest edible dry bean and fourth largest sugar beet producer in the United States. Combined, pests and diseases cost Michigan bean and beet producers estimated annual losses of tens of millions of dollars. Effective management of these issues requires early and accurate diagnosis of the diseases and pathogens present in the field. The 2023 Bean & Beet Diagnostic Day was developed to 1) help the industry better understand and identify the pests and diseases impacting dry bean and sugar beet production, 2) provide a comprehensive diagnostic training in bean and beet diagnostics, which are often included in the same rotation, and 3) connect these industries with Michigan State University Extension resources, specialists, and educators. Deployed August 23, 2022.

Attendance: 147 total attendees representing 23 counties in Michigan (77% attendees were industry stakeholders and 23% were MSU faculty, staff, and student researchers)



Participants growing drybeans or sugarbeets (N = 101)



Grower survey respondents (N = 51) represented at least 12,000 bean acres and 10,135 beet acres. Agribusiness survey respondents (N = 29) reported to advise between 65 to 155,000 acres (see table).

More than 80% advised greater than 1,000 acres.

%	acres
3	<100
14	100-1,000
17	1,000-10,000
48	10,000-20,000
7	20,000-100,000
10	>100,000

Topics and Activities:

- **Dry bean insects:** Show-and-tell highlights, including live specimens of various insect pests as well as discussion of scouting and damage assessment methods.
- **Herbicide injury:** Demonstration plots in sugar beet and dry bean. Interactive participant identification quiz and review of modes of action with common injury symptoms.
- **Nitrogen fertility in beets:** Demonstration plots of nitrogen programs highlighting in- and end-of-season management related to sugar and yield outcomes.
- **Weed ID:** A brief introduction to important plant structures and the resources available to assist in weed identification, including the use of smartphone apps.
- **Nematode ID:** Interactive workshop to see and learn the basics of identifying beet cyst nematodes through hand lens and microscopes.
- **Beet diseases:** Hands-on exercises using symptomatic beet plots and collected samples to detect, diagnose, and submit samples for major seedling, root, and foliar beet diseases of the region.
- **Bean diseases:** Show-and-tell with diseased samples to recognize common bacterial and fungal diseases. Also included brief discussion of management and other resources.



Dry bean insect show-and-tell session led by Chris Difonzo and Scott Bales.



Sugar beet herbicide injury demonstration led by Christy Sprague and Dennis Bischer.



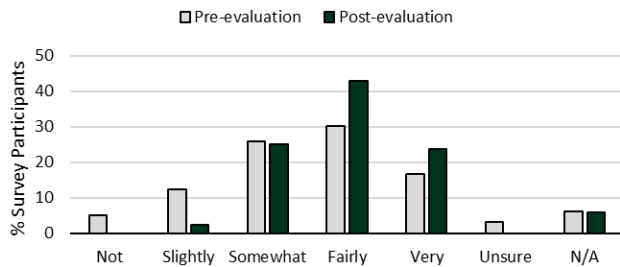
Sugar beet nitrogen program demonstrations led by Kurt Steinke, Corey Guza, and graduate students Storm Soat and Lane Suplito.



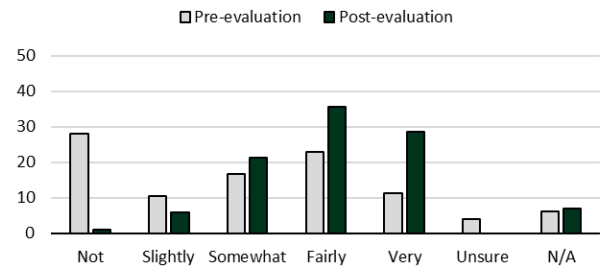
Sugar beet seedling and foliar disease demonstrations led by Linda Hanson and Jaime Willbur.

Pre- and Post-Evaluation Survey Results: Participants responded to an online pre- (grey, $N = 96$) and post- (green, $N = 85$) evaluation survey administered to assess confidence levels surrounding each topic.

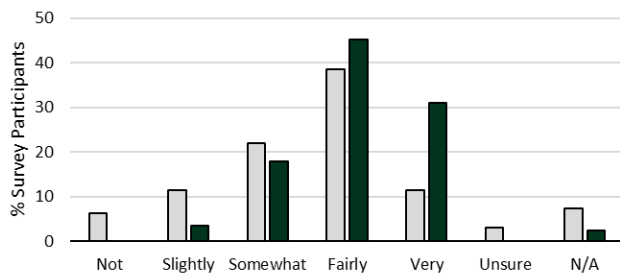
Insect Pests and Damage



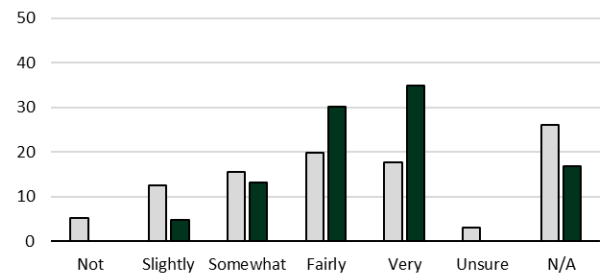
Nematode Identification



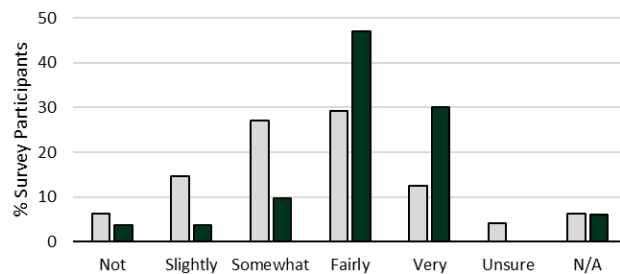
Herbicide Injury



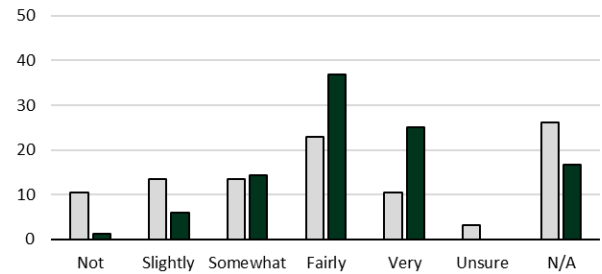
Foliar Diseases Sugar Beet



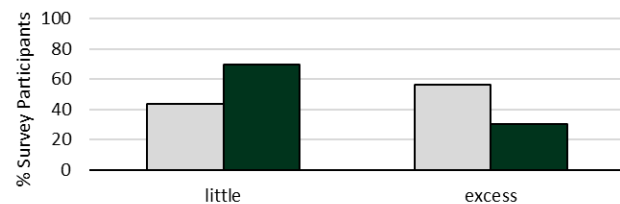
Weed Identification



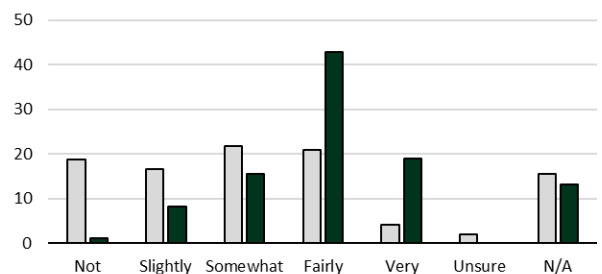
Seedling and Root Diseases Sugar Beet



Regarding N management, would you prefer your crop to have too little or too much N heading into mid-season?

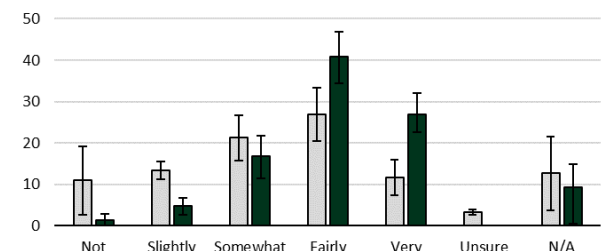


Bacterial and Fungal Diseases Dry Bean

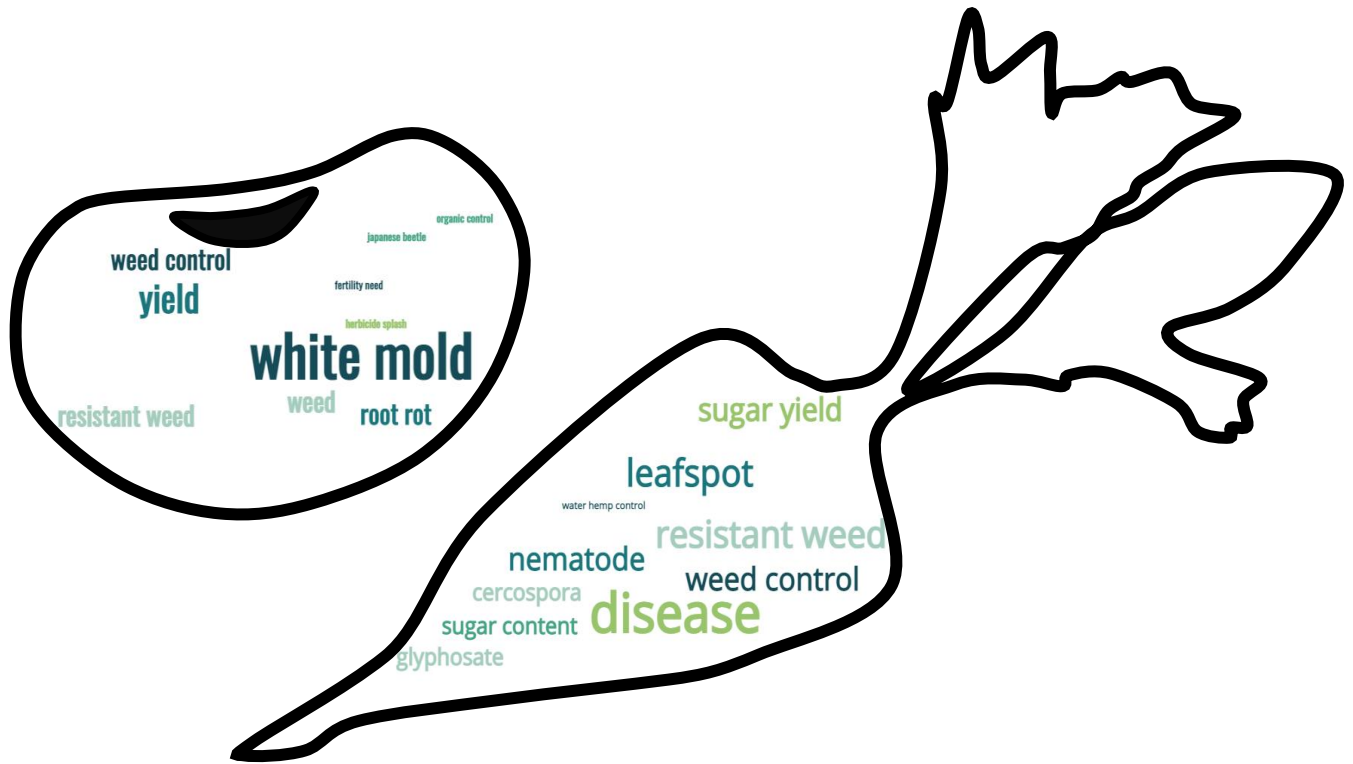


Across all topics, participant confidence increased in the “fairly” and “very” categories by more than 10% following the event (mean frequencies shown at right). Corresponding decreases were noted in all “not” and “slightly” categories. In the nitrogen management question, post-evaluation responses shifted toward the target answer “little” rather than “excess” as were the slight majority beforehand.

Pre- and Post-Evaluation Means



Content Relevance: Online survey participants were given the opportunity to comment on their “most important agronomy concern for sugar beet and/or bean crops”. These responses ($N = 57$) were used to generate the figures below illustrating the significant concerns for the bean (left) and beet (right) industries. To summarize, white mold, yield, resistant weeds, and root rots were the top dry bean concerns; diseases, leaf spots, resistant weeds, sugar yield, and nematodes were the top sugar beet concerns. We were glad to see that the activities presented aligned well with industry concerns. This information will also be used to direct future extension programming efforts.



Concluding Remarks: The 2023 Bean & Beet Diagnostic Day was the first co-coordinated event delivering interactive diagnostic activities to these combined industries. The event was well attended by dry bean and sugar beet industry stakeholders, according to registration numbers and regions represented. The event content was well aligned with grower concerns and helped to increase attendee confidence in across all topics. Attendee participation was further noted to be higher than in a typical field day and comments from stakeholders following the event were positive. The coordinators feel that periodic integration of the diagnostic day event into dry bean and sugar beet extension programming is beneficial to educate participants, especially those new to the industry, in the diagnosis and management of current and emerging pest, disease, and agronomic concerns.

Event Details and Full Agenda

August 23, 2022

9 a.m. - 3 p.m.

Saginaw Valley Research and Extension Center
 3775 S. Reese Rd., Frankenmuth, MI 48734

8:30-9:00 AM	Registration, Check-In, and Refreshments
9:00-11:20 AM	Morning Tours
Session 1 (40 min)	Dry Bean Insects - Identification of common dry bean insects and damage. (Chris Difonzo & Scott Bales)
Session 2 (40 min)	Herbicide Injury - Diagnosing herbicide injury in dry bean and sugar beet. (Christy Sprague & Dennis Bischer)
Session 3 (40 min)	Nutrient and Fertility Concerns - Discussions of nitrogen management. (Kurt Steinke & Corey Guza)
11:30AM-12:30PM	Lunch Provided by Norm's Catering
12:40-3:00 PM	Afternoon Tours
Session 1 (40 min)	Weed ID When You're in a Hurry! - A brief introduction to the resources available to assist in weed identification. 20 minutes. (Erin Hill & Angela Tenney) Beet Cyst Nematode ID - Learn the basics of nematode identification and key characteristics of sugar beet cyst nematodes. 20 minutes. (Marisol Quintanilla)
Session 2 (40 min)	Spot the Spot, and Root out the Rot! - Learn to detect and diagnose major seedling, root, and foliar beet diseases of the region. (Linda Hanson & Jaime Willbur)
Session 3 (40 min)	Bean Diseases - Learn how to recognize and manage common bacterial and fungal diseases and discuss Sporecaster app. (Marty Chilvers, Scott Bales, Jill Check, Madison Whyte, Molly Irvin)
3:00-3:30 PM	Concluding Remarks & Ice Cream Social - Cream & Sugar Ice Cream Company

Acknowledgements: We thank the Michigan dry bean and sugar beet industries for supporting and participating in this event. Funding support provided by MSU Project GREEN Extension. This work was further collaboratively organized and supported by the MSU AgBioResearch and Extension programs, MSU ANR Event Services, Michigan Sugar Company, Michigan Dry Bean Commission, and USDA-ARS.