

Final Report for: 2023 High-Management Testing of Michigan Wheat Varieties

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Project goals and value for Michigan Wheat Growers

Variation for response to high-management production potentially exists among wheat varieties adapted to Michigan wheat growing environments. Some varieties may reach higher yields in response to management inputs. Conducting variety trials under high management practices that involve applications of higher nitrogen levels and multiple fungicides will identify varieties demonstrating a higher yield response to intensive management practices. Planting varieties that respond optimally to management will generate a high return on investment for Michigan wheat growers.

Results of Project

A split-plot design was used to evaluate variety by management interactions and identify varieties that respond optimally to management inputs. Management practice was the whole plot level treatment and variety the sub-plot treatment.

Conventional management consisted of pre-plant fertilizer applied (300 lbs. 13-8-24 +7% S + 0.83% Zn + 0.47% Mn + 0.13% Cu +0.13% B) and seeding rates calibrated to 1.8 million seeds per acre. At Feekes 4, 90 lbs. of Nitrogen was applied using an Orbital Air Gandy unit. Weed control was done at Feekes 5-6 with Affinity BroadSpec at 8 oz per acre and a Non- Ionic Surfactant at 0.25%.

The high-management treatments received the following additional 3 applications:

1. At Feekes 6-7, 30 lbs. of nitrogen will be applied in the form of 28% liquid nitrogen using raindrop nozzles.
2. Quilt Excel fungicide was tank mixed with herbicide and applied at Feekes 9 with TeeJet Turbo TwinJet Flat Spray Tips using 12 oz. of product and 15 gallons per acre.
3. Prosaro fungicide applied when approximately one third of all varieties have reached Feekes 10.5.1 applied with 12 oz. of product and 15 gallons per acre with Non-Ionic Surfactant at 0.25%.

In 2023, 105 commercial and experimental lines were tested. Plots were harvested with a Wintersteiger Quantum research plot combine equipped with a Harvest Master H2 on board weigh system to obtain yield, moisture and test weight. Plots were evaluated for lodging, but there was virtually no lodging to record. Data was published in the MSU Wheat State Performance Report (<https://varietytrials.msu.edu/wheat/>).

Partial budget analysis was used to determine the responsive varieties. For each variety, the conventional management treatment yield was subtracted from the high management yield to obtain the bushel per acre advantage of the extra management. The analysis shows that the cost per acre of the extra three passes is \$74.12. At a wheat price of \$6.50 per bushel, that is a breakeven yield of 11.4 bushels per acre (Table 1). Variety responses to the high management ranged from -5.8 to 27.9 bushels per acre at the Tuscola SYT location and -10.3 to 22.6 bushels per acre at the Isabella SYT location.

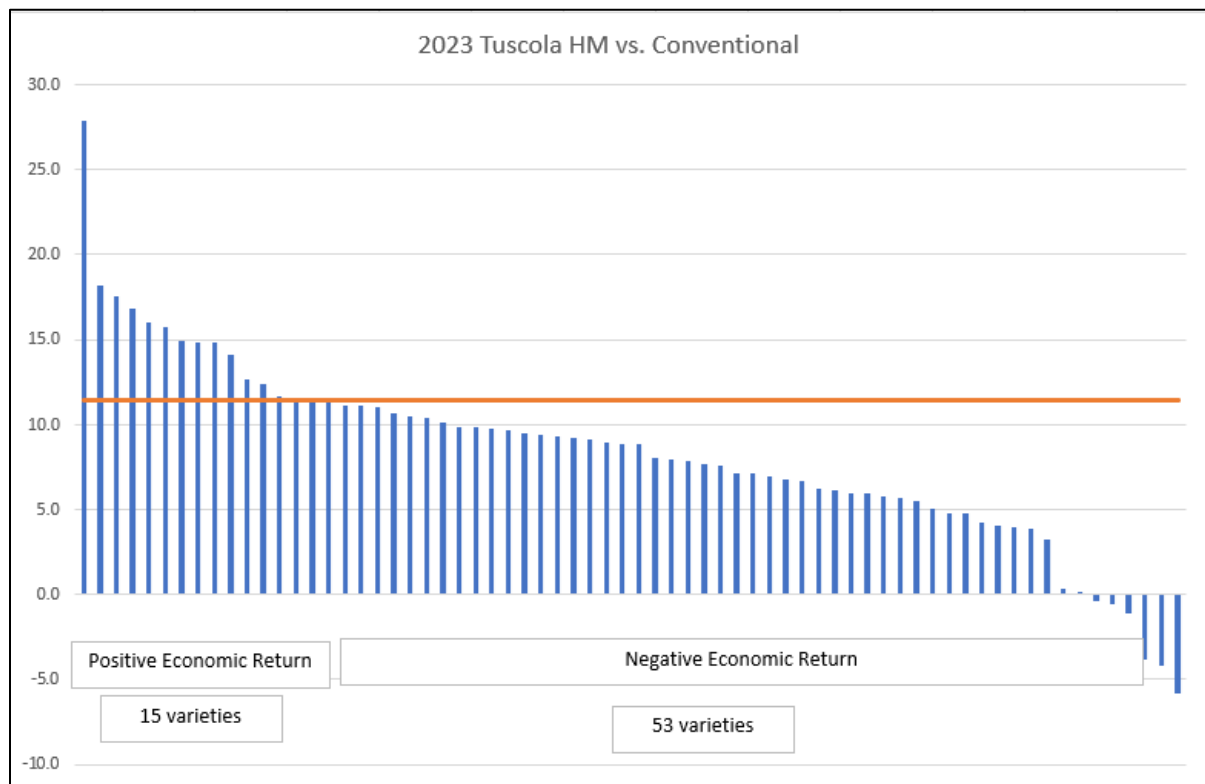
Table 1. High management costs determined per acre.

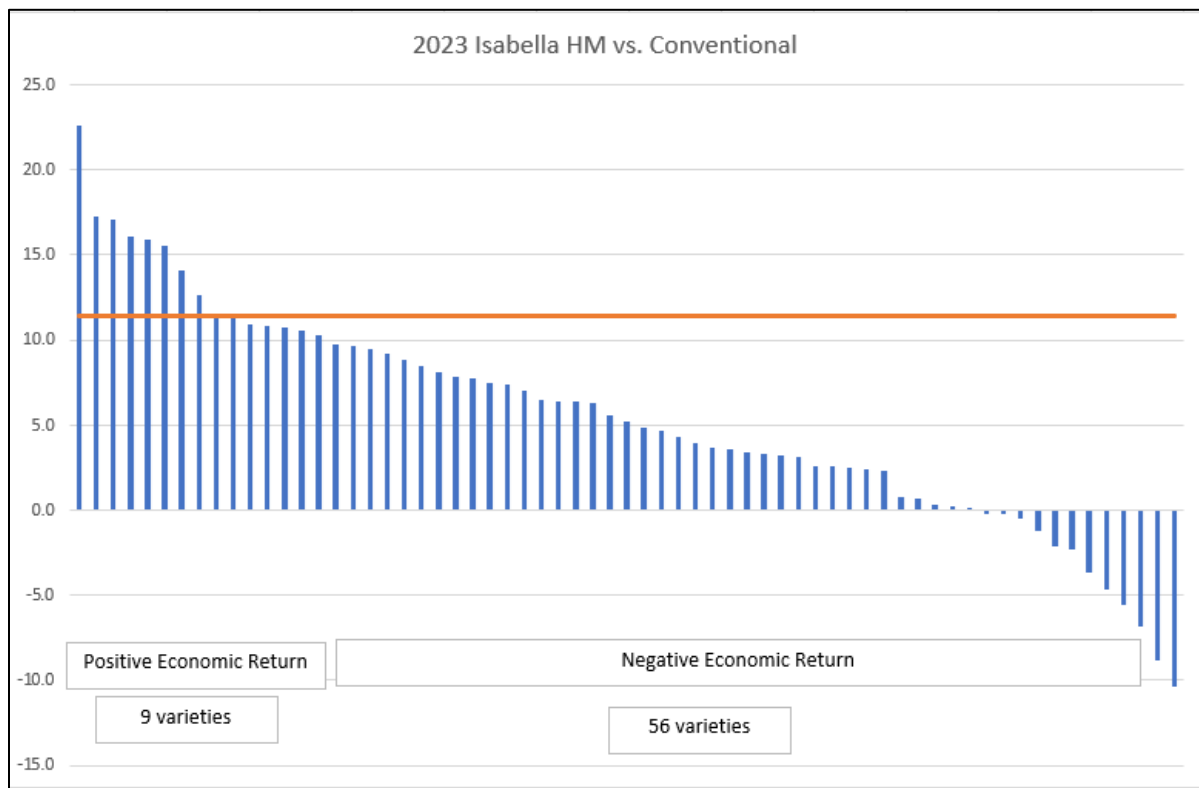
PRODUCT	RATE	COSTS	
28%	@ 30 lbs. N per acre (50¢)	\$12.87	per acre
Quilt Excel	@ 12 oz. per acre	\$20.63	per acre
Prosaro + NIS	@ 8.0 oz. per acre + 0.25%	\$20.05	per acre
AMS	@ 20# Sulfur per acre	\$12.57	per acre
Custom Spraying	per acre	\$8.00	per acre

Total	\$74.12
Wheat price (\$/bu)	\$6.50
Breakeven bushels	11.4

There were 15 and 9 varieties at the Tuscola and Isabella locations, respectively, that showed a positive economic response above the breakeven yield advantage of 11.4 bushels per acre. See Figure 1 and 2 for details.

Figure 1 and 2. Charts showing the yield response of varieties entered in the 2023 MSU Wheat State Performance Trials at the Tuscola and Isabella locations. Each bar represents one variety. The size of the bar represents the yield advantage of that variety with high management compared to the conventional management yield.





One Paragraph Summary of Project: Wheat will respond to higher levels of management. Additions of fungicide and split nitrogen application is being used on farms to increase wheat yields. When utilizing these high management practices, make sure the genetics (varieties) will respond to the higher level of management. Not all varieties respond the same each year.

Recommendations from Project: This research shows that when farmers are making decisions about how to manage their wheat in terms of adding extra inputs, they must figure variety selection into the equation. Some farmers try adding a split of nitrogen or a fungicide in one year or two and have reported variable responses. Some of the variability is likely due to variability in variety response. Farmers wanting to push their wheat for higher yields need to select varieties on the left side of the chart where they are responsive.

Future work: It is important to note that continuing this work every year is important as varieties are turning over more and more quickly. It is rare for varieties to remain in these trials for more than 3 years. As new varieties are released, they need to be tested for their response to management.

Project Changes

None

Budget narrative:

"On target."

Intellectual property

No intellectual property was created in this research project.

Approach to Disseminate Research

Data from these trials will be presented at several winter meetings including the MSU Field Crops Team IPM meetings, Agribusiness Update and the Great Lakes Crop Summit. Data is also published in the MSU State Performance Trials for 2023 (<https://varietytrials.msu.edu/wheat/>).

Please Indicate which Month is appropriate and that you are able to provide an article with photos, graphs, charts other graphics for publication in the Michigan Wheat e-newsletter and for release through wheat and other media channels. What is your timeline and source for getting information to growers.

August would be a good month to post this as farmers are selecting varieties then.