

FINAL PERFORMANCE REPORT

The completed Final Performance Report will be posted to the AMS website.

FINAL PROJECT REPORT TEMPLATE

Final Performance Reports must illustrate the completion of the project within the grant agreement.

PROJECT INFORMATION

Project Title	Evaluation of Cereal Rye Varieties for the Michigan Craft Distilling Industry – year 1			
Recipient Organization Name:	Michigan State University			
Period of Performance:	Start Date:	4/1/2020	End Date:	7/31/2021
Recipient's Project Contact				
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PERFORMANCE NARRATIVE

PROJECT BACKGROUND

Provide enough information for the reader to understand the importance or context of the project. This section may draw from the background and justification contained in the approved project proposal.

A 2017 survey conducted by the Michigan Craft Distillers Association (60% response rate) found that the responding businesses purchased over 1.3 million pounds of grain (corn, barley, rye, etc.) from Michigan farmers. This conservative estimate combined with the expectation of further growth in the industry will likely result in significantly larger amounts of grain purchases in the future. Rye is primarily used as a raw ingredient in spirits and beer, making it a very accessible grain to source locally; the distillery or brewery can purchase it directly from a farm as long as it's been appropriately dried and cleaned. Thus, craft beverage artists and farmers alike are interested in what varieties are best suited to produce high yields of quality grain for local and regional use. Rye is commonly used as a cover crop by Michigan's farmers, and variety selection is based on performance as a cover crop more so than grain quality. Thus, we know little about the grain quality of common or improved rye varieties as it relates to distilling, brewing, or food purposes. Agronomic survey data on rye is limited. Information on grain quality, spirit yield, and flavor of named rye varieties would be of great value to distillers and farmers, and potential for a direct connection between distillers and farmers would allow for rapid adoption of varieties of interest.

ACTIVITIES PERFORMED

Address the below sections as they relate to the entire project's period of performance.

OBJECTIVES

Provide the approved project's objectives from your approved proposal/grant agreement.

#	Objective	Completed?	
		Yes	No*
1	Conduct replicated variety trials with 15 varieties at three locations in Michigan.	X	
2	Evaluate the effects of plant growth regulators on lodging, yield and grain quality of the studied rye varieties.	X	
3	Evaluate the prevalence of Fusarium head scab and leaf diseases across different varieties, and the efficacy of a fungicide to reduce its severity.	X	
4	Produce 500 pounds of six contrasting varieties of rye for batch spirit production and evaluation at American Fifth Spirits and Mammoth Distilling.	X	

*If no is selected for any of the listed objectives, you must expand upon this in the challenges and lessons learned sections.

ACCOMPLISHMENTS

List your accomplishments for the project's period of performance, including the impact they had on the project's beneficiaries, and indicate how these accomplishments assist in the fulfillment of your project's objective(s), outcome(s), and/or indicator(s).

#	Accomplishment or Impact	Relevance to Objective, Outcome, and/or Indicator
1	Planted, managed and harvested variety trials including 15 varieties at three locations.	This was a crucial part of our project for the generation and acquisition data. This relates to Objective 1 and was completed.
2	Evaluated varieties from each location for grain quality, spirit yield and sensory characteristics (4-VG)	This was crucial to Objective 1, in that evaluating varieties included both agronomic and grain quality data.
3	Implemented plant growth regulator and fungicide treatments at two locations	These treatments were crucial to obtaining data relative to Objectives 2 and 3.
4	Collected in field data on phenology and plant characteristics.	These data points (such as height, lodging, vigor and disease ratings) were critical to completing Objectives 1 - 3.
5	Planted, managed and harvested bulk quantities of seven different varieties of rye	This activity was crucial to completing Objective 4. Six varieties were grown in bulk. Three from Chatham and three from Hickory Corners were cleaned by Emergent Malt and the first distillation completed by Michigrain Distillery.

#	Accomplishment or Impact	Relevance to Objective, Outcome, and/or Indicator
		Final distillation and barreling is in process at the MSU Fermented Beverage Lab (continued evaluation is on-going).
5	Project information was disseminated in a publication with agronomic results for two locations	MSU Cereal Rye Variety Trials – 2020 Results was published on-line (27 web views) This publication was one major product for dissemination of results. See Additional Information for link to publication
6	Completed videos with commentary in plots in Hickory Corners and Chatham. Held on-line Small Grains for Distilling Happy Hours to disseminate results. The project was presented during the 2020 MI Ag Ideas to Grow With virtual conference.	Due to COVID-19, in person meetings were not allowed. Thus, collecting videos and images is important to help us disseminate results through multiple on-line and virtual formats. Eighteen virtual meetings titled Small Grains for Brewing and Distilling Happy Hour (Averaging 15 live participants per meeting and 510 total web views) were implemented providing a forum to present and discuss this and other industry related information. One featured the Rye Trial at MSU (9 live participants, 52 web views) and another Rye Research at the University of Minnesota and North Dakota State University (22 live participants, 9 web views). The project was presented at the 2020 MI Ag Ideas to Grow with virtual conference (52 participants). See Additional Information for links to videos.
7	Developed new relationships with industry.	We continue to develop relationships with craft distillers, maltsters and farmers in Michigan and throughout the broader region. Baas, DeDecker, Hamilton and Wilke have all been involved in different relationship development. A new relationship for grain cleaning was formed with Emergent Malt. A distilling relationship was developed between MSU and Michigrain Distillery.

CHALLENGES AND DEVELOPMENTS

Provide any challenges to the completion of your project or any positive developments outside of the project's original intent that you experienced during this project. Also, provide the corrective actions you took to address these issues. If you did not attain an approved objective(s), outcome(s), and/or indicator(s), provide an explanation in the Corrective Actions column.

#	Challenge or Development	Corrective Action or Project Change
1	COVID-19 restricted in-person meeting for the dissemination of results from this project.	The project team pivoted to on-line meetings and conferences to successfully reach our stakeholders including farmers, maltsters, brewers and distillers.

#	Challenge or Development	Corrective Action or Project Change
2	Originally American Fifth Spirits and Mammoth Distilling agreed to distill the bulk grains, but due to scale issues were unable to participate.	Michigrain Distillery and the MSU Fermented Beverage Lab were identified to implement the distillation of the bulk grain samples.
3		
4		

LESSONS LEARNED

Provide recommendations or advice that others may use to improve their performance in implementing similar projects.

Overall this has been a very successful project, which has partially been a result of the great collaborators, including both scientists at MSU, grain quality labs (including Hartwick College) and industry representatives. The trials were able to be conducted at multiple locations because of great cooperation from multiple MSU investigators. We were able to identify varieties of interest and conduct distilling at scale based on collaborations with industry. Furthermore, making connections more broadly (i.e., Minnesota and North Dakota connections) allowed us to evaluate our results in the context of the larger region we are in.

The only component that we wish we would have done differently is to grow the same varieties of rye in bulk at two locations, which we did in small plots but not in large batches for commercial scale analysis. This comparison would have allowed us to better evaluate the genetic x environment effect on flavor characteristics of the rye and is of interest for a subsequent project.

CONTINUATION AND DISSEMINATION OF RESULTS (IF APPLICABLE)

Describe your plans for continuing the project (sustainability; capacity building) and/or disseminating the project results.

The evaluation of cereal rye for the distilling industry is continuing through a year two grant funded by the Michigan Craft Beverage Council. Multi-year agronomic and quality data over varied climate conditions is essential for evaluating the performance of rye varieties. Data from this project will be combined with subsequent data and disseminated in future reports.

BENEFICIARIES

Number of project beneficiaries: 75

ADDITIONAL INFORMATION

Provide additional information available (i.e., publications, websites, photographs) that is not applicable to any of the prior sections.

MSU CEREAL RYE VARIETY TRIALS – 2020 RESULTS publication available at https://www.canr.msu.edu/malting_barley/uploads/files/2021-02-10%20MSU%20Rye%20Variety%20Pub%20.pdf.

Meeting 2 - Grains for Brewing & Distilling Virtual Happy Hour – Rye Trials at MSU available at <https://www.youtube.com/watch?v=y1jVWozkJc>.

Meeting 13 - Grains for Brewing and Distilling Virtual Happy Hour – Rye Research at U of MN and NDSU available at <https://www.youtube.com/watch?v=LBpA-jCwt5E&t=1789s>.

Complete Grains for Brewing & Distilling Virtual Happy Hours YouTube Playlist available at https://www.youtube.com/playlist?list=PLb6YqAv-gsO_ppm1D1ZHY35JKkLkISgOC.

MI Ag Ideas to Grow With Virtual Conference – Sustainability Session - Barley and Rye for the Brewing and Distilling Industries available at <https://www.canr.msu.edu/miagideas/Schedule/sustainability>.

The Authorized Individual must sign this statement after the applicable report form is completed.

I certify that the statements and information contained in these documents are true, accurate, and complete.

Signature of Responsible Official:

Date:



08/13/21