

2015 GENOTYPE FIELD TRIALS

In early 2015, a grant was awarded to researchers at the John Innes Centre (JIC) in Norwich, UK, to support a partnership between their research facility and malting barley researchers in eastern US and Canada. This partnership developed out of visits by UK partners to Michigan research plots in the summer of 2014. The JIC researchers are exploring heritage barley lines for new malt flavors and potential Fusarium head blight (FHB) resistance – a disease that poses a great challenge to upper Midwest barley production. The grant, awarded by the Biotechnology and Biological Sciences Research Council, provides funding for research trials and a barley symposium in Norwich June 2016. Other partners include researchers from; Penn State, Cornell, Agri-Food Canada (Prince Edward Island), Virginia Tech, and Deer Creek Malting in Pennsylvania.

Eastern North America is the focus for this work because of the emerging malting barley and malt industries in those regions. In recent years, those industries have been primarily in the western states, and so too have the variety breeding programs. Now, as interest increases in the east, farmers and maltsters are finding it difficult to identify varieties that are well suited to a less arid climate. Reviving some of these heritage barley lines, naturally adapted for the UK climate, may serve as a useful tool as more adaptable varieties are developed domestically. Another area of research to be examined is the soil health implications of malting barley cultivation – primarily as it relates to the barley’s ability to form beneficial associations with mycorrhizal fungi and soil bacteria – a research focus well-aligned with the MSU UPREC mission.

Six genotypes were grown out at UPREC for purposes of analyzing quality factors and increasing seed stock. They were selected from a cross with Chevallier, a popular barley from the Victorian period, for resistance to FHB.

Table 1. UK genotypes grown at UPREC (2015)

Variety	Seeding Rate (lbs./acre)	Height (in.)	Test Weight	Yield (bu/acre)
CXT 117	142	28.4	42.1	21.1
CXT 120	144	30.7	42.0	24.8
CXT 141	131	23.4	40.5	18.3
CXT 143	127	25.7	43.0	25.2
CXT 149	134	27.3	41.5	21.3
CXT 24	132	29.3	43.1	25.3

The trial was harvested on August 31, 2015 with a Hege 125b plot combine. Samples were collected and cleaned through a Clipper Eclipse fanning mill. Grain moisture and test weight were analyzed on a Dickey-John GAC 2500.

RESEARCH AT A GLANCE

PURPOSE:

Evaluate UK-based genotypes for potentially desirable traits.

TRIAL LOCATION:

Upper Peninsula Research and Extension Center, Chatham, MI

Soil type – well-drained
Eben Very Cobbly Sandy Loam

EXPERIMENTAL DESIGN:

Randomized complete block design, four replications

TRIAL NOTES:

- Planted May 14, 2015
- Plot size 3’ wide by 20’ long
- Borders and alleys trimmed to minimize edge effect
- 60 lbs. N fertilizer top-dressed after planting (urea 46-0-0)
- Huskie applied for weed control (13.5 oz./acre)
- Plot headed out week of July 20th, later than domestic varieties
- Plot harvested August 31 2015

Replicate samples were composited across each variety, and sent to North Dakota State University for grain quality analysis. Results are displayed in Table 2.



Figure 1. UPREC Crops Researcher, Christian Kapp, plants 6 UK malting barley varieties to assess varying levels of Fusarium head blight resistance

Table 2. Grain quality of UK genotypes grown at UPREC (2015)

Variety	NIR Protein	RVA	GE (72-hour)	% Plump	% Thin	DON
CXT 117	16.3	81	97	61.9	6.5	0.12
CXT 120	15.4	45	85	64.0	6.4	0.11
CXT 141	16.6	36	83	42.7	10.4	0.09
CXT 143	15.1	38	85	71.9	4.4	0.09
CXT 149	16.0	101	95	59.0	7.3	0.17
CXT 24	16.1	43	84	63.6	6.8	0.10

Overall, grain quality from this trial was poor. Varieties had too high protein, they were showing indication of sprout, and kernels were quite thin. Furthermore, the yields were about 50% of the average yield we see on conventional, modern varieties.

Nonetheless, DON, on average, was very low (under the 1 ppm threshold for food safety), even though the weather conditions throughout the season were conducive to Fusarium head blight infection and despite no fungicide treatment. The Chevallier line may in fact hold promise for FHB resistance, but continued breeding is required to ensure viability for yield and quality demands.

CONCLUSIONS

Yield and quality performance was low.

DON infection was low.

Continued research is needed to determine whether or not select UK heritage lines hold promise in modern malting barley breeding programs.

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Research and resources
can be found at:

[msue.anr.msu.edu/topic/
info/malting_barley](https://msue.anr.msu.edu/topic/info/malting_barley)