

GENETIC IMPROVEMENT OF CEREAL RYE: AGRONOMIC TRAITS AND END USE ATTRIBUTES

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OBJECTIVE

One of our objectives is to evaluate yield potential of several new cereal rye populations that we have developed in replicated grain yield plots. A second objective is to continue making improvements in our new populations by selecting for higher seed weight per spike and more tillers per plant. We are using dwarfing genes in some of our populations to reduce lodging. We have used speed breeding in cereal rye to improve intermating and genetic isolation.

METHODS & MATERIALS

Seed developed from our breeding program was used to plant four yield trials, using several hybrids (KWS Daniello, KWS Bono, KWS Brasetto) and open pollinating population varieties (Aroostook, Danko, Aventino, Wheeler) along with nearly 100 test populations. Four replications of plots (4 feet by 20 feet with 7 rows spaced at 6 inches) were used. Seeding rates were at the lower end of the recommended range. Plots were fertilized with a low to moderate level of nitrogen in early March (35 #N/ac.). Grain was harvested when all entries were mature. Lodging was not a serious problem during the 2022 production year.

RESULTS AND DISCUSSION

Grain yields were better than we have seen in Lexington in our yield trials, even with a low level of fertilization and a lighter seeding rate. Several of our new populations had yields that were not statistically different from the yield of hybrid cultivars. In one trial, KYSC1503C0 yielded 70 bu/A, more than the ~60 bu/A average for the three hybrid varieties and 58 bu/A for two open-pollinating varieties (Aroostook and Danko). We are very encouraged that some of our populations have shown competitive yields. Thirty populations were used for an additional round of selection for improved spike fertility, measured by seed weight per spike. We snapped 300 heads per population, weighted them, and keep the top 30%. Six populations were selected from spaced-planted nurseries for higher tiller number, low lodging, and shorter plant height. Two populations were intermated in isolation in the lab over the winter using LED grow lights and long daylengths in a test of speed breeding's potential use in rye.

CONCLUSION

Progress has been made in developing new, open-pollinated (OP) cereal rye varieties for use in Kentucky. Our goal is to produce OP populations that are competitive with hybrid varieties in yield and quality, especially when grown under average production input levels. Additional yield trials in multiple locations will be used to confirm this year's promising results.

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