2020 Results

Increase and Release: Working with Clements Ag Supply and Walnut Grove Farms, we grew approximately 50 acres increase of our most advanced wheat breeding line: KY07C-1145-94-12-5. Following data analysis and compilation, a proposal for the release of this line as Pembroke 2021 was presented to the Variety Release Committee in the Dept of Plant and Soil Sciences. The proposal was approved and forwarded to Dr. Houtz, the Director of the Kentucky Agricultural Experiment Station, who also approved the release. Pembroke 2021 was released exclusively to the Kentucky Small Grain Growers Association. Pembroke 2021 is a short-statured, mid-early, high yielding, high test weight, scab resistant soft red winter wheat. Unlike previous Pembroke releases, this variety is awnless. The genetically pure breeder seed that was used for variety increase was produced in Yuma. AZ in 2018.

Yield testing: Yields across our testing locations varied tremendously this year, based on the degree of damage caused by severe freezes on April 15 and May 9. The freeze was so bad in central KY that we did not harvest yield plots at Woodford county and Lexington. Schochoh was hard hit, though late maturing lines fared well and Princeton was the only location where the freeze damage was minimal. Test weight at both of these locations was excellent; the cool May temperatures were ideal for grain fill. The only serious disease was Septoria leaf blotch; head scab was minimal, likely held in check by the low temperatures at and after flowering. At Princeton and to a lesser extent Schochoh, we were able to identify promising lines in terms of agronomic traits.

Crossing: We produced approximately 400 crosses in the greenhouse this season, both single cross hybrids between 2 parental lines and 3-way crosses in which we cross the hybrid with a third parent. We are planting the single cross hybrids in the greenhouse this fall for an additional round of crossing; the 3-parent F_1 hybrids will be planted in the field at Lexington this fall to produce F_2 seed. We will use genomic crossing software that predicts the most productive crosses to be made, based on genomic and field performance information about the parents. The majority of our crosses, though, will be made on the basis of field performance combined with information about which disease resistance genes are present in which parents.

Line development: F$_4$ and F$_5$ headrows at Lexington were hit hard by the spring freeze but fortunately late tillers produced seed, so we were able to select rows in order to advance a generation. About 750 rows were selected based on the usual traits: height, clean leaves and heads, and overall vigor; it was difficult to assess maturity since we were relying on late tillers. These lines will go into an observation trial Lexington this fall. They will also be genotyped so we can use genomic predictions as well as apparent vigor, height, maturity and clean leaves to select the lines that go into replicated testing. We also had some very high yielding scab resistant lines in our Advanced, Max and Supermax tests; these have been advanced to the next stages in the testing system even though the number of locations from which we had test data was reduced due to the freezes.

Scab screening: Unfortunately, the scab nursery was planted somewhat early and was completely destroyed by the spring freezes. The unfortunate consequence was that we lost a year of screening data.

Speed Breeding: We acquired more high intensity LED lights this year and put them in the greenhouse to increase our speed-breeding effort. We will plant the lines that came out of the greenhouse in the field in the next two weeks and that will produce enough seed to go into yield testing the following year.

Genomic Selection: In 2020 we were forced to use our genomic prediction alogrithms to choose lines on the basis of genomic predictions since we only had good data from Princeton and just fair data from Schochoh. Basically, we treated the predicted yields as though they came from another location. We won't know how well this has worked until we see the outcome of the crop that will be planted over the next month.