

2023 Report to KSGGA
UK Wheat Breeding Project
Dave Van Sanford

2023 Results

Yield testing: 2023 turned out to be a record year for Kentucky wheat yields and we saw very high yields in the breeding program as well. In our breeding line trials, Schochoh, Princeton and Woodford Co. produced these average yields in bushels per acre: Schochoh: 88; Princeton: 99; Woodford: 104. . It is rare that yields in central KY will exceed those observed in the western part of the state, but this was also seen in farmers fields based on anecdotal information and in state yield contests. We have never had a set of trials with an average of 104 bushels/acre! Presented in Table 1 are data from the Max Test 2 averaged over Schochoh, Princeton and Woodford. The interesting thing about these lines is that they were initially selected in headrows in 2021 based on genomic predictions.

Table 1. Grain yield of wheat breeding lines in Max Test 2 averaged Over 3 locations, 2023.

Entry	Yield (bu/a)	Std. Error Yield (bu/a)
X16-1021-13-13-3-5	110.74	5.77
X16-1026-46-9-3-1	109.65	2.39
X16-1022-82-4-1-14	109.62	3.46
X16-1023-26-19-1-8	109.52	3.43
X16-1001-19-3-1-1	108.87	3.96
X16-1030-126-5-3-1	108.64	4.86
X16-1026-45-20-3-1	108.05	5.22
X16-1030-126-8-1-1	107.29	4.57
PIONEER 26R10	104.32	3.76
X16-1023-26-15-1-6	103.17	5.36
PEMBROKE 2021	102.83	5.58
X16-1030-123-17-1-1	101.48	2.27
X16-1030-123-2-3-1	100.87	3.60
X16-1023-86-4-5-1	99.40	3.14
X15-1085-57-3-5-13	98.03	5.14
X16-1021-13-19-1-7	97.40	3.85
X16-1023-25-11-1-1	97.17	3.28

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AMAX 438	96.64	3.61
X16-1008-42-10-3-1	96.11	4.90
X16-1021-84-8-5-1	96.07	3.50
X16-1021-13-17-5-10	93.93	6.51
X16-1016-36-11-3-1	93.37	4.51
TRUMAN	92.62	2.48
X16-1047-72-18-5-1	90.26	2.83
X16-1067-132-1-1-1	89.34	5.82
X16-1068-33-3-5-4	89.31	4.32
X16-1077-48-9-3-1	79.50	3.11
X16-1081-22-11-3-13	75.60	3.49

Data from our advanced trials is shown in Table 2. The lines in these tests were selected primarily on genomic information while they were in headrows in 2022. The yields in the Advanced Trials are encouraging, but we did not have enough seed to test at all locations, so we will have to see how robust this data is when we harvest the 2024 crop.

Table 2. Grain yield, heading date, height and test weight of wheat breeding lines in Advanced Trials tested at one or two locations, 2023.

YEAR	NAME	Yield (bu/a)	PERCENT LOCATION MEAN
2023	X17-1227-75-5-3-6	179.8	215.4
2023	X17-1078-4-20-1-4	131.3	125.8
2023	X17-1601-103-11-5-1	126.6	132.4
2023	X17-1673-29-10-1-10	126.5	121.1
2023	X17-1414-103-1-1-7	126.3	121.0
2023	X17-1413-42-2-5-1	124.1	116.2
2023	AMAX 438	123.1	147.4
2023	X17-1088-91-1-1-8	122.6	114.8
2023	X17-1085-16-15-3-3	122.3	117.1
2023	X17-1227-75-6-5-10	121.5	127.9
2023	X17-1227-75-6-5-10	121.5	127.9
2023	X17-1162-100-20-1-9	121.5	113.7
2023	X17-1640-114-17-5-4	120.8	115.7
2023	X17-1673-29-10-1-1	120.5	115.4
2023	X17-1273-71-19-3-5	120.2	143.9

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2023	X17-1640-114-17-5-7	119.9	114.8
2023	X17-1413-42-2-5-2	119.4	111.8
2023	X17-1651-3-20-3-10	118.8	142.2
2023	X17-1313-43-17-5-10	118.8	113.8
2023	X17-1674-24-14-5-2	118.6	139.9
2023	PEMBROKE 2021	117.8	112.9

Increase and New Release: The breeding line X11-0039-1-17-5 0039 has performed very well in the state yield trial over the past 3 years (Table 3). This line is being increased in 2023-24 for possible release as a Pembroke variety.

Table 3. Performance of Varieties and Breeding Lines in the KY Variety Trial 2021, 2022, and 2023. Averages based on 21 location years.

VARIETY	YIELD (BU/A)	TESTWT (LB/BU)	HEIGHT (IN)	HDATE (>APR.1)
USG 3352	98.1	60.9	36.0	32.3
X11-0039-1-17-5	97.8	60.3	35.0	31.4
GROWMARK FS 600	97.5	62.8	36.0	31.9
Dyna-Gro 9151	97.0	62.8	36.0	32.0
AgriMAXX 505	96.7	62.8	36.0	31.9
AgriMAXX 514	96.7	59.5	35.0	31.9
AgriMAXX 454	96.6	60.6	36.0	32.0
Dyna-Gro 9172	96.3	60.7	35.0	32.0
AgriMAXX 503	95.8	61.1	37.0	32.5
X11-0120-12-4-3	95.7	60.1	35.0	32.8
GROWMARK FS 623	95.6	61.1	37.0	32.5
USG 3472	95.5	60.7	35.0	32.0
AgriMAXX 513	95.5	61.9	35.0	31.0
GROWMARK FS 624	95.3	61.7	37.0	32.3
PEMBROKE 2021	95.2	61.5	35.0	30.7
AgriMAXX 516	95.0	60.5	34.0	32.0
Dyna-Gro 9120	95.0	62.4	35.0	30.7
Go Wheat 4059S	90.0	61.5	34.0	32.7
PEMBROKE 2016	87.5	60.5	34.0	30.8
Truman	83.2	61.1	41.0	37.3

Crossing: We produced approximately 420 crosses in the greenhouse during 2023, both single cross hybrids between 2 parental lines and 3-way crosses in which we cross the hybrid with a third parent. Specific crosses were chosen on the basis of genomic

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information, field performance, or very often both. Most of these F₁ hybrids were planted in single rows in the field this fall and some are also being vernalized to use in the greenhouse. Crossing will start in early December.

Line development: From F₄ headrows at Lexington in 2023 we selected about 700 rows to plant back in the Preliminary line test. These lines have just emerged in the field and we will receive genomic predictions on them in February/March. We will also evaluate vigor, height, maturity and clean leaves in the field next spring/summer, before making selections. The selected rows will be grown in tests at 1, 2 or 3 locations the following year depending on how much seed they produce.

Scab screening: We struggled again this year to get good scab symptoms in the scab nursery. Even though we had almost no visible kernel damage, we sent samples off to MN for DON testing and got results back that ranged from < 1 ppm to 23 ppm. Fortunately we have genomic predictions of scab resistance on most of our lines; we can use this information along actual DON data to build a profile of the different lines.