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G03-1521 Using Corn Hybrid Yield Data to Improve Selection of Rapidly Changing Hybrids

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Using Corn Hybrid Yield Data to Improve Selection of Rapidly Changing Hybrids

Choosing the proper hybrid can greatly enhance crop production profitability. This NebGuide illustrates how to use corn hybrid test data and adjust it to your farm when selecting seed.

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How often should you change hybrids? An Auburn University study compared the top corn hybrids from a 3-year regional trial (114 bushel average) with the top hybrids from the previous year's test (119 bushel average). Since the yields went from 114 to 119 bushels - a 5 bushel increase - using data from 11 locations and 8 years, should we expect twice that difference - a 10 bushel increase - with yields of 228 bushels per acre? If so, one might conclude that to maximize corn yield, hybrids must be constantly replaced.

Plant breeders are certain that genotype response is different in different environments. Grain producers need to be aware of that response to select the best hybrids for their farm. There are year-to-year differences also. The cost of seed of the best yielding hybrid and a lesser yielding hybrid often are nearly equal so the benefits derived from spending the time to choose the correct hybrid are pure profit.

The University of Nebraska Cooperative Extension hybrid testing program includes hybrids that farmer cooperators are growing on their farms as well as those chosen because they are widely grown in that area. These are termed "popular" or "widely grown" entries. Table I summarizes information from 13 irrigated corn tests in Nebraska in 2002. Column 1 lists the county where the trial was grown and the water management used. Column 2 lists the total number of popular and company hybrids that were compared and Column 3 gives the average yield of the popular entries. Column 4 gives the yield of the same number of top hybrids entered by seed companies in the test. This column, when averaged, showed a 14 bushel per acre advantage for the company over the popular hybrids. Perhaps this comparison is too severe since it includes all the popular hybrids and only the top company entries. If so, a comparison of Columns 5 and 6 offers a more conservative approach. Column 5 lists yields from the top popular hybrid. Column 6 shows the yield of the top company entry. This average is above the average of the top popular entries in Column 5 by five bushels per acre.

These numbers show how choosing the best adapted hybrid for your farm can create an opportunity for

improved yields. One reason for the yield advantages of company hybrids is that they are usually more recently developed than hybrids that were widely grown the previous year. Corn hybrids are improving at the rate of approximately one bushel per acre per year. This leaves an interesting dilemma in using yield data to select hybrids. Research indicates that data become more reliable as we add locations and years. Unfortunately, each year of data we add makes the hybrid that much further behind. Recently, there is more interest in using only two years of data from two or more locations each year when selecting hybrids. Corn germplasm is changing so rapidly that waiting for a third year of data can be costly.

Most producers plant more than one hybrid on their farm. This strategy offers many benefits. The first is from having genetic diversity. This increases the possibility of having the best hybrid for a given year. One method of obtaining diversity is to select hybrids from the top yielding group that differ in harvest moisture or other traits. Another advantage of growing several hybrids is that maturity dates can be spread. Growing hybrids with varying disease and insect resistance will help spread the risk and workload.

Data on corn hybrids are available from many sources. The University of Nebraska Corn Hybrid Tests report (EC-105) is a good starting place for choosing a new hybrid. This publication is updated annually and is available at local county Extension offices and on the World Wide Web at http://varietytest.unl.edu. This publication allows for fair comparisons of entries from many companies. Information presented includes yield, moisture, bushel weight, disease reaction when differences were noted, and other characteristics when available. These data are summarized over multiple locations and years. After identifying some superior hybrids from these tests, consult literature or representatives from those companies marketing them about their strengths and weaknesses. Once a new hybrid is chosen, we suggest that it be limited to less than 20 percent of your acres the first year. Acreages can be increased the second year if performance warrants it.

A number of characteristics have been mentioned regarding hybrid selection. Generally, yield is the first factor considered in choosing a new hybrid, followed closely by maturity. With corn, maturity will influence planting date and determine harvest date, harvest moisture, and the chances of getting caught with immature corn in case of an early frost. Other factors to consider are disease resistance, insect resistance, herbicide resistance, quality, and seed price.

Let's first examine the latest copy of the Nebraska Corn Hybrid Test EC-105. It includes:

- plot locations, problems, farmer entries;
- cooperators, soil types, planting, and harvest dates;
- average performance at each location;
- maps of test sites; and
- brands, seed company, and addresses.

Locate the tests in your area. For the purpose of illustration we will say you farm in south central Nebraska and the tests at Clay and Harlan counties best apply. See Table II. First look at the column with the average yields of the two locations. We list only the top 24 out of 64 entries in the test. Look at the difference required for significance (LSD), which in this test is less than or equal to 16 bushels (see next to last row). The Least Significant Difference (LSD) is listed at the 0.05 level. These values indicate how large a difference is needed to be confident that one variety is superior to another. Differences between varieties that are equal to or greater than the 0.05 LSD have only a 1 in 20 chance of being due to chance or error. By subtracting 16 bushels from the top yielding hybrid (236 bushels per acre), we get 220 bushels per acre. Highlight those hybrids with a yield from 220 to 236 bushels per acre. This is the high yielding group of hybrids. If possible, select hybrids from this group.

Our next step is to highlight the top yielding hybrids in both Clay and Harlan counties. For Clay, since the LSD is 19, we subtract 19 from the top yield, which is Kruger K-9114 BT at 260 bushels per acre. Highlight all those hybrids yielding from 241 to 260 bushels per acre. In Harlan County, we highlight those within 23 bushels of the highest yielding hybrid (213 bushels per acre) 213 - 23 = 190. See Table III. All of the highlighted hybrids within a column are not significantly different from the highest yielding hybrid given the variability inherent in our trials.

The next step is to assure that there is some diversity in the top-yielding hybrids. One method to assure this when selecting hybrids that yield comparably is to examine other hybrid characteristics such as moisture.

To highlight the various moisture groupings start with the lowest moisture since that is preferred and work up. The LSD is 0.9 percent for moisture. Our lowest moisture is 17.1. The moisture groupings in Table III, as indicated by the following colors, are: 1) 17.1 - 18.0 - Green; 2) 18.1 - 19.0 - Yellow; and 3) 19.1 - 20.0 - Pink.

Table III has been highlighted to show the moisture groupings. Of the high yielding group, two hybrids were in the lowest grain moisture group (green). To insure genetic diversity we would only grow one of these two since they yielded the same and had the same moisture content. Likewise, 18 of the top yielding hybrids were in the middle (yellow) moisture group. Again, we recommend growing only one of these to help insure genetic diversity. Continue using this logic until you have two to three new hybrids to grow next year. By selecting hybrids out of the various groups we can increase the probability of the hybrids being genetically different. Use information from seed comparisons on corn grower plots to supplement this process.

The next step is to examine last year's yields. As an example Table IV includes data for a hypothetical farm. Examine the hybrid test publication to see if any of the hybrids on "your farm" (Table IV) were included in the tests. Two are highlighted in Table V. We add the yields, moisture, broken stalks, and dropped ears from the NU test results in the adjusted columns.

To compare "your corn" yields and the yields in the NU tests we need to adjust the yield on "your farm". This is done in Table VI. For example, the yield in the NU test was 21 bushels higher for Hawkeye and 19 bushels higher for Kruger or 20 bushels higher on the average. Therefore, we will increase yields for your other hybrids by 20 bushels per acre to compare them. See Table VII.

We will also make adjustments for moisture, broken stalks, and dropped ears in the same way (Tables VI and VII). You are now ready to make your selection for next year. Compare your information directly to the yield trial information using the adjusted values. Remember to select hybrids with different characteristics to assure greater diversity. In this example, you might select BobWonder and Hawkeye. These are the two hybrids with the highest adjusted yields and there is a large difference in their adjusted moisture values. Record your hybrid selections in Table VIII.

Table I. Comparison of widely grown and farmer entries with top company corn entries in Nebraska in 2002 tests.

Trial Location	*Popular and Company Compared*	*All Popular Entries*	*Top Yielding Company Entries (same # as popular)*	*Highest Yielding Popular*	*Highest Yielding*
County	*Number*	*Yield*	*Yield*	*Entry*	*Entry*
		bu/A			
Furnas — Furrow Irrigated	13	210	242	240	257
Red Willow — Furrow Irrigated	11	241	256	258	277
Lincoln — Furrow Irrigated	4	261	282	277	285
Dundy — Pivot Irrigated	4	258	269	270	277
Dawson — Furrow Irrigated	13	178	185	206	198
Custer — Pivot Irrigated	13	220	229	241	237
Brown — Pivot Irrigated	10	233	238	247	246
Brown — Furrow Irrigated	10	198	202	213	218
Hamilton — Furrow Irrigated	8	248	258	266	261
York — Furrow Irrigated	21	225	244	259	266
Clay — Furrow Irrigated	10	242	254	257	260
Harlan — Furrow Irrigated	8	191	208	203	213
Pierce — Pivot Irrigated	5	204	226	223	233
Average		224	238	243	248

Table II. South Central Irrigated Corn Hybrid Tests, Clay and Harlan Counties in 2002.

		Yield					
Brand	*Hybrid*	*Average bu/A*	*Clay Co. bu/A*	*Harlan Co. bu/A*	*Grain Moisture %*	*Broken Stalk %*	*Dropped Ear %*
Hawkeye	SX70	236	258	213	18.5	0	0
Kaystar	KX-890 Bt	235	258	211	18.1	0	0
Fontanelle	5282	232	253	210	18.7	0	0
Kruger	K-9114 Bt	231	260	201	18.8	0	0
Pioneer	33P67*	230	257	203	19.5	1	0
Pfister	2656	229	250	208	18.0	0	0
Kaystar	KX-898	229	250	207	18.2	1	0
Pfister	2750	228	251	204	18.6	1	1
Den Besten	2212	227	253	201	18.6	0	1
Kruger	K-9114	226	244	207	18.1	0	0
Asgrow	RX889	225	251	198	19.7	1	0
Hawkeye	314 Bt	225	243	206	18.9	0	0
Renze	6363	224	249	198	18.3	0	0
Kruger	K-9313	221	238	203	19.1	1	0
Kruger	K9315 Bt	221	251	190	19.0	1	0
Kruger	K-9217 Bt	221	238	203	18.6	1	0
LG Seeds	LG 2606	221	246	196	18.3	0	0
Bo-Jac	5548	220	240	200	18.8	2	0
Kruger	K-9315B Bt	220	247	193	17.5	1	0
M/W Genetics	G 8122	220	250	190	19.1	1	0
Ottilie	5333	220	250	190	18.1	1	0
Pfister	2730	220	234	206	18.8	0	0
Ottilie	5250	219	255	183	18.3	1	0
Renze	8492 Bt	219	245	193	18.8	0	1
Avg All Entries		214	238	192	18.7	1	0
Dif. Req. for Sig. 5%		16	19	23	0.9	NS	NS
*Entered by UNL	Top Grouping	236-220					

Table III. South Central Irrigated Corn Hybrid Tests, Clay and Harlan Counties in 2002.

		Yield					
Brand	*Hybrid*	*Average bu/A*	*Clay Co. bu/A*	*Harlan Co. bu/A*	*Grain Moisture %*	*Broken Stalk %*	*Dropped Ear %*
Hawkeye	SX70	236	258	213	18.5	0	0
Kaystar	KX-890 Bt	235	258	211	18.1	0	0
Fontanelle	5282	232	253	210	18.7	0	0
Kruger	K-9114 Bt	231	260	201	18.8	0	0
Pioneer	33P67*	230	257	203	19.5	1	0
Pfister	2656	229	250	208	18.0	0	0
Kaystar	KX-898	229	250	207	18.2	1	0
Pfister	2750	228	251	204	18.6	1	1
Den Besten	2212	227	253	201	18.6	0	1
Kruger	K-9114	226	244	207	18.1	0	0
Asgrow	RX889	225	251	198	19.7	1	0
Hawkeye	314 Bt	225	243	206	18.9	0	0
Renze	6363	224	249	198	18.3	0	0
Kruger	K-9313	221	238	203	19.1	1	0
Kruger	K9315 Bt	221	251	190	19.0	1	0
Kruger	K-9217 Bt	221	238	203	18.6	1	0
LG Seeds	LG 2606	221	246	196	18.3	0	0
Bo-Jac	5548	220	240	200	18.8	2	0
Kruger	K-9315B Bt	220	247	193	17.5	1	0
M/W Genetics	G 8122	220	250	190	19.1	1	0
Ottilie	5333	220	250	190	18.1	1	0
Pfister	2730	220	234	206	18.8	0	0
Ottilie	5250	219	255	183	18.3	1	0
Renze	8492 Bt	219	245	193	18.8	0	1
Avg All Entries		214	238	192	18.7	1	0
Dif. Req. for Sig. 5%		16	19	23	0.9	NS	NS
*Entered by UNL.	Top Grouping	236-220	260-243	213-190			

Table IV. 2002 Corn yields — Your Farm, NE.

Brand	Hybrid	Acres	Yield (bu/A)	Adj. Yield	Moisture	Adj. Moisture	Broken Stalks (%)	Adj. Broken Stalks	Dropped Ears	Adj. Dropped Ears
LensSuperX	2999	400	175		21.5		0		0	
BobWonder	5880	250	230		15.6		2		2	
Hawkeye	SX70	250	215		20.0		1		1	
Winners	8970	50	215		15.0		1		6	
Kruger	K9313	50	202		20.7		2		1	

Table V. Common hybrids grown on "your farm" and in UNL trials. 2002 Corn yields — Your Farm, NE.

Brand	Hybrid	Acres	Yield (bu/A)	Adj. Yield	Moisture	Adj. Moisture	Broken Stalks (%)	Adj. Broken Stalks	Dropped Ears	Adj. Dropped Ears
LensSuperX	2999	400	175		21.5		0		0	
BobWonder	5880	250	230		15.6		2		2	
Hawkeye	SX70	250	215	236	20.0	18.5	1	0	1	0
Winners	8970	50	215		15.0		1		6	
Kruger	K9313	50	202	221	20.7	19.1	2	1	1	0

Table VI. 2002 Corn yields — Your Farm, NE....Adjustments for yield and other characteristics.

Brand	Hybrid	Acres	Yield (bu/A)	Adj. Yield	Moisture	Adj. Moisture	Broken Stalks (%)	Adj. Broken Stalks	Dropped Ears	Adj. Dropped Ears
LensSuperX	2999	400	175		21.5		0		0	
BobWonder	5880	250	230		15.6		2		2	
Hawkeye	SX70	250	215	236	20.0	18.5	1	0	1	
			+21		-1.5		-1		-1	0
Winners	8970	50	215		15.0		1		6	
Kruger	K9313	50	202	221	20.7	19.1	2	1	1	
			-19		-1.6		-1		-1	0
Adj. Factor				+20		-1.5		-1		-1

Table VII. 2002 Corn yields — Your Farm, NE.

Brand	Hybrid	Acres	Yield (bu/A)	Adj. Yield	Moisture	Adj. Moisture	Broken Stalks (%)	Adj. Broken Stalks	Dropped Ears	Adj. Dropped Ears
LensSuperX	2999	400	175	195	21.5	20.0	0	1	0	0
BobWonder	5880	250	230	250	15.6	14.1	2	2	2	1
Hawkeye	SX70	250	215	236	20.0	18.5	1	0	1	0
			+ 21							
Winners	8970	50	215	235	15.0	13.5	1	0	6	5
Kruger	K9313	50	202	221	20.7	19.1	2	1	1	0
			–19							
Adj. Factor				+20		-1.5		-1		-1

Table VIII. 2003 Corn hybrid list.

Brand	Hybrid	Acres	Notes

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