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Abstract

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Using Yield Trial Data to Make Variety Selections

By Jim Rouse, Department of Agronomy

Each year I receive several questions about how best to use yield trial data to make hybrid and variety selection decisions. This article will cover the most common issues that are discussed.

As always, variety selection is about much more than just yield. Growers also need to evaluate the various combinations of maturities, defensive traits and herbicide traits that are important to them. Even with all that, there is still a high priority on yield potential and it's easy to see why. The rest of the selection process is relatively easy—the candidates for selection either possess the desired trait or they don't. They are either within the desired maturity range or they're not. But among those that meet your desired criteria, how do you choose those with the greatest yield potential?

Use proper data reports

Remember, variety selection is not about identifying which lines did best over the past year—it is about predicting which lines will do best in the future. This is not dependent upon how you use data reports. Instead, it depends on the proper selection of data reports to use in the first place.

Predictive information for yield potential should come only from multi-environment trial averages. If your favorite data report does not include district or regional yield averages, you should not use it to make selection decisions.

Why are multi-location averages more predictive? Consider this: The data from a single location is a measure of the yields produced by the interactions of the varieties (genetics) with the environment (everything else). In these experiments, the environment is comprised of soil type(s), soil conditions, weather, nutrients, pests, pathogens, and any other factor that can impact the expression of genetic yield potential during that season. But the only factors that you can know for next season will be the soil type(s) where you plant and the varieties you choose. Because of this, you cannot expect the results from a single-location trial in one season to be duplicated in another season.

Be aware that varieties will perform differently at different locations, even when steps are taken to choose similar environments. In most yield trials researchers attempt to test in as many different environments as possible. If these data are not averaged across locations, how then does one evaluate the results?

Many people ignore this and continue to use other criteria to choose a single location from which to select. These criteria include, but are not limited to, the location that:

- Is closest to your farm
- Had the same heat units you had
- Had the same crop rotation you use
- Had the same tillage method you use
- Had the soil type most similar to yours

Remember that all of these criteria will interact in various unknown and unpredictable ways to impact the final data measurements in each field. Thus, for these results to be predictive, your field next year must experience conditions essentially identical to the yield trial field where the data were collected.

Since it is highly unlikely that next season's conditions will be the same as those in any single-location report, you will increase your probability of success by selecting a variety that can perform well in many environments. And you can identify these varieties only in test reports that display averages over locations.

Understanding the data

The most important aspect of reviewing data involves understanding the data that are provided. Use information like the least significant difference (LSD) to help you sort entries. Any entries that differ by less than the reported LSD for a trait (i.e. yield, maturity, disease rating, and pest resistance) should be considered equal for that trait. Measurements within a LSD could be due to a number of different factors, including measurement error or random chance. These differences are not considered to be significant and are not likely repeatable in your field.

Do not rely on summary tables or diagrams to determine if one variety is better or worse than another—look at the data. All data provided without LSD values should be considered unreliable and should not be used to make variety decisions. This point cannot be overstated: using test results without the accompanying statistics will lead to conclusions that are not supported by the test results.

Using the data

Now that you know how to evaluate reports, the next step is to sort through the data to make your selections. Variety selection is composed of two distinct but related components. The first is selecting high-yielding varieties for your operation. The second is risk management, as defined by the number of varieties you select, their mix of maturities, defensive traits, seed treatments, and their acreage allocation.

Even though the risk management aspect of variety selection can instill some variability in methodology, there are certain characteristics that should remain consistent among all users of yield trial data:

- 1) Only multiple-location data should be used to make predictive selection decisions.
- 2) Yield trials do not have to be performed on your farm, on your soil type, or even under your crop rotation scheme to provide relevant data.
- 3) Sort the data by yield. Make initial selections based on yield and appropriate maturity.
- 4) Once you have a pool of candidates, sort among these to identify lines that have the desired mix of defensive traits.
- 5) More information is better information, so use all reliable sources of data.

Because variety selection is a multi-step process the most effective approach will incorporate several sources of information. At Iowa State University, the most comprehensive source of information for corn and soybean yields and several defensive traits can be found at Iowa Crop Performance Testing at www.croptesting.iastate.edu.

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