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## A fresh view of variety selection

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# A fresh view of variety selection

## **Abstract**

Integrating soybean variety selection with soybean pest management strategies seems like a simple task. Many pest management strategies tout variety selection as a key component of pest management. Variety selection is not, however, quite as simple as "choosing the best one." Difficulty arises in identifying which data reports should be used. Using the proper information will allow you to make better variety selection decisions and improve your profitability.

## **Keywords**

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## **Disciplines**

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## A fresh view of variety selection

by *Jim Rouse, Department of Agronomy*

*The following article is an abridged version. The complete article is available as a PDF.*

Integrating soybean variety selection with soybean pest management strategies seems like a simple task. Many pest management strategies tout variety selection as a key component of pest management. Variety selection is not, however, quite as simple as "choosing the best one." Difficulty arises in identifying which data reports should be used. Using the proper information will allow you to make better variety selection decisions and improve your profitability.

No pest scouting and management techniques will increase the genetic yield potential of your soybean varieties. Instead, those practices allow varieties to perform more closely to their yield potential by reducing losses due to pests, pathogens, or various other environmental factors. The consequence is that selection of varieties with high yield potential is crucial to maximizing your return.

Variety selection is obviously about more than just yield, yet the decisions revolve around yield potential. Growers will not choose low-yielding varieties, no matter what level of pest resistance they may have.

But there is a catch, and this is where many researchers and ag professionals get tripped up:

**Variety selection is not about identifying which lines did best in the past year--it is about predicting which lines will do best in the future. So how do you evaluate which sources of data can provide predictive information and which cannot?**

The answer is simple: Predictive information should come only from multi-environment trial averages.

Without this, you have a lower probability of success because you are not incorporating all available data into your decisions.

The data collected from any 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 in this equation that you can know for next season will be the soil type(s) where you plant and the genetics you choose. Because of this, you cannot expect the results from a single-location trial in one season to be duplicated in another season.

If data are not averaged across locations, how then does one evaluate the results? If you want to select the best variety, from which location do you select? Many criteria could be used to choose the location upon which to base your soybean variety selection. These include, but are not limited to, the location that:

- Is nearest to you;
- Had the same rainfall or heat units you had;
- Had the soil type most similar to yours; and
- Had initial SCN counts closest 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. These varieties can be found in reports that display averages over locations and years.

## Understanding the data

To thoroughly review reports, you must first understand the data that are provided. The least significant difference (LSD) will help you evaluate entries. Any entries that differ by less than the reported LSD for a trait must be considered equal for that trait. Measurements within an LSD for any trait could be due to a number of different factors, including site selection, seed quality, measurement error, or random chance. These differences are not considered to be statistically significant and are not likely repeatable in your field under any circumstances.

The LSD is widely considered to be a measurement of the quality of an experiment. Lower values for an LSD give more statistically significant results and indicate higher quality experiments. An added benefit of multi-location reports is that they will almost always have lower LSD values than single-location data. When evaluating various sources of variety information, reports with lower LSD values should be given a higher priority than others.

Do not rely on incomplete summary tables or diagrams to determine if one variety is better or worse than another--look for all of the supporting information. All data provided without LSD values should be considered unreliable and should not be used. The risk is that viewing data without the accompanying statistics may lead to conclusions that are not supported by the experimental results.

## Using the data

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. If variety selection was just about finding the highest yield, it would be a simple task. It is the risk management element that makes variety selection difficult.

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) Sort the data by yield. Make initial selections based on yield and appropriate maturity.
- 3) Once you have a pool of candidates, sort among these to identify lines that have the desired mix of defensive traits.
- 4) 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 (ISU), the most comprehensive source of information for soybean yields and defensive traits can be found at [Iowa Crop Performance Tests](#). Supplemental data for SCN tolerance is found on ISU's [Nematology Lab site](#).

Additional SCN resistance ratings and assorted disease screening results can be found at the [Illinois Varietal Information Program for Soybeans](#).

Jim Rouse is a program manager with research and extension responsibilities in corn hybrid and soybean variety testing.

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