



Crop Production

A fresh view of variety selection

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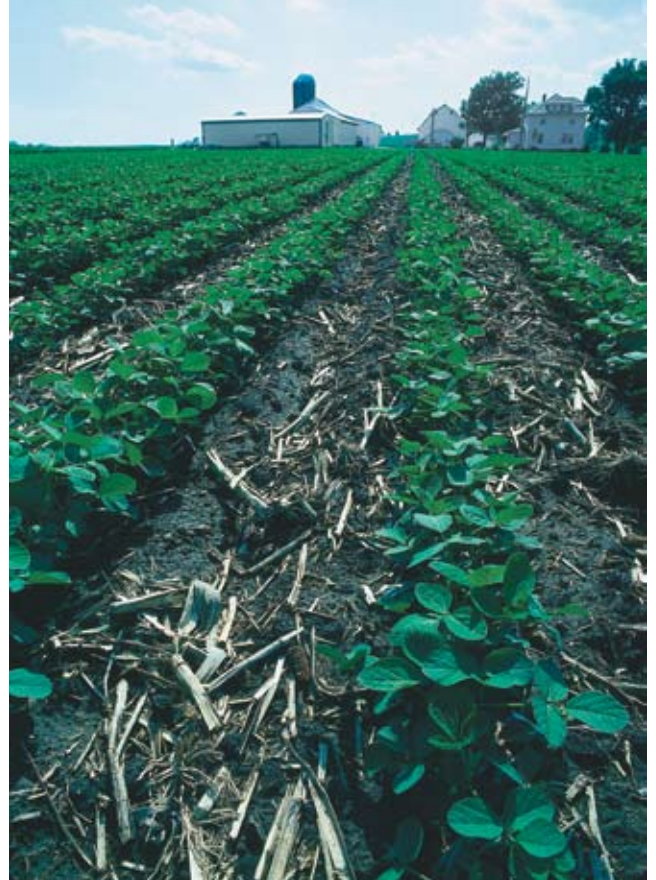
This article will demonstrate some of the ways in which soybean variety selection can be integrated into various soybean pest management strategies. It seems like a simple task since many pest management strategies tout the importance of variety selection as a key component of pest management. Variety selection is not, however, quite as simple as “choosing the best one.” The difficulty arises in identifying which sources of information should be used to make selection decisions.

When viewing reports, the data are simply “numbers.” It is up to each of us to convert the data into information. If we can then properly utilize this information, we have gained knowledge. Having done that, we can make better variety selection decisions and improve our profitability.

You already know that none of your pest scouting and management techniques can increase the genetic yield potential of your soybean varieties. Instead, those practices will allow varieties to perform more closely to their yield potential by minimizing or eliminating losses due to pests, pathogens, or various other environmental factors. The obvious implication of this principle is that selection of varieties with high yield potential is crucial to maximizing your return when growing soybeans.

Knowing this, and within the objective of this issue, it is fair to assume that variety selection is about more than just yield potential. At the same time, we must also acknowledge that variety selection revolves around yield. Growers will not knowingly select low-yielding varieties, even if they may have the best resistance to the current “pest-of-the-year.” Growers identify high-yielding varieties and then sort among those to find the various combinations of maturities and defensive traits that are important to them.

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 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 proper selection of which data reports to use in the first place. So how do you evaluate which sources of data can provide predictive information and which cannot?



(USDA, Natural Resources Conservation Service)

The answer is simple; the reasoning is a bit more complex. Predictive information, primarily for yield estimates, should come only from multi-environment trial averages. If your favorite data report does not include district or regional averages on your criteria of interest, you have a lower probability of success because you are not incorporating all available data into your 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 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.

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? 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;
- Is closest to your latitude;
- Had the same rainfall you had;
- 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;
- Had the same soybean disease problems you had;
- Had initial SCN counts closest to yours;
- Had the SCN HG type that is 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

The most important aspect of reviewing reports involves understanding the data that are provided. Use information like the least significant difference (LSD) to help you sort through entries. Any entries that differ by less than the reported LSD for a trait (i.e., yield, maturity, disease rating, and pest resistance) 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. In an experiment, these differences are not considered to be 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 to make soybean variety decisions or to help manage pest complexes. 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

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. If variety selection was just about finding the highest yield, it would be a simple task—use district summaries to identify the top varieties. It is the risk management element that makes variety selection difficult. Growers will use yield trial data in different ways to reach their appropriate combination of varieties, maturities, defensive traits, etc.

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 (ISU), the most comprehensive source of information for soybean yields and several defensive traits can be found at Iowa Crop Performance Testing at www.croptesting.iastate.edu. Supplemental data regarding SCN tolerance is found on ISU's Nematology Lab site at www.plantpath.iastate.edu/dept/labs/tylka. Additional SCN resistance ratings and assorted soybean disease screening results can be found at the Illinois Varietal Information Program for Soybeans at <http://web.aces.uiuc.edu/VIPS/v2home/vips2home.cfm?b=y>.

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