

Site-Specific Management Guidelines

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The Pioneer Split-Planter Comparison Method

Summary

- The Pioneer Split-Planter Comparison Method is a simple, low-cost technique for making treatment evaluations using a global positioning system (GPS)-equipped yield monitor in whole fields.
- Comparisons can be made between two hybrids, varieties, or agronomic treatments applied in alternating strips throughout a field.
- Careful attention to products or practices tested, harvest direction in sloping fields, and accurate load designation will help insure meaningful results.
- Pooling results from similar comparisons made at multiple locations is much preferred to relying on single-location results.
- The ability to bring a yield difference map into a geographic information system (GIS) and overlay it with other spatial data layers will greatly increase the value of the map as a crop management tool.

The Pioneer Split-Planter Comparison Method is a precision farming tool that compares two products or practices across an entire field. This Guideline describes procedures for designing, establishing and harvesting split-planter comparisons and for creating yield difference maps.

Designing Split-Planter Comparisons

The split-planter comparison method can be used to evaluate two agronomic treatments in parallel strips. Some common examples of comparisons include:

- Two hybrids or varieties
- Two hybrids or varieties with differential resistance to an insect or disease pest
- Two seeding rate strategies or seed treatments
- Two different ground speeds in alternating planter passes
- Two fertilizer treatments, such as starter vs no-starter, or variable-rate vs a uniform fertilizer rate
- Two tillage treatments if tillage and harvest equipment widths are compatible
- Two pesticide treatments or herbicide resistance traits

If the hybrids or varieties tested differ by at least 5 days relative maturity, 5 percent grain moisture content at harvest, or 5 lb/bu test weight, two yield monitor calibrations may be necessary.

Establishing a Split-Planter Comparison

Establishing a split-planter comparison may be as simple as placing a different seed product in each half of the planter. Planting the field normally then results in pairs of adjacent hybrid strips across the whole field.

The two hybrids or varieties should be assigned to the right and left halves of the planter. Take care to insure that seeding rates and planter adjustments are appropriate to achieve the same stand of each hybrid or variety on both sides of the planter. Care must be taken to avoid switching the products each time the planter boxes are filled. In addition, accurate records must be kept of where all products were planted.

Harvesting Split-Planter Comparisons

For best results, the width of the combine harvest header should be exactly one-half the planter width. Data from a split-planter comparison should be collected with a yield monitor equipped with a differentially-corrected GPS receiver. Use of a well-calibrated weigh wagon or certified scale is recommended to help assure proper yield monitor calibration.

Grain harvested from each hybrid (or treatment) strip must be identified as a specific “load” on the yield monitor. On the AgLeader and Case AFS monitors, this can be done by designating a new load when entering each new strip or by switching back and forth between Load 1 for Hybrid A and Load 2 for Hybrid B, for example. On the GreenStar monitor, hybrid or treatment changes can also be identified by toggling between pre-assigned “Variety” labels using the display keypad. A detailed planting map or plot plan in the combine cab will also help the combine operator identify all harvest passes correctly. Mislabeled loads are of no value! When possible, the adjacent strips of the two hybrids or treatments should be harvested while traveling in the same direction, particularly in sloping fields. Yield data should be collected every one second if possible.

Creating a Yield Difference Map

There are several software systems that can be used to create a yield difference map. These include the The Split-Planter Comparison Tool from Agris Corp., Soil Rx from Red Hen Systems, Inc., SSToolbox from the SST Development Group, Inc., or any fully functional GIS. The **first step** in the process is to create a separate yield map for each hybrid as if it were planted across the entire field. One initial precautionary step is to inspect the yield data file and search for “outliers”. These are points that reflect erroneous yield values, or which have latitude and longitude coordinates located outside of the field boundaries. If any “clean-up” of the data is needed, it should be done before any data manipulations are made.

The **second step** is overlaying the two maps and then calculating the yield difference over the entire field. The analysis process involves looking at the data for each hybrid separately and rasterizing a yield grid for each. Rasterizing is an operation that converts point data to grid cell values. Typically, a 50 x 50 foot grid is used. By converting the data to a raster format, mathematical comparisons or operations between two or more layers can be performed. When the comparison process begins, an analysis window moves around the grid. For each grid cell location, the average yield values of the two hybrids are compared, and the resulting difference value is assigned to the corresponding grid cell on the difference

map. The result is a map of yield difference values that represent yield advantage trends across the field.

When comparing gridded data, it is possible for some yield differences to “look” significant when there may be no true difference. A simple precaution to minimize this potential problem is to place more weight on large-scale trends or yield difference regions, and much less weight on small, point features that are not explainable based on other site features. In general, yield differences below 5 bu/A for corn and 2 bu/A for soybeans are probably not “significant”.

Interpreting the Yield Difference Map

As with regular yield maps, difference maps often generate many new questions. The challenge is to correlate yield difference patterns on the map with specific environmental or field conditions that had the most direct effects on crop yield. These will vary from field to field and year to year and include such factors as climate, soil type, slope, aspect, and soil nutrient status. Ideally, the features that cause different yield performance between the two hybrids or treatments will be consistent from year to year. If so, the grower may decide to switch to a different hybrid or practice in future seasons based on the yield difference map.

Another scenario might be to plant more than one hybrid/variety within a spatially variable field. For example, the grower may decide to plant a drought-resistant hybrid only in the moisture-stressed portions of a field, and a different hybrid in the higher-yielding portions of the field to increase overall field productivity.

The ability to bring a yield difference map into a GIS and overlay it with other spatial data layers will greatly increase the value of the map as a crop management tool. In addition, a GIS allows the user to explore the data more completely and generate new information. These spatial queries could include evaluation of profit, yield variability, and yield stability within a field. Evaluating yield difference maps of the same or similar treatment comparisons over several years and/or locations will also increase the level of confidence in management changes based on yield difference maps. ■

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