

## **ON FARM TRIALS USING PRECISION AG IN NORTHEAST LOUISIANA**

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### **ABSTRACT**

The availability of yield monitors and precision application equipment on producers' farms have made it much easier for researchers to take the results from experiment station trials and apply them to producers' fields. Treatments/methods are applied in strips, by prescription, embedded plots or in combination. Fields are divided into zones for analyzing the harvest yield data. These can include soil type, soil Ec, or other criteria. Treatments are analyzed spatially across zones and as whole strips. This process shows how treatments/methods perform in different parts of producers' fields. The process of applying treatments and collecting the resulting data is a technical process which requires planning and attention to detail to achieve a viable experiment/demonstration. The end product is a large field size experiment which lets researchers continue evaluating products/methods while educating producers in the use of precision ag equipment for the betterment of their farms.

Since 2006, LSU AgCenter Researchers and Geospatial Extension Agents have been conducting on-farm research trials/demonstrations working with various treatments. These treatments have included variety performance, nematicide treatments, and nitrogen fertility rates. The majority of their work has been with cotton and corn in Northeast Louisiana. The results from these trials have assisted producers with decisions about how these treatments will perform on their farms. Producers have benefited from participating in these trials/demonstrations not only from the information they receive but from learning how to gain the most from the precision ag equipment they have.

**Keywords:** Precision Agriculture, On-Farm Cotton Trials, Yield Monitors,

## PRESENTATION SUMMARY

The availability of cotton picker yield monitors on farms has allowed research scientists and extension agents to take the results from experiment station trials and move them to producers' farms. Cotton seed has become a major investment for producers, varieties have a short shelf-life and new technologies change rapidly. These factors represent a purpose for working with producers in on-farm trials. Some of the goals presented to cooperating producers are: Variety x Soil Type, Variety Stability, PGR Management, Variety x irrigation, and Pest Management.

There are several considerations which must be taken into account when considering on-farm cotton trials. The first consideration is the trial plan. What are the treatments, goals, applications going to be and how will harvest be handled. The first step after developing a trial plan is to find a cooperating producer with the right type of field location. The field location can vary according to the treatments and goals of the trial plan. The next step concerns the equipment the cooperating producer has. What planting and application equipment (how many rows wide), harvest equipment (how does it match up to the planter and application equipment), does the producer have? The main factor is that the cotton picker must have a yield monitor to be able to break yield down by different factors in the field. The next consideration is the layout of the actual trial in a producer's field. If different soil or Electrical conductivity (Ec) zones are being used for analysis, the trial needs to cross all zones significantly to be able to return viable results. Other factors such as drainage, irrigation efficiency and uniformity and soil fertility levels have to be figured into how the final analysis of the trial. What data will be collected throughout the cropping season? How will the yield results be analyzed is another consideration. What criteria will be used to create management zones for comparing the treatments? How will the actual analysis be done? The comparison of treatment means within a management zone and whole fields are one way of interpreting the results. There has been a lot of work done using spatial statistical analysis to determine the results from treatments in an on-farm trial. The last area to be considered when working with on-farm trials is a variable not normally taken into consideration, when working on an agricultural research station, this factor is larger areas. On-farm trials are generally large in size. Individual treatments can be any amount of acres, from two acres to forty acres. The treatment acres do need to be similar in acreage to keep everything in perspective. Larger farm trials also take more time and larger amounts of inputs to be applied. The slowdown in a producer's farming operation costs that producer money in labor, fuel, and efficiency. The goal of the scientist is to try match the correct number of treatments and applications to get proper responses without costing the producer too much in time and expense. Flexibility and adaptability are two standard operating procedures for working with producers and on-farm trials.

Accurate yield results are critical to determining how well an on-farm cotton trial performs. Cotton yield monitors measure the volume of seedcotton as it travels through the seed chutes to the basket. Different varieties have different

readings and in a variety trial each individual variety must have a calibration factor collected at harvest. This calibration factor can be obtained one of two ways. The seedcotton weight registered by the yield monitor is recorded for a given amount of seedcotton picked. The seedcotton is weighed in a boll buggy equipped with scales and the calibration factor is determined by comparing the actual weight to the yield monitor weight. Another method, if there is enough area available for each variety, a module can be built and taken to the gin and weighed. The procedure is the same at this point but because of the larger area harvested a more consistent calibration number may be found.

On-farm trials can utilize several different types of plot styles for treatment applications. The most common types are strips placed across the field covering the management zones which will be used in the final analysis process. Another type is the embedded plot. This is a small plot, one or two applicator widths and at least two hundred feet long. This arrangement allows treatments which might be detrimental to a producer, either in added expense or lower yield, to be used because they take less area in the field. An example of this is a zero nitrogen application rate. Progressive producers are usually some of the best cooperators but they can also bring additional factors to a trial. For example, a nitrogen rate trial was conducted in 2011 with a producer who was already doing variable rate applications. The nitrogen treatment rates were arranged within the producer's management zones.

Another trial option for working with producers using pesticide applications are verification strips. These are treated strips placed across a field and the yield results are used to evaluate the treatment responses and possibly develop a treatment prescription for the field. Verification strips work very well with nematicide trials.

The potential variability of producers' fields can also bring out treatment effects not expected or anticipated by the participants. In a 2010 cotton variety by soil type trial, root-knot nematodes in the lightest soil zone became a treatment factor. These types of occurrences reinforce the idea that on-farm trials require flexibility and adapting to changing conditions.

Data collection and other measurements of treatments for on-farm trials have to be well thought out because of the larger plot areas that have to be dealt with. Normalized Difference Vegetative Index, NDVI, readings can be taken from treatments in a field and used to show differences that may or may not be as obvious to the observers.

In 2011, a Plant Growth Regulator (PGR) by Cotton Variety by Soil Zone on-farm trial was put in Northeast Louisiana. The management zones were soil type and Electrical Conductivity, Ec, data for deep readings. Due to the extreme drought that occurred in 2011, the PGR part of the trial was not conducted and the trial became Cotton Variety by Soil Zone. The following two figures illustrate the results from the trial as analyzed by two different management zones.

Figure 1.

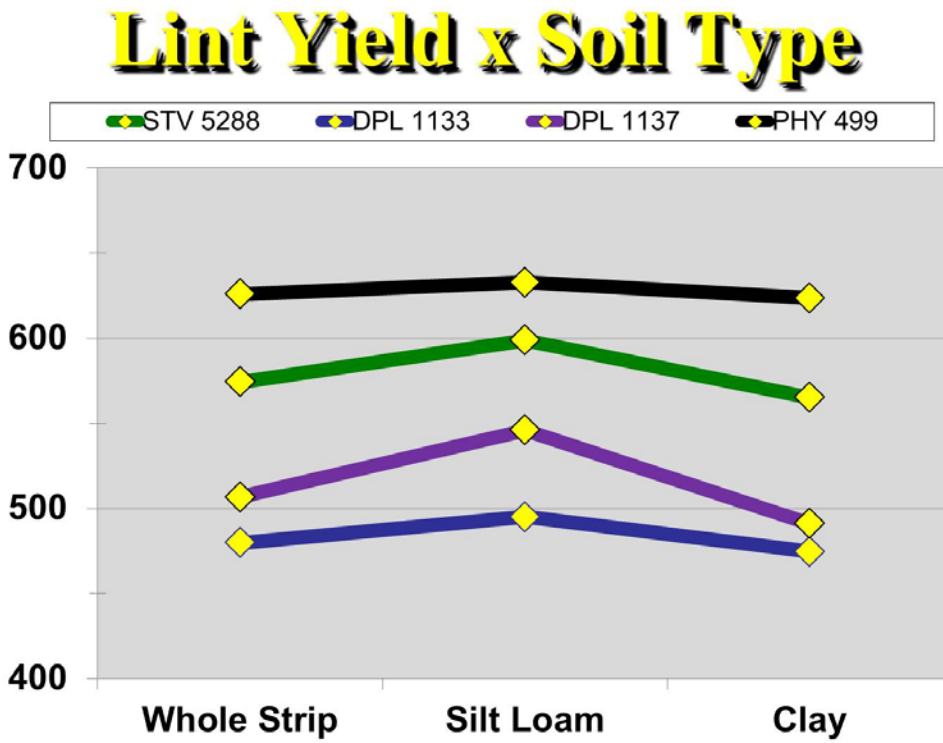
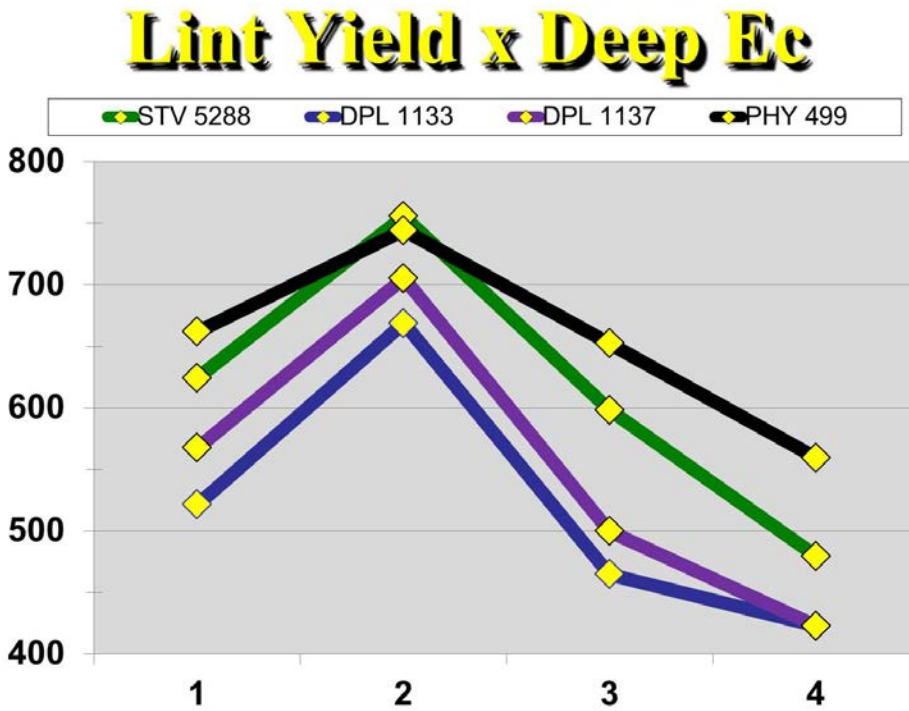


Figure 2.



In Summary, on-farm trials expand research station results onto production farms. Proper planning and allowing for flexibility and adapting to changing conditions make a good trial. Working with producer's equipment and the education of producers is another goal of on-farm trials. A critical part of an on-farm trial is the producer and their attitude toward wanting to participate and learn from the trial. The greater their desire and interest the better their cooperation and the better the trial. On-farm trials using precision agriculture techniques will continue to expand and educate more producers who in turn will teach their neighbors.