GETTING GOOD DATA FROM ON-FARM RESEARCH

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The use of on-farm trials present tremendous opportunities to fine tune a management practice and evaluate inputs for their ability to enhance production. The ability of farms to conduct their own trials has been further enhanced by several technologies related to data collection, record keeping and precision management.

While the focus here is trials related to crop management, many of these same principals hold true to projects that may evaluate a production practice with other aspects of the farm. In any on-farm research there are a number of resources available to aid in trial design and implantation and it is highly advisable to utilize these resources. Conducting on-farms trials do create extra work so it is critical that the trial is designed properly to assure maximum returns on the investments made in conducting a trial.

Attaining Valid Data

When looking to the information obtained from trials to guide decision making, it is critical that the trials are properly designed and implemented and you have confidence in the data. In contrast to most laboratory settings there are a number of hard to control variables in field scale trials that need to be addressed to reduce error and boost the power of the data generated. Additionally, if yield monitoring technology is being used it is critical there is a high level of confidence in the calibration and function of the equipment.

As previously mentioned, field trails can guide decision making related to management strategies such as tillage and manure management as well as evaluating an ever expanding selection of crop inputs. Often company representatives will approach a farm about evaluating their product or comparing their product to the existing farm practice. Conducting your own trials can be a powerful tool for evaluation but can also lead you down the wrong path if not properly executed.

When approaching a project it is critical to differentiate between a demonstration project and a research project. Demonstration projects can be useful in observing the effects of a practice that has already been validated by research but as a demonstration project its results should not be interpreted as research findings. To be a research project the project must be replicated and randomized.

Major factors in designing a project include; defining a single answerable research question, addressing any potential in-field variability, the importance of replication, what information is important to record throughout the trial and how data will be collected. Cornell Agronomy Factsheet # 68 available online at

http://nmsp.cals.cornell.edu/guidelines/factsheets.html provides technical detail on experimental design and implementation for field scale trials.

Experimental design is critical to obtaining meaningful results. Replication allows the data to be analyzed by statistics where the replicates provide evidence of how uniformly a certain treatment performs within the trial. While three replicates is often considered a minimum, in field research each treatment should have four or more replicates. Additionally, with field research randomization of the replicates is important. This assures that a variable or field characteristic doesn't influence a certain treatment more than others. Information on laying out treatments in a replicated randomized design can be found in Spatially – Balanced Designs: A Proposed Standard for Agronomic Experiments (What's Cropping Up? Vol. 15, No. 1, Van Es et al. 2005).

Putting Results in Proper Context

In addition to the technical design of the experiment it is important to recognize that while valuable data can be generated from research conducted on your own farm there are also limitations in its value. Each growing season is slightly (or substantially) different from any other season pre or post experiment. Therefore an experiment limited to one location and one growing season may offer an answer that is limited to that set of conditions. It is important to objectively evaluate if the question being evaluated has a high likelihood of showing consistent results to varying weather conditions over multiple growing seasons or if the results are likely to be influenced by these factors.

Some study questions may also be more sensitive to other parameters such as soil type, elevation, soil fertility, crop rotation history, or pest cycles. With more understanding of the potential implications of these parameters on your specific question you can evaluate whether additional testing is needed or not. An experiment may need to be repeated over multiple growing seasons, at different points in a crop rotation or on different soil types to provide truly valuable feedback that can be used by the farm.

It is also critical to look at other research that has addressed the same question, looking for independent, replicated trials that have the same robust design as your own. This can serve a few purposes. Even if you feel like you have a unique set of conditions it is reasonable to expect that your results at least show a similar trend to what is expected from the product or practice being evaluated. If your results are contrary to all other accepted work at the time it is prudent to re-evaluate your methods and consider repeating the trial to see if your results are repeatable.

A second function served by comparing your results to other research is to gain a better understanding as to the likeliness of your results holding up under different environmental conditions that may have been experienced at other locations where the same experiment was completed. In the case of crop selection it can be valuable to determine what hybrids/varieties perform best in a specific set of conditions compared to which may perform more consistently over a wide range of conditions.