

Designing and Assessing Results of On-Farm Trials

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In the first two presentations in this session, we will de-mystify on-farm experimentation by providing practical guidance to help you design and carry out experiments to test if new practices really offer an improvement over what you normally do.

The fundamentals of on-farm trials

The most important part of designing on-farm trials is to clearly define your research questions and the intended scope of your conclusions. In other words, **what is it you want to learn?** We'll give examples of clear and not-so-clear objectives, and we'll discuss what types of results you can expect from different kinds of research questions.

Designing and conducting an experiment

Using clear examples, we will talk about those aspects of designing an experiment that directly affect how you will analyze the data, what you can learn from the results, and whether or not you have a reasonable chance of successfully answering your question. We'll cover the following:

- Treatment selection
- The use of controls
- Replication (how much is needed?)
- Randomization (how to do it)
- Managing variability

Once you have gone to the effort of designing a trial and carrying it out, how do you know whether you've learned anything? We will discuss the crucial difference between seeing what may look like an improvement and using statistical analysis to test whether such an observed improvement is real. But statistical significance is not everything, for it is also perfectly possible to measure statistically significant differences that are not meaningful in a practical sense.

Even the most carefully designed experiments will not yield good results, however, if you're unable to implement the plan and collect the type and quality of data you need. We will share practical tips for how to choose what to measure, keep track of treatments, and collect data appropriate for analysis.

Statistical analysis and interpretation

Lastly, we'll show examples of statistical analysis, and how to interpret the results. While analysis can be done using spreadsheet programs such as MS Excel, this requires a detailed understanding of statistics. In fact, most researchers use specialized statistical software packages to analyze their data. How, then, to analyze your on-farm data? The best approach is probably to collaborate with your local Extension Specialists and researchers, who are familiar with statistical analysis and who regularly use this software, and ask for their help. We'll show how simple this can be.