

Conducting On-Farm Experiments: Making The Most Of Precision Agriculture Technologies

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Each year, farmers conduct field-scale on-farm experiments to test new products and fine-tune their production practices using spatial technologies such as yield monitors and global positioning system (GPS) guidance. Three of the most important and least understood steps in conducting on-farm research include: designing the experiment, collecting site-specific data, and analyzing the data for farm management decision-making.

Farmers desire experiments that lead to quality data being collected while not requiring excessive time and efforts to implement. Experiments that are time intensive to implement or harvest may interfere with the completion of other field operations. Designs conducive to farmer-managed field-scale trials will be discussed including strip-trials, split-field, and other designs. Once the experimental design is chosen, GPS guidance and automated controllers can reduce the in-field management required to implement the experiment while increasing the likelihood of accurate execution of the design.

Additional factors specific to on-farm trials should be kept in mind prior to harvest. It is recommended that the harvester's GPS equipment is checked to make sure it is working, that differential correction is being received, and that the GPS firmware version is current. For most trials, it is important for weeds in field-scale experiments to be adequately controlled as to not interfere with harvester operation and moisture sensor measurements. It is especially important that the yield monitor be properly calibrated prior to harvest, after all it is not the field average yield that is of interest but the within field yield and variability that will be analyzed.

Once yield data has been recorded, most farmers desire the results of the experiment as quickly as possible in order to plan for the next production season and make input orders soon enough to secure early order discounts. Some farmers may analyze the data themselves while others opt to rely upon third party analysts. Either way, the appropriate spatial analysis technique is necessary to make adequate production recommendations and farm management decisions. Although it is expected that the majority of yield data analysis is conducted by visual comparison of maps, quantitative data analysis has become more prevalent with advances in farm-level mapping software.

Farmers tend to make use of technology in ways that developers had not anticipated. One example is how innovative farmers use yield monitors and other precision technologies to aid in conducting field-scale on-farm experiments. Terry addresses the issues that farmers struggle with and offers his suggestions based on practical experience from a 7 year case study. Discussions will address why appropriate spatial analysis techniques are necessary and include results of a three-year case study of how farmers have used their yield monitor data from on-farm trials to enhance farm management decisions. Δ