

COMPARISON OF SOYBEAN YIELDS IN ON-FARM TRIALS VS. SMALL PLOT EXPERIMENTS

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Abstract

Performance of foliar fungicides can be evaluated in field-scale on-farm replicated strip trials and in small-plot experiments. This presentation will present analyses of two datasets from Iowa to compare yield and yield response variability to fungicide applications in on-farm trials versus small-plot experiments. An estimate number of locations, replications and years required to detect yield differences of interest will be covered. One dataset includes 123 on-farm trials evaluating Headline (BASF) foliar fungicide on soybean (*Glycine max* (L.) Merr) in 2008 and 2009 across Iowa by farmers working with the Iowa Soybean Association On-Farm Network. The other dataset includes small-plot experiments conducted by university researchers to evaluate the same fungicide during the same growing seasons at six Iowa State University Research and Demonstration Farms. On-farm trials were harvested by farmers' combines equipped with yield monitors and GPS and small-plot experiments by small-plot combines. Variance component analysis was used to quantify the random sources of yield variation contributed by location and blocks nested within each location and conduct power analyses for multi-location trials. Disease ratings were done in all small-plot trials. While yield responses in the two types of trials were similar (about 125 kg ha⁻¹), the residual random yield variation in on-farm trials tended to be smaller than that in small-plot trials but the random variation due to location effect was larger in on-farm trials. The presentation will show examples of power curves showing the numbers of trials, replications and years required to detect specific response, often <68 kg ha⁻¹. The results also suggest about the different utility of two methods for evaluating fungicides, specifically, the on-farm trials for answering the question "when, where and how likely" a given fungicide works while small-plot trials for comparing multiple chemistries at the same locations and quantifying the interactive effects of application timing.

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