Management, Topographical, and Weather Effects on Spatial Variability of Crop Grain Yields. (5457)

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Abstract:

The quantitative characterization of spatio-temporal variability in crop grain yields is an important component for successful precision agriculture applications. The objective of this study was to analyze and quantify effects of management practices, topographical features, and weather conditions on spatial variability of crop yields. A one-factor randomized complete block design experiment with six replications was established at the Long Term Ecological Research site in southwest Michigan in 1988. The treatments included two treatments with conventional chemical inputs (chisel plow and no-till) and two organic-based chisel plowed treatments with a winter leguminous cover crop (low chemical input and zero chemical input). The data consisted of corn-soybean-wheat yields collected via combine monitors from 1996 to 2001. We observed that stressful conditions, regardless of the stress origin, were associated with increase in both small scale and large scale yield variability. The effects of the water stresses were either enhanced or relieved within the field depending on topography. Water stresses and yield variability associated with them were also enhanced or relived by management features, e.g., enhanced by shortage of nitrogen in organic systems, corn-wheat antagonism in no-till, or somewhat relieved by no-till management in soybean and wheat.

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