Soil Electrical Conductivity Classification: A Basis for Site-Specific Management in Semiarid Cropping Systems. (S04-johnson112155-Poster)

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Abstract:

Site specific management (SSM) has the potential to improve both economic and ecological outcomes in agriculture. Effective SSM requires a strong and temporally consistent relationship between identified management zones, underlying soil physical, chemical, and biological parameters defining yield potential, and actual yield. Relationships between apparent electrical conductivity (ECa) (approximately 0-30 cm depth of measurement), soil properties, and two years of winter wheat (Triticum aestivum L.) and corn (Zea mays L.) yield maps were examined for potential application in SSM of a semiarid dryland cropping system. In a 250-ha farm-scale experiment, eight fields were individually classified into four management zones (ranges of ECa) that were used for stratified soil sampling (0-30 cm depth). Soil characterics associated with productivity (SOM, total C and N, extractable P, and percent moisture) were negatively correlated with ECa, while soil characteristics indicative of erosion (clay content, bulk density, and pH) were positively correlated; all soil indices were different among ECa zones. Wheat yields were strongly related to ECa within fields, particularly when regressing mean wheat yields within ECa classes against mean ECa within ECa classes (r^2 = 0.95 to 0.99). Yield response curves relating wheat yields and ECa revealed a boundary line of maximum yield that decreased with increasing ECa. In this semiarid dryland system, ECa-based management zones can potentially be used in SSM of wheat for: (1) yield goal determination, (2) soil sampling to assess residual fertilizer concentrations and soil attributes affecting herbicide efficacy, and (3) prescription maps for metering fertilizer, pesticide and seed inputs. Corn yields showed no consistent association with ECa probably due to extreme levels of crop drought stress during both years evaluated.

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