

Improved Techniques for Soil Sampling

Introduction:

A recent development in the soil testing industry is automated soil collection machines such as Autoprobe™ (Figure 1). This machine is equipped with soil probes mounted on tracks. Soil cores are collected every 7.5 feet across the field resulting in the collection of 25 percent more soil samples compared to hand sampling. Early development research has indicated that results from automated soil testing machines are better than hand sampling. For example, Figure 2 (back page) illustrates a potassium spread map based upon automated soil collection. In comparison, Figure 3 shows a hand sampling map. Note that fertilizer decisions are dramatically different based upon the soil sampling technique. In this field, fertilizer savings for machine based sampling was \$17/Acre due to greater detail in the spread zones. Regarding soil organic matter, early data indicates that machine sampled fields are more accurate compared to hand sampling (data not shown). The pattern that automated soil sampling is an improvement over hand sampling has been observed in three fields, but sampling more fields will be necessary to draw final conclusions.



Figure 1. Autoprobe soil sampling machine (<http://www.agrobotics.com>).



Project Description:

The project will compare soil sampling techniques in six additional fields. Comparisons will be automated soil sampling versus hand sampling at two grid densities (1.25 and 2.5 acre). A secondary analysis of the data could be a comparison of zone sampling using Environmental Response Units (ERUs) versus standard grid sampling. Field sizes are expected to range from 40 to 80 acres. Soil test data will be lab analyzed for phosphorous, potassium, organic matter, pH and cation exchange capacity. Analysis of the data will involve spatial statistics with emphasis on comparing fertilizer recommendations based on the various sampling techniques.

Project Goals:

- Further characterize the value of automated soil collection machines compared to hand sampling
- Understand the value of dense soil sampling (1.25 acre grids) compared to 2.5 acre grids in terms of fertilizer recommendations
- Determine the potential to use dense soil sampling for CEC level or organic matter as decision zones for variable rate seeding and fertilizer applications
- Compare the merits of zone sampling using ERUs with standard grid sampling





Experiment Details:

Locations: 6

- 40 to 80 acre fields with significant variability in terms of topography, yield level and soil types

Comparisons:

- Autoprobe sampled at 1.25 and 2.5 acres (to be contracted with Autoprobe vendor)
- Hand sampled grids at 1.25 and 2.5 acres (to be contracted)
- Zone sampling using ERUs versus grid sampling
- Note: Each field will be sampled at 1.25-acre intensity for automated and hand sampling. For the 2.5-acre sampling comparisons, every other data point will be removed from the intensive sampling to represent 2.5 acre grids. Zone sampling will be conducted similarly with points selected to represent each ERU

Analytics:

- Spatial analysis conducted by ISA Analytics

Delivery of Results:

- Summary of results in Crop Insight format
- Submission for publication to technical journal

Costs and Funding:

Description	Costs Per Field	Total Costs for Six Fields <i>(40 to 80 A field sizes)</i>
Autoprobe sampling at 1.25 acre grids	\$15	\$3,600 to 7,200
Hand sampling at 1.25 acre grids	\$15	\$3,600 to 7,200
Total Costs		\$7,200 to 14,400
Requested Funding		\$15,000

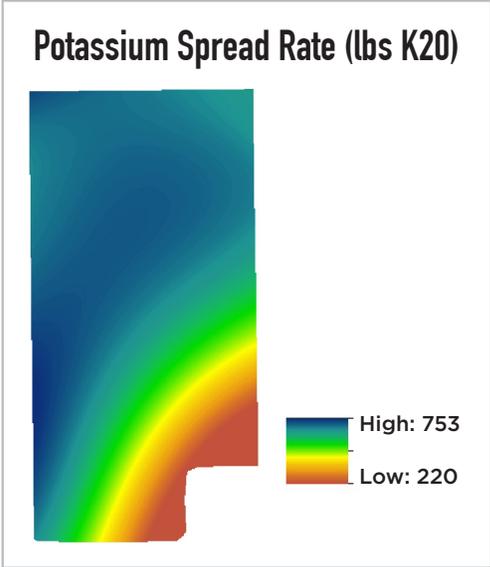


Figure 2. Potassium spread rate based on hand sampling at 2.5 acre grids.

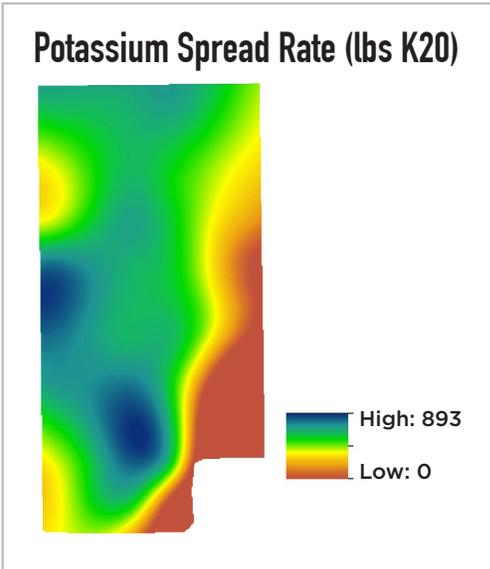


Figure 3. Potassium spread rate based on machine sampling at 2.5 acre grids.

To get involved or for more information, contact your regional agronomist:

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