Integrating Site-Specific K Management with Precision Agriculture Practices

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Introduction

• “Soil test-crop response relationships can be quite site-specific”

• Approximately 70% of US fertilizer dealers offer variable-rate applications

• Precision agriculture technologies can aid in site-specific implementation of 4R practices

• K has not received the specific attention that N and P have
IPNI Global Maize Project – Virginia, USA

Legend
New Ground K application 2015
0-0-60 application rate (lbs/ac)
- 200
- 233
- 267

K Soil Test Levels Shown

Total area to be applied = 39.7 acres
Total 0-0-60 to be applied = 8,898 lbs

Notes:
1) K is being applied for corn, wheat, and soybean crops
2) Application rates based on soil test levels and expected crop removal

Legend
New Ground Field Yield bu/ac
- < 115
- 115 - 130
- 130 - 145
- 145 - 160
- 160 - 175
- 175 - 190
- > 190

Field Avg = 153.1 bu/ac
Variation in Soil Series
Variation in Productivity Due to Soil Series

25 ha field in Caroline County, VA

Wheat yields: 2.9 to 5.3 Mg/ha

Corn yields: 5.3 to 11.1 Mg/ha

Alley and Roygard, 2000
Management Zones...

1. Bare soil imagery

- Soil organic matter
- Moisture content and
- Other stable soil properties (bulk density, texture, compaction, etc)
Variation in Clay Content and Type

Sharpley, 1990; Suresh et al., 2014; Veris, 2017
Remote Sensing Groundcover/Residue

Vegetation Thresholds
- Water -1.0-0.1
- Minimal biomass 0.1-0.3
- Low biomass 0.3-0.45
- Med biomass 0.45-0.6
- High biomass 0.6-1.0

Landsat 5 Satellite Imagery
Jan 3rd, 2011
Remote Sensing and In-season Imagery

Thomason, 2017; Paganella, 2016; Mahlein, 2016
Evaluation of Nutrient Deficiency Using UAVs
Mobile Devices – Agricultural Apps
Summary

• Several site-specific factors affecting spatial variability in plant available K can be managed using precision agriculture technologies
  – Targeted soil sampling
  – Yield mapping
  – Imagery and remote sensing
  – Mobile device decision support

• More research is needed to determine proper approach for variable-rate K fertilizer recommendations
Thank You

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