

PRSTM Probes are a Useful Tool for Evaluating the 4Rs of Nutrient Management

Lindsey Andronak¹, Eric Bremer¹, Jeff Schoenau²

¹Western Ag Innovations, Saskatoon, SK, ²Dept. of Soil Science, University of Saskatchewan

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Key Words

PRSTM Probes, 4R nutrient management, nitrogen, sulfur, manure, potato, canola, source, placement, timing, rate

Introduction

Plant Root Simulator (PRSTM) Probes are ion-exchange membranes in plastic supports that are convenient for in situ monitoring of soil nutrients. PRS Probes measure nutrient supply rates, which is the measure of ion flux over a specified time to a quantifiable surface area. Duration of exposure, soil moisture, soil temperature and competing sinks all affect nutrient supply rates.

Source

Three different N rates were applied as either urea or liquid swine manure on canola (Qian and Schoenau, 2000). At equivalent rates of total N added, urea had a higher available N supply. Manure N did not completely mineralize and/or may have been immobilized. Available N supply did not increase proportionally with the rate of added N.

Rate

Three different N rates were applied as either hog manure-sawdust compost or pelletized dehydrated poultry manure (Sharifi et al., 2009). Potato N uptake was significantly influenced by source, rate and their interaction. Total N supply rate (both NH₄ and NO₃) was highly correlated with plant N uptake ($r^2=0.99$).

Timing

Sulphur was applied to canola at 20 kg ha⁻¹ – S as ammonium sulphate during fall (mid-October) or spring (Grant et al., 2003). Sulphate supply rates were higher with spring broadcast when compared with fall broadcast

Placement

Nitrogen was applied as 80 kg ha⁻¹ urea N on canola either side-row or mid-row banded (Thavarajah et al., 2003). Side-row banded urea had significantly higher N supply rates starting on day 6 and continuing through to day 14. NH₄⁺-N was always significantly higher with side-row banding and NO₃⁻-N was generally significantly higher with side-row banding.