Interactions of Glyphosate and Foliar Amendments with IAA Synthesis and Urease Activity by Rhizobacteria of Glyphosate-Resistant Soybean
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Introduction

- Increased use of glyphosate-resistant crops has raised concerns regarding the potential environmental impact of glyphosate. Furthermore, other foliar-applied chemicals may impact soil microbial ecology.
- Biostimulants (products containing plant hormones) and liquid fertilizers affect soil microorganisms by providing additional nutrients or growth factors that alter metabolic activity and improve crop growth and productivity. For example, Grozym® and PT-21® are foliar amendments used to increase crop yield.
- Metabolites implicated in growth-suppressive activity include hydrogen cyanide, phytotoxins such as indole-3-acetic acid (IAA), and unidentified phytotoxins. The objectives of this study were to describe changes in IAA synthesis and urease activity of rhizosphere bacteria of glyphosate-resistant soybean (Glycine max, ‘Roundup Ready’ soybean).

Objectives

- To describe changes in IAA synthesis and urease activity of rhizosphere bacteria of glyphosate-resistant soybean (Glycine max, ‘Roundup Ready’ soybean).
- Are IAA metabolites produced by rhizobacteria plant-growth promoting or suppressive?
  - To up to 80% of rhizobacteria can produce IAA (Leinhos and Vacek, 1994).
  - Various microbes in the rhizosphere produce an auxin, IAA, identical to that found in plants.

Why is microbial urease activity important?

- An indicator to estimate urea hydrolysis involved in C and N mineralization of rhizosphere microorganisms.
- Catalyze the hydrolysis of urea to CO2 and NH3 with a reaction mechanism based on the formation of carbamate as an intermediate (Tabatabai, 1994).

Results

- Total rhizobacteria (Figure 2) and IAA-producing bacteria populations (Figure 5) were generally stimulated by application of glyphosate and significantly stimulated at day 20.
- Urease activity of soils treated with glyphosate was considerably lower than treated glyphosate soils (Figure 3).

Summary

- Glyphosate-resistant soybean may modify the bacterial composition and activity in the rhizosphere to a limited extent.
- The changes may impact crop productivity and soil biological processes.

References