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Public Abstract

First Name:Kristin

Middle Name:

Last Name:Rosenbaum

Adviser's First Name:Kevin

Adviser's Last Name:Bradley

Co-Adviser's First Name:

Co-Adviser's Last Name:

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Department:Plant, Insect and Microbial Sciences

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Title:INTERACTIONS BETWEEN GLYPHOSATE, FUSARIUM INFECTION OF WATERHEMP, AND SOIL MICROORGANISMS

Currently, waterhemp is the most common weed species encountered in Missouri soybeans. Incidence of glyphosate resistance (GR) in waterhemp has evolved across wide geographies in Missouri and surrounding states and research is necessary to determine best management practices for producers. Objectives of experiments were to determine: frequency and distribution of GR waterhemp in Missouri; if any in-field parameters serve as indicators of GR in future crop production systems; palmer amaranth and waterhemp control, soybean yield, and net income with preemergence (PRE) and post-emergence herbicide programs in three soybean production systems; effects of soil microbial and phytopathogen populations on GR and susceptible (GS) waterhemp survival and Fusarium infection; soil microbial abundance and diversity in soils collected from soybean fields with differences in waterhemp biotypes and herbicide and crop rotation histories. Results indicate programs containing PRE herbicides provide the best opportunity for season-long control of waterhemp and palmer amaranth and highest grain yields and net returns across systems. GR was confirmed in 69% of the total waterhemp populations sampled. In-field parameters suggest soybean fields with GR waterhemp were more likely to: be free of other weed species; occur where soybeans were continuously cropped; occur where glyphosate was the only herbicide applied for several seasons consecutively; and where waterhemp survived herbicide treatment. Results of the soil study indicate plants are more sensitive to glyphosate in non-sterile than sterile soils and glyphosate may predispose plants to soilborne phytopathogens. The results suggest continuous use of glyphosate does not significantly affect soil microbial abundance or diversity.