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Effects of Soybean Cyst Nematode Infestation and Resistance on Fusarium Root Rot on Soybeans

Maria Mercedes Diaz Arias
Iowa State University

Leonor F.S. Leandro
Iowa State University, lleandro@iastate.edu

Gary P. Munkvold
Iowa State University, munkvold@iastate.edu

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Abstract
Fusarium species are ubiquitous in soil and can cause important soybean diseases such as damping-off and soybean root rot. At least twelve different species of Fusarium have been reported to infect soybean roots, but their relative aggressiveness as root rot pathogens is not known. In some cases, these root rots can be exacerbated by other pathogens, such as the soybean cyst nematode (Heterodera glycines). The most important species of Fusarium causing root rot on soybean, as well as their interactions and overall impact on soybean productivity, are unclear. To determine whether SCN infestation enhances Fusarium root rot in soybean, field experiments were conducted using cultivars that differ in genetic resistance to SCN.

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RFR-A1098

Mercedes Diaz Arias, graduate assistant
Leonor Leandro, assistant professor
Gary Munkvold, professor
Department of Plant Pathology

Introduction

Fusarium species are ubiquitous in soil and can cause important soybean diseases such as damping-off and soybean root rot. At least twelve different species of *Fusarium* have been reported to infect soybean roots, but their relative aggressiveness as root rot pathogens is not known. In some cases, these root rots can be exacerbated by other pathogens, such *as the soybean cyst nematode (Heterodera glycines).* The most important species of *Fusarium* causing root rot on soybean, as well as their interactions and overall impact on soybean productivity, are unclear. To determine whether SCN infestation enhances Fusarium root rot in soybean, field experiments were conducted using cultivars that differ in genetic resistance to SCN.

Materials and Methods

Field plots were established at Iowa State University Northern Research Farm, Kanawha, IA. Six soybean varieties representing a range of resistance to SCN were planted. Soil and plant samples were collected to test for soil SCN populations, soil pH, and Fusarium root rot severity on soybean roots. Soil samples were collected at planting and harvest from each plot in order to determine SCN population density. Using a visual scale at two different plant stages (V2-V3 and R4), ten soybean plants with complete root system, per plot, were sampled and evaluated for root rot severity and root and shoot fresh weight. Each root was also scanned in order to determine root length, diameter, and root discoloration. Experiments were harvested and yield was measured for each plot.

Results and Discussion

Results show significant relationships between root rot severity, SCN population density, soil pH, and yield. However, there was no consistent relationship between soybean resistance to SCN and root rot (Figure 1).

Root rot severity explained 28.6 percent of the variation in yield (Figure 2), but the relationship between SCN population densities and root rot severity was not significant.

There was a significant relationship between root rot severity and soil pH; soil pH explained 18.5 percent of the variation in root rot.

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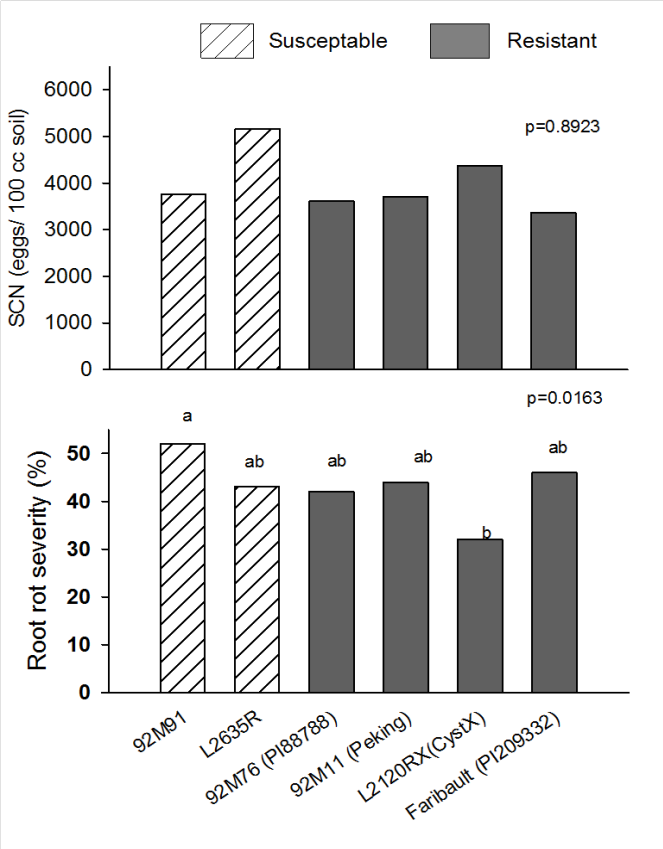

Figure 1. Root severity and yield in soybeans with different sources of resistance to SCN.

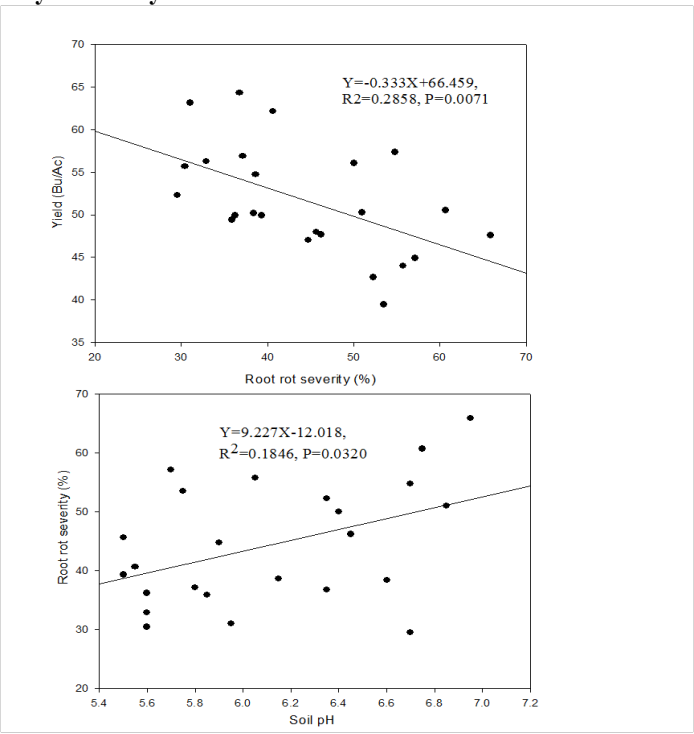

Figure 2. Regression analysis of the relationship between soil pH and root rot severity, and between root rot severity (%) and yield (bu/acre).