

Nematode and Peanut Response to Fluopyram as Influenced by Crop Sequence and Cultivar Selection

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Introduction



Traditional North Carolina crop sequences, peanut cultivar, and in-furrow nematicide treatment can impact plant parasitic nematodes in soil and peanut yield.

Introduction

- Plant parasitic nematodes can have negative impacts on the yield of peanut in North Carolina by affecting root growth and peg development (1)
- Crop rotation, crop cultivar selection, and chemical treatments can be viable components of effective Integrated Pest Management programs for plant parasitic nematodes control (2)
- Short and long-term rotations of peanuts can impact yield, disease incidence, and nematode populations (1)

Introduction

- Cultivars expressing resistance to nematodes are commercially available (3)
- Chemical treatments, such as nematicides or fumigants, can be used to reduce the negative impact of plant parasitic nematodes in soil (4)
- Fluopyram has shown to maintain yield while maintaining free-living nematode populations (5)
- Interactions of crop sequence, cultivar selection and fluopyram applied in the seed furrow at planting have not been documented in North Carolina

Objectives

- To determine the effect of crop sequence, cultivar selection, and fluopyram on root growth, population of plant parasitic nematodes in soil, and peanut yield in North Carolina
- To develop more informed recommendations to manage nematodes in peanut in North Carolina

Hypothesis

- Crop sequence, cultivar selection, and fluopyram would not interact with respect to root growth, population of plant parasitic nematodes in soil, and peanut yield

Materials and Methods

- Imidacloprid or imidacloprid plus fluopyram was applied in the seed furrow in the same area of each plot
- Fluopyram treatments were applied to peanut (2019), cotton (2020), and peanut (2021)
- Cultivars Bailey alone (2019) or Bailey II and TifNV High O/L (2021)

2021 Treatments



Bailey II
Imidacloprid

TIFNV High O/L
Imidacloprid

Bailey II
Imidacloprid
Fluopyram

TIFNV High O/L
Imidacloprid
Fluopyram

Bailey II
Imidacloprid
Metam Sodium

TIFNV High O/L
Imidacloprid
Metam Sodium

Materials and Methods

- Soil samples taken in September of each year to determine populations of plant parasitic nematodes
- Visible estimates of peanut condition within two weeks of digging on a scale of 0 to 5
- Peanut root growth visual estimates taken using a scale of 1 to 10 (2021 only)



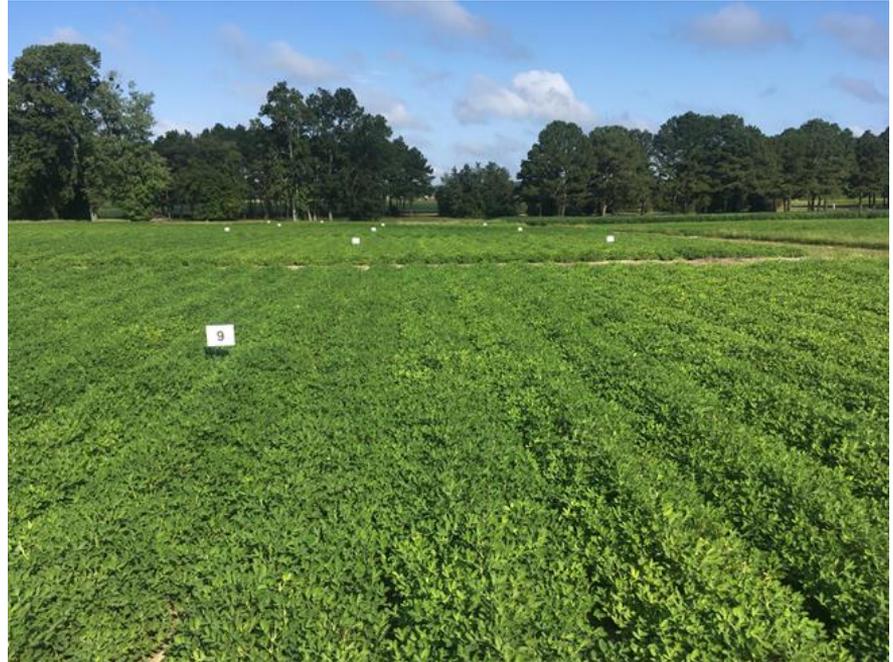
Materials and Methods

- Yield of cotton and peanut was determined
- Data for population of plant parasitic nematodes in soil transformed to the natural log, plant condition, root injury caused by nematodes, and crop yield were subjected to ANOVA. A t-test or Fisher's Protected LSD test at $p \leq 0.05$



Results

- Regardless of year or crop, the interaction of cropping sequence by fluopyram treatment was not significant.
- The main effect of rotation sequence was significant in both years for nematode population in peanut but not for cotton.
- Fluopyram did not affect root knot nematode population in peanut in 2019 or cotton (2020) but did reduce the population in peanut in 2021 compared with the non-treated control.

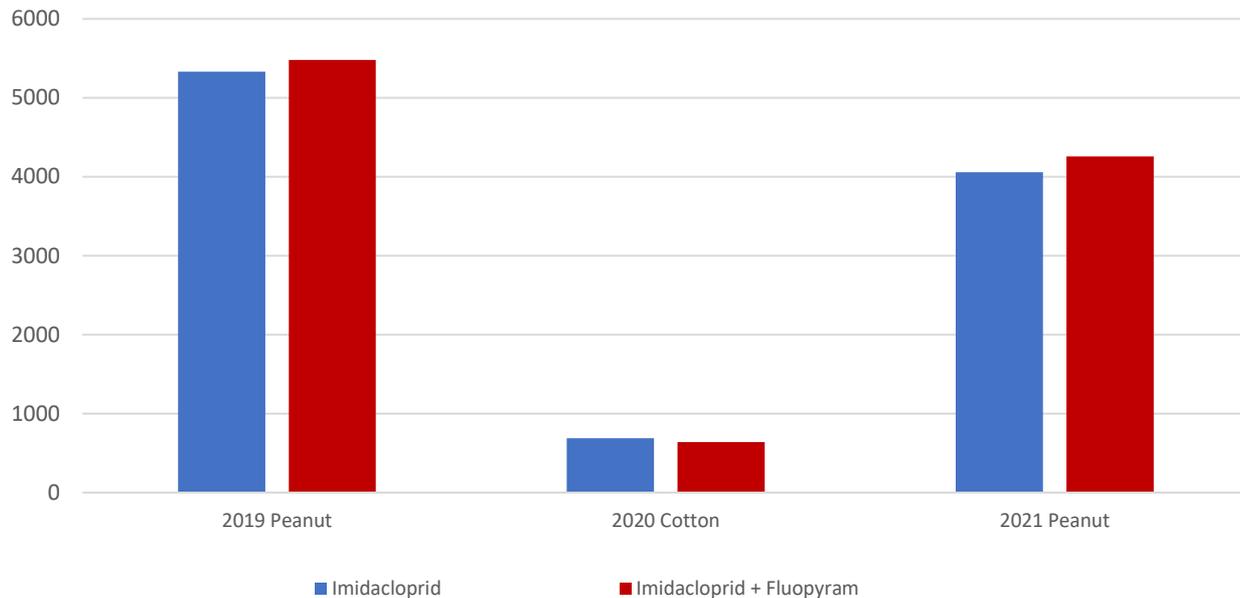


Results

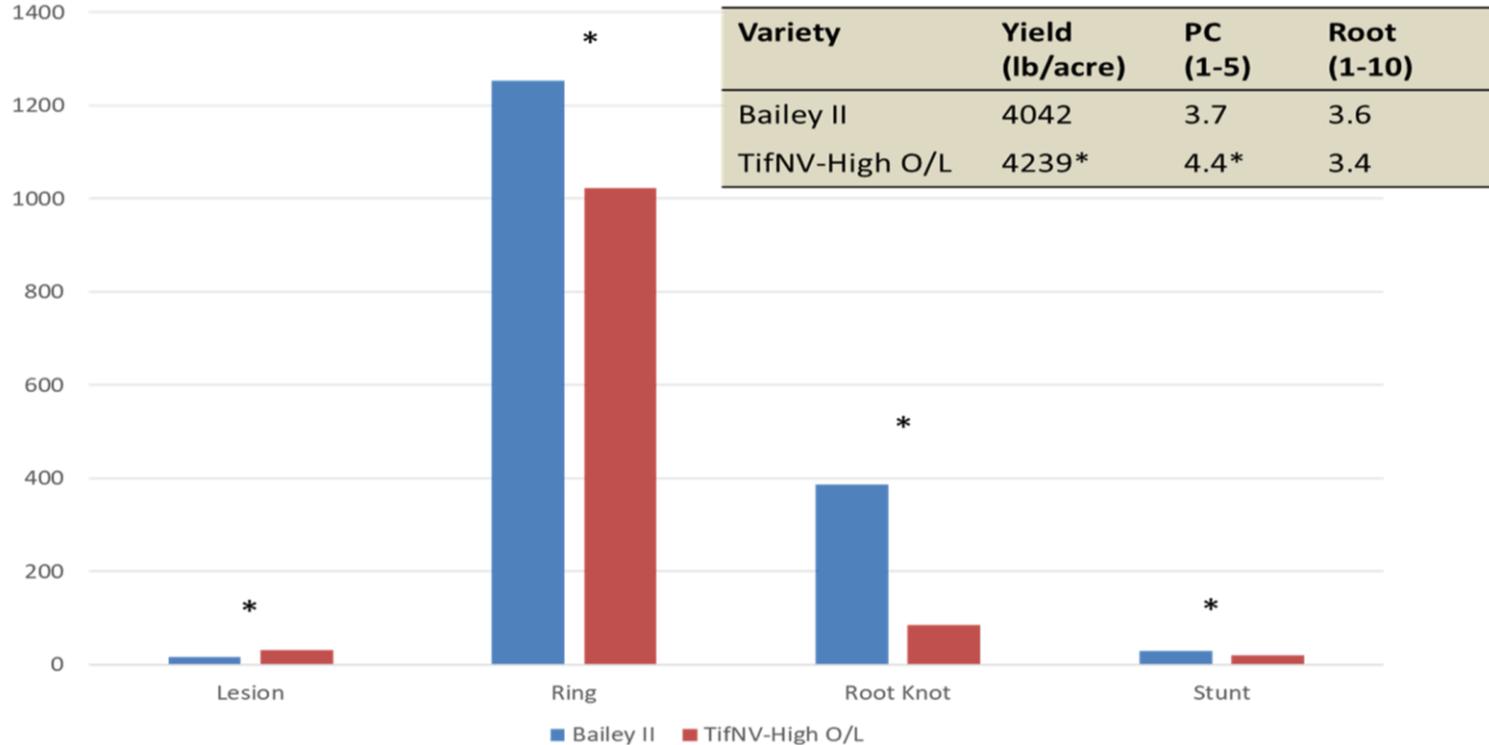
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Peanut and Cotton Yield (lbs/acre) Response to Chemical Treatment are pooled over rotation and variety (2021)



a. Nematode (number per soil sample) Response to Varieties
Data are pooled over rotations and chemical treatments



Discussion

- Accept the null hypothesis that crop sequence, cultivar selection, and fluopyram interact with respect to visible plant condition, root growth, and peanut yield
- Crop sequence was the major driver of response
- Cultivar and fluopyram had significant but modest impacts, but response was significant across all crop sequences

Future Research

- Determine the value of the nematode-resistant Virginia market type developed by Dr. Holbrook in North Carolina
- Evaluate performance of fluopyram under different environmental conditions

Citations

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3. Holbrook, C. Personal communication
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