

# **Comparison of Pest Management Practices in Peanut Planted into a Cereal Rye Cover Crop**

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# Introduction

- Cereal rye can reduce weed populations in peanut and other crops (Lassiter et al. 2011)
- Leaf spot disease can differ based on tillage system and winter cover crop (Cantonwine et al., 2007)
- Thrips populations and incidence of tomato spotted wilt are often lower in reduced tillage (Brandenburg et al., 1998; Olson et al., 2006)
- Interactions of tillage/cover crop systems and pest management have not been defined in North Carolina in recent years, especially with the three major pest disciplines (entomology, plant pathology, weed science)



# Introduction

- Contribution of cereal rye cover to suppress weeds given herbicide resistance is prevalent for ALS- and PPO-inhibiting herbicides
- Contributions of cereal rye cover crop to suppress thrips, especially with confirmation of imidacloprid- and acephate-resistant thrips populations
- Contributions of cereal rye cover crop to suppression of leaf spot disease given shifts in populations and resistance to group 3 and 11 fungicides
- What is the impact of cereal rye cover crop on damage caused by southern corn rootworm in absence of chlorpyrifos
- Will contributions of cereal rye to pest management be minimized due to risk of lower peanut yield in reduced tillage on some soil series

# Hypothesis

Interactions among termination date for cereal rye cover crop, weed management, fungicide programs, and insecticide treatments will exist with respect to leaf spot incidence and canopy defoliation, damage from southern corn rootworm, response to drought conditions, pod yield, and financial return on investment.

# Objectives

To define interactions among pest management practices across pest disciplines to develop effective strategies for peanut production systems.

## North Carolina Certified Planted Peanut Acres

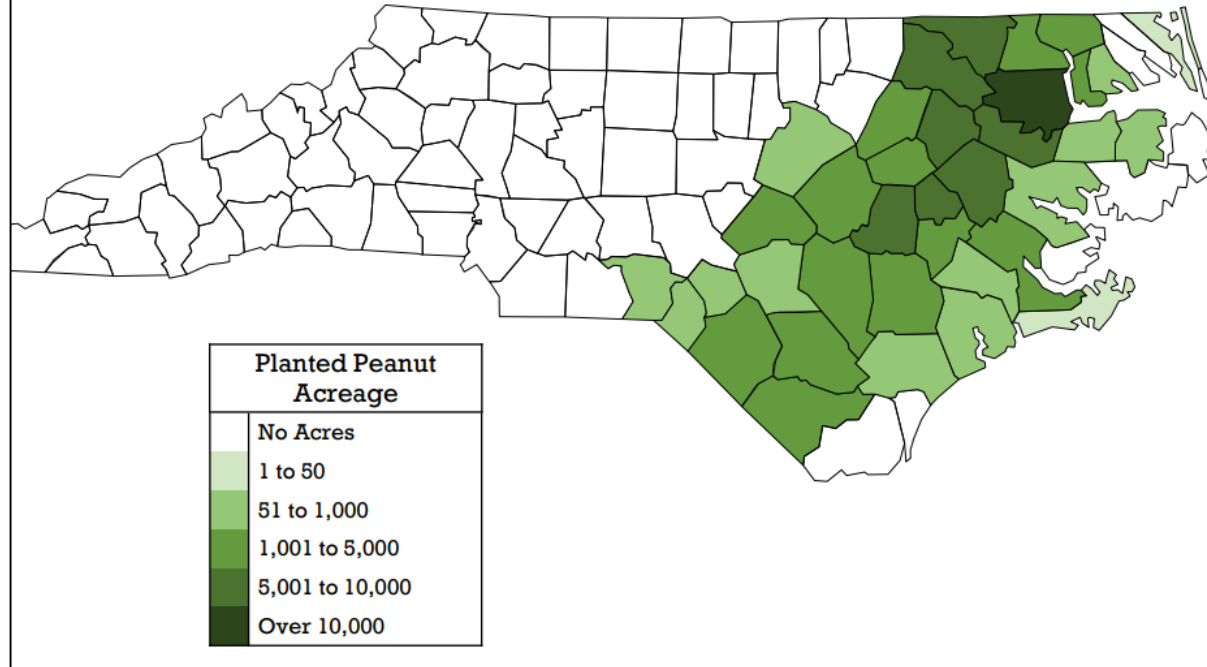


Image provided by Ashley Collins, NCPGA

# Materials and Methods

## Treatment Factors (16 total)

- Cereal rye desiccation date (early April or early May)
- Arthropods (intensive vs. moderate management)
- Leaf spot/stem rot (intensive vs. moderate management)
- Weed management (intensive vs. moderate management)
  
- Intensive management included greater pesticide inputs or hand removal of late-season weeds compared with moderate management
- However, the moderate management approach is employed by some growers

# Materials and Methods

## Cover Crop Management

Cereal rye cover crop was established in recently prepared raised beds in October of each year and desiccated in early April or early May prior to planting





# Materials and Methods

## General Procedures

- Variety: Bailey II
- Small plots (4 rows 30 feet)
- 4 replications
- Planted in mid-May
- CO<sub>2</sub>-pressurized backpack sprayer
- 15 gpa, 31 psi, 3 mph
- 11002 VS nozzles

# Materials and Methods

## Arthropod and Disease Management

Application Date	20-Jun	4-Jul	18-Jul	1-Aug	19-Aug
<b>Insecticide Program</b>	Indoxacarb	Indoxacarb	Indoxacarb		
<b>Moderately Intensive Fungicide Program</b>			Chlorothalonil + Tebuconazole	Chlorothalonil + Tebuconazole	Chlorothalonil
<b>Intensive Fungicide Program</b>		Chlorothalonil	Miravis + Elatus		Chlorothalonil

\*Intensive weed management included clethodim applied to control grasses

# Material and Methods

- Incidence of leaf spot and canopy defoliation
- Peanut wilting due to drought
- Early season injury caused by thrips
- Southern corn rootworm damage
- Late-season weed density
- Pod yield
- Financial return calculated based on yield and price less cost of inputs



# Materials and Methods

## Statistical Analysis

- Split plot with cereal rye desiccation as whole-plot units and combinations of pest management as sub-plot units
- Data for leaf spot incidence, canopy defoliation, pod scarring caused by southern corn rootworm, weed population, canopy wilting, pod yield, and estimated financial return subjected to ANOVA using PROC GLMMIX at  $p \leq 0.05$

# Results

In most cases, 2-way and 3-way interactions of treatment factors were not significant

In some cases, main effects of treatment factors were significant

# Results

Peanut plants wilted less in August and September when the cover crop was terminated in May compared with termination in April



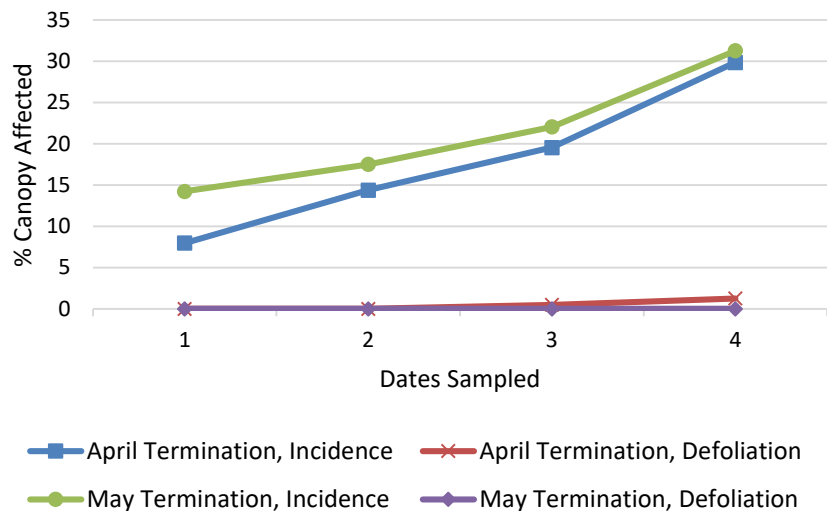
# Results

Three applications of indoxacarb and rye termination date had no effect on the damage from southern corn rootworm

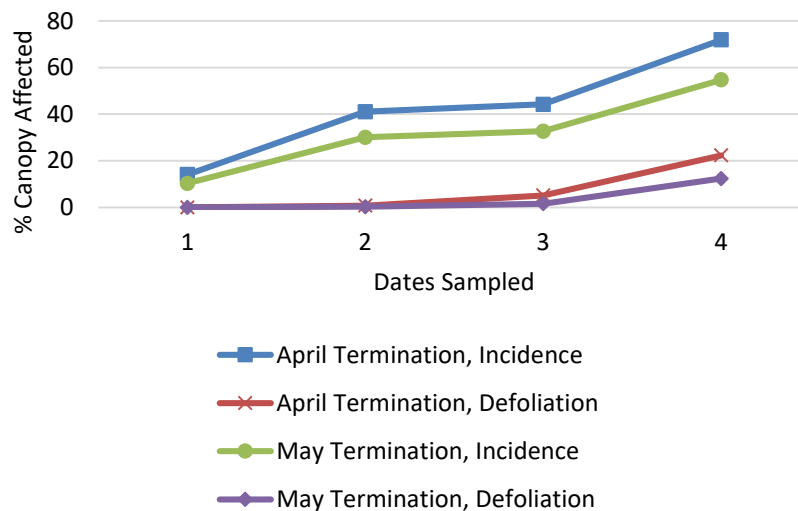


# Results

Rocky Mount Disease Pressure in Different Rye Termination Dates



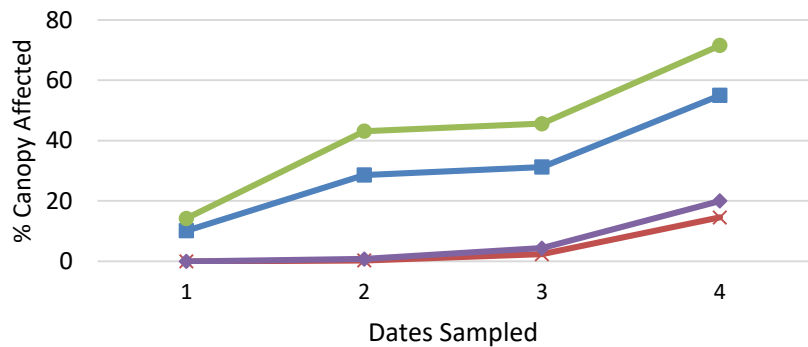
Lewiston Disease Pressure in Different Rye Termination Dates





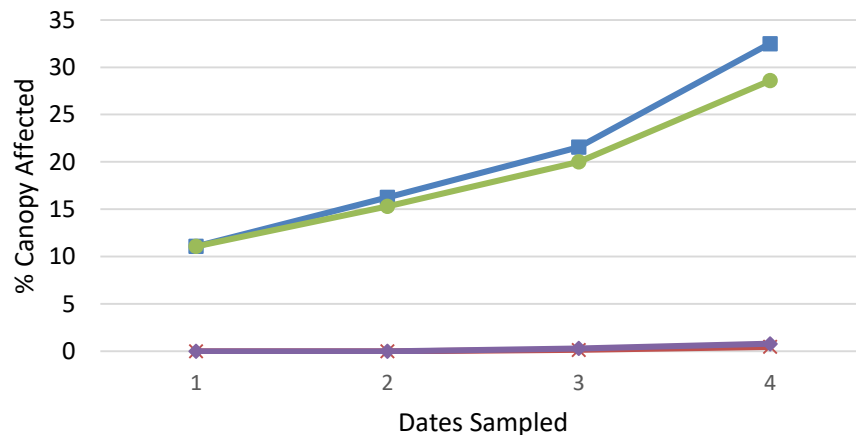
# Results

### Lewiston Disease Pressure in Different Fungicide Programs



- Moderately Intensive, Incidence
- × Moderately Intensive, Defoliation
- Intensive, Incidence
- ◆ Intensive, Defoliation

### Rocky Mount Disease Pressure in Different Fungicide Programs



- Moderately Intensive, Incidence
- × Moderately Intensive, Defoliation
- Intensive, Incidence
- ◆ Intensive, Defoliation

# Results

Pod yield was lower when peanut was planted into cereal rye desiccated in May compared with April



# Financial Return

- Financial return did not differ when indoxacarb was applied compared with no treatment for southern corn rootworm
- Financial return did not differ when weeds were removed by hand or when clethodim was applied compared with no hand weeding or additional sprays for grass control
- Financial return was similar for both fungicide programs
- Financial return was greater when cereal rye was terminated in April compared with May



# Summary

- Cereal rye has limited utility in peanut due to negative impacts on yield even though pest populations may be reduced with cereal rye
- Yield differences in the rye treatments were possibly due to greater early season interference of rye with peanut
- The value of indoxacarb for control of cucumber beetles (adults for southern corn rootworm) may have limited utility in North Carolina

# Hypothesis

Interactions among termination date for cereal rye cover crop, weed management, fungicide programs, and insecticide treatments will exist with respect to leaf spot incidence and canopy defoliation, damage from southern corn rootworm, response to drought conditions, pod yield, and financial return on investment

*In general, the hypothesis was rejected (main affects were significant in some instances while 2-way and 3-way interactions were seldom significant)*

# Future Research

- Investigate impact of early season interference from later termination of a cereal rye cover crop and the potential impacts on harvest efficiency
- Evaluate other approaches to disease, insect, and weed management using different tillage and cover crop systems
- Determine if results from small-plot research are translatable to farming operations

## References

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