INTERACTIONS OF TILLAGE SYSTEMS WITH SIX PEANUT CULTIVARS IN NORTH CAROLINA

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INTERPRETIVE SUMMARY

RESEARCH QUESTION

Many growers in North Carolina are interested in adopting reduced-tillage practices for peanuts. Research in this area has demonstrated that peanut response to reduced tillage systems can be inconsistent. Most reduced tillage studies in North Carolina have been conducted with a single cultivar with one digging date. Many studies also introduce production on flat ground versus bedded rows, and this most likely can affect response. Determining if cultivar selection and digging date can explain inconsistent response of peanuts to tillage would be useful in defining factors that will determine utility of these systems. The objective of this research was to determine the effect of cultivar selection and digging date on peanut yield, gross value, and pest reaction of peanut grown in conventional and reduced tillage systems.

LITERATURE SUMMARY

Farmers who produce cotton and other crops in reduced tillage systems in North Carolina also would like to adopt these systems in peanut in order to save time in the spring and reduce labor and long-term equipment costs. Improvement in long-term productivity and sustainability of cropping systems often occurs in reduced tillage systems, but only if crop yield is maintained. Conventional tillage practices are expensive and time consuming, and timing for tillage practices comes when growers are involved in many other farming operations, especially during the spring months. Research with reduced tillage systems in peanut has shown variable results. While research suggests that eliminating primary tillage practices such as moldboard plowing can be done without sacrificing yield or quality, yields in strip tillage and no tillage systems do not always equal that of conventional tillage systems. Research is needed to address the inconsistencies observed in various tillage systems.

Cultivars express a wide range of attributes that can be influenced by production practices. Seedling vigor, vegetative growth, pod retention, pest reaction, and maturity can contribute greatly to yield potential. Digging date can have a major impact on yield and quality, and timing of digging relative to peanut response to various inputs in experiments can have a major impact on conclusions drawn from these experiments. Determining if inconsistent response of peanut to tillage systems can be explained by cultivar selection or digging date could lead to more informed recommendations on implementation of reduced tillage systems.

STUDY DESCRIPTION

Field studies were conducted during 1999 at three locations in North Carolina on loam to loamy

sand soils (Gates, Chowan, and Martin Counties). In these studies, the cultivars NC 10C, NC-V 11, NC 12C, Perry, VA 98R, and Georgia Green were planted in conventional or reduced tillage systems, with two digging dates spaced approximately 10 days apart. Maturity of these varieties can range by as much as 20 days. Reduced tillage systems at Chowan, Gates, and Martin Counties consisted of no tilling into a wheat cover crop with a fluted colter, strip tillage using a Ferguson implement, and strip tillage with a KMC implement, respectively. Strip tillage implements were non-PTO driven and contained an in-row subsoiler with standard rolling baskets and colters. A subsoiler was not included at Chowan County in either conventional or no tillage systems. In Perquimans County, the cultivars listed above were evaluated in a strip tillage system only (KMC implement described previously) with two digging dates. In Edgecombe County, inclimate weather prevented evaluating two digging dates. However, cultivars were evaluated in conventional and strip tillage (KMC implement described previously) systems at this location. In Chowan County, the seedbed was flat for both tillage systems. Peanut was planted on beds in Perquimans County and on beds in both tillage systems in Edgecombe County. In Gates and Martin Counties, beds were generally higher in conventional tillage systems than in reduced tillage systems. The runner market type cultivar Georgia Green was seeded at 80 lb/A. The other cultivars (Virginia market types) were seeded at 120 lb/A. The planting operation was performed from several days following strip tillage to as long as 2 weeks after strip tilling. Standard pest management and production practices were administered to the entire test area throughout the season. Disease reaction, pod yield, market grade characteristics, and gross value were determined. Means of significant main effects and interactions were separated using Fisher's Protected LSD Test at P = 0.05 for individual locations.

APPLIED QUESTIONS

Did cultivar selection or digging date influence peanut yield or gross value differently in reduced tillage systems versus conventional tillage systems?

Main effects of tillage, digging date, and cultivar were significant in most but not all experiments. The interaction of cultivar by digging date was significant in most experiments. Differential response to digging date and cultivar selection was anticipated. Delaying digging often increases yield and gross value, and this response was noted at three of four locations. Cultivar response varied across locations. Other research has demonstrated that cultivar response often varies depending on pest pressure, environmental conditions, and digging dates. However, the interaction of cultivar by tillage system was not significant at the four locations where conventional and reduced tillage systems were compared. These data suggest that cultivars do not respond differently to tillage systems. When pooled over cultivars and digging dates, peanut response to tillage systems was similar in three of four experiments. However, there was a slight trend for decreased yield in the reduced tillage system at Gates County.

How does tillage affect pest reaction in peanut?

With the exception of Martin County, experiments were established in fields without a history of Cylindrocladium black rot [caused by *Cylindrocladium crotalarie* (Loos) Bell and Sobers] (CBR), a soil pathogen that occurs frequently in the Virginia-Carolina production region. Additionally, foliar diseases, such as early leaf spot (caused by *Cercospera arachidicola),* as well as the soilborne diseases southern stem rot (caused by *Sclerotium rolfsii)* and rhizoctonia limb and pod rot (caused by *Rhizoctonia solani),* were controlled with standard fungicide spray programs. Sclerotinia Blight (caused by *Sclerotinia minor* Jagger) was not present in these

experiments. At Martin County, incidence of CBR was not affected by tillage system. However, consistent with previous research, the cultivars NC 10C, NC 12C, and Perry offered some degree of resistance to this disease. Georgia Green offered intermediate resistance while NC-V 11 and, to a greater degree, VA 98R were very susceptible. Yield and gross value followed closely the trend noted for CBR reaction.

RECOMMENDATIONS

These studies suggest that cultivar selection and digging date do not appear to have a major impact on peanut response in conventional and reduced tillage systems. These studies reemphasize that yield response to cultivar selection and digging date will vary depending upon a variety of edaphic, environmental, and cultural practices. Conventional and reduced tillage systems performed equally well in three of four experiments. It should be noted that weather conditions during digging and combining in North Carolina were poor, and peanut response to these variables needs to be evaluated under normal production and harvesting conditions. However, results from these studies suggest that reduced tillage systems may be a satisfactory alternative to conventional production systems for peanuts grown in North Carolina. However, it is recommended that growers attempt reduced tillage peanut production on only a fraction of their acres to determine consistency of response on their soils under their management practices.