EFFECTS OF TILLAGE SYSTEMS ON PEANUT DISEASES, YIELD AND FUNGICIDE PERFORMANCE IN A PEANUT-COTTON ROTATION

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INTERPRETIVE SUMMARY

Reduced tillage systems are rapidly gaining in popularity throughout the southeastern United States. The adoption of reduced tillage methods has been slower in peanuts than in other crops, but more farmers are utilizing this technology for peanuts. The need to start growing peanuts to sell at competitive world market prices has generated interest in reduced input production systems, and reduced tillage systems help some growers achieve that goal. The additional benefits for reduced soil erosion, improved water infiltration, and economics of time and labor make reduced tillage even more attractive, particularly in areas with highly erodible soils.

One of the factors that has limited the acceptance of reduced tillage for peanut production has been the belief that conventional deep turning was essential for disease control, particularly stem rot (white mold) caused by *Sclerotium rolfsii*. This disease has been a major production constraint for peanut producers in Georgia for many years and continues to be one of our most damaging diseases. Previous work has demonstrated the potential for organic matter near or at the soil surface to increase losses to stem rot. With few other options previously available to manage this widespread pathogen, deep turning the soil was considered a frontline of defense. The registration of several highly effective fungicides has greatly increased our ability to manage stem rot, but deep turning has persisted as the primary method of land preparation for peanuts in Georgia.

Crop rotation is also known to have dramatic effects on peanut productivity and disease levels. The rapid increase in cotton acres in Georgia during the 1990's has made it the most commonly rotated crop with peanut. This rotation is generally favorable for cotton production and for reducing nematode and stem rot levels in peanut, but there are concerns about Rhizoctonia limb rot. Cotton stalks are also persistent and contribute to higher levels of organic matter associated with cotton rotations.

In this study we evaluated peanut and cotton grown in alternating years from 1994-1998 using conventional deep turning, strip tillage in a rye stubble, and strip tillage in a stale seed bed consisting of the previous years crop stubble and weeds killed by herbicide. Split plots of peanut were treated or not treated with Moncut for control of soilborne peanut diseases. The field had high levels of stem rot with an incidence of up to 45% in nontreated plots. Moncut reduced stem rot incidence 70-80% and increased peanut yields up to 47%. The fungicide was equally effective in the conventional and reduced tillage plots. In the plots where Moncut was not sprayed, there were small differences in disease incidence in some years, but over the five years of the study stem rot levels were similar in all tillage treatments. Tomato Spotted Wilt Virus (TSWV) was a significant factor each year of the test. The conventional tillage plots had significantly higher incidence of this disease several years, thus verifying observations that reduced tillage fields had reduced damage from TSWV. This factor has since been incorporated into the Georgia TSWV Risk Index. Rhizoctonia limb rot was present only at low levels each year of the study and little was learned about the effects of tillage on this disease.

Crop yields were very similar among the three tillage treatments. There were no significant differences in peanut yields due to tillage in any year of the study. Average yields across years were 2842, 2995, and 2966 lb/A for the conventional tillage, strip till in rye, and strip till in a stale bed, respectively. Moncut consistently increased peanut yields with the greatest increase being 47%. Seed cotton yields showed some variation among tillages, but it was not consistent from year to year. Most years cotton yields were similar among tillage treatments averaging 1246, 1178, and 1202 lb/a for the conventional tillage, strip till in rye, and strip till in a stale bed.

Overall there were surprisingly few differences among tillage treatments in crop yield and disease levels, especially since there was a lot of stem rot present. Increased crop residues in this study did not increase diseases. Differences were observed among weed control programs. Reduced tillage systems required greater inputs of post-emergence herbicides and volunteer peanuts were a problem in reduced tillage cotton. Reduced tillage peanuts may have a place for more growers in the southeast. Further improvements in farm chemicals and other technologies may make it even more practical.