INTERACTIONS OF TILLAGE WITH OTHER COMPONENTS USED TO MANAGE TOMATO SPOTTED WILT OF PEANUT

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ABSTRACT

Conservation tillage is a cultural practice that can be used to minimize tomato spotted wilt of peanut (*Arachis hypogaea* L.). Other practices that influence incidence of tomato spotted wilt include: in-furrow insecticides to control thrips (*Frankliniella fusca*), cultivar selection, planting date, planting pattern, and plant population. Tomato spotted wilt was generally lower when the peanut cultivar Gregory was seeded at higher plant populations in strip tillage systems, or when phorate was applied in the seed furrow. However, when *Cylindrocladium* black rot [caused by *Cylindrocladium crotalarie* (Loos) Bells and Sobers] was present, disease incidence was higher and peanut pod yield lower when the cultivar Gregory was planted rather than the cultivar Perry. While supporting the current tomato spotted wilt index in North Carolina and Virginia, these data also indicate that response to specific components of the index can be inconsistent, and that distinguishing between *Cylindrocladium* black rot and tomato spotted wilt in previous years is critical when incorporating appropriate cultural and pest management practices for control of both diseases.

SUMMARY

Tomato spotted wilt is a major disease of peanut in the southeastern United States and has also become established in the Virginia-Carolina production region in recent years. Risk indices have been developed in both production regions to minimize the impact of tomato spotted wilt on peanut yield and quality. Planting date, plant population, row pattern, tillage system, cultivar selection, and in-furrow insecticide can influence the severity of tomato spotted wilt of peanut. However, these practices are incorporated into management systems early in the season before growers know the severity of infestation for that year. There are no curative or corrective practices for tomato spotted wilt that can be incorporated after peanut is planted. Defining interactions among these practices is important in order to determine which components are the most effective, especially when considering other pests. Research was conducted from 2002 through 2004 to evaluate interactions of tillage system, cultivar selection, in-furrow insecticide, and plant population/seeding rate on development of tomato spotted wilt and peanut pod yield.
Experiments were conducted in North Carolina at the Peanut Belt Research Station located near Lewiston-Woodville from 2002 through 2004 and at the Upper Coastal Plain Research Station located near Rocky Mount during 2003 and 2004. Peanut was seeded in conventional tillage systems or strip tilled into a killed wheat cover crop. Phorate at 5 lb ai/acre or aldicarb at 7 lb ai/acre were applied in the seed furrow with the cultivars Gregory or Perry. In 2002 each tillage system/cultivar/in-furrow insecticide combination was included in twin row and single row planting patterns at Lewiston-Woodville. In 2003 and 2004 peanut was seeded in single rows at in-row populations of 4 or 5 seed/row-foot. Twin row planting patterns consisted of rows spaced

9 inches apart on 36-inch centers. The percentage of plants in each plot exhibiting visual signs of tomato spotted wilt virus or *Cylindrocladium* black rot were recorded in mid September using a scale of 0 to 100% where 0 = no diseased plants and 100 = the entire peanut canopy exhibiting symptoms of disease. Pod yield was determined in late September or early October.

The interaction of experiment X tillage system X in-furrow insecticide X cultivar X plant population/planting pattern was not significant for disease incidence or pod yield. However, several two and three-way interactions were significant. At three locations incidence of tomato spotted wilt or *Cylindrocladium* black rot did not exceed 5%. When tomato spotted wilt was present, less disease was noted when peanut was seeded in conservation tillage systems, when the insecticide phorate was applied rather than aldicarb, when the cultivar Gregory was planted rather than Perry, and when peanut was planted in a twin row planting pattern rather than in single rows. When *Cylindrocladium* black rot was present, more disease was noted for Gregory compared to Perry. Suprisingly, less *Cylindrocladium* black rot was noted when Gregory was planted and aldicarb was applied compared to applying phorate. Incidence of *Cylinrocladium* black rot was also higher when the in-row plant population was increased.

Pod yield varied depending upon year, location, tillage system, and cultivar. Pod yield was higher in two experiments when peanut was seeded in conservation tillage systems. In two experiments there was no difference in yield when comparing tillage systems while at one location yield was higher in conventional tillage systems than in conservation tillage systems. Yield of the cultivars Gregory and Perry was similar in three experiments, lower for Gregory in one experiment, and lower for Perry in the other experiment. The interaction of experiment, in-furrow insecticide, and plant population was also significant. When comparing within experiments, there was no difference in yield between plant poulations when phorate was applied. However, when aldicarb was applied, pod yield was lower in one experiment when tomato spotted wilt was present and peanut was seeded at 4 seed/row-foot rather than at 5 seed/row-foot. The opposite response was noted when *Cylindrocladium* black rot was present and aldicarb was applied in-furrow.