TILLAGE AND THIMET EFFECTS ON THREE PEANUT CULTIVARS: TOMATO SPOTTED WILT VIRUS CONTROL

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ABSTRACT

The study was conducted in 1998 on a Dothan sandy loam at Quincy and on a Chipola loamy sand (fine, loamy siliceous, thermic Plinthic Kandiudults) at Marianna, two locations of the North Florida Research and Education Center (NFREC). The objectives of this research were to evaluate the influence of tillage (strip-till vs. conventional) and Thimet application on Tomato Spotted Wilt Virus (TSWV) control and yield of three peanut varieties (Georgia Green, SunOleic 97R, and MDR 98). Georgia Green and Florida MDR are somewhat resistant to TSWV and SunOleic 97R is a susceptible check. There was no significant difference between conventional and strip tillage for, the incidence of TSWV. Georgia Green (Quincy) and Georgia Green and MDR98 (Marianna) showed less TSWV incidence when compared with S97R. Thimet significantly reduced TSWV incidence at Quincy but not at Mariana where disease was much more severe. Severity of TSWV was generally lower for strip tillage than conventional tillage at both locations. The variety with least severity of TSWV was Georgia Green (Quincy) and Georgia Green and MDR98 (Marianna). Yield of peanuts were higher from strip tillage than conventional tillage from the experiment conducted in Quincy, but the yields were not influenced by tillage systems on the experiment conducted in Marianna. Higher yields were obtained from Georgia Green than other cultivars at the Quincy site and from MDR98 than other cultivars at the Marianna site. There was no significant difference for peanut yields between Thimet applications at the Quincy and Marianna sites. Use of resistant cultivars can be an important factor in decreasing the effects of disease (TSWV), and subsequent cost of disease control and use of Thimet can be a positive addition to a management program in areas where TSWV is a problem.

INTRODUCTION

Tomato Spotted Wilt Virus (TSWV) is a serious disease of peanut (Culbreath et al., 1992). Most peanut fields in the southeastern USA are infected with this virus. According to Olson and Funderburk (1986), the tobacco thrips, Frankliniella fusca (Hinds), is an important vector of TSWV in Florida. Viral disease of peanut is difficult to manage due to lack of chemical control (Carrol et al., 1996). Integrated strategies using cultural practices and host plant resistance are currently the only options for management of TSWV. These strategies are updated yearly as new research is available by a checklist chart called "tomato spotted wilt risk index for peanut" (Prostko, 2000).

Conservation tillage systems are receiving increasing acceptance to reduce erosion (Berg et al., 1988). Moldenhauser et al. (1983) have shown that the effectiveness to control erosion depends on the amount of crop residue left on the soil surface. Minimum tillage increases soil organic matter, soil moisture, and improves soil texture that usually results in increased yield of plants.

The objectives of the experiments were to compare three cultivars of peanuts planted in

conventional and strip tillage with and without Thimet for the TSWV incidence, severity, and yields.

MATERIALS AND METHODS

These studies were conducted in 1998 on a Dothan sandy loam at Quincy and on a Chipola sandy loam (fine, loamy siliceous, thermic Plinthic Kandiudults) at Marianna, both locations of the University of Florida, NFREC. The treatments were: Peanut variety (Georgia Green, SunOleic 97R, and MDR 98), Tillage (Strip-till and Conventional), and Thimet application (Thimet - 5 lb/A and no Thimet). The conventional section of the study was plowed and smoothed with an s-tined field cultivator. Rows on the strip-till section were prepared with a Brown Ro-till planter. Three varieties of peanuts were planted with KMC planters at a seeding rate of 6 seeds/ft of 36-inch wide rows in Quincy and Marianna on April 23 and 24 in 1998, respectively. Thimet was applied at planting in fun-ow at 5 lb/A on the sections with Thimet. After planting, the entire study was sprayed with Prowl at 1 qt/A. In Quincy, the test was irrigated when needed and in Marianna the test was not irrigated.

Peanuts were sprayed with Cadre DG at 1.44 oz/A + Induce at 1 qt/l00 gal to control weeds. Bravo S at 3 pt/A was also broadcast sprayed, starting about 40 days after emergence and continued every 2 weeks with Bravo Ultra at 0.7 lb/A until 2 weeks prior to harvest. During the growing season, peanuts were evaluated for severity and incidence of TSWV. Severity was the average of 20 plants from each of four replicated plots (rated from 0-5, with 0 being no symptoms; 3, general chlorosis; and 5, general necrosis). Incidence was the proportion of 20 plants with symptoms of four replicated plots. Mature peanuts were inverted and harvested in Marianna and Quincy and then dried to 10% moisture.

Data were analyzed using SAS (1989) by analysis of a variance, and means were separated using Fisher's Least Significant Difference Test at the 5% probability level.

RESULTS AND DISCUSSION

There was no significant difference between conventional and strip tillage for the incidence of TSWV, but it increased significantly with time of observation and tended to be lower throughout the season with strip tillage (Figs. 1 and 2).

The comparison of three peanut cultivars (Figs. 3 and 4) shows that Georgia Green (Quincy) and Georgia Green and MDR98 (Marianna) were more resistant to the TSWV incidence when compared with S97R. For all cultivars, incidence increased with time of observation with the highest incidence of TSWV at the end of the observation period.

There was no significant difference between the treatments with and without Thimet in Marianna (Fig. 6), but the incidence of TSWV was lower with Thimet application on peanuts grown in Quincy (Fig. 5).

Severity of TSWV on three peanut cultivars in conventional and strip tillage in Quincy and Marianna was generally lower for strip tillage than conventional tillage for both locations (Figs. 7 and 8). Georgia Green was the most resistant variety to TSWV. The differences were more significant at the end of the vegetation period for peanuts (Figs. 9 and 10).

At Quincy, there was a tendency to reduce the seventy of TSWV on peanuts with the application of Thimet (Fig. 11), but the results obtained from Marianna did not show any benefits of Thimet application to reduce this severity (Fig. 12).

Yields of peanuts were higher from strip tillage than conventional tillage at the experiment conducted in Quincy (Fig. 13), but yields were not influenced by tillage systems on the experiment conducted in Marianna (Fig. 14). Higher yields were obtained from Georgia Green than other cultivars at Quincy (Fig. 13), but yields of peanuts were higher from MDR98 than other cultivars at Marianna (Fig. 14). There was no significant difference for peanut yield with and without Thimet at Quincy or Mariana (Figs. 15 and 16).

CONCLUSIONS

1. There were little differences in yields of peanuts grown in strip or conventional tillage, although severity of TSWV was lessened by strip tillage as compared with conventional tillage.

2. Use of resistant cultivars can be an important factor in decreasing the effects of TSWV and subsequent yield.

3. Use of Thimet can be a positive addition in areas where TSWV is a problem but may be less effective under extremely high disease pressure.

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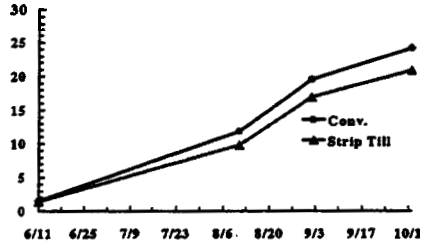

Fig. 1. Incidence of TSWV on three peanut cultivars in conventional and strip tillage in Quincy

Fig. 2. Incidence of TSW on three peanut cultivars in conventional and strip tillage in Marianna

Fig. 3. Incidence of TSWV on three peanut cultivars across two tillage methods in Quincy

Fig. 4. Incidence of TSWV on three peanut cultivars across two tillage methods in Marianna

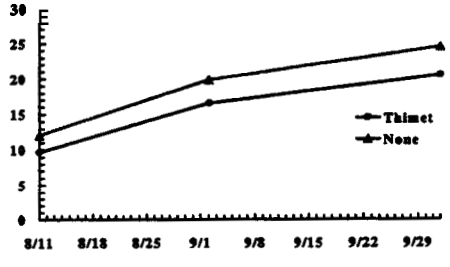

Fig. 5. Incidence of TSWV on Thimet use in conventional and strip tillage in Quincy

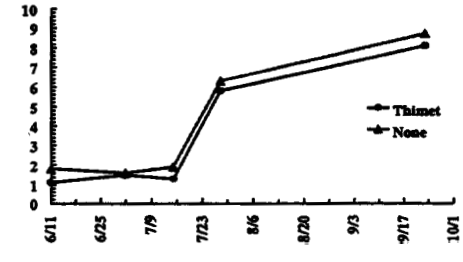

Fig. 6. Incidence of TSWV on Thimet use in conventional and strip tillage in Marianna

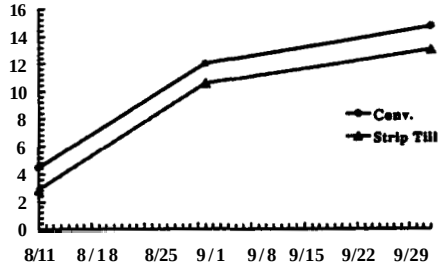

Fig. 7. Severity of TSWV on three peanut cultivars in conventional and strip tillage in Quincy

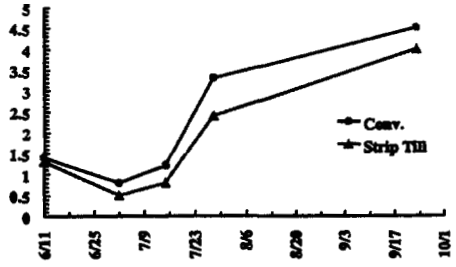

Fig. 8. Severity of TSWV on three peanut cultivars in conventional and strip tillage in Marianna

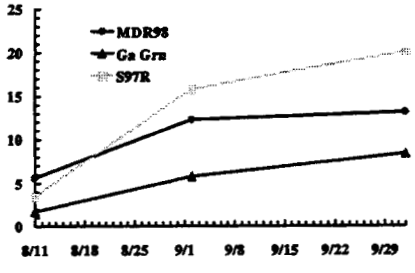

Fig. 9. Severity of TSWV on three peanut cultivars across two tillage methods in Quincy

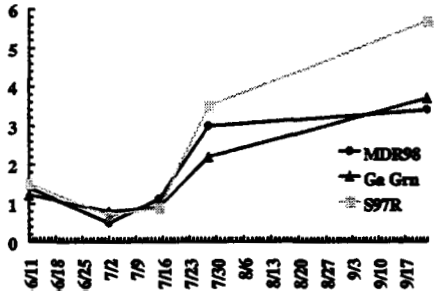

Fig. 10. Severity of TSWV on three peanut cultivars across two tillage methods in Marianna

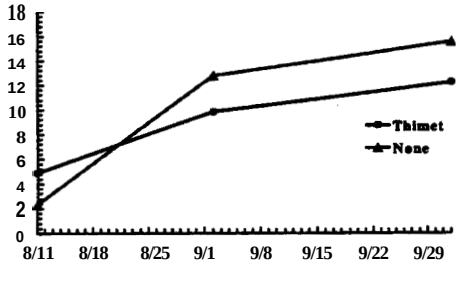

Fig. 11. Severity of TSWV in relation to Thimet use in conventional and strip tillage in Quincy

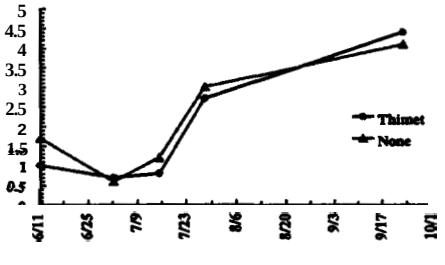

Fig. 12. Severity of TSWV in relation to Thimet use in conventional and strip tillage in Marianna

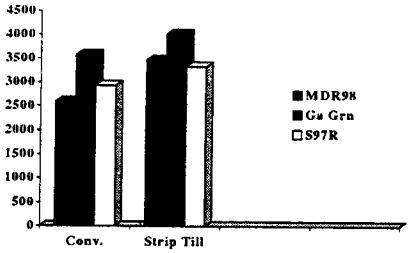

Fig. 13. Pod yields (lb/A) of three peanut cultivars in conventional and strip tillage in Quincy

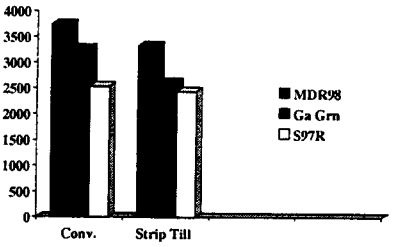

Fig.14. Pod yields (Ib/A) of three peanut cultivars in conventional and strip tillage in Marianna

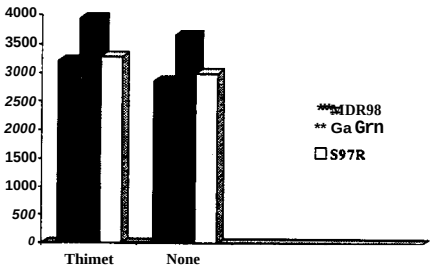

Fig. 15. Pod yields (Ib/A) in relation to Thimet use in conventional and strip tillage in Quincy

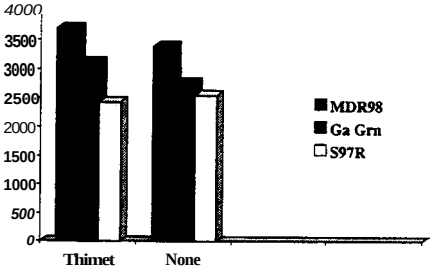

Fig. 16. Pod yields (lb/A) in relation to Thimet use in conventional and strip tillage in Marianna