

THRIPS POPULATIONS, BUT NOT YIELD, AFFECTED BY PLASTIC MULCH, BUT NOT CULTIVAR, IN SUMMER TOMATOES

Thomas Horgan¹, Kent Cushman¹, and Jack Reed²

¹ Horticulture Research & Education Unit, North Mississippi Research & Extension Center, PO Box 1690, Mississippi State University, Verona, MS 38879

² Dept. of Plant and Soil Sciences, Mississippi State University, PO Box 9555, Mississippi State, MS 39762

ABSTRACT: This experiment was conducted during the 2001 growing season at the North Mississippi Research and Extension Center in Verona. This study was conducted in part due to the high incidence in northern Mississippi of Tomato Spotted Wilt Virus (TSWV) during 1999 and 2000. The experimental design was a split plot with four replications. The main plot was plastic mulch, silver or white. The subplot was cultivar, BHN 444, BHN 555, 'Mountain Spring' and 'Equinox'. The two BHN cultivars are reported to have TSWV resistance and 'Mountain Spring' and 'Equinox' do not. BHN 555 and 'Equinox' are considered to be heat-tolerant tomato cultivars. Cultivars were transplanted to the field 18 May. Incidence of TSWV was very low and it was generally reported throughout our region that incidences of TSWV was low during 2001. The main plot factor of plastic mulch significantly affected thrips populations but not yield. There were few flower thrips present, but of those present there was a significantly greater number of flower thrips detected on plants grown on silver mulch than on plants grown on white mulch. In contrast, there was a greater number of tobacco thrips present than flower thrips, and there was a significantly greater number of tobacco thrips on plants grown on white mulch than on plants grown on silver mulch. Later in the season, one day prior to first harvest, flower thrips were more numerous, and there appeared to be a significantly greater number on plants grown on white mulch than on plants grown on silver mulch. These results were consistent for the two species of flower thrips, *Frankliniella tritici* and *F. occidentalis*. None of the yield categories were affected by mulch. The subplot factor of cultivar did not affect thrips populations. In addition, cultivar did not affect total yield. Percent marketable yield, however, was significantly lower for BHN 555 than the three other cultivars. BHN 555 also had significantly greater yield of tomatoes in the jumbo category than 'Mountain Spring' or 'Equinox' and it had significantly greater size (oz/fruit) than 'Equinox.'

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KEY WORDS: Thrips, *Frankliniella spp*, tomato cultivars, *Lycopersicon esculentum*, plasticulture, reflective polyethylene mulches.

MATERIALS AND METHODS: This experiment was conducted during the 2001 growing season at the North Mississippi Research and Extension Center in Verona. This study was conducted in part due to the high incidence in northern Mississippi of Tomato Spotted Wilt Virus (TSWV) during the growing season of 1999 and 2000.

The experimental design was a split plot design with four replications. The main plot was plastic mulch, silver or white. The subplot was cultivar, BHN 444, BHN 555, 'Mountain Spring' and 'Equinox'. The two BHN cultivars are reported to have TSWV resistance and 'Mountain Spring' and 'Equinox' do not. BHN 555 and 'Equinox' are considered to be heat-tolerant tomato cultivars All cultivars were seeded into 36-cell flats in the greenhouse 16 April and transplanted to the field, by hand, through holes made in the plastic 18 May.

Results of a soil test recommended fertilizer applications of 120 lb N, 180 lb P₂O₅, and 180 lb K₂O per acre. Sixty percent of the N and all the P and K were applied preplant. Soluble fertilizer was applied after first bloom by injecting a concentrated solution of NH₄NO₃ and CaNO₃ through the drip tubing and this supplied an additional 30 lb/ac N. Raised beds were formed six inches high and 24 in across the top with a press-pan-type bed shaper. Immediately after shaping, the drip tubing and mulches were applied.

Each plot was three rows wide and 10 ft long. Plants were spaced 2 ft apart within rows, making a total of 15 plants per plot. The two outside rows, a total of 10 plants, were harvested for yield determinations, and the middle row, of

5 plants, was reserved for flower and leaf removal and subsequent determination of thrips populations. Plant beds were spaced 6 ft apart, center to center.

After planting, the herbicide Sencor DF (metribuzin) was applied between plots with a backpack sprayer. Asana XL (esfenvalerate), Spintor (spinosad), or Pounce 3.2EC (permethrin), were mixed with Bravo WS (chlorothalonil) or Quadris (azoxystrobin) and sprayed on a 7 to 10 day schedule for insect and disease control.

Plants were sampled by visual examination of all leaves on the plants and the numbers of adult thrips were counted. Thrips on foliage were not collected, but were identified on the plants by color (dark = tobacco thrips [*Frankliniella fusca*]; light = flower thrips, a combination of western flower thrips [*F. occidentalis*] and flower thrips [*F. tritici*]). Plants were not damaged and leaves were not removed. After plants began flowering uniformly, 10 blooms per plot were strongly thumped with a finger over a white pan to dislodge thrips, and thrips were vacuumed into a vial with a battery-powered aspirator. Vials containing thrips were taken to the laboratory for identification under magnification (dissection microscope). Some of the thrips from blooms were mounted on microscope slides to further verify identifications made under the dissection microscope.

Weekly harvests began 19 July and ended 16 August for a total of 5 harvests. Tomatoes were separated into marketable or unmarketable with marketable tomatoes further separated into size categories of jumbo, extra large, large, or medium.

RESULTS AND DISCUSSION:

Incidence of Tomato Spotted Wilt Virus (TSWV) was very low in this experiment, and it was generally reported throughout our region that TSWV was low during the 2001 growing season. Only two out of a total of 480 plants exhibited symptoms of TSWV. With so few plants exhibiting symptoms, no conclusions about the effects of plastic mulch or cultivar in controlling disease incidence can be reported.

The main plot factor of plastic mulch significantly affected thrips populations but not yield. Thrips populations on young plants were affected differently according to the species of thrips. There were few flower thrips present, but there was a significantly greater number of flower thrips detected on plants grown on silver mulch than on plants grown on white mulch (Table 1) In contrast, there was a greater number of tobacco thrips present than flower thrips, and there was a significantly greater number of tobacco thrips on plants grown on white mulch than on plants grown on silver mulch. Later in the season, one day prior to first harvest, flower thrips were more numerous than earlier in the season, and there appeared to be a significantly greater number on plants grown on white mulch than on plants grown on silver mulch (Figs. 1 and 2). These results were consistent for the two species of flower thrips, *Frankliniella tritici* and *F. occidentalis*. None of the yield categories were affected by mulch (Table 2).

The subplot factor of cultivar did not significantly affect thrips populations (Table 1; Figs. 1 and 2). In addition, cultivar did not affect total yield. Percent marketable yield, however, was significantly lower for BHN 555 than the three other cultivars. BHN 555 also had significantly greater yield of tomatoes in the jumbo category than 'Mountain Spring' or 'Equinox' and it had significantly greater size (oz/fruit) than 'Equinox.'

Table 1. Mean thrips per plant across dates on pre-bloom tomatoes.

Bracket	Level of	Level of	Flower thrips*	Flower thrips* Std. Dev.	Tobacco thrips	Tobacco thrips Std. Dev.
Mulch	White mulch		0.15 a	0.48	4.08 a	5.54
Mulch	Silver mulch		0.48 b	0.82	0.37 b	0.68
Variety	Mt Spring		0.18 a	0.46	2.41 a	5.03
Variety	BHN 444		0.44 a	0.80	1.25 a	2.08
Variety	Equinox		0.41 a	0.76	3.00 a	5.44
Variety	BHN 555		0.24 a	0.69	2.41 a	4.18
Mulch*Variety	White	Mt Spring	0.00 a	0.00	4.28 a	6.40
Mulch*Variety	White	BHN 444	0.25 a	0.45	2.25 a	2.57
Mulch*Variety	White	Equinox	0.19 a	0.40	5.63 a	6.77
Mulch*Variety	White	BHN 555	0.20 a	0.77	4.13 a	5.26
Mulch*Variety	Silver	Mt Spring	0.38 a	0.62	0.31 a	0.60
Mulch*Variety	Silver	BHN 444	0.63 a	1.02	0.25 a	0.45
Mulch*Variety	Silver	Equinox	0.63 a	0.96	0.38 a	0.81
Mulch*Variety	Silver	BHN 555	0.29 a	0.61	0.57 a	0.85

Means within a column and bracket not sharing common letters differ significantly (LSD; $p=0.05$)

*Flower thrips includes *Frankliniella occidentalis* (western flower thrips) and *F. tritici* (flower thrips).

Table 2. Yield, percent marketable, and average weight of tomatoes. Values are means of four replications of 10 plants per replication.

Treatment	Total marketable ¹		Jumbo		Extra large		Large		Medium	
	(lb)	(%)	(lb)	(oz/fruit)	(lb)	(oz/fruit)	(lb)	(oz/fruit)	(lb)	(oz/fruit)
<i>Cultivar</i>										
Mt Spring	154	82	15	15.3	111	9.6	20	6.0	9	4.3
BHN 444	175	79	20	15.7	132	9.7	16	6.2	7	4.6
Equinox	161	80	14	14.9	120	9.5	20	6.0	7	4.6
BHN 555	159	70	24	15.8	115	10.0	14	6.1	6	4.7
LSD ²	NS	4	8	0.7	NS	NS	NS	NS	NS	NS
<i>Plastic mulch</i>										
White	168	78	20	15.3	124	9.7	17	6.1	7	4.2
Silver	157	78	16	15.5	115	9.7	18	6.1	7	4.9
LSD ²	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

¹ Total marketable yield (lb) is the sum of jumbo, extra large, large, and medium. Total marketable (%) is the relative number of marketable tomatoes as a percentage of total number harvested (marketable plus unmarketable).

² Least Significant Difference (LSD) at $P=0.05$. Treatments not significantly different (NS).

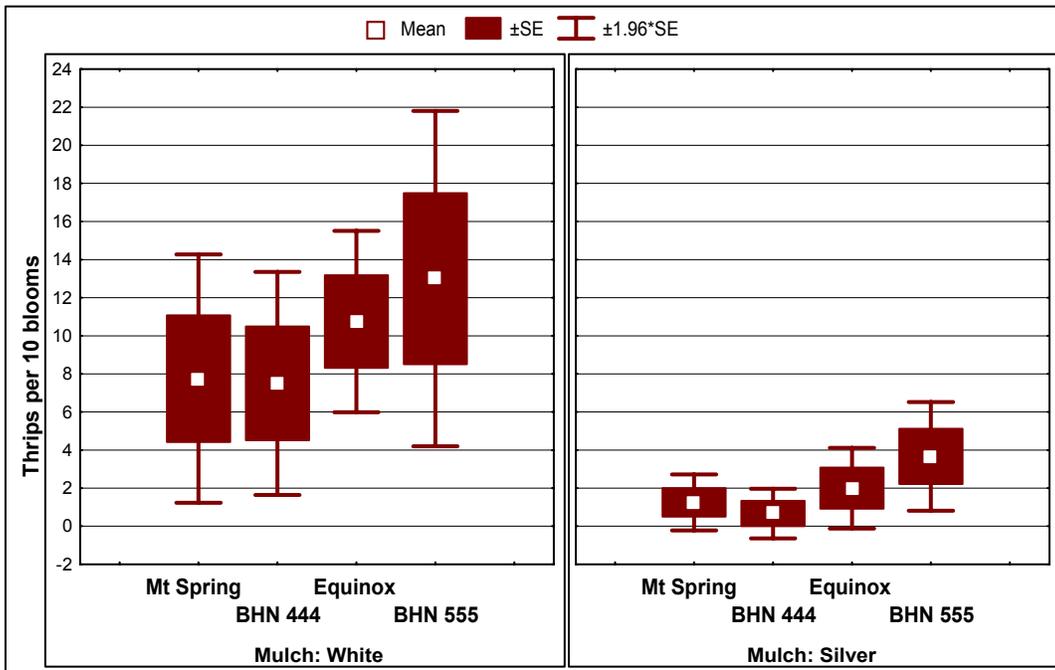


Figure 1. Mean western flower thrips (*Frankliniella occidentalis*) per 10 blooms on 18 July, 2001.

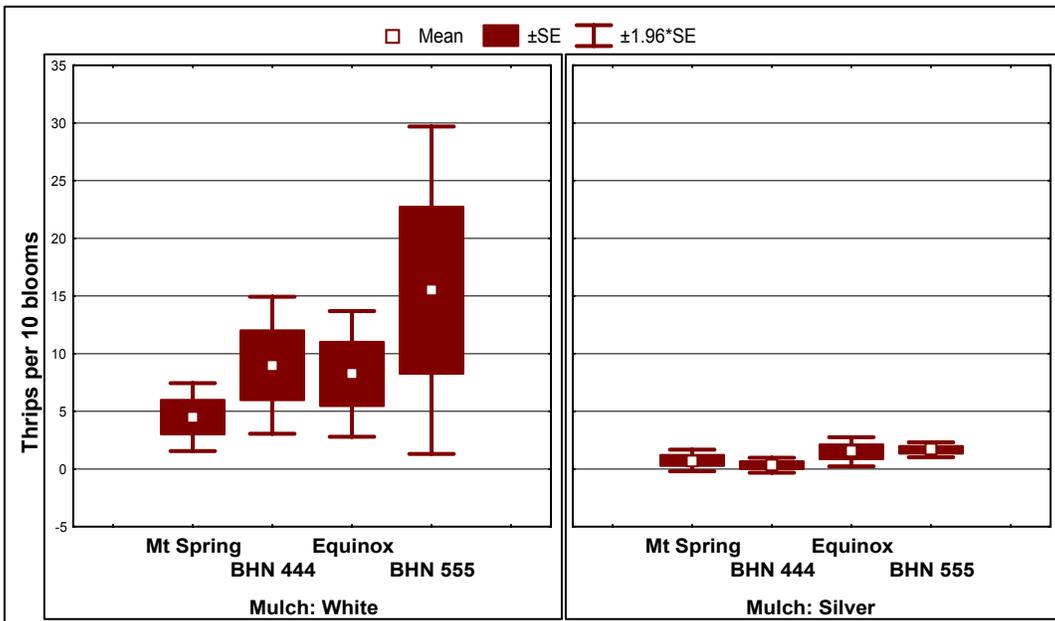


Figure 2. Mean (eastern) flower thrips (*Frankliniella tritici*) per 10 blooms, July 18, 2001.