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GROWTH AND YIELD OF TRIPLOID WATERMELON AS AFFECTED BY FERTILIZER SOURCE, MULCH, AND ROW COVER

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INTRODUCTION

Interest in triploid watermelon (seedless) production has increased in recent years. The first commercial plantings in Texas were made in 1969 (Earhart, 1971). Watermelons are among the crops which efficiently use nutrients available from poultry litter (Bandel et al., 1972). Melons can be successfully produced by using black plastic mulch and/or row covers (Bhella, 1988). There has been little, if any, work on the interactive effects of these inputs on watermelon production.

The objective of this study was to investigate the effect of fertilizer source (poultry litter vs. commercial fertilizer), black plastic mulch, and spunbonded floating row cover on growth, yield, and quality of triploid watermelons.

METHODS AND MATERIALS

The experiment was conducted in 1990 in Nacogdoches, Texas on a Fuquay-Darco sandy loam soil that had not been in cultivation since 1970. A split-plot design with 3 replications was used. The main plot was fertilizer source. Subplots were plastic mulch and row cover. The poultry litter to be used was analyzed and determined to contain 3.12% total N. Application rates of poultry litter and commercial fertilizer were made on 3 April. Commercial fertilizer rates were based on recommended rates of N for watermelon production in the East Texas area (Stein et al., 1990). Poultry litter at a rate of 6 tons/ac, containing .03% total N, was broadcast and soil incorporated to a depth of 8 in. Commercial fertilizer at the rate of 600 lbs/ac (6-24-24) was applied 4 in. deep in double row bands 12 in. apart on a single bed. Beds were made on 40 in. centers with 3 beds per plot, which allowed for guard rows on each side of the data row. At vine elongation, commercial fertilizer plots received an additional application of 30 lbs N by injecting urea-ammonium-nitrate (UAN) through the trickle system. Photo-degradable plastic mulch 1.5 mil thick and 5 ft. wide was applied 9 April. Individual rows were 40 in. wide by 20 ft. long. Triploid watermelon plants (Tiffany) were hand transplanted the same day at a spacing of 3 ft. Royal Jubilee was used as a pollinator and planted on plot borders.

Immediately following planting 6 ft. wide row cover, 3.5 oz/yd^2, was applied on treated plots and left in place for 25 days. Vegetative growth measurements were obtained on 9 May. Temperatures were monitored 15 min. every 4 hrs. over a 10-day period only on poultry litter plots. Ambient air temperature was measured at 2 in. row. Soil temperature was monitored at 4 in. depth. Air temperature under row cover was measured at a distance of 1 in. above plastic mulch and bare ground. Yield and soluble solids concentration data were obtained from a once-over harvest on 28 June.

RESULTS AND DISCUSSION

Growth and quality factors examined were not significantly affected by fertilizer source (Table 1). Mean fruit weight and soluble solids concentration were increased by plastic mulch. Vine dry weight and length were decreased by row cover. A possible explanation was the excess thickness of the row cover, which may have reduced light transmission resulting in decreased plant growth. Black plastic mulch and row cover interacted on vine fresh weight, melon number, and plot weight (Table 2). Mulch treatments without row cover increased vine fresh weight. A pronounced increase was noted when black plastic was used alone. Row cover alone decreased melon number per plot. No differences in plot weight were observed for black plastic treatment with or without row cover. A 48% decrease in plot yield was found when row cover was used alone.

Several treatments had a pronounced effect on diurnal soil and air temperatures over a 24 hr. period (Fig. 1). Soil temperatures were increased by all treatments when compared to bare ground alone. Floating row covers tended to decrease soil temperature when used in combination with plastic mulch, but showed an increase when used on bare ground alone. Air temperature under row cover in combination with plastic mulch or bare ground was increased over ambient air.

CONCLUSION

The data obtained indicated that poultry litter could be substituted for commercial fertilizer blends in seedless watermelon production. An increase in melon number and weight, as well as soluble solids concentration, can be expected when black plastic is used. The weight of row cover material used in this experiment was possibly too heavy to be of any beneficial use in early seedless watermelon production.

Lighter weight row covers should be considered to allow for more light penetration. Increased diurnal soil and air temperatures can be anticipated with the use of plastic mulch and row cover which should prove to be useful in terms of wind and frost protection for successful production of early seedless watermelons.

LITERATURE CITED

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Table 1. Effects of fertilizer source (FS), black plastic mulch (BPM), and spunbonded floating row cover (SFC) on triploid watermelon vegetative growth, yield, and soluble solids concentration.

Treatment	Vegetative Growth[z]			Yield			
	Vine fresh wt. (g)	Vine dry wt. (g)	Vine length (cm)	Melon no. per plot	Plot wt. (kg)	Mean fruit wt. (kg)	Soluble solids conc. (%)
Fertilizer Source							
Poultry litter	355.1	63.8	83.1	15	41.6	2.7	9.6
Commercial	426.3	75.7	92.7	12	36.5	2.9	10.2
Black Plastic Mulch							
With	452.1	71.6	93.1	16	50.5	3.2	10.8
Without	329.3	67.9	82.7	11	27.7	2.4	9.0
Floating Row Cover							
With	277.5	51.8	68.7	13	34.7	2.6	9.7
Without	503.9	87.6	107.0	15	43.4	3.0	10.0
SIGNIFICANT EFFECTS AND INTERACTIONS[y]							
FS	NS	NS	NS	NS	NS	NS	NS
BPM	*	NS	NS	***	***	***	***
SFC	***	***	***	NS	**	NS	NS
BPM X SFC	**	NS	NS	***	**	NS	NS
FS X BPM	NS	NS	NS	NS	NS	NS	NS
FS X SFC	NS	NS	NS	NS	NS	NS	NS
FS X BPM X SFC	NS	NS	NS	NS	NS	NS	NS

[z] Data taken 5 days after SFC removal.
[y] Nonsignificant (NS) and significant at P = .10 (*), .05 (**), and .01 (***).

Table 2. Interactive effects of black plastic mulch and spunbonded floating row cover on triploid watermelon vine fresh weight, melon number per plot, and plot weight.

Treatment		Vine fresh wt. (g)	Melon no. per plot	Plot wt. (kg)
Black plastic mulch	Floating row cover			
With	With	268.2 B[z]	17 a	50.6 a
	Without	635.9 A	14 a	50.3 a
Without	With	286.7 a	8 b	18.9 B
	Without	372.0 a	14 a	36.4 A

[z]Means followed by the same letter are not significantly different at P = .05 (lower case), and .01 (uppercase).

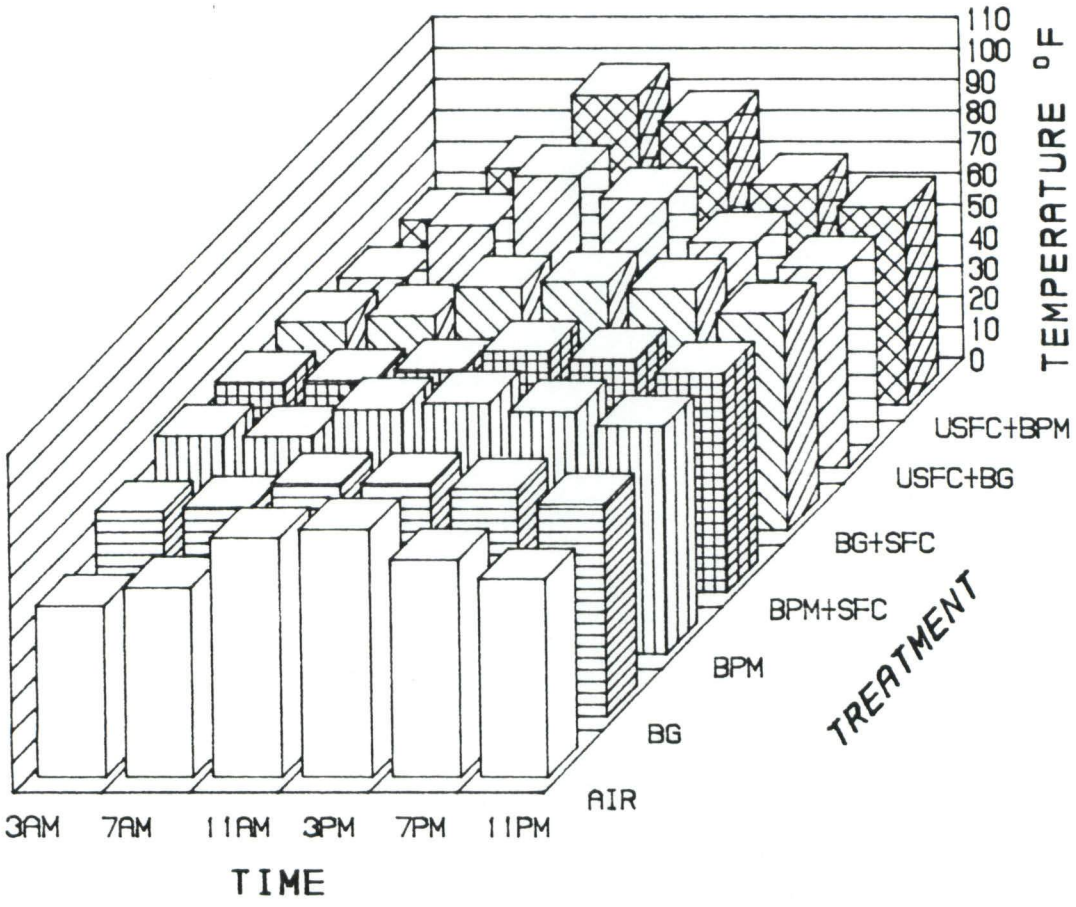

Fig. 1. Effects of black plastic mulch and floating row cover on diurnal soil and air temperatures recorded every 4 hrs. for 24 hrs. over a 10-day period. Air (AIR), bare ground (BG), black plastic mulch (BPM), black plastic mulch + row covers (BPM+SFC), bare ground + row covers (BG+SFC), under row cover on black plastic mulch (USFC+BPM), and under row cover on bare ground (USFC+BG). Air temperatures were recorded for treatments (AIR), (USFC+BPM), and (USFC+BG). Soil temperatures were recorded for (BG), (BPM), (BPM+SFC), and (BG+SFC).