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INTERACTIONS OF POULTRY LITTER, POLYETHYLENE MULCH AND FLOATING ROW COVERS ON TRIPLOID WATERMELON PRODUCTION

J. T. Baker, D. R. Earhart, M. L. Baker, F. J. Dainello, and V. A. Haby

Background. The poultry (*Gallus domesticus)* industry in the United States is projected to grow by 5% per year into the foreseeable future. The litter from these operations is often eliminated by applying it as a fertilizer to nearby pastures and crops, as it contains most mineral elements essential for plant growth. However, the litter can degrade water quality through the leaching of nitrates into ground water and surface runoff of N and P into rivers and lakes. Over the past 25 years, plasticulture, or the use of polyethylene mulch to cover the soil, and use of drip or trickle irrigation have increased substantially in commercial vegetable production systems. However, no information is available on the use of poultry litter in intensive crop management systems utilizing polyethylene mulch and row covers for the production of triploid watermelon. Triploid watermelons have become increasingly popular among consumers in recent years and projections indicate that this trend will continue. The objectives of this study were to compare yields, yield components, and leaf and soil nutrient contents of triploid watermelons cv. 'Tiffany' fertilized with either poultry litter or commercial fertilizer and grown with or without polyethylene mulch and floating row covers.

Research Findings. Triploid watermelon was grown on the same plots in 1990 and 1991 at the George Millard Farm near Nacogdoches, Texas, and fertilized with either poultry litter or commercial fertilizer. Additional treatments included bare soil or plots mulched with black polyethylene and plots with or without spunbonded fabric row covers over both bare soil and mulch. Watermelon yields were unaffected by fertilizer source in 1990 (Table 1) but were significantly higher for poultry litter than for commercial fertilizer treatment in 1991 (Table 2). Polyethylene mulch significantly increased post-harvest soil NO_3 and leaf N concentrations in 1990 and increased yield and yield components in both years. There were no beneficial effects of row covers on yield in either year, presumably because no early season freezes occurred.

Application. We conclude that composted poultry litter is a viable alternative to commercial fertilizers for production of triploid watermelon. Inclusion of an unfertilized overwintering cover crop appears to be one way of reducing the accumulation of soil P for cropping systems utilizing poultry litter as a fertilizer source. Our results indicate polyethylene mulch increases triploid watermelon production in part by improving N availability and uptake.

Table 1. Interaction of mulch (M) and row cover (RC) treatments on yield and yield components of triploid watermelon grown in 1990. Pretransplant fertilizer source (FS) treatments were poultry litter and chemical fertilizer. Main effect means for FS omitted (NS).

Mulch	Row cover	Yield (t/acre)	Melon no. (1000/acre)	Melon fresh weight (lbs/melon)
Yes	Yes	36.4	11.3	6.6
	No	36.3	9.7	7.5
	Mean	---	---	7.1
No	Yes	29.4	14.0	4.2
	No	27.1	9.5	5.7
	Mean	---	---	5.1
Significance of F				
FS		NS	NS	NS
M		0.004	NS	0.010
FS*M		NS	NS	NS
RC		0.016	NS	NS
FS*RC		NS	NS	NS
M*RC		0.015	NS	NS
FS*M*RC		NS	NS	NS

[NS]Nonsignificant at $P \leq 0.05$.

Table 2. Main effect of fertilizer source (FS), mulch (M), row cover (RC), and preplant fertilizer rate (R) on yield and yield components of triploid watermelon grown in 1991. Main effect for RC omitted (NS).

Treatment	Yield (t/acre)	Melon no. (1000/acre)	Melon fresh weight (lbs/melon)
FS			
Poultry	41.2	9.1	9.0
Commercial	30.6	7.6	7.5
M			
With	47.3	10.1	9.3
Without	24.5	6.5	7.3
R			
1X[z]	32.3	7.8	7.7
2X	39.5	8.8	8.8
Significance of F			
FS	0.029	0.002	NS
M	0.003	0.011	0.007
FS*M	NS	NS	NS
RC	NS	NS	NS
FS*RC	NS	0.032	NS
M*RC	NS	0.047	NS
FS*M*RC	NS	NS	NS
R	NS	NS	0.019
FS*R	NS	NS	NS
M*SR	NS	NS	NS
RC*R	NS	NS	NS
FS*M*R	NS	NS	NS
FS*RC*R	NS	NS	NS
M*RC*R	NS	NS	NS
FS*M*RC*R	NS	NS	NS

[Z]1X and 2X refer to single and double preplant fertilizer application rates, respectively.
[NS]Nonsignificant at $P \leq 0.05$.