



Field Evaluation of Watermelon Produced on Paper Mulch Coated with Polymerized Vegetable Oil¹ 2000-01

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Material and Methods

The paper mulch study was conducted during the spring, 2000 season at Live Oak, Florida on Lakeland fine sand. Plowing and disking prepared soil for the experimental area. Beds were formed on 7.5 foot centers with each 24 inches wide at the top. On March 16, 2000 beds were fertilized and formed with a bedpress. Treatments included paper mulch and black polyethylene mulch. The black polyethylene mulch was a Sonoco high-density film (0.6 mil). The paper used was a brown kraft paper coated with a polymerized vegetable oil provided by Randal Shogran, Plant Polymer Research Unit, National Center for Agricultural Utilization Research, ARS, USDA, Peoria Illinois, 61604. All mulches were applied to the beds with Kennco mechanical mulch application machine. One-half of each plot was fumigated with a methyl bromide and chloropicrin mixture (67:33) at a rate of 400 lbs per treated acre. Drip irrigation tubing was Roberts row drip tubing with a 8-mil wall thickness and emitter spaced 12 inches apart. Pre-bed fertilizer application was 500 lbs/A 13-4-13 (N-P₂O₅-K₂O). Remaining N and K₂O was fertigated weekly to result in N and K₂O rates for the season of 150 lbs/A.



On March 23, 2000, watermelon transplants were planted in the field. Watermelon, cultivar ‘Royal Sweet’ plants were placed in a single row on each bed with 36 inches between plants in a row. Transplants were planted with a mechanical-aid transplanter “water-wheel” and water was applied with each transplant for aid in transplant establishment. Recordings were made of the soil temperature at the 4-inch depth in the beds on March 27.

Watermelon fruit were harvested only once, on May 31, due to severe crow damage. All data was analyzed by analysis of variance and means were compared using Duncan’s Multiple Range Test.

¹ Trial conducted in cooperation with Dr. Randal L. Shogren, Plant Polymer Research Unit, National Center for Agricultural Utilization Research, ARS, USDA, Peoria, Illinois, 61604

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Results and Discussion



Mulch application of polyethylene mulch was excellent and paper mulch was fair to good. The paper mulch tore occasionally during application. Paper mulch application would have improved at a slower speed. The speed of the application was set at 3 miles per hour for both polyethylene and paper.

Transplants were planted using a water wheel transplanter. Holes were punched in the paper without any serious problems. The holes in the paper tended to tear an additional 1-2 inches but no more. The paper mulch laid tightly to the bed and resulted in an acceptable mulched bed.

Soil temperature measured on March 27 showed very little difference between paper and plastic mulched plots. The paper was brown but was somewhat opaque allowing some light through the paper. Soil temperatures were also similar between fumigated and non-fumigated plots. Weeds in the non-fumigated plots pushed up on the paper mulch. The primary weed was yellow nutsedge, which pierced through the black plastic mulch. Weed growth made heat transfer less efficient in both non-fumigated mulch treatments.

Yield of watermelon fruit number and weights were similar on paper and plastic mulched plots (Table 1). Average fruit weights were also similar from paper and plastic mulched plots.

Fumigation had no effect on number of fruit per acre (Table 2). Fumigation with methyl bromide and chloropicrin eliminated weeds from the plots early in the season. Yield of 35,164 lbs/A was found in the fumigated plots and 26,864 lbs/A in the non-fumigated plots. The difference between these treatments, however, was not significant. The same trend of higher average fruit weight was found in fumigated plots, but again was not significant.



The first signs of initial degradation of the buried tuck area of the paper mulch was noticed on May 7, 52 days after application. The integrity of the paper mulch was adequate for a single crop of watermelon transplanted in a spring season in North Florida.

The paper mulch treatments performed in a very similar manner in this trial to the standard black polyethylene mulch.

Table 1 - Effect of mulch type on yield, fruit size, and soil temperature at Live Oak, Florida.

| Mulch Type | Total Fruit Number (No./acre) | Total Mkt Weight (lbs/acre) | Season Avg. Fruit Wt. (lbs/fruit) | Soil Temperature (°F) |
|-----------------------|-------------------------------|-----------------------------|-----------------------------------|-----------------------|
| Paper | 2,435 | 31,678 | 13 | 91 |
| Plastic | 2,186 | 30,350 | 14 | 89 |
| Significance (p=0.05) | NS | NS | NS | NS |

Table 2 - Effect of fumigation on yield, fruit size, and soil temperature at Live Oak, Florida.

| Fumigation | Total Fruit Number (No./acre) | Total Mkt Weight (lbs/acre) | Season Avg. Fruit Wt. (lbs/fruit) | Soil Temperature (°F) |
|-----------------------|-------------------------------|-----------------------------|-----------------------------------|-----------------------|
| + | 2,324 | 35,164 | 15 | 91 |
| - | 2,296 | 26,864 | 12 | 89 |
| Significance (p=0.05) | NS | NS | NS | NS |