

## **Can Paper Mulches Replace Black Plastic in Vegetable Production?**

### **Introduction**

Vegetable growers in New York and the Northeast rely on black plastic to enhance early growth and total yield of many crops including many cucurbits, peppers and tomatoes. Mulches help vegetable producers achieve early, more lucrative markets by enhancing earliness of their crops. The challenge and concern for using plastics is the increasing costs of disposal. While black plastic mulches are relatively inexpensive, paper mulches could be tilled in at the end of the season, reducing labor hours for pick up as well as disposal costs. Paper mulch is still in the early stages of development. The quality has improved tremendously since we started working with these products four years ago. The first products were very difficult to apply and degraded quickly. In 2000 and 2001, we compared experimental paper mulches to black plastic for effects on growth and productivity of muskmelons (*Cucumis melo L*). Muskmelons were chosen as the indicator crop since they are very responsive to the improved soil environment created by black plastic mulches.

### **Materials and Methods**

#### *Products tested*

Three paper mulches were compared to black plastic mulch in the 2001 experiment, at the Homer Thompson Research Farm in Freeville, NY. Two mulches were from International Paper. These were 30 and 40 weight kraft paper coated with a biodegradable polyester polymer impregnated with carbon black, to slow the rate of breakdown and to provide color. The material received from Cascade had a biodegradable black coating prepared from a corn starch polymer on the upper surface and clear coating on the under surface.

#### *Production*

Muskmelons (cultivar 'Athena') were sown on May 11, 2001 in 72 cell trays using a peat-based media. Transplants were grown in the greenhouse at 85° F day/ 65° F night temperatures and fertilized once (350 ppm N) before they were moved outdoors to a cold frame. Granular fertilizer was applied

to the field (60 lbs. of N, 60 lbs. P<sub>2</sub>O<sub>5</sub>, and 60 lbs. K<sub>2</sub>O per acre) and incorporated before the mulches were applied. The mulches were applied on May 30 with a raised bed mulch layer (Model 2600, Rain Flo, Pa) along with drip tape (approximately 6" from the center of the bed). The raised beds (4") were spaced 6 feet apart. The melon plants were drenched with Admire 2F (Imidacloprid, 0.02 ml/plant) 24 hours before transplanting for cucumber beetle control. The melons were transplanted 2 feet apart on June 4 and starter fertilizer was applied to each plant. Additional fertilizer was delivered through the drip system during the growing season (60 lbs. of N, 20 lbs. P<sub>2</sub>O<sub>5</sub>, and 20 lbs. K<sub>2</sub>O per acre), resulting in a total of 120 lbs. of N, 80 P<sub>2</sub>O<sub>5</sub>, and 80 K<sub>2</sub>O per acre applied in the growing season. On July 9, five uniform, consecutive plants were harvested from each plot and fresh and dry weights were recorded along with any fruit weight if present. The harvest areas (20 feet) were marked before harvest (10 data plants). The melons were sprayed with fungicides and insecticides as needed.

### *Harvesting*

Melons were harvested from the data plants when mature (at full slip as recommended for 'Athena'). Fruit were graded into two size classes: large (3 lbs. and greater) and medium (2 lbs. to 2.99 lbs.). Any fruit under 2 lbs. were culled (very few in experiment). Total numbers and weight in each size class were recorded. Length and diameters of the fruit also were recorded at each harvest also. Fruit were harvested on 8 dates (August 9, 12, 16, 21, 23, 26, 30 and September 5). Statistical analysis was conducted on all data using a P<0.05 for significant differences.

### **Results and Discussion** (Table 1)

The paper mulches produced similar early and total yield compared with black plastic mulch. Most fruit (90 to 97%) harvested in the experiment were large size (3 lbs. or more) by weight. The length and width were the same for all mulch treatments. A medium melon had an average length of 5" with a width of 4.5". The average length of large melon was 7" with a width of 6". Fresh and dry weights of the plants harvested on July 9 were not significantly different, indicating that early season growth of melons was similar on both paper and plastic mulches. The International and Cascade paper mulches both show promise as alternative mulches for muskmelon and other warm season crop production in Central New York. Currently these mulches are not available commercially because the price of the polymer coating needed for production is very high. We will continue to evaluate new paper and biodegradable mulches as they are developed.