

Performance of Chandler Strawberries with Colored Mulches

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A field research trial was established in a grower's field in the summer of 1998 in Fresno to evaluate what effect different colors of plastic mulches had on the production of Chandler strawberries in the Central Valley of California. The traditional method is to apply clear plastic mulch onto the beds in February after plants have been mowed down. It is known that clear plastic mulch has a warming effect on the soil, and that certain colored mulches have an effect on weed control. Experimental parameters were yield (total and marketable), berry size, Brix, and soil temperatures. Following are the treatment colors used in this trial:

- | | |
|----------|------------------------|
| 1. Clear | 5. Red on brown |
| 2. Black | 6. White on black |
| 3. Green | 7. Reflective |
| 4. Brown | 8. Reflective on black |

Materials and Methods

Chandler strawberry plants (frigo) were set out on August 12, 1998 by the grower. Beds were 12" in height (bottom of furrow to top of bed) and spaced 54" center to center. Plants were spaced 12" within the row, two rows per bed. The plastic mulches were laid on the beds February 16-17, 1999. Plots were harvested twice weekly beginning April 28 and ending June 11 (13 harvests).

The site was located in Sanger, California and soil type was a Hanford fine sandy loam. Plots were 20' in length in a randomized complete block design, with three replications. Yields were taken for each harvest as well as berry size and soluble solids (BRIX). Psiom temperature data logger probes were buried at 4" (10.2 cm.) in each plot to record soil temperature under each plastic.

Report Highlights

- Clear and green plastic mulches produced significantly higher yields in the first 5 harvests than other colors and resulted in more warming of the soil.
- White plastic mulch resulted in the coolest soil temperatures.

Results and Discussion

TOTAL YIELD: No significant differences in total yield between treatments was observed ($p = 0.1764$). After 13 harvests, however, yield was highest in the brown mulch (76.9 lb.), followed by reflective (72.7 lb.) and clear (72.2 lb.). Cull rates were between 8-9 %.

MARKETABLE YIELD: No statistically significant difference between treatments was observed and a similar yield pattern was obtained as was seen above (Table 1). The yield in the brown mulch treatment (69.4 lb.) was 7% higher than the clear mulch yield (65.2 lb.). Reflective and white mulch yields, 66.7 and 66.5 lb respectively, were only 2% higher than the clear mulch. Yield from black mulch was not as great as in previous years.

BERRY SIZE: Twelve berries were collected from each harvested treatment throughout the season and weighed. There was no significant difference in berry weights between the treatments. The difference in weight of 12 berries between the brown mulch (307 grams) and the clear mulch (286.2 grams) was only 20.8 grams, or 1.7 grams per berry. (Table 2)

BRIX: Soluble solids were measured for each of the treatments, each harvest, using a hand held refractometer. No significant difference was measured between treatments. (Table 3)

FIRST FIVE HARVESTS: There was a significant difference between mulches in yields for the first five harvests indicating that mulch color may influence earliness of harvests (Table 4). Clear and green colored mulches produced the highest yields during the first 2.5 weeks (5 harvests), while the two reflective mulches produced about 22-28% less than the clear mulch, possibly a result of cooling of the soil, though other factors such as light reflectance may also contribute. Where earliness and weed control are important, a green mulch may be more advantageous than a clear. Benefits from early warming of the soil eventually

disappeared as the season progressed and other colors became important from a marketable yield standpoint, namely, brown, reflective, white, and clear.

SOIL TEMPERATURES: Soil temperatures were collected at the 4" (10.2 cm) depth, average minimum and maximum for March, April, and May. What is most interesting about soil temperatures is that for the three months of collection, both clear and green mulches resulted in a "positive" average temperature compared to black plastic (reference 0 Temperature). Both the clear and green also resulted in the highest yields for the first 5 harvests, suggesting there may be a relationship between these two colors and warming of the soil to obtain early harvests. White resulted in the coolest soil temperatures, generally 2.6° cooler than black.

Reference temperatures as compared to black plastic

| Clear | Green | Black | Reflective + black | Red | Brown | Reflective | White |
|-------|-------|-------|--------------------|-----|-------|------------|-------|
| 2.6 | 0.6 | 0 | -0.8 | -1 | -0.8 | -1.2 | -2.6 |

WEED CONTROL: All mulches provided some weed control except for the clear, which actually encouraged the weeds by providing a mini greenhouse. Plastic mulches with a darker backing (co extrusion) provided superior weed control e.g. black, reflective + black, white + black, red + brown; while the other colors allowed some weeds to grow, albeit small and spindly (green, brown, reflective).

Table 1. Total Marketable Yields

| Treatment | Means (lb.) |
|----------------|-------------|
| 3 (brown) | 69.4 |
| 5 (reflective) | 66.7 |
| 4 (white) | 66.5 |
| 2 (clear) | 65.2 |
| 7 (red) | 64.2 |
| 8 (green) | 63.3 |
| 6 (refl+black) | 62.6 |
| 1 (black) | 57.3 |
| | n.s. |

Table 2. Berry Size -12 berries

| Treatment | Means (grams) |
|----------------|---------------|
| 6 (refl+black) | 308 |
| 5 (reflective) | 307 |
| 1 (black) | 303 |
| 4 (white) | 299 |
| 7 (red) | 293 |
| 2 (clear) | 286 |
| 8 (green) | 286 |
| 3 (brown) | 284 |
| | n.s. |

Table 3. Soluble Solids

| Treatment | Brix- seasonal ave. |
|----------------|---------------------|
| 3 (brown) | 7.5 |
| 2 (clear) | 7.4 |
| 8 (green) | 7.3 |
| 4 (white) | 7.3 |
| 6 (refl+black) | 7.3 |
| 7 (red) | 7.3 |
| 5 (reflective) | 7.2 |
| 1 (black) | 7.2 |
| | n.s. |

Table 4. Yields, first five harvests

| Treatment | Mean (pounds) |
|----------------|---------------|
| 2 (clear) | 36.5 A* |
| 8 (green) | 35.8 A |
| 3 (brown) | 34.5 AB |
| 7 (red) | 32.3 AB C |
| 4 (white) | 32.1 AB C |
| 1 (black) | 29.1 BC |
| 5 (reflective) | 28.6 BC |
| 6 (refl+black) | 26.2 C |

* means with no letters in common are significantly different on Fisher's LSD test at P= 0.05 LSD 6.34