Effect of polyethylene on the behaviour and yield of strawberry (Fragaria x ananassa)

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Abstract

The use of polyethylene in commercial cultivation of strawberry (Fragaria x ananassa Duch.) can play a pivotal role in minimising winter injury and plant mortality and increasing productivity. Covering the strawberry beds with low clear plastic tunnels induced one month early cropping, prevented bed erosion and increased total yields by 20 per cent. The black polyethylene mulched beds did not require any weeding. During summers (in hills) the polyethylene sheets of the tunnels were replaced by plastic anti-hail nets or anti-bird nets which resulted in advanced harvest, increased yield and improved fruit quality.

Key words: Strawberry, Fragaria x ananassa, productivity, clear plastic tunnel, black polyethylene, mulch, weeding, anti-hail nets, advanced harvest, fruit quality.

Introduction

The cultivated strawberry (Fragaria x ananassa Duch.) is an important soft fruit crop of the world. It has adapted well to varied climates ranging from temperate to subtropical regions. It is even being cultivated in the tropics and the arid regions. Being a shallow rooted, herbaceous plant it is prone to extremes of weather and to damage by birds, rodents and mammals because of its too attractive fruits. Investigations were conducted to evaluate the effectiveness of plastics in minimising damage to the newly planted strawberry plants and improving their productivity. Possibility of this has been reported under different agro-climatic conditions (Albregts, 1993; Shiow et al., 1998).

Materials and methods

Thirty five strawberry cultivars, representing diverse fruit and plant characteristics constituted the material for the present study. The investigation was carried out at the IARI Regional Station (Horticulture), Shimla during 1996-1998. The observations were recorded from randomly selected five plants from cultivar in each replication. Observations were recorded for date of first flower opening, date of full bloom, number of fruits per plant, weight of individual fruits, fruit length, fruit width, total soluble solids, yield per plant and weed growth in both open and polyethylene covered beds.

The strawberry plants were planted 30 cm apart in rows that were 45 cm apart. Ten plants were planted in a bed of 150 x 60 cm. All runners produced during the course of the experiment were removed as soon as they appeared. There were three replications with five beds of each cultivar in each replicate. Other recommended agronomic and plant protection measures were followed for successful strawberry cultivation.

Results and discussion

Black polyethylene mulch in the strawberry beds resulted in considerable reduction in weed growth (Table 1). It was 28.68 percent and 15.75 percent of the weed growth observed in the unmulched strawberry beds. The clear/translucent polyethylene mulch was less effective in this respect. The black polyethylene mulched beds did not require any weeding while the unmulched beds required weeding at 20 to 30 days intervals during the period. Difference in the influence of variously coloured plastic mulches have also been reported earlier (Locascio and Smart, 1968; Himelrick, 1982; Shiow, et al. 1998).

Table 1. Effect of plastic mulches on weed growth in strawberry plots

<table>
<thead>
<tr>
<th>Mulch</th>
<th>Fresh wt.</th>
<th>Dry wt.</th>
<th>Fresh wt.</th>
<th>Dry wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>basis (%)</td>
<td>basis (%)</td>
<td>basis (%)</td>
<td>basis (%)</td>
</tr>
<tr>
<td>Black polyethylene</td>
<td>28.68</td>
<td>17.40</td>
<td>15.75</td>
<td>14.29</td>
</tr>
<tr>
<td>Black polyethylene</td>
<td>62.64</td>
<td>56.43</td>
<td>16.67</td>
<td>17.86</td>
</tr>
<tr>
<td>Unmulched</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Plot area (150 x 60 cm)

The differences in fruit characteristics as a result of open cultivation versus use of plastics are presented in Table 2. Under open conditions the fruit weight varied from 2.10 g in No. A to 24.38 g in Etna. The maximum number of fruits per plant were harvested from Shimla Delicious (30) followed by No. A (28); whereas the minimum number of was recorded in Selva and Etna (10). Yield per plant also varied greatly with cultivars. Etna, Chandler and Belrubu were high yielders. Both the parameters of fruit weight and yield per plant were increased by providing polyethylene cover. The fruit weight, depending on the cultivar was increased by 14.29 percent to 20.50 percent. Similarly the yield on per ha basis showed an increase of almost 20 percent as a result of incorporating plastic usage in strawberry cultivation.

Perusal of Table 2 revealed that covering the strawberry beds with low plastic tunnels advanced the dates of full bloom by almost a month in all the varieties under evaluation. The fruit growth period from full bloom to harvest was reduced by one
day in nine cvs and a maximum of 14 days in cv Majestic. Cultivar Douglas was not affected at all in this respect. The date of first flower appearance was advanced by maximum of 78 days in cv Belrubu followed by No. 7 (60 days), Gorella (59 days), Black more (57 days), Larson (53 days), Missionary first flower appearance was exhibited by cvs Torrey (8 days), followed by Douglas (9 days), Katrain Sweet (12 days) and N.R. Round Head (18 days). Similar influence of clear polyethylene winter mulch on the growth and yield of strawberries has been reported by Scheel (1982).

Covering the strawberry beds with low plastic tunnels induced one month early cropping and increased total yields by 20 percent. Winter injury and consequent mortality was appreciably reduced. During summers, replacement of the plastic sheet of the tunnels with anti-hail or anti-bird nets resulted in higher yields and better fruit quality. Black polyethylene mulching considerably reduced weed growth.

### References


