

Influence of Weed Control on Quality and Economics of Strawberry (*Fragaria x ananassa* Duch.) cv. Chandler

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Strawberry has acquired a unique place among cultivated berry fruits in Jammu. However, its yield is limited due to uncontrolled weeds. The yield reduction has been reported from 40 to 60% by way of competing of weeds for water, nutrients, light, space with crop and providing shelter of obligate and facultative parasites. Conventional method of weeding is cumbersome, inefficient, costly and sometimes impracticable. The application of mulch is also regarded as one of the important practices for control of weeds in strawberry. Since no efforts in past were carried out to quantify the cost : benefit ratio with the easily available polythene under Jammu conditions, hence, it has become imperative to study the influence of polythene mulch on the productivity and profitability of strawberry. Besides use of herbicides either alone or in combination is gaining more popularity because of economical and timely more effective for controlling weeds (Shoemaker, 1975). Moreover, not much work on weed management in strawberry under Jammu sub-tropics was carried out earlier. Keeping in view the importance of the crop and losses caused by weeds, the present investigation was undertaken.

A field experiment was conducted during **rabi** 2007-08 at Research Orchard of Division of Fruit Science, Faculty of Agriculture, Sher-e-Kashmir University of Agricultural Sciences and Technology, Udheywalla, Jammu (J & K). Nineteen treatments comprising weedy check, weed free check, polythene mulch (thickness 25 μ), hand weeding at 15 days interval, oxyfluorfen @ 0.50, 0.55 and 0.60 kg/ha (pre- planting), napropamide @ 4.00, 4.50 and 5.00 kg/ha (post-planting), oxyfluorfen+ napropamide @ 0.50+4.00, 0.50+4.50, 0.50+5.00, 0.55+4.00, 0.55+4.50, 0.55+5.00, 0.60+4.00, 0.60+4.50 and 0.60+5.00 kg/ha (pre-planting) were tested in randomized block design with three replications.

The soil of the experimental field was sandy loam and was neutral in reaction (pH 7.09). Pre-plant herbicidal treatments were given three weeks before planting, whereas post-plant herbicidal treatments were

carried out two weeks after planting of runners. Runners were planted on well prepared 2.0 x 1.5 m² raised beds after thorough ploughing, harrowing and levelling of land with a spacing of 40 cm from row to row and 25 cm from plant to plant. Observations were recorded on quality attributes. Cost of cultivation for each treatment was calculated to obtain the total expenditure. The net income and benefit : cost ratio was also worked out.

The data presented in Table 1 reveal that all the weed control treatments significantly reduced the weed population and weed dry matter as compared to unweeded control. The lowest weed population and dry matter were observed in the weed free check followed by herbicide treatment of oxyfluorfen and napropamide @ 0.60+5.00 kg/ha. The physico-chemical parameters of fruit were significantly influenced by different weed control treatments. Maximum fruit length (31.31 mm), fruit diameter (22.70 mm) and fruit weight (12.26 g) were obtained under weed free plots which were at par with black polythene mulch treated plots and oxyfluorfen @ 0.55 kg/ha, whereas minimum fruit length, diameter, weight and volume were obtained under weedy check.

Highest total soluble solids (6.83° Brix), total sugars (4.72%) and ascorbic acid (71.05 mg/100 g of fresh berries) was observed in fruits harvested from weed free plots which were at par with polythene mulch treatment and oxyfluorfen @ 0.55 kg/ha, whereas lowest under control plots (Table 2). The increase in the physico-chemical parameters of fruit may be due to reduction in weed population irrespective of the use of herbicide or by other weed control techniques resulting in better moisture conservation, increased organic matter and improved nutrient supply by reducing the competition to greater extent between the strawberry plant and the weeds as presented in the weedy check. These findings are in agreement with the observations of Albregts and Chandler (1993) and Gilreath and Santos (2005).

Economic Studies

The highest net return per hectare (Rs. 546760/

Table 1. Effect of weed control treatments on weed population, weed dry matter and length, diameter and weight of fruit

Treatments	Dose (kg/ha)	Weed population/m ²	Weed dry matter (g/m ²)	Length of fruit (mm)	Diameter of fruit (mm)	Fruit weight (g)
Oxyfluorfen	0.50	6.53 (41.66)	4.76 (21.74)	28.59	21.32	11.38
Oxyfluorfen	0.55	5.59 (30.33)	4.19 (16.64)	29.92	22.65	11.65
Oxyfluorfen	0.60	4.82 (22.33)	3.68 (12.58)	27.77	20.47	10.87
Napropamide	4.00	11.51 (131.66)	8.51 (71.74)	23.82	18.63	8.81
Napropamide	4.50	10.39 (107.00)	7.58 (56.56)	24.75	18.46	9.34
Napropamide	5.00	9.09 (81.66)	6.68 (43.71)	24.71	18.33	9.72
Oxyfluorfen+Napropamide	0.50+4.00	5.91 (34.00)	4.43 (18.64)	26.35	19.45	10.18
Oxyfluorfen+Napropamide	0.50+4.50	5.28 (27.00)	4.05 (15.45)	27.48	21.17	10.91
Oxyfluorfen+Napropamide	0.50+5.00	5.19 (26.00)	3.80 (13.48)	28.33	21.71	11.49
Oxyfluorfen+Napropamide	0.55+4.00	5.37 (28.00)	4.04 (15.34)	26.57	21.51	10.55
Oxyfluorfen+Napropamide	0.55+4.50	5.31 (27.33)	3.91 (14.30)	24.77	20.61	10.20
Oxyfluorfen+Napropamide	0.55+5.00	4.75 (21.66)	3.56 (11.70)	24.80	19.45	9.50
Oxyfluorfen+Napropamide	0.60+4.00	5.16 (25.66)	3.80 (13.45)	26.57	20.15	10.01
Oxyfluorfen+Napropamide	0.60+4.50	4.75 (21.66)	3.46 (11.01)	23.67	19.72	9.89
Oxyfluorfen+Napropamide	0.60+5.00	3.99 (15.00)	3.05 (8.36)	24.08	18.71	9.23
Hand weeding	At 15 days interval	4.72 (21.33)	3.42 (10.78)	30.52	22.62	11.92
Weed free	-	1.00 (00.00)	1.00 (0.00)	31.31	22.70	12.26
Polythene mulch (thickness 25 μ)	-	4.82 (22.33)	3.49 (11.23)	29.00	22.65	11.52
Weedy check	-	20.10 (403.33)	15.00 (223.99)	17.47	15.27	7.21
LSD (P=0.05)	-	0.272	0.190	2.784	1.603	0.208

Data subjected to sq. root ($\sqrt{x+0.5}$) transformation. Figures in parentheses are original.

ha) was obtained under black polythene mulch treated plots with benefit : cost ratio of 1.56 followed by herbicidal treatment of oxyfluorfen @ 0.55 kg/ha (Rs. 519810/ha) with benefit : cost ratio of 1.51 and lowest (Rs. 193410/ha) with benefit : cost ratio of 0.56 was obtained under control (Table 2). This is due to the higher strawberry fruit yield but involvement of more

labour under weed free treatment as compared to use of polythene mulch for controlling of weeds. The estimates derived in the present investigation are in close conformity with the estimates of Sharma (2004).

Investigations were carried out on weed control in strawberry during 2007-08 which revealed that weed free treatment proved significantly superior in improving

Table 2. Effect of weed control treatments on quality and economics of strawberry cv. Chandler

Treatments	Dose (kg/ha)	TSS (°Brix)	Total sugars (%)	Ascorbic acid (mg/100 g of fresh berries)	Fruit yield (q/ha)	Net return (Rs./ha)	B : C ratio
Oxyfluorfen	0.50	6.57	4.52	68.58	169.00	501885	1.46
Oxyfluorfen	0.55	6.68	4.69	70.42	172.66	519810	1.51
Oxyfluorfen	0.60	6.60	4.58	67.36	162.66	469510	1.36
Napropamide	4.00	6.58	4.48	65.71	132.00	317460	0.92
Napropamide	4.50	6.57	4.41	64.45	137.33	343760	1.01
Napropamide	5.00	6.52	4.35	63.40	142.33	368435	1.07
Oxyfluorfen+Napropamide	0.50+4.00	6.64	4.63	67.51	152.00	414235	1.19
Oxyfluorfen+Napropamide	0.50+4.50	6.60	4.32	66.42	162.66	467185	1.34
Oxyfluorfen+Napropamide	0.50+5.00	6.55	4.27	64.85	166.33	491105	1.44
Oxyfluorfen+Napropamide	0.55+4.00	6.46	4.61	66.60	157.66	442160	1.27
Oxyfluorfen+Napropamide	0.55+4.50	6.52	4.22	65.71	153.66	421810	1.21
Oxyfluorfen+Napropamide	0.55+5.00	6.50	4.20	64.45	143.00	368185	1.06
Oxyfluorfen+Napropamide	0.60+4.00	6.47	4.16	64.39	150.00	409455	1.20
Oxyfluorfen+Napropamide	0.60+4.50	6.47	4.12	62.54	148.33	394860	1.13
Oxyfluorfen+Napropamide	0.60+5.00	6.47	4.04	61.78	137.00	337885	0.97
Hand weeding	At 15 days	6.63	4.67	68.48	172.00	492110	1.33
Weed free	-	6.83	4.72	71.05	182.00	517610	1.31
Polythene mulch (thickness 25 m)	-	6.72	4.70	70.47	179.33	546760	1.56
Weedy check	-	6.45	3.96	61.45	106.66	193410	0.56
LSD (P=0.05)	-	0.030	0.039	3.679	-	-	-

Sale of fruit @ Rs. 5000/q.

the quality traits of fruit which was at par with black polythene mulch treatment and oxyfluorfen @ 0.55 kg a. i./ha. Maximum fruit length (31.31 mm), fruit diameter (22.70 mm), fruit weight (12.26 g), fruit yield (182.0 q/ha), highest total soluble solids (6.83° Brix), total sugars (4.72 %) and ascorbic acid (71.05/100 g) of fresh berries were obtained under weed free plots. Black polythene mulch treatment also proved economical with benefit : cost ratio of 1.56 as compared to other weed control methods.

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