



IMPACT OF PLASTIC MULCH COLOUR ON EARLINESS AND YIELD OF SUMMER SQUASH IN BHABAR AREA OF UTTARAKHAND

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ABSTRACT

A field experiment was conducted during winter- spring season to investigate the effect of different coloured mulches on growth and yield of summer squash var. Cora under Bhabar area (Haldwani, Nainital) of Uttarakhand. Four coloured poly mulches viz., black, blue, green and transparent were used in summer squash crop along with a control (no mulch) treatment with four replications in randomized block design. Data on days to first flowering, days to first harvest, fruit yield/plant and fruit yield/ha were recorded and analyzed as per RBD design of experiment. Economic viability of using plastic mulches was also adjudged by B:C ratio. Black and blue poly mulches exhibited around a week earliness for days to first flowering and ten days earlier first harvest as compared to control. Highest total fruit yield (5.74 kg/ plant and 71.80 t/ha) was recorded in the plants mulched with black polyethylene followed by plants mulched with blue polyethylene (5.50 kg/ plant and 68.72 t/ha) with no significant difference between these two treatments. Lowest fruit yield was obtained from the crop without mulching (3.40 kg/ plant and 42.56 t/ha). The fruit yields under white and green mulch treatments were also found significantly higher than the control but the yields were significantly lower in comparison to black and blue poly mulch trails. Highest B:C ratio was also obtained with black followed by blue mulch.

Key words : Plastic mulch, earliness and yield of summer squash, bhabar area of Uttarakhand.

Summer squash (*Cucurbita pepo* L.) is an economically important member of gourd family, cucurbitaceae grown for its immature fruits. It is a rich source of Vitamin A, calcium and phosphorus. Various biotic (diseases and insect-pests) and abiotic (low temperature, drought, rain-fed conditions with high or erratic rainfall etc.) stresses during crop cycle are adversely affecting the productivity as well as quality of it. This dependency on natural factors of production restricts the growers to get the handsome return of the produce. An approachable solution of the problem was offered by the poly mulch technology, which can partially combat the adverse natural factors of production (1). A wide variety of vegetables can be successfully grown by using mulches. Cucumbers, squashes, capsicums, melons, tomatoes, cole crops and okra have shown significant increase in earliness, yield and quality (2). In addition to soil and moisture conservation, improved yield and quality, suppression of weed growth, mulches can improve the water and nutrient use efficiency with the reduction in labour requirement and drudgery (3). Thus, use of poly mulch technology in summer squash cultivation can play a pivotal role in increasing productivity and can fetch better price by enhancing earliness. However, information regarding mulch effect in summer squash production under bhabar condition of Uttarakhand is scanty and requires attention on this aspect. Therefore, present investigation was carried out to study the effect of different coloured mulches on the growth and yield of summer squash in bhabar region of Uttarakhand i.e. in Haldwani (Nainital) area.

MATERIALS AND METHODS

The study was conducted at Experimental Farm of Uttarakhand Open University, Haldwani, Nainital (Uttarakhand) during the winter- spring season of the year 2016-17 to find out the effect of coloured poly mulches on growth and yield of open field summer squash. The experimental site is situated Bhabar region of lower Shivalik range lies at 29° 21' North latitude and 79° 51' East longitudes at an altitude of 424 m above mean sea level. Bhabar is the gently-sloping coarse alluvial zone below the Shivalik hills (outermost foothills of the Himalayas). Four coloured poly mulches viz., black, blue, green and transparent were used in summer squash crop along with a control (no mulch) treatment with four replications in randomized block design. Seedlings of summer squash var. Cora were sown in poly bags on December, 2016 under poly low tunnel. Thirty five days old seedlings were transplanted on raised beds at row spacing of 90 cm and plant to plant spacing of 60 cm. The thickness of all coloured poly mulches was 25 micron. Recommended doses of NPK along with FYM were applied uniformly in all the plots under investigation. Data on days to first flowering, days to first harvest, average fruit yield per plant and average fruit yield per ha were recorded and data were statistically analyzed as per statistical methods suggested by (4).

RESULTS AND DISCUSSION

The results presented in Table-1 revealed highly significant differences under different poly mulches over control, not only in terms of fruit yield but also in terms of vigorous growth and earliness in flowering and fruiting of

Table-1 : Effect of coloured poly mulches on earliness and yield of summer squash.

Treatment	Days to first flowering	Days to first harvest	Average fruit yield (kg/plant)	Average fruit yield (t/ha)	% increase over control
Control (No mulch)	52	65	2.10	26.30	-
Black mulch	44	55	3.42	42.80	62.73
Blue mulch	45	55	3.25	40.72	54.82
Green mulch	49	61	2.54	31.73	20.65
Transparent mulch	45	55	2.92	36.56	39.01
C.D. at 5%	2.3	2.7	0.37	3.46	-

summer squash var. Cora in open field. Summer squash seedlings transplanted under black mulch took minimum period for days to first flowering (44 days) which was closely followed by blue mulch covered plants (45 days) with no significant differences between these two values, however, both the treatments had the same performance in case of days to first harvest (55 days). Both the treatments exhibited around a week earliness for days to first flowering and ten days earlier first harvest as compared to control. This crop advancement (10 days) fetches a good price early in the season. The plants mulched with green and transparent plastic took three and five days less for days to first flowering and first harvest, respectively as compared to unmulched (control) plants. Similar results with early growth and fruiting in summer squash were also observed by (5, 6).

Highest total fruit yield of 3.42 kg/ plant (42.80 t/ha) was recorded in the plants mulched with black polyethylene followed by plants mulched with blue polyethylene 3.25 kg/ plant (40.72 t/ha) with no significant difference between these two treatments in terms of fruit yield. Lowest fruit yield was obtained from the crop without mulching 2.10 kg/ plant (26.30 t/ha). The fruit yields under transparent and green mulch treatments were also found significantly higher than the crop without mulch but the yields were significantly lower in comparison to black and blue poly mulch trails. The increase in yield due to mulch effect was to the tune of 62.73 per cent for black, 54.82 per cent for blue, 39.01 per cent for transparent and 20.65 per cent for green poly mulches. Earliness in flowering and fruiting with significantly higher yields of poly mulch trails owed to the direct effect of plastic mulch on the micro-climate around the plant as it modifies the radiation budget of the surface and decreasing the soil water loss, nutrient leaching and compaction of soil, which provides a better environment for root growth. Moreover, adequate presence of moisture to the plants results in full cell turgidity and eventually higher meristematic activity leading to more foliage development, greater photosynthetic rate and consequently better plant growth. Highest absorption of photosynthetic photon flux (PPF 400-700 nm) and soil

temperature was reported with the use of black plastic mulch (7), while the greatest reflection of PPF and blue light was observed in white plastic mulch. The greater availability of PPF enhanced the photosynthetic activity of plant and hence also resulted in early plant growth and higher yield. Besides improved plant micro-climate due to the above mentioned reasons mulch films have an effect in higher yields as they are nearly impervious to carbon di-oxide. 'Chimney effect' might have been created, resulting in abundant CO₂ for the plants which might have added higher plant growth and fruit yield grown under plastic mulches (2). Black poly mulch has an additional advantage that the absence of light with it did not allow photosynthesis under the film and therefore weed growth was depressed. On the contrary with transparent films, the presence of light with the improved condition of growth (heat, moisture, good soil structure) encouraged weed growth (8). The results of present findings are in accordance to (9, 10, 11) who have reported maximum yield of brinjal, cucumber and summer squash, respectively under black poly mulch.

It may be inferred from the present study that the use of black or blue poly mulch for summer squash cultivation was found much conducive for inducing earliness and for higher yields in Bhabar region of Uttarakhand.

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