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S Narayan
Division of Vegetable Science, Division of Basic Sciences and Humanities Sher-e-Kashmir University, of Agricultural Sciences and Technology of Jammu and Kashmir, India

MI Makhdoomi
Division of Vegetable Science, Division of Basic Sciences and Humanities Sher-e-Kashmir University, of Agricultural Sciences and Technology of Jammu and Kashmir, India

Ajaz Malik
Division of Vegetable Science, Division of Basic Sciences and Humanities Sher-e-Kashmir University, of Agricultural Sciences and Technology of Jammu and Kashmir, India

Ambreen Nabi
Division of Vegetable Science, Division of Basic Sciences and Humanities Sher-e-Kashmir University, of Agricultural Sciences and Technology of Jammu and Kashmir, India

K Hussain
Division of Vegetable Science, Division of Basic Sciences and Humanities Sher-e-Kashmir University, of Agricultural Sciences and Technology of Jammu and Kashmir, India

FA Khan
Division of Vegetable Science, Division of Basic Sciences and Humanities Sher-e-Kashmir University, of Agricultural Sciences and Technology of Jammu and Kashmir, India

Correspondence
S Narayan
Division of Vegetable Science, Division of Basic Sciences and Humanities Sher-e-Kashmir University, of Agricultural Sciences and Technology of Jammu and Kashmir, India

Influence of Plastic and organic mulching on productivity, growth and weed density in chilli (*Capsicum annuum* L.)

S Narayan, MI Makhdoomi, Ajaz Malik, Ambreen Nabi, K Hussain and FA Khan

Abstract
A field experiment was conducted in kharief season at experimental farm, division of Vegetable Science, SKUAST-K, Shalimar to study the effect of mulching on growth and yield of chilli for three consecutive years 2013 -15. Three levels of organic mulch as 6.0, 9.0t and 12.0t/ha paddy straw and three forms of inorganic mulch as black double coated, white double coated and black single coated polythene of 30 micron thickness were used. Data was recorded on soil moisture, weed density, number of fruits, fruit length, fruit width, fruit weight and fruit yield. Economics of various treatments was also worked out and B:C ratio was calculated. Black plastic mulch (double coated) recorded the highest soil moisture retention (16.74%), lowest weed density (74.81g/plot dry weight), highest number of fruits (140/plant), with maximum fruit weight (9.99g) and total fruit yield (463.08q/ha). Mulching with double coated black polythene recorded highest B:C ratio of 3.49 hence may be stated as a viable tool to increase yield in chilli under temperate conditions.

Keywords: B:C ratio, chilli, organic mulching, yield

Introduction
Chilli pepper (*Capsicum annuum* L.) is an important spice and cash crop in many countries of the world. It is mostly grown in the tropical and sub-tropical regions of world as an important vegetable and condiment crop. The fruits are good source of vitamin A (292 IU) and ascorbic acid (111mg/ 100g of edible matter). Water deficit often limits the crop growth and development as it is sensitive to water stress. To improve the productivity of crops where either particularly non-irrigated rainfed conditions, proper moisture management of the soil is necessary (Hale & Orcutt, 1987) [4]. Mulching is an efficient method to conserve soil moisture, inhibit weed growth, maintain soil moisture, repel insect and reflect back selective light wavelengths (Decoteau *et al*., 1990; Green & Dole, 2003, Ham *et al*., 1993; Tarara 2000) [2, 3, 5, 9] and increase yield (Nagalakshmi, 2002) [6]. Therefore the present study was carried to ascertain the effect of different mulches on soil moisture, plant growth and yield of chilli under temperate conditions of Kashmir.

Materials and Methods
The experiment was conducted during three consecutive years viz kharief 2013-15 at Experimental Field, Division of Vegetable Science SKUAST-K Shalimar. The altitude of the location is 1685 m asl and situated 34^0N latitude and 74.89^0E of longitude. Six mulching treatments viz paddy straw (6t/ha), paddy straw (9t/ha), paddy straw 12t/ha and three inorganic mulches viz Black polythene (double coated 30 Micron), white polythene (double coated 30 micron) and black polythene (single coated 30 micron) along with a control (bare soil) were used in a local variety of chilli Kashmir long-1.The land was prepared by ploughings, weeds and crop stubbles removed and NPK were applied as per package of practices (120:80:60kg NPK/ha). Experiment was laid in RBD with three replications on raised plots (15cm high) of size 2 x 2.4m were made. Spacing of 60 x 50cm was followed to raise the crop. The data was recorded on fruit length, (cm), fruit width (cm), fruit weight (cm) and fruit yield (kg/ ha), soil moisture content (%) and weed density (g/plot) on dry weight basis. The soil moisture content in various experimental plots under different mulches was recorded in 0-10 cm depth. Data obtained on various attributes were pooled and statistically analyzed for critical differences using standard procedure.

Results and discussion:
The results obtained are discussed here under with relevant captions.

Soil moisture content
Perusal of the data revealed that all the mulches retained higher moisture content as compared to the control. There was significant soil moisture content difference among various mulching treatments. The black polythene mulch (double coated 30 micron) showed higher soil moisture content (16.74%), followed by Double coated w hite polythene (15.22%) and lowest in control (10.10%). Increase in moisture retention capacity due to polythene mulching could be attributed to less moisture evaporation from the soil. Moreover the water evaporated from the soil was again trapped beneath the mulches, resulting in vapours which again dropped into upper soil layer. Wang *et al* (1998) [11] reported that all types of polythene mulch increased the soil moisture content in chilli field compared to control.

Weed density
At the time of harvesting of crop, the weeds were removed from different plots and dried to obtain dry weight (g/plot). The results revealed that polythene mulches were very much effective in decreasing the weed density as compared to the organic mulches. In plots with polythene mulch weeds only emerged through the punch and no weed was found under the plastic which might be due to lack of penetration of light through black plastic. The weed density was minimum in black polythene mulch (double coated 30 micron) (74.81 g/plot) followed by white polythene mulch (Double coated 30 micron) (32.42g/plot) and maximum in control (418g /plot). Black plastic mulching blocked the weeds, except a few, which emerged through the planting holes (Schonbeck, 1998) [8]. Zhang *et al.*, 1992 [12] reported that black plastic mulch resulted in 100% control of all the weeds in maize that supported the present experimental result.

Yield and yield attributes
Number of fruits
Perusal of the data revealed significant differences among various treatments for number of fruits per plant. The Treatment viz Black plastic mulch (Double coated 30 micron) recorded highest number of fruits per plant (140) followed Black plastic mulch (single) (120) and minimum with control (55 fruits /plant). The results are in accordance with the earlier report of Ravinder *et al* (1997) [7] and Ashrafuzzaman *et al* (2011) [1] who reported that mulching significantly improved the number of fruits per plant and reduced the percentage fruit abortion compared to unmulching control. The increase in the number of fruits per plant associated with plastic mulching can probably be attributed to conservation of moisture, improved microclimate and less competition from weed growth. The suitable conditions enhanced the plant growth and development and produced increased fruit bearing nodes compared to the control (Ashrafuzzaman *et al*., 2011) [1].

Fruit length
As per the data obtained from the experiment, it was found that black plastic mulch (double coated) recorded highest mean fruit length (14 cm) followed by other plastic mulches. Nagalakshmi *et al* (2002) [6] offended the maximum number of fruits per plant (97.67), length of fresh fruit (6.93 cm), circumference of fruit (3.57 cm) and yield of chilli (8.6g/ha^{-1}) with the application of black plastic mulch compared to organic and no mulch (control).

Fruit width
Perusal of the data revealed statistically non-significant values for control and other treatments indicating that the character is mainly genetically and not environmentally controlled.

Fruit weight and yield
The effect of various mulching treatments on fruit weight and yield per plot was found statistically significant. Mulching resulted in higher fruit weight and yield per plot than in control, indicating that mulch had positive effect in generating increased fruit yield. Black plastic mulch (double coated) produced highest fruit weight of 9.99 g followed by white plastic mulch (8.98g).Total fruit yield was maximum in black polythene mulch (Double coated) 463.7 q/ha followed by black polythene mulch (single coated) 311.68q/ha and lowest in control (132.80 q/ha). Fruit yield increased in mulched plot because of increased number of fruit/plant and fruit weight which may be attributed to the better utilization of inputs due to lowest weed competition and better soil moisture. The results are in accordance with Ashrafuzzaman *et al* (2011) [1] who reported maximum fruit yield in case of black plastic mulch in chilli.

Economics of the system
Pooled data on benefit cost ratio reveals significant differences among different mulching treatments. treatment T5 i.e mulching with black polythene double coated gave highest B:C ratio of 3.49 followed by T7 i.e black polythene mulch single coated (2.91)which is significantly higher than control

Conclusion
Based on the experimental results, it could be concluded that plastic mulches can prove as a boon to enhance productivity in hills. A favourable soil, water-plant relation is created by placing mulch over the soil surface. The microclimate surrounding the plant and soil is significantly affected by mulch. Black plastic mulch (double coated 30 micron) could enhance soil moisture retention supers weed growth and enhanced crop yield. Therefore, mulching could be incorporated to enhanced yield in chilli.

Table 1: Effect of mulch on soil moisture, weed density and yield parameters in chilli (*Capsicum annuum* L.)(Pooled over years)

Treatments	Soil Moisture Content (%)	Weed density(g/plot dry wt)	Number of fruits	Fruit length (cm)	Fruit width (cm)	Fruit weight (g)	Green Fruit yield (kg/plant)	Green Fruit yield (q/ha)	B:C Ratio
No mulch	10.10	418.41	55	12.50	1.97	7.81	0.433	144.6	1.63
Organic mulch 6t/ha	12.92	373.97	68	11.87	1.67	6.17	0.419	139.85	1.52
Organic mulch 9t/ha	13.32	366.08	60	12.60	1.33	5.39	0.504	167.99	1.48
Organic mulch 12t/ha	14.78	352.82	71	12.43	2.03	8.48	0.278	198.79	1.62
Black polythene (double coated 30 micron)	16.74	75.37	140	14.06	2.07	9.99	1.39	463.88	3.49
white polythene (double coated 30 micron)	15.22	82.82	80	14.02	1.83	8.86	0.718	239.12	1.77
Black polythene (single coated 30 micron)	15.00	108.92	120	14.03	1.73	7.79	0.945	314.94	2.91
CD(P≤0.05)	0.22	20.90	10.5	0.37	0.23	0.28	1.52	31.70	

References

1. Ashrafuzzaman M, Halim1 MA, Ismail MR, Shahidullah SM, Hossain MA. Effect of Plastic Mulch on Growth and Yield of Chilli (Capsicum annuum L.). Brazilian Archives of Biology and Technology. 2011; 54 (2):321-330.
2. Decoteau DR, Kasperbauer MJ, Hunt PG. Bell pepper plant development over mulches of diverse colors. HortScience. 1990; 25(4):460-462.
3. Greer L, Dole JM. Aluminum foil, aluminum-painted, plastic and degradable mulches increase yields and decrease insect-vectored viral diseases of vegetables. HortTechnology. 2003; 13(2):276-284.
4. Hale MG, Orcutt DM. The physiology of plants under stress. Willey Interscience, New York, 1987.
5. Ham JM, Kluitenberg GJ, Lamont WJ. Optical properties of plastic mulches affect the field temperature regime. Journal of American Society for Horticulture Science. 1993; 228(2):188-193.
6. Nagalakshmi S, Palanisamy D, Eswaran S, Sreenarayanan VV. Influence of plastic mulching on chilli yield and economics. South Indian Horticulture. 2002; 50:262-265.
7. Ravinder K, Srivastava BK, Kumar R. Effect of different mulch materials on the soil temperature and moisture in winter tomato. Crop Research. 1997; **14**:137-141.
8. Schonbeck MW, Weed suppression and labor costs associated with organic, plastic and paper mulches in small-scale vegetable production. Journal of Sustainable Agriculture. 1998; **13**:13-33.
9. Tarara JM Microclimate modification with plastic mulch. HortScience. 2000; 35(2):169-180.
10. Thakur PS, Thakur A, Kanaujia SP, Thakur A. Reversal of water stress effects: Mulching impact on the performance of *Capsicum annuum* under water deficit. Indian Journal of Horticulture. 2000; 57:250-254.
11. Wang XQ, Li SX, Gao YJ. Effect of plastic film mulching on ecophysiology and yield of spring maize on arid lands. Acta Agronomica Sinica. 1998; **24**:348-353.
12. Zhang BY, Chen HG, Zhou TW. Exploration on coloured plastic film mulch for controlled weeds in tomato and maize fields. Plant Protection.1992; **6**:40-41.