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Influence of mulching on soil moisture, organic carbon content and weed intensity in marigold

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Abstract
The field experiment was conducted in *rabi* season of 2020-2021 at College of Horticulture, Dapoli, Ratnagiri, Maharashtra. The experiment was laid out in randomized block design (RBD) comprising four replications and six mulching treatments a Control (No mulch, T_1), Paddy straw (T_2), dry grass (T_3), glyricidia leaves (T_4), black polyethylene mulch (T_5) and silver polyethylene mulch (T_6). The soil moisture was recorded highest (22.30%) in treatment T_5 (Black polythene mulch) and was significantly superior to all other treatment and the lowest soil moisture (16.70%) was registered in treatment T_1 (Control). The organic carbon content was not varied significantly due to mulching treatments. At 60 days and 90 after transplanting, the significantly lowest weed intensity (1.27 and 2.16 per m^2, respectively) was also observed in T_5 treatment (Black polythene mulch). It was at par with the T_6 treatment indicating that polythene mulches are advantageous to check the weed growth in marigold cultivation.

Keywords: Marigold, mulching, soil moisture, weed

Introduction
Marigold belongs to “Asteraceae” family is called as 'poor man's crop'. It is widely accepted important flower since long back. The flowers are used for several purposes like religious, party and most of the festivals. Marigold flowers are available in attractive shapes and colours and sizes. Therefore. It is perfect for any garden decoration and also making garlands. Owing to a shorter cropping span and low care and investment, marigold is popular among flower growers. It is one of the most commercial flower among the loose flowers which is extensively used for religious and social functions (Patade *et al*., 2020) [6].

Various crop management practices are adopted for boosting the crop yield and among them mulching is a prominent practice. This can lead to increased flower yield and quality, making it a valuable technique, especially in water-scarce or hot climates. Various organic and inorganic mulches are used in agriculture. Mulching is the practice where the soil surface is covered with any organic or inorganic material for conserving the soil moisture and reducing the evaporation. It also helps in smothering the weeds. Marigold crop is generally weak competitor and suffer from heavy infestation of many annual weeds in early stages of growth. With this view, the present investigation was undertaken to assess the influence of mulching on soil moisture, soil organic carbon content and weed intensity in marigold.

Materials and Methods
The field experiment was conducted in *rabi* season of 2020-2021 at Research Farm of College of Horticulture, Dapoli, Ratnagiri, Maharashtra. The experiment was laid out in randomized block design (RBD) comprising four replications and six mulching treatments a Control (No mulch, T_1), Paddy straw (T_2), dry grass (T_3), glyricidia leaves (T_4), black polyethylene mulch (T_5) and silver polyethylene mulch (T_6). The flat beds having size of 4.2 m x 1.2 m were prepared by following preparatory tillage. The marigold (cv. Double Orange) seedlings were transplanted I the experiemtnal plots at the spacing of 30 cm x 45 cm in the evening hours. The organic mulches *viz*; Paddy straw, Dry grass, Glyricidia leaves were laid between the two rows of seedlings in such a way that it covers the area between two rows. The polythene mulch films of each colour i.e. black and silver cut in size of 4.2 m x 1.2 m and laid between two rows of

seedlings in such a way that it cover all the area between two rows. The recommended cultural practices were unvaryingly followed for raising the crop. The observations on weed intensity were recorded at an interval of 30 days. The soil moisture and the organic carbon content in each plot were also analyzed in the laboratory. The collected data were analyzed (Panse and Sukhatme,1985) [5].

Results and Discussion

The data presented in Table 1 with respect to the soil moisture revealed significant differences due to the various mulching treatment. The highest soil moisture (22.30%) was recorded in treatment T_5 (Black polythene mulch) and it was significantly superior to all other treatment. It was followed by T_6 treatment. The lowest soil moisture (16.70%) was registered in treatment T_1 (Control) and it was at par with T_4 treatment.

From the present findings, it is clear that mulching treatments had the noteworthy effect on soil moisture conservation. The increased soil moisture percentage under mulch might be due to less evaporation from the soil and less penetration of light from soil surface. Mulches also prevent soil from compaction, reduce soil erosion and increase availability of water to plant (Chancellor, 1977) [1]. The less depletion of water through the plastic mulches causes less capillary movement of water molecules from soil pores increases water availability to root zones for healthy plant growth (Hochmuth *et al*., 2001) [3]. The results are analogous to the findings documented by Chaudhry *et al*. (2004) [2] and Sardar *et al*. (2015) [7].

The result pertaining to organic carbon content in the soil under marigold crop as influenced by the mulching treatments are presented in Table 1. From the data, it is seen that the organic carbon content was not varied significantly due to mulching treatments. However, it was in the range 0.49 to 1.24 per cent. The organic mulch has positive effect on organic carbon enrichment but this is a one season application of organic mulch to marigold crop. The similar results were also reported by Kokkeragadda *et al*. (2018) [4].

The data on weed intensity recorded at different stages of crop growth are presented in Table 2. The data pertaining to number of weeds indicate that there was significantly reduction in the weed population (Intensity) due different mulching treatments at every growth stage. At 30 days, the weed intensity in T_5 and T_6 (Black and silver polythene mulches) treatments was zero indicating no weed growth. However, among the rest of the treatments, the significantly least weed intensity (7.88 per m^2) was in T_4 treatment (Glyricidia leaves) followed by paddy straw (T_2) and dry grass (T_3). The maximum weed intensity (79.90) was registered in unmulched plants in treatment T_1 (Control).

The intensity of weed was increased with advanced growth phase. At 60 DAT and 90 DAT, the significantly lowest weed intensity (1.27 and 2.16 per m^2, respectively) was observed in T_5 treatment (Black polythene mulch). It was at par with the T_6 treatment indicating that polythene mulches are advantageous to check the weed growth in marigold cultivation. These treatments were followed by T_4, T_2 and T_3 treatments. Whereas, the weed intensity was highest (83.75 per m^2 at 60 DAT and 86.58 per m^2 at 90 DAT) in control (T_1). It is perused that the use of mulch found effective to control the weed as the interspace between the plants is covered by the layer material which avoid the germination and successive growth of the weed. The beneficial effect of mulching was also reported by Sardar *et al*. (2015) [7]. Shalini and Patil (2006) [8] documented that polythene mulch was better than weedicide to control the weed.

Table 1: Effect of different type of mulches on soil moisture and organic carbon content in marigold plot cv. Double Orange

Treatments		Soil moisture (%)	Organic carbon (%)
T_1	Control	0.49	16.70
T_2	Paddy straw	1.00	18.40
T_3	Dry grass	0.54	17.18
T_4	Glyricidia leaves	1.24	16.93
T_5	Black polythene	0.64	22.30
T_6	Silver polythene	0.96	20.10
Range		16.70-22.30	0.49-1.24
Mean		18.60	0.81
S.Em.±		0.594	0.202
C.D.at5%		1.790	NS

Table 2: Effect of different type of mulches on weed intensity in Marigold plot cv. Double Orange

Treatments		Weed Intensity per m^2		
		30 DAT	60 DAT	90 DAT
T_1	Control	79.90	83.75	86.58
T_2	Paddy straw	18.70	18.45	16.33
T_3	Dry grass	59.78	53.50	71.80
T_4	Glyricidia leaves	7.88	12.60	17.80
T_5	Black polythene	0.00	1.27	2.16
T_6	Silver polythene	0.00	1.32	2.20
Range		0.0-79.90	1.27-83.75	2.16-86.58
Mean		28.88	28.88	31.25
S. Em. ±		3.14	4.54	2.94
C. D. at 5%		9.47	13.71	8.86

Conclusion

From the present investigation it is inferred that the higher moisture conservation and low weed intensity was observed by using Black polythene mulch in marigold.

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