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Affect of different doses of Fym on flower yield of marigold (*Tagetes Erecta* L.) CV. Hawaii

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Abstract
The present study was carried out with an aim to identify and standardize the most suitable doses of FYM to achieve higher yield of marigold flower. The experiment was laid out in randomize block design with three replicates and five treatments i.e. T_1 (11 tonne /ha), T_2 (22 tonne /ha), T_3 (27.50 tonne /ha), and T_4 (Control). The maximum yield was obtained from treatment T_1 (11 tonne /ha) 37.41±0.629 concentration of FYM 22 tonne /ha.

Keywords: *Tagetes erecta* L., flower yield, FYM.

Introduction
Marigold (*Tagetes erecta* L.) cv. Hawaii belongs to family Asteraceae, which is one of the most commonly grown loose flower and use extensively on religious and social functions in different forms. African marigold flowers have attractive range of colors for a considerably prolonged period and the flowers can be kept remarkably well after being cut. Sometimes, the whole plant can be used for decoration. They can be planted in beds for mass display, in mixed borders and can also be grown in pots. Marigold is a native of Central and South America especially Mexico. The generic name *Tagetes* is derived from, *Tages*", the name of Estrucsch God, known for his beauty. French were first to apply the name *Tagetes*, which was later adopted by others. Marigold was domesticated and used as an ornamental plant during pre-Columbian period before they were introduced in European and South Asian continents including India. In India, there is tremendous potential for the cultivation and use of ornamental plants and flowers owing to their importance and potentiality. In floriculture cultivation of this flower is receiving much attention in many countries but the firm foundation on which this ornamental flower can be built up as an industry has to be given a back up of well planned research and experimentation. Agriculture, which largely depends on chemical fertilizers, pesticides herbicides etc, though resulted in increased production, but on the same hand it has adversely affected the soil productivity and environmental quality. The word organic refers to something which has its genesis from living things and with organic farming to make production system alive with a long life. It is similar to other sustainable farming systems, viz., permaculture, eco farming, etc., which are based on harmony with nature or have near to the natural approach. Long term fertilizer experiments have made clear the negative impacts of continuous use of chemicals on soil health. As a result, many farmers are seeking alternative practices like organic farming which includes poultry manure, farm yard manure, vermi compost and compost to make crop cultivation sustainable. Organic farming is not mere non-chemical agriculture, but it is a system integrating relations between soil, plant and water. Organic farming helps in soil health, proper energy flow in soil, crop, water environment systems, keeps biological life cycle alive and helps in sustaining considerable levels in yield. It is mainly based on principles of restoration of soil organic matter in the form of humus, increasing microbial population, skilful application of the factors contributing soil life and health and treating manures in bio-dynamic way. Application of organics which is an important component in organic farming, apart from improving the soil physical, chemical and biological properties with direct impact on moisture retention, root growth and nutrient

conservation, can also reduce the cost of production in agriculture. Keeping these benefits in view an investigation was carried out to find out the "Effect of organic manures inorganic fertilizer on flower yield of marigold (*Tagetes erecta* L.)" cv. Hawaii with the following objectives:

Materials and Methods

The present investigation which is entitled Effect of different doses of FYM on flower Yield of Marigold (*Tagetes erecta* L.) CV. Hawaii was undertaken at Department of Agriculture, Quantum University, Roorkee, Uttarakhand during the year 2017. The details pertaining to the materials and methods adopted are presented in this chapter. Raised nursery beds of 3.0m x 1.0 m were prepared thoroughly. Then the seeds were sown on 03-7-2017 during rainy season. The nursery beds were maintained systematically up to 45 days till the seedlings were ready for transplanting. Experimental plot was ploughed one month before planting of seedling. After that three harrowing were given in order to bring the land to a fine tilth. On 3 July, 2017 the experimental area was laid out in flat beds of size (1mx1m) with well decomposed manures applied twenty days prior to the transplanting seedling at the rate of the (1and 2) kg/m^2 according to treatment and mixed well in the soil. The plots were subjected to irrigation two days in advance to the transplanting of the seedlings, so that seedlings could be transplanted in suitably moist soil. Seedlings of Marigold were transplanted in the main field when they had 2-3 true leaf stage on 18 August 2017. During the transplanting soil was pressed firmly around the seedlings so that seedlings will not be disturbed by irrigation water immediately after transplanting. The organic manures (T_1. FYM 1 kg /m^2, T_2. FYM 2kg/m^2 T_3 FYM 2.5kg/m^2 manure, T_4 control) were applied manually before twenty days from planting. They were applied in each plot according to the treatments. Also NPK were applied with rate 100 -100- 100 Kg Half dose of N and total dose of P_2O5 and K_2O were applied as basal dose one week before transplanting. The second dose N was applied as top dressing at 30 DAT. and well mixed with the soil to all treatments.

Results and Discussions

The present investigation was aimed at identifying suitable effect of different doses of FYM on flower yield of marigold (*Tagetes erecta* L.) Cv. Hawaii with respect to the productivity of the flowers that are usually cut. Four organic manures and treatments, including control, were evaluated during the rainy season 2017 in the experimental unit of Department of Agriculture, Quantum University, Roorkee, Uttrakhand India. Following are the results of the trial which are presented separately under the following headings.

Plant Height: The different treatment of FYM significantly affected the plant height. It is quite incontestable from table 1 that amongst the different treatments, the maximum plant height 60.333±1.667 was recorded with T_4 FYM – (2.5 kg/m^2) and T_3 FYM – (2.5kg/m^2) 54.667±3.712 The minimum plant height was recorded with T_2 FYM – (1 kg/m^2) 45±5.568.
Similar results were reported by Razzaq in marigold [1].

Number of flowerings per plant: The different treatment of FYM also significantly affected the number of flowering per plant. It is evident from table 1 that among the different treatment, the maximum number flowers 7±0.577 were recorded with T_2 FYM – (1 kg/m^2) followed by T_1. FYM -(1 kg /m^2) 6.667± Control 6.333±0.8820.667 and T_3 FYM – (1 kg/m^2) 6.667±0.667. T4 produced the minimum number of flowers per plant. These results are in confirmation with the results obtained which were obtained by Idan *et al*. (2014) [1].

Fresh weight of flower (gm): Along with the plant height and number of flowerings per plant, the different treatment of FYM also significantly affected the fresh weight of flower (gm). It is evident fr.om table 1 that among the different treatment, the maximum fresh weight of flower (gm) 5.33±0.154 were recorded with T_2 FYM – (1 kg/m^2) followed by T_1. FYM -(1 kg /m^2) 5.087±0.32 and T_3 FYM – (1 kg/m^2) 4.9±0.551. The minimum fresh weight of flower per plant was recorded with T_4 control 4.157±0.691. Similar results were reported by Mukesh *et al*., (2007) in marigold [2], these results are also similar with Ajit Kumar, (2002) [3] and Shadanpour, F (2001) in (marigold) [4].

Flower yield per plant (gm): The fresh flower yield per plant was also affected significantly by the different treatment of FYM. It is evident from table 1 that amongst the different treatments, the maximum flower yield per plant (gm) 41.667±0.882 were recorded with T_1. FYM -(1 kg /m^2) followed by T_2 FYM – (2 kg/m^2) 39.333±0.333and. It was T_4 control 33.333±1.202 which gave minimum number of Flower yield per plant. Similar results were reported by Ajit Kumar, (2002) [3] and Mukesh *et al*., (2007 [2] in marigold.

Flower Yield (t ha-1): Another important parameter that had a significant effect of the different treatment of FYM was the Flower Yield. It is evident from table 1 that amongst the different treatments, the maximum Flower Yield 37.41±0.629 were recorded with T_1 FYM – (1 kg/m^2), followed by T_2 FYM –(2 kg/m^2) 35.49±0.234 and T_3 FYM – (2.5 kg/m^2) 30.3±0.743. The minimum Flower Yield was recorded with T_4 control 30.06±1.111. Similar results were reported by Shadanpour *et al.,* (2011) [4], Bhat *et al.,* (2010) [5] Mukesh *et al.,* (2007) and Ajit Kumar (2002) [3] in (marigold).

FYM played an important role in improving physico-chemical properties (pH, EC, organic carbon, macro and micro nutrients) of soil because of its higher analytical values. Jeyabasakaran *et al*., (2001) [6].

Conclusion

Based on the present investigation which aims at identifying suitable effects of different doses of FYM flower yield of marigold *(tagetes erecta l.)* Cv. Hawaii, it can be concluded that the application of treatment (T_1) FYM 1 kg /m^2, gave maximum flower yield (T_1) (37.41 tha-1) and hence is found to be most suitable.
However, since the results are obtained from trial conducted over one season only,
therefore further investigations must be done before any specific treatment is recommended.

Table 1:

Treatment	Plant Height	Number of flower per plant	Fresh weight of flower (gm)	Flower yield per plant (gm)	Flower Yield (t ha-1)
T_1	45±5.568	6.667±0.667	5.087±0.32	41.667±0.882	37.41±0.629
T_2	50±1	7±0.577	5.33±0.154	39.333±0.333	35.49±0.234
T_3	54.667±3.712	6.333±0.667	4.9±0.551	33.667±0.882	30.3±0.743
T_4	60.333±1.667	6.333±0.882	4.157±0.691	33.333±1.202	30.06±1.111
C.D.	N/A	N/A	N/A	2.553	2.268
SE(m)	3.045	0.907	0.473	0.771	0.685
SE(d)	4.306	1.282	0.669	1.09	0.969
C.V.	10.143	22.017	15.697	3.257	3.211

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