International Journal of Academic Multidisciplinary Research (IJAMR)
ISSN: 2643-9670
Vol. 4, Issue 5, May – 2020, Pages: 159-163

Effect of Different Growing Media on the Growth of Marigold Flower under Agro Climatic Condition of Quetta

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Abstract: *Present study was conducted to evaluate the effect of different growing media on the growth and flowering of Merigold elegans Seven different growth media including T_1 = Rice hull25%+Cattle manure 25%+soil 50%..T_2 = sand25%,leaf manure 25%,50 soil.T_3 = FYM 25%+25% soil,50 Poultry manure.T_4 = Perlite 50%,50% soil.T5=Peat mass 25%+25%soil+50 sand.T6= Peat Mass 50%+25% soil+25% sand.T7= CONTROL were used for growing merigold. The experiment was laid out in Complete Randomized Design giving equal importance to treatments. Number of flowers, blooming period, number of lateral branches per plant, number of leaves per plant, plant height (cm), leaf area(cm2), days to first flower emergence, size of flower and flower quality were determined. The properties of each medium, including water holding capacity (saturation percentage), pH, total nitrogen, available phosphorus and available potassium were also determined. Plant height (cm), number of leaves per plant, number of side branches, days to first flower emergence and number of flowers were affected significantly when plants were grown in leaf manure mix. Coconut compost gave maximum size of flowers which was significantly greater than soil. Flower quality was found to be non-significantly affected with the use of various growth media. It is therefore opined that the utilization of coconut compost, silt and leaf manure is a good source of NPK. Therefore, utilization of growing media in combinations proves more effective for the good growth and flowering of merigold.*

Keywords: different media growth.

INTRODUCTION:

Marigold (*Tagetes erecta* L.) occupies a prominent place in commercial and ornamental horticulture with an area of about 6.17 thousand ha and the production around 52.07 thousand mt (Kumar and Kumar, 2011). Marigold is growing throughout the year although the production doesn't remain high during the seasons of the year except October to February (Mortensen and Moe, 2012**;** Nezihe *et al.* 2016**).** The variation in the productivity is emanated from the variation in weather parameters in which the crop is grown. The tropical humid environment therefore it is highly important to identify the suitable planting times during the seasons excluding the winter. As this crop is a very popular flower and is cultivated throughout the year, the identification on planting time based on weather will be remunerative to the rural economy. In the present experiment, we have tried to illustrate the effect of temperature, humidity and light on growth and flowering behavior in marigold (Nath *et al.*, 2012; Kofranek, 2013).

The potting media for container or pot seedlings is available in two types viz soil and organic based. The soil based medium contain soil as major part while organic based medium is compost of organic materials such as bagasse, coco peat, peat, peat moss, perlite, vermiculite, leaf litters or any organic material. Most nurseries in our local premises do not have cheap access to these organic materials and growers often prepare their own potting medium using locally available and cheap sources (Sardoei *et al.* 2014). A good potting medium would provide sufficient anchorage or support to the plant, serves as reservoir for nutrients and water, allow oxygen diffusion to the roots and permit gaseous exchange between the roots and atmosphere outside the root substrate. The good quality potting medium must be porous for root aeration and drainage and also capable of water and nutrient retention. Oxygen, of course, is required for all living cells. (Abad *et al*., 2012).

Composition and nutritional status of the potting medium is considered to be helpful for the production of good quality flowering plants. Nutrients availability plays a pivotal role in good flower production and thus provision of proper growing media is the pre-requisite for better growth and production of floriculture crops (Kapoor et al. 2015). Traditionally, zinnia is not fertilized since it believes that nutrients in the potting substrate are sufficient to maintain plant growth and development as commercial potting mixtures are often used because they are sterilized, ready to use and may even contain some fertilizer (Hochmuth et al., 2015; Kochakinezhad et al. 2012). In some cases zinnias are fertilized with chemical fertilizers to meet the demands of the overpopulated societies. The environmental stress and depletion of the soil are due to the excessive use of chemical fertilizers. Well-fertilized plants, however, have noticeably better flowers, an earlier adult phase, and an important increase in pest and disease resistance. However, as the level of technology applied increases, the risk of plant losses increase as well. This shows that there are limits for nutrient applications, with excellent

results at adequate rates and the possibility of death due to nutrient toxicity and/or salinity when nutrients are supplied in excess (Novais and Rodrigues, 2011).

Review of Literature:

Anamika et al. (2017) studied the effect of organic compost, prepared using Efficient Microorganism (EM) consortium and applied along with full or half of the recommended dose of chemical fertilizers, on the growth of Calendula and Marigold plants, soil physico-chemical parameters and soil enzyme activities. Soil enzyme activities were improved with the increase in the rate of EM compost application in both Calendula and Marigold. Carotenoid pigment increased by 46.11% and 12.19% with application of EM compost over the control in Calendula and Marigold flowers respectively. Soil humus, available nitrogen and organic carbon content also increased due to the supplementation of EM compost resulting in better soil fertility. For Calendula, treatment T5 (Half dose NPK + EM compost 20 000 kg· hm−2) was found to be the most promising in terms of acid phosphatase (82.63 µg ***p***-Nitrophenyl Phosphate· g−1· h−1), dehydrogenase (10.46 µg Triphenyl Formazan· g−1· d−1) and ***β***-glucosidase (0.30 IU· g−1) activities. In Marigold, treatment C (Half dose NPK + EM compost 5 000 kg· hm−2) was the most promising in terms of amendment in soil enzyme activities.

Atiyeh et al. (2017) reported that vermicomposts, which are produced by the fragmentation of organic wastes by earthworms, have a fine particulate structure and contain nutrients in forms that are readily available for plant uptake. In greenhouse trials, the growth of marigold and tomato seedlings, in a commercial horticultural potting medium (Metro-Mix 360), was enhanced significantly upon substitution of Metro-Mix 360 with 10% or 20% vermicomposted pig solids or vermicomposted food wastes, when all required nutrients were supplied. Same enhancement in marigold and tomato seedlings' growth occurred also upon substitution of Metro-Mix 360 with composted biosolids, but not with leaf compost. The shoot dry weights of raspberry plants, grown in a mineral soil mixed with vermicomposted pig wastes weighed more than those grown in unfertilized control soil, and were as great as those in soil receiving a complete fertilizer treatment. By comparison, raspberry shoot growth in soils amended with yard, leaf or bark composts, was poorer than that in the unfertilized control soil. Amending the soil with 4% chicken manure compost killed most of the raspberry plants. However, plant mortality was reduced and growth restored when the chicken manure compost was mixed with vermicomposted pig solids, but not with bark or yard composts. Plant growth in soils containing a mixture of chicken manure compost with 20% vermicomposted pig wastes was similar to that of plants grown in the unfertilized control. Our results showed that vermicomposts have the potential for improving plant growth when added to greenhouse container media or soil. However, there seem to be distinct differences between specific vermicomposts and composts in terms of their nutrient contents, the nature of their microbial communities, and their effects on plant growth.

Awang and Ismail (2015) reported that marigold produced more flowers where grown in a medium containing coconut coir although, in this case, coconut coir alone failed to produce these effects. However, the coconut compost alone produced significantly the largest average flower size (8.0 cm) compared with rest of the media which were statistically at per with one another, although the leaf manure mix was next in the order to the coconut compost in terms of average size of the flowers shows that silt alone as a medium of growth for zinnia had a worthwhile effect on two important flowering characteristics i.e. (i) total blooming period and (ii) days taken to first flower emergence. This medium gave significantly the least number of days for emergence of first flower and the longest blooming period compared with all the rest of the media. In fact, the flower emergence in this medium (silt) was initiated 3-4 days earlier than rest of the media that contributed to overall longer period of blooming compared with rest of the media indicating that blooming period terminated in all media almost at the same time. This treatment has produced the maximum number of leaves per plant which was significantly more than all other treatments except the leaf manure mix which could also contribute to maximum number of flowers per plant.

Farzad et al. (2015) studied the application of compost mixture in growth media is an integral element for improving growth, flowering and development of bedding plants. To achieve this aim, the present comparative study was conducted on African marigold as a complete block design with 9 treatments (soil amendments: "Agrobiosol", "Alkan", "Barvar-2" phosphate biofertilizer, animal and plant vermin compost, animal manure) and 3 replications at the Research Field of Landscape Organization Shiraz Municipality, Iran. The results indicated that some traits were affected significantly by soil amendments.

Ali et al. (2014) determined the effects of vermin compost of an animal manure origin on the growth and flowering of marigold grown under glasshouse conditions. Marigold seeds were germinated, transplanted into media and grown-on for 150 days. The traditional base medium (control) was a mixture of 70% farm soil and 30% sand (v/v). Treatments were either vermicompost incorporated at 10, 20, 30, 40, 50 and 60% into the base medium. Vermicompost had significant $P<0.05$] positive effects on total parameter compared to both control amended media. The highest root volume, fresh weight of petal and shoot was achieved in 30% compost treatment. Plant performance was best in the 60% vermicompost medium.

Renuka et al. (2014) studied the influence of vermicomposts prepared from cow dung and house hold waste on the growth and flowering of marigold crop. A total of seven potting media were prepared containing soil, cow dung vermicompost and cow dung + house hold waste vermicompost. The fertility status of soil and vermicomposts was quantified. In these media, growth and flowering of marigold plant seedlings was studied for 60 days. The results showed that the vermicomposting process converted the cow dung and household waste into a highly stabilized product having C:N ratio <20.0. The plant grown in vermicompost-containing potting media had 2.3 times more plant height than control. Results showed that the addition of vermicompost, in appropriate quantities, to potting media has significantly positive effects on growth and flowering of marigold seedlings including plant biomass, plant height, number of buds and flowers. It was concluded that addition of vermicompost, in appropriate quantities, to potting media has synergistic effects on growth and yield of marigold.

MATERIAL AND METHOD:

The pot experiment will be conducted at Horticulture Garden, at Quetta. Completely randomized design (CRD)-factorial will be laid out with three replications and each replication will be contains three pots. Then those will be shifted in shade on daily basis. The experimental details are as under:

Experimental design = Completely Randomized Design CRD)-Factorial
Replication = Three
Treatments = 7 treatment
T_1 = Rice hull25%+Cattle manure 25%+soil 50%..

T_2 = sand25%,leaf manure 25%,50 soil.

T_3 = FYM 25%+25% soil,50 Poultry manure.

T_4 = Perlite 50%,50% soil.

T5=Peat mass 25%+25%soil+50 sand.

T6= Peat Mass 50%+25% soil+25% sand.

T7= CONTROL

RESULTS:

Plant characteristics: Growth medium is known to have a large effect on value of potted ornamental plants (Vendrame et al., 2005). Five different media used in this study had significant impact on some of the selected parameters of vegetative growth and ornamental value of Merigold elegans cv Blue Point cohile the effect was statistically non significant on length of side branches (Table 2). In general, mixture of T1 (1:1:1) gave the highest values of growth parameter such as number of leaves per plant, plant height and number of side branches which were significantly

higher than all the rest of the media in respect of number of leaves per plant and number of side branches, but differed non significantly with silt in terms of number of leaves per plant. Rest of the media differed non significantly among themselves with regard to plant height and number of side branches per plant. Silt produced first flower the earliest of all the treatments and the number of days taken for emergence of first flower were statically lesser than all other treatments, while the emergence was delayed by 4 days in the case of leaf manure mix. However, the number of leaves per plant were the maximum with leaf manure mix, followed by silt which had significantly higher values than rest of the treatments. Both physical and chemical characteristics of the growth medium exert substantial effect on growth of plants. Among the physical characteristics, aeration and water holding capacity are probably the most important factors while, among the chemical characteristics, nutritional status, and salinity level have a crucial role on plant development (Dewayne et al., 2003) Apparently, the leaf manure mix (silt + leaf manure + coconut compost; 1:1:1) had the most appropriate physical characteristics as well a high level of nutrition and thus gave the highest values for most of the growth parameters measured in this study (Table2; Fig. 1a-1e). Although leaf manure had the highest concentration of nutrients (Table 1), but it also had high ECe (salinity) which reduced the growth compared with the leaf manure mix because ECe higher than 4dS/m generally depresses plant growth (Miller, 2001; Ribeiro et al., 2002).

Flowering characteristics: Five parameters pertaining to flowering characteristics were evaluated which included: days to first flower emergence, number of flowers per plant, average size of flowers, total blooming period and overall visual evaluation of flower.

Table 1: Chemical analysis of growing media before and after growing of Merigold plants

Sr. No	pH	EC dS/m	NO_3-N ppm	PO_4-P ppm	K ppm
T1	8.12	1.0	0.99	6.75	200

T2	7.61	6.92	2.22	17.98	1220
T3	8.2	4.75	2.50	26.35	448
T4	7.70	1.4	1.66	16.46	152
T5	7.2	2.4	1.62	14.73	143
T6	7.1	1.8	1.74	14.62	178
T7	8.1	1.3	0.90	3.37	100

Table 2: Effect of various growth media on vegetative plant characteristics of *Merigold elegance* cv.

Treatments	**Number of Plant leaves/plant**	**height (cm)**	**Number of side branches/plant**	**Length of side branches/plant**
T1	45.6c	44.6c	9.06b	12.4
T2	45.8a	45.7c	6.86b	9.2
T3	39.9c	46.2b	6.93b	10.0
T4	41.2b	47.0b	5.93c	9.4
T5	47.0a	53.9	8.06a	12.2
	P<0.05	P<0.01	P<0.05	NS
T6	25d	39c	4b	7.7
T7	33c	37c	4.3b	2.2

Conclusion:

The resent study confirms the fact that selection of the appropriate medium of growth for potted flowering plants (in this case Merigold elegans cv. Blue point) was very important from aesthetic and marketing point of view. The medium must ensure the production of plants of the required quality on cost effective basis. In the present study, leaf manure mix (T1) produced significantly the maximum number of flowers per plant while the maximum flower size was obtained with coconut compost. However, silt alone (a cheaper growth medium) produced flowers earliest with the longest blooming period while the number of flower per plant and size of flowers was only significantly smaller than one of the other media studied. Therefore, keeping cost of production in view, silt was also a good candidate as a growth medium for Merigold *elegans*.

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