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Effect of Different Growing Media on the Growth and Development of *Zinnia* (*Zinnia elegans*) under the Agro-Climatic Condition of Jiroft

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ABSTRACT

Zinnia elegans, an annual flowering plant of the genus *Zinnia*, is one of the best known zinnias. Present study was conducted to evaluate the effect of different growing media on the growth and flowering of *Zinnia elegans*. Seven different growth media including coconut compost, silt, soil loam, leaf manure, (leaf manure+silt; 2:1), (coconut compost+soil loam; 1:1) and (leaf manure+soil loam+silt; 1:1:1) were used for growing *Zinnia*. The experiment was laid out in Complete Randomized Design (CRD) giving equal importance to treatments. Number of flowers, length of lateral branches, number of lateral branches, stem diameter, plant height (cm), diameter of flower, vase life (day) and fresh and dry root, shoot and total were determined. The present study confirms the fact that selection of the appropriate medium of growth for potted flowering plants in this case *Zinnia elegans* 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 produced significantly the maximum vase life and diameter of flower while the maximum vase life and diameter of flower was obtained with mix (coconut compost+soil loam; 1:1).

Key words: Media, vase life, number of flowers, *Zinnia*

INTRODUCTION

Zinnia is a wonderful summer annual flower which is gaining rapid popularity for its variety of colorful blooms. It belongs to family Compositae. It is native to Mexico and Central America. *Zinnia* flowers exhibit bright, uniform colors, sturdy stems with disease resistant plants and along vase life (Dole, 1999). Increasing awareness of environment-related issues, as well as the need to dispose of and use rising amounts of waste along with the need to reduce the consumption of nonrenewable resources like peat have encouraged the use of composted organic biomass in agriculture. In Iran, *Zinnia* is grown in many types of soils, soil mixtures, or mixtures of organic matter and materials without soil that may include sand, peat, perlite, bark and wood chips, sludge, or composted leaves. The growing media should be porous, uniform in texture, hold sufficient moisture and should be well drained. Commercial mixtures are often used because they are sterilized, ready to use and may even contain some fertilizer (Hochmuth *et al.*, 1996). Different growing media can be used to grow *Zinnia* while, the physical and chemical properties of media, like structure, texture, pH as well as nitrogen, phosphorus and potassium are the dominant factors for the growth and development of plant. Composition and nutritional status of the medium is

considered to be helpful for the production of good quality flowering plants with more number of flowers and greater size. No extensive work has been carried out on this flowering plant in Iran, therefore, keeping in view the decorative and aesthetic value of the *Zinnia*, this study was undertaken to determine the effect of different growing media on the growth and flowering of *Zinnia*. Pure soil, coconut compost, leaf manure, silt and soil mix were used to evaluate their effects on the growth and flowering of *Zinnia* to find out the appropriate growing media for this species.

Good flower production usually depends upon various factors including the type of growing media used. Growing media is defined as the mean where the roots of cultivated plants grow (Kampf, 2000). Their primordial function is to give support for plant growing (Kampf, 2000; Robert, 2000). 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. The plant growing 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. The coarse-textured media often meet these requirements. Mushroom compost, leaf mold, farmyard manure and other amendments may fulfill these requirements. Brundert and Schmidt (1982) stated that plants with higher water requirements grew more vigorously in leaf mold medium. Maldonado (1984) observed that the plant height and leaf development of foliage plants were best in leaf mold medium. Khan and Khan (1991) reported that the bulb of *Dahlia* was best developed in the leaf mold. Aquila and Pasini (1989) observed maximum plant height and number of leaves in plants grown in leaf mold medium. Shah *et al.* (2006) got maximum leaves (7.0 mean), with maximum length (20 cm), maximum leaf area (84.7 cm²) and maximum roots (15 mean) in *Ficus binnendijki* cutting, when leaf mold was used as potting media. A good growing medium would provides 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 (Argo, 1998; Abad *et al.*, 2002). This important factor is usually under estimated while working on commercial flower production. Only few studies deal with growing media and their effect in various flowering ornamentals like *Lilium* (Kapoor *et al.*, 2000), *Gladiolus* (Khan *et al.*, 2002), *Crocus* (Wazir, 2005), *Phlox* (Naz *et al.*, 2006), *Dahlia* (Kiran *et al.*, 2007), *Freesia* (Ali *et al.*, 2011) and tuberose (Ikram *et al.*, 2012). The current study is being proposed to study the effect different growing media on growth and flowering of *Zinnia* (*Zinnia elegans*) plant.

MATERIALS AND METHODS

Plant material and treatments: Present research was conducted in the Floriculture area, Institute of Horticultural Sciences, University of Agriculture, Jiroft. Seven different growth media including coconut compost, silt, soil loam, leaf manure, (leaf manure+silt; 2:1), (coconut compost+soil loam; 1:1) and (leaf manure+soil loam+silt; 1:1:1) were used for growing *Zinnia*.

Plant-growth parameters: Pots of 17.5 cm diameter were used for growing plants. Experiment was carried out in CRD having twenty eight plants in an experimental unit with seven replications and data were collected fortnightly. Thirteen different parameters including number of flowers, length of lateral branches, number of lateral branches, stem diameter, plant height (cm), diameter of flower, vase life (day) and fresh and dry root, shoot and total were used for this study.

Data analysis: Analysis was performed on data using SPSS 16. Comparisons were made using one-way analysis of variance (ANOVA) and Duncan's multiple range tests. Differences were considered to be significant at $p < 0.05$.

RESULTS AND DISCUSSION

Seven different media used in this study had significant impact on some of the selected parameters of vegetative growth and ornamental value of *Zinnia elegans* the effect was statistically non significant on stem diameter, root fresh weight and root and shoot dry weight (Table 1). In general, leaf manure gave the highest values of growth parameter such as vase life and diameter of flower which were significantly. Growth medium is known to have a large effect on value of potted ornamental plants (Vendrame *et al.*, 2005).

The effect of various media with regard to one of the important parameters length of lateral branches and number of lateral branches was significant and the leaf manure mix (leaf manure+silt; 2:1) gave significantly the highest values as compared to all other media which differed significantly with one another (Table 1).

As far as the visual qualitative assessment of flowers was concerned, the differences due to media were non significant (Table 2) and therefore, the role of the media tested seems to be unimportant in this regard. The effect of various media with regard to one of the important parameter number of flowers per plant was significant and the leaf manure mix (coconut compost+soil loam; 1:1) gave significantly the highest values as compared to all other media which differed significantly with one another (Table 1). It is worth mentioning that the leaf manure had produced most vigorous plants in terms of vase life, diameter of flower and root and total fresh and dry weight compared with other media. Similar results were reported by Riaz *et al.* (2008).

These results support the findings of Awang and Ismail (1997) and Riaz *et al.* (2008), who found that *Zinnia elegans* 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 plant height (62.25 cm) compared with rest of the media which were statistically at par with one another, although the leaf manure mix was next in the order to the coconut compost in terms of average plant height (Table 1). Similar results were reported by Rahbarian and Sardoei (2013).

Table 1: Effect of various growth media on growth and flowering characteristics of *Zinnia elegans*

Media	Stem diameter (cm)	Plant height (cm)	Length of lateral branches (cm)	No. of flowers	No. of lateral branches	Vase life (day)	Diameter of flower (mm)
Soil loam	0.22 ^a	44.50 ^{cd}	19.03 ^c	3.3 ^{abc}	2.25 ^b	27.25 ^{ab}	63.45 ^{bc}
Leaf manure	0.31 ^a	49.37 ^{bcd}	24.35 ^{bc}	3.5 ^{ab}	3.0 ^{ab}	32.75 ^a	72.27 ^a
Coconut compost	0.26 ^a	62.25 ^a	31.23 ^{ab}	3.25 ^{abc}	3.25 ^a	26.50 ^{ab}	66.58 ^{ab}
Leaf manure+silt	0.23 ^a	54.37 ^{abc}	36.37 ^a	3.5 ^a	3.5 ^a	24.25 ^{ab}	65.85 ^{ab}
Leaf manure+soil loam+silt	0.23 ^a	58.12 ^{ab}	28.62 ^{abc}	2.75 ^{bc}	2.25 ^b	32.25 ^a	69.71 ^{ab}
Coconut compost+soil loam	0.26 ^a	42.87 ^d	22.47 ^{bc}	3.75 ^a	2.75 ^{ab}	20.50 ^b	67.52 ^{abc}
Silt	0.26 ^a	50.87 ^{bcd}	24.11 ^{bc}	2.5 ^c	2.75 ^{ab}	23.33 ^{ab}	61.11 ^c

Means followed by same letter are or non significantly different at p<0.05 probability using Duncan's test

Table 2: Effect of various growth media on plant fresh and dry weight of *Zinnia elegans*

Media	Fresh weight (g)			Dry weight (g)		
	Root	Shoot	Total	Root	Shoot	Total
Soil loam	1.78 ^a	13.72 ^{ab}	15.50 ^c	0.99 ^a	6.78 ^a	7.78 ^{bc}
Leaf manure	3.82 ^a	31.05 ^a	35.02 ^a	2.12 ^a	15.89 ^a	18.01 ^a
Coconut compost	2.67 ^a	21.52 ^a	24.19 ^b	1.00 ^a	11.69 ^a	12.69 ^{ab}
Leaf manure+silt	3.07 ^a	31.41 ^a	34.48 ^a	1.33 ^a	16.59 ^a	17.93 ^a
Leaf manure+soil loam+silt	3.00 ^a	25.42 ^{ab}	28.42 ^{ab}	1.42 ^a	11.32 ^a	12.74 ^{ab}
Coconut compost+soil loam	2.25 ^a	23.15 ^{ab}	25.41 ^b	1.16 ^a	12.05 ^a	13.22 ^a
Silt	1.01 ^a	11.15 ^b	12.56 ^c	0.55 ^a	4.86 ^a	5.41 ^c

Means followed by same letter are or non significantly different at p<0.05 probability using Duncan's test

The results showed that the availability of proper nutrients to the plants may alter the plant height as Younas *et al.* (2008) also obtained maximum plant height of *Dahlia coccinia* on leaf manure. Similar results have been reported by Riaz *et al.* (2008), who reported vigorous plant height in *Zinnia elegans* cv. Blue point, when leaf manure mixture was used as a growing media.

The effect of various media with regard to one of the important parameters shoot fresh and dry weight was significant and the leaf manure mix (leaf manure+silt; 2:1) gave significantly the highest values as compared to all other media which differed significantly with one another (Table 2).

CONCLUSION

The present study confirms the fact that selection of the appropriate medium of growth for potted flowering plants in this case *Zinnia elegans* 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 produced significantly the maximum vase life and diameter of flower while, the maximum vase life and diameter of flower was obtained with mix (coconut compost+soil loam; 1:1).

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