

EFFECTS OF DIFFERENT GROWING MEDIA ON GROWTH AND FLOWERING OF *ZINNIA ELEGANS* CV. BLUE POINT

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Abstract

Present study was conducted to evaluate the effect of different growing media on the growth and flowering of *Zinnia elegans* cv. Blue Point. Five different growth media including coconut compost, silt, soil, leaf manure, leaf manure mix (silt + leaf manure + coconut compost; 1:1:1) were used for growing zinnia. 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 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. The most cultivated zinnia varieties "Blue Point" and "Oklahoma" are considered best because of their good performance and various color blooms. Zinnia flowers exhibit bright, uniform colors, sturdy stems with disease resistant plants and a long 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 Pakistan, 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.

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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 Pakistan, 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 leaf manure mix were used to evaluate their effects on the growth and flowering of zinnia to find out the appropriate growing media for this species. The chemical analysis of these media was undertaken to check the ultimate influence of various media on growth and flowering of zinnia.

Materials and Methods

Present research was conducted in the Floriculture area, Institute of Horticultural Sciences, University of Agriculture, Faisalabad. Five different growing media were used as sources for growth including, soil, leaf manure mix (silt + leaf manure + coconut compost; 1:1:1), coconut compost (soil + coconut coir 1:1), silt and leaf manure. Clay pots of 17.5 cm diameter were used for growing plants. Experiment was carried out in CRD having twenty five plants in an experimental unit with three replications and data were collected fortnightly. Ten different physiological parameters including germination percentage, number of leaves per plant, plant height (cm), number of side branches, length of side branches (cm), days to first flower emergence, number of flowers, size of flower (cm) blooming period and flower quality were used for this study. Along with these characteristics, chemical analysis of all growing media was done and different properties were recorded (Table 1).

Electrical conductivity and pH were determined in suspension of medium in water (1:1) by following Richards (1954) and McLean (1982) respectively. Organic matter was determined using the method of Walkley & Black (1947). For nitrogen determination the method given by Bremner & Mulvanet (1982) was used. For measurement of available phosphorus, the method used was of Olsen *et al.*, (1984) and for available potassium, United States Salinity Laboratory Staff (1954) method was used and determination was made with flame photometer.

Statistical Analysis: Standard procedures were followed to collect the data for growth and flowering parameters. The data collected was analyzed statistically by using Duncan's Multiple Range (DMR) test at 5% probability level and used to compare the difference among treatments means (Steel *et al.*, 1997).

Results and Discussion

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 *Zinnia elegans* cv Blue Point cohile the effect was statistically non significant on length of side branches (Table 2). In general, mixture of silt + leaf manure + coconut compost (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 (Table 2; 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 *Zinnia* plants

Sr. No	pH	EC dS/m	NO ₃ -N ppm	PO ₄ -P ppm	K ppm
Soil fresh	8.12	1.0	0.99	6.75	200
Soil used	7.61	6.92	2.22	17.98	1220
Manure mix fresh	8.2	4.75	2.50	26.35	448
Manure mix used	7.70	1.4	1.66	16.46	152
Coconut compost fresh	7.2	2.4	1.62	14.73	143
Coconut compost used	7.1	1.8	1.74	14.62	178
Silt fresh	8.1	1.3	0.90	3.37	100
Silt used	7.89	1.45	1.11	7.42	104
Leaf manure fresh	7.95	11.13	9.31	16.08	1760
Leaf manure used used	7.66	11.25	4.56	27.81	436

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

Treatments	Number of leaves/plant	Plant height (cm)	Number of side branches/plant	Length of side branches/plant
Soil	38.6c	44.6c	6.06b	9.4
Silt	45.8a	45.7c	6.86b	9.2
Leaf manure	39.9c	46.2b	6.93b	10.0
Coconut compost	41.2b	47.0b	5.93c	9.4
Leaf manure mix	47.0a	53.9	8.06a	12.2
	P≤0.05	P≤0.01	P≤0.05	NS

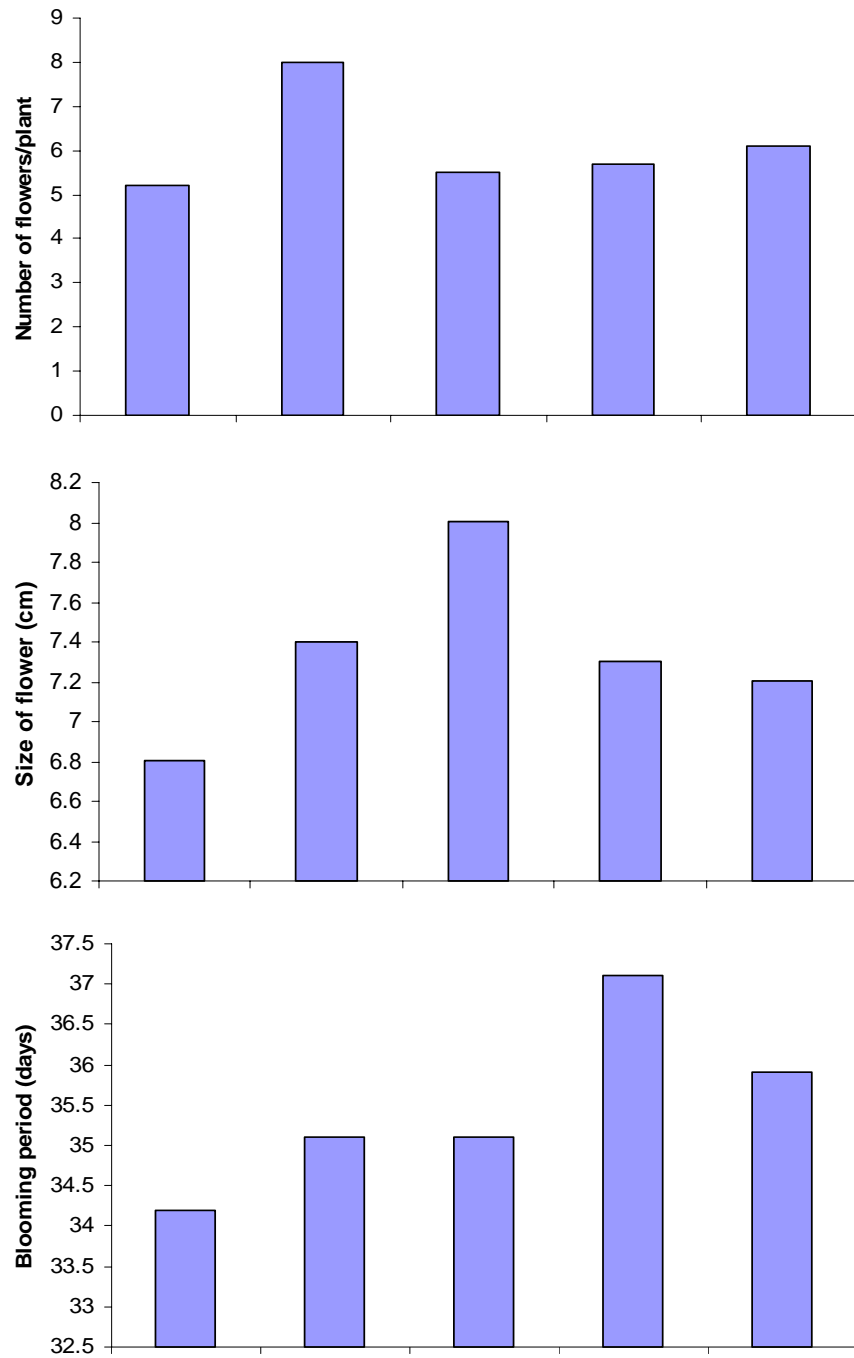


Fig. 1 (a-c): Effect of various growth media on flowering characteristics.

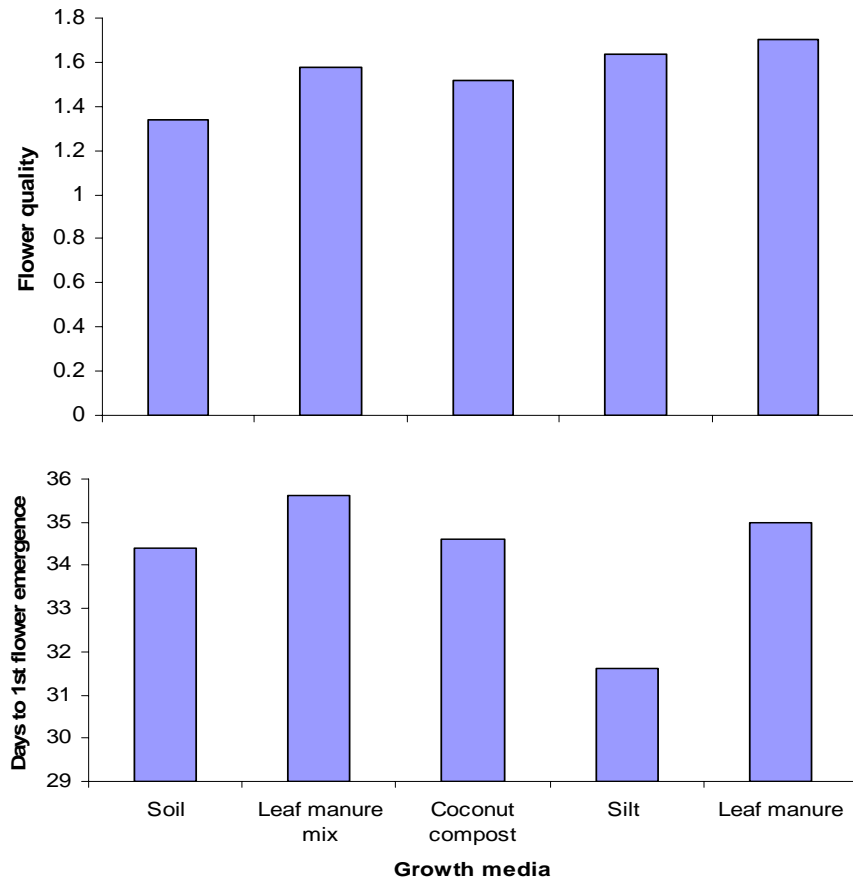


Fig. 1(d-e): Effect of various growth media on flowering characteristics

quality (colour, sharpness, fresh look etc). As far as the visual qualitative assessment of flowers was concerned, the differences due to media were non significant (Fig. 1d) 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 parameters i.e number of flowers per plant was significant and the leaf manure mix (silt + leaf manure + coconut compost; 1:1:1) gave significantly the highest values as compared to all other media which differed non significantly with one another (Table 1; Fig 1a). It is worth mentioning that the leaf manure mix had produced most vigorous plants in terms of plant height, number of leaves per plant, number of side branches and length of side branches compared with other media.

These results support the findings of Awang & Ismail (1997) who found that *Zinnia elegans* and 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 par 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 (Fig 1b). Fig. 1 (c & e) 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.

Conclusions: The present study confirms the fact that selection of the appropriate medium of growth for potted flowering plants (in this case *Zinnia 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 (silt + leaf manure + coconut compost; 1:1:1) 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 *Zinnia elegans* cv. Blue Point.

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