

## Impact of potting mixtures on vegetative growth and flowering of *Zinnia* (*Zinnia elegance L.*)

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### ABSTRACT

The purpose of the studies was to determine the effect of various potting mixtures (Vermicompost, Farmyard Manure, Coarse Sand and Soil in 6 different ratios) on Growth and Flowering of zinnia during the summer season crop of 2010. Among all, the (VC+CS+SOIL) potting mixtures combination treatments of 3:2:0 respectively showed best result in both vegetative and flowering parameters. The poorest result was showed in the (VC+CS+SOIL) potting mixtures combination treatment of 1:1:1 in all vegetative and flowering parameters.

**Key words:** Potting mixture, Vermicompost, Farm Yard Manure, Coarse Sand, Soil, Zinnia

### INTRODUCTION

The genus *zinnia* belongs to family compositae/Asteraceae. It is a wonderful annual flower which is gaining rapid popularity for its variety of colourful blooms. It is commonly known as as zinnia, youth and old age. It is native to Mexico and Central America. Zinnia is a popular garden annual and varies in height from very dwarf (15cm) to tall (90cm). As a result of intensive breeding various flower forms-single, semi-double, and double-varying in size from 2.5 to 10cm across have been obtained. Zinnia flowers exhibit bright, uniform colour, sturdy stems with disease resistant plants and a long vase life (Dole,

1999). Zinnia is easy to grow. The plants have tendency to flower at young stage. For pot culture 20-30cm pots are suitable. (Randhawa *et al.*, 2006). The usual constituents of a potting mixture are a good garden soil, preferably loam, which generally forms the greater part of the mixture, leaf-mould or peat-moss, coarse sand, old mortar rubber, vermicompost, well rotted farm yard manure, charcoal and cinder ash. The proportion of the constituents will vary according to the type of the plant. For plants which need rich potting mixture, the amount of soil in the mixture is reduced and other constituents such as

vermicompost, farm yard manure are increased. It has already been stated that the proportion of the various ingredients in a soil will vary according to the type of the plant grown and the nature of the loam used, but, nevertheless, the following potting mixtures with a little variation, depending on the situation, will be suitable for most of the general type of annuals. Potting media play very vital (Jones, 1982; McCown, 1986), which have a property of superior drainage, appropriate aeration, and water holding capacity. (Randhawa *et al.*, 2006).

#### MATERIALS AND METHODS

The study was conducted at the Horticulture Research Farm of the Department of Applied Plant Science (Horticulture) Babasaheb Bhimrao Ambedkar University, Vidya Vihar, Rae Bareilly Road Lucknow, during summer season of 2010 to find out the potting mixtures effect on growth and flowering of zinnia. The pot experiment was laid out in Randomized Block Design with three replications consisting 12 treatments i.e. Vermicompost + Coarse sand + Soil (1:1:1), Vermicompost + Coarse sand + Soil (2:1:1), Vermicompost + Coarse sand + Soil (3:1:1), Vermicompost + Coarse sand + Soil (1:2:1), Vermicompost + Coarse sand + Soil (2:2:1), Vermicompost + Coarse sand + Soil (3:2:0), FYM + Coarse sand + Soil (1:1:1), FYM + Coarse sand + Soil (2:1:1), FYM + Coarse sand + Soil (3:1:1), FYM + Coarse sand + Soil (1:2:1), FYM + Coarse sand + Soil (2:2:1), FYM + Coarse sand + Soil (3:2:0). One month old seedlings of uniform growth were transplanted in evening hour. Observations of vegetative parameters like plant height(cm), plant spread(cm), number of leaves per plant, number of branches per plant, stem diameter(cm), leaf length(cm), and leaf width(cm) and flowering parameters like Days to first bud initiation, Bud diameter(cm), Bud length(cm), Number of flowers per plant, Flower diameter(cm) and Stalk length (cm) were recorded. Plant spread was taken from the average of the plant spread in

North-South and East-West directions. When pea sized buds appear the bud initiation date was noted.

#### RESULTS AND DISCUSSION

The data presented in Table: 1 and 2 revealed that all the vegetative and flowering parameters of Zinnia were more significantly influenced by the different potting mixtures in different ratios. Among the different potting mixtures Vermicompost + Coarse sand + Soil (3:2:0) exhibited the better results in terms of plant height (46.36 cm), plant spread (24.90cm), number of leaves (103.33), number of branches (9.00), diameter of stem (1.26cm), leaf length (7.73cm), leaf width (4.26cm), minimum days takes for first flower bud initiation(8.66 days), maximum bud diameter (0.87cm), maximum bud length (1.23cm), maximum number of flowers per plant (12.00), maximum flower diameter (7.43cm) and maximum flower stalk length (7.36cm). Nazari *et al.*(2008) reported that the application of compost media is an integral element for improving growth, flowering and development of bedding plants. Sangwan *et al.*[4] reported that the influence of Vermicompost, prepared from (i) cow dung (CD) and (ii) sugar mill wastewater treatment plant sludge spiked with horse dung, on the growth and productivity of marigold plants in pot culture experiment. The soil was used as potting media, and Vermicompost were amended with it in 10, 20, 30 and 40% ratio. A total of nine different potting media were prepared. The fertility status of soil and vermicomposts was quantified. There were significant differences in the fertilizer quality of soil and both the vermicomposts. Maximum numbers of flowers was produced in the potting media containing 30% of CD Vermicompost and minimum was reported in control (soil without amendments). The diameter of biggest flower was reported in the potting media containing 40% of sugar mill wastewater treatment plant sludge Vermicompost, in appropriate quantities, to potting media has synergistic effects on growth

and flowering of plants including number of buds, number of flowers, plant shoot biomass, root. Dash *et al.* (1979) indicated that increase in plant growth have mostly been related to improvements in physical or chemical structure of growth media. However, the use of VC appears to affect plant growth in ways that cannot be directly linked to its physical or chemical properties. It seem likely that some growth promotion is due to plant hormone like activity related to microflora associated with vermicomposting and to metabolites produced as a consequence of secondary metabolism. Sindhu *et al.* [5] indicated that the effect of different amendments in growing media on physio-chemical properties of substrate as well as its effects on available leaf nutrient concentration on gerbera (*Gerbera jamesoni* Boleux ex Hoof.F) under greenhouse condition. The locally available materials like, soil, farmyard manure, Vermicompost, samridhi and sawdust were used as amendments. Atiyeh *et al.* [1] reported that amendment of Metro-Mix 360, a standard commercial greenhouse container medium, with various volumes of pig manure Vermicompost (e.g., 40%) significantly improved growth and productivity of marigold plants. Chamani *et al.* [2] reported that the effect of Vermicompost of an animal manure origin on the growth and flowering of *Petunia hybrida* 'Dream Neem Rose' grown under glasshouse conditions were determined. *Petunia* seeds were germinated, transplanted into media and grown up 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 20, 40 and 60% or sphagnum peat incorporated at 30 and 60% into the base medium. Vermicompost had significant ( $P < 0.05$ ) positive effect on flower number, leaf growth and shoot fresh and dry weights compared

to both control and peat amended media. Plant performance was best in the 20% Vermicompost medium. Further increasing the Vermicompost content in the base media decreased flower numbers, leaf growth rates and shoot fresh and dry weights. Plant performance was poorest in the 60% sphagnum peat medium.

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**Table-1** Effect of different potting mixtures on vegetative growth parameters of Zinnia

| S.NO. | Character   | Plant height (cm) | Plant Spread (cm) | No. of leaves Per plant | No. of branches per plant | Stem diameter (cm) | Leaf length (cm) | Leaf width (cm) |
|-------|-------------|-------------------|-------------------|-------------------------|---------------------------|--------------------|------------------|-----------------|
|       | Treatment   |                   |                   |                         |                           |                    |                  |                 |
| 1.    | VC+CS+SOIL  | 37.40             | 18.86             | 76.66                   | 6.66                      | 0.76               | 5.83             | 2.56            |
| 2.    | VC+CS+SOIL  | 42.63             | 22.03             | 92.66                   | 7.66                      | 0.94               | 6.26             | 3.30            |
| 3.    | VC+CS+SOIL  | 45.83             | 24.33             | 102.33                  | 8.66                      | 1.16               | 7.46             | 4.16            |
| 4.    | VC+CS+SOIL  | 41.33             | 21.13             | 87.33                   | 7.00                      | 0.89               | 6.13             | 3.16            |
| 5.    | VC+CS+SOIL  | 45.03             | 23.90             | 97.33                   | 8.66                      | 1.13               | 7.20             | 4.13            |
| 6.    | VC+CS+SOIL  | 46.36             | 24.90             | 103.33                  | 9.00                      | 1.26               | 7.73             | 4.26            |
| 7.    | FYM+CS+SOIL | 39.40             | 20.06             | 81.33                   | 6.66                      | 0.82               | 5.86             | 2.73            |
| 8.    | FYM+CS+SOIL | 42.23             | 21.70             | 90.66                   | 7.66                      | 0.91               | 6.16             | 3.13            |
| 9.    | FYM+CS+SOIL | 43.83             | 22.66             | 94.33                   | 7.66                      | 0.95               | 6.53             | 3.70            |
| 10.   | FYM+CS+SOIL | 40.86             | 20.76             | 85.33                   | 7.00                      | 0.85               | 6.16             | 2.96            |
| 11.   | FYM+CS+SOIL | 44.00             | 23.00             | 95.66                   | 7.66                      | 0.96               | 6.83             | 3.83            |
| 12.   | FYM+CS+SOIL | 44.70             | 23.26             | 95.00                   | 8.00                      | 1.02               | 6.93             | 4.10            |
|       | Mean        | 42.80             | 22.21             | 91.83                   | 7.69                      | 0.97               | 6.59             | 3.60            |
|       | C.D. at 5%  | 0.551             | 0.509             | 2.130                   | 0.829                     | 0.060              | 0.219            | 0.156           |

\*VC-VERMICOMPOST \*CS -COARSE SAND \* FYM- Farm Yard Manure

**Table-2** Effect of different potting mixtures on flowering parameters of Zinnia

| S.NO. | Character  | DAYS TO FIRST BUD INITIATION | BUD DIAMETER (cm) | BUD LENGTH (cm) | NUMBER OF FLOWERS PER PLANT | FLOWER DIAMETER (cm) | STALK LENGTH (cm) |
|-------|------------|------------------------------|-------------------|-----------------|-----------------------------|----------------------|-------------------|
|       | Treatment  |                              |                   |                 |                             |                      |                   |
| 1.    | VC+CS+SOIL | 18.66                        | 0.45              | 0.50            | 6.33                        | 4.13                 | 4.50              |
| 2.    | VC+CS+SOIL | 13.66                        | 0.61              | 0.77            | 9.66                        | 5.06                 | 5.56              |
| 3.    | VC+CS+SOIL | 9.66                         | 0.83              | 0.96            | 11.33                       | 7.33                 | 7.00              |
| 4.    | VC+CS+SOIL | 16.00                        | 0.54              | 0.66            | 9.00                        | 4.73                 | 5.16              |
| 5.    | VC+CS+SOIL | 9.66                         | 0.79              | 0.93            | 11.33                       | 6.36                 | 6.53              |
| 6.    | VC+CS+SOIL | 8.66                         | 0.87              | 1.23            | 12.00                       | 7.43                 | 7.36              |

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|     |             |       |       |       |       |       |       |
|-----|-------------|-------|-------|-------|-------|-------|-------|
| 7.  | FYM+CS+SOIL | 17.66 | 0.49  | 0.55  | 8.66  | 4.23  | 4.90  |
| 8.  | FYM+CS+SOIL | 15.00 | 0.59  | 0.68  | 9.66  | 4.86  | 5.43  |
| 9.  | FYM+CS+SOIL | 12.66 | 0.65  | 0.78  | 9.66  | 5.26  | 5.90  |
| 10. | FYM+CS+SOIL | 16.00 | 0.51  | 0.62  | 9.00  | 4.43  | 5.13  |
| 11. | FYM+CS+SOIL | 11.66 | 0.71  | 0.84  | 10.66 | 5.70  | 6.13  |
| 12. | FYM+CS+SOIL | 10.33 | 0.73  | 0.89  | 10.66 | 6.13  | 6.23  |
|     | Mean        | 13.30 | 0.65  | 0.78  | 9.83  | 5.47  | 5.82  |
|     | C.D. at 5%  | 1.119 | 0.027 | 0.060 | 1.112 | 0.373 | 0.263 |

\*VC-VERMICOMPOST \*CS -COARSE SAND \* FYM- Farm Yard Manure