Response of potting media composition for pot mum chrysanthemum production (*Dendranthema grandiflora* L.)

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**Abstract**

An investigation was carried out with ten potting media for pot mum chrysanthemum production at Department of Horticulture, RCA Campus, MPUAT, Udaipur during 2016-2017 to find out suitable potting media combination for growth, floral and media analysis parameter. The experiment was laid out in Completely Randomized Design with 20 replications and 10 potting media as treatment. The data were analyzed by analysis of variance technique at 5% level of significance. The maximum value for plant height (20.45cm), plant spread (15.69cm), intermodal length (3.29, 4.54cm at 30.60 DAT), stem diameter (4.43mm), branches plant⁻¹ (7.15), days to, flower diameter (1.91cm), spray plant⁻¹ (7.60), days to flower withering (149.45), flower plant⁻¹ (50.60), flower weight (46.54gm.), flower durations (45.95days), pH (6.1), EC (0.64dsm⁻¹), water holding capacity (87.85%) of potting media before transplanting, pH, EC, water holding capacity (7.3), (1.47 ds/m) and (97.36%) respectively after completion of flowering phase and percent plant survival (96.70%), while earliest first flower bud appearance (75.30 days), bud show color (83 days), floral bud break (101.50 days) were recorded in potting media treatment combination consisting from Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5 v/v). On the basis of result obtained it is concluded that potting media treatment combination consisting from Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5 v/v) were found best for pot mum chrysanthemum production over treatments.

**Keywords:** Chrysanthemum, flower plant⁻¹, media combination, net return, plant height

**Introduction**

The genus Chrysanthemum belongs to family Asteraceae, native from Asia and Northern Europe and contains diploid chromosome 2n = 18. Most of the species originated from East Asia and center of diversity which is exist in China. The name ‘chrysanthemum’ is derived from the greek words chryos (gold) and anthemon (flower). Its erract and tall growing cultivar is suitable for back ground planting in border as cut flower. The dwarf and compact growing ones are suitable for pot culture. The decorative and fully bloomed small flowered cultivar are suitable for making garland and hair decoration. Chrysanthemums were first cultivated in China as a flowering herb as far back as the 15th century B.C. Over 500 cultivars had been recorded by the year 1630. The flower might have been brought to Japan in the 8th century A.D. The festival of happiness in Japan celebrates the flower. The flower head occur in various form and can be daisy like pompon or buttons.

Total estimated area under Indian floriculture is 317.2 (’000 hac.) with total production is 1804.52 MT of loose and 502 (’000’ tones) cut flower during 2014-15. Total area under chrysanthemum is 16.63 ha along with production is 179.37 MT of loose flower and 5.72 MT of cut flower (horticulture statistics data base, 2015-2016).

Media is a substrate that provides physical support, moisture and aeration to the growing plant, which also play a vital role in growth and development of plants. The important potting media are- soil, sand, FYM, vermicompost, vermiculite, peat, cocopeat and perlite, etc. Soil texture is an important physical property of the soil that plays a vital role in seed germination and rooting of cutting. The main textual classes of soil are sand, sandy loam, silt loam, clay loam and clay etc. A soil have 40% sand, 40% silt and 20% clay is considered to be the best for seed germination of many plant species. Sandy loam soils are excellent for preparation of soil mixtures for pot growing plants as reported by Bhattacharjee (2006). Vermicompost is richer in many nutrients than compost produced by other composting methods.
It also contains millions of microbes which helps in break down nutrients already present in the soil into plant-available forms, improve its physical structure, porosity, water holding capacity, enriching soil in micro-organisms, adding plant hormones such as auxins and gibberellic acid, and adding enzymes such as phosphatase and cellulase, that enhance germination, plant growth and crop yield. Through, FYM a larger portion of N is directly available to the plant when it decomposes, FYM contain:- N =0.50%, P=0.25%, K=0.40, Ca=0.080%, S=0.020%, Zn=0.004%, Cu=0.003%, Mn=0.0070%, Fe=0.45%.

Soil at our locality are clay loam in texture, saline in nature, poor drainage, water holding capacity, aeration, porosity, more compaction and higher pH results in poor growth of chrysanthemum. Therefore, present investigation entitled “Potting Media composition for Pot Mum Chrysanthemum production (Dendranthema grandiflora)” was under taken.

Materials and Methods

The experiment was conducted at department of Horticulture, at Maharana Pratap University of Agriculture & Technology Udaipur during August 2016 - February 2017. Which is situated at 24.58°N and 73.70°E at an elevation of 602 m above mean sea level. The experiment was conducted in pots using different potting media combinations treatments T1 - Soil (control), T2 - Soil + Sand + FYM (2:1:1v/v), T3 - Soil + Sand + Vermicompost (2:1:1v/v), T4 - Soil + Sand + Vermicompost (2:1:0.5:0.5v/v), T5 - Cocopeat only, T6 Cocopeat + Sand + FYM (2:1:1v/v), T7 - Cocopeat + Sand + Vermicompost (2:1:1v/v), T8 - Cocopeat + Sand + Vermicompost (2:0.5:0.5:0.5v/v), T9 - Cocopeat + Perlite + Vermiculite (3:1:1v/v) sand T10 - Cocopeat + Soil + Perlite + Vermicompost (2:1:1v/v) at Maharana Pratap University of Agriculture & Technology E at an elevation of 24.58

The experiment was conducted in department of Horticulture, Materials and Landscaping IARI, New Delhi and planted in 6 inch plastic pots on 2, August, 2016 with 20 plant per treatment in 20

replication as par ten potting media used as a treatment in completely randomized design. Water soluble fertilizer (19:19:19) NPK were applied along with irrigation water 20 gm per ten litre of water in four split doses before flower bud initiation and standard package of practices followed for insect, pest and disease management. The observations were recorded on various parameters viz plant height, plant spread, internodal length, stem diameter at flowering stage, branches plant⁻¹, days to first bud appearance, days to bud show color stage, days to floral bud break stage, flower diameter, spray plant⁻¹, days to flower withering, flower plant⁻¹, flower weight plant⁻¹, flower duration, pH, electrical conductivity, water holding capacity analysis of growing media before planting and after flowering completion, gross returns, net returns / ha and B:C ratio. The data were recorded on twenty plants and all the mean value of the recorded data were statistically analyzed as per the method suggested by Fisher (1950) at 5% level of significance and tabulated.

Results and Discussion

Vegetative parameters

Pursual of individual year as well as pool data in Table-1 out of the ten potting media evaluated for their vegetative (Table.1) parameter, the maximum plant height was recorded in potting media combination T4 (20.45cm) i.e. potting media composed of Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5v/v) followed by T3, Soil : Sand : FYM (2:1:1v/v). While, lowest plant height was recorded in T1, Soil as control(8.15cm.). Which was better over the control and other treatment combination of potting media on chrysanthemum cv. Pusa Sona. The increase in plant height in T4 - Soil: Sand: FYM: Vermicompost (2:1:0.5:0.5v/v) provide more nutritive media resulted in increment to plant height. which might be due that potting media combination T4 alone had lower down clay content, pH, compactness, which improve drainage, aeration, water holding capacity and highest nutrients uptake by root system respectively results in highest plant height in potting media T4 - Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5v/v).Present findings are in conformity with the findings of Nair and Bharti (2015) [14] also obtained in chrysanthemum cv. Sadbhavana. Bala and Singh (2013) [2] in chrysanthemum var. “Yellow Charm” for plant height (20.46cm) in media combination Soil: Sand: FYM: Vermicompost (2:1:0.5:0.5 v/v).

However, highest plant spread (15.69 cm) was obtained in T4 - Soil: Sand: FYM: Vermicompost (2:1:0.5:0.5, v/v). Whereas, it was minimum (9.03cm) in T1 potting media composed from soil as control. The plant spread increase was mainly due to production of increased number of branches and wider angles from point of origin. Greater plant spread shows better vegetative growth of plants.

The highest internodal length was recorded in T4 (3.27cm) potting media comprising with Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5v/v), followed by T2 (2.97cm) potting media comprising Soil : Sand : FYM (2:1:1v/v).

The highest stem diameter was recorded in potting media T4(4.43mm) comprising with Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5v/v), followed by T2 (3.55 mm) comprising Soil : Sand : FYM : Vermi compost (2:1:1 v/v). The increase in diameter of stem might be due to the reason that the growing media improve proper aeration, water holding capacity, supplying substantial amount of nutrients through root absorption which converts in photosynthates helps in cell division and cell elongation results in higher stem diameter. Similar findings have been reported by Mehwish et al. (2007) [13] with growing media combinations Sand : Silt : Leaf (1:1:1 v/v) in stem diameter (1.93cm.) in dahlia.

Highest branches plant⁻¹ was recorded in potting media T4(7.15) comprising with Soil: Sand : FYM : Vermicompost (2:1:0.5:0.5v/v) followed by T2(4.55) consisting from Soil : Sand : FYM (2:1:1v/v) while, minimum branches plant⁻¹ was recorded in T1 media comprising with soil as control (2.45) on chrysanthemum cv. Pusa Sona. which might be due to the reason that the potting media in combination might have provided optimal conditions for the better growth after pinching, more number of lateral shoots and increase in giberelline synthesis in plant system consequently resulted in more branches plant⁻¹ Whereas, minimum number of branches per plant (2.45) were produced in the potting media consisting with soil as control. Similar findings have been reported by Bala and Singh (2013) [2] in chrysanthemum chrysanthemum with media combination Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5, v/v) var. “Yellow Charm” for branches plant⁻¹ (39.97), Nair and Bharti (2015) [14] in chrysanthemum cv. Sadhabhavana with media combination Cocopeat only for highest branches plant⁻¹ (7.6) var.

Floral parameters

Pursual of individual year as well as pool data in Table-2 earliest first flower bud appearance (75.3 days), floral bud show color (83.0 day), floral bud break (101.5 days ) was recorded in potting media T4 comprising from Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5v/v). While, potting media T1 – comprising from Soil as control delayed first bud appearance, bud show color & floral bud break stage.
The combined influence of soil with sand improve drainage, aeration, lower compactness along with farm yard manure and vermicompost brings down the pH to optimum level for the availability of macro and micro nutrients uptake by plant root system with the help of improve water holding capacity and higher photosynthetic activity resulted in better C:N ratio. When C: N ratio improve, simultaneously floreign plant hormone level also improve, which is responsible for earliest flower bud initiation, flower bud show color and anthesin is a plant hormone, which responsible for early flower bud break in chrysanthemum. While vermicompost in combination treatment also enrich soil micro – organism, adding plant hormone such as auxins and gibberelline acid, adding phosphatase and cellulose enzyme. Similar finding have been reported by Bala and Singh earliest floral bud break (113.28days) in chrysanthemum with growing media consisting Soil: Sand: FYM: Vermicompost. (2:1:0.5:0.5v/v), Dingdrodiya et al. (2017) [7] in rose with growing media consisting from Soil : FYM: Saw dust (2:1:1v/v) with fertigation WSF mix for first flower bud initiation (124.70 days), Mehwish et al. (2007) [13] in dahlia with growing media comprising Sand: Silt: Leaf mould (1:1:1 v/v) for earliest floral bud break (91.66 days. Wazir et al. (2005) also obtained earliest flower bud initiation (147.80 days) in alstromeria cv. Sel. No. 14 with growing media combining Soil: Sand : Cocopeat : Vermicompost : FMY : (1:1:1:1 v/v).

The highest flower diameter was recorded in potting media T$_4$ (1.91cm) consisting from Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5v/v) and found to be significantly higher over other potting media. However, lowest flower diameter was recorded in potting media T$_1$ (1.17 cm) Soil as control on chrysanthemum cv. Pusa Sona that increase in flower diameter mainly due to the genetic make up and which might have been further modified by prevailing environmental condition and potting media combination Soil : Sand : FYM : Vermicompost (2:1:0:5:0.5v/v). It helps in more accumulation of photosynthates in the sink (flower) from source (leaves). Continuous availability of photosynthates, cell division, cell elongation & cell enlargement remain on peak resulted in higher flower diameter. Similar trends Bala and Singh (2013) [2] in chrysanthemum var. Yellow Charm for highest flower diameter (3.91cm) with growing media consisting consisting Soil : Sand:FYM : Vermicompost (2:1:0.5:0.5v/v), Gupta et al. (2014) in marigold with media combination cow dung Vermicompost :Soil (20% : 80%) for maximum flower diameter (8.5cm.), Dulta et al. (2015) [6] also obtained highest flower diameter (21.45cm) in Hydrangea macrophylla in growing media combination with Forest soil (Rhododendron) : FYM : Vermicompost (2:1:1v/v), Mehwish et al. (2007) [13] in dahlia with growing media combinations Sand : Silt : Leaf mould for maximum no. of flower (10.50) and Dingdrodiya et al. (2017) [7] also obtained highest no. of flower (9.09) in polyhouserose.

Maximum day to flower withering was recorded in potting media T$_4$(149.45days) composed from Soil: Sand : FYM : Vermicompost (2:1:0:5:0.5,v/v). While, minimum days to flower withering was observed in potting media T$_1$(133.30 days) containing soil as control. The reason of maximum days taken to flower withering in potting media might be due to the hereditary traits, prevailing environmental and growing media combination.

Further, highest flowers plant$^{-1}$ (51.1) were recorded in T$_4$ - Soil : Sand : FYM : Vermicompost (2:1:0:5:0.5 v/v). Whereas, minimum flowers plant$^{-1}$ (16) were observed in potting media T$_1$ comprising with soil as control. The production of higher number of flowers per plant in the potting media could be due to the reason that this media have produced more spray, flower bud per plant as well as more number of flowers per spray. Hence, resulted in higher flowers plant$^{-1}$.Similar finding have been reported by Bala and Singh (2013) [2] in Chrysanthemum, var. “Yellow Charm” for highest flower plant$^{-1}$ (210.69) growing media consisting from Soil : Sand : FYM : Vermicompost. (2:1:0.5:0.5v/v), Chauhan et al. (2014) in gerbera with growing media combination Soil : Rice husk :Cocopeat : Castor Cake : Vermicompost (1:1:1:1v/v) resulted highest flower plant$^{-1}$ (8.97), Gupta et al. (2014) [10] in marigold with media combination cowdung Vermicompost : Soil (20 : 80%) for maximum flower plant$^{-1}$ (100), Dilta et al. (2015) [6] also obtained highest flower no. (17.84) in Hydrangea macrophylla in growing media combination with Forest soil (Rhododendron) : FYM : Vermicompost (2:1:1v/v), Mehwish et al. (2007) [13] in dahlia with growing media combinations Sand : Silt : Leaf mould for maximum no. of flower (10.65) and Dingdrodiya et al. (2017) [7] obtained highest flower plant$^{-1}$ (15.9) with growing media comprising with Soil : FYM : Saw dust (2:1:1v/v)with fertigation of WSF mix under polyhouse condition.

Further, highest significance on influence maximum flower weight (46.54gm.) was recorded in T$_4$ comprised with Soil : Sand : FYM : Vermicompost (2:1:0:5:0.5v/v). Whereas, minimum flower weight plant$^{-1}$ (6.87 gm.) were observed in potting media comprising with soil as control. Reason of maximum flower weight might be due to more availability of nutrients, media and genetic make up. Similar finding have been reported by Chauhan et al. (2014) in gerbera with potting media consisting from Soil : Rice husk : Cocopeat : Castor cake : Vermicompost (1:1:1:1:1v/v) for highest flower weight (42.10gm).

However, maximum flower duration (45.95 days) was recorded in T$_4$ Soil : Sand : FYM : Vermicompost (2:1:0:5:0.5 v/v), While, minimum flowering duration (14.25 days) was registered in T$_1$ soil (control). Maximum flower duration in potting media may be due to that this potting media might have provided optimum growing environment particularly in the root zone besides supplying sufficient nutrients in available forms as well as better physico-chemical and biological properties which led to better growth and flowering of plants. Thus exhibiting maximum flowering duration. Similar findings have been reported by Bala and Singh (2013) [2] in chrysanthemum var. Yellow Charm for highest flower duration (35.24 days) with growing media consisting from Soil : Sand : FYM : Vermicompost (2 : 1 : 0.5 : 0.5 v/v), Nair and Bhardi (2015) [14] in chrysanthemum with media combination Soil:Sand : FYM : (2:1:1v/v) for flower duration (108.47 days) and Dilta et al. (2015) [6] also obtained longest flower duration (99.56 days) in Hydrangea macrophylla in
growing media combination with Forest soil (Rai): FYM: Vermicompost (2:1:1:v/v).

**Potting media analysis**
Persuasion of individual year as well as pool data in Table -4 the ideal pH, EC, WHC (6.1, 0.64 dSm⁻¹, 87.85%) respectively were recorded in potting media T₁ - Soil: Sand : FYM : Vermicompost (2:1:0.5:0.5 v/v). Whereas, poor performing potting media treatment T₁ soil as control (7.7, 0.75 dSm⁻¹, 27.59%) before transplanting of chrysanthemum rooted cutting cv. Pusa Sona. While, after completion of flowering ideal pH (7.3), EC (1.47 dSm⁻¹) and higher water holding capacity (97.37%) were recorded in in potting media T₁ - Soil: Sand : FYM : Vermicompost (2:1:0.5:0.5 v/v) chrysanthemum cv. Pusa Sona.

Similar findings have been reported by Ahmed *et al.* (2012) [¹] in gerbera with growing media consisting Soil: Mushroom compost (1:1:1:v/v) for pH, EC (7.6, 0.73 dSm⁻¹) respectively. The soil pH in the range of 6.5-8.7 has been reported to be the best for the availability of most of the nutrient elements (Jackson, 1979) [²] In light of the suggested EC value less than 0.8 dSm⁻¹ indicates level as normal and suitable for all crops (Richards, 1954) [³]. The water holding capacity of compost amended soil increased compared to the control soil. The gain in water holding capacity occurred only with compost amended of sandy soil but appeared to decrease with compost amendment of clay soils (Krishoff *et al.* 2003) [⁴].

**Plant survival (%)**
Persuasion of individual year as well as pool data in Table-3 highest percent plant survival were recorded in T₁ consisting from Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5 v/v), and T₁ (96.70) comprising from Soil : Sand : FYM (2:1:1, v/v). While, minimum percent plant survival (67.50) was recorded in potting media T₁ - Soil as control. The overall growth and flowering performance results in highest plant survival percent in given media. Similar findings were recorded by Wazir *et al.* 2009 [⁷] in alstromeria cv. Sel. No. 14.

**Economic analysis of potting media combinations**
Persuasion of individual year as well as pool data in Table -5 relative economics of the potting media were calculated as per formula given in the material and methods. On the basis of the results obtained potting media combination T₁. Soil: Sand : FYM: Vermicompost (2:1:0.5:0.5 v/v) was found best for highest gross return of (62855) and net return of (40225) and net return per rupee investment (1.78), while it was minimum (0.56) in potting media combination T₁. Soil as control in chrysanthemum cv. Pusa Sona tested under Udaipur condition.

### Table 1: Effect of potting media on vegetative parameters of chrysanthemum cv. Pusa Sona

| Treatment (v/v)                  | Plant height (cm) | Plant spread (cm²) | Inter nodal length(cm) | Stem diameter (mm) | Branches plant⁻¹ |
|---------------------------------|-------------------|--------------------|------------------------|--------------------|------------------|
| T₁ Soil (control)               | 8.15              | 8.31               | 1.13                   | 1.48               | 2.45             |
| T₂ Soil + Sand + FYM (2:1:1)    | 18.25             | 13.70              | 2.97                   | 3.55               | 4.60             |
| T₃ Soil + Sand + Vermicompost (2:1:1) | 15.05          | 11.26              | 2.17                   | 3.45               | 2.02             |
| T₄ Soil + Sand + Vermicompost (2:1:0.5:0.5) | 20.45          | 15.69              | 3.29                   | 4.54               | 4.43             |
| T₅ Cocopeat only                | 15.25             | 10.83              | 2.66                   | 3.31               | 3.40             |
| T₆ Cocopeat + Sand + FYM (2:1:1) | 13.45           | 9.03               | 2.04                   | 3.26               | 4.50             |
| T₇ Cocopeat + Sand + Vermicompost (2:1:1) | 12.35          | 10.83              | 1.91                   | 1.57               | 3.55             |
| T₈ Cocopeat + Sand + Vermicompost (2:0.5:0.5:0.5) | 12.65          | 10.18              | 1.91                   | 1.71               | 4.25             |
| T₉ Cocopeat + Perlite + Vermiculite (3:1:1) | 11.30           | 9.98               | 1.82                   | 1.96               | 2.50             |
| T₁₀ Cocopeat + Soil + Sand (2:1:1) | 10.15           | 9.59               | 2.22                   | 1.99               | 3.55             |

### Table 2: Effect of potting media on floral parameters of chrysanthemum cv. Pusa Sona

| Treatment (v/v)                  | First bud appearance (days) | Bud show colour stage (days) | Floral bud break stage (days) | Flower diameter (cm) | Spray plant⁻¹ | Flower withering (days) |
|---------------------------------|-----------------------------|-----------------------------|------------------------------|----------------------|--------------|------------------------|
| T₁ Soil (control)               | 83.85                       | 89.30                       | 120.15                       | 1.17                 | 5.25         | 133.30                 |
| T₂ Soil + Sand + FYM (2:1:1)    | 76.55                       | 83.25                       | 102.40                       | 1.72                 | 6.40         | 137.50                 |
| T₃ Soil + Sand + Vermicompost (2:1:1) | 78.80          | 84.80                       | 105.25                       | 1.43                 | 5.05         | 142.50                 |
| T₄ Soil + Sand + Vermicompost (2:1:0.5:0.5) | 75.30          | 83.00                       | 101.50                       | 1.91                 | 7.60         | 149.45                 |
| T₅ Cocopeat only                | 76.95                       | 84.25                       | 108.90                       | 1.34                 | 4.50         | 133.85                 |
| T₆ Cocopeat + Sand + FYM (2:1:1) | 79.40                       | 85.75                       | 108.90                       | 1.32                 | 4.35         | 138.25                 |
| T₇ Cocopeat + Sand + Vermicompost (2:1:1) | 76.95          | 84.50                       | 109.20                       | 1.19                 | 3.90         | 136.55                 |
| T₈ Cocopeat + Sand + Vermicompost (2:0.5:0.5:0.5) | 78.30          | 86.55                       | 119.15                       | 1.29                 | 4.00         | 136.90                 |
| T₉ Cocopeat + Perlite + Vermiculite (3:1:1) | 79.35           | 84.90                       | 114.70                       | 1.37                 | 4.00         | 139.70                 |
| T₁₀ Cocopeat + Soil + Sand (2:1:1) | 78.25                       | 85.00                       | 105.55                       | 1.26                 | 3.40         | 137.70                 |

CD (P= 0.05) 1.35 1.69 5.18 0.10 0.84 2.32
The present findings reveals

Table 3: Effect of potting media on floral parameter of chrysanthemum cv. Pusa Sona

| Treatment (v/v)                                      | Flower plant (Flower weight (g.), Flower duration(Days), Plant Survival (%)) |
|------------------------------------------------------|------------------------------------------------------------------------------|
| T1 Soil (control)                                    | 16.00, 6.87, 14.25, 67.50                                                     |
| T2 Soil + Sand + FYM (2:1:1)                         | 49.80, 40.96, 38.60, 96.70                                                     |
| T3 Soil + Sand + Vermicompost (2:1:1)                | 45.80, 28.36, 31.70, 93.50                                                     |
| T4 Soil + Sand + FYM + Vermicompost (2:1:0.5:0.5)    | 50.60, 46.54, 45.95, 96.70                                                     |
| T5 Cocopeat only                                     | 33.85, 24.65, 24.95, 93.50                                                     |
| T6 Cocopeat + Sand + FYM (2:1:1)                     | 37.80, 20.95, 29.35, 93.48                                                     |
| T7 Cocopeat + Sand + Vermicompost (2:1:1)           | 37.50, 23.24, 26.85, 93.60                                                     |
| T8 Cocopeat + Sand + FYM + Vermicompost (2:0.5:0.5:0.5) | 36.45, 25.77, 17.25, 90.40                                                     |
| T9 Cocopeat + Perlite + Vermiculite (3:1:1)         | 31.30, 22.84, 25.25, 90.45                                                     |
| T10 Cocopeat + Soil + Sand (1:1)                     | 30.15, 17.59, 31.00, 93.30                                                     |
| CD (P= 0.05)                                        | 2.36, 0.60, 4.52, 0.34                                                        |

Table 4: Effect of potting media on physical properties of chrysanthemum cv. Pusa Sona

| Treatment (v/v)                                      | Before Transplanting | After Flowering Phase |
|------------------------------------------------------|----------------------|-----------------------|
|                                                       | pH | EC (ds/m) | WHC (%) | pH | EC (ds/m) | WHC (%) |
| T1 Soil (control)                                    | 7.7 | 0.75      | 27.59    | 8.3 | 1.06      | 43.36   |
| T2 Soil + Sand + FYM (2:1:1)                         | 7.3 | 0.82      | 55.32    | 7.4 | 1.80      | 81.10   |
| T3 Soil + Sand + Vermicompost (2:1:1)                | 7.4 | 0.73      | 56.46    | 7.8 | 1.52      | 58.68   |
| T4 Soil + Sand + FYM + Vermicompost (2:1:0.5:0.5)    | 6.1 | 0.64      | 87.85    | 7.3 | 1.47      | 97.36   |
| T5 Cocopeat only                                     | 6.3 | 0.22      | 44.19    | 7.3 | 1.46      | 77.86   |
| T6 Cocopeat + Sand + FYM (2:1:1)                     | 6.9 | 1.66      | 52.13    | 7.6 | 3.17      | 77.11   |
| T7 Cocopeat + Sand + Vermicompost (2:1:1)           | 6.6 | 1.08      | 61.07    | 8.7 | 4.15      | 67.71   |
| T8 Cocopeat + Sand + FYM + Vermicompost (2:0.5:0.5:0.5) | 6.4 | 0.27      | 67.15    | 7.6 | 2.21      | 83.28   |
| T9 Cocopeat + Perlite + Vermiculite (3:1:1)         | 6.8 | 0.85      | 65.21    | 7.8 | 3.45      | 84.47   |
| T10 Cocopeat + Soil + Sand (1:1)                     | 0.06 | 0.02      | 0.69     | 0.04 | 0.05      | 0.73    |
| CD (P= 0.05)                                        | 0.06 | 0.02      | 0.69     | 0.04 | 0.05      | 0.73    |

Table 5: Economic analysis of potting media on chrysanthemum cv. Pusa Sona

| Treatment (v/v)                                      | Total cost | Survive pots | Price /pot | Gross return | Net return | B : C |
|------------------------------------------------------|------------|--------------|------------|--------------|------------|-------|
| T1 Soil (control)                                    | 21615      | 675          | 60         | 58020        | 33750      | 12135 |
| T2 Soil + Sand + FYM (2:1:1)                         | 22193      | 967          | 60         | 56100        | 33330      | 143   |
| T3 Soil + Sand + Vermicompost (2:1:1)                | 23062      | 935          | 60         | 56100        | 33038      | 1.43  |
| T4 Soil + Sand + FYM + Vermicompost (2:1:0.5:0.5)    | 22630      | 967          | 60         | 56100        | 33028      | 1.17  |
| T5 Cocopeat only                                     | 25872      | 935          | 60         | 56100        | 31773      | 1.30  |
| T6 Cocopeat + Sand + FYM (2:1:1)                     | 24327      | 935          | 60         | 56100        | 30970      | 1.23  |
| T7 Cocopeat + Sand + Vermicompost (2:1:1)           | 25190      | 936          | 60         | 55980        | 31810      | 1.32  |
| T8 Cocopeat + Sand + FYM + Vermicompost (2:0.5:0.5:0.5) | 24848      | 904          | 60         | 54240        | 29756      | 1.22  |
| T9 Cocopeat + Perlite + Vermiculite (3:1:1)         | 34403      | 905          | 60         | 54300        | 19897      | 0.58  |
| T10 Cocopeat + Soil + Sand (1:1)                     | 24170      | 933          | 60         | 55980        | 31810      | 1.32  |

Conclusion

The present findings reveals that highest plant height, plant spread, intermodal length, stem diameter, branches plant, flower diameter, spray plant, days to flower withering, flower plant, flower weight, flower duration, earliest first bud appearance, floral bud show colour stage, floral bud break stage, pH, EC, percent water holding capacity (6.1, 64 ds/m and 87.85 respectively) of potting media before transplanting and pH, EC, water holding capacity (7.3, 1.47 ds/m, 97.36%) respectively after completion of flowering phase, percent plant survival (96.70), gross return, net return and benefit cost ratio were recorded in potting media combination T1. Soil: Sand : FYM: Vermicompost (2:1:0.5:0.5 v/v) on chrysanthemum.

Finally therefore, it was concluded that potting media combination T1 comprising from Soil: Sand : FYM: Vermicompost (2:1:0.5:0.5 v/v) found better than potting media T1 – Soil as control on chrysanthemum cv. Pusa Sona.

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