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Disha Kala
Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan, India

LN Mahawer
Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan, India

HL Bairwa
Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan, India

Corresponding Author:
Disha Kala
Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan, India

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

Disha Kala, LN Mahawer and HL Bairwa

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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 developement 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 textural 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 24.58^0N and 73.70^0E at an elevation of 602 m. above mean sea level. The experiment was conducted in pots using different potting media combinations treatments T_1 - Soil (control), T_2 - Soil + Sand + FYM (2:1:1v/v), T_3- Soil + Sand + Vermicompost (2:1:1v/v), T_4- Soil + Sand + FYM + Vermicompost (2:1:0.5:0.5v/v),T_5- Cocopeat onlyT_6- Cocopeat + Sand + FYM (2:1:1v/v),T_7- Cocopeat + Sand + Vermicompost (2:1:1v/v), T_8-Cocopeat + Sand + FYM + Vermicompost (2:0.5:0.5:0.5v/v), T_9 - Cocopeat + Perlite +Vermiculite (3:1:1v/v)and T_{10} -Cocopeat + Soil + Sand (2:1:1 v/v). The terminal rooted cutting of chrysanthemum cv. Pusa Sona was procured from Division of Floriculture & Landscaping IARI, New Delhi and planted in 6 inch plastic pots on 2, August, 2016 with 20 plant per treatment in 20 th 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

Persual 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 T_4 (20.45cm) i.e. potting media composed of Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5v/v) followed by T_2 Soil : Sand : FYM (2:1:1v/v). While, lowest plant height was recorded in T_1 - 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 T_4 - 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 T_4 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 T_4 - 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 T_1 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 T_4 (3.27cm) potting media comprising with Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5v/v), followed by T_2 (2.97cm) potting media comprising Soil : Sand : FYM (2:1:1v/v).

The highest stem diameter was recorded in potting media T_4(4.43mm) comprising with Soil : Sand : FYM: Vermicompost (2:1:0.5:0.5v/v), followed by T_2 (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 T_4(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 T_1 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 gibberelline 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. Sadabhavana with media combination Cocopeat only for highest branches plant-^{1} (7.6) var.

Floral parameters

Persual of individual year as well as pool data in Table-2 earliest first flower bud appearance (75.3days), floral bud show color (83.0 days), floral bud break (101.5 days) was recorded in potting media T_4 comprising from Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5 v/v). While, potting media T_1 – 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 florigen plant harmone level also improve, which is responsible for earliest flower bud initiation, flower bud show color and anthesin is a plant harmone, which responsible for early flower bud break in chrysanthemum. While vermicompost in combination treatment also enrich soil micro – organism, adding plant harmone 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 : FYM.(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 is 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). Continueous 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 (8cm.), Dilta *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 flower diameter(8.8cm.) and Dingrodiya *et al.* (2017) [7] also obtained with growing media comprising with Soil : FYM :Saw dust (2:1:1v/v) with fertigation WSF mix resultedhighest flowerdia meter(9.09cm.) inpolyhouserose.

The potting media T_4 comprising with Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5, v/v) recorded maximum number of spray per plant (7.6). Higher spray were increased due to pinching operation lower down auxin level and more gibberellins synthesis in plant system might be resulted in lateral shoot induction due to combined influence Soil: Sand : FYM : Vermicompost (2:1:0.5:0.5, v/v). Similar findings have been reported in alstroemeria by Wazir *et al.* (2009) [17] and Dutt *et al.* (2002) [8] in chrysanthemum.

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 (1:1:1:1:1v/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 (10.6.) and Dingrodiya *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 Bharti (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 (2:1:1v/v).

Potting media analysis

Persual of individual year as well as pool data in Table -4 the ideal pH, EC, WHC (6.1, 0.64dsm^{-1}, 87.85%) respectively were recorded in potting media T_4 - Soil: Sand : FYM : Vermicompost (2:1:0.5:0.5 v/v). Whereas, poor performing potting media treatment T_1 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 T_4 - 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: Sand: Mushroom compost (1:1:1v/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) [11]. In light of the suggested EC value less than 0.8 dSm-1 indicate level as normal and suitable for all crops (Richards, 1954) [15]. 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 (Krichoff *et al.*2003) [12].

Plant survival (%)

Persual of individual year as well as pool data in Table-3 highest percent plant survival were recorded in T_4 consisting from Soil : Sand : FYM : Vermicompost (2:1:0.5:0.5 v/v), and T_2 (96.70) comprising from Soil : Sand : FYM (2:1:1, v/v). While, minimum percent plant survival (67.50) was recorded in potting media T_1 - Soil as control.

The over all growth and flowering performance results in highest plant survival percent in given media. Similar findings were recorded by Wazir *et al.* 2009 [17] in alstromeria cv. Sel. No. 14.

Economic analysis of potting media combinations

Persual of individual year as well as pool data in Table -5 relative economics of the potting media were calculated as par formula given in the material and methods. On the basis of the results obtained potting media combination T_4 - 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 T_1 - 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 (cm^2)	Inter nodal length(cm)		Stem diameter (mm)	Branches plant^{-1}
			30 DAT	60 DAT		
T_1Soil (control)	8.15	8.31	1.13	1.57	1.48	2.45
T_2 Soil + Sand + FYM (2:1:1)	18.25	13.70	2.97	3.78	3.55	4.60
T_3Soil + Sand + Vermicompost (2:1:1)	15.05	11.26	2.17	3.45	2.02	3.95
T_4Soil + Sand + FYM + Vermicompost (2:1:0.5:0.5)	20.45	15.69	3.29	4.54	4.43	7.15
T_5Cocopeat only	15.25	10.83	2.66	2.77	3.31	3.40
T_6 Cocopeat + Sand + FYM (2:1:1)	13.45	9.03	2.04	2.40	3.26	4.50
T_7Cocopeat + Sand + Vermicompost (2:1:1)	12.35	10.83	1.91	2.47	1.57	3.55
T_8Cocopeat + Sand + FYM+ Vermiompost (2:0.5:0.5:0.5)	12.65	10.18	1.91	2.51	1.71	4.25
T_9 Cocopeat + Perlite + Vermiculite (3:1:1)	11.30	9.98	1.82	2.46	1.96	2.50
T_{10} Cocopeat + Soil + Sand (2:1:1)	10.15	9.59	2.22	2.50	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)
T_1Soil (control)	83.85	89.30	120.15	1.17	3.25	133.30
T_2 Soil + Sand + FYM (2:1:1)	76.55	83.25	102.40	1.72	6.40	137.50
T_3Soil + Sand + Vermicompost (2:1:1)	78.80	84.80	105.25	1.43	5.05	142.50
T_4Soil + Sand + FYM + Vermicompost (2:1:0.5:0.5)	75.30	83.00	101.50	1.91	7.60	149.45
T_5Cocopeat only	76.95	84.25	108.90	1.34	4.50	133.85
T_6 Cocopeat + Sand + FYM (2:1:1)	79.40	85.75	108.90	1.32	4.35	138.25
T_7Cocopeat + Sand + Vermicompost (2:1:1)	76.95	84.50	109.20	1.19	3.90	136.55
T_8Cocopeat + Sand + FYM+ Vermiompost(2:0.5:0.5:0.5)	78.30	86.55	119.15	1.29	4.00	136.90
T_9 Cocopeat + Perlite + Vermiculite (3:1:1)	79.35	84.90	114.70	1.37	4.00	139.70
T_{10} 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

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

Treatment (v/v)	Flower plant^{-1}	Flower weight (g.)	Flower duration(Days)	Plant Survival (%)
T_1Soil (control)	16.00	6.87	14.25	67.50
T_2 Soil + Sand + FYM (2:1:1)	49.80	40.96	38.60	96.70
T_3Soil + Sand + Vermicompost (2:1:1)	45.80	28.36	31.70	93.50
T_4Soil + Sand + FYM + Vermicompost (2:1:0.5:0.5)	50.60	46.54	45.95	96.70
T_5Cocopeat only	33.85	24.65	24.95	93.50
T_6 Cocopeat + Sand + FYM (2:1:1)	37.80	20.95	29.35	93.48
T_7Cocopeat + Sand + Vermicompost (2:1:1)	37.50	23.24	26.85	93.60
T_8Cocopeat + Sand + FYM+ Vermiompost(2:0.5:0.5:0.5)	36.45	25.77	17.25	90.40
T_9 Cocopeat + Perlite + Vermiculite (3:1:1)	31.30	22.84	25.25	90.45
T_{10} Cocopeat + Soil + Sand (2:1:1)	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(%)
T_1Soil (control)	7.7	0.75	27.59	8.3	1.06	43.36
T_2 Soil + Sand + FYM (2:1:1)	7.3	0.82	55.32	7.4	1.80	81.10
T_3Soil + Sand + Vermicompost (2:1:1)	7.4	0.73	56.46	7.8	1.52	58.68
T_4Soil + Sand + FYM + Vermicompost (2:1:0.5:0.5)	6.1	0.64	87.85	7.3	1.47	97.36
T_5Cocopeat only	6.7	0.22	44.19	7.3	1.46	77.86
T_6 Cocopeat + Sand + FYM (2:1:1)	6.9	1.66	52.13	7.6	3.17	77.11
T_7Cocopeat + Sand + Vermicompost (2:1:1)	6.6	1.08	61.07	8.7	4.15	67.71
T_8Cocopeat + Sand + FYM+ Vermiompost(2:0.5:0.5:0.5)	7.2	1.47	65.60	7.7	4.09	77.94
T_9 Cocopeat + Perlite + Vermiculite (3:1:1)	6.4	0.27	67.15	7.6	2.21	83.28
T_{10} Cocopeat + Soil + Sand (2:1:1)	6.8	0.85	65.21	7.8	3.45	84.47
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/ 1000 pots	Survive pots for sale	Price /pot (Rs.)	Gross return (Rs.)	Net return (Rs.)	B : C
T_1Soil (control)	21615	675	50	33750	12135	0.56
T_2 Soil + Sand + FYM (2:1:1)	22193	967	60	58020	35827	1.62
T_3Soil + Sand + Vermicompost (2:1:1)	23062	935	60	56100	33038	1.43
T_4Soil + Sand + FYM + Vermicompost (2:1:0.5:0.5)	22630	967	65	62855	40225	1.78
T_5Cocopeat only	25872	935	60	56100	30228	1.17
T_6 Cocopeat + Sand + FYM (2:1:1)	24327	935	60	56100	31773	1.30
T_7Cocopeat + Sand + Vermicompost (2:1:1)	25190	936	60	56160	30970	1.23
T_8Cocopeat + Sand + FYM+ Vermiompost(2:0.5:0.5:0.5)	24484	904	60	54240	29756	1.22
T_9 Cocopeat + Perlite + Vermiculite (3:1:1)	34403	905	60	54300	19897	0.58
T_{10} Cocopeat + Soil + Sand (2:1:1)	24170	933	60	55980	31810	1.32

Conclusion

The present findings reveals that highest plant height, plant spread, internodal length, stem diameter, branches plant^{-1}, flower diameter, spray plant^{-1}, days to flower withering, flower plant-^{1}, flower weight, flower duration, earliest first bud appearance, floral bud show colour stage, floral bud break stage, p^{H}, EC, percent water holding capacity (6.1, 64 ds/m and 87.85 respectively) of potting media before transplanting and p^{H}, 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 T_4 - Soil: Sand : FYM: Vermicompost (2:1:0.5:0.5 v/v) on chrysanthemum.

Finally therefore, it was concluded that potting media combination T_4 comprising from Soil: Sand : FYM: Vermicompost (2:1:0.5:0.5 v/v) found better than potting media T_1 – Soil as control on chrysanthemum cv. Pusa Sona.

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References

1. Ahmad A, Ahmmad T, Gulfam A, Saleem M. Growth and flowering of gerbera as influenced by various horticultural substrates. Pakistan Journal of Botany. 2012; 44(2):291-99.
2. Bala M, Singh K. Effect of different potting media for pot mum production in chrysanthemum grown under open and poly house conditions. Journal of Ornamental Horticulture. 2013; 16(1, 2):35-39.
3. Basheer SN, Thekkayam SG. Effect of growing media and organic nutrition on vegetative growth in anthurium plant. The Asian Journal of Horticulture. 2012; 7(2):354 - 58.
4. Bhattacharjee SK. Media. In: Advances in Ornamental Horticulture, Pointer publisher, Jaipur, 2006; 1:49.
5. Chauhan RV, Varu DK, Kava KP, Savaliya VM. Effect of different media on growth, flowering and cut flower

yield of gerbera under protected condition. The Asian Journal of Horticulture 2014; 9(1):228-31.
6. Dilta BS, Gupta YC, Sharma BP, Negi N, Kushal S. Influence of growing media on growth, flowering and pot presentability of *Hydrangea macrophylla*. International Journal of Farm Science. 2015; 5(3):111 -18.
7. Dingrodiya P, Gupta NK, Bhadouria RS, Ajay H. Effect of growing media on growth and flowering of cut roses under the protected environmental condition. International Journals of Microbiology Research. 2017; 9(2):861-63.
8. Dutt M, Patil MT, Sonawane PC. Effect of various substrates on growth and flowering of chrysanthemum. Indian Journal of Horticulture. 2002; 59(1):191-95.
9. Fisher RA. Statistical Methods for Research Workers, Oliver and Boyd, Edinburg, 1950, 356.
10. Gupta R, Yadav A, Garg VK. Influence of vermicompost application in potting media on growth and flowering of marigold crop. International Journal of Re-cycle Organization Waste Agriculture. 2014; 3(47):1-7.
11. Jackson ML. Soil Chemical Analysis, An advance course 2nd ed., University of Wisconsin, Madison, USA. 1979, 618.
12. Krichoff CJ, Malina J Jr, Michael B. Characteristics of compost: moisture holding and water quality improvement. Project Summary Report 0-4403-S. Centre fo Transportation Research. The university of Texas, Austin, 2003, 1-3.
13. Mehwish K, Baloch JD, Waseem K, Jilani MS, Khan MQ. Effect of different growing media on the growth and development of dahlia (*Dahlia pinnata*). Pakistan Journal of Biological Sciences 2007; 10(22):4140-43.
14. Nair SA, Bharti TU. Influence of potting media composition on pot mum production. International Journal of Life Science. 2015; 10(1):73-6.
15. Richard LA. Diagnosis and improvement of saline and alkali soils. Handbook No. 60 US Department of Agriculture, Washington D.C. (USA), 1954.
16. Saxena M, Bhattacharya S, Malhotra SK. State-wise area and production of horticultural crops for 2014-15 database. In: Horticultural Statistics at a Glance 2015. Oxford University Press. New Delhi, 2016, 157-59.
17. Wazir JS, Sharma YD, Dhiman SR. Performance of potted alstroemeria (*Alstroemeria hybrida* L.) in different growing media under wet temperate conditions. Journal of Ornamental Horticulture. 2009; 12(3):167-74.