INDIAN JOURNAL OF ARID HORTICULTURE
2015, Vol. 10 (1-2):50-53

Standardization of chrysanthemum cv. Mother Teresa to different potting media under *Tarai* field conditions

Deepti Bisht*
Department of Agriculture Sciences and Engineering, IFTM University, Lodhipur.
Moradabad Pin code: 244102 (Uttar Pradesh)
*email- diptibisht.pnt@gmail.com
(Received: 24.11.2014; Accepted: 25.06.2015)

Abstract

A study on response of pot mum cv. Mother Teresa to different potting media under open field conditions was conducted during 2009-10 at GBPUA&T, Pantnagar. In the present investigation, eight growing media were tested. Plants growing in plastic pots containing cocopeat + sand + FYM + vermicompost (2:1:0.5:0.5) media exhibited the maximum plant height (36.00 cm), and number of primary and secondary branches (3.67 & 17.67, respectively). Number of flowers per plant (34.0) was recorded maximum in cocopeat + sand + vermicompost (2:1:1). Plants took minimum days for flowering (57.00) when grown in cocopeat + sand + FYM. Flower diameter was observed maximum (5.73 cm) in plants grown in cocopeat + sand + FYM + vermicompost. Maximum duration of flowering (28.13 days) was observed in growing media namely cocopeat + sand + vermicompost. Keeping in view the response of chrysanthemum cv. Mother Teresa to different growing media containing cocopeat + sand + FYM + vermicompost (2:1:0.5:0.5) can be recommended for quality pot mum production under open conditions.

Key words: Pot mum, growing media, open field, vegetative and floral traits

Introduction

Chrysanthemum (*Dendranthema grandiflorum* Tzvelev.) commonly called as *guldaudi* or 'Autumn Queen' is one of the major cut flower crop as well as grown for pot mum production globally. It ranks second after rose for cut flower trade and fifth as pot plant in the world floricultural trade. In India, besides, its use as a cut flower and pot plant, flowers are also used for making garlands, *venis*, *gajras* and in religious offerings. It has a wide range of plant shape, size, flower shape and colour which makes it highly suitable for pot culture and bedding purposes.

Growing media is an important component for successful pot mum production. Popular and well-studied growing media which are in use now-a-days are peat, rock wool, vermiculite, perlite and sand. Peat is the most widely used substrate for pot plant production in the nurseries and accounts for a significant portion of the material used to grow potted plants (Ribeiro *et* al., 2007). In the last few years, cocopeat (coir dust) has been considered as a renewable sphagnum peat substitute for use in horticulture (Yau and Murphy, 2000). Pot mums are more in fashion in western countries and they are even getting importance now-a-days in India due to rise in per capita income as well as awareness and interest among individuals regarding growing of flowers. Moreover, due to shortage of time and space, more and more people prefer to grow plants in pots and in their home gardens. However, not much work has been done to standardize the media composition of chrysanthemum for pot mum production. Keeping in view the current demand for pot mum production, there is an urgency to standardize the most appropriate media for different cultivars under different agro-climatic conditions. Therefore, the present investigation was undertaken to standardize the most appropriate media composition for pot mum production under *Pantnagar conditions of Uttarakhand.*

Materials and Methods

The experiment was conducted at the Model Floriculture Centre, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar during 2009 to 2010. The experiment consisted of eight treatments with three replications. The experiment was plotted according to Completely Randomized Design (CRD). Mother Teresa, a popular spray type cultivar of chrysanthemum was chosen for present investigation. Well rooted plants of uniform size and age were transplanted in plastic pots of 15 cm size. The pots were filled with different media with varying composition of soil + sand + FYM (2:1:1), soil + sand + vermicompost (2:1:1), soil + sand + FYM + vermicompost (2:1:0.5:0.5), cocopeat only, cocopeat + sand + FYM (2:1:1), cocopeat + sand + vermicompost (2:1:1), cocopeat + sand + FYM + vermicompost (2:1:0.5:0.5) and soil (control). The observations were recorded on vegetative and flowering traits on five selected plants per treatment in each replication and average value was calculated statistically.

Results and Discussion

The data presented in Table 1 and Table 2 reveal significant variations on growth characters of pot mum under open field conditions. Plant height is an important trait for pot mum production of chrysanthemum. Different media grown plants had varied plant height. Plants grown in cocopeat + sand

+ FYM + vermicompost (2:1:0.5:0.5) media produced plants with maximum height (36.0 cm) closely followed by cocopeat + sand + vermicompost (35.60 cm). Plant height was retarded and was found minimum (23.0 cm) in soil used as control. The cocopeat amended media gave maximum plant height on account of high porosity, nutritional value and good water holding capacity. Similar results were obtained by Noguera *et al.* (2000). Likewise, Singh *et al.* (2009) found that potting media containing sand + FYM (1:1) produces maximum plant height (29.47 cm) in *Begonia*. Plant spread determines the size of the plant in different directions. Maximum plant spread (29.00 cm) was recorded as an average of North-South & East-West in cocopeat + sand + FYM + vermicompost (2:1:0.5:0.5) followed by cocopeat + sand + vermicompost (2:1:1) and soil + sand + FYM + vermicompost (2:1:0.5:0.5), which had plant spread of 27.0 and 26.33 cm, respectively. However, minimum plant spread was found in control. Maximum plant spread may be due to increased synthesis of protein as nitrogen is an essential part of nucleic acid which plays vital role in promoting plant growth (Kaur, 1992).

Number of primary and secondary branches differed significantly with respect to different growing media used. Maximum numbers of primary and secondary branches (3.67 and 17.67, respectively) were found in cocopeat + sand + FYM + vermicompost (2:1:0.5:0.5) which also produced maximum number of leaves (119.33) per plant followed by cocopeat + sand + vermicompost (2:1:1). Statistically non-significant differences were recorded for number of leaves per plant in media containing soil: sand: FYM: and sand: soil: vermicompost (T_2 and T_3). Like other parameters, minimum number of leaves per plant were observed in control. Superiority of the above media over soil might be due to better growing conditions of the media provided by the presence of cocopeat and vermicompost as these media are rich in nutrients and are also porous in nature. These findings are in conformity with the findings of Kumar and Kumar (2000) who observed that the vegetative characters of gerbera varied in different media owing to the variable production environments. Rani *et al.* (2005) found that among *Lilium* cv. Elite produces more number of leaves per stem (37.37) when grown in a mixture of soil and cocopeat. *Singh et al. (2010) observed higher number of leaves per plants growing in sand + FYM in the ratio of 1:1 in Dieffenbachia amoena.* Maximum length of leaf (6.90 cm) was observed in cocopeat + sand + FYM + vermicompost (2:1:0.5:0.5) and minimum (4.83 cm) was recorded in control. Ali *et al.* (2011) reported that maximum leaf length (22.76 cm) was produced by the plants grown in silt + mushroom compost, followed by plants grown in silt + leaf mold (20.78 cm) while silt + garden soil + FYM (1:1:1) behaved alike producing minimum leaf length (18.62 cm). However, leaf width was noticed maximum (4.37 cm) in soil + sand + FYM + vermicompost (2:1:0.5:0.5) followed by 4.30 cm in cocopeat + sand + FYM (2:1:1). Surprisingly, minimum (3.27 cm) width of leaf was recorded in cocopeat + sand + vermicompost (2:1:1) as compared to plants grown in soil, i.e., control (3.50 cm). There was a wide range of variations for number of roots per plant and length of root among the various treatments. Number of roots per plant varied from 248.33 to 390.0 with treatment T_8 and T_1 exhibiting minimum and maximum roots per plant, respectively. However, different trends of results were observed for length of root of plants, with control producing shortest roots (14.60 cm). These results are in corroboration with the findings of Budiarto *et al.* (2006) who studied that chrysanthemum cuttings planted in the carbonized rice husk produce better rooting capacity compared with those grown on vermiculite.

Maximum number of days taken to bud initiation was (60.50) in T_1 (control) followed by 57.54 days in T_2 i.e., soil + sand + FYM (2:1:1). Bud initiation was earliest (50.0 days) in cocopeat + sand + FYM (2:1:1) which also took minimum days for flowering (57.0 days). Flowering was delayed most in control which took 72.50 days for flowering. These results are in accordance with the findings of Naz *et al.* (2006) who reported that the overall performance of phlox was better in sand + silt + leaf mold. Diameter and total number of flowers per plant are the important floral traits in pot mum which can make or mar the beauty of pot mum production. More the number of flowers and better the growth of plant, better is the media composition. In present experiment, larger flower diameter (5.73 cm) was observed in cocopeat + sand + FYM + vermicompost (2:1:0.5:0.5) and plants grown in control produced flowers of smaller diameter (4.40 cm). The influence of growing media on flower diameter was also observed by other workers. Tailin *et al.* (2003) obtained highest flower diameter of dahlia by using leaf manure + sand as media. Similarly, Yasmeen *et al.* (2012) reported that leaf compost + sand (1:1) produce maximum flower diameter (4.94 cm) and farmyard manure produce minimum flower diameter (3.95 cm). Highest number of flowers per plant (34.0) were produced in T_7 i.e. cocopeat + sand + vermicompost. Other treatments which produced appreciable number of flowers were T_6 and T_5 and rest of the treatments were inferior for this very important flowering trait (Table 2). Like most of the traits which were found inferior in control, number of flowers per plant were also found minimum (21.30) in control. The variation in number of flowers/plant may be attributed to the genetic potential of the crop or the physico-chemical properties of the substrates. An increase in number of flowers/plant could be attributed to overall vegetative growth of chrysanthemum plants grown in these substrates. Greater carbohydrate accumulation due to increased photosynthesis might have caused the production of more number of flowers/plant. This in turn might have been caused due to the optimum balance and supply of plant nutrients present in the substrate. Similarly, increased availability of essential elements at critical growth stages could have led to increase in number of flowers. Singh *et al.* (2009) also reported that potting media comprising of saw dust + brick pieces + wooden charcoal + soil + sand + FYM in the ratio of 2:1:1:1:1 produces maximum number of flowers per plant

(6.07) and minimum days to flowering (260.47) in anthurium. Duration of flowering recorded from peak flowering up to the stage till plants remain presentable, was found more (28.13 days) in case of cocopeat + sand + vermicompost (2:1:1). Apart from this media, plants grown in soil + sand + FYM + vermicompost (2:1:0.5:0.5) also remained in good form for considerable extent (28.00 days) and minimum (19.67 days) duration of flowering was recorded in control. Yasmeen *et al.* (2012) depicted that leaf compost + sand (1:1) produce flower in minimum days than other substrates used. Longevity of flowers varied among various media studied. Plants grown in soil + sand + vermicompost (2:1:1) exhibited maximum flower longevity (15.60 days). Moreover, appreciable flower longevity was observed with various formulations tried for pot mum production and control grown plants. Based on the results obtained in the present investigation, it can be concluded that cocopeat+ sand+ FYM+ vermicompost (2:1:0.5:0.5) is a better growing media for pot mum cv. Mother

Table 1. Effect of growing media on vegetative characters of chrysanthemum cv. Mother Teresa

Treatment		Plant height (cm)	Plant spread (cm)	No. of primary branches per plant	No. of secondary branches per plant	No. of leaves per plant	Length of leaf (cm)	Width of leaf (cm)	Number of roots per plant	Length of root (cm)
T_1	Control	23.00	18.23	1.93	11.63	93.00	4.83	3.50	390.00	14.60
T_2	Soil + Sand + FYM (2:1:1)	27.00	20.07	2.87	14.00	111.73	5.90	3.83	373.67	19.60
T_3	Soil + Sand + Vermicompost (2:1:1)	29.67	23.00	2.97	14.43	111.13	6.17	3.43	318.67	19.07
T_4	Soil +Sand + FYM + Vermicompost (2:1:0.5:0.5)	32.10	26.33	3.47	13.77	112.80	6.47	4.37	289.67	18.07
T_5	Cocopeat only	31.67	24.67	2.93	15.33	103.77	5.83	3.60	373.33	18.03
T_6	Cocopeat + Sand + FYM (2:1:1)	31.33	20.43	3.37	15.20	112.23	5.60	4.30	375.00	18.37
T_7	Cocopeat + Sand + Vermicompost (2:1:1)	35.60	27.00	3.57	16.67	115.67	6.77	3.27	273.00	25.33
T_8	Cocopeat + Sand + FYM + Vermicompost (2:1:0.5:0.5)	36.00	29.00	3.67	17.67	119.33	6.90	3.63	248.33	24.67
CD at 5%		1.81	1.94	0.35	2.06	5.01	0.92	NS	16.48	2.25

Table 2. Effect of growing media on flowering characters of chrysanthemum cv. Mother Teresa

Treatment		No. of days taken to bud initiation	No. of days taken to flowering	Flower dia. (cm)	Total No. of flowers per plant	Flowering duration (days)	Flower longevity (days)
T_1	Control	60.50	72.50	4.40	21.30	19.67	10.00
T_2	Soil + sand + FYM (2:1:1)	57.54	67.54	5.10	24.03	25.60	12.97
T_3	Soil + sand + vermicompost (2:1:1)	57.00	66.00	5.23	26.27	25.11	15.60
T_4	Soil + sand + FYM + vermicompost (2:1:0.5:0.5)	52.33	60.54	5.33	27.57	28.00	12.83
T_5	Cocopeat only	52.66	60.34	5.43	23.00	23.66	15.57
T_6	Cocopeat + sand + FYM (2:1:1)	50.00	57.00	5.17	30.67	25.60	14.23
T_7	Cocopeat + sand + vermicompost (2:1:1)	52.33	61.34	5.60	34.00	28.13	14.33
T_8	Cocopeat + sand + FYM + vermicompost (2:1:0.5:0.5)	56.96	66.94	5.73	29.67	27.27	14.00
CD at 5%		4.51	2.80	NS	2.27	3.31	2.15

References

Ali, T., Amin, N.U., Khattak, A.M. and Khan, M.A. 2011. Response of Freesia cultivars to different growing media under Peshawar conditions. *Sarhad J. Agric.*, 27: 43-49.

Budiarto, K., Sulyo, Y., Dwi, E. and Maaswinkel, R.H.M. 2006. Effects of types of media and NPK fertilizer on the rooting capacity of chrysanthemum. *Indonesian J. Agric. Sci.*, 7: 67-70.

Kaur, K. 1992. Studies on the production of *Gerbera jamesonii* in the sub tropical environment of Punjab. M.Sc. Thesis, Punjab Agricultural University, Ludhiana.

Kumar, D. and Kumar, R. 2000. Seasonal response on gerbera cultivars. *J. Orn. Hort.*, 3(2): 103-106.

Naz, I., Baloch, J.U.D. and Waseem, K. 2006. Effect of different growing media on the growth and development of phlox (*Phlox drummondi*). M.Sc. (Hons) Thesis, Faculty of Agriculture, Gomal University, D.I. Khan, Pakistan.

Noguera, Abad, P.M. and Noguera, V. 2000. Coconut coir waste, a new and viable ecologically-friendly peat substitute. *Acta Hort.*, 517: 279-283.

Rani, N., Kumar, R. and Dhatt, K.K. 2005. Effect of nitrogen levels and growing media on growth, flowering and bulb production of *Lilium* cultivars. *J. Orn. Hort.*, 8: 36-40.

Ribeiro, H.M., Romero, A.M. and Pereira, H. 2007. Evaluation of a compost obtained from forestry wastes and solid phase of pig slurry as a substrate for seedling production. *Bioresource Tech.*, 98: 3294-3297.

Singh, A.K., Gupta, S. and Singh, A.K. 2009. Influence of various potting media on vegetative and root characteristics in Wax begonia. *J. Orn. Hort.*, 12: 111-115.

Singh, P., Dhaduk, B.K., Chawla, S.L., Singh, A., Aklade, S.A., Desai, J.R. and Yadav, M.K. 2009. Standardization of growing media for anthurium (*Anthurium andreanum* L.) cv. 'Flame' under protected conditions. *J. Orn. Hort.*, 1: 101-105

Singh, A.K., Gupta, S. and Singh, A. 2010. Study on nutrient levels of various potting media and its effect on vegetative and root characteristics in Dieffenbachia. *J. Orn. Hort.*, 13: 117-121.

Tailin, Z., Bailin, Q. and Renjuan, J. 2003. Cultivation experiments on several kinds of herbaceous flowers. Zhejiang Forestry College, 20(1): 108-110.

Yasmeen, S., Younis, A., Rayit, A., Riaz, A. and Shabeer, S. 2012. Effect of different substrates on growth and flowering of *Dianthus caryophyllus* cv. 'Chauband Mixed'. *American Eurasian J. Agric. Env. Sci.*, 12: 249-258.

Yau, P.Y. and Murphy, R.J. 2000. Biodegraded cocopeat as a horticultural substrate. *Acta Hort.*, 517: 275-278.