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STUDIES ON THE EFFECT OF DIFFERENT MEDIA AND THEIR COMBINATIONS ON ROOTING OF CARNATION (*DIANTHUS CARYOPHYLLUS* L.) CUTTINGS OF CV. KEIRO UNDER POLYHOUSE CONDITIONS

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Abstract

The experiment was conducted at commercial floriculture farm, Mudimyal, Rangareddy district, A.P. during September 2011 to March 2012 to study effect of different rooting media and their combinations on rooting of carnation (*Dianthus caryophyllus* L.) cuttings of cv. Keiro under poly house conditions. The experiment was conducted in randomised block design with 11 treatments replicated thrice. Among the media treatments studied red earth + coco peat recorded less number of days for formation of root initials (9.10 days), maximum percentage of rooting (97.70%) and maximum percentage of establishment of rooted cuttings (87.38%). Among the individual media treatments studied vermicompost recorded maximum number of roots per cutting (14.01) followed by cocopeat (13.41) and red earth (12.85). However, pressmud alone recorded lowest number of roots (9.14) per cutting. Among the combination media treatments, red earth + coco peat recorded maximum fresh weight of roots (5.71 g) followed by coco peat + vermicompost (4.62g), cocopeat + pressmud (3.91 g) and red earth+ vermicompost (3.74 g). However, lowest fresh weight was recorded with vermicompost + pressmud (2.55 g). Among all the media treatments control recorded lowest length of longest root (7.08 cm), lowest cumulative length of roots (29.02 cm).

Key words : Carnation, red earth, coco peat, vermicompost, press mud, rooting.

Introduction

Carnation (*Dianthus caryophyllus* L.) is one of the most important commercial cut flower belongs to the family caryophyllaceae. It is a very important cut flower crop in world floriculture industry. Commercially carnation is propagated through soft wood cuttings obtained from mother plant. The demand for carnation rooted cuttings is very high as the commercially planted cultivars are productive only for two years. Year after year the plant material has to be changed, which creates a lot of demand for rooted cuttings. The medium used for rooting of cuttings serves to hold them in position and provide them with the moisture, nutrition and aeration.

Among the different factors influence the rooting of cuttings media plays an important role. The medium used for rooting of cuttings serves to hold them in position and provide them with the moisture, aeration and nutrition. Red earth, coco peat, vermicompost and pressmud are the most commonly and cheaply available rooting media. Thomas *et al.* (2003) reported maximum percentage of rooting and maximum longest root length when carnation cuttings planted in soil alone media. Khayyat *et al.* (2007) reported maximum fresh weight of roots, when pothos cuttings were planted in cocopeat media alone. Bharathy *et al.* (2003), reported maximum percentage of rooting with vermicompost alone followed by coco peat + perlite media. Joshi and Sharma (2010) studied the physico chemical characters of presssmud, reported that Pressmud like other organic material effect the physical, chemical and biological properties of the soil. However, due to it's bulky nature and wax content, it usually give less benefit in the year of direct application in the fields. Hence, there exist a lot of contradiction on the best media for rooting of carnation cuttings, so the experiment was conducted to study the ideal media for rooting of carnation cuttings.

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Materials and Methods

The experiment was conducted at commercial floriculture farm, Mudimyal, Rangareddy district, A.P. during September 2011 to March 2012 under naturally ventilated poly house. During the period of study the minimum and maximum temperatures recorded was 18-30°C and the relative humidity fluctuated between 59-88%. The experiment included rooting media *viz*., red earth, coco peat, vermicompost and pressmud individually, their combinations (red earth + coco peat, red earth + vermicompst, red earth + pressmud, coco peat + vermicompost, coco peat + pressmud and vermicompost + pressmud in 1:1 ratio) and control (sand). The experiment was laid out in randomised block design with 11 treatments and 3 replications and 30 cuttings were taken per replication.

The terminal cuttings of 10-15 cm length with 2-4 pairs of leaves were taken from mother plants of current season's growth. A sharp slant cut was given at planting position below the node in order to get more area for better rooting. Cuttings were planted in polytrays and kept in polyhouse. Each poly tray can accommodate 40 cuttings so, three poly trays were taken per treatment. Cuttings were watered regularly with rose can to maintain the moisture in the medium. Biometric observations recorded were number of days taken for formation of root initials, percentage of rooting, number of roots per cutting, length of longest root, cumulative length of roots and fresh weight of roots, these were recorded twice at an interval of 15 days, for recording the observations 5 cuttings were selected randomly in each replication. The survival percentage of cuttings planted for rooting was recorded 30 days after transplanting and the data were statistically analysed.

Results and Discussion

Number of days taken for formation of root initials

Among the different media treatments, red earth + coco peat recorded minimum number of days (9.10 days) (table 1) for formation of root initials followed by coco peat + vermicompost (9.87 days). However, Maximum number of days for formation of root initials was recorded with control (16.98 days). Among the media treatments coco peat in combination with other media recorded superior rooting parameters. Zalewska and Wozny (2005) reported that, Medium containing 30 per cent of coconut fiber favoured earlier root initiation in *Pelargonium* cuttings. Khewale *et al.* (2005) reported early root it initiation of carnation cuttings when treated with IBA 125 ppm and planted in coco peat media.

Percentage of rooting

Among the different media treatments, red earth + coco peat recorded maximum percentage of rooting (97.70%) (table 1) followed by coco peat + vermicompost (91.62%) and vermicompost (87.21%). Percentage of rooting of coco peat alone (84.20%) was on par with red earth+ vermicompost (84.47%). The lowest percentage of rooting was recorded with control (41.22%). As the soil contains adequate organic matter that improves the soil structure which enables to retain moisture and variety of microorganisms that support the root growth. Thus, resulted in maximum percentage of rooting. Among the different pressmud based media treatments, pressmud + coco peat recorded maximum rooting percentage (84.37%) followed by red earth + press mud (81.30%) and vermicompost + press mud (76.30%). Whereas, Pressmud alone (71.33%) recorded lowest percentage of rooting. Bhosale *et al*. (2012), studied the physico-chemical characteristics of pressmud and reported that pressmud is a spongy, amorphous, waxy material which on addition to soil improves the physical properties of soil such as water holding capacity but on direct use it has less benefit.

Number of roots per cutting

As regards to the number of roots per cutting, media in combination recorded maximum number of roots per cutting over individual media treatments. Maximum number of roots was recorded (16.02) (table 1) with red earth + coco peat followed by coco peat + vermicompost (14.55) and vermicompost alone (14.01). However, lowest number of roots per cutting was recorded with control (5.08). Red earth + coco peat recorded maximum number of roots per cutting (16.02), which was superior over either of individual media treatments *i.e.*, coco peat alone (13.41) and red earth alone (12.85). It might be due to, richness of soil with nutrients that are necessary for basic plant nourishment that include nitrogen, phosphorous, potassium and micro nutrients and coco peat can retain moisture up to nine times of its own volume while maintaining excellent air filled porosity, providing vital oxygen to the roots. Thomas *et al.* (2003) reported that carnation cv. Mixed Super Chaubad recorded maximum number of roots per cutting in a medium containing soil alone followed by soil + sand. And Khelwale *et al.* (2005) reported that coco peat was significantly superior to remaining media treatments in rooting of carnation.

Length of longest root

Among the different media treatments, red earth + coco peat recorded (table 1) maximum longest root length

Table 1 : Effect of media on rooting of carnation (*Dianthus caryophyllus* L.) cuttings of cv. Keiro under polyhouse conditions

Media treatments	Number of days (days)	Percentage of rooting (%)	Number of roots / cutting	Length of longest root (cm)	Cumulative length of root (cm)	Fresh weight of root (g)	Percentage of establis-hment (%)
Red earth	10.80	79.49	12.85	12.34	128.88	2.95	70.53
Coco peat	10.40	84.20	13.41	14.48	165.28	3.63	73.80
Vermicompost	10.20	87.21	14.01	14.95	175.55	4.28	81.09
Pressmud	11.20	71.33	9.14	9.48	67.72	2.25	62.30
Red earth + Cocopeat	9.10	97.70	16.02	16.34	229.29	5.71	87.38
Red earth+ Vermicompost	10.30	84.47	12.40	12.73	132.38	3.74	72.24
Redearth + Pressmud	10.63	81.30	11.73	11.35	109.29	3.00	70.40
Coco peat+ Vermicompost	9.87	91.62	14.55	15.36	192.21	4.62	82.33
Coco peat + pressmud	10.53	84.37	13.48	14.44	165.34	3.91	74.32
Vermicompost+ pressmud	10.93	76.30	11.21	10.24	94.24	2.55	66.37
Control – Sand	16.98	41.22	5.08	7.08	29.02	0.98	51.27
SEM	0.116	1.303	0.053	0.056	1.355	0.025	0.460
CD at 5%	0.242	2.720	0.110	0.118	2.826	0.052	0.960

(16.34 cm). Among the vermicompost based media treatments, coco peat + vermicompost recorded maximum longest root length (15.36 cm) (table 1) followed by vermicompost alone (14.95 cm), red earth + vermicompost (12.73 cm) and vermicompost + pressmud (10.24 cm). Lowest length of longest root was recorded with control (7.08 cm). Norman and Edward (2005) studied the effect of vermicompost on plant growth and reported that vermicompost is a rich source of mineral nutrition and its addition to media increases quality of media by increasing microbial activity and microbial biomass which are key components in nutrient cycling and production of plant growth regulators. That might have resulted in superior length of longest root. Shirol *et al*. (2001) in dwarf poinsettia recorded maximum root development with Vermicomopost + sand (1:1), followed by vermicompost alone.

Cumulative length of roots

Red earth + coco peat (229.29 cm) recorded highest of cumulative length of roots (table 1) followed by coco peat + vermicompost (192.21 cm). Among the individual media treatments studied, cuttings planted in vermicompost media recorded maximum cumulative root length (175.55 cm) followed by coco peat (165.28 cm), red earth (128.88 cm) and pressmud (67.72 cm). And minimum cumulative root length was recorded with control (29.02 cm). Edward and Neuhauser (1988) reported that vermicompost has maximum pore space, aeration, water holding capacity and has ability to supply nutrients in available form such as nitrate nitrogen and soluble phosphorous, which are necessary for root growth. That might have resulted in maximum cumulative length of roots per cutting.

Fresh weight of roots

Among the different media treatments studied, combination media treatments red earth+ coco peat recorded maximum fresh weight of roots (5.71 g) followed by coco peat + vermicompost (4.62 g) which was significantly superior over individual media treatments *i.e*., vermicompost alone (4.28 g), coco peat alone (3.63 g) and red earth alone (2.95 g). The lowest fresh weight of roots was recorded with control (0.98 g), which may be attributed to poor water holding capacity of sand. As lacuna of one media is compensated by the charactestic property of other media. Soil is a rich source of organic matter, nutrients and various micro organisms that hastens the root growth but has relatively lower porosity that is compensated by excellent porosity and water holding property of coco peat. Singh *et al.* (2004), reported that the growth of root, shoot and leaflets was maximum in treatments with soil, sand and vermicompost combinations over their individual use. The highest fresh weight of roots with soil, river bed silt and FYM in equal ratio was recorded by Kumar *et al.* (2011) in patchouli cuttings.

Percentage establishment of rooted cuttings

Among the media treatments studied red earth + coco peat recorded maximum percentage of establishment of rooted cuttings (87.38%) (table 1) followed by coco peat + vermicompost (82.33%), vermicompost alone (81.09%) and coco peat alone (73.80%). Lowest percentage of establishment of rooted cuttings was recorded with control (51.27%). Cuttings planted in red earth+ coco peat media recorded maximum number of roots, cumulative root

length and fresh weight of roots which might have resulted in the highest percentage of establishment of rooted cuttings. Barreto and Nookaraju (2007) recorded superior percentage of establishment of in vitro grape plant lets when planted in coco peat in combination with soil.

On the basis of above results it can be inferred that red earth + coco peat media recorded less number of days for formation of root initials, maximum percentage of rooting, maximum number of roots and maximum percentage of establishment of rooted cuttings. Coco peat + vermicompost and vermicompost alone also recorded superior rooting parameters. Among the individual media treatments studied vermicompost alone recorded maximum number of roots, maximum length of longest root followed by cocopeat and red earth, while the minimum number of roots was recorded with pressmud. Among the media treatments studied pressmud alone or in combination recorded more number of days for formation of root initials, lower percentage of rooting, poor root length. Media in combination recorded superior rooting parameters over individual treatments.

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