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# Impact of growing media on Karonda (*Carissa carandas* L.) seedling

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**Abstract**
The present investigation entitled "Impact of growing media on karonda (*Carissa carandas* L.) seedling" was carried out in Completely Randomized Design with three replications during August to November 2017 at Horticulture Farm, Rajasthan College of Agriculture, Udaipur. The experiment was conducted in nursery and seed were sown in poly bag for investigation purpose. During the course of investigation growing media were evaluated at different levels. Twelve various growing media were applied. The growing media $G_{10}$ (Soil: Sand: FYM: Vermicompost: Perlite, 2:1:1:1:1 v/v) was found to be significant on the characters *viz*. days to initiation of germination, germination percentage, seedling height, leaves per seedling, root length, fresh weight of root and shoot, root/shoot ratio and survivability percentage of karonda seedling at 90$^{th}$ days after sowing.

**Keywords:** Growing media, karonda, sand, seed, germination

## Introduction
Karonda (*Carissa carandas* L.) belongs to the family Apocynaceae and has the chromosome number (2n=22) it is also known as 'Bengal currant' or "Christ's thorn" in South India (Imran *et al.* 2012) [3]. It is cultivated in Bangladesh, South Africa, U.S.A., Denmark, Ghana, Israel, Pakistan, Nepal, Sri Lanka and Afghanistan. In India it is cultivated in Punjab, Kashmir, Uttar pradesh, Rajasthan, parts of Gujarat and West Bengal. Karonda is one of the best tropical and sub-tropical fruit having commercial and medicinal value. It is rich source of iron (39.10 mg/100g), vitamin-A (1619IU/100g) and carbohydrates (67.10 mg/100g). The raw and ripe fruit are used to prepare preserved products like jam, jelly squash and pickle (peter, 2007) [7].
It is usually propagated by seed and sown immediately after extraction due to low seed viability percentage. Seedlings are highly heterozygous and slow in growth and ordinarily do not become ready for transplanting up to the age of two years. The seed viability can be increased by storing them in certain well defined conditions (Sharma and Singh, 1997; Naidu and Amritphali, 1994) [8].
For proper plant growth and development suitable growing media is one of the most important factor for raising healthy seedlings in karonda. The growing media plays an important role on seed germination, seedling growth and its development at early stage. Under optimum conditions, a farmer and nursery man can achieve not only rapid uniform germination but get well developed seedlings; therefore, growing media must retain moisture, supply nutrients and provide support for the seedling. Some nutrients must be present, particularly phosphorus and calcium. The pH should be neutral. Common growing media mixtures are soil, sand, FYM, vermicompost, perlite and poultry manure. Therefore, this experiment has been planned to investigation impact of growing media on karonda (*Carissa carandas* L.) seedling under Southern Rajasthan condition.

## Materials and method
A nursery experiment entitled "Impact of growing media on karonda (*Carissa carandas* L.*)* seedling" was conducted at the Horticulture Farm, Rajasthan College of Agriculture, Udaipur from August to November 2017. In the present study growing media were tested under Completely Randomized Design with overall 12 treatment combination and 3 replication.
In case of experiment the effect of growing media on germination and seedling vigour of seed during sowing were studied.

120 seeds were sown for each treatment in polythene bags filled with moist growing media containing 2:1:1 ratio of soil: sand: FYM/ Vermicompost / perlite/poultry mannure and 120 seeds from each treatment were sown in polythene bags with moist growing media containing 2:1:1:1 ratio of soil: sand: FYM: Vermicompost/ Perlite/poultry manure and 2:1:1:1:1 ratio of soil: sand: FYM/Vermicompost / Perlite/poultry manure. The poly bags watered regularly. On the lower part of poly bags, 5 holes were made for maintaining proper drainage.

The observations on initiation of germination and the percentage of germination was recorded in each treatment. The percentage of germination calculated after entire germination process was over. Germination of seed was recorded from the date of sowing than germination percentage was worked out after the final germination, i.e., after stoppage of germination. It was calculated by dividing the total number of seeds sown with the number of seeds germinated and multiplied by 100.

$$\text{Germination percentage (\%)} = \frac{\text{Number of seeds germinated}}{\text{Number of seed sown}} \text{X100}$$

Observation for growth parameters was recorded for height of seedling (cm), leaves per plant, root length (cm), fresh weight of shoot (g), fresh weight of root (g), Root: Shoot ratio.

**Root: Shoot ratio**

Five seedlings were selected at random in each replication for measuring root: shoot ratio. The root shoot ratio was calculated using the following formula at 90 days after sowing.

$$\text{Root: Shoot ratio} = \frac{\text{Dry weight of the root}}{\text{Dry weight of the shoot}}$$

**Survival percentage of seedlings**

The survival percentage of each treatment was recorded at 90 days after seed sowing. The survival percentage was calculated by using formula as given below:

$$\text{Survival (\%)} = \frac{\text{No.of survived seedling}}{\text{Total no.of seedlings}} \text{X100}$$

**Result and discussion**

The data pertaining to effect of growing media on days taken to initiation of germination, germination percentage, seedling height, leaves per plant, root length, fresh weight of shoot, fresh weight of root, root/shoot ratio, survivability percentage are presented in Tables 1 and 2, depicted in Fig. 1

In respect of growing media, the lowest days taken to initiation of germination (*i.e*. 7.00 days) was recorded in $G_{10}$ treatment (*i.e.* Soil: Sand: FYM: Vermicompost: Perlite, 2:1:1:1:1 v/v) as compared to highest number of days taken to initiation germination (*i.e*.13.12 days) was exhibited in $G_0$ treatment (*i.e.* Soil: Sand: FYM, 2:1:1v/v). It might be higher moisture content in seed which promote the early germination. The findings are supported by Singh *et al.* (2014) in custard apple.

Similarly, with regards of growing media, the maximum germination percentage (*i.e*. 66.60) was recorded in $G_{10}$ treatment (*i.e.* Soil: Sand: FYM: Vermicompost: Perlite, 2:1:1:1:1 v/v) as compared to lowest germination percentage (*i.e*. 44.94) was recorded in $G_0$ treatment (*i.e.* Soil: Sand: FYM, 2:1:1v/v). It might be because of media containing organic manures possess organic acid, which improve drainage, aeration, water holding capacity and highest nutrients within them. Therefore, more available moisture and some acids may have helped in minimum days to germination and better germination percentage this results are in accordance with Parasana *et al.* (2012) [6] in mango and Mirza *et al.* (2014) in karonda.

Maximum seedling height (*i.e*. 29.00 cm), leaves per plant (*i.e*.19.11), root length (*i.e*. 6.06 cm) were recorded in $G_{10}$ treatment (*i.e.* Soil: Sand: FYM: Vermicompost: Perlite, 2:1:1:1:1 v/v) while, the minimum seedling height (*i.e*. 15.28 cm), leaves per plant (*i.e*.13.77), root length (*i.e*.4.79cm) were obtained in $G_0$ treatment (*i.e.* Soil: Sand: FYM, 2:1:1v/v).

The increase of growth parameters in $G_{10}$ (soil: sand: FYM: Vermicompost: perlite 2:1:1:1:1 v/v) provide more nutritive media resulted in increment to plant height, leaves per and plant, root length. which might be due that growing media combination $G_0$ alone had lower 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 growing media $G_{10}$ (soil: sand: FYM: Vermicompost: perlite 2:1:1:1:1 V/V). The results have been supported by Bhardwaj *et al.* (2013) who obtained maximum seedling height in papaya due to vermicompost application.

The superior fresh weight of shoot (*i.e*.1.01g) and root (*i.e*. 0.31 g) were recorded in $G_{10}$ treatment (*i.e.* Soil: Sand: FYM: Vermicompost: Perlite, 2:1:1:1:1 v/v) as compared to the inferior fresh weight of shoot (*i.e*.13.12 days) and of root (*i.e*.0.14g) were exhibited in $G_0$ treatment (*i.e.* Soil: Sand: FYM, 2:1:1v/v).

It might be due to that the synergistic combination of both the factors which improve the physical conditions of the media and nutritional factors. Similar results have been reported by deepika *et al.* (2014) [2] in karonda.

With respect of growing media, the superior root: shoot ratio (0.39) and survivability percentage (*i.e*.66.66) were recorded in $G_{10}$ treatment (*i.e.* Soil: Sand: FYM: Vermicompost: Perlite, 2:1:1:1:1 v/v) as compared to the inferior root: shoot (0.31) and survivability percentage (*i.e*.40.32g) and (0.31) were exhibited in $G_0$ treatment (*i.e.* Soil: Sand: FYM, 2:1:1v/v).It might be because of media containing organic manures possess organic acid within them. Therefore, more available moisture and some acids may have helped in minimum days to germination and better germination percentage this results are in accordance with parasana *et al.* (2012) [6] in mango.

In the present investigation it may be concluded that growing media significantly influence germination and growth parameters, root: shoot ratio and survivability percent of karonda seedlings. Growing media with $G_{10}$ – Soil: Sand: FYM: Vermicompost: Perlite (2:1:1:1:1v/v) was found superior for germination, growth parameters, root: shoot ratio and survivability percentage than any other growing media.

**Table 1:** Impact of growing media on germination parameter of karonda seedlings.

| Treatments | Initiation of germination | Germination percentage |
|---|---|---|
| $G_0$-Soil: Sand: FYM (2:1:1 v/v) | 13.12 | 49.89 (44.94) |
| $G_1$-Soil: Sand: Vermicompost (2:1:1v/v) | 11.30 | 68.28 (55.73) |
| $G_2$-Soil: Sand: Perlite (2:1:1v/v) | 12.10 | 65.00 (53.76) |
| $G_3$-Soil: Sand: Poultry manure (2:1:1v/v) | 12.02 | 67.36 (55.19) |
| $G_4$ -Soil: Sand: FYM: Vermicompost (2:1:1:1v/v) | 10.29 | 78.65 (62.58) |
| $G_5$ -Soil: Sand: FYM: Perlite (2:1:1:1v/v) | 10.36 | 75.89 (60.81) |
| $G_6$ -Soil: Sand: FYM: Poultry manure (2:1:1:1v/v) | 10.52 | 75.00 (60.03) |
| $G_7$ -Soil: Sand: Vermicompost: Perlite (2:1:1:1v/v) | 9.50 | 82.12 (65.04) |
| $G_8$ -Soil: Sand: Vermicompost: Poultry manure(2:1:1:1:1v/v) | 10.19 | 81.56 (64.59) |
| $G_9$ -Soil: Sand: Perlite: Poultry manure (2:1:1:1:1v/v) | 10.79 | 72.78 (58.70) |
| $G_{10}$ -Soil: Sand: FYM: Vermicompost: Perlite (2:1:1:1:1v/v) | 7.00 | 84.11 (66.60) |
| $G_{11}$ -Soil: Sand: FYM: Vermicompost Poultrymanure(2:1:1:1:1v/v) | 7.78 | 83.22 (65.87) |

**Table 2:** Impact of growing media on growth parameter, root: shoot ratio and survivability percentage of karonda seedlings.

| Treatments | At 90 days after seed sowing | | | | | | |
|---|---|---|---|---|---|---|---|
| | Seedling height (cm) | Leaves/plant (number) | Root length (cm) | Fresh weight of Shoot | Fresh weight of root | Root: Shoot Ratio | Survival percentage |
| $G_0$-Soil: Sand: FYM (2:1:1 v/v) | 15.28 | 13.77 | 10.43 | 0.68 | 0.14 | 0.31 | 41.89 (40.32) |
| $G_1$-Soil: Sand: Vermicompost (2:1:1v/v) | 20.38 | 15.36 | 13.86 | 0.80 | 0.16 | 0.32 | 51.87 (46.07) |
| $G_2$-Soil: Sand: Perlite (2:1:1v/v) | 18.39 | 14.77 | 12.01 | 0.76 | 0.15 | 0.33 | 44.66 (41.93) |
| $G_3$-Soil: Sand: Poultry manure (2:1:1v/v) | 20.45 | 14.93 | 13.48 | 0.78 | 0.16 | 0.32 | 46.44 (42.96) |
| $G_4$ -Soil: Sand: FYM: Vermicompost (2:1:1:1v/v) | 22.79 | 16.49 | 15.11 | 0.88 | 0.20 | 0.34 | 78.45 (62.46) |
| $G_5$ -Soil: Sand: FYM:Perlite (2:1:1:1v/v) | 24.12 | 16.87 | 16.06 | 0.94 | 0.25 | 0.30 | 76.32 (60.89) |
| $G_6$ -Soil: Sand: FYM: Poultry manure (2:1:1:1v/v) | 22.25 | 16.52 | 14.97 | 0.86 | 0.19 | 0.33 | 73.24 (58.95) |
| $G_7$ -Soil: Sand: Vermicompost: Perlite (2:1:1:1v/v) | 23.09 | 17.12 | 17.78 | 0.89 | 0.21 | 0.32 | 80.13 (61.60) |
| $G_8$ -Soil: Sand: Vermicompost: Poultry manure(2:1:1:1:1v/v) | 23.61 | 17.14 | 15.61 | 0.91 | 0.22 | 0.35 | 79.29 (61.30) |
| $G_9$ -Soil: Sand: Perlite: Poultry manure (2:1:1:1:1v/v) | 24.51 | 18.38 | 16.16 | 0.94 | 0.23 | 0.34 | 70.31 (60.10) |
| $G_{10}$ -Soil: Sand: FYM: Vermicompost: Perlite (2:1:1:1:1v/v) | 29.02 | 19.11 | 19.58 | 1.01 | 0.31 | 0.39 | 84.34 (66.66) |
| $G_{11}$ -Soil: Sand: FYM: Vermicompost Poultrymanure (2:1:1:1:1v/v) | 26.27 | 18.73 | 15.79 | 0.91 | 0.27 | 0.36 | 83.34 (66.24) |

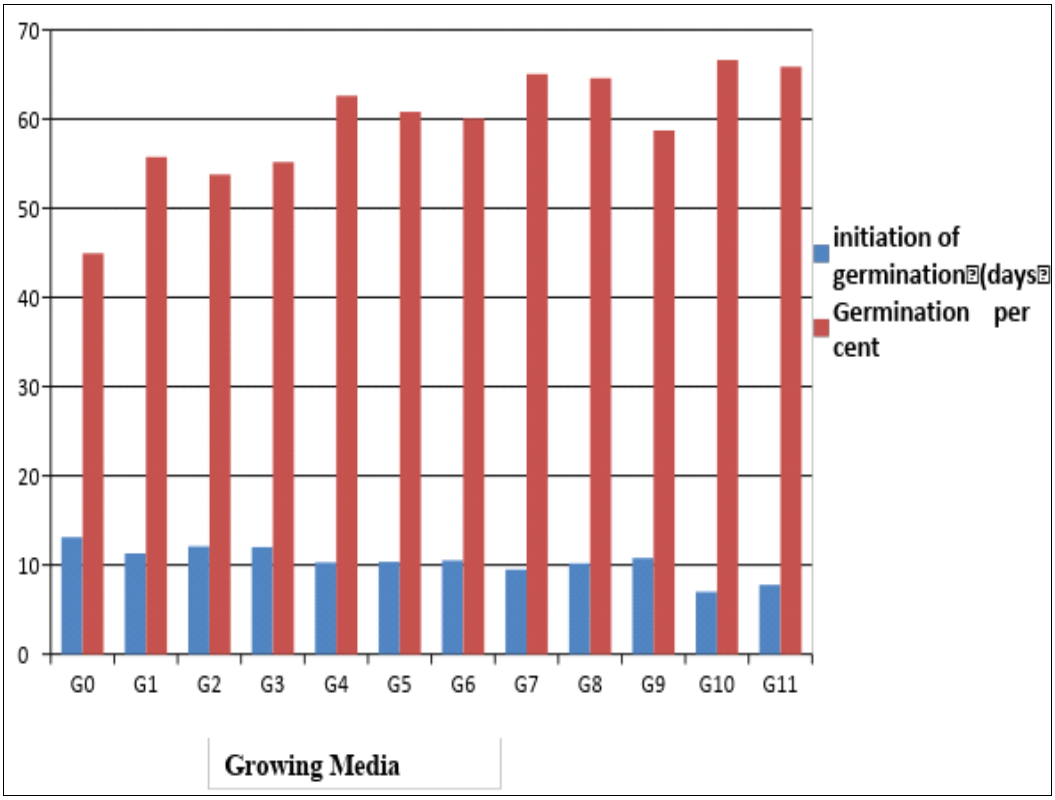

**Fig 1**: Impact of Growing Media on Seed Germination parameters of Karonda (*Carissa carandus* L.)

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