Plant Archives Vol. 26, Supplement 2, 2026 pp. 3080-3085 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2026.v26.supplement-2.393

EFFECT OF ORGANIC SEED TREATMENTS AND GROWING MEDIA ON GERMINATION AND SEEDLING VIGOUR OF KARONDA (*Carissa carandas* L.)

Ashutosh Dwivedi[1*], Rajnee Sharma[2], Reena Nair[2], Priyanshi Gupta[1], Aishwaryditya Singh[1] and Rupali Koshti[1]

[1]Department of Fruit Science, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur-482004, Madhya Pradesh, India
[2]Department of Horticulture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur-482004, Madhya Pradesh, India
*Corresponding author email: ashu15012001@gmail.com
(Date of Receiving : 05-05-2026; Date of Revision : 27-06-2026; Date of Acceptance : 18-07-2026)

ABSTRACT

The present investigation entitled "Effect of organic seed treatment and growing media on germination and growth attributes of karonda (*Carissa carandas* L.) seedling" was carried out during 2024-25 at the Fruit Research Station, Imalia , Department of Horticulture, College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.). The experiment was laid out in Asymmetrical Factorial Completely Randomized Design with three replications comprising different organic seed treatments and growing media combinations. Observations were recorded on days taken to first germination, days taken to 50 percent germination, germination percentage, survival percentage, seedling vigour index-I and seedling vigour index-II. Seed treatment with Beejamrit and growing media consisting of Soil + Sand + Vermicompost + Cocopeat (1:1:1:1) recorded superior performance with respect to germination and vigour parameters. Among different treatment combinations, Beejamrit + Soil + Sand + Vermicompost + Cocopeat (S_2G_4) recorded minimum days taken to first germination (8.00 days), minimum days taken to 50 per cent germination (9.33 days), maximum germination percentage (96.67%), survival percentage (96.67%), seedling vigour index-I (2801.07) and seedling vigour index-II (76.70). The study revealed that seeds treated with Beejamrit and sown growing media consisting of Soil + Sand + Vermicompost + Cocopeat (1:1:1:1) improved germination and vigour of karonda seedlings.

Keywords **:** Karonda, Beejamrit, Organic seed treatment, Germination, Seedling vigour, Growing media.

Introduction

Karonda (*Carissa carandas* L.) is an important underutilized fruit crop belonging to the family Apocynaceae. It is widely distributed in tropical and subtropical regions of India and is commonly cultivated for its nutritional and medicinal importance. The fruits are rich in iron and vitamin C and are utilized for preparation of pickles, jelly, jam, chutney and beverages. Karonda is mainly propagated through seeds; however, poor and uneven germination along with slow seedling growth are major problems in nursery production (Saroj and Kumar, 2023).

The seeds of karonda are recalcitrant in nature and lose viability rapidly because of high moisture content and hard seed coat. Pre-sowing seed treatments are therefore important to improve germination percentage, reduce germination period and enhance seedling vigour. Organic seed treatments such as cow urine and Beejamrit contain naturally occurring growth-promoting substances and beneficial microorganisms which improve germination and seedling establishment (Bhandari *et al.*, 2014).

Growing media also play an important role in seed germination and subsequent growth of seedlings. An ideal growing medium should provide proper aeration, drainage, moisture retention and nutrient availability for healthy seedling development. Organic components like vermicompost and cocopeat improve physical and chemical properties of media and support better root growth and nutrient uptake.

Several workers have reported beneficial effects of organic seed treatments and growing media on

germination and seedling growth in fruit crops. Pal *et al*. (2019) observed higher germination and vigour in karonda with cow urine treatment. Sharma *et al*. (2021) reported improved germination in papaya under integrated growing media combinations. Singh (2021) found that soil + sand + vermicompost + cocopeat medium significantly enhanced germination and survival in acid lime seedlings.

Keeping these facts in view, the present investigation was undertaken to study the effect of organic seed treatment and growing media on germination and seedling vigour of karonda.

Materials and Methods

The present experiment was conducted during the year 2024-25 at the Fruit Research Station, Imalia, Department of Horticulture, College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh. The experimental site is situated at 23.10°N latitude and 79.58°E longitude with an altitude of 412.08 m above mean sea level. The experiment was laid out in Asymmetrical Factorial Completely Randomized Design with three replications comprising twelve treatment combinations. The organic seed treatments included:

S1 : Water

S2 : Beejamrit

S3 : Cow urine

The growing media combinations included:

G1 : Soil + Sand (1:1)

G2 : Soil + Sand + Vermicompost (1:1:1)

G3 : Soil + Sand + Cocopeat (1:1:1)

G4 : Soil + Sand + Vermicompost + Cocopeat (1:1:1:1)

Healthy and uniform karonda seeds were selected and subjected to different organic seed treatments before sowing. The treated seeds were sown in polybags containing different growing media combinations. Standard nursery practices were followed during the course of investigation. Beejamrit was prepared using fresh cow dung, cow urine, lime and soil collected from the bund of an undisturbed field following the standard procedure described by Devakumar *et al*. (2014). Fresh cow urine (100%) was used as the cow urine treatment. Karonda seeds were soaked separately in Beejamrit and fresh cow urine for 24 hours before sowing, whereas seeds soaked in normal water served as the control. The treated seeds were sown in perforated polyethylene bags (20 × 15 cm) filled with the respective growing media combinations. The experimental data were statistically analysed by analysis of variance (ANOVA) for an Asymmetrical Factorial Completely Randomized Design.

Observations were recorded on days taken to first germination, days taken to 50 per cent germination, germination percentage, survival percentage, seedling vigour index-I and seedling vigour index-II.

Results and Discussion

Days taken to first germination

The data presented in Table 1 revealed that days taken to first germination was significantly influenced by different organic seed treatments and growing media combinations. Among seed treatments, Beejamrit soaking (S_2) recorded minimum days taken to first germination (9.08 DAS), whereas maximum days for germination (11 DAS) were observed under water treatment (S_1). The beneficial effect of Beejamrit might be due to the presence of beneficial microorganisms and growth promoting substances like Indole Acetic Acid (IAA) and Gibberellic Acid (GA), which enhanced enzymatic activity and mobilization of food reserves during germination. Similar findings were reported by Sreenivasa *et al*. (2009) and Nagaraja (2009).

Among growing media, Soil + Sand + Vermicompost + Cocopeat (G_4) recorded minimum days taken to first germination (9.11 DAS) while, maximum days taken to first germination (11.33 DAS). The improved germination under G_4 might be due to better aeration, higher water holding capacity, sufficient porosity and continuous nutrient availability provided by vermicompost and cocopeat. Similar findings were also reported by Sajana *et al*. (2018) in marking nut.

The interaction effect was also found significant. The treatment combination S_2G_4 (Beejamrit + Soil + Sand + Vermicompost + Cocopeat) recorded earliest germination (8.00 DAS). While, control recorded maximum days to first germination (12.33 DAS). Beejamrita enhances seed germination and provides antibacterial, antiviral and antifungal properties against crop diseases (Vyankatrao *et al*., 2019). Moreover, vermicompost along with cocopeat may improve soil porosity, water holding capacity, drainage, enhances the permeability and aeration in soil, thereby creating favourable conditions for germination.

Days taken to 50 percent germination

The data presented in Table 1 revealed that days taken to 50 percent germination were significantly

influenced by different organic seed treatments and growing media combinations. Among seed treatments, Beejamrit soaking (S_2) recorded minimum days taken to 50 per cent germination (11.00 DAS), whereas maximum days (12.83 DAS) were observed under water treatment (S_1). Beejamrit may be attributed the higher efficiency of beneficial microbial flora and organic metabolites such as indole-3-acetic acid (IAA) and gibberellins, which enhance enzymatic activity and mobilization of food reserves during the early phase of germination. Karuppaswamy and Perumal (2013) reported that using a Beejamrit (25%) gave the best results for seed germination.

Among growing media, Soil + Sand + Vermicompost + Cocopeat (G_4) recorded minimum days taken to 50 percent germination (10.78 DAS), while maximum days (13.11 DAS) were recorded under Soil + Sand (G_1). 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. Similar results were also obtained by (Arvind *et al*., 2015; Nagar *et al*., 2016) in papaya.

The interaction effect was also found significant. The treatment combination S_2G_4 (Beejamrit + Soil + Sand + Vermicompost + Cocopeat) recorded minimum days taken to 50 per cent germination (9.33 DAS), whereas maximum days (14.33 DAS) were observed under S_1G_1 (Water + Soil + Sand). Improved germination could be attributed to the presence of abundant macro and micronutrients in Beejamrita is a rich source of macro and micronutrients. Vermicompost being rich in organic matter, enhances nutrient availability and phosphorous uptake, which, supports early germination.

Germination percentage

The data represented in Table 1 revealed that germination percentage was significantly influenced by different seed treatments. Among seed treatments, Beejamrit (S_2) recorded maximum germination percentage (92.50%), whereas minimum germination percentage (83.33%) was observed under water (S_1). The higher germination under Beejamrit treatment may be due to the presence of beneficial microorganisms and growth promoting substances which enhanced seed metabolism and enzymatic activity during germination. Similar findings were also reported by Shakuntala *et al*. (2012).

Among growing media, Soil + Sand + Vermicompost + Cocopeat (G_4) recorded maximum germination percentage (93.33%), while minimum germination percentage (84.44%) was observed under Soil + Sand (G_1). The improved germination in G_4 may be due to better aeration, moisture retention and nutrient availability provided by vermicompost and cocopeat. Similar results were also reported by Nagar *et al*. (2016) in papaya.

The interaction effect was also found significant. The treatment combination S_2G_4 (Beejamrit + Soil + Sand + Vermicompost + Cocopeat) recorded maximum germination percentage (96.67%), whereas minimum germination percentage (73.33%) was observed under S_1G_1 (Water + Soil + Sand). The combined effect of Beejamrit and growing media comprises of Soil + Sand + Vermicompost + Cocopeat might have created favourable conditions for better germination and seedling establishment. These findings are in agreement with Fernando *et al*. (2022).

Survival percentage at 180 DAS

The data presented in Table 1 revealed that survival percentage of karonda seedlings was significantly influenced by different seed treatments and growing media combinations. Among seed treatments, Beejamrit (S_2) recorded maximum survival percentage (89.44%), while minimum survival percentage (79.59%) was observed under water treatment (S_1).The superiority of Beejamrit may be due to its beneficial microbial population, bioactive compounds, and antimicrobial metabolites derived from cow dung and cow urine, which enhance nutrient uptake, improve physiological vigour, and protect seedlings from soil- and seed-borne pathogens. Similar findings were reported by Desai *et al*. (2017) in papaya and Patel *et al*. (2017) in mango.

Among growing media, Soil + Sand + Vermicompost + Cocopeat (G_4) recorded maximum survival percentage (88.58%), whereas minimum survival percentage (79.76%) was observed in Soil + Sand (G_1). The physical and biological properties of vermicompost and cocopeat positively influence root development, thereby contributing to higher survival percentage and reduced mortality. Similar results were also reported by Hota *et al*. (2018) in jamun.

The interaction effect was also found significant. The treatment combination S_2G_4 (Beejamrit + Soil + Sand + Vermicompost + Cocopeat) recorded maximum survival percentage (96.67%), while minimum survival percentage (72.62%) was observed under S_1G_1 (Water + Soil + Sand). The combined effect of Beejamrit and enriched growing media might have promoted better root development and seedling establishment.

Beneficial microorganisms and bioactive compounds present in Beejamrit which improved seedling vigour and establishment. Additionally, Vermicompost, being rich in humic substances and plant growth regulators, further stimulated root proliferation and seedling establishment, leading to higher survival (Arancon *et al.,* 2004). Similar beneficial effects of vermicompost- and cocopeat-based media on seedling survival were also reported by, Prasanna *et al.* (2014) in mango.

Table 1: Effect of organic seed treatment and growing media on germination parameters of karonda seedlings

Treatment	Days taken to 1st germination	Days taken to 50% germination	Germination percentage (%)	Survival % at 180 DAS
Soaking treatment				
S1 : Water	11.00	12.83	83.33	79.59
S2 : Beejamrit	9.08	11.00	92.50	89.44
S3 : Cow urine	10.17	11.92	87.50	84.61
SEm (±)	0.17	0.22	1.52	0.94
CD (5%)	0.51	0.64	4.44	2.74
Growing media				
G1 : Soil + Sand	11.33	13.11	84.44	79.76
G2 : Soil + Sand + Vermicompost	10.22	12.00	85.56	85.84
G3 : Soil + Sand + Cocopeat	9.67	11.78	87.78	84.01
G4 : Soil + Sand + Vermicompost + Cocopeat	9.11	10.78	93.33	88.58
SEm (±)	0.20	0.25	1.76	1.08
CD (5%)	0.58	0.74	5.13	3.16
Interaction				
S1G1 : Water + Soil + Sand	12.33	14.33	73.33	72.62
S1G2 : Water + Soil + Sand + Vermicompost	11.67	13.33	83.33	84.09
S1G3 : Water + Soil + Sand + Cocopeat	10.33	12.33	86.67	81.85
S1G4 : Water + Soil + Sand + Vermicompost + Cocopeat	9.67	11.33	90.00	79.81
S2G1 : Beejamrit + Soil + Sand	10.67	12.67	90.00	85.19
S2G2 : Beejamrit + Soil + Sand + Vermicompost	9.33	11.33	93.33	87.50
S2G3 : Beejamrit + Soil + Sand + Cocopeat	8.33	10.67	90.00	88.43
S2G4 : Beejamrit + Soil + Sand + Vermicompost + Cocopeat	8.00	9.33	96.67	96.67
S3G1 : Cow urine + Soil + Sand	11.00	12.33	90.00	81.48
S3G2 : Cow urine + Soil + Sand + Vermicompost	9.67	11.33	80.00	85.93
S3G3 : Cow urine + Soil + Sand + Cocopeat	10.33	12.33	86.67	81.76
S3G4 : Cow urine + Soil + Sand + Vermicompost + Cocopeat	9.67	11.67	93.33	89.26
SEm (±)	0.35	0.44	3.04	1.88
CD (5%)	1.01	1.29	8.88	5.47

Seedling vigour Index-I and II

The data presented in Table 2 showed significant differences among different seed treatments with respect to seedling vigour index-I and II. Among seed treatments, Beejamrit (S_2) recorded maximum seedling vigour index-I (2411.85) and seedling vigour index-II (60.53), whereas the minimum seedling vigour index-I (2064.51) and seedling vigour index-II (48.51) was observed in treatment S_1 (Water). Beejamrita facilitated better nutrient mobilization and supplied plant growth-promoting substances along with essential micronutrients required for crop growth. Similar findings were reported by Naikwade (2019) and Devakumar *et al*. (2014).

Among growing media, Soil + Sand + Vermicompost + Cocopeat (G_4) recorded maximum seedling vigour index-I (2553.34) and seedling vigour index-II (69.20). The minimum seedling vigour index-I (2012.53) and seedling vigour index-II (44.68) were obtained in G_1 (Soil+ Sand). It may be attributed to the fact that soil, vermicompost and cocopeat enhanced soil texture, porosity, water holding capacity, and the

activity of beneficial soil microflora and fauna, thereby maintaining optimum soil temperature and improving the overall soil health and nutrient status of the medium. These results are in agreement with the findings of Ramteke *et al*. (2015) in papaya.

The interaction effect was also found significant. The treatment combination S_2G_4 (Beejamrit + Soil + Sand + Vermicompost + Cocopeat) recorded maximum seedling vigour index-I (2801.07) and seedling vigour index-II (76.70), whereas minimum values for seedling vigour index-I (1734.80) and seedling vigour index-II (36.20) were observed under S_1G_1 (Water + Soil + Sand). Beejamrit may be attributed to the presence of beneficial microorganisms capable of nitrogen fixation, phosphorus solubilization, hormone production (IAA and GA), and pathogen suppression, which enhance nutrient availability and protect seedlings from soil- and seed-borne diseases (Devakumar *et al.*, 2014). Similar beneficial effects of Beejamrit on vigour index were also reported by Naikwade (2019). Also, the addition of vermicompost and cocopeat in the growing media improved texture, porosity, water-holding capacity, and microbial activity at the early stages.

Table 2: Effect of organic seed treatment and growing media on seedling vigour of karonda seedlings

Treatment	Seedling vigour index-I	Seedling vigour index-II
Soaking treatment		
S1 : Water	2064.51	48.51
S2 : Beejamrit	2411.85	60.53
S3 : Cow urine	2235.03	54.59
SEm (±)	35.34	0.90
CD (5%)	103.16	2.64
Growing media		
G1 : Soil + Sand	2012.53	44.68
G2 : Soil + Sand + Vermicompost	2201.07	53.44
G3 : Soil + Sand + Cocopeat	2181.57	50.86
G4 : Soil + Sand + Vermicompost + Cocopeat	2553.34	69.20
SEm (±)	40.81	1.04
CD (5%)	119.12	3.05
Interaction		
S1G1 : Water + Soil + Sand	1734.80	36.20
S1G2 : Water + Soil + Sand + Vermicompost	2055.73	48.90
S1G3 : Water + Soil + Sand + Cocopeat	2127.70	47.10
S1G4 : Water + Soil + Sand + Vermicompost + Cocopeat	2339.80	61.83
S2G1 : Beejamrit + Soil + Sand	2164.20	49.80
S2G2 : Beejamrit + Soil + Sand + Vermicompost	2439.73	61.30
S2G3 : Beejamrit + Soil + Sand + Cocopeat	2242.40	54.33
S2G4 : Beejamrit + Soil + Sand + Vermicompost + Cocopeat	2801.07	76.70
S3G1 : Cow urine + Soil + Sand	2138.60	48.03
S3G2 : Cow urine + Soil + Sand + Vermicompost	2107.73	50.13
S3G3 : Cow urine + Soil + Sand + Cocopeat	2174.60	51.13
S3G4 : Cow urine + Soil + Sand + Vermicompost + Cocopeat	2519.17	69.07
SEm (±)	70.69	1.81
CD (5%)	206.33	5.28

Conclusion

The present investigation clearly indicated that organic seed treatments and growing media significantly influenced germination and seedling vigour of karonda seedlings. Among the different treatment combinations, seed treatment with beejamrit and growing media consist of Soil + Sand + Vermicompost + Cocopeat (1:1:1:1) recorded superior performance with respect to first germination, 50% germination, germination percentage, survival percentage, seedling vigour Index-I and seedling vigour index- II. Therefore, the integrated use of Beejamrit along with Soil + Sand + Vermicompost + Cocopeat growing media may be recommended for

raising healthy and vigorous karonda seedlings under nursery conditions.

References

Arancon, N.Q., Edwards, C.A., Atiyeh, R. and Metzger, J.D. (2004). Effects of vermicomposts produced from food waste on the growth and yields of greenhouse peppers. *Bioresource Technology*, **93**(2), 139-144.

Arvind K, Ritesh KM and Upadhyay NV. 2015. Effect of different growing media and containers on germination and establishment of seedlings of papaya (*Carica papaya* L.) cv. Madhubindu. *Trends in Biosciences*, **8**(1), 227-235.

Bhandari, M.M., Banjare, C. and Patel, D. (2014). Effect of organic formulations on seed germination and seedling growth in horticultural crops. *International Journal of Agricultural Sciences*, **10**(2), 567-570.

Desai, P., Patel, R. and Singh, V. (2017). Effect of cow urine seed treatment on seedling growth and survival in papaya. *International Journal of Chemical Studies*, **5**(6), 1456-1459.

Devakumar, N., Rao, G.G.E. and Shubha, S. (2014). Evaluation of locally available media for the growth and development of microbial population in Jeevamrutha and Beejamrutha. *Proceedings of National Seminar on Organic Farming and Sustainable Agriculture*.

Fernando, K. M. C., and Ekanayake, E. M. U. I. (2022). Seed germination and early seedling growth of different vegetable species treated by organic liquid preparations of Dasagavya and Beejamrita. Journal of Dry Zone Agriculture, **8**(1), 1–20.

Hota, D., Behera, S. and Mishra, N. (2018). Effect of growing media on seed germination and seedling growth of jamun (*Syzygium cumini* Skeels). *Journal of Pharmacognosy and Phytochemistry*, **7**(5), 1842-1845.

Karuppaswamy CD and Perumal M. 2013. Analysis of biochemical parameters of Amaranthus tristis during seed germination using $CaCl_2$, Bijamrita and Cyanospray. *Global Journal of Science Frontier Research*, **13**(2), 11–20.

Nagar, P.K., Sharma, R. and Yadav, R. (2016). Effect of growing media on seed germination and seedling growth of papaya. *International Journal of Tropical Agriculture*, **34**(4), 1059-1063.

Nagaraja, M.S. (2009). Effect of Beejamrit on seed germination and seedling growth in chilli. M.Sc. Thesis, University of Agricultural Sciences, Bangalore.

Naikwade PV. 2019. Effect of Beejamrit and other organic liquid treatments on seed germination and seedling growth of legume crops. *Online International Interdisciplinary Research Journal*, **9**(3), 59–68.

Naikwade, P.V. (2019). Effect of Beejamrit on seed germination and seedling growth in legume crops. *International Journal of Agricultural Sciences*, **11**(5), 7856-7860.

Pal, S., Kumar, R. and Singh, A. (2019). Combined effect of cow urine and PGPR on germination and seedling growth of karonda (*Carissa carandas* L.). *International Journal of Current Microbiology and Applied Sciences*, **8**(9), 1501-1509.

Patel, M., Sharma, R. and Singh, V. (2017). Effect of cow urine seed treatment on seedling growth and survival in mango. *International Journal of Agricultural Sciences*, **9**(3), 4120-4123.

Prasanna, K., Reddy, M.L.N. and Kumar, P. (2014). Influence of growing media on seed germination and seedling growth of mango. *The Asian Journal of Horticulture*, **9**(1), 18-22.

Ramteke V, Paithankar DH, Kamatyanatti M, Baghel MM, Chauhan J, and Kurrey V. 2015. "Seed germination and seedling growth of papaya as influenced by GA_3 and propagation media." *International Journal of Farm Sciences*, **5**(3), 74-81.

Sajana, B., Reddy, Y.N. and Rao, V.K. (2018). Effect of growing media on germination and seedling growth of marking nut. *International Journal of Current Microbiology and Applied Sciences*, **7**(7), 3108-3113.

Saroj, P.L. and Kumar, S. (2023). Production technology of karonda (*Carissa carandas* L.) under Indian conditions. *Indian Horticulture*, **68**(2), 25-29.

Shakuntala, N.M., Vasudevan, S.N., Patil, S.B. and Doddagoudar, S.R. (2012). Effect of seed treatment with organics on germination and seedling vigour. *Karnataka Journal of Agricultural Sciences*, **25**(3), 349-352.

Sharma, R., Patel, M. and Verma, S. (2021). Influence of cow urine and growing media on germination and seedling growth of papaya. *Biological Forum – An International Journal*, **13**(3), 98-103.

Singh, D. (2021). Effect of growing media on germination and seedling growth of acid lime under protected conditions. *Journal of Pharmacognosy and Phytochemistry*, **10**(1), 1450-1454.

Sreenivasa, M.N., Nagaraj, M., Bhat, S.N. and Beeralingappa (2009). Beneficial traits of microorganisms isolated from Beejamrutha and Jeevamrutha. *Karnataka Journal of Agricultural Sciences*, **22**(3), 570-572.

Vyankatrao, N.P. (2019). Effect of Bijamrita and other organic liquid treatments on seed germination and seedling growth of legume crops. *Online International Interdisciplinary Research Journal*, **9**(3), 59-68.