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Influence of organic seed treatment on germination of karonda (*Carissa carandas*) seeds

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Abstract
The present research was carried out at Fruit Research Station, Imalia, Department of Horticulture, College of Agriculture, J.N.K.V.V., Jabalpur (M.P.). The experiment was conducted adopting Factorial Randomized Block Design with three replications and sixteen treatment combinations. It was performed to identify the influence organic seed treatment *i.e.* seed soaking duration (24 hours and 48 hours), growing media (with and without *Pseudomonas*) and concentration of cow urine (0, 25%, 50% and 100%) and their combinations on germination of Karonda seeds. The results revealed that treatment T6 with seed soaking duration of 24 hours in 25% cow urine followed by sowing in growing media incorporated with *Pseudomonas* @ 6 ml kg^{-1} soil was found superior with respect to various growth parameters such as over the other treatment combinations.

Keywords: Cow urine, *Pseudomonas*, Karonda seeds, germination

Introduction
Karonda is endemic to India and 30 species of the genus Carissa were reported by Singh *et al*. (1967) [16]. It grows in tropical and subtropical regions across India. Carissa carandas plant is found in the plains, hills and forests of the Deccan Peninsula and the west coast regions, Punjab, Kashmir, Uttar Pradesh, Gujarat, West Bengal and Mount Abu (Rajasthan). Karondais a fruit of arid regions and grows well in hot regions. It is as of now developed on a restricted premise in Rajasthan, Gujarat, Bihar and Uttar Pradesh. It is additionally developed in other nations. Bangladesh, South Africa, USA, Denmark, Ghana, Israel, Pakistan, Nepal and Afghanistan. It is additionally found in a few swamp rainforest ecoregions of Sri Lanka.

Karonda natural product is wealthy in iron (Dry weight 3.91Â°) and contains bounty of vitamin C. Hence, it is valuable within the treatment of diabetes and has antiscurvy properties. The vitamin A substance of the natural product is 1619 IU/ 100 g eatable parcel and 87% to 90% mash, 13% to 14% add up to solvent solids and 4% to 6% acid. It can be made on a trade scale as the natural product of the trade economy within the changing world commerce demonstrate.

Seed proliferation is one of the plant proliferation strategies in nature and is additionally one of the foremost successful and broadly utilized seedling engendering strategies. Sowing is the physical starting of seedling propagation. Physical and chemical changes that happen amid natural product maturing cause the natural product to age and the seeds to scatter. One of the foremost discernible changes is the drying of tissues. In a few species, this causes the natural product to burst and the seeds to come out. Seeds in most species dry out some time recently aging and scattering when dampness substance drops to 30% or less. Once collected, the seeds are assist dried, ordinarily around 4-6% dried for storage. Planting cannot be done at the level of dryness, which is the fundamental premise for keeping up quality and controlling germination. For a few species, seeds must be dried to no less than 30 to 50%, something else they may lose their capacity to sprout (Chin 1981) [5]. Plants can be classified as hard-headed or customary based on their hereditary capacity to endure capacity. Most solid seeds cannot withstand less than 25% dampness, and a few assortments are moreover delicate to cold temperatures.

Karonda is as a rule engendered by seeds, and modern seeds are sown in Admirable and September to extend seedlings.

Soil environment is one of the most important elements of the environment and plays an important role in the growth and early development of seedlings. Optimizing plant growth by finding the right soil is one of the most important things in nursery care to grow good seedlings. Under good conditions, growers not only get fast and consistent results, but also healthy crops with good transportation without controlling the growth of the plants. Therefore, the growing medium needs to retain moisture, provide nutrients, and provide support for the seedlings. Some nutrients are needed, especially phosphorus and calcium. pH should be neutral. Mixed soils such as panel soil, sand and peat can be used. However, they are being added to the market and are widely used by plant manufacturers. Small seeds should be medium-sized, firmer than large seeds.

Bovine urine contains press, urea, uric acid, estrogen and progesterone, which influence the inhibitory reaction of seed germination, shoot development and seedling reasonability (Dilrukshi, 2009) [6].

Rhizosphere organisms that support plant growth are soil organisms that live around and on the rhizosphere. They stimulate the growth of plants by producing nutrients in the soil, provide greater plant growth, protect plants from plant diseases by controlling or inhibiting their growth, improve the processing of soil samples and sequester toxic heavy metal species, and provide biological removal of soil pollution by degrading exogenous compounds such as pesticides (Ahemad 2012; Hayat *et al*. 2010; Rajkumar *et al*. 2010; Braud *et al*. 2009) [1, 13, 4].

Material & Methods

The present investigation was conducted at Fruit Research Station, Imalia, JNKVV, Jabalpur, Madhya Pradesh. Jabalpur is located in the "Kaymore Plateau and Satpura Hills" agro-climatic zone in Madhya Pradesh, at 23.9 °N latitude, 79.58 °E longitude and 411.78 meters above sea level. The Tropic of Cancer passes through the middle of the region.

Climate and weather condition

Jabalpur district has a semiarid and subtropical climate; Spring a nd summer are hot and dry, and winters are cold, with maximum and minimum temperature usually above 45 °C and below 5 °C in May-June and December, respectively. Relative humidity varies between 70% and 80%. About 1,375 mm is the average annual rainfall, distributed mostly from midJune to the first wee k of October under the influence of the western monsoon, with o ccasional rain in winter.

Treatment Combination

There were sixteen treatment combinations, they are depicted in Table 1.

Table 1: Total treatment combination

Treatments	Treatment Combinations	Composition
T_1	$D_1G_1C_1$	24 hrs. + tap water (Control)
T_2	$D_1G_1C_2$	24 hrs + 25 percent cow urine
T_3	$D_1G_1C_3$	24 hrs + 50 percent cow urine
T_4	$D_1G_1C_4$	24 hrs + 100 percent cow urine
T_5	$D_1G_2C_1$	24 hrs + 6 ml per kg + tap water
T_6	$D_1G_2C_2$	24 hrs + 6 ml per kg + 25 percent cow urine
T_7	$D_1G_2C_3$	24 hrs + 6 ml per kg + 50 percent cow urine
T_8	$D_1G_2C_4$	24 hrs + 6 ml per kg + 100 percent cow urine
T_9	$D_2G_1C_1$	48 hrs + tap water
T_{10}	$D_2G_1C_2$	48 hrs + 25 percent cow urine
T_{11}	$D_2G_1C_3$	48 hrs + 50 percent cow urine
T_{12}	$D_2G_1C_4$	48 hrs + 100 percent cow urine
T_{13}	$D_2G_2C_1$	48 hrs + 6ml per kg + tap water
T_{14}	$D_2G_2C_2$	48 hrs + 6 ml per kg + 25 percent cow urine
T_{15}	$D_2G_2C_3$	48 hrs + 6 ml per kg + 50 percent cow urine
T_{16}	$D_2G_2C_4$	48 hrs + 6 ml per kg + 100 percent cow urine

Preparation of seed soaking media

Use a graduated cylinder to measure 25 ml and 50 ml of fresh cow urine and pour into 100 ml beakers respectively. Prepare 25% and 50% cow urine solutions by adding distilled water to make up the volume. To obtain 100% cow urine, place 100 ml of fresh cow urine in a 100 ml beaker.

Seed treatment

Fresh Karonda seeds were placed in cow urine solution at differe nt intervals for 24 and 48 hours and then planted under the green house in plastic bags.

Soil treatment

The solution of *Pseudomonas* was measured using a graduated cylinder and applied to the soil at 6 ml per kg.

Filling of polybags

Take a 200 gauge plastic bag 15 cm long and 10 cm in diameter. Bags are packaged according to treatment, i.e. with or without *P seudomonas*.

Seed sowing

Treated Karonda seeds were sown in 15 X 10 cm polyethylene b ags filled with and without *Pseudomonas*-treated soil. Sow the seed in a plastic bag to a depth of 2-2.5 cm. Each procedure was repeated three times using 10 polyethylene bags. Water daily or manually as needed.

Seed Vigor Parameters

Days taken to first germination

The number of days required by each treatment to initiate germination after sowing were observed and recorded.

Days taken to 50% germination

The number of days required by each treatment for 50 percent germination after sowing were observed and recorded.

Germination at 60 days after sowing (%)
After 60 days of sowing the germination in each treatment was recorded. The germination percentage was expressed as follows:

$$\text{Germination \%} = \frac{\text{Total seeds germinated}}{\text{Total seeds sown}}$$

Speed of Germination
As the germination began, the number of germinated seeds were counted daily till maximum germination was obtained. The speed of germination was evaluated by the following formula:

$$\text{Speed of Germination} = \frac{\text{No. of seedlings removed daily}}{\text{Days after sowing}}$$

Coefficient of Germination
The germination in each treatment was recorded after sowing. Number of seedlings were counted and expressed the coefficient of germination.

$$\text{Coefficient of Germination} = \frac{\text{Total no. of seeds germinated}}{\text{Total no. of days required}}$$

Table 2: Influence of organic seed treatments on germination of Karonda seeds

Treatment combination	Days taken to first germination	Days taken for 50 percent germination	Germination percentage at 60 DAS	Speed of germination	Coefficient of germination
$D_1G_1C_1$	10.00	24.66	62.86	5.00	3.90
$D_1G_1C_2$	7.66	17.33	71.63	6.93	4.76
$D_1G_1C_3$	8.00	17.66	71.20	6.86	4.70
$D_1G_1C_4$	8.33	18.33	70.46	6.13	4.50
$D_1G_2C_1$	9.00	22.33	65.83	5.63	4.40
$D_1G_2C_2$	4.00	13.66	84.66	10.30	6.90
$D_1G_2C_3$	5.33	14.33	83.76	9.90	6.10
$D_1G_2C_4$	5.66	14.66	73.03	9.40	5.90
$D_2G_1C_1$	9.67	24.33	63.33	5.20	4.00
$D_2G_1C_2$	8.00	19.33	69.73	6.10	4.50
$D_2G_1C_3$	9.00	20.33	69.10	6.00	4.50
$D_2G_1C_4$	8.67	21.33	68.66	5.90	4.50
$D_2G_2C_1$	9.00	23.33	64.53	5.60	4.20
$D_2G_2C_2$	6.67	15.33	74.60	8.00	5.30
$D_2G_2C_3$	7.33	15.66	73.66	7.70	5.00
$D_2G_2C_4$	7.00	16.33	72.80	7.06	4.80
SEm±	0.21	0.28	0.34	0.03	0.02
CD at 5 percent Level	0.62	0.83	1.00	0.10	0.07

Result & Discussion
Write conclusion in 100-120 following

1. **Days taken to first germination:** The data presented in Table 2 reveals that minimum duration taken for first germination is 4 days in treatment T6. Findings from Sankaranarayana *et al*. (1994) [15] reported that coconut seeds in 10% of cow urine were fasted for 24 hours. Bashan *et al*. (2008) [3] reported that inoculation of Phragmites australis seeds with *Pseudomonas* aspleniosa improved germination and protected the plant from growth inhibition. Monica Hoft *et al*. (1991) [9] reported that the germination and dry matter of maize seeds inoculated with *Pseudomonas* aeruginosa 7NSK 2 and *Pseudomonas fluorescens* ANP 15 were significantly increased compared to uninoculated plants.
2. **Days taken to 50% germination:** Minimum days taken for 50% germination was recorded in treatment T6 i.e. 13.66 days, Results Parameswari *et al*. (2001) [11] found that 10% cow urine for 24 hours could induce dormancy of tamarind and promote the growth and development of seeds. Gullami *et al*. (2009) [7] reported that plant growth-promoting rhizosphere bacteria improved maize seed germination and seedling viability.
3. **Germination at 60 days after sowing (%):** Maximum percentage of germination at 60 days after sowing was obtained in treatment T_6 with 84.66%. Rao (1975) [14] reported that the addition of apple seeds to 10% cow urine for 24 hours improved the bacteria and the height of the seeds, supporting this finding. The number of leaves, number of roots, root length, weight and weight of each seedling were compared with the control group. Klopper *et al*. (1980) [10] Two *Pseudomonas fluorescens* strains isolated from potato epidermis and celery roots increased the growth of potato plants by 500% compared to the control in greenhouse experiments.
4. **Speed of Germination:** The highest speed of germination (10.30) was recorded in treatment T6. The results were consistent with those of Vijayalakshmi *et al*. (1998) [17] prepared a mixture consisting of 50 g of rhizome powder, 2.5 liters of water and 1 liter of cow urine boiled in a pot. This amount is sufficient to process 1 kg of seeds. It has been reported that sweet fruit treated with this drug grows and develops rapidly, and its resistance to pests increases. Pawar and Pawar (1998) [12] obtained an increase in seed yield and crop nitrogen uptake in inoculating pigeon pea seeds with Pseudomanas striata before sowing and also found an increase in plant protein content and oil nitrogen content and phosphorus from management.
5. **Coefficient of Germination:** The maximum coefficient of germination was observed in treatment T_6 with the value 6.90. This finding is consistent with Ambika *et al*. powered by. (2014) [2] investigated the effect of treating seeds before planting with urine obtained from cattle, cows, sheep, goats and pig. They soaked rice seeds, maize, sorghum, cumbu and irunchucholam seeds (Local species) for 3 hours at concentrations of 5% and 10%, respectively, and applied a control group (Dry treatment). Seed quality parameters such as early germination time, germination rate, seedling length (cm) and viability index were evaluated. Among the treatments for cow urine, cow urine (5%) is the most

effective of all grains. This finding was supported by Ahmad (2013) [18], who showed that ACC deaminase-producing Rhizobium and *Pseudomonas* strains could improve the growth, flesh, and quality of soybeans in saline locations.

Conclusion

In conclusion, the experiment revealed significant insights into the germination process, highlighting treatment T6 as particularly effective across various parameters. The minimal duration for first germination, the swift progression to 50% germination, the substantial percentage of germination at 60 days after sowing, the remarkable speed of germination, and the high coefficient of germination all point towards the efficacy of this treatment. Supported by previous research on seed treatments and inoculations, especially with substances like cow urine and beneficial bacteria such as *Pseudomonas* spp., the findings underscore the potential for enhanced seedling vigor, growth, and ultimately, crop productivity. These results offer valuable implications for agricultural practices aiming to optimize germination rates and crop yield, contributing to sustainable and resilient farming systems. Further exploration and application of such treatments hold promise for addressing challenges in agricultural production and food security.

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