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Study on effect of organic pre sowing treatments on seed germination of papaya (*Carica papaya* L.) in Chhattisgarh plains

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Abstract

The research work entitled with “Study on effect of organic pre sowing treatments on seed germination of Papaya (*Carica papaya* L.) in Chhattisgarh Plains” was conducted at experimental field PFDC (Precision Farming Development Centre), IGKV, Raipur (C.G.). Germination parameters like, rate of emergence, and percentage of germination were 69.7% and 80.1% respectively, were found superior with using treatment T₁ (Seed soaking with cow urine (12%) + Azotobactor) followed by treatment T₂(Seed soaking with cow urine (12%) + PSB).

Keywords: Papaya seed, azotobactor, cow urine, PSB

Introduction

Papaya (*Carica papaya* L.) is known as a wonder fruit of the tropics. It belongs to the family caricaceae, originated in tropical America (Hofmeyr, 1938) [9]. It gives the highest production of fruits per hectare and generates income after banana as well as it is cheaper source of vitamins (vitamin A) and minerals. In India, the total papaya production was 6.06 million MT from the total area of 0.15 million ha (Anonymous, 2021a) [3] whereas in Chhattisgarh the total papaya production was 0.377 million MT from 13.98 ha of area (Anonymous, 2021b) [4]. Its cultivation is performed under a number of restrictions, leading to its cultivation in prohibited regions around the nation. Propagational issues, vulnerability to frost and water logging, fungal and viral illnesses, and variable sex-forms are well-known obstacles to papaya farming at the moment. Integrated management techniques have the best results for papaya plants. It produces a varied plant population because it is a crop that is heavily cross pollinated and typically propagated by seeds. Numerous internal and external elements, including temperature, oxygen, water, plant species, growth-stimulating hormones, radiation influence, and others, have an impact on the variability in plants.

Papaya is a fruit that is extremely delicious, healthy, and valued for its ability to aid in digestion. 100g of papaya contains (89.6%) moisture, (9.5%) carbohydrate, (4.0%) calorific value, (0.5%) proteins, (0.1%) fat, (0.4%) minerals, (0.01% calcium, 0.01% phosphorus, 0.4mg iron), 2020 IU Vitamin A (Carotene), 40 IU Vitamin B (Thiamine) 250 IU Vitamin B2 (riboflavin), 85mg Vitamin C (ascorbic acid), and IU nicotinic acid.

The germination, development, and functionality of the roots system are directly impacted by the use of appropriate growing media or substrates when sowing seeds. A good growing medium gives the plant enough anchoring or support, acts as a buffer for nutrients and water, allows oxygen to reach the roots, and allows gas exchange between the roots and the atmosphere outside the root substrate (Abad *et al.*, 2002) [1].

Cow urine is important component. Of the mixture called as “Panchgavya”. Cow urine is considered as special and contains several minerals. Cow urine contains about 1.21 per cent N₂, 0.01per cent P₂O₅ and 1.35 per cent K₂O (Subramaniam, 2005) [24] and also contains trace elements (Munoz, 1988) [16], nutrients and plant growth regulators (Joseph and Nair, 1989) [10].

As a growing media cocopeat is becoming .very popular material. Excellent pore space is found in cocopeat which is 25-30 per cent and fine structure is required for proper growth and development of seedlings. Moreover, cocopeat is a wealthy nutrients. Source and can be used for mixing with other growing materials. An excellent soil conditioner, vermi-compost is a peat-like substance with great porosity, microbial activity, aeration, water holding capacity, and drainage (Edwards *et al.*, 2010) [6].

There are so many literature available, which shows that vermi-compost contain growth regulators materials, such as humic acid (Muscolo *et al.*, 1999) [17] for propagation, it is used as a growing media but it can be mixed with soil in appropriate amount. Both the nitrogen-fixing bacteria *Azotobacter* spp. and the phosphorus-solubilizing bacteria *Pseudomonas* spp. are known to produce a variety of growth hormones that frequently promote root and shoot growth. In fruit crops like papaya (Sukhade *et al.*, 1995) [25] and banana (Gogoi *et al.*, 2004) [7].

Materials and Methodology

The experiment was performed in PFDC (Dept. of Fruit Science) College of Agriculture, IGKV, Raipur (C.G) situated at 21° 14' 02" N latitude and 81° 43' 11" E longitudes. All the field and lab test were performed in the university as well.

The poly bags experiment was laid out in Completely Randomized Design with three replications. The experiment comprised of nine treatments consisting of organic substance cow urine, panchgavaya, amrutpani and cow dung along with PSB and Azotobactor. The cow urine, panchgavaya and amrutpani was used 12 % of concentration for dipping of papaya seeds for 12 hrs. Growing media (Soil: Cocopeat: Vermi-compost) was used in the ratio of (1:1:1) for all the treatments.

The treatments include T₀: Untreated control (Distilled water), T₁: Seed soaking with cow urine (12%) + Azotobactor, T₂: Seed soaking with cow urine (12%) + PSB, T₃: Seed soaking with panchgavaya (12%) + Azotobactor, T₄: Seed soaking with panchgavaya (12%) + PSB, T₅: Seed soaking with amrutpani (12%) + Azotobactor, T₆: Seed soaking with amrutpani (12%) + PSB, T₇: Seed soaking with cow dung + Azotobactor, T₈: Seed soaking with cow dung + PSB. The experiment was laid out in a Completely Randomized Design with three replications. Each of nine treatments consisted of 20 polybag sand one seedling in each polybag. The observations pertaining to germination parameters were recorded for all the seed sown *i.e.* days required for the germination, rate of emergence, germination percentage. The data generated from these investigations were appropriately computed, tabulated and analyzed as described by Panse and Sukhatme, (1985) [20] using MS-Excel and OPSTAT in

Completely Randomized Design (CRD).

Result and Discussion

The result obtained from the present investigation as well as relevant discussion have been summarized under following given in table 1 the effect of cow urine, panchgavaya, amrutpani and cow dung on germination parameters:

On days taken to germination

Observation was recorded in tabular form for the number of days taken by papaya seeds for germination influenced by different organic substance, cow urine, panchgavaya, amrutpani and cow dung with PSB and azotobactor. Table 1 showed the days taken to germinate papaya seeds. It was observed germination days varied from 7.5 to 13.9 days. The minimum days required for germination was 7.5 days recorded in T₂ (Seed soaking with cow urine (12%) + PSB) and maximum days where recorded when seeds are influenced with T₀ (Untreated control) of 13.9 days. These results are consistent with the findings of Kumar *et al.* (2008) [13].

On rate of emergence

The data on rate of emergence of papaya seeds influenced by different organic substances, cow urine, panchgavaya, amrutpani and cow dung with PSB and azotobactor. It was observed that rate of emergence varied from 57.8% to 69.7%. Minimum rate of emergence was observed in T₀ (Untreated control) of 57.8 % whereas the maximum rate of emergence of 69.7 % was recorded in T₁ (Seed soaking with cow urine (12%) + Azotobactor). Similar findings are also reported with the findings of Shinde *et al.* (2008) [22].

On germination percentage

Influenced of different organic growth substances, cow urine, panchgavaya, amrutpani and cow dung with PSB and azotobactor on germination percentage of papaya seeds where recorded in Table 4.3. Germination percentage varied from 61.2 % to 80.1 %. Maximum germination percentage of 80.1 % recorded in T₂ (Seed soaking with cow urine (12%) + PSB) and minimum 61.2 % was recorded in T₀ (Untreated control) and T₈ (Seed soaking with cow dung + PSB), respectively. These results were in conformity with the results of Shinde and Malshre (2015) [23] and Pal *et al.* (2020) [19].

Table: Effect of cow urine, panchgavaya, amrutpani and cow dung on germination parameters

Notations	Treatments	Days taken to germination	Rate of emergence	Germination percentage
T ₀	Untreated control (Distilled water)	13.9	57.8	61.2
T ₁	Seed soaking with cow urine(12%) + Azotobactor	7.5	69.7	80.1
T ₂	Seed soaking with cow urine (12%) + PSB	7.9	65.5	72.2
T ₃	Seed soaking with panchgavaya (12%) + Azotobactor	8.4	61.8	68.1
T ₄	Seed soaking with panchgavaya (12%) + PSB	9	64.3	71.5
T ₅	Seed soaking with amrutpani (12%) + Azotobactor	9.7	62.8	69.0
T ₆	Seed soaking with amrutpani (12%) + PSB	9.3	63.1	70.9
T ₇	Seed soaking with cow dung + Azotobactor	10.3	60.7	64.8
T ₈	Seed soaking with cow dung + PSB	12.3	59.7	65
	SEm	0.34	3.07	2.41
	C.D	1.03	9.21	7.29

Conclusion

The results obtained from the experiment, accomplished that the minimum days required for germination was 7.5 days recorded in T₁ (Seed soaking with cow urine (12%) + Azotobactor) whereas the maximum rate of emergence of

69.7 % was recorded in T₁(Seed soaking with cow urine(12%) + Azotobactor). Maximum germination percentage of 80.1 % and minimum 61.23% was observed in T₁ (Seed soaking with cow urine (12%) + Azotobactor).

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