

## Response of Jackfruit Seeds to Different Bioformulations on Germination and Seedling Growth

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### ABSTRACT

An experiment was conducted to know the effect of bioformulations on germination and growth of jackfruit seedling. Maximum germination percentage and vigour index was observed in seeds treated with panchagavya 3% (94.75 %) and (3.86) respectively. Significantly least number of days taken for initiation of germination was recorded in seeds treated with panchagavya 3% (4.58 days). 50% germination (9.33 days) and complete germination (20.00 days) were observed in seeds treated with panchagavya 3% which was significantly lesser than other treatments. Growth parameters such as seedling height (43.88 cm at 120 DAS), seedling diameter (6.46 mm at 120 DAS), number of leaves (10.67 at 120 DAS) and leaf area (91.10 cm<sup>2</sup> at 120 DAS) of

jackfruit seedlings were recorded maximum where the seeds were pretreated with panchagavya 3%.

**Keywords:** Bioformulations, Germination, Jackfruit, Seedling growth.

### INTRODUCTION

The jackfruit (*Artocarpus heterophyllus* Lam.) is a tree species of the family Moraceae, which is native to parts of south and of Southeast Asia, the East Indies and other warm areas of both hemispheres. Tender jackfruit appears in the market in spring and continues until summer as popular vegetables. When used as vegetable, it is peeled, sliced and boiled and then seasoned or mixed with other food. Ripe fruit has high nutritive value. A jackfruit is an important source of pectin and contains about 1.9-2.2% protein on fresh fruit basis. Fructose, glucose and sucrose are the major sugars in all parts of the fruit, except in the outer spiny rind, which is devoid of glucose.

Horticulture has faced vast changes, challenges and difficulties in past years. Indiscriminate use of fertilizers, pesticides and herbicides has polluted our environment affecting the health of soil and soil micro-flora. To revive the soil health and microorganisms which support to achieve sustainable production

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system, the soil environment need to be made congenial for living of the useful microbial population responsible for continuous availability of nutrients from natural sources. Experiencing the adverse effects of synthetic input dependent agriculture, the concept of organic / sustainable / natural farming is gaining momentum. This shift in the scenario necessitates raising the seedlings or seedlings organically (from the nursery itself) to ensure higher graft-take, better growth, particularly more stem girth development which is of paramount importance for early grafting operation. Early grafting would be able to meet ever increasing demand for elite planting materials. Therefore, chemical free traditional farming technology (organic, biodynamics, panchagavya, amritipani, jeevamruth, beejamruth) are gaining a new momentum not only in India, but also over the world. These systems offer a means to address self-reliance, rural upliftment and conservation of natural resources. Basanagowda (2005) found that mango seeds treated with panchagavya was recorded maximum for germination, seedling height, stem girth and seedling biomass at 180 days after sowing as compared to control. Basanagowda (2005) in mango and Durgannavar (2005) in papaya found the beneficial effect of panchagavya on mango and papaya. Moreover works on the use of different bioformulations in an underutilized fruit crop particularly jackfruit for enhancing germination and seedling growth is very scanty. Hence an attempt was made to study the effect of bioformulations on the germination and seedling growth of jackfruit.

## MATERIALS AND METHODS

The experiment was conducted in the year 2015 at Research Farm, Department of Horticulture, North-Eastern Hill University, Tura Campus, Meghalaya. Seven treatments namely T<sub>1</sub>-Control (water soaking); T<sub>2</sub>- Beejamruth 3% (24 hours); T<sub>3</sub>-Jeevamruth 3 % (24 hours); T<sub>4</sub>-Panchagavya 3% (24 hours); T<sub>5</sub>-Amritipani 3% (24 hours); T<sub>6</sub>-Plant extract (basil leaf extract 5%); T<sub>7</sub>-Vermiwash 1:3 (24 hours) were allocated in Completely Randomized Design, replicated thrice. The seeds of jackfruit were soaked in water (control) and other bioformulations for 24 hours and sown in polythene bag (20 X 15 cm) filled with potting media which were placed in shade net. The observations on days

required for initiation of germination, days required for 50% germination and complete germination, germination percentage and germination vigour index were recorded daily. Morphological parameters like seedling height, seedling diameter, number of leaves and leaf area were recorded on monthly basis.

## RESULTS AND DISCUSSION

### Effects of bioformulations on germination of jackfruit seed

The bioformulations had beneficial effect on germination of jackfruit seed. All the treatments promoted significantly earlier germination when compared with control. The seeds pre-treated number of day with panchagavya 3 % recorded significantly lesser number of days for initiation of germination (4.58) compare with control (water soaking-24 hours) (9.66 days) (Table 1). The study of data in (Table 1) revealed that among different pre-treated treatments, panchagavya recorded significantly minimum number of days (9.33) for 50% germination, which was statistically at par with vermiwash (17.00). Panchagavya treated seeds took significantly minimum number

**Table 1.** Effect of bioformulations on days taken for germination and vigour index of jackfruit seeds.

Treatments	Number of days taken for		Germination		
	Initiation of germination	50% germination	Completion of germination	Percent	Vigour index
T <sub>1</sub> (Control)	9.66	19.00	33.66	86.50	2.46
T <sub>2</sub> (Beejamruth 3%)	8.00	15.00	24.00	88.66	3.13
T <sub>3</sub> (Jeevamruth 3%)	7.16	13.00	21.33	92.83	3.40
T <sub>4</sub> (Panchagavya 3%)	4.58	9.33	20.00	94.75	3.86
T <sub>5</sub> (Amritipani 3%)	8.16	16.00	22.66	90.31	3.05
T <sub>6</sub> (Basil Leaf Extract 5%)	7.00	14.00	21.66	92.08	3.58
T <sub>7</sub> (Vermiwash 1 : 3)	8.75	17.00	24.66	87.33	2.93
SE (m)	0.35	0.73	0.77	0.61	0.08
CD (5%)	1.08	2.25	2.37	1.89	0.27
CV(%)	8.06	8.62	5.67	1.18	4.77

of days for completion of germination (20.00 days), which was at par with jeevamruth (21.33 days) and basil leaf extract (21.66 days). While significantly maximum number of days for completion of germination was recorded in control (33.66 days). It was also observed that seeds treated with panchagavya 3% recorded significantly highest germination percentage (94.75 %) and germination index (3.86) compared to control (86.50 %) and (2.46) respectively (Table 1).

The superiority of this treatment with respect to minimum days required for germination and maximum germination percentage could be due to the presence of beneficial microbial biomass and nutrient status in panchagavya which is a blend of five products, obtained from cow, which work on with cosmic energy and with a production of certain plant growth stimulants, viz., hormones and enzymes with enormous increase in beneficial micro-organisms (Natarajan 2002). The significant enhancement of germination was also noticed in different pre-soaking treatments by Padma and Reddy (1998) in mango, Reddy and Khan (2001) in Khirni and Yallesh et al. (2008) and Basanagowda (2005) in mango, Singh et al. (2011) in cashew.

### Effects of bioformulations on growth of jackfruit seedling

The bioformulations had beneficial effect on jackfruit seedlings. These effects are evident from increased vegetative parameters. The seeds pretreated

with panchagavya 3% recorded significantly maximum seedling height (29.58 cm, 38.51 cm, 41.66 cm and 43.88 cm) at 30, 60, 90 and 120 DAS respectively (Table 2). While significantly lowest values were observed in control i.e. water soaking (10.21 cm, 15.45 cm, 19.00 cm and 21.50 cm) at 30, 60, 90 and 120 DAS respectively. The maximum seedling diameter was observed in panchagavya 3% pretreated seeds (5.13 mm, 5.75 mm, 6.30 mm and 6.46 mm) at 30, 60, 90 and 120 DAS respectively, while beejamruth 3% pretreated seeds was found at par with panchagavya 3% treated seeds (4.93 mm and 5.41 mm) at 30 and 60 DAS respectively, while the lowest value was recorded in control (Table 2). The data on number of leaves produced by seedlings were influenced by different treatments with bioformulations and were found to be significant at all stages of growth. Significantly maximum number of leaves was recorded in the seeds pretreated with panchagavya 3% (4.83, 8.50, 9.50 and 10.67) at 30, 60, 90 and 120 DAS respectively (Table 2). The data on leaf area depicted that the seeds pretreated with panchagavya 3% had significantly highest leaf area (68.99 cm<sup>2</sup>, 85.65 cm<sup>2</sup>, 89.23 cm<sup>2</sup> and 91.10 cm<sup>2</sup>) at 30, 60, 90 and 120 DAS respectively, while lowest values were observed in control (Table 2).

The higher seedling growth parameters observed in the present investigation can be attributed to the effect of organics which are known to release growth substances and growth regulators to enhance the growth stimulating hormone. The increase in seed-

**Table 2.** Response of different bioformulations on seedling growth of jackfruit. DAS : Days After Sowing.

Treatments	Seedling height (cm)				Seedling diameter (mm)				Number of leaves				Leaf area (cm)			
	30 DAS	60 DAS	90 DAS	120 DAS	30 DAS	60 DAS	90 DAS	120 DAS	30 DAS	60 DAS	90 DAS	120 DAS	30 DAS	60 DAS	90 DAS	120 DAS
Control	10.21	15.45	19.00	21.50	2.21	2.80	3.16	3.30	4.50	5.50	6.33	7.00	34.74	44.20	49.64	51.15
Beejamruth 3%	20.70	26.75	29.21	31.53	4.93	5.41	5.55	5.69	3.66	5.00	6.66	7.33	59.33	66.00	67.62	68.25
Jeevamruth 3%	13.13	18.25	23.33	25.05	4.20	4.75	4.96	5.06	2.00	3.33	7.00	8.33	38.20	48.58	52.12	53.35
Panchagavya 3%	29.58	38.51	41.66	43.88	5.13	5.75	6.30	6.46	4.63	8.50	9.50	10.67	68.99	85.65	89.23	91.10
Amritpani 3%	29.53	35.21	36.88	39.17	3.98	4.83	5.13	5.20	4.33	7.00	8.00	9.00	53.75	64.91	70.52	72.00
Basil leaf extract 5%	11.13	17.46	19.16	21.17	2.21	2.88	4.00	4.20	3.91	5.66	6.67	7.67	37.51	46.73	50.82	52.12
Vermiwash 1 : 3	11.58	19.00	21.76	23.72	3.05	3.58	4.88	5.04	3.50	6.16	7.16	8.33	39.95	56.46	62.18	63.15
SE (m)	1.02	1.08	0.97	0.88	0.14	0.16	0.17	0.16	0.45	0.37	0.44	0.42	2.82	3.16	2.91	2.75
CD (5%)	3.13	3.33	2.99	2.60	0.45	0.51	0.54	0.48	1.40	1.15	1.35	1.23	8.65	9.69	8.93	8.15
CV (%)	9.85	7.72	6.21	5.20	6.97	6.81	6.31	5.70	20.73	11.13	10.41	8.68	10.30	9.30	8.00	7.25

ling height and girth by application of panchagavya and amritpani was also reported by earlier workers, Basanagowda (2005), Yellesh et al. (2008) in mango, Durgannavar (2005) in papaya, which is in conformity with the present findings.

## CONCLUSION

From the above experiment, it can be concluded that different bioformulations and plant extract has superior effect on the germination and seedling growth of jackfruit as compared to control. Among the treatments, panchagavya 3% had shown significantly positive results on germination and other growth parameters of the seedlings like lesser germination days, better germination percentage, vigour index and other vegetative growth, which were followed by other treatments like beejamruth, amritpani and jeevamruth pretreated seeds.

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