Original Research Article

Effectofwashingandnon-washingofseedson growthof papayaseedling (*Carica papaya* L.) **cv.** *PusaNanha*

Abstract

A field experiment was conducted to investigate the response of washingandnon-washingofseedsongrowth of papayaseedling at the CRC Farm, ITM University, Gwalior (M.P.). The experiment was laid out in the Randomized Block Design using 4 media with or without washing of seeds with tap water comprising 12 treatments combinations (viz., controlled (soil + water), vermiwash (50%) + wood dust, vermiwash (50%) + cocopeat, vermiwash (50%) + pond soil, cow-urine (50%) + wood dust, cow-urine (50%) + cocopeat, cow-urine (50%) + pond soil, vermiwash (100%) + wood dust, vermiwash (100%) + cocopeat, vermiwash (100%) + pond soil, cow-urine (100%) + wood dust, cow-urine (100%) + cocopeat, cow-urine (100%) + pond soil which were replicated thrice. For experimental purpose, freshly ripe fruits of papaya were purchased from the papaya-growing farmer of IARI, New Delhi and seeds were sown in the poly bag (4x24 inch sized). The results indicated that the application of application of Vermiwash (100%)+pondsoil recordedmaximum heightofseedling(cm),numberofleavesperseedling,stemdiameter(cm), leaf area (158.41 cm^2), fresh weight of seedling (8.49g), dry weight of seedling (1.17 g), dryweightofshoot(0.334g),dry weight of root (0.779), root/shoot ratio (2.34) ascomparedto withoutwashing ofseedsand otherrooting media. Thus, application of Vermiwash (100%)+pondsoil was found to the best treatment among all the treatments and it gave the maximum growth attributes which will inturn improve the yield of papaya.

Keywords: *Papaya, Growth, Stem diameter,Vermiwash, Pond soil, and cow-Urine*

Introduction

The papaya is regarded as a "Wonder fruit of the tropics" and is one of the few fruit crops that yield early and reliable profits every year. Originating in tropical America, possibly in neighboring Central America and Southern Mexico, papaya cultivation dates back thousands of years. Papaya cultivation was first brought to India in the latter half of the 16th century, through Malaysia and the Philippines, and it has since become widely distributed throughout India's tropical and subtropical regions(Sangakkarapa, 1995).With an area of 1.15 lakh hectares and a production of 49.12 lakh tonnes per ha, India is the world's greatest producer

of papaya. Tamil Nadu, Andhra Pradesh, Assam, Bihar, Maharashtra, Uttar Pradesh, Gujarat, Punjab, West Bengal, Madhya Pradesh, Karnataka, and other states are among those where it is widely grown. It is largely consumed locally although it has huge potential for export.

A delicious fruit, papayas is abundant in minerals, vitamin A, ascorbic acid, and carbohydrates. After mango crops, the nutritional value of crops rank second in terms of rich vitamin A (2020IU)It also contains Vitamin B2 (250 mg/100 gm). It is used as an aid to digestion and to treat diphtheria and ulcers. It serves as a degumming agent for rayon and natural silk, a pre-shrinking agent for wool, and a clarifying agent for beer (Dayeswari*et al*., 2017). Papaya is used for the production of pharmaceuticals that cure kidney problems, tapeworms, and intestinal cancer. Papain, a milky latex derived from immature fruits, is a proteolytic enzyme that has multiple applications such as tanning leather and tenderizing meat.

The kind of growth media used affects both seed germination and seedling quality (Wong & Lee, 2000). The growing medium has a direct impact on the germination of seeds, the growth and development of seedlings, and ultimately the upkeep of the highly functioning roots system. An adequate growth medium gives the plant enough anchoring or support, acts as a reservoir for nutrients and water, diffuses oxygen to the roots, and permits gaseous exchange between the roots and the surrounding atmosphere. Media for fruit crop seedlings often consists of pond soil, sand, dirt, and organic matter. Because it is affordable and simple to obtain, pond soil is typically utilized as a basic medium. The goal of adding more sand is to increase the medium's porosity.Asmah *et al.* (2002) state that cocopeat is regarded as a desirable growth media component, with sufficient pH, electrical conductivity, and other chemical properties, while organic matter (Farm Yard Manure and Vermicompost) is added to feed seedlings with adequate nutrients. Good physical qualities, high water content, low shrinkage, low bulk density, and a moderate rate of biodegradation characterize cocopeat. Similarly, vermicompost is a combination of humus, organic matter, worm castings, live earthworms, their cocoons, and other species. Earthworms increase the concentration of huic acid, decrease the C:N ratio, and have a greater capacity for cation exchange and water-soluble carbohydrates (Thangam *et al*., 2009). Similarly, after the fiber from the coconut husk is extracted, an agricultural by-product known as cocopeat is

produced (Abharim*et al*., 2010). In the tropics, it can be utilized as a growing medium to generate a variety of crop species in manageable quantities.

Cow urine is utilized in the production of several growth promoters and biopesticides, which efficiently increase soil fertility and manage a wide range of illnesses and pests. Applying cow urine to the plants boosted their biochemical content. All the advantages of mulch, without the hefty price tag, can be achieved by covering the base of garden plants with sawdust to keep roots cooler, inhibit weed growth, and assist retain moisture. To avoid a nitrogen shortage in the soil, just remember to add a nitrogen component to your garden as well. Sawdust enhances the soil's structure. Better root development and nutrient uptake are encouraged by vermiwash. It enhances the soil's nutritional status, boosting both macro- and micronutrient levels (Singh *et al*., 2018). Compost pits can also benefit from its addition, which speeds up the breakdown process. Vermiwash is an extraction of coelomic fluid that contains enzymes that promote crop development and production. It is full of nutrients, including bacteria, fungus, auxins, cytokinins, potassium, phosphorus, and calcium. Vermiwash contributes significantly to agricultural productivity, plant growth and development, and pace of output growth by boosting soil organic matter and nutrient content, which are easily absorbed by plants. Keeping in the view of above facts, the present investigation on "Effect ofwashing and different growing media on the growth of papaya cv.PusaNanha(*Carica papaya* L.) was conducted.

Material and Methods

Experimental site and climate:

A field experiment was conducted at the Research Farm, ITM School of Agriculture, Gwalior(M.P.). The experimental site is situated at 26°10 N latitude and 78°20′ E longitude at an elevation of 211.52 m above mean sea level falling in the sub-tropical region of India. The climate of this place is bestowed with hot and dry early summers followed by hot and humid monsoon season and cold and dry winters.

Soil:

The soil of the experimental field was sandy loam in texture, with good drainage and uniform texture, slightly alkaline (pH 7.68) in reaction, low in organic carbon (4.5 g/kg) and available nitrogen (19.6 kg/ha) but medium in available phosphorus (19.01 kg/ha) and potassium (241 kg/ha) with electrical conductivity in the safer range.

Treatment details:

The experiment was laid out in the Randomized Block Design using 4 media with or without washing of seeds with tap water comprising 12 treatments combinations (viz., controlled (soil + water), vermiwash (50%) + wood dust, vermiwash (50%) + cocopeat, vermiwash (50%) + pond soil, cow-urine (50%) + wood dust, cow-urine (50%) + cocopeat, cow-urine (50%) + pond soil, vermiwash (100%) + wood dust, vermiwash (100%) + cocopeat, vermiwash (100%) + pond soil, cow-urine (100%) + wood dust, cow-urine (100%) + cocopeat, cow-urine (100%) + pond soil which were replicated thrice.

Crop management:

Freshly ripe papaya fruits were acquired from the IARI, New Delhi papaya farmer for experimental purposes, and seeds were planted in a 4-by-24-inch poly bag. The following findings were noted while the trial was underway. For a total of ninety days following the administration of treatments, observations concerning the vegetative growth characters—that is, the height of seedlings, the number of leaves per seedling, and the diameter of the stem—were made at 30-day intervals. At the conclusion of the experiment, measurements of the leaf area, chlorophyll content, fresh and dry seedling weights, and root characteristics were made. The Analysis of variance was performed to determine the effect of washing and non-washing of seeds on seed germination of papaya seedlings. using Opstat. The interpretation of treatment effects was made on the basis of critical difference at 5 % probability level.

Result and Discussion

Growth parameters

The results with respect to growth parameters (Table 1)revealed that the different treatments of washing and rooting mediaextendedsignificanteffectonheightof seedling(cm), number of leaves per seedlings and stem diameter of papaya.Themaximum height of seedlings(16.82,29.82and42.22cm), number of leaves per seedlings (8.65, 13.90, 24.53) and stem diameter of (1.73,2.64,3.35)Stemdiameter(cm) were recorded at30,60and90DAS with the application of Vermiwash(100%)+pondsoilfollowedbyVermiwash(100%)+cocopeat. While, the minimum Height of seedling (cm) (9.33, 17.33 and 25.33) at 30, 60 and90DASinT0:Controlled (soil+ water). This may be due to fact that Vermiwashpromotesbetterroot growthandnutrientabsorption.Similar results were reported

by Sharma *et al*., 2022. Itimprovesnutrient status of soil-both macro-nutrients and micro-nutrients. It can also be added tocompostpitstohastenthedegradationprocess.

Table1.Effectsofwashinganddifferentgrowingmediaonheightofseedling, no. of leaves per seedling and stem diameter of papaya cv. Pusa Nanha(*Carica papaya*L.)

Treatmentcombinations	**Heightofseedling(cm)**			**Numberofleavesperseedling**			**Stemdiameter(cm)**		
	30 DAS	**60 DAS**	**90 DAS**	**30 DAS**	**60 DAS**	**90 DAS**	**30 DAS**	**60 DAS**	**90 DAS**
Controlled (soil + water)	9.33	17.33	25.33	4.59	7.34	17.32	1.04	1.59	1.94
Vermiwash (50%) + wood dust	14.11	27.12	33.10	7.19	11.56	20.58	1.49	2.22	3.02
Vermiwash (50%) + cocopeat	14.21	26.33	33.28	7.23	11.31	20.90	1.52	2.23	3.05
Vermiwash (50%) + pond soil	14.66	27.22	34.22	7.64	11.58	21.29	1.56	2.30	3.10
Cow-urine (50%) + wood dust	11.08	19.88	25.33	5.62	9.04	16.32	1.18	1.73	2.04
Cow-urine (50%) + cocopeat	12.66	20.11	27.11	6.09	9.24	17.27	1.17	1.81	2.09
Cow-urine (50%) + pond soil	13.14	20.88	29.66	6.14	9.54	17.80	1.20	1.94	2.22
Vermiwash (100%) + wood dust	15.41	28.44	35.88	7.87	13.10	22.44	1.62	2.42	3.18
Vermiwash (100%) + cocopeat	15.68	28.22	35.55	8.10	13.34	23.12	1.68	2.52	3.22
Vermiwash (100%) + pond soil	16.82	29.82	42.22	8.65	13.90	24.53	1.73	2.64	3.35
Cow-urine (100%) + wood dust	13.97	22.66	30.22	6.25	10.12	18.32	1.25	2.02	2.44
Cow-urine (100%) + cocopeat	13.14	22.53	32.66	6.46	10.22	18.54	1.32	2.06	2.74
Cow-urine (100%) + pond soil	13.28	23.55	33.17	6.86	10.78	19.63	1.34	2.16	2.94
S.Ed (±)	0.328	0.609	1.007	0.213	0.361	0.456	0.028	0.056	0.062
C.D.at 0.5%	0.677	1.258	2.079	0.439	0.745	0.941	0.058	0.115	0.128

The data in Table 2 revealed that the interaction of washing viz., (Vermiwashand Cow-urine (50 and 100%) of seeds and different media had significant effect on leaf area, fresh and dry weight of seedlingdry weight of root and shoot and root/shoot ratioof seeds.

The maximum leaf area (158.41 cm^2), fresh weight of seedling (8.49g), dry weight of seedling (1.17 g), dryweightofshoot(0.334g),dry weight of root (0.779), root/shoot ratio (2.34) was recorded with the application of Vermiwash(100%)+pondsoilfollowedVermiwash(100%)+cocopeat, While, theminimumroot/shootratio (1.32)in T0:Controlled (soil+water).this is probably due to fact that vermiwash plays an important role in the plantgrowth and development, production growth rate and improvement in crop productionincreasing the soil organic matter and increase innutrient content which are readilyavailablefortheplants.Resultingingoodcropyield (Parasana*et al*., 22013). Further, pondsoilwhichcontainsalargeamountoforganicmatterisgenerally used asabasicmediumresults in increased potential ofthesoiltogrowvegetationinmanywayslikehavinghighwaterholdingcapacity,effectivedrainage, supplyofenormousorganicmatterandbetteraeration Similar results were reported by Sharma *et al*. (2022), Rathod*et al.* (2018), Dawer*et al*. (2019) and Kharga*et al*. (2019)and Rajawat*et al.* (2019).

Table2.Effectsofwashinganddifferentgrowingmediaonleaf area, fresh and dry weight of seedlingand root:shoot ratioof papaya cv. Pusa Nanha(*Carica papaya* L.)

Treatmentcombinations	Leafarea(cm^2)	Freshweightofseedling(g)	Dryweightofseedling(g)	Dryweightofshoot(g)	Dryweightofroot(g)	Root/shootratio
Controlled (soil + water)	121.22	5.54	0.59	0.211	0.279	1.32
Vermiwash (50%) + wood dust	136.22	7.47	0.88	0.270	0.515	1.91
Vermiwash (50%) + cocopeat	137.15	7.55	0.92	0.273	0.590	2.16
Vermiwash (50%) + pond soil	140.25	7.84	0.95	0.291	0.635	2.19
Cow-urine (50%) + wood dust	118.41	6.23	0.65	0.296	0.494	1.67
Cow-urine (50%) + cocopeat	120.55	6.57	0.69	0.302	0.424	1.41
Cow-urine (50%) + pond soil	122.63	6.91	0.73	0.307	0.435	1.42
Vermiwash (100%) + wood dust	146.22	8.14	1.04	0.312	0.719	2.31
Vermiwash (100%) + cocopeat	145.55	8.21	1.10	0.322	0.728	2.27
Vermiwash (100%) + pond soil	158.41	8.49	1.17	0.334	0.779	2.34

Cow-urine (100%) + wood dust	127.15	7.04	0.77	0.359	0.661	1.84
Cow-urine (100%) + cocopeat	131.23	7.10	0.79	0.367	0.719	1.96
Cow-urine (100%) + pond soil	128.41	7.23	0.82	0.375	0.713	1.90
S.Ed (±)	2.267	0.118	0.039	0.009	0.021	0.092
C.D.at 0.5%	4.678	0.244	0.081	0.018	0.043	0.189

Conclusion

It can be concluded that application of Vermiwash(100%)+pondsoilrecordedmaximum heightofseedling(cm),numberofleavesperseedling,stemdiameter(cm),leaf area (cm2), fresh weight of seedling (g), dry weight of seedling (g) and dry weight ofshoot (g), length of longest tap root (cm),dry weight of root and root/shoot ratioascomparedto withoutwashing ofseedsand otherrooting media. Thus, application of Vermiwash (100%)+pondsoil was found to the best treatment among all the treatments and it gave the maximum growth attributes which will inturn improve the yield of papaya.

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