

DOI No.: <http://doi.org/10.53550/EEC.2023.v29i05s.057>

Effect of different type of media and polybags on germination, survival and seedling growth of papaya (*Carica papaya* L.) cv. Pusa delicious under shed net condition

Saumya Mishra and Annjoe V. Joseph

Department of Horticulture, Naini Agriculture Institute
Sam Higginbottom University of Agriculture, Technology and Science, Prayagraj 211 007,
U.P., India

(Received 21 April, 2023; Accepted 5 June, 2023)

ABSTRACT

An experiment was carried out under net house condition at shade net, in the Department of Horticulture, Sam Higginbottom University of Technology and Science, Prayagraj. The treatment combination of perlite, vermicompost and cocopeat mixed in various percentages. Altogether, 11 treatments were applied in CRD with three replications. The results revealed that the application of treatment T₅ (Perlite + Vermicompost in black polybag) is found better with respect to early germination as well as higher germination percentage, length of seedlings and roots. Further, the treatment T₅ (Perlite + Vermicompost) has an increased effect on stem girth, number of leaves, seedlings height and survival percentage with comparatively higher root length.

Key words: Papaya, Seedlings, Pusa delicious, Growing media

Introduction

Papaya (*Carica papaya*) is a tropical fruit belonging to the family Caricaceae. It is one of the few fruit crops that produce fruits throughout the year giving early and steady returns. Papaya occupies 1.8% of total fruit crop area and 6.3 % of total fruit production in India. Introduced from Philippines through Malaysia to India in the later part of 16th century, papaya cultivation has now spread widely in tropical and subtropical regions of our country. Papaya is mainly propagated by seeds which show a wide variability in germination and seedling growth (Dayeswari *et al.*, 2017).

In India, papaya is grown widely in the states *viz.* Andhra Pradesh, Tamil Nadu, Assam, Bihar,

Maharashtra, Gujarat, Chhattisgarh, Haryana, Madhya Pradesh, etc. occupying an area approximately 146 thousand hectares with annual production of 5540 thousand metric tonnes of papaya fruits with a productivity of 5.89mt/ha (NHB 2021-22). In Uttar Pradesh, papaya is cultivated in an area around 13.14 area per hectares with the production of 111.85 thousand metric tonnes (NHB2021-22).

Materials and Methods

A field experiment entitled “Effect of different growing media and different Color poly bags on seed germination and seedling growth of papaya (*Carica papaya* L.) cv. Pusa delicious” was carried out in the Department of Horticulture, SHUATS

Prayagraj during session of November 2022 – February 2023. Different growing media showed in Table 1 viz., Soil, Perlite, cocopeat and vermi-compost were used in same proportion as a mixture for sowing seeds black polybags (4 x 6 inches), white poly bags (4 x 6 inches) were filled with mixture of growing media according to the treatments. Water-soaked seeds of papaya were dibble at about 2- 3 cm depth in each polybag. For each treatment 4 polybags were filled in every replication

Table 1. Details of different combination of media and poly bags

Notation	Treatments
T ₀	Soil in black polybag
T ₁	Cocopeat in black poly bag
T ₂	Cocopeat in white poly bag
T ₃	Vermicompost in black poly bag
T ₄	Vermicompost in white poly bag
T ₅	Perlite + Vermicompost in black poly bag
T ₆	Perlite + Vermicompost in white poly bag
T ₇	Perlite + Cocopeat in black poly bag
T ₈	Perlite + Cocopeat in white poly bag
T ₉	Cocopeat + Vermicompost in black poly bag
T ₁₀	Cocopeat + Vermicompost in white poly bag

Results and Discussion

Number of days required for initiation of germination

The experimental data showed in Table 2 that the days required to initiation of germination were found minimum days of germination in treatment number T₅ (Perlite+ Vermicompost) in black polybag 6.82 day rest of all treatments and maximum days required to initiation of germination in T₀ (soil with black polybag) 15.66. The least days required to initiation of germination in T₀ (soil with black polybag) 15.66. The least days required for initiation of germination in T₅ (perlite + Vermicompost) in black poly bag due to high porosity aeration and water holding.

capacity effected these media contained most nutrients in available forms such as nitrate, phosphorus exchangeable calcium and soluble potassium.

Effect of media and polybags on Days required for 50% germination

Days required for 50% germination in this Table 2 found minimum days of germination treatment

Table 2. Performance of different treatment combinations of different media and different color polybags on seed germination of papaya (Pusadelicious)

Treatment Notation	Treatment details	Days required to initiation of germination	Days required for 50% germination	Germination (%)	Seedling height (cm) 90	Number of leaves 90 DAS	Stem diameter (mm)	Leaf area (cm ²)	Tap root length	Vigour Index	Survival percentage
T0	Soil in black polybag	15.6	20.35	58.33	21.61	12.96	17	59.37	10.25	1261.77	45.83
T1	Cocopeat in black poly bag	13.78	18.97	64.58	26.87	15.19	18.07	72.17	11.67	1734.48	52.08
T2	Cocopeat in white poly bag	11.31	18.38	62.5	26.25	14.19	17.71	71.65	11.53	1642.69	50
T3	Vermi compost in black poly bag	11.41	15.77	70.83	28.81	15.37	19.21	80.92	12.61	2040.98	58.33
T4	Vermi compost in white poly bag	12.67	16.68	66.67	27.59	15.19	19.11	79.8	12.55	1839.71	54.17
T5	Perlite+Vermi compost (1:1) in black poly bag	6.89	9.13	91.67	31.6	17.44	19.85	85.93	14.07	2897.4	79.17
T6	Perlite+Vermi compost (1:1) in white poly bag	8.22	9.71	87.5	31.22	16.91	19.76	83.76	13.42	2731.46	72.92
T7	Perlite+Cocopeat (1:1) in black poly bag	13.43	17.65	68.75	27.64	15.06	18.85	77.46	12.1	1902.25	62.5
T8	Perlite+Cocopeat (1:1) in white poly bag	13.81	18.22	66.67	27.35	14.61	18.65	71.75	11.76	1822.13	56.25
T9	Cocopeat + Vermicompost(1:1) in black poly bag	9.32	11.69	83.33	30.18	16.64	19.69	83.18	13.13	2514.96	70.83
T10	Cocopeat +Vermicompost(1:1) in white poly bag	9.66	13.11	75	30	16.5	19.36	81.91	12.79	2249.69	52.08
	F – Test	S	S	S	S	S	S	S	S	S	S
	C.D. at 0.5%	0.652	1.05	10.267	0.84	0.999	0.372	2.323	0.363	305.57	13.311
	S.Ed. (+)	0.312	0.503	4.922	0.403	0.479	0.178	1.114	0.174	146.49	6.381
	CV	4.421	4.897	2.601	4.178	3.726	4.081	3.46	3.83	462	52.01

number T₅ (Perlite + Vermicompost) in black polybag 9.13 days rest of all treatments and maximum days required to initiation of 18.97 germination in T₀ (soil with black polybag) 20.35 moisture content these media contain perfect combination of media and favourable climate for 50% germination of seedlings.

Germination % in papaya (*Pusa delicious*)

It is evident that the germination percentage was shown Table 2 influenced by different treatment applied T₅ (perlite + vermicompost) in black polybag in which maximum germination obtain 91.67% and the minimum germination percent T₁ (cocopeat with black poly bag) germination percentage is 64.58.

This study is supported by the similar finding of Meena *et al.* (2017) and Bhagel *et al.* (2004) who reported that the application of different growing media enhance the germination percentage of papaya seeds.

Seedling Height(cm)

A perusal of data mentioned in Table 2 Maximum height of seedlings (31.60 cm) on 90 days was observed in T₅ (Perlite + Vermicompost in Black Polybag) and minimum (21.61 cm) in T₀ control.

This study is supported by similar findings of Meena *et al.* (2017) who reported that the application of different growing media enhance the maximum growth of seedling of the papaya *viz* seedling length, seedling girth etc.

Number of leaves

It is evident showed in Table 2 that the no. of leaves per seedling were influenced by different treatment. Among the treatment applied T₅ (perlite+vermicompost) in black polybag in which no of leaves per seedling obtain 17.44 (90 DAS) and the minimum number of leaf per seedling observed in T₀ (soil with black polybag), 12.96 (90 DAS). This study is supported by the similar findings of Govind *et al.* (1993) who reported that the application of different growing media enhance the maximum growth of the seedling of the papaya.

Stem diameter

As per the experimental data showed in Table 2 the Maximum stem diameter on 90 days was observed (19.85 mm) T₅ (Perlite + Vermicompost in Black Polybag) followed by minimum (17.00 mm) in T₀

control.

This study is supported by similar findings of Meena *et al.* (2017) who reported that the application of different growing media enhance the maximum growth of seedling of the *viz* seedling length, seedling girth etc.

Leaf area

It is evident from Table 2 that the leaf area was influenced by different treatment applied T₅ (perlite+vermicompost) in black polybag in which maximum leaf area obtain and the minimum leaf area observed in T₀ (soil with black polybag) with 59.37.

This study is supported by the similar finding of Meena *et al.* (2017) and Baghel *et al.* (2004) who reported that the application of different growing media enhance the maximum leaf area of papaya.

Root length

The experimental data showed in Table 2 that root length (cm) of papaya seed was significantly influenced by growing media Maximum root length on 90 days was observed (85.93 cm²) T₅ (Perlite + Vermicompost in Black Polybag) followed by minimum (59.37 cm²) in T₀ control.

This study is supported by the similar finding of Abharim *et al.* (2010) and Costa *et al.* (2010) who also reported similar the root lengths of papaya.

Seedling vigour index

It is evident that the Table 2 that seedling vigour index was influenced by treatments among the treatment applied T₅ (perlite + vermicompost in black polybag) which was maximum seedling vigor index obtained 2897.40 and the minimum seedling vigor index observed in T₀ (soil with black polybag) with 1261.77

This study is supported by similar findings of Meena *et al.* (2017) who also reported the application of different growing media enhance the maximum growth of seedling of the papaya *viz* seedling length, seedling girth, seed vigour index etc.

Survival percentage

It is absorbed from Table 2 Maximum survival percentage was observed (79.17%) T₅ (Perlite + Vermicompost in Black Polybag) followed by minimum (45.83%) in T₀ control.

This study is supported by similar by Anjanawe *et al.* (2012) who found the best papaya transplants were produced with organic manures.

Conclusion

From the above experimental findings it is concluded that the treatment T₅ (Perlite + Vermicompost in Black Polybag) gave positive results on shed net conditions among all treatment used and T₀ (soil) recorded lowest for all the parameters recorded. The different growing media of papaya crop with (Perlite + Vermicompost in Black Polybag) is recorded highest for all the parameters recorded.

References

- Abirami, K., Rema, J., Mathew, P. A., Srinivasan, V. and Hamza, S. 2010. Effect of different propagation media on seed germination, seedling growth and vigour of nutmeg (*Myristica fragrans* Houtt.).
- Anjanawe, 2012. Effect of plant growth regulators and growth media on seed germination and growth vigour of papaya. *Annals of Plant and Soil Research*. 15(1): 31-34 .
- Baghel, B.S., Yadav, R., Tiwari, R. and Gupta, N. 2004. Response of phalsa (*Grewia subinaequalis* DC) cuttings to biofertilizers and rooting media. *Indian Journal of Horticulture*. 61(1): 89-91.
- Costa, 2010. Papaya seedling formation in different substrates and protected environments *Revista Ceresia*. 57(5) : 679-685.
- Dayeswari, D., Rayaprolu, S. and Jone, A. 2017. Effect of potting media on seed germination, seedling growth and vigour in TNAU Papaya Co. 8 (*Carica papaya* L.). *International Journal of Pure Application Biosci*. 5(3): 505-512.
- Govind, S. and Chandra, R. 1993. Standardization of suitable pottin media for raising seedling of khasi mandarin. *Indian J. of Horticultutre*. 50: 224-227.
- Meena, A.K., Garhwal, O.P., Mahawar, A.K. and Singh, S.P. 2017. Effect of different growing media on seedling growth parameters and economics of papaya (*Carica papaya* L) cv. Pusa delicious. *Int J Curr Microbiol App Sci*. 6(6): 2964-2972.
- NHB, National horticulture data base 2021-2022.
- Krishnanayak, L., Kotiyal, A. and Koubouris, G. 2023. Optimized seed germination and adaptation of plantlets to a new environment of papaya cv. 'Red Baby' using organic media and plant growth regulators. *Vegetos*. 1-8.