



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2018; 6(3): 2538-2541

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Received: 14-03-2018

Accepted: 17-04-2018

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## Germination response and interaction effect under polybag and protray conditions of Papaya (*Carica papaya* L.) cv. Pusa Nanha

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**Abstract**

This present investigation was carried out at the Horticulture Farm, Rajasthan College of Agriculture (MPUAT) Udaipur during the year 2014. In this experiment, papaya seeds were sown in to different growing media in polybags (C<sub>1</sub>) and protrays (C<sub>2</sub>) containers and study their response and interaction effect on germination of papaya seeds. Among the different containers, C<sub>2</sub> (Protrays) took significantly minimum days (8.80) for initiation of germination as compared to C<sub>1</sub> (polybags). Minimum days required for 50 per cent germination (10.81) of papaya seeds was observed in C<sub>2</sub> (Protrays) as compared to polythene bags (11.67) and significantly the maximum germination percentage (90.15%) of papaya seeds was observed in C<sub>2</sub> (Protrays) while, the minimum germination (86.96%) of papaya seeds was observed in C<sub>1</sub> (Polybag).

The interaction between media and container (M × C) was found significant combination with M<sub>7</sub>C<sub>2</sub> i.e. Soil + FYM + Sand + Cocopeat + Vermicompost (1:1:1:1:1) + Protrays took minimum days (8.37) for initiation of germination. While, the combination M<sub>1</sub>C<sub>1</sub> i.e. Soil + FYM (1:1) + Polybags took maximum days (9.91) for initiation of germination.

**Keywords:** polybags and protrays, growing media and papaya seeds

**Introduction**

Papaya (*Carica papaya* L.) is an important fruit crop of tropical and sub-tropical countries of the world. It is well documented that the growing containers directly affects the germination of papaya seeds. The quality seedling established well in field and increased the productivity of papaya orchard. Papaya is an important fruit crop which is propagated by seed only. Containers used for growing seedlings have passed through a number of evolutionary shapes and designs over time. Polybags and protrays are available in different volumes. However, little information is available on size and what type of container should be used to obtain optimum growth of the seedlings.

**Materials and Methods**

This experiment was carried out on Germination response and interaction effect under polybag and protray conditions of Papaya (*Carica Papaya* L.) cv. Pusa Nanha." during the year 2014-15 at Horticulture farm, Rajasthan College of Agriculture, M. P. University of Agriculture & Technology, Udaipur during the year 2014. Different growing containers like black polythene bags and protrays were filled with different mixture of growing media according to the treatments. Two seeds of the papaya were dibbled at about 2 to 3 cm depth in each container. For each treatment 25 containers were filled in every replication.

**1. Containers (C): 02 type**

Polybags -C<sub>1</sub>

Protrays- C<sub>2</sub>

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Sr. No	Treatment Symbols	Treatment Combinations	
		Level of Growing Media (M)	Type of Container (C)
1.	M <sub>1</sub> C <sub>1</sub>	Soil + FYM (1:1)	Polybags
2.	M <sub>1</sub> C <sub>2</sub>	Soil + FYM (1:1)	Protrays
3.	M <sub>2</sub> C <sub>1</sub>	Soil + FYM + Sand (1:1:1)	Polybags
4.	M <sub>2</sub> C <sub>2</sub>	Soil + FYM + Sand (1:1:1)	Protrays
5.	M <sub>3</sub> C <sub>1</sub>	Soil + FYM + Cocopeat (1:1:1)	Polybags
6.	M <sub>3</sub> C <sub>2</sub>	Soil + FYM + Cocopeat (1:1:1)	Protrays
7.	M <sub>4</sub> C <sub>1</sub>	Soil + FYM + Vermicompost (1:1:1)	Polybags
8.	M <sub>4</sub> C <sub>2</sub>	Soil + FYM + Vermicompost (1:1:1)	Protrays
9.	M <sub>5</sub> C <sub>1</sub>	Soil + FYM + Sand + Cocopeat (1:1:1:1)	Polybags
10.	M <sub>5</sub> C <sub>2</sub>	Soil + FYM + Sand + Cocopeat (1:1:1:1)	Protrays
11.	M <sub>6</sub> C <sub>1</sub>	Soil + FYM + Sand + Vermicompost (1:1:1:1)	Polybags
12.	M <sub>6</sub> C <sub>2</sub>	Soil + FYM + Sand + Vermicompost (1:1:1:1)	Protrays
13.	M <sub>7</sub> C <sub>1</sub>	Soil + FYM + Sand + Cocopeat + Vermicompost (1:1:1:1:1)	Polybags
14.	M <sub>7</sub> C <sub>2</sub>	Soil + FYM + Sand + Cocopeat + Vermicompost (1:1:1:1:1)	Protrays

The experiment was laid out in factorial completely randomized design. For this experiment, seeds of papaya variety "Pusa Nanha" were sown in different media mixture filled in the polybags and pro-trays (9 × 7 cm sized) containers. These containers are watered regularly with the help of watering rose can to keep medium moist and observations were recorded as per study schedule. The days taken for first seed germination were calculated from the date of sowing up to germination of the first seedling. The days taken for 50 per cent germination were calculated from date of sowing up to 50 per cent germination of seedlings. The germination percentage at 30 DAS was calculated by counting number of papaya seed germinated out of total seeds dibbled into the containers and average was calculated.

## Results and Discussion

### Germination Attributes

**Days required for first seed germination:** Among the different containers, C<sub>2</sub> (Protrays) took significantly minimum days (8.80) for initiation of germination as compared to C<sub>1</sub> (polybags). And media M<sub>7</sub> i.e. Soil + FYM + Sand + Cocopeat + Vermicompost (1:1:1:1:1) took significantly the minimum days (8.6) for first germination as compared to rest of the growing media except media M<sub>2</sub>, while, M<sub>1</sub> took maximum days (9.42) to first germination.

Among the container portrays is better for germination parameters. It might be due to better aeration in protrays because these have small pores on their surface and this favours better air exchange to increase germination parameters (Table 1) and (fig 4.1). The similar results were obtained by Saroj *et al.*, 2000 in aonla. Polybags (C<sub>1</sub>) took significantly maximum days (9.21) for initiation of germination.

**Table 1:** Germination response under polybag and protray conditions of Papaya seeds

Treatments	Germination attributes		
	Initiation (days)	50 % Germination (days)	Germination % (30 DAS)
<b>A. Media (M)</b>			
M <sub>1</sub>	9.42	11.77	82.98
M <sub>2</sub>	8.69	11.32	90.36
M <sub>3</sub>	8.90	11.17	91.63
M <sub>4</sub>	9.36	11.50	87.32
M <sub>5</sub>	8.89	11.50	89.97
M <sub>6</sub>	9.17	11.01	86.63
M <sub>7</sub>	8.60	10.42	91.00
SEm±	0.057	0.166	1.704
CD at 5%	0.166	0.482	4.935
<b>B. Containers (C)</b>			
C <sub>1</sub>	9.21	11.67	86.96
C <sub>2</sub>	8.80	10.81	90.15
SEm±	0.038	0.109	1.115
CD at 5%	0.109	0.315	3.231
Interaction (M X C)	Sig.	NS	Sig.

**Table 2:** Interaction effect between media and containers on germination attributes of papaya seeds

Media Containers	Germination initiation (Days)		Germination % (30 DAS)	
	C <sub>1</sub>	C <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>
M <sub>1</sub>	9.91	8.93	80.77	85.20
M <sub>2</sub>	8.92	8.47	86.77	93.96
M <sub>3</sub>	9.00	8.80	89.97	93.30
M <sub>4</sub>	9.58	9.13	93.30	81.33
M <sub>5</sub>	8.92	8.87	86.63	93.30
M <sub>6</sub>	9.33	9.00	83.30	89.97
M <sub>7</sub>	8.83	8.37	88.00	94.00
M <sub>1</sub>	9.91	8.93	80.77	85.20
SEm±	0.081			2.409
CD at 5%	0.2354			6.9791

**Interaction effect (M x C)**

The interaction between media and container (M x C) was found significant. Growing media combination with M<sub>7</sub>C<sub>2</sub> i.e. Soil + FYM + Sand + Cocopeat + Vermicompost (1:1:1:1:1) + Protrays took minimum days (8.37) for initiation of germination. While, the combination M<sub>1</sub>C<sub>1</sub> i.e. Soil + FYM (1:1) + Polybags took maximum days (9.91) for initiation of germination. Graphically depicted in Fig. 4.1. This media might have containing high organic manures, which possess organic acid with high available moisture and some acids may have helped to reduce the germination period under protrays condition.

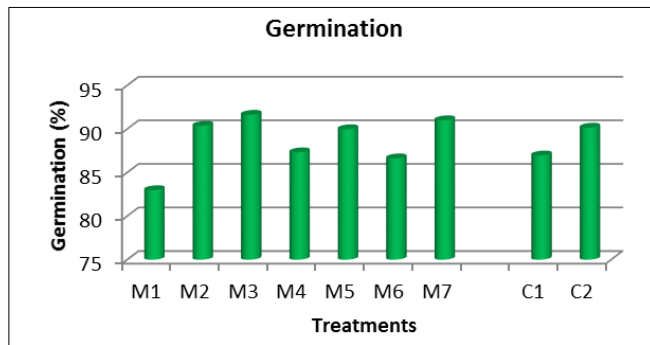
**Days required for 50 per cent seed germination:** Significantly the minimum days required for 50 per cent germination (10.81) of papaya seeds was observed in C<sub>2</sub> (Protrays) as compared to polythene bags (11.67). It might have provided more uniform and congenial conditions for seed germination.

**Interaction effect:** The interaction between media and container, (M x C) was found non-significant.

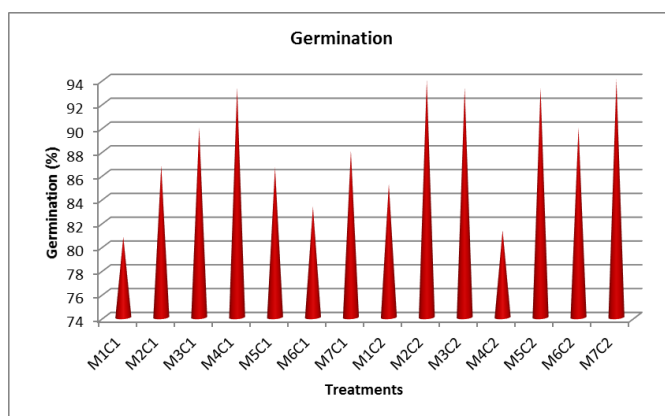
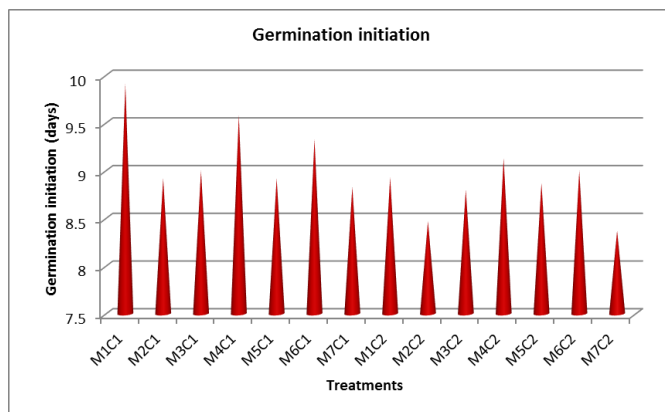
**Germination percentage at 30 DAS:** Among different containers, significantly the maximum germination percentage (90.15%) of papaya seeds was observed in C<sub>2</sub> (Protrays) while, the minimum germination (86.96%) of papaya seeds was observed in C<sub>1</sub> (Polybag). It might be due to better aeration in protrays because these have small pores on their surface and this favours better air exchange to increase germination. Similar results were obtained by Vaghamsi and Delvadia (2006) in mango seedlings.

**Interaction Effect**

The interaction between media and container, (M x C) was found significant. Growing media combination with M<sub>7</sub>C<sub>2</sub> i.e. Soil + FYM + Sand + Cocopeat + Vermicompost (1:1:1:1:1) + Protrays show maximum germination per cent (94.00%). While, minimum germination per cent (80.77%) was recorded in the combination M<sub>1</sub>C<sub>1</sub> i.e. Soil + FYM (1:1) + Protrays. Protrays. It might be due to protrays provide more uniform and congenial conditions for seed germination.



**Fig 1:** Germination response under polybag C<sub>1</sub> and protray C<sub>2</sub> conditions of Papaya seeds seeds



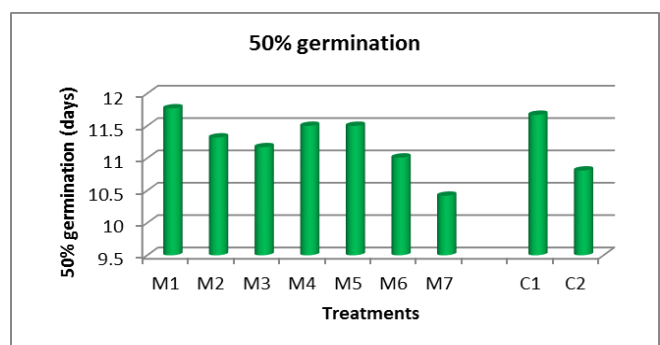
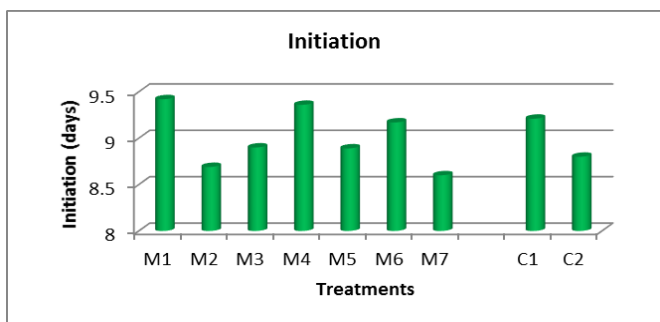
**Fig 2:** Interaction effect between different growing media and containers on germination attributes of papaya seeds

**Conclusion**

On the basis of the results it may be concluded that among the different Containers i.e. protrays and polybags, protrays gave better germination parameters then polybags The interaction between media and container (M x C) was found significant for initiation of germination seeds and germination percentage

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