

Studies on the Effect of Media and Growth Regulating Substances on Seed Germination of Papaya

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Abstract: An experiment was conducted to study the influence of media and growth regulating substances on germination of papaya seeds (*Carica papaya* L.) cv. Coorg Honey Dew. The treatments comprised of 4 media (M_1 -Soil + FYM @ 2:1, M_2 -Cocopit, M_3 -Cocopit + FYM @ 4:1, M_4 -Soil + FYM + Cocopit @ 2:1:1) and 5 growth regulating treatments (G_0 -Soaking in water for 12 hrs, G_1 -Soaking in 100 ppm GA_3 for 12 hrs, G_2 -Soaking in 250 ppm GA_3 for 12 hrs, G_3 -Soaking in 500 ppm GA_3 for 12 hrs, G_4 -Soaking in 0.5 M KNO_3 for 12 hrs) and laid out in a factorial CRD with three replications. Amongst the media the media M_4 has given consistent results in giving the best values for the germination related observations. Similarly the soaking of seeds with 500 ppm GA_3 for 12 hours prior to sowing (G_3) has also given the best results for the characters studied. Among the interactions the M_4G_3 has excelled all the other media and growth regulating substances combinations.

INTRODUCTION

Papaya (*Carica papaya* Linn.) is an excellent as well as one of the most preferred fruit crop for its nutritive value as well as medicinal properties, all over the world. It was introduced to India and become so popular and adaptive that today it grows in almost all places of the country. The demand for this crop has increased manifolds during the past decades.

Papaya is generally propagated through seeds. The germination may take 3-5 weeks. It can be exploited to 2-3 weeks. Papaya seed viability and germination is a problem. Seed germination is affected by many factors, which include type of substrate used, environmental factors such as oxygen, water, temperature and for some plant species, light [2]. The germination of seeds of *C. papaya* is frequently reported to be slow, erratic and is incomplete [1], [4]. For example, in one study freshly harvested seeds gave only 6% germination [3]. With increase in the storage period the viability decreases. The seed is enclosed within a gelatinous sarcotesta (aril, or outer seed coat which is formed from the outer integument). Whilst this sarcotesta

can prevent germination [4], [6] dormancy is also observed in seeds from which the sarcotesta has been removed [4], [6]. Removal of seed covering structures: arils then pre soak arils then pre wash improves germination [4], [5], [6]. Hence this study was taken up to find out whether soaking in growth regulating substances and growing under different media have impact on germination and growth of papaya seedlings.

MATERIAL METHOD

The experiment was conducted during 2013 inside poly-house at the horticulture research station of OUAT, Bhubaneswar, Odisha. It is situated at 20°15' N latitude and 85°5' E longitude and at an altitude of 25.9 meter above the mean sea level. The experiment comprised of 4 media (M_1 -Soil + FYM @ 2:1, M_2 -Cocopit, M_3 -Cocopit + FYM @ 4:1, M_4 -Soil + FYM + Cocopit @ 2:1:1) and 5 growth regulating treatments (G_0 - Soaking in water for 12 hrs, G_1 -Soaking in 100 ppm GA_3 for 12 hrs, G_2 -Soaking in 250 ppm GA_3 for 12 hrs, G_3 -Soaking in 500 ppm GA_3 for 12 hrs, G_4 -Soaking in 0.5 M KNO_3 for

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12 hrs). It was laid out in a factorial CRD with three replications. The seeds of papaya variety Coorg Honey Dew for the experiment were procured from IIHR, Bangalore. The media was placed on a seed pan and 100 treated seeds were sown in each seed pan and seedling observations were taken after 20 days.

RESULTS AND DISCUSSIONS

Table 1
Effect of media and growth regulating substances on days to first seedling emergence

Seed soaking	M1	M2	M3	M4	Mean
G0	6.66	6.00	5.00	5.00	5.66
G1	5.00	4.67	4.33	4.00	4.50
G2	4.66	4.33	4.00	3.33	4.08
G3	4.33	3.00	3.00	3.00	3.33
G4	4.66	3.66	3.33	3.33	3.75
Mean	5.06	4.33	3.93	3.73	
		M	G	Interaction	
SEm		0.111	0.124	0.247	

Table 2
Effect of media and growth regulating substances on Number of seeds germinated on first emergence

Seed soaking	M1	M2	M3	M4	Mean
G0	4.00	10.66	15.00	15.33	11.25
G1	6.66	13.33	16.33	17.33	13.41
G2	7.33	15.66	17.33	18.66	14.75
G3	11.33	19.66	20.66	22.66	18.58
G4	8.33	17.33	18.33	17.66	15.41
Mean	7.53	15.33	17.53	18.33	
		M	G	Interaction	
SEm		0.458	0.512	1.025	
CD 5%		1.31	1.46	2.92	

Table 3
Effect of media and growth regulating substances on days to 50% germination

Seed soaking	M1	M2	M3	M4	Mean
G0	10.66	7.66	7.33	7.33	8.25
G1	7.33	7.00	6.66	6.33	6.83
G2	6.66	6.00	5.66	5.66	6.00
G3	5.66	4.66	4.66	4.33	4.83
G4	6.33	5.66	5.33	5.33	5.66
Mean	7.33	6.20	5.93	5.80	
		M	G	Interaction	
SEm		0.153	0.171	0.342	
CD 5%		0.43	0.48	0.97	

From the table it was revealed that the media having two parts soil + one part FYM + one part cocopit (M₄) gave the highest value for the parameters of germination of seeds studied *i.e.* Days to first seedling emergence (3.73), number of seeds germinated on the first seedling emergence day

Table 4
Effect of media and growth regulating substances on number of seeds germinated at 50% seed germination day

Seed soaking	M1	M2	M3	M4	Mean
G0	53.00	54.33	56.33	56.66	55.08
G1	57.33	63.66	65.66	67.66	63.58
G2	58.33	65.66	67.66	66.33	64.50
G3	58.67	67.66	74.33	69.66	67.58
G4	57.33	66.00	67.33	66.66	64.33
Mean	56.93	63.46	66.26	65.40	
		M	G	Interaction	
SEm		0.451	0.504	1.008	
CD 5%		1.28	1.41	2.82	

Table 5
Effect of media and growth regulating substances on germination% at 30 DAS

Seed soaking	M1	M2	M3	M4	Mean
G0	63.33	71.33	71.33	72.33	69.58
G1	76.33	77.00	78.00	82.33	78.41
G2	75.33	79.67	82.67	87.67	81.33
G3	76.33	83.67	89.67	95.33	86.25
G4	75.00	81.67	84.33	90.67	82.91
Mean	73.26	78.66	81.20	85.67	
		M	G	Interaction	
SEm		0.442	0.494	0.989	
CD 5%		1.26	1.41	2.82	

(18.33), days to 50% seed germination (5.80), number of seeds germinated on the day of 50% seed germination (65.40) and germination % on 30th days after sowing of seeds (85.67). It also significantly differed from rest of media used. It may be due to better soil microclimate condition created by combination of farm yard manure and cocopit compared to soil and FYM mixture. Better aeration and nutrient availability might have taken place for better growth of seedlings.

The treatments comprising soaking of papaya seeds for 12 hours in 100 ppm GA₃ (G₁), 50 ppm GA₃ (G₂) and 500 ppm GA₃ (G₃) solution and 0.5m KNO₃ had positive impact on germination of seeds as compared to soaking seedlings in water for 12 hours. The lowest number of days taken for emergence of first seedlings (3.33 days) and highest number of seedling on first day of emergence (18.58) was recorded under soaking of seeds with 500 ppm GA₃ for 12 hours followed by G₄ (soaking in 0.5 M KNO₃ for 1 hours). Soaking of seeds in 500 ppm GA for 12 hours (G₄) took the lowest number of days (5.80) to give 50% seed germination while soaking with water took the highest number of days (8.25) for 50% germination of seeds. Soaking of seeds in 500 ppm GA₃ for 12 hours (G₃) recorded 67.58 numbers of germinated seed on the day of 50% seed

germination while G₄ recorded the lowest value. The data presented in table -5 on germination % at 30 DAS revealed that G₃ was found to be superior (86.25%) and also varied significantly from rest of the treatments. It may be that the Gibberellic acid being a multi fact growth regulator having a diversified role acted positively when soaked for longer period of 1 hours. Medium washing of seeds have impact on germination [7], which corroborates with our findings.

All the character studied showed that amongst the interactions the M4G3 has excelled all other combinations. Better performance of papaya seed germination by use of soaking of seeds with KNO₃ [8] which is in agreement with our findings.

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