

Influence of resting period and pre-sowing treatment on seed nut germination and growth of coconut seedling cv. D x T

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ABSTRACT

The present experiment was conducted at R. H. R. S., Navsari (Gujarat) during 2010-11. Treatments comprised three resting periods and four pre-sowing treatments with 12 treatment combinations. Fifteen days rest after harvesting (R_2) was found better with respect to earliness in germination with higher percentage of germination and growth with maximum height of seedling and number of leaves. Whereas in pre-sowing treatment, seed nut soaked in water for 15 days with punching was superior in early germination and growth of seedling.

Key words : Coconut seed, germination, pre-sowing treatments, resting period

INTRODUCTION

The coconut (*Cocos nucifera* L.) belongs to family Areaceae/Palmaceae under the class Monocotyledons and is native of South East Asia. It is an important oilseed as well as plantation crop. In India, coconut is grown in 1895.9 thousand ha with an annual production of 10840.0 thousand nuts with productivity of 5700 nuts/ha. Among the major coconut growing states, the production share of Kerala, Tamilnadu and Karnataka is 38.25, 33.77 and 11.09%, respectively. In Gujarat, area under coconut is 16,400 ha with an annual production of 138.30 million nuts and productivity of 5433 nuts/ha (Anonymous, 2009).

Cocos is a monotypic genus and there are no wild forms and hence variability exists only within local types of population. The quality planting material determines the ultimate returns from the tree crops like coconut. The seedling vigour is highly correlated with adult palm characters such as early flowering, nut yield and copra production.

Regarding collection of seed nut, the season of seed nut collection may vary from region to region. Always it is better to collect nuts that had undergone development during rainy season for seed nut purpose. The seed nuts should be collected from February-May with 11-12 months age, the shape and size should be proper, any type of damage of the

nut during harvesting is to be avoided rather the nuts are to be lowered by ropes only to get an undamaged embryo, the presence of water is to be judged by shaking the nuts and getting clear metallic sound on tapping.

Usually the seed nuts are stored in open shade for about a month till the husk becomes dry to facilitate speedy and maximum germination (Thampan, 1981). Therefore, the present investigation was conducted with an objective to find out the proper rest period and appropriate pre-sowing treatments in coconut cv. D x T with respect to germination and growth of coconut seedling.

MATERIALS AND METHODS

The present investigation was conducted at R. H. R. S., N. A. U., Navsari (Gujarat) during 2010-11. This experiment was laid out in complete randomized design with two factors and repeated thrice. The treatments comprised three resting periods (R_1 : Fresh just after harvesting, R_2 : 15 days rest and R_3 : 30 days rest after harvesting) and four pre-sowing treatments (S_1 : Control, without any treatment, S_2 : Water soaking for 15 days without punching, S_3 : Water soaking for 15 days with punching and S_4 : Soaking of seed nut in 10000 ppm solution of thiourea for 24 h after punching on seed nut). Twelve treatment combinations were taken in the present study. Sample size was 25 nuts per treatment. The

observations on germination and growth of seedling were recorded.

RESULTS AND DISCUSSION

Number of Days Taken for Germination and Germination Percentage

The data presented in Table 1 indicate that number of days taken to germination of coconut seed nut was significantly affected by resting period. Earliness in germination of seed nut was observed with increasing resting period. Thirty days resting period was found better for early germination of seed nut followed by 15 days resting period. Both these treatments i. e. R_2 and R_3 were at par. It was due to drying up of the husk which increases the rapid entry of water to facilitate early and higher percentage of germination. These results are in conformity with those of Mandal (1998) in coconut. Delayed germination was recorded in fresh seed nut sowing which may not have the stage of ripeness.

Pre-sowing treatments had a significant effect on days to germination in coconut seed nut. The treatment of water soaking for 15 days with punching (S_3) was found better for earliness in germination. This treatment was statistically at par with S_2 (Water soaking for 15 days without punching) and S_4 (Soaking of seed nut in 10000 ppm solution of thiourea for 24 h after punching on seed nut). Delayed germination was observed in control treatment. Ohler (1984) also recommended soaking of the nuts in water for a period of about two weeks to improve sprouting or germinating of the nuts. Similar trend was perviously seen by Thomas (1974).

Regarding interaction effect between resting period and pre-soaking treatments, treatment combination of R_2S_3 (15 days rest and soaking for 15 days with punching) was found better for early germination of seed nut (Table 2). Delaying in germination of seed nut was noted in fresh seed nut and without any treatment (R_1S_1).

The data pertaining to germination

Table 1. Effect of resting period and pre-sowing treatments on germination of coconut seed nut cv. D x T

Treatment	No. of days taken to germination	Germination percentage at 90 DAS
Resting Period (R)		
R_1 : Fresh (just after harvesting)	75.91	60.33 (66.10)
R_2 : 15 days rest	71.00	67.00 (70.01)
R_3 : 30 days rest	68.91	61.00 (66.35)
S. Em±	1.86	2.00
C. D. (P=0.05)	5.43	NS
Pre-sowing treatment (S)		
S_1 : Control (without any treatment)	78.11	56.00 (63.30)
S_2 : Water soaking for 15 days without punching	72.44	62.22 (66.84)
S_3 : Water soaking for 15 days with punching	68.00	66.22 (69.75)
S_4 : Soaking of seed nut in 10000 ppm solution of thiourea for 24 h after punching on seed nut	69.22	66.66 (70.08)
S. Em±	2.15	2.31
C. D. (P=0.05)	6.27	NS
Interaction of R x S		
S. Em±	3.72	4.01
C. D. (P=0.05)	10.87	12.00
C.V. (%)	8.97	11.72

Data in parentheses indicate arc sin transformed values.

NS : Not Significant.

Table 2. Interaction effect of R x S on germination and per cent of germination at 90 DAS on seed nut cv. D x T

Treatment	No. of days taken to germination of seed nut		
	R ₁	R ₂	R ₃
	86.66	80.66	67.00
	78.60	68.33	71.00
	76.66	60.33	67.00
	62.33	74.66	70.00
S. Em±	3.72		
C. D. (P=0.05)	10.87		
	Germination (%) at 90 DAS		
	R ₁	R ₂	R ₃
	57.33	50.67	60.00
	(64.38)	(59.03)	(66.48)
	62.67	76.00	48.00
	(68.04)	(76.41)	(56.07)
	52.00	89.33	57.33
	(60.25)	(84.53)	(64.45)
	69.33	52.00	78.67
	(71.74)	(60.08)	(78.42)
S. Em±		4.01	
C. D. (P=0.05)		12.00	

Data in parentheses indicate arc sin transformed values.

percentage at 90 days after sowing as influenced by resting period and pre-sowing treatment of coconut seed nut are presented in Table 1. Individual factor i. e. resting period and pre-soaking treatments had no significant effect on germination of seed nut at 90 DAS.

Table 3. Effect of resting period and pre-sowing treatments on growth of coconut seed nut cv. D x T at 270 DAS

Treatment	Height of seedling (cm)	No. of leaves/seedling	Girth at collar region (cm)
Resting period (R)			
R ₁ : Fresh just after harvesting	102.07	4.03	8.69
R ₂ : 15 days rest	121.94	4.87	10.25
R ₃ : 30 days rest	100.21	4.18	9.19
S. Em±	3.27	0.06	0.18
C. D. (P=0.05)	9.55	0.18	0.53
Pre-sowing treatment (S)			
S ₁ : Control (without any treatment)	96.16	4.06	8.80
S ₂ : Water soaking for 15 days without punching	104.84	4.20	9.48
S ₃ : Water soaking for 15 days with punching	111.43	4.27	9.08
S ₄ : Soaking of seed nut in 10000 ppm solution of thiourea for 24 h after punching on seed nut	119.86	4.91	10.14
S. Em±	3.77	0.07	0.21
C. D. (P=0.05)	11.03	0.21	0.62
Interaction of R x S			
S. Em±	6.54	0.12	0.36
C. D. (P=0.05)	19.10	0.36	1.07
C. V. (%)	10.49	4.96	6.80

However, higher value of germination percentage was observed with 15 days rest (R₂) and water soaking for 15 days with punching (S₃). An interaction between resting period and pre-soaking treatment was found significant at 90 DAS with respect to germination percentage (Table 2). The maximum per cent of germination (84.53%) was observed in treatment combination of R₂S₃ (15 days rest+water soaking for 15 days with punching), which was at par with R₃S₄ and R₂S₂. The superiority of this treatment with respect of minimum days required for germination and increase in germination percentage might be due to cause for softening of husk and leached out germination inhibitors present in hard seed coat or might be due to softening of seed coat and making it permeable to water. Sufeliffe (1981) observed that soaking of seed nut in water after harvesting or storage would bring the matric potential to zero. Water could then migrate into the nut primarily through the soft eye in the proximity of the embryo. Germination process might be triggered immediately or when the negative osmotic potential of the nut water is raised to zero. Fremond and Brinin (1966) noted that removal of slice of the husk from the upper part of the nut at the distal end above the germinating eye has the advantage of facilitating of water and early emergence of sprout. These findings were supported by Hadas and Russor (1974),

Yaklich and Orzolak (1977), Harries (1981), Arvindakshan *et al.* (1988) and Mandal (1991) in coconut, and Shukla *et al.* (2008) in *Terminalia arjuna*.

Growth Parameters

The data on growth parameters as influenced by various treatments are presented in Table 3. All growth parameters were significantly affected by individual factor and interaction. Regarding rest period, resting of 15 days after harvest (R_2) was found better for providing maximum height of seedling, number of leaves/seedling and girth of seedling at 270 DAS. Lower values of growth parameters were observed in R_1 and R_3 and both were at par. These results are also in conformity with those of Thomas (1974) and Thomas *et al.* (2008) in coconut and Singh *et al.* (2001) in ber.

Pre-sowing treatments of seed nut had significant effect on growth attributes of coconut seed nut (Table 3). Seedling growth was significantly improved in all treatments as compared to control. Tallest seedling with maximum number of leaves and girth of seedling were obtained when seed nut was

Table 4. Interaction effect R × S on seedling height, number of leaves and girth at collar region at 270 DAS

Treatment	Height of seedling (cm)		
	R_1	R_2	R_3
S_1	87.5	94.06	106.93
S_2	100.06	140.66	73.80
S_3	114.00	133.83	86.46
S_4	106.73	119.2	133.66
S. Em±	6.54		
C. D. (P=0.05)	19.10		
	No. of leaves per seedling		
S_1	3.73	4.66	3.80
S_2	3.80	5.00	3.80
S_3	3.93	4.83	4.06
S_4	4.66	5.00	5.06
S. Em±	0.12		
C. D. (P=0.05)	0.36		
	Girth at collar region (cm)		
S_1	8.06	8.83	9.50
S_2	8.20	11.80	8.46
S_3	8.36	9.90	9.00
S_4	10.13	10.50	9.80
S. Em±	0.36		
C. D. (P=0.05)	1.07		

soaked for 24 h in 10000 ppm thiourea after punching (S_4). Second best treatment was water soaking for 15 days with punching. These results are in agreement with the findings of Hore and Sen (1994) in ber, Cetinbas and Koyuncu (2006) in cherry and Patel *et al.* (1996) in Khirnee with thiourea treatment.

An interaction between R × S was significant with respect to all growth parameters (Table 4). Higher value of growth attributes was noted in R_2S_2 (15 days rest and water soaking for 15 days without punching and it remained at par with R_2S_3 and R_2S_4).

From the above discussion, it could be concluded that 15 days rest after harvesting and seed nut soaked in water for 15 days with punching was found better for germination and growth of coconut seed nut cv. D × T.

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