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RESEARCH PAPER

Studies on seed germination of khirni (*Manilakara hexandra* L.) seedlings under shade net house condition

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Abstract : Studies were carried out on seed germination and subsequent growth of Khirni (*Manilkara hexandra* L.). seedlings under shade net house condition at Department of Horticulture, Late Shri. Vasantrao Naik Marahwada Agricultural University, Parbhani (M.S.), India during the year 2006-07 and 2007-08. Among the various seed soaking treatments given to Khirni seed, GA_3 200 ppm seed soaking treatment for 24 hours was the best for increasing germination percentage and subsequent growth of Khirni seedlings under shade net house condition. While the treatment control i.e. no soaking recorded least germination percentage and subsequent growth of Khirni seedlings.

Key Words : GA_3, Seed germination, Subsequent growth, Khirni, Shade net

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INTRODUCTION

Sapota is one of the most important tropical fruits belonging to family sapotaceae. India is a leading producer of sapota. It is a native of South Mexico and Central America. Major sapota producing states are Karanataka, Maharashtra, Gujrat and to some extent in Andhra Pradesh, West Bengal, Orissa and Tamil Nadu. Area under sapota in India was 107.16 thousand ha with a production of 1284.60 thousand MT and productivity of 11.99 MT ha (Anonymous, 2022). Sapota is valued for its sweet and delicious fruits.

The most common commercial method of propagation of sapota at present are inarching and softwood grafting on Khirni or rayan which is considered as a best rootstock for sapota in India. The growth of Khirni seedlings is dead slow and to attain graftable size, it requires about 2-3 years. With this view point, the present study was undertaken at Late Shri Vasantrao Naik Marathwada Agriculture University to increase the germination percentage of Khirni seeds and subsequent growth of Khirni seedlings.

MATERIAL AND METHODS

Germination studies of Khirni seeds were carried

out under shade net house conditions during April 2006 and subsequently the trial was repeated in April 2007. The experiment was conducted in Completely Randomized Block Design (C.R.D.) with three replications. The various treatments were To-Control (No soaking), T_1-Water soaking, T_2-GA_3 150 ppm, T_3-GA_3 200 ppm, T_4-Thiourea 1.0%, T_5-Thiurea 1.5%, T_6-Vermiwash 100%, T_7-Coconut water 100%, T_8-Cowdung slurry, T_9-Cow urine 50%, T_{10}- Cow urine 100%. For shade net house experiment, the polythene bags of 6 x 9 inches were filled with garden mixture comprising of 2 parts of soil + 1 part of fine sand + 1 part of FYM. The selected seeds were soaked in above treatments for 24 hours in separate beakers as per treatment. After that sowing of seeds were carried out in already filled polythene bags. Observations with regard to germination percentage, number of days taken to initiate germination, shoot length, root length, number of leaves, fresh and dry weight of seedling were recorded.

RESULTS AND DISCUSSION

The experimental findings obtained from the present study have been discussed in following heads :

Germination (%) :

From pooled data of two years under shade net house condition, it was observed that GA_3 200 ppm soaking treatment to Khirni seeds for 24 hours recorded highest germination percentage (89.51%) followed by cow dung slurry (86.66%) and lowest germination (64.73%) was recorded in the untreated control. The promotive effect of GA on seed germination might be due to enzyme alpha amylase is activated which converts starch into simple carbohydrates and chemical energy is liberated which is used up in the activation of embryo (Shipley *et al.,* 1973). The results are in agreements with the findings of Reddy and Khan (2001) in Khirni and Jadhav (2003) in Rangpur lime.

Number of days taken to initiate germination :

Under shade net house condition from pooled data, it was observed that treatment $GA_3$200 ppm seed soaking for 24 hours took least number of days (20.95 days) to initiate germination in Khirni seed under shade net house condition followed by treatment cow dung slurry (26.05 days). Control (No soaking) took maximum days (40.50 days) to initiate germination. This is in line with the findings of Reddy and Khan (2001) in Khirni and Pampanna and Sulikeri (2001) in sapota.

Shoot length of Khirni seedling (cm) :

Under shade net house condition from pooled data at 90 days after sowing, it was revealed that $GA_3$200 ppm seed soaking treatment recorded maximum shoot length (11.25 cm) followed by cow dung slurry soaking treatment (10.52 cm). The increase in seedling height

Table 1: Effect of different treatments on seed germination of Khirni (*Manilkara hexandra* L) seedlings under shade net house condition (pooled data for 2006 and 2007)

Tr. No.	Treatments	Germination (%)	No. of days taken to initiate germination	Shoot length of Khirni seedling (cm)	Number of leaves per seedling	Root length of Khirni seedling (cm)	Fresh weight of seedling (g)	Dry weight of seedling (g)
To	Control (No soaking)	63.64(52.92)	40.50	2.24	2.74	6.33	0.67	0.33
T_1	Water soaking	82.99(65.66)	26.25	8.53	5.95	12.65	1.07	0.75
T_2	GA_3 150 ppm	82.54(63.32)	27.00	8.12	5.87	11.80	0.93	0.73
T_3	GA_3 200 ppm	89.51(71.15)	20.95	11.25	7.35	16.55	1.31	0.93
T_4	Thiourea 1.0%	79.61(63.16)	28.05	6.14	4.81	9.50	0.86	0.64
T_5	Thiourea 1.5%	76.65(61.11)	31.80	4.20	3.75	7.35	0.81	0.51
T_6	Vermiwash 100%	80.86(64.07)	28.50	7.47	5.10	10.26	0.91	0.69
T_7	Coconut water 100%	77.64(61.79)	28.97	5.52	4.72	8.58	0.87	0.56
T_8	Cow dung slurry	86.66(68.61)	26.05	10.52	7.26	15.77	1.23	0.91
T_9	Cow urine 50%	83.61(66.14)	27.97	9.60	6.20	13.63	1.09	0.76
T_{10}	Cow urine 100%	85.13(67.36)	33.85	9.70	7.05	14.68	1.13	0.79
	S.E.±	1.358(1.015)	1.2853	1.087	0.729	1.14	0.090	0.090
	C.D. (P=0.05)	3.758(2.810)	3.550	3.010	2.017	3.16	0.270	0.270

(Figures in parenthesis indicates are sin percentage values)

with GA_3 treatment was due to the fact that this harmone increased osmotic uptake of nutrients causing cell elongation and thus increasing height of the plant (Shanmugavelu, 1966). This was in confirmation with Pampanna and Sulikeri (2001) in sapota, Reddy and Khan (2001) in Khirni.

Number of leaves per seedling :

Under shade net house condition from pooled data, it was revealed that at 90 days after sowing, treatment GA_3 200 ppm seed soaking produced maximum number of leaves per Khirni seedling (7.35) which was at per with cow dung slurry soaking treatment (7.26). Control recorded of minimum number of leaves (2.74). The increase in number of leaves might be due to activity of GA_3 at the apical meristem resulting in more synthesis of nucleoprotein responsible for increasing leaf initiation (Sen and Gunti, 1976). These results are in close conformity with the results obtained by Pampanna and Sulikeri (2001) in sapota and Meena and Jain (2005) in papaya.

Root length of seedling :

Under shade net house condition, pooled data indicated that treatment GA_3 200 ppm soaking produced maximum root length of Khirni seedling (16.55 cm) followed by cow dung slurry soaking treatment (15.77 cm). However, minimum root length of Khirni seedling (6.33 cm) was observed in control (no soaking). This is in line with the findings of Ratan *et al.*, (1993) in custard apple Cv. Balanagar and Pillewan *et al*., (1999) in mango.

Fresh and dry weight of seedling (g per plant) :

Under shade net house condition pooled data showed that GA_3 200 ppm soaking treatment produced maximum fresh weight (1.31 g) and dry weight (0.93 g) of Khirni seedling at 90 days after sowing. However minimum fresh weight (0.67 g) and dry weight (0.33 g) of Khirni seedling was obtained under the treated control. Increase in fresh and dry weight of Khirni seedling was due to the fact that GA_3 improved the rate of photosynthates (Chacko and Singh, 1966). These results are in close conformity with the results obtained by Reddy and Khan (2001) in Khirni and Meena and Jain (2005) in Papaya.

Conclusion :

Thus it may be concluded that GA_3 200 ppm seed soaking treatment to Khirni seeds was the best for increasing germination percentage for 24 hours and subsequent growth of Khirni seedlings under shade net house condition.

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