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EFFECT OF PRE CONDITIONING ON GERMINATION AND SEEDLING GROWTH OF *TERMINALIA CHEBULA* RETZ.

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ABSTRACT
Germination and growth of Harda (*Terminalia chebula*) was considerably improved by pre-sowing seed treatments. Seeds collected from Madhugiri provenance took the least number of days (9.5) for germination when they were soaked in 200 and 100 ppm GA_3 for 1 hour. Where, GA_3 at 500 ppm recorded maximum germination (80%) and shoot length (21.30 cm) in seeds collected from B.R.Hills and Madhugiri, respectively. While, GA_3 at different concentrations recorded higher seedling vigour index compared to control and water soaking treatments.

KEYWORDS: *Terminalia chebula*, B. R. Hills, Madhugiri, GA_3, seedling vigour index.

INTRODUCTION

Terminalia chbula is an important medicinal tree. Its fruit is not only astringent and laxative but is also used externally as a local application to chronic Ulcers and Wounds, and as gargle in stomatitis. It is one of main constituent of Triphala which is known as Panacea for stomach disorders (Sharma *et al.,* 1995). Poor natural regeneration due to lower rate of seed germination has led to the scarcity of this species in their natural habitat Richa and Sharrna, M.K. (1994). Considering its importance and natural scarcity the present study was undertaken with an objective to improve its germinative capacity through pre-sowing seeds treatments.

MATERIAL AND METHODS

Potting experiments were conducted under poly mist propagation house at (Sanjeevini Vatika, GKVK, Bangalore. The fruits from five different provenances of Karnataka, namely, Arasikere, B. R. Hills, Channapattan, Madhugiri and Shimoga were collected. They were dehusked and hard endocarp was removed carefully without causing damage to seeds before they were subjected to different pre-sowing treatments viz., T_1 – Control, T_2 – Soaking in cold water for 24 hrs., T_2 – Soaking in cold water for 48 hrs., T_2 – Soaking in 100 ppm GA_3 for 1 hr. Observations were recorded on germination percentage, number of days taken for germination, plant height and seedling vigour index. The data were first transformed (square root transformation) and then analysed statistically using Fischer's analysis of variance techniques.

RESULTS & DISCUSSION

Germination percentage and time taken for germination

Seeds collected from Arasikere, B.R. Hills and Shimoga recorded significantly highest germination percent of 8.62 (74.00), 8.96 (80.00) and 6.40 (42.00), respectively when they were treated with 500 ppm GA, except in Shimoga where, 200 ppm GA, recorded 5.69 (32.00) per cent germination, which was on par with 500 ppm GA3 treatment. Soaking of seeds with 200 and 100 ppm GA3 for one hour recorded highest germination in seeds collected from Channapattana [8.73 (76.00%)] and Madhugiri [7.98 (64.00%], respectively and comparable germination of 7.86 (62.00) and 7.50 (56.00) per cent was recorded in seeds collected from Madhugiri provenance when they were treated with 500 and 200 ppm GA3 for 1 hour (Table-1). Since gibberlins are known to break dormancy and induce maturity of embryonic axis, this factor would have enhanced seed germination. These results are in line with the studies of Nagaraj and Farooqi (1989) in Bersera penciliata and Kiran *et al*. (2000) in Givotia rottleriformis. Seeds collected from Arasikere [3.23 (10.00)] and B.R. Hills [3.19 (9.70)] recorded significantly early germination when soaked with 500 ppm GA3 for 1 hour. While, 500 and 200 ppm GA3 recorded significantly early germination in seeds collected from Channapattana [3.20 (9.80)]. Whereas, seeds collected from Madhugiri took lower number of days for germination [3.16 (9.50)] when they were soaked in 200 and 100 ppm GA_3 (Table-2). While, GA_3 at 200 ppm recorded early germination in seeds collected from Shimoga [3.56 (12.20)] which was *on par* with 500 ppm GA_3 [3.57 (12.30)] and 100 ppm GA_3 [3.59 (12.400)]. The early germination may be due to the faster maturity of embryonic axis or GA_3 induced mobilization of stored reserves for metabolism, which has helped in early germination. These results are in conformity with the results obtained by Moktan *et al*. (1993) in *Albizzia odorossimma*.

Plant height and seedling vigour index

The seeds treated with 500 ppm GA_3 for 1 hour recorded significantly higher plant height of 4.56 (20.31) cm and 4.66 (21.30) cm in seedlings grown from seeds collected from Arasikere and Madhugiri respectively. Seedlings raised from seeds, Which collected from Channapattana and Shimoga recorded significantly higher plant height of 4.09 (16.28) cm a and 4.15 (16.80) cm when they were treated with 200 ppm GA_3 which was on par with 500 ppm

GA_3 in their respective provenances (Table-3). However, 100 ppm GA_3 recorded significantly higher plant height of 4.10 (16.36) cm in seedlings raised from seeds of B. R. Hills, which was on par with 500 ppm GA_3 treatment [4.07(16. 14)cm). The increased plant height may be due to early germination and effect of GA_3 on cell elongation. These results were similar to reports made by Nagraj and Farooqi (1989) in Bersera and Nagarajaiaha and Swamy Rao (1990) in *Grewia robusta*.

TABLE 1: Effect of pre sowing treatments on germination (percentage) *Terminalia chebula* seeds (without endocarp) collected from different provinces of Karnataka

Treatments	Arasikere	B.R. Hills	Channapattana	Madhugiri	Shimoga
T_1 - Control	5.85 (34.00)	4.86 (24.00)	5.85 (34.00)	6.66 (44.00)	0.70 (0.00)
T_2 – Soaking in cold H2O for 24 hrs	5.66 (32.00)	6.02 (36.00)	7.37 (54.00)	6.94 (48.00)	4.72 (22.00)
T_3 - Soaking in cold H2O for 48 hrs	4.46 (20.20)	6.17 (38.00)	4.92 (24.00)	0.70 (0.00)	0,70 (0.00)
T_4 – GA_3 500 ppm	8.62 (74.00)	8.96 (80.00)	7.61 (58.00)	7.86 (62.00)	6.40 (42.00)
T_5 – GA_3 200 ppm	7.48 (56.00)	7.07 (50.00)	8.73 (76.00)	7.50 (56.00)	5.69 (32.00)
T_6 – GA_3 100ppm	6.29 (40.00)	6.80 (46.00)	7.50 (56.00)	7.98 (64.00)	5.49 (30.00)
F – Test	*	*	*	*	*
SEm±	0.33	0.28	0.23	0.28	0.29
CD at 5%	0.96	0.84	0.67	0.83	0.86

(Values in parenthesis indicates original values)

TABLE 2: Effect of pre sowing treatments on time (days) taken for germination in *Terminalia chebula* seeds (without endocarp) collected from different provinces of Karnataka

Treatments	Arasikere	B.R. Hills	Channapattana	Madhugiri	Shimoga
T_1 - Control	4.34 (18.40)	4.33 (18.30)	4.33 (18.30)	4.38 (18.70)	0.70 (0.00)
T_2 – Soaking in cold H_2O for 24 hrs	4.38 (18.70)	4.34 (18.40)	4.36 (18.60)	4.20 (17.20)	4.46 (19.40)
T_3 - Soaking in cold H_2O for 48 hrs	4.28 (17.90)	4.34 (18.40)	4.28 (17.90)	0.70 (0.00)	0.70 (0.00)
T_4 – GA_3 500 ppm	3.23 (10.00)	3.19 (09.70)	3.20 (9.80)	3.34 (10.70)	3.57 (12.30)
T_5 – GA_3 200 ppm	3.43 (11.30)	3.53 (12.00)	3.20 (9.80)	3.16 (9.50)	3.56 (12.20)
T_6 – GA_3 100ppm	3.56 (12.20)	3.44 (11.40)	3.36 (10.80)	3.16 (9.50)	3.59 (12.40)
F – Test	*	*	*	*	*
SEm±	0.03	*0.04*	0.04	*0.03*	0.02
CD at 5%	0.09	0.12	0.14	0.09	0.06

(Values in parenthesis indicates original values)

TABLE 3: Effect of pre sowing treatments on plant height (in cm) in *Terminalia chebula* seeds (without endocarp) collected from different provinces of Karnataka

Treatments	Arasikere	B.R. Hills	Channapattana	Madhugiri	Shimoga
T_1 - Control	3.10 (9.16)	2.70 (6.80)	3.00 (8.54)	3.40 (11.10)	0.70 (0.00)
T_2 – Soaking in cold H_2O for 24 hrs	2.88 (7.80)	2.98 (8.40)	3.31 (10.52)	3.50 (14.40)	3.13 (9.36)
T_3 - Soaking in cold H_2O for 48 hrs	3.37 (10.92)	3.62 (12.64)	3.30 (10.44)	0.70 (0.00)	0.70 (0.00)
T_4 – GA_3 500 ppm	4.56 (20.34)	4.07 (16.14)	4.01 (15.60)	4.66 (21.30)	4.08 (16.20)
T_5 – GA_3 200 ppm	3.36 (10.82)	3.77 (13.76)	4.09 (16.28)	3.89 (14.69)	4.15 (16.80)
T_6 – GA_3 100ppm	4.07 (16.12)	4.10 (16.36)	3.42 (11.28)	3.96 (15.24)	3.84 (14.27)
F – Test	*	*	*	*	*
SEm±	0.05	0.05	0.04	0.05	0.04
CD at 5%	0.15	0.15	0.13	0.15	0.12

(Values in parenthesis indicates original values)

TABLE 4: Effect of pre sowing treatments on seedling vigour index in *Terminalia chebula* seeds (without endocarp) collected from different provinces of Karnataka

Treatments	Arasikere	B.R. Hills	Channapattana	Madhugiri	Shimoga
T_1 - Control	5.44 (28.90)	3.81 (15.36)	3.33 (10.20)	6.29 (45.32)	0.70 (0.00)
T_2 – Soaking in cold H_2O for 24 hrs	5.38 (28.80)	4.38 (18.72)	6.01 (38.80)	6.80 (46.01)	4.08 (12.54)
T_3 - Soaking in cold H_2O for 48 hrs	5.32 (28.07)	5.87 (34.22)	6.23 (40.56)	0.70 (0.00)	0.70 (0.00)
T_4 – GA_3 500 ppm	13.72(186.48)	13.63(184.80)	10.43 (114.84)	11.76 (138.26)	8.84 (79.38)
T_5 – GA_3 200 ppm	7.68 (58.24)	8.86 (78.50)	11.71 (136.90)	8.23 (77.40)	7.84 (59.84)
T_6 – GA_3 100ppm	7.50 (56.80)	6.74 (48.76)	10.38 (101.36)	9.40 (88.83)	6.41(44.40)
F – Test	*	*	*	*	*
SEm±	0.44	*0.36*	0.44	*0.38*	0.45
CD at 5%	1.29	1.07	1.30	1.11	1.31

(Values in parenthesis indicates original values)

REFERENCES

Kiran, D. S., Rao, P.S., Venkaiah, K. and Saibabu. A. (2000) Effect of GA3, on germination of Givotia rolleformis seeds. *Indian For.*, 127 (8): 944. - 946.

Moktan, M.R., Gopikumar, K. and Anoop, E.V. (1993) Effect of growth regulators on, seed germination and seedling vigour in two selected tree legumes, *My. For*., 29 (1): 1-5.

Nagaraj, C. & Farooqi. A.A. (1989) Studies on the seed germination as influenced by pre-treatment in Bersera. *Indian Perfumer* 33 (1): 48-53.

Nagarajaiah, C. and Swami Rao, N. (1990) Accelerated growth of some forest species induced by gibberline. *My For*., 26 (1): 51-56.

Richa and Sharrna, M.K. (1994) Enhancing germination of stored Bamboo seeds using plant growth regulators. *Seed Sci. and Tech.* 22 (2): 313-31.

Sharma, K., Sanjeev. T & Badiyala, S.D. (1995) First report on propagation of Terminalia *chebula* through patch budding. *Indian For*., 121 (8): 760-761.