Influence of stratification duration and hormone concentration in aonla (*Emblica officinalis*, GAERTN.)

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Abstract

The experiment was conducted at the Department of Horticulture, Kulbhasker Ashram Post Graduate Collage, Allahabad, Uttar Pradesh with a view to standardize suitable stratification duration and hormone concentration for Aonla seed treatment. There were ten treatment combinations (T_1 to T_{10}) including a control. Different duration of seed stratification i.e., 24hours, 48 hours and 72hours were tried along with the 100ppm, 200ppm and 300 ppm GA_3 seed treatment. Treated seeds were sown in the polythene bags (25x15 cm size, 200gauge thick) containing soil, sand and FYM mixture (1:1:1). It was interesting to note that the effect of stratification duration and hormone treatment concentration was found to be significant for seed germination, transplanting success, seedling mortality percentage and rate of seed germination. Treatment T_6 (48hrs+300ppm GA_3) yielded highest percentage, (84.00) of seed germination while the lowest percentage value (37.25) was recorded in T_9 (72hrs+300ppm GA_3) treatment and the transplanting success was also lowest in T_9 . The seedling mortality percentage was maximum (79.25) with T_9 where as lowest percentage value (22.00) was observed for T_6 treatment. It may be concluded that T_6 treatment can be recommended for the better stand establishment of Aonla nursery.

Key Words: Stratification, Treatment, GA_3 , Nursery, Aonla, Mortality, Seedling, Germination, Seed.

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Introduction

Increased demand of aonla (*Emblica officinalis*, Garten.) buddlings in traditional as well as nontraditional areas of India due to its peculiar character of diverse use, medicinal value, tolerance to biotic and abiotic stresses, higher benefit cost ratio and positive government policies emphasized to chalk out some feasible and acceptable measures for the better stand-establishment of saplings at the nursery stage. Aonla buddlings are prepared thorough budding on seedling root - stock which is obtained through seeds. In nature, aonla seed has poor germination and higher seedling mortality, owing to adverse edaphic conditions during nursery stage. Therefore it becomes imperative to standardize suitable stratification time and exact hormone concentration for seed treatment for flourishing the aonla nursery-industry. Certainly, these tactics are the most important component to provide sound base for propagation, once time and concentration is standardize, we shall be able to grow healthy

seedlings with faster rate.

Keeping these aspects in view, the experiment was under taken to ascertain the effect of the stratification and hormone treatment on seed germination, rate of seed germination, transplanting success and mortality of seedlings.

Materials and Method

The experiment was conducted at the Department of Horticulture, Kulbhasker Ashram Post Graduate Collage, Allahabad, Uttar Pradesh during the year 2012-13 with a view to standardize suitable stratification duration and hormone concentration for Aonla seed treatment. There were ten treatment combinations (T_1 to T_{10}) including a control. Different duration of seed stratification i.e., 24hours, 48 hours and 72hours were tried. Soaked seed were put in layers under different strata of moist sand for varying duration. GA_3 hormone @ 100ppm, 200ppm and 300 ppm was used for seed treatment after stratification. Treated seeds were sown in the polythene bags (25x15 cm

size, 200 gauges thick) containing soil, sand and FYM mixture (1:1:1).

Results and Discussion

Seed germination in aonla started after 3 days of seed sowing and completed within 27 days in all the treatment. Seed germination under different treatments ranged between 37.25 to 84.00 percent. The percentage of seed germination as influenced by treatments differed significantly. The maximum seed germination (84.00 %) was recorded in treatment T₆ (48 hrs stratification+300 ppm GA₃) which was significantly superior to all other treatments and the value was lowest (37.25%) in T₉ (72 hrs stratification+300 ppm

GA₃). The findings of the study supported and corroborated the findings of Bisla *et al.*, (1984) in Ber and Govind and Chandra (1993) in Khasi Mandrin. The lowest percentage of seed germination obtained with treatment T₉ indicated adverse effect of longer duration of stratification coupled with toxic concentration GA₃ which augmented seed decay and partial damage of seed too. Over tendering of seed coat and ultra concentration of GA₃ might be corroded the plumbe and radicle of the seed resulting failure of germination. The possibility of exo-osmosismay not be denied. Dewey (1960); Paliwal and Gandhi (1968) and Ayers and Westcot (1976) also observed the same causes.

Table 1: Influence of stratification duration and hormone concentration on seed germination and rate of seed germination in Aonla (*Emhlica officinalis*, GAERTN.)

Treat-ments	Seed germination (%)								Rate of seed germination
	3 DAS	6 DAS	9 DAS	12 DAS	15 DAS	18 DAS	21 DAS	27 DAS	
T ₁	2.95 (9.89)	22.66 (23.29)	43.33 (35.4)	48.33 (37.06)	53.66 (40.92)	56.00 (45.12)	56.00 (45.12)	56.00 (45.12)	10.43
T ₂	3.05 (10.3)	22.66 (25.29)	45.33 (38.40)	50.33 (40.06)	58.66 (45.92)	60.00 (50.12)	60.00 (50.12)	60.00 (50.12)	10.25
T ₃	3.25 (10.30)	24.66 (28.29)	47.33 (40.4)	53.33 (45.06)	60.66 (48.92)	61.00 (52.12)	61.00 (52.12)	61.00 (52.12)	10.01
T ₄	2.36 (8.83)	25.66 (30.29)	49.33 (44.4)	55.33 (48.06)	63.66 (52.92)	64.00 (53.12)	64.00 (53.12)	64.00 (53.12)	11.40
T ₅	3.60 (10.82)	25.66 (30.33)	51.33 (45.76)	61.66 (51.75)	64.66 (53.5)	65.00 (53.72)	65.00 (53.72)	65.00 (53.72)	11.24
T ₆	5.63 (13.55)	27.66 (31.64)	57.66 (49.41)	64.00 (51.13)	83.33 (68.91)	84.00 (69.35)	84.00 (69.35)	84.00 (69.35)	11.03
T ₇	2.63 (10.75)	24.53 (33.21)	39.85 (39.44)	42.25 (41.44)	44.25 (42.44)	44.25 (42.44)	45.49 (43.21)	45.49 (43.21)	9.24
T ₈	2.33 (6.75)	23.53 (30.21)	39.25 (38.44)	40.25 (39.44)	41.25 (40.44)	41.25 (40.44)	41.25 (40.44)	41.25 (42.44)	9.01
T ₉	2.23 (5.75)	22.53 (28.21)	37.25 (37.44)	37.25 (37.44)	37.25 (37.44)	37.25 (37.44)	37.25 (37.44)	37.25 (37.44)	8.25
T ₁₀	2.53 (8.75)	20.53 (23.21)	33.25 (32.44)	43.12 (39.21)	48.00 (41.04)	49.54 (42.32)	50.74 (43.49)	50.74 (43.49)	15.52
CD _{0.5}	2.01	3.24	3.11	2.89	2.75	3.01	3.01	3.01	2.36

Note: Data in parentheses are average transformed value.

T₁ = (24hrs+100ppmGA₃)

T₃ = (24hrs+300ppmGA₃)

T₅ = (48hrs+200ppmGA₃)

T₇ = (72hrs+100ppmGA₃)

T₉ = (72hrs+300ppmGA₃)

T₂ = (24hrs+200ppmGA₃)

T₄ = (48hrs+100ppmGA₃)

T₆ = (48hrs+300ppmGA₃)

T₈ = (72hrs+200ppmGA₃)

T₁₀ = (control)

There was insignificant difference on the rate of aonla seed germination as it was conspicuously influenced by duration of stratification and seed treatment. However, the faster rate of seed germination was recorded in T₉ (72 hrs stratification+300 ppm GA₃) i.e.8.25 mean days followed by T₈ (72 hrs stratification+2 ppm GA₃) i.e.,9.01 mean days). The slowest rate of seed germination

was recorded T₁₀ (control) i.e., 15.52 mean days). Similar result was also recorded by Bahuguna and Pyarelal (1993) in case of *Acacia*. There was a noticeable and significant effect of treatments on transplanting success. All those treatments respond poor in seed germination also were poor in transplanting success. Though seeds were sown in polythene bags and gently transplanted into the field.

Table: 2 Influence of stratification duration and hormone concentration on seedling mortality and transplanting success in Aonla (*Emhlica officinalis*, GAERTN.)

Treatments	Seedling mortality, (%)					Transplanting success, (%)
	28 DAS	35 DAS	42 DAS	49 DAS	56 DAS	
T ₁	12.00 (22.30)	23.09 (32.04)	28.93 (34.91)	35.01 (38.03)	35.01 (38.03)	74.43
T ₂	11.00 (21.30)	21.09 (30.04)	26.93 (32.91)	30.91 (34.03)	30.01 (34.03)	75.25
T ₃	10.99 (21.10)	20.89 (29.94)	26.63 (32.81)	30.01 (33.93)	30.01 (33.93)	76.01
T ₄	8.99 (20.10)	19.99 (29.64)	25.66 (31.41)	29.00 (33.13)	29.00 (33.13)	79.40
T ₅	8.63 (19.55)	19.66 (28.64)	24.66 (30.41)	26.00 (32.13)	28.00 (32.13)	81.24
T ₆	7.63 (15.55)	17.66 (24.64)	20.66 (27.41)	22.00 (28.13)	22.00 (28.13)	91.03
T ₇	45.63 (39.75)	48.53 (40.21)	50.85 (43.44)	58.25 (52.44)	58.25 (52.44)	49.24
T ₈	58.33 (51.75)	62.53 (55.21)	65.25 (57.44)	68.25 (58.44)	68.25 (58.44)	39.01
T ₉	62.23 (55.75)	69.53 (58.21)	77.25 (62.44)	79.25 (65.44)	79.25 (65.44)	35.25
T ₁₀	46.63 (39.95)	49.53 (41.21)	51.85 (44.44)	59.25 (53.44)	59.25 (53.44)	65.52
C.D. at 5%	2.31	3.54	3.42	3.89	2.95	4.43

(Note: figures in parentheses are average transformed value)

The differences due to various treatments in respect of seedling mortality differed significantly. The mortality of aonla seedling ranges between 22.00 to 79.25 per cent within 56 days of seed sowing. The highest mortality was recorded (79.25%) in T₉ (72 hrs stratification+300 ppm GA₃) followed by 68.25 per cent in T₈ (72 hrs stratification+200 ppm GA₃) and the value was lowest (22.00%) in T₆ (48 hrs stratification+300 ppm GA₃) treatment. Similar results were also found by Awang and Hamzah (1986) in *Acacia*. Aonla seed soaking

more than 48 hours was proved detrimental in term of seed germination and mortality.

Therefore, soaking hours should not constitute more than 48 hours to achieve better survival of aonla seedlings. Obviously, more leaching had toxic effect of hormone on tender seedlings and higher osmotic pressure, imbalanced nutrient level lead to mortality of the seedlings. The findings are in the conformity of the findings of the Shamet *et al.*, (1994) and Gupta (1989).

Based on the result obtained from investigation it can be concluded that seed

soaking for 48 hours followed by 300 ppm seed treatment with GA₃ resulted best performance with regards to percent seed germination (84.00%) and least seedling mortality (22.00%).

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