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Effect of pre-sowing seed treatments for enhancing the germination and seedling growth in soursop (*Annona muricata* L.)

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ABSTRACT

The present investigation entitled “Effect of pre-sowing seed treatments for enhancing the germination and seedling growth in soursop (*Annona muricata* L.)” was conducted at the College of Horticulture, Dapoli. Dist. Ratnagiri (M.S.), during the academic year 2025–26. The experiment comprised nine pre-sowing seed treatments, including (T_1) GA_3 250 ppm, (T_2) GA_3 500 ppm for 24 hrs; (T_3) 5%, (T_4) 10% of cow urine for 24 hrs; (T_5) 25%, (T_6) 50% of cow dung slurry for 24 hrs; (T_7) hot water soaking treatment at 50 °C for 3 mins; (T_8) tap water soaking treatment for 24 hrs and (T_9) control, with three replications. Among the different treatments, soursop seeds treated with GA_3 @ 500 ppm for 24 hours (T_2) consistently recorded the earliest germination (28.00 days), highest germination percentage (72.00%), minimum days to attain 50 per cent germination (32.00 days) and highest survival percentage (53.37%) which was at par with the treatments T_1 (GA_3 @ 250 ppm) and T_3 (cow urine @ 5%) and also exhibited superior vegetative growth with the maximum seedling height (67.17 cm), seedling girth (7.42 mm), number of leaves (42.07), fresh shoot weight (19.40 g), dry shoot weight (10.12 g), primary root length (40.44 cm), number of secondary roots (50.33), fresh root weight (14.30 g), dry root weight (2.86 g), seedling vigour index I (4837.47) and vigour index II (934.69) Thus, pre-sowing seed treatment with GA_3 @ 500 ppm for 24 hours was found to be the most effective for improving seed germination, seedling vigour and overall growth in soursop.

Keywords: Soursop, Pre-sowing seed treatments, Germination, GA_3

1. Introduction

Soursop (*Annona muricata* L.) is an important tropical fruit crop belonging to the family Annonaceae. It is valued for its nutritional, medicinal and commercial importance and is believed to have originated in the tropical regions of Central and South America, particularly the West Indies. The crop is widely distributed throughout tropical and subtropical regions and is cultivated in countries such as Brazil, Mexico, Venezuela, Colombia and Southeast Asian nations. In India, soursop is cultivated on a limited scale in states such as Kerala, Tamil Nadu, Karnataka, Maharashtra and parts of Andhra Pradesh. The fruit is consumed fresh and is also used in the preparation of various value-added products, including juices, beverages, ice creams, candies and syrups. It is rich in vitamin C, essential minerals and bioactive compounds, contributing to its nutritional and medicinal significance. Soursop is an evergreen fruit tree that produces large, green fruits with a characteristic spiny surface and white, juicy pulp. In addition to its fruit, various parts of the plant, including the leaves, bark, roots and seeds, have been used in traditional medicine. Despite its potential as a tropical fruit crop, the commercial cultivation of soursop is limited by the availability of quality planting material. Seed propagation plays an important role, particularly in raising rootstocks for vegetative propagation through grafting and budding. Poor, slow and irregular seed germination is one of the major constraints in soursop propagation. The hard seed coat and possible presence of germination inhibitors may contribute to delayed and uneven germination, resulting in non-uniform seedling growth. Therefore, suitable pre-sowing seed treatments are necessary to improve germination percentage, promote uniform seedling emergence and enhance seedling vigour. Various pre-sowing seed treatments, including gibberellic acid (GA_3), water soaking, hot-water treatment and mechanical scarification, have been used to improve seed germination and subsequent seedling growth. Gibberellins stimulate seed germination by overcoming dormancy associated with factors such as mechanically resistant seed coverings and physiological limitations of the embryo (Diaz *et al.*, 1971) [1]. Water soaking may facilitate water absorption and accelerate the germination process. In addition, organic treatments such as cow urine and cow dung slurry may provide nutrients and support healthy seedling development (Singh *et al.*, 2018) [2]. Considering the importance of producing healthy and vigorous planting material, the present investigation entitled “Effect of pre-sowing seed treatments for enhancing the germination and seedling growth in soursop (*Annona muricata* L.)” was undertaken to evaluate the effect of

different pre-sowing seed treatments on seed germination and seedling growth, with the objective of identifying suitable treatments for improving germination, seedling vigour and the overall propagation of soursop.

2. Material and methods

The experiment was conducted at Nursery No. 10, College of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, from December 2025 to June 2026. The seeds of soursop were collected from the local cultivar. The seeds were extracted from fully mature fruits particularly from disease-free plants. Before sowing, the seeds were subjected to different pre-sowing treatments involving plant growth regulators, organic manures and water for the specified durations. After treatment, the seeds were directly sown in “6 × 8” inch polybags containing a soil and vermicompost mixture in a ratio of 3:1. The experiment was laid out in a Randomized Block Design (RBD) comprising nine treatments. The treatments were as follows: (T₁) GA₃ at 250 ppm for 24 hours, (T₂) GA₃ at 500 ppm for 24 hours, (T₃) cow urine @ 5% for 24 hours, (T₄) cow urine @ 10% for 24 hours, (T₅) cow dung slurry @ 25% for 24 hours, (T₆) cow dung slurry @ 50% for 24 hours, (T₇) hot water at 50°C for 3 mins, (T₈) tap water for 24 hours and (T₉) untreated control. A unit consisting of 50 seedlings per treatment per replication was maintained. Observations were recorded from five tagged seedlings in each treatment and replication and the corresponding mean values were used for statistical analysis. The observations included germination parameters, viz., days required for germination, days required for 50% germination, germination percentage (%) and survival percentage (%). Growth parameters included seedling height (cm), seedling girth (mm) and number of leaves. Shoot parameters comprised fresh shoot weight (g) and dry shoot weight (g), while root parameters included primary root length (cm), number of secondary roots, fresh root weight (g) and dry root weight (g). Seedling Vigour Index-I was calculated using the formula Seedling Vigour Index-I = Germination percentage × Seedling length. The data obtained during the investigation were subjected to statistical analysis using the standard procedures described by Panse *et al.* (1985) [3].

3. Result and Discussion Germination parameters Days Required for Germination

The number of days required for germination was significantly influenced by the different pre-sowing seed treatments under study. As presented in Table 1, the minimum number of days required for germination in soursop seeds was recorded in treatment T₂ (GA₃ @ 500 ppm) 28.00 days which was at par with the treatments T₁ (GA₃ @ 250 ppm) with a germination period of 29.67 days and T₃ (cow urine @ 5%) with 30.00 days, whereas the maximum was observed in T₉ (Control) with 39.33 days however it was at par with T₈ (Tap water) 37.00 days. The early germination in GA₃ treated seeds may be attributed to the role of gibberellic acid in stimulating enzymatic activity during germination. GA₃ promotes the synthesis of α-amylase, which facilitates the breakdown of stored starch into simple sugars, thereby providing the energy required for various physiological and metabolic activities associated with seed germination (Singh *et al.*, 2017; Tandoh *et al.*, 2025) [4, 5]. The nutrients and biologically active compounds present in cow urine may enhance seed metabolic activity and facilitate the mobilization of stored food reserves, thereby promoting early embryo growth and seed emergence (Deeksha *et al.*, 2020) [6].

3.1.2 Days required for 50% germination

The number of days required to achieve 50% germination in soursop seeds varied significantly among the different seed treatments under study. Treatment T₂ (GA₃ @ 500 ppm) recorded the minimum number of days for 50% germination 32.00 days which was at par with the treatments T₁ (GA₃ at 250 ppm) which required 34.33 days and T₇ (hot water at 50 °C for 3 minutes) which required 35.67 days, whereas the maximum period of 45.00 days was observed in T₉ (Control) which was at par 42.00 days with T₈ (Tap water). GA₃ promotes the synthesis of α-amylase, which breaks down stored starch into simpler sugars, thereby supplying the energy required for various physiological and metabolic processes involved in germination (Palepad *et al.*, 2017; Hota *et al.*, 2018) [8, 7]. The comparatively earlier attainment of 50 % germination under T₇ (hot water at 50 °C for 3 minutes) may be attributed to the mild heat treatment, which can facilitate seed imbibition by modifying the seed coat and thereby promote the entry of water and oxygen into the seed (Tandoh *et al.*, 2025) [5].

Table 1. Effect of different pre-sowing seed treatments on various germination parameters in soursop

Treatment No.	Treatment details	Days required for germination	Days required for 50% germination	Germination percentage	Survival percentage (%)	Vigour index- 1
T ₁	GA ₃ 250 ppm	29.67	34.33	66.00	49.39	3858.13
T ₂	GA ₃ 500 ppm	28.00	32.00	72.00	53.37	4837.47
T ₃	Cow urine @ 5%	30.00	36.00	64.67	37.50	3378.33
T ₄	Cow urine @ 10%	34.00	38.00	58.67	32.81	2655.60
T ₅	Cow dung slurry @ 25%	32.00	37.00	60.00	34.02	2855.00
T ₆	Cow dung slurry @ 50%	35.00	40.33	48.67	27.44	2102.40
T ₇	Hot water (50°C) for 3 mins	31.00	35.67	64.00	37.04	3251.41
T ₈	Tap water	37.00	42.00	28.67	26.67	1129.20
T ₉	Control	39.33	45.00	25.33	22.00	708.13
Range		28.00-39.33	32.00-45.00	25.33-72.00	22.00-53.37	4837.47-708.13
Mean		32.89	37.81	54.22	35.58	2745.45
SE.m±		0.86	0.72	8.23	5.74	3984.9
C.D. @ 5%		2.56	2.71	24.67	17.20	1184.02

3.1.3 Germination percentage

The germination percentage of soursop seeds varied among the different seed treatments under study. The highest germination percentage was recorded in T₂ (GA₃ @ 500 ppm) at 72.00% which was at par

with the treatments T₁ (GA₃ @ 250 ppm) at 66.00% and T₃ (cow urine @ 5%) at 64.67% while the lowest was observed in T₉ (Control) at 25.33% which was at par (28.67%) with T₈ (Tap water).

The higher germination percentage in GA₃ treated seeds may be attributed to the role of gibberellic acid in activating enzymes and promoting amylase synthesis. This enzyme facilitates the conversion of stored starch into soluble sugars, providing the energy required for seed germination. Furthermore, GA₃ may promote radicle growth by overcoming metabolic barriers and facilitating the leaching of germination inhibitors during soaking (Palepad *et al.*, 2017) [8]. The cow urine treatment may help in reducing physiological restrictions associated with seed dormancy and create a favourable biochemical environment for radicle emergence (Desai *et al.*, 2017) [9].

3.1.4 Survival percentage

The survival percentage of soursop seedlings varied across the different treatments under study. The highest survival percentage of 53.37% was recorded in T₂ (GA₃ @ 500 ppm) which was at par with the treatments T₁ (GA₃ @ 250 ppm) which recorded (49.39) and T₃ (cow urine @ 5%) which recorded (37.50), whereas the lowest percentage of 22.00% was observed in T₉ (Control) which was at par 26.67 with T₈ (Tap water). The improved survival of GA₃-treated seedlings may be attributed to the growth-regulating effects of gibberellic acid, which supports balanced root and shoot development, enhances seedling vigour and may improve tolerance to environmental stress Dilip *et al.* (2017) [10] in Rangpur lime and Patel *et al.* (2017) [11] in custard apple. The cow urine treatment may also have supplied small amounts of readily available nutrients during the early stages of seedling development, supporting the establishment of healthy seedlings (Pal *et al.*, 2019) [12].

3.1.5 Vigour index

As presented in Table 1, the different pre-sowing seed treatments significantly influenced the Vigour Index-I of soursop seedlings at 180 days after sowing (DAS). Among the treatments under study, T₂ (GA₃ @ 500 ppm for 24 hours) recorded the highest Vigour Index-I of 4837.47, whereas the lowest value of 708.13 was observed in T₉ (Control). The higher Vigour Index-I under GA₃ treatment may be attributed to the improved germination percentage and increased seedling height. The combined effect of a higher germination rate and greater seedling growth contributed to the enhanced seedling vigour. These findings are in agreement with the results reported by Sharma *et al.* (2021) [13] and Barathkumar (2019) [14] in aonla.

2. Growth parameters Seedling height (cm)

At 180 days after sowing (DAS), seedling height was significantly influenced by the different pre-sowing seed treatments under study. The maximum seedling height of 67.17 cm was recorded in T₂ (GA₃ @

500 ppm), whereas the minimum height of 30.09 cm was observed in T₉ (Control). The increased seedling height in response to GA₃ treatment may be attributed to its role in promoting cell elongation and cell division, thereby enhancing seedling growth and plant height. These findings are in accordance with Gurung *et al.* (2014) [15] who reported that GA₃ stimulates plant growth by enhancing cellular activity. Furthermore, GA₃ may indirectly promote plant growth by facilitating amino acid synthesis, as observed in citrus species (Meshram *et al.*, 2015) [16].

3.2.2. Seedling girth (mm)

At 180 days after sowing (DAS), significant differences in seedling collar girth were observed among the different pre-sowing seed treatments under study. The average collar girth was 5.14 mm. Treatment T₂ (GA₃ @ 500 ppm) recorded the maximum collar girth of 7.42 mm, whereas the minimum girth of 3.55 mm was observed in T₉ (Control). The increase in collar girth under GA₃ treatment may be attributed to the stimulation of cambial activity, cell proliferation and cell elongation and division in the stem. The enhanced activity of these cellular processes, potentially promoted by GA₃, may have contributed to greater girth at the collar region (Kalyani and Bharad, 2017). Similar results were reported by Singh *et al.* (2017) [4] in soursop. Hota *et al.* (2018) [7] also observed increased girth in jamun seedlings treated with GA₃ @ 450 ppm, recording a girth of 5.78 mm.

3.2.3 Number of leaves

The number of leaves per soursop seedling varied significantly among the different pre-sowing seed treatments under study at 180 (DAS). The maximum number of leaves (42.07) was recorded in T₂ (GA₃ @ 500 ppm) which was at par with T₁ (GA₃ @ 250 ppm) and T₃ (cow urine @ 5%) recording (40.07) and (36.00) leaves, whereas the minimum (24.40) was observed in T₉ (Control) which was at par 25.80 with T₈ (Tap water). The increase in leaf number following GA₃ treatment may be associated with enhanced photosynthetic activity, increased chlorophyll content and improved stomatal conductance. These effects may promote photosynthate production and its allocation to actively growing tissues, thereby supporting the initiation of leaf primordia, leaf expansion and overall leaf development. Similar findings were reported by Meshram *et al.* (2015) [16] in acid lime, where GA₃ @ 200 ppm resulted in 34.93 leaves per seedling. The favourable response of cow urine treatment may be attributed to its ability to support vegetative development through the supply of readily available nutrients particularly nitrogen, potassium, sulphur and other growth-promoting constituents as by Deeksha *et al.* (2023) [17] in custard apple.

Table 2. Effect of different pre-sowing seed treatments on various growth parameters (seedling height, seedling girth and no. of leaves/plant) in soursop seedlings

Treatments	Seedlings height (cm) Girth (mm) No. of leaves/plant								
	60 DAS	120 DAS	180 DAS	60 DAS	120 DAS	180 DAS	60 DAS	120 DAS	180 DAS
T ₁	17.06	45.03	58.40	2.61	3.45	7.20	5.67	14.43	40.07
T ₂	20.03	50.08	67.17	2.83	3.55	7.42	5.80	14.72	42.07
T ₃	15.06	42.39	52.13	2.52	3.40	5.38	5.60	14.39	36.00
T ₄	12.00	35.43	45.33	2.23	3.10	4.80	4.87	13.93	28.93
T ₅	13.67	38.08	47.58	2.35	3.20	5.18	5.00	14.05	30.17
T ₆	11.80	33.39	43.07	1.98	3.00	3.80	4.67	13.80	27.53
T ₇	14.91	40.11	50.11	2.35	3.30	5.25	5.03	14.17	34.20
T ₈	11.58	25.18	37.47	1.94	2.86	3.70	4.60	13.76	25.80
T ₉	10.40	20.31	30.09	1.85	2.74	3.55	4.40	12.96	24.40
Range	10.40-20.03	20.31-50.08	30.09-67.17	1.85-2.83	2.74-3.55	3.55-7.42	4.40-5.80	12.96-14.72	24.40-42.07
Mean	14.06	36.67	47.93	2.27	3.18	5.14	5.07	14.02	32.13
S.E.m (±)	0.85	0.62	1.47	0.02	0.01	0.02	0.21	0.02	1.02

(continued on next page)

Treatments	Seedlings height (cm)			Girth (mm)			No. of leaves/plant		
	60 DAS	120 DAS	180 DAS	60 DAS	120 DAS	180 DAS	60 DAS	120 DAS	180 DAS
C. D. @ 5%	2.54	1.86	4.41	0.05	0.03	0.06	0.62	0.06	3.05

3.3 Effect of different seed treatments on shoot parameters in soursop seedlings

3.3.1 Fresh weight of shoot (g)

The fresh weight of soursop seedling shoots at 180 days after sowing (DAS) differed significantly among the various pre-sowing seed treatments under study. Treatment T₂ (GA₃ @ 500 ppm for 24 hours) recorded the highest fresh shoot weight 19.40 g. In contrast, the minimum fresh shoot weight of 6.84 g was observed in T₉ (Control). The higher fresh shoot weight in GA₃ treated seedlings may be attributed to enhanced vegetative growth, as reflected in increased seedling height, leaf number and stem girth. These improvements in growth parameters may have contributed to greater biomass accumulation, resulting in increased fresh shoot weight. Similar findings were reported by Hota *et al.* (2018) [7] in jamun and Gurung *et al.* (2014) [15] in passion fruit.

3.3.2 Dry weight of shoot (g)

At 180 days after sowing (DAS), the dry weight of soursop seedling shoots was significantly influenced by the different pre-sowing seed treatments under study, with an overall mean of 5.09 g. The maximum dry shoot weight of 10.12 g was recorded in T₂, where seeds were soaked in GA₃ @ 500 ppm for 24 hours. Conversely, the minimum dry shoot weight of 1.41 g was observed in T₉ (Control), which received no pre-sowing treatment. The higher dry shoot weight under GA₃ treatment may be associated with enhanced seedling growth and greater biomass accumulation, as also reflected in the increased fresh shoot weight. The improved vegetative growth may have contributed to greater dry matter production in the seedlings. These findings are in agreement with the results reported by Boricha *et al.* (2020) [6] in guava, Gurung *et al.* (2014) [15] in passion fruit and Gawade (2008) [18] in custard apple.

Table 3. Effect of different pre-sowing seed treatments on various shoot and root parameters in soursop seedlings

Treatment No.	Treatment details	Fresh weight of shoot (g)	Dry weight of shoot (g)	Length of primary root (cm)	Number of secondary roots	Fresh weight of root (g)	Dry weight of root (g)
T ₁	GA ₃ 250 ppm	18.07	8.23	37.58	43.33	13.46	2.69
T ₂	GA ₃ 500 ppm	19.40	10.12	40.44	50.33	14.30	2.86
T ₃	Cow urine @ 5%	17.81	6.53	32.74	40.67	12.72	2.54
T ₄	Cow urine @ 10%	13.78	3.76	22.57	32.33	6.98	1.40
T ₅	Cow dung slurry @ 25%	14.29	4.82	24.64	36.33	7.58	1.52
T ₆	Cow dung slurry @ 50%	11.26	3.67	22.57	28.67	6.29	1.26
T ₇	Hot water (50°C) for 3 mins	15.17	5.46	29.09	39.67	8.83	1.77
T ₈	Tap water	9.04	1.79	21.64	26.33	4.57	0.91
T ₉	Control	6.84	1.41	16.61	20.33	3.01	0.60
Range		6.84-19.40	1.41-10.12	16.61-40.44	20.33-50.33	3.01-14.30	0.60-2.86
Mean		13.96	5.09	27.69	35.33	8.64	1.73
SE.m±		0.07	0.11	0.11	0.59	0.17	0.35
C.D. @ 5%		0.20	0.34	0.33	1.75	0.50	1.06

3.3 Effect of different seed treatments on root parameters in soursop seedlings

3.4.1 Length of primary root (cm)

At 180 days after sowing (DAS), the length of the primary root in soursop seedlings was significantly influenced by the different pre-sowing seed treatments under study. As presented in Table 3, the maximum primary root length of 40.44 cm was recorded in T₂ in which seeds were soaked in GA₃ @ 500 ppm for 24 hours. In contrast, the minimum root length of 16.61 cm was observed in T₉ (Control), which received no pre-sowing treatment. Primary root length is an important parameter for assessing root development and overall seedling vigour. The increased primary root length under GA₃ treatment may be attributed to enhanced nutrient and water uptake, along with the stimulation of cell elongation in the sub-apical region of the root. These effects may have contributed to the vigorous growth of the taproot. Similar findings have been reported Meshram *et al.* (2015) [16], Singh *et al.* (2017) [4], Kumar *et al.* (2020), Anburani *et al.* (2010) [19], Yadav *et al.* (2018) [20] and Khandekar *et al.* (2006) [21] who observed significant enhancement in root growth following GA₃ seed treatment.

3.4.2 Number of secondary roots

The number of secondary roots in soursop seedlings at 180 days after sowing (DAS) differed significantly among the various pre-sowing seed treatments under study. As shown in Table 3, T₂ (GA₃ @ 500 ppm for 24 hours) recorded the highest number of secondary roots (50.33). This was significantly higher than the values recorded under the other treatments. Conversely, the minimum number of secondary roots (20.33) was observed in T₉ (Control), which received no pre-sowing seed treatment. The increased number of secondary roots in GA₃ treated seedlings may be associated with enhanced root development and improved physiological activity, contributing to a more extensive root system. The improved development of lateral roots may also be related to the role of plant growth regulators, including auxins, in root initiation and development. Similar results were reported by Yadav *et al.* (2018) [20] in custard apple and Dhojariya *et al.* (2022) [22] in jamun.

3.4.3 Fresh weight of root (g)

The fresh weight of soursop seedling roots at 180 days after sowing (DAS) was significantly influenced by the different pre-sowing seed treatments under study, as presented in Table 3. Among the treat

ments, T₂ (GA₃ 500 ppm for 24 hours) recorded the maximum fresh root weight of 14.30 g. In contrast, the minimum fresh root weight of 3.01 g was observed in T₉ (Control), which received no pre-sowing seed treatment. The increase in fresh root weight under GA₃ treatment may be attributed to the growth-promoting effects of gibberellic acid, which stimulates cell elongation in the sub-apical region of roots. This may enhance root length and overall root development, resulting in greater fresh root biomass. Similar findings were reported by Gawade (2008) [18] in custard apple, Gurung *et al.* (2014) [15] in passion fruit and Boricha *et al.* (2020) [6] in guava.

3.4.4 Dry weight of root (g)

The dry weight of soursop seedling roots at 180 days after sowing (DAS) varied significantly among the different pre-sowing seed treatments under study. As presented in Table 3, the maximum dry root weight of 2.86 g was recorded in T₂ which was at par with the treatments T₁ (GA₃ @ 250 ppm) recording 2.69 g and T₃ (cow urine @ 5%) recording 2.54 g. Conversely, the minimum dry root weight of 0.60 g was observed in T₉ (Control) which was at par (0.91 g) with T₈ (Tap water). The higher dry root weight in GA₃ treated seedlings may be attributed to enhanced root growth and increased dry matter accumulation. These findings are in agreement with the results reported by Gawade (2008) [18] in custard apple, Gurung *et al.* (2014) [15] in passion fruit and Boricha *et al.* (2020) [6] in guava. The treatment T₃ (cow urine @ 5%) also recorded higher dry root weight (2.54 g). The favourable response may be attributed to the growth-promoting effect of cow urine, which may support root development and accumulation of dry matter in root tissues (Patel *et al.*, 2021) [23].

4. Conclusion

The present investigation entitled “Effect of pre-sowing seed treatments for enhancing the germination and seedling growth in soursop (*Annona muricata* L.)” revealed that pre-sowing seed treatments significantly improved seed germination, seedling survival and overall growth compared with the control. Among the treatments evaluated, T₂ (GA₃ @ 500 ppm) exhibited the most favourable results across the various parameters studied. It recorded the minimum number of days required for initial germination (28.00 days) and 50% germination (32.00 days), along with the maximum germination percentage (72.00%) and seedling survival percentage (53.37%). Treatment T₂ produced the tallest seedlings (67.17 cm), the maximum collar girth (7.42 mm) and the highest number of leaves (42.07). It also recorded the maximum fresh shoot weight (19.40 g), dry shoot weight (10.12 g), primary root length (40.44 cm), number of secondary roots (50.33), fresh root weight (14.30 g) and dry root weight (2.86 g). Additionally, the highest seedling vigour index-I (4837.47) and seedling vigour index-II (934.69) were observed in this treatment. Overall, the findings indicate that soaking soursop seeds in GA₃ @ 500 ppm for 24 hours was the most effective treatment among those evaluated for improving germination, seedling vigour and subsequent growth under the conditions of the present study.

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