International Journal of Global Science Research
Vol. 13, Issue. 1, April 2026, pp. 9139-9151
Available Online at www.ijgsr.com

ISSN: 2348-8344 (Online)
DOI: https://doi.org/10.26540/ijgsr.v13.i1.2026.354

Research Paper

Impact of climate change on Endemic tree species of genus *Garcinia* at Andaman & Nicobar Islands

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Received: 21/03/2026
Revised: 09/04/2026
Accepted: 14/04/2026

Abstract: *Garcinia* is an economically important genus of family Clusiaceae, comprising 250 species in the world and 43 species in India. The Andaman and Nicobar Islands represents 17 species including 7 endemics among which *G. dhanikhariensis* is highly restricted in Andaman group of Islands. This endemic species occur in the inland forest at Dhanikhari area in South Andaman and few individuals in cultivation at Chouldhari area in South Andaman Islands. It has potential of using as a fruit crop and ornamental tree.
This study focuses on *ex-situ* conservation of *G. dhanikhariensis* through seed germination and seedlings collections from natural habitats and conservation at Dhanikhari Experimental Garden Cum Arboretum of Botanical Survey of India, Andaman and Nicobar Islands. Seed germination rate, and seedling growth behavior were recorded. Besides, the influence of temperature, humidity, and rainfall on seedlings was assessed. This paper aims to study the germination rate, growth patterns, and the impact of climatic factors on this endemic species, for its conservation and sustainable utilization

Keywords: Endemic, Garcinia, Growth data, Climate change, conservation.

Introduction: *Garcinia* L. is a well-recognised genus of family Clusiaceae for it has commendable economic importance as a source of edible fruits. The genus is represented by 250 species in the world (Rogers and Sweeney, 2007; Sweeney, 2008; Sharma *et al*., 2013; Nimanthika and Kaththriarchi, 2010), and in India by 43 species (Anderson, 1874; Maheshwari, 1964; Singh, 1993; Srivastava, 1994, Singh 2020). It has 17 members in the Andaman and Nicobar Islands including 7 endemics

such as *G. andamanica* King, *G. cadelliana* King, *G. calycina* Kurz, *G. dhanikhariensis* S. K. Srivastava, *G. kingii* Pierre ex Vesque, *G. kurzii* Pierre, and *G. microstigma* Kurz (Hazra *et al*., 1999; Sinha, 1999; Pandey and Diwakar, 2008; Murugan *et al*., 2016; Singh et al., 2021; Purohit and Vivek, 2022; Purohit *et al*., 2022 and 2023). Out of 7 endemics, *G. dhanikhariensis* is highly restricted in Andaman group of Islands. It has potential as both a fruit crop and an ornamental tree.

Garcinia dhanikhariensis was first described by S. K. Srivastava in 1994, collected from the Nayasahar forest in the Dhanikhari area of South Andaman Island. The specific epithet 'dhanikhariensis' was given in reference to its type locality. Recently, three studies were published on the species regarding the seed germination and fatty acid content (Bohra *et al.*, 2021), leaf anatomy (Devi and Jayakumar, 2022) and report on new location in Andaman Islands and their IUCN red list assessment (Purohit *et al*., 2025). The present authors have worked on growth behavior of the species during 2019 to 2023 and correlated the data with climate data. These plants were found distributed in and around the type locality at Nayasahar, with a few individuals cultivated in the Chouldhari area, nearly 12 km from the type locality.

Taxonomic Treatment:

Garcinia dhanikhariensis S. K. Srivast. Nordic J. Bot. 14: 51. 1994: Evergreen tree, *c*. 8 m high. Bark greyish to black, old ones flaked; exudation milky; crown pyramidal with horizontal spreading branches. Branchlets warted at nodes, brown when dry, glabrous. Leaves 9–14 × 3–5 cm, opposite, elliptic or elliptic-lanceolate, apex acuminate, base cuneate, margin entire, thinly coriaceous, upper surface slightly glossy, lower rather dull; midrib prominent beneath; lateral nerves 9–12 pairs, obscure above, visible beneath; petiole *c.* 5 mm long, channelled. Male flowers 1.2 cm across, solitary or in fascicles of three, actinomorphic, red in colour, bracteolate; bracteoles 2, ovate, mucronate, attached at the base of the sepal; pedicel 5–6 mm long. Sepals 4, 3–4 mm long, jointed at the base, imbricate, persistent, fleshy, glabrous. Petals 4, 5–7 × 4–5 mm, oblong, broadly ovate, obtuse, crimson-red, glabrous. Stamens 12 in 4 bundles of 3 stamens each, 3–4 mm long, staminal bundles opposite to sepals, anthers dithecous, introse, unilocular, dorsifixed; filament 2–3 mm long. Ovary globose, *c.* 5 mm diam., 5-locular; style sessile; stigma of the rudimentary pistil with 6–7 radiating lobes. Berry subglobose, 2.5–5 cm in diam., reddish to purplish when ripen, sepals persistent, pulp is yellowish (Fig. 1: A & B).

Flowering & fruiting: January–April.

Distribution: India; Andaman and Nicobar Islands: South Andaman, Nayasahar, Chouldhari..

IUCN Red List Assessment: Endemic & Critically Endangered (Purohit *et al.*, 2025).

Result and Discussion: Seeds of *Garcinia dhanikhariensis* were sowed in polybags and the germination percentage was noted (Fig. 1: C, D & E). After germination, five replicates were maintained in polybags and placed separately in the garden under regular monitoring with watering provided as and when required. The growth rate was recorded weekly including length of stem and number of leaves initiated after germination of seeds, and the data were tabulated in Excel sheets. Observations were continued up to 901 days after germination of seeds. On each day of data recording, corresponding climate data i.e. temperature, humidity and rainfall of Port Blair were obtained from online world climate data and

tabulated in Excel sheets. Simultaneously both growth and climate data were combined in to a single table. Based on this, 12 graphs were prepared to show the relation between climatic factors with growth behavior after germination. The 12 graphs with their explanations are presented as follows:

(1) Growth behaviour of *Garcinia dhanikhariensis* with temperature (Graph-1): Graph-1 shows that the temperature in the nursery area ranged from 28ºC – 29ºC during the first 90 days after seedling plantation with an average seedling growth of 9 cm. Between 91 to 195 days, the maximum temperature remained around 29ºC and the minimum temperature dropped to 23ºC. During this period, the seedling growth slowed with an incriment of only 3.6 cm. From 196 – 400 days, high fluctuation in the temperature was recorded with minimum temperature ranging from 21ºC – 28ºC and maximum temperature from 28 ºC – 31ºC). Correspondingly, plant hight increased up to 21.04 cm (out of five replicates, one plant showed exceptional growth up to 49.5 cm). However, a decline in temperature from 20ºC to 26ºC during 401 to 645 days resulted in a marked reduction in growth with seedlings showed only a 2.8 cm increase. After 645 days, a significant rise in temperature was recorded, with the minimum temperature reaching 27°C and maximum temperatures reaching 30°C. The plant growth was increased by 5.12 cm during 646 – 900 days period.

Conclusion:

Graph-1 shows the growth behaviour of *Garcinia dhanikhariensis* seedlings under nursery condition, showing different pattern according to the variation of maximum and minimum temperature regimes in the study area

Maximum growth was observed when the minimum and maximum temperature gradually decreased.

Growth slowed when the values of minimum and maximum temperature difference were progressively increased.

A steady and moderate growth occured when the minimum temperature fluctuated and maximum temperature remained stable.

When the maximum and minimum temperature fluctuated abruptly and decreased steeply, seedlings showed irregular growth pattern, likely influenced by temperature related climatic factors.

(2) Growth behaviour of *Garcinia dhanikhariensis* with rainfall (Graph-2): During the first 30 days after seedling plantation, rainfall ranged from 0 – 32.4 mm and seedlings grew to an average hight of 6.8 cm. Between 31 and 195 days, rainfall decreased to 0.3 mm or even no rainfall, resulting in slow growth, with plant hight increasing by 12.6 cm which is 5.8 cm in 165 days. This period experienced a low rainfall. From 195 to 405 days rainfall inceased moderately ranged between 0.9 mm to 57.8 mm, which supported a gradual increase in seedling growth up to 21.08 cm. However, between 406 to 580 days, seedlings growth was remarkably decreased with 2.14 cm height increment in 175 days due to low rainfall or no rainfall between 406 and 580 days. After 580 days, an abrupt high rainfall event (51.6 mm in a day) was observed but the seedling growth remained slow, increasing by mere 0.62 cm during 65 days duration between 581 and 645 days. From 646 to 720 days, as rainfall gradually increased to 51.4 mm, seedlings growth also gradually increased to 2.08 cm in 75 days. Between 721 and 900 days, a drastic decline in rainfall (less than 2 mm per day) observed, coupled with a slower seedling

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growth with plant hight reached up to 29.1 cm by the end of this period.

Conclusion: The graph-2 shows the growth behaviour of *Garcinia dhanikhariensis* seedlings in nursery under different rainfall conditions. The growth pattern varies in four major ways according to the rainfall regimes in the study area

The seedlings shows rapid growth when the rainfall is high with repeated intervals.

Seedlings growth becomes slow when rainfall drops suddenly and remains less than 2 mm per day.

The seedlings shows gradual increase in growth when the rainfall increases progressively in regular intervals.

When the rainfall per day fluctuate abruptly and decrease sharply, the seedlings shows an irregular growth pattern, likely due to rainfall related climatic factors.

(3) Growth behaviour of *Garcinia dhanikhariensis* with humidity (Graph-3): The maximum humidity in the nursery area was recorded at 82% during the first 40 days of seedling plantation, with average seedling growth reaching up to 7 cm. Between 41 and 135 days, humidity decreased up to 79% with a very slow growth of seedlings up to 9.54 cm, and increment of mere 2.54 cm hight in a 95 days. After this period, an abrupt drop in humidity was observed. However, from 135 to 390 days, the seedling growth improved significantly up to 20.68 cm when the maximum humidity ranged between 80% and 85%. A marked decline of seedling growth followed during 391 to 660 days when humidity droped to 61 %. During this 20 days, seedling hight increased by only 3.76 cm indicating poor growth. Between 661 and 735 days, gradual increases in rainfall resulted in an increase of humidity up to 83% which lead to an increase of growth up to 2.2 cm in coming 75 days. From 736 to 900 days the graph shows sharp decrease in humdity up to 67% due to reduced rainfall (less than 2 mm per day). This period also corresponded with reduced seedlings growth.

Conclusion: The graph-3 shows the growth behaviour of *Garcinia dhanikhariensis* seedlings in nursery. The growth pattern varies in four major ways according to the humdity regime of the study area.

The seedlings shows high growth when humdity ranges between 80% and 85%, whereas growth slows when humdity declines.

The seedlings exhibit better growth when humidity is more than 75% and growth reduces when humdity falls less than 75% per day.

The seedlings growth increase with a gradual increase in humdity and decreases when humidity decline progressively.

When humidity fluctuate abruptly and decrease sharply (by more than 15% to 20% e), or when it fluctuate slightly (less than 5%), seedlings undergo irregular growth pattern, likely influenced by other climatic factors effective with humidity fluctuation.

(4) Leaf initiation of *Garcinia dhanikhariensis* with temperature (Graph-4): The difference between maximum and minimum temperature ranged from 1ºC to 3ºC in the nursery area during the first 90 days of seedling plantation with an average leaves initation of 9.8 leaves per plant. Between 91 – 140 days, both maximum and minimum temperatures decreased by 2ºC to 3ºC, which corresponded with a reduction in the plant biomass and an average leaf fall of 0.8 leaves per plant. During 141 to 180 days, both seedling growth and biomass incresed with an average of 3.4 leaves per plant. During this period, the minimum and

maximum temperature increased between 3ºC to 5ºC and observed a high gain of biomass. From 181 – 560 days, seedling growth and biomass increased gradually with an average of 22.4 leaves per plant and net increase of 8.4 leaves. This duration experienced a higher difference between minimum and maximum temperature supporting gradual increase of biomass. Between 561 and 660 days, seedling growth decreased markedly and as the minimum and maximum temperature increased up to 28ºC and 31ºC. During this 100 days period, poor seedling growth was observed with an average leaf fall of 4.2 leaves per plant. Seedling growth and biomass increased gradually between 661 and 705 days with an average of of 21.6 leaves per plant and an average increase of 3.4 leaves. During this period, both minimum and maximum temperature decreased up to 3ºC to 5ºC and increased the biomass. After 705 days of seedling plantation, the minimum temperature decreased again up to 22ºC and maximum temperature remained the same up to 28ºC. An average of 1.6 leaves per plant was increased during these 30 days. Between 736 to 900 days, the graph shows considerable fluctuations in both minimum and maximum temperatures. During this period the average number of leaves also varied by ±1.6 leaves per plant, accompanied by slow growth and reduced biomass accumulation.

Conclusion: The graph-4 shows the leaf initiation behaviour of *Garcinia dhanikhariensis* seedlings in the nursery. The average number of leaves per plant varies in in different maximum and minimum temperature regimes in the study area.

The seedlings shows a higher average number of leaves per plant when the difference between minimum and maximum temperatures gradually decreases.

The gradual decrease in the temperature difference between minimum and maximum values leads to a reduction in the average number of leaves per plant.

When the maximum temperature remains constant and minimum temperature fluctuate abruptly and decrease steeply, the average number of leaves per plant shows a gradual increase.

When the maximum and minimum temperature fluctuate abruptly and decline steeply, the average number of leaves per plant fluctuate in leaf initiation. This pattern is presumed to be the effect of other climatic factors effective with temperature fluctuation.

(5) Leaf initiation of *Garcinia dhanikhariensis* with rainfall (Graph-5): The rainfall during the first 100 days of seedling plantation was ranged between 0 – 32.4 mm in the nursery area. During this period, an average of 9.8 leaves initiation per plant was recorded. Between 101 – 200 days, rainfall decreased up to 1.5 mm or no rainfall. Correspondgly leaf fall was observed with an average of 5.8 leaves per plant during this period, which indicate the adverse effect of low rainfall on seedlings growth. 201 – 480 days the seedling growth increased with and average of 13 leaves per plant and an average of 7.2 leaves per plant. Rainfall during this period ranged between 0.6 mm and 57.8 mm, and plant gained higher biomass. Between 481 to 530 days, the reduction of rainfall led to poor growth with an average reduction of 1.4 leaves due to leaf fall in 50 days. A sudden increase was observed between 531 – 545 days even under no rainfall with an average increase of 3.4 number of leaves per plant in 15 days. Following this, a sudden increase of rainfall (51.6 mm in a day) after 545 days of

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Available Online at www.ijgsr.com

seedling plantation, resulted decrease in biomass and number of leaves per plant (up to an average 5.4 during 120 days) during 546 to 665 days. Between 666 – 755 days, 1 or 2 sudden high rainfall event enhanced the seedling growth, resulted an increase of 21.2 leaves per plant. Between 756 – 900 days rainfall drastically reduced to less than 2 mm per day leading to slow seedling growth. During this 145 days, only 0.2 leaves initiated per plant in between 756 to 900 days.

Conclusion: The graph-5 shows the leaf initiation behaviour of *Garcinia dhanikhariensis* seedlings under different rainfall regimes in nursery conditions. The average number of leaves varies in three major ways

The seedlings shows higher average number of leaves per plant when the rainfall events are high and occur repeatedly in few days intervals.

The seedlings shows decrease in average number of leaves per plant or leaf fall when the rainfall is less than 2 mm in a day.

In some cases, both sudden high rainfall and prolonged rainfall (less than 2 mm in a day), lead to fluctuations in the leaf initiation. This irregular response suggest the influence of other climatic factors effective with rainfall fluctuation.

(6) Leaf initiation of *Garcinia dhanikhariensis* with humidity (Graph-6): The maximum humidity reached to 82% with an average of 76% during the first 110 days of seedling plantation in the nursery. During this period, an average of 10 leaves per plant was initiated. Between 111 – 240 days of seedling plantation, the humidity fluctuated and decreased up to 65%.. During this period, an average of 6.4 leaves per plant initiation was observed for 130 days. At this point graphs shows sudden drop in maximum humidity. Seedling growth increased gradually with average 13 total number of leaves per plant in 480 days showing an average of 5.4 leaves initiation per plant during 200 days between 241 – 480 days. At this point graphs shows the maximum humidity increased up to 85% and average humidity increased up to 78% and a corresponding biomass increase. Between 481 – 530 days, seedling growth markedly decreased due to humidity decline up to 73% which resulting poor seedling growth and leaf fall with average 1.4 leaves per plant over 50 days. Between 531 – 545 days, a sudden increase in growth was observed even though humidity and rainfall decreases. During this 15-day period, an average 3.4 leaves per plant was initiated. From 546 – 665 days, growth of seedlings markedly decreased. This period experienced a humidity decline up to 61% and a sudden increase (80% – 83% in a day). Subsequently, a poor seedling growth and leaf fall with average 5.4 leaves per plant was observed in 120 days. After 665 days, increased rainfall led to a rise in humidity up to 86%. This period (666 – 755 days) showed significant biomass gain with an average of 21.2 leaves per plant in 90 days period. Between 756 – 900 days, humidity declined up to 78% due to reduced rainfall. As a result seedling growth also reduced considerably, with an average of 0.2 leaves per plant initiated.

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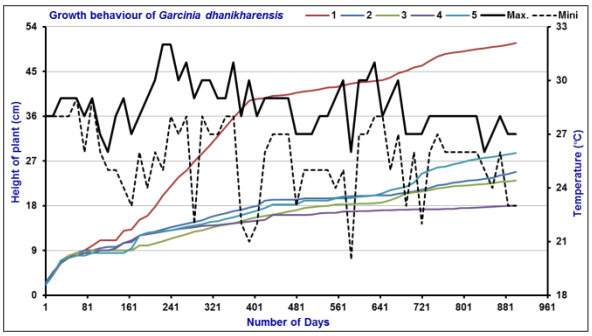
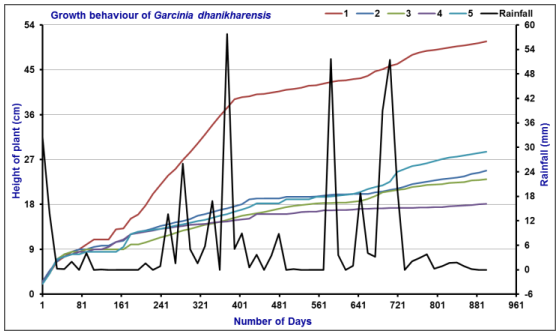
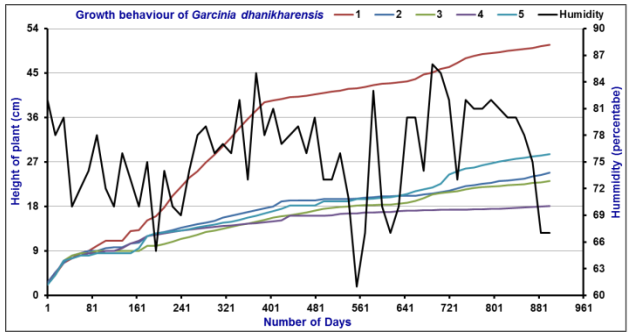


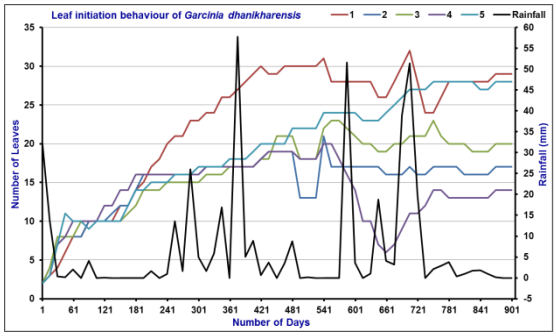
Graph-1: growth behaviour of *Garcinia dhanikhariensis* in relation to temperature variation



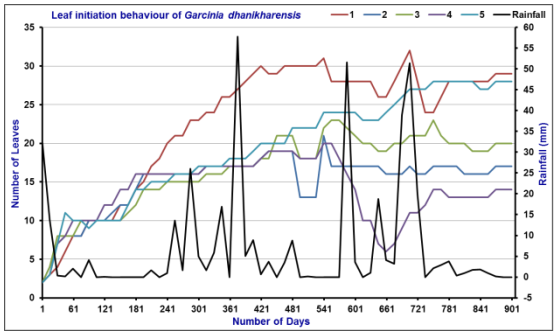
Graph-2: growth behaviour of *Garcinia dhanikhariensis* in relation to rainfall



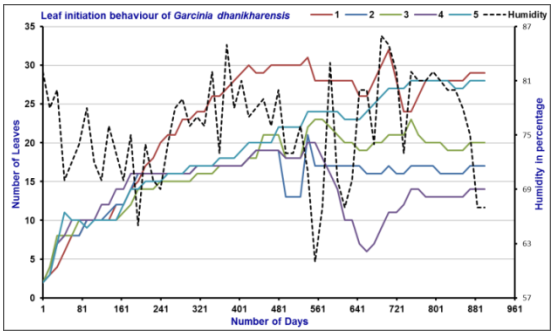
Graph-3: growth behaviour of *Garcinia dhanikhariensis* in relation to humidity



Graph-4: shows effect of temperature variation on leaf initiation in *Garcinia dhanikhariensis*



Graph-5: shows effect of rainfall variation on leaf initiation in *Garcinia dhanikhariensis*



Graph-6: shows effect of humidity variation on leaf initiation in *Garcinia dhanikhariensis* with Humidity

Conclusion: The graph-6 shows the leaf initiation behaviour of seedlings of *Garcinia dhanikhariensis* under varying humidity conditions in the nursery. The average number of leaves varies in four major ways. The seedlings shows higher average number of leaves per plant when humdity increases suddenly in a range of 80% – 85%. The seedlings shows slow growth and leaf fall when humdity drop between 61–67%. The

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seedlings shows slow growth and slightly increased rate of leaf production when the humidity ranges between 73% – 77%. The seedlings shows higher average number of leaves per plant when the average humdity is more than 78% or leass than 72 %.

(7) Month-wise growth of *Garcinia dhanikhariensis* with number of days and temperature (Graph-7): The graph-7 shows the monthly growth pattern (in terms of hight) of *Garcinia dhanikhariensis* seedlings under nursery condition. The growth significantly varied in two major ways according to the effects of maximum and minimum temperature regimes of study area. The growth was favorable when the difference between average minimum and maximum temperature was not more than 5ºC and average monthly minimum temperature remained above 24ºC. Under these coditions, the seedlings showed remarkable growth during August, September and October, reaching up to 5.5 cm per month. In contrast, difference between average monthly minimum and maximum temperature exceed 5ºC and the average monthly minimum temperature dropped down to 24ºC or below, seedlings growth was suppressed. During November and December, seedlings showed poor growth, with the maximum hight increased only up to 0.5 cm per month.

(8) Month-wise growth of *Garcinia dhanikhariensis* with number of days and rainfall (Graph-8): The graph-8 shows the monthly growth pattern (in terms of height) of *Garcinia dhanikhariensis* seedlings under nursery condition. The growth varied in three major ways according to the effect of maximum and minimum rainfall regimes. The average monthly rainfall ranged between 300 to 500 mm favoured seedling growth, with remarkable growth increased during June, August, September, reaching up to 5.3 cm per month. However, when the average monthly rainfall reduced up to 100 mm or less, the seedling growth was poor, with maximum hight reached only up to 0.8 cm per month. When the average monthly rainfall flactuate between 100 mm to 300 mm, the seedlings growth undergo fluctuation which is presumed to be influenced by climatic factors effective with rainfall fluctuation.

(9) Month-wise growth of *Garcinia dhanikhariensis* with number of days and humidity (Graph-9): The graph-9 shows the monthly growth pattern (in terms of height) of *Garcinia dhanikhariensis* seedlings in nursery conditions. The growth varied in two major ways according to the humidity regimes of the area. The average monthly humidity of 80% and above favoured seedling growth. The seedlings showed remarkable growth during June, July, August, September and October, reaching up to a height up to 5.3 cm per month. However, the average monthly humidity of 70% and below was not favourable for seedling growth. led to poor growth during Novermber, December and January, with maximum hight limited only up to 0.8 cm per month.

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(10) Month-wise leaf initiation of *Garcinia dhanikhariensis* with number of days and temperature (Graph-10): The graph-10 shows the monthly leaf initiation pattern (average number of leaves) of *Garcinia dhanikhariensis* seedlings in nursery condition. The average number of leaves varied in two major ways according to the maximum and minimum temperature regimes of the area. When the difference between average monthly minimum and maximum temperature not more than 5ºC and average monthly minimum temperature exceed 24ºC, the leaf initiation was favoured with a remarkable increase of biomass and an increase of average number of leaves up to 4.5 leaves per month. July and September were favourable for biomass increase. In contrast, the difference between average monthly minimum and maximum temperature exceedd 5ºC and average monthly minimum temperature dropped to 24ºC or below, the leaf initiation, was not favoured and observed a leaf fall with a monthly average number of leaves decreased to 2. The months of December and January was unfavourable for growth and observed a biomass decrease as leaf fall due to unfavourable temperature regimes.

(11) Month-wise leaf initiation of *Garcinia dhanikhariensis* with number of days and rainfall (Graph-11): The graph-11 shows the monthly leaf initiation pattern (average number of leaves) of *Garcinia dhanikhariensis* seedlings in nursery condition. The average number of leaves varied in two major ways in response to maximum and minimum rainfall regimes of the area. The monthly rainfall range between 300 and 500 mm favoured leaf initiation and biomass increase with a monthly average number of 4.5 leaves increased per month. The months of August, September and October were favourble for increase of biomass and number of leaves because of rainfall more than 300 mm or more per month. However, a monthly rainfall event 92.2 mm or below was unfavourable for leaf initiation and leaf fall occurred. No leaves were initiatiated and the average number of leaves declined to 2 in a month. During May and June the leaf initiation and biomass were negetively affected and leaf fall occurred due to a rainfall reduction below 92 mm per month.

(12) Month-wise leaf initiation of *Garcinia dhanikhariensis* with number of days and humidity (Graph-12): The graph shows, monthly leaf initiation pattern (average number of leaves) of *Garcinia dhanikhariensis* seedlings under nursery condition. The average number of leaves varied in two major ways based on the humidity regimes of the area. The average monthly humidity of 78% and above favoured biomass and leaf initiation. During these conditions, average number of leaves increased up to 4.5 per month. August and October supported enhanced leaf initiation and biomass increase as average humidity increase.

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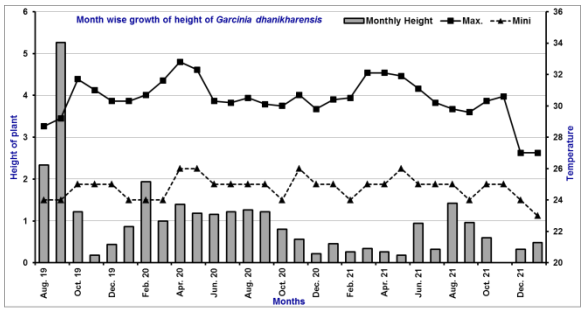
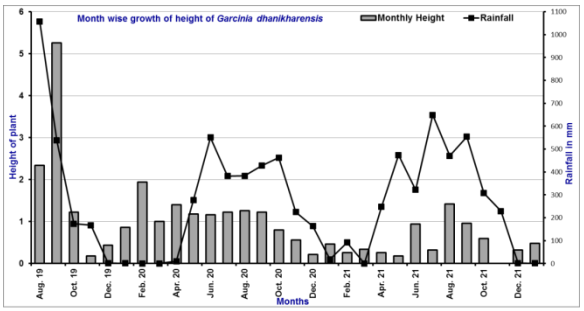
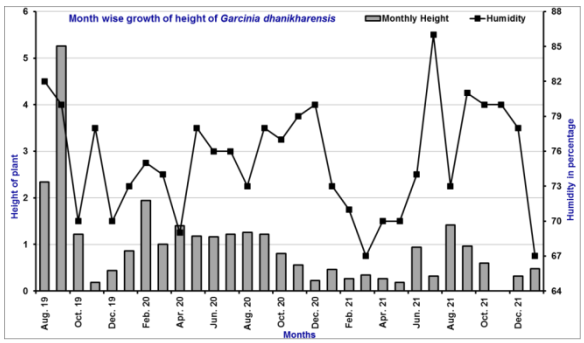


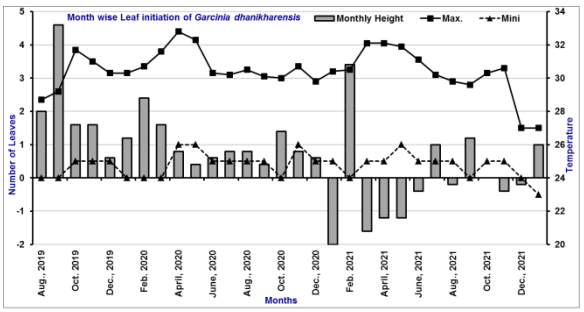
Graph-7: shows month-wise growth of *Garcinia dhanikhariensis* with corresponding number of days and average temperature



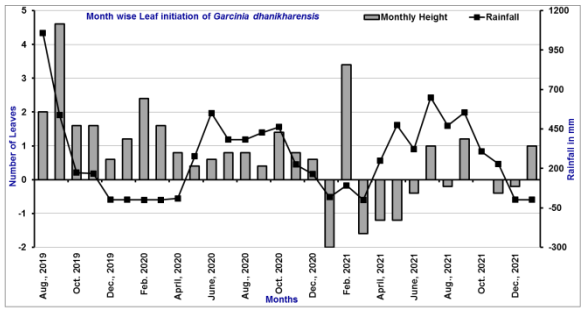
Graph-8: shows month-wise growth of *Garcinia dhanikhariensis* with corresponding number of days and rainfall



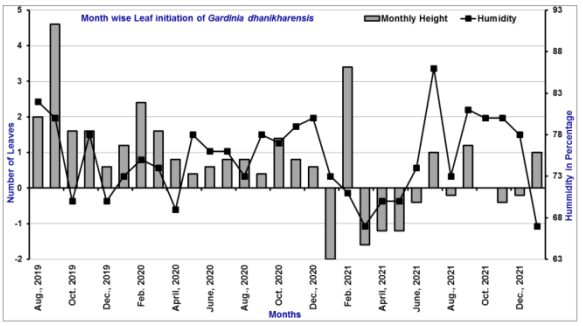
Graph-9: shows month-wise growth of *Garcinia dhanikhariensis* with number of days and Humidity



Graph-10: shows month-wise leaf initiation of *Garcinia dhanikhariensis* with number of days and temperature



Graph-11: shows month-wise leaf initiation of *Garcinia dhanikhariensis* with corresponding number of days and rainfall



Graph-12: shows month-wise leaf initiation of *Garcinia dhanikhariensis* with corresponding number of days and humidity

Average monthly humidity less than 70% was unfavorable for leaf initiation and leaf fall was occurred, with an average number of leaves decreased up to 2 in a month. April, May and June month of every year was unfavorable for leaf initiation and biomass decrease due to leaf fall as average humidity fall.

Conclusion: *Garcinia dhanikhariensis* has significant potential for domestication and commercialization as a fruit crop in the Andaman and Nicobar Islands. However, its natural habitat is highly confined and under various threats which required proper conservation management. Therefore, the authors attempted an effective approach for mass propagation of seedlings in polybags. Seeds were collected from fully ripened fruits. Approximately 500 seeds of this species were sown in polybags, and the germination rate and growth data were monitored weekly at the Dhanikhari Experimental Garden cum Arboretum of the Botanical Survey of India, Andaman and Nicobar Regional Centre. The comparison between growth data and climatic variables shows that the climate plays a significant role in growth and leaf initiation of this species. Rainfall and temperature show strong relationship with seedling performance. High rainfall has a direct influence on leaf initiation, especially when it occurs around 50 mm per day and at regular intervals. In contrast, low rainfall or absence of rain lead to reduced growth and slower leaf initiation. Temperature also significantly influences the growth patterns of the species. A gradual decrease in the difference between maximum and minimum temperatures is connected with growth improvement and more leaf initiation. However, a drastic temperature difference slows down the seedling growth. Sudden fluctuations in high temperature also influence a rapid stem growth.

Acknowledgements:
The authors are thankful to the Director, Botanical Survey of India for providing facilities and encouragement. They are thankful to the officers and staff of Botanical Survey of India, Andaman and Nicobar Regional Centre, for helps during ex-situ conservation activities. They are also thankful to the Forest Department, Andaman and Nicobar Islands for support during the field work.

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International Journal of Global Science Research
Vol. 13, Issue. 1, April 2026, pp. 9139-9151
Available Online at www.ijgsr.com

ISSN: 2348-8344 (Online)
DOI: https://doi.org/10.26540/ijgsr.v13.i1.2026.354

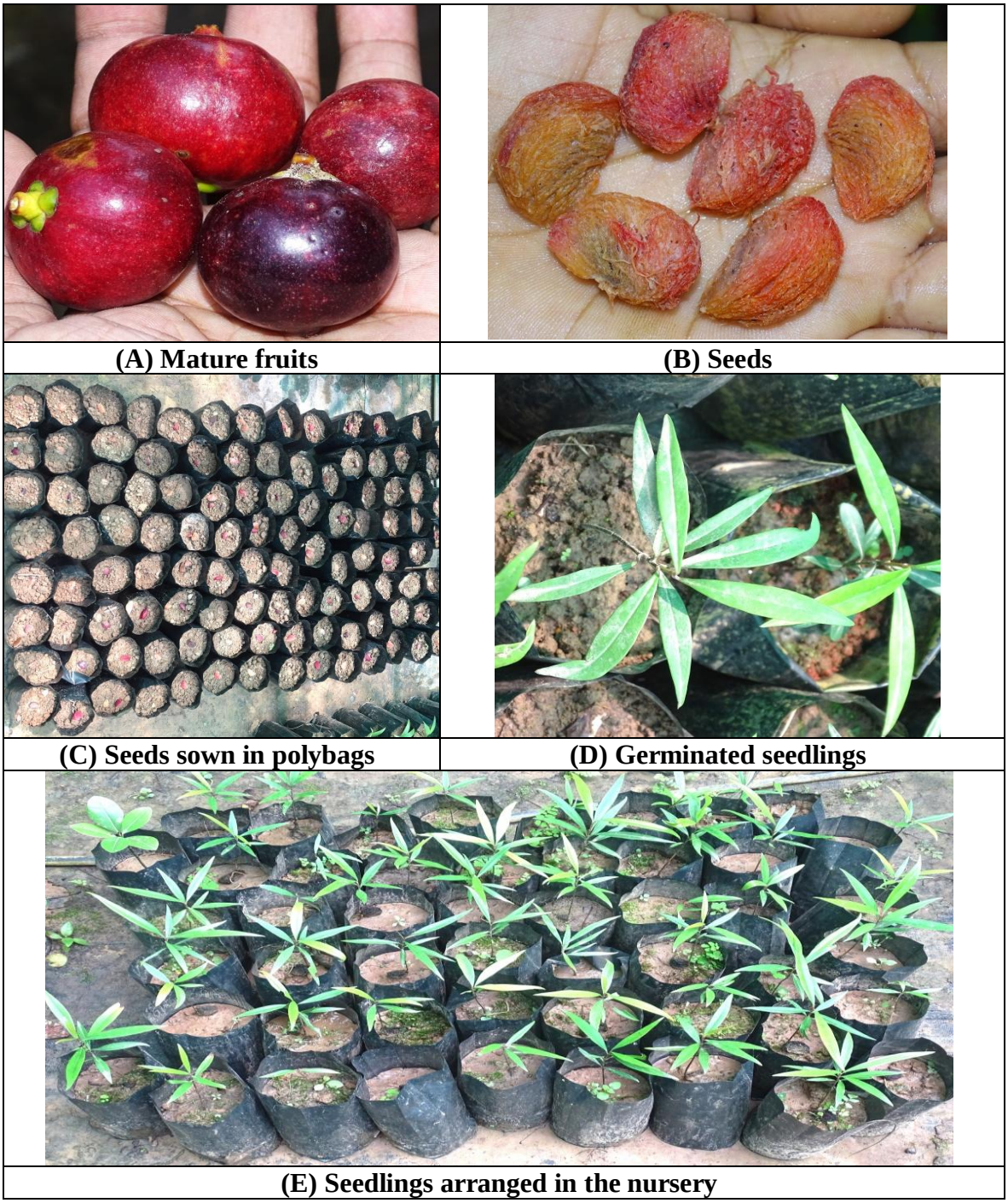

Figure: 1. ***Garcinia dhanikhariensis:*** Various stages of seed germination and seedling development in the nursery at Dhanikhari Experimental Garden cum Arboretum, BSI, Port Blair (Photos @ C.S. Purohit).