



A new *Lagenandra* species with two varieties from the Wet Zone of Sri Lanka

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Abstract

Field based taxonomic revisions play an important part in unfolding new species. During such a revision of Sri Lankan members of the genus *Lagenandra*, we encountered a new *Lagenandra* species; *Lagenandra peradeniyae* with two infraspecific taxa; *L. peradeniyae* var. *peradeniyae* and *L. peradeniyae* var. *speciosa*. The new species with its infraspecific taxa were studied in detail and compared with the morphology of the other species described in the genus and based on field collected data conservation assessments were performed. A detailed description for the new species and the infraspecific taxa is presented and, a key for the identification of the two varieties of *Lagenandra peradeniyae* is given for easy identification. With the newly described species, the number of endemic members of Sri Lankan species of *Lagenandra* rises to twelve and global to twenty. The two recognized infraspecific taxa would be the first below species level taxa described under the genus. According to the IUCN red data category guidelines, *Lagenandra peradeniyae* qualifies for Critically Endangered category under Criterion B1ab (iii, v) + B2ab (iii, v) and C2 (a) (i).

Keywords: Biodiversity conservation, Critically endangered, Flora of Sri Lanka, Ornamental aquatics, Amphibious/Rheophytic plants

Introduction

Taxonomy, an area that receives less consideration and is neglected, plays an important role in biodiversity conservation. Conservation of organisms cannot necessarily be expected unless they are identified. Our efforts to understand the consequences of environmental change and degradation are compromised fatally if we cannot distinguish and describe the interacting components of natural ecosystems. In this context, describing species provides way for the conservation of the species by resolving the species ‘unit’ (Mace 2004). Even though molecular data have extensively contributed to resolving species limits, taxonomic revisions based on extensive field surveys are mandatory in unveiling the undescribed nature's treasure before it becomes extinct. Such exercises provide the basis for the biodiversity richness of a country. In such context, we have initiated a taxonomic revision of the genus *Lagenandra* in Sri Lanka, where three new endemic *Lagenandra* species have already been described (Madola *et al.* 2021a, Madola *et al.* 2021b). Continuous extensive field surveys in the Wet Zone of Sri Lanka still contribute to discovering new species of the genus.

Lagenandra Dalzell (1852: 289), an amphibious/rheophyte genus in the family Araceae with presently 19 recognized species (Sivadasan & Babu 1995, Sivadasan *et al.* 2001, Biju *et al.* 2018, Nicolson 1987, Sasikala *et al.* 2019, Madola *et al.* 2021a, Madola, *et al.* 2021b). The genus is confined to Sri Lanka, Bangladesh, and India and most of its members are well known for their ornamental potential (Yakandawala 2012, Biju *et al.* 2018). In Sri Lanka 12 species have previously been recognized: *L. bogneri* de Wit (1978: 33–34), *L. dewitii* Crusio & de Graaf (1986: 56–59), *L. erosa* de Wit (1978: 36–38), *L. jacobsenii* de Wit (1983: 291), *L. kalugalensis* Madola, D. Yakandawala and K. Yakandawala in Madola *et al.* (2021b:190–193), *L. koenigii* (Schott 1859: 81) Thwaites (1864: 334), *L. lancifolia* (Schott 1857: 221) Thwaites (1864: 334), *L. ovata* (Linnaeus 1753: 967) Thwaites (1864: 334), *L. praetermissa* de Wit (1983: 299), *L. srilankensis* Madola, Yakand. & K. Yakand. in Madola *et al.* (2021b:193–197), *L. thwaitesii* Engler

(1879: 621) and *L. wayambae* Madola, K. Yakand., Yakand. & Karunaratne in Madola *et al.* (2021b: 217–220) of which eleven are endemic to the island (Nicolson 1987, Madola *et al.* 2021a, Madola *et al.* 2021b). Even though, Crusio & Graaf in 1986, recognized *L. dewitii* as a species occurring in the country, according to Nicolson (1987), the species is a variation of *L. praetermissa*. With the presently described *L. peradeniyae* the number is 13.

Several *Lagenandra* species possess attractive foliage and colourful spathes and have fascinated the aquatic ornamental plant industry worldwide. Therefore, many of these endemics that are of high demand in the aquarium trade are over-exploited from the naturally occurring populations for export. This has resulted in a marked reduction in their populations and in some instances to local extinctions (Daily news.lk 2009, Yakandawala 2012, Yakandawala *et al.* 2013, Personal communications). In addition to the threat of extracting from the wild, habitat degradation due to anthropogenic activities is another hazard that we have noticed during the past few years. Subsequently, six of the eight endemic species previously recorded in Sri Lanka are now listed as threatened in the National Red list (The National Redlist 2020), of which four under Endangered, one under Critically Endangered while the other under Critically Endangered (probably extinct) category. Further, the conservation status of the recently described three species, *L. wayambae*, *L. kalugalensis* and *L. srilankensis* have been determined as Critically Endangered (Madola *et al.* 2021a, Madola *et al.* 2021b), raising this category to four and total endemics to eight in Sri Lanka. The present paper describes the most recent addition to the genus *Lagenandra* with two varieties from the Wet Zone of Sri Lanka together with the conservation status.

Material and methods

Field collection of samples and coding of characters

During field studies carried out covering the Wet Zone of the country we came across a *Lagenandra* that did not match any of the described species, in the Indikada Mukalana Forest Reserve. Therefore, extended field studies were conducted in the area and adjacent areas in the Welikanna (Waga), Colombo district, between 2018–2022 with repeated field visits to monitor the flowering and the fruiting populations.

The morphological characters of the field collected samples were studied in detail in the laboratory, at the Department of Botany, University of Peradeniya. Both quantitative and qualitative morphological characters were studied. A minimum of five mature flowering individuals from each population were selected to record data for characters, and five measurements were taken from each individual plant for a particular character. The mean of the measured characters was taken as the particular character state value. Macroscopic parts were observed under a dissecting microscope and a stereomicroscope (LEICA L2). All character measurements were obtained using a ruler (smallest measurement 1 mm) or an eyepiece graticule (smallest measurement 0.1 mm) where appropriate. As within population variations were noted, a morphometric analysis was performed to evaluate the possibility of the presence of below species level taxa.

Sixteen individuals were employed in the morphometric analyses and the individuals were denoted by an acronym for easy reference (L170a-h and L171a-h). A total of 83 morphological characters (39 quantitative and 44 qualitative) were coded into a data matrix. The list of the characters with character states used in the morphometric analyses is given in Table 1.

Morphometric analyses

Morphometric analysis was performed using clustering and ordination methods (Marhold 2011). Hierarchical Cluster Analysis (CA) and, Principal Coordinate Analysis (PCoA) and Principal component analysis (PCA) were carried out using the statistical software PAST (Version 2.15) (Hammer *et al.* 2001). Cluster Analysis (CA) were applied to the matrix of all material to obtain information about the grouping of specimens on the basis of overall morphological similarity. The cluster solution was selected from the best suitable algorithm where Gower distance was used to calculate the similarity measures with the ‘paired group’ (UPGMA) option and the Single Linkage algorithm with the highest Cophenetic correlation value. The ordination analysis was completed with Gower distance (transformation exponent $C=2$) to produce a distance matrix for use in the PCoA. Since the PCoA gives the distance between the individuals rather than the correlation between characters, this is appropriate for a mixed character data, as it will not be distorted by binary characters as by Principal Components Analysis (PCA) (Cupido 2003). A PCA analysis was carried out employing only the quantitative characters. Consequently, each major clusters recovered were identified.

TABLE 1. Morphological characters utilized in the morphometric analysis.

Character	Character state
1. Plant habit	[0] Leaves parallel to the substrate; [1] Not parallel to the substrate
2. Petiole length	cm
3. Petiole width	cm
4. Sheath length	cm
5. Sheath symmetry	[0] Asymmetric; [1] Symmetric
6. Petiole color	[0] Green mixed with maroon; [1] Green
7. Petiole shape	[0] Terete; [1] Flat on the upper surface
8. Petiole protuberance	[0] Absent; [1] Present
9. Leaf shape	[0] Lance-ovate to narrowly elliptic; [1] Lance-ovate
10. Leaf color-upper surface	[0] Dark green; [1] Light green
11. Leaf length	cm
12. Leaf width	cm
13. Leaf length/width ratio	Ratio
14. Base shape	[0] Obtuse; [1] Rounded
15. Base symmetry	[0] Asymmetric; [1] Symmetric
16. Apex shape	[0] Acuminate; [1] Other
17. Marginal type	[0] Entire; [1] Crenate
18. Mid rib upper surface	[0] Raised; [1] Un-raised
19. Mid rib lower surface	[0] Raised; [1] Un-raised
20. Mid rib lower surfaces protuberance	[0] Absent; [1] Present
21. Silver color on leaf upper surface	[0] Variegated; [1] Either side of the mid-rib
22. Lower surface leaf margin	[0] Cartilaginous; [1] Not cartilaginous
23. Lower surface leaf vein protuberances	[0] Absent; [1] Present
24. Cataphyll length	cm
25. Cataphyll color	[0] Light green; [1] Dark maroon
26. No of keels	Count
27. Rhizome diameter	cm
28. Inflorescence position in relation to the leaves	[0] Above leaves; [1] Below leaves
29. Peduncle color	[0] Light green; [1] Light red
30. Peduncle length	cm
31. Peduncle width	cm
32. Kettle length	cm
33. Kettle width	cm
34. Kettle warts	[0] Absent; [1] Present
35. Kettle outside color	[0] Light cream; [1] Light maroon
36. Kettle inside color	[0] Dark maroon; Other
37. Kettle texture inside	[0] Vertical strips absent; [1] Vertical strips Present
38. Limb length	cm
39. Limb width	cm
40. Limb wart	[0] Absent; [1] Present
41. Limb outside color	[0] Light creamy; Dark maroon
42. Limb inside color	[0] Dark maroon; Other
43. Limb inside texture	[0] Type 1; [1] Type 2
44. Limb shape	[0] Type1; [1] Type 2
45. Tail length	cm
46. Tail width	cm

.....continued on the next page

TABLE 1. (Continued)

Character	Character state
47. Tail orientation	[0] Straight; [1] Twisted
48. Spathe length	cm
49. Spathe color	[0] Light cream; [1] Dark maroon
50. Spathe twist	[0] More than half; [1] Less than half
51. Pistillate flower region length	cm
52. Pistillate flower region width	cm
53. Sterile region length	cm
54. Staminate flower region length	cm
55. Staminate flower region width	cm
56. Appendix length	cm
57. Appendix width	cm
58. Spadix length	cm
59. Pistillate region color	[0] Light yellow and light pink; [1] Light brown with yellow
60. Sterile region color	[0] White purple; [1] Purple
61. Staminate region color	[0] Light yellow; [1] Yellow
62. Appendix region color	[0] Purple with white; [1] White with marron
63. No of female flowers	Count
64. Female flower shape	[0] Type 1; [1] Type 2
65. Female flower arrangement	[0] Type 1; [1] Type 2
66. No of male flowers	Count
67. Male flower shape	[0] Type 1; [1] Type 2
68. Appendix shape	[0] Type 1; [1] Type 2
69. Infructescence Length	cm
70. Infructescence width	cm
71. Infructescence stalk length	cm
72. Infructescence stalk width	cm
73. Infructescence shape	[0] Type 1; [1] Type 2
74. Fruitlet length	cm
75. Fruitlet width	cm
76. Fruitlet width junction	cm
77. Fruitlet protuberance	[0] Absent; [1] Present
78. No of seeds in a fruitlet	Count
79. Seed length	cm
80. Seed width	cm
81. Seed shape	[0] Type 1; [1] Type 2
82. Seed striation no	Count
83. Seed color	[0] Light green; [1] Green with marron

Further, herbarium specimens of *Lagenandra* species were compared with herbaria deposited in the National Herbarium, Royal Botanic Gardens, Peradeniya, Sri Lanka, other on-line herbaria and resources; JSTOR Global Plants 2021, Smithsonian National Museum of Natural History 2021, Bastmeijer 2021 and published literature; de Wit 1978, Graaf & Arends 1986, Nicolson 1987, Sivadasan & Babu 1995, Sivadasan *et al.* 2001, Biju *et al.* 2018, Sasikala *et al.* 2019, Madola *et al.* 2021a, Madola *et al.* 2021b.

The distribution map was compiled using ArcGIS version 10.4 software (ESRI 2017) coupled with GPS data and conservation assessment following IUCN (2019) criteria. Based on the mapped distribution, the Area of Occupancy (AOO); the area of suitable habitat currently occupied by the taxon and Extent of Occurrence (EOO); the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred, or projected sites of present occurrence of a taxon, excluding cases of vagrancy were calculated. Conservation

assessments of the newly described *Lagenandra* sp. was carried out following IUCN (2019) recommendations. The site information of all sub-populations was noted with repeated field visits.

Results

Comparison of the morphological characters, with the published literature and herbarium specimens, provided convincing evidence that the populations encountered in the Indikada Mukalana Forest Reserve to be a new *Lagenandra* species.

The dendrogram that resulted from the CA (cophenetic correlation coefficient=0.98) recognized two clusters (Figure 1). The individuals L170 a–h clustered in one group (cluster A) while individuals L171 a–h clustered in the other group (cluster B). Based on the SIMPER analysis, number of male florets, peduncle colour, leaf shape and number of female florets were four most contributing characters for the grouping.

The ordination diagram from the PCoA based on the complete set of data shows a pattern similar to the results of the cluster analyses (Figure 2). The first four (principal) eigenvalues recovered from the PCoA (2703.4, 214.7, 201 and 166.5) accounted for 95.6% of the total variance (78.7%, 6.3%, 5.8%, and 4.8% respectively). The individuals were well separated from each other along the 1st Coordinate with no overlap. The results of the PCA also were in corroboration with the other analyses, recognizing two well separated groups (Figure 3). According to loading along the 1st axis, the number of male florets, number of female florets, infructescence stalk length and peduncle length were the most contributing quantitative characters.

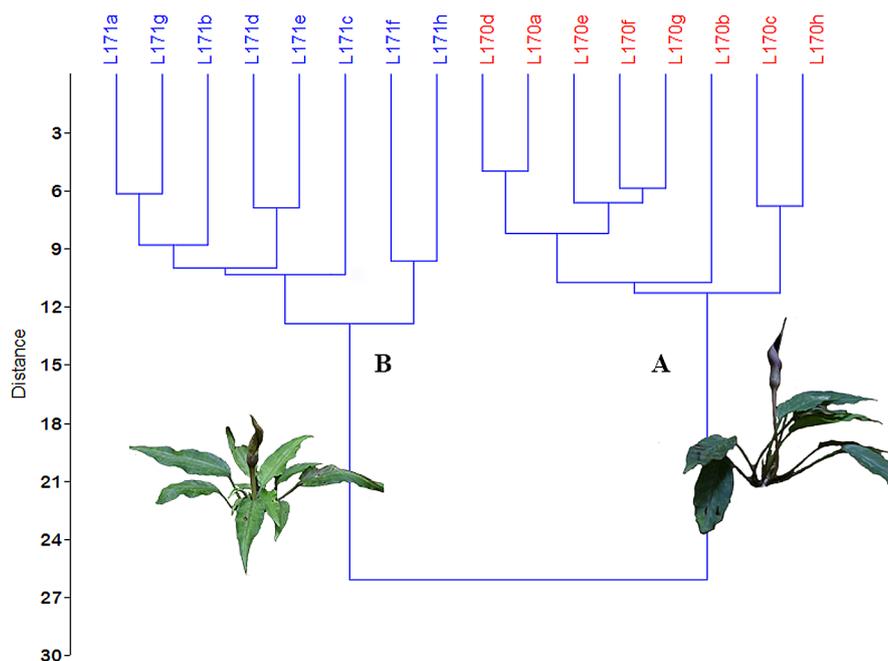


FIGURE 1. The clustering dendrogram using UPGMA (Un-weighted Pair Group Clustering Method) with Gower's general similarity coefficient based on morphological characters. The individuals of *Lagenandra peradeniyae* formed two distinct phenetic groups that are well-separated from each other. L 170a–h = *Lagenandra peradeniyae* var. *peradeniyae* (cluster A) and L171a–h = *L. peradeniyae* var. *speciosa* (cluster B).

The results of the morphometric analyses support the presence of below species level variations warranting the recognition of two varieties of the newly discovered *Lagenandra* species.

The new species was named as *Lagenandra peradeniyae*, with two infraspecific taxa; *Lagenandra peradeniyae* var. *peradeniyae* (cluster A) and *Lagenandra peradeniyae* var. *speciosa* (cluster B). Accordingly, the present taxonomic key for the genus constructed using morphological characters for the identification of all *Lagenandra* species recorded in Sri Lanka (Madola *et al.* 2021b) was revised. The distribution map of *Lagenandra peradeniyae* var. *peradeniyae* and *L. peradeniyae* var. *speciosa* is given in Figure 4.

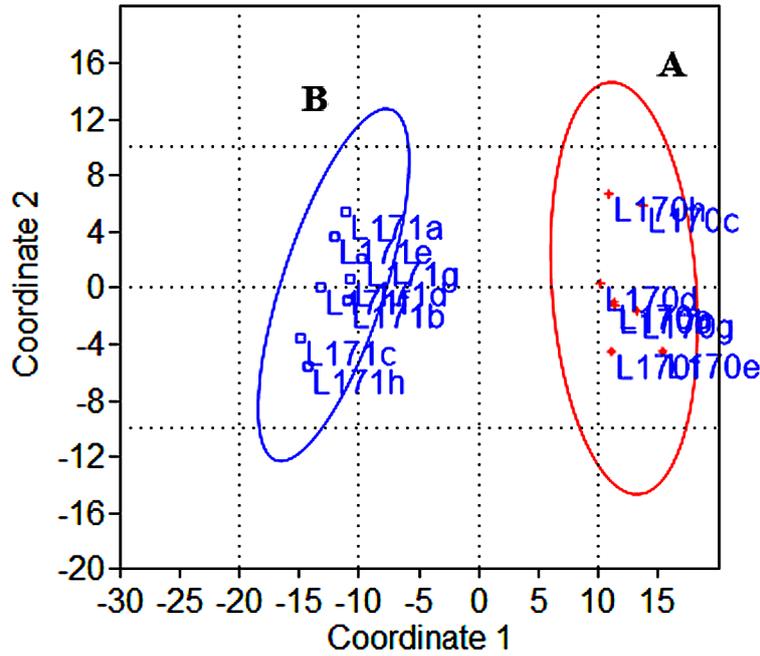


FIGURE 2. Scatterplot analyzed by Principal Coordinates Analysis using Gower's general similarity coefficient on *Lagenandra peradeniyae*. *Lagenandra peradeniyae* var. *peradeniyae* (cluster A) and *L. peradeniyae* var. *speciosa* (cluster B).

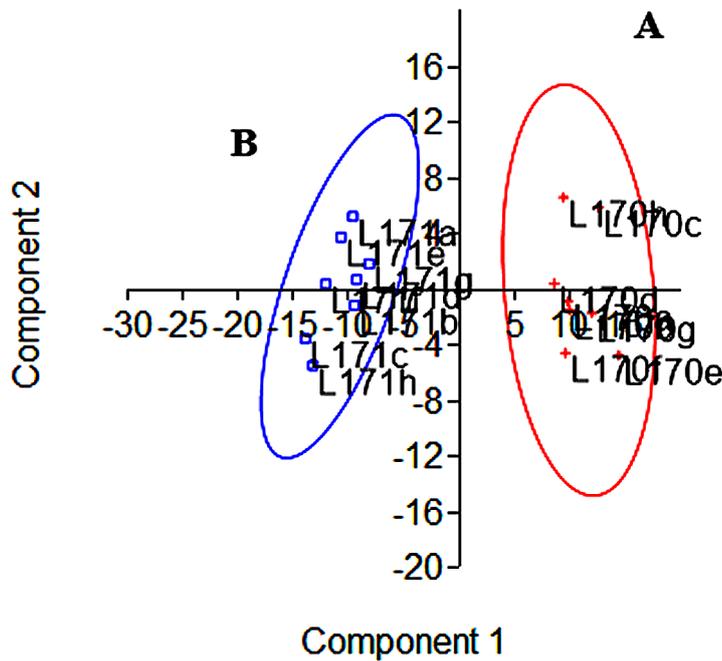


FIGURE 3. Scatter diagram analyzed by Principal Component Analysis employing quantitative characters on *Lagenandra peradeniyae*. *Lagenandra peradeniyae* var. *peradeniyae* (cluster A) and *L. peradeniyae* var. *speciosa* (cluster B).

Taxonomy

Lagenandra peradeniyae Madola, D.Yakandawala & K.Yakandawala, *sp. nov.* (Figs. 4–11)

The habit of *L. peradeniyae* differs from all other *Lagenandra* species described up to date in relation to their orientation of the spathe that stands well above the leaves that are aligned more or less parallel to the substrate giving way to the spathe. Even though the

spathes of both *L. bogneri* and *L. erosa* reach above the leaves, the spathe of *L. peradeniyae* grows well above the leaves, where at least a part of the peduncle is always placed above the leaves.

Type:—SRI LANKA, Western Province, Colombo District, in the Indikada Mukalana Forest Reserve, 50 m asl. Collected 08th of March 2021, Madola, D. Yakandawala & K. Yakandawala L170 (holotype PDA!, isotypes PDA!, K!).

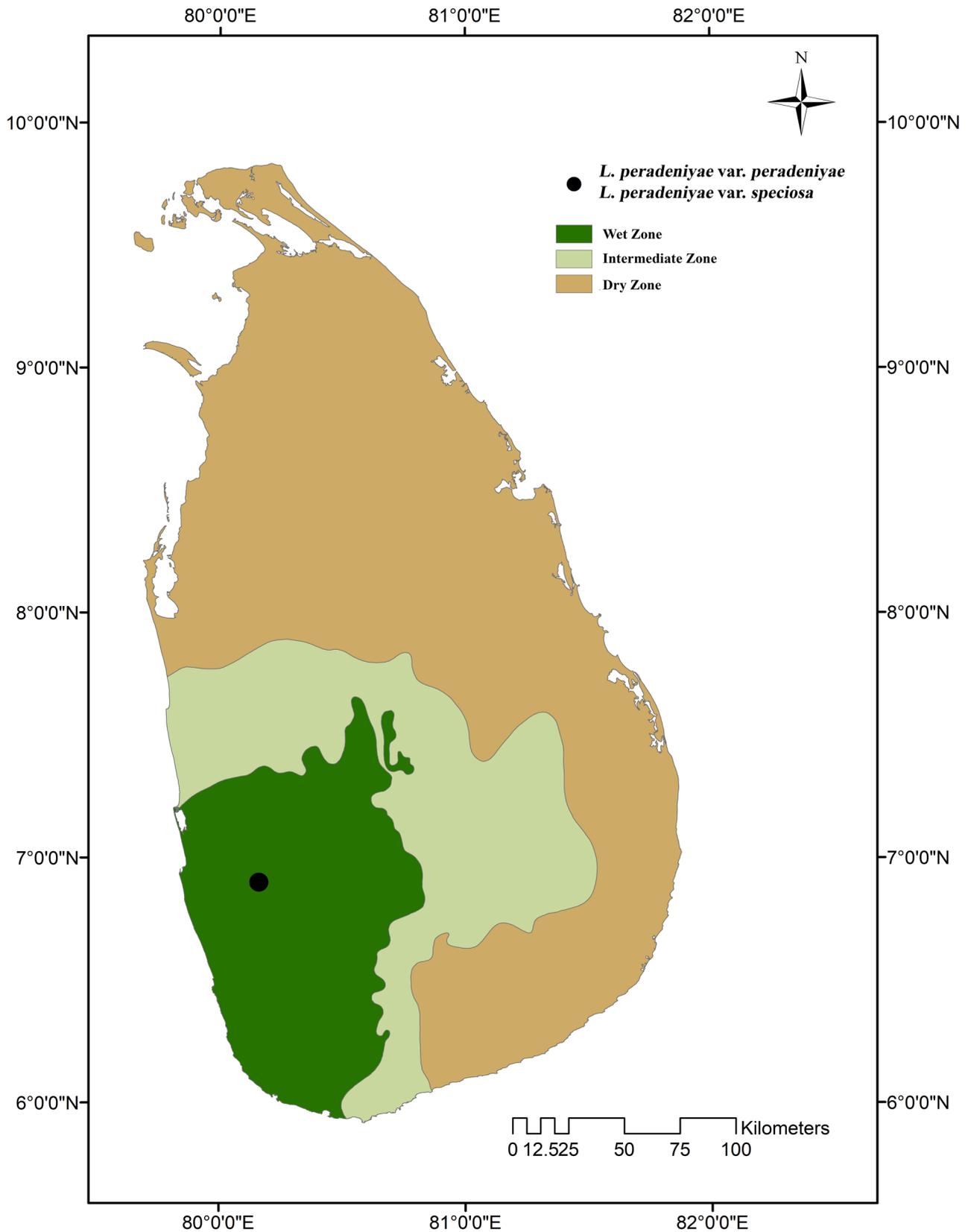


FIGURE 4. Distribution of *Lagenandra peradeniyae*; *Lagenandra peradeniyae* var. *peradeniyae* and *L. peradeniyae* var. *speciosa*, in the Wet Zone of Sri Lanka.



FIGURE 5. Habitat of *Lagenandra peradeniyae*, either A. Between the crevices of the stones in running water or B. On the banks of the stream.



FIGURE 6. Habit of *Lagenandra peradeniyae*; A. *Lagenandra peradeniyae* var. *peradeniyae* and B. *L. peradeniyae* var. *speciosa*.



FIGURE 7. Leaf and spathe of *Lagenandra peradeniyae*; *Lagenandra peradeniyae* var. *peradeniyae*, A1. Maroon spathe and A2. Leaves light green, variegated with silver patches and *L. peradeniyae* var. *speciosa*, B1. light green/yellow mixed with maroon/purple spathe and B2. leaves with silver colour appearing towards either side of the mid rib.

Evergreen large herb with creeping to erect rhizome ca. 0.8–1.3 cm in diam. Cataphylls ca. 4–7 cm. Petiole ca. 4–17 cm long, ca. 0.2–0.4 cm wide, sheath ca. 1.5–4.5 cm long, unequal. Leaf blades light green to dark green with silver colour associated with either as variegated with silver patches or green with the silver colour appearing towards the either side of the mid rib. Leaves lanceolate to lance-ovate, apex acuminate, base acute or rounded, margin entire, sometimes undulate, blade ca. 6.7–17.2 × 2.3–5.0 cm; mid rib prominent on the upper surface. Peduncle ca. 7.8–20.5 cm long, 0.3–1.1 cm width. Spathe dark maroon/maroon or light green/yellow mixed with maroon, slightly rugose to rugose, ca. 6.8–12.8 cm long, kettle ca. 1.5–2 × 1.3–1.9 cm, dark maroon with smooth longitudinal striations inside; limb ca. 3.4–6.2 × 1.5–2.7 cm, slightly twisted, dark maroon ribs and horizontally irregularly roughened inside; tail ca. 0.7–7.8 × 0.1–0.4 cm. Spadix ca. 1–2 cm long; pistillate flower zone ca. 0.3–0.6 × 0.5–0.9 cm, three whorls, not fused; sterile zone ca. 0.4–1 cm long; staminate flower zone ca. 0.3–0.5 × 0.2–0.4 cm; appendix ca. 0.2–0.3 × 0.1–0.3 cm long, purple. Pistils ca. 28–38, up-right. Staminate flowers ca. 48–74. Infructescence up to 20 cm long, oblate, fleshy capsule up to 20–26, lobes pointed, with many warty out-growths. Seeds 1–2, size ca. 0.5–0.6 × 0.2–0.3 cm and longitudinally ridged.

Etymology:—The new species is named after the University of Peradeniya, Sri Lanka.

***Lagenandra peradeniyae* var. *peradeniyae* (Figs. 4, 5, 6 (A), 7(A1 and A2), 8 and 9)**

Leaf blades dark green, variegated with silver patches, lance-ovate to narrowly elliptic, apex acuminate, base obtuse, margin entire. blade ca. 6.7–17.2 × 2.3–5.0 cm. Peduncle ca. 10.1–20.5 cm long. Spathe dark maroon/maroon. Pistils ca. 34–38. Staminate flowers ca. 68–74.

***Lagenandra peradeniyae* var. *speciosa* Madola, D.Yakandawala & K.Yakandawala var. *nov.* (Figs. 4, 5, 6(B), 7 (B1 and B2), 10 and 11)**

Lagenandra peradeniyae var. *speciosa* differs from the type variety by lance-ovate leaves and the silver colour appearing towards either side of the mid rib of the leaf lamina, rounded base and spathe light green/yellow mixed with maroon/purple.

Type:—SRI LANKA, Western Province, Colombo District, in the Indikada Mukalana Forest Reserve of Sri Lanka, 50 m asl. Collected 08th of March 2021, Madola, D. Yakandawala & K. Yakandawala L171 (holotype PDA!, isotypes PDA!, K!).

Leaf blades light green with the silver colour appearing towards the either side of the mid rib, lance-ovate, apex acuminate, base rounded, margin entire, blade ca. 8.6–15.4 × 2.9–5.2 cm. Peduncle ca. 7.8–17.3 cm long. Spathe light green/yellow mixed with maroon/purple, 7.9–12.8 cm long. Pistils ca. 28–32. Staminate flowers ca. 48–52.

Etymology:—The new variety name refers to its striking habit.

Distribution, phenology and conservation status:—To date, the distribution of *L. peradeniyae* together with its varieties is restricted to only one locality in Sri Lanka, along a main stream and a streamlet originating from the Idikada Mokalana Forest Reserve, which joins the Wak-oya stream. The population is scattered and spread over a stretch of about 200 m. The population consists of about 30 mature individuals (*L. peradeniyae* var. *peradeniyae*, 20 mature individuals and *L. peradeniyae* var. *speciosa*, 10 mature individuals) with 10–15 young individuals.

The Indikada Mukalana Forest Reserve was declared as a forest reserve initially in 2008 (Gazette no. 1572/9 of the Forest Ordinance on October 21, 2008) but soon after it was de-gazetted through Gazette no. 1585/14 on January 21, 2009 (Chamikara 2011). However, in 2012, the forest has regained its position as a Forest Reserve (Gazette no. 1759/2 of the Forest Ordinance on May 21, 2012). Indikada Mukalana Forest Reserve is the second largest tropical lowland rainforest in the Colombo District, Sri Lanka with an extent of 572 ha and is situated in the Western Province of the country. It contributes to the conservation of a number of plants and animals including many endemics (Chamikara 2011, Dias and Udayakantha 2016, Wijerathna *et al.* 2017).

Lagenandra peradeniyae, with two varieties both equally attractive, could be considered as one of the most attractive *Lagenandra* species described to date in the world. Of the other described *Lagenandra* species, *L. thwaitesii* with a silver margin on the leaves has gained popularity as an ornamental plant in the ornamental aquatic plant industry. It is being sold around the world via e-commerce (e.g. Premiumbucos 2021, Aquasabi 2022). The plants are still extracted from the wild and therefore are severely threatened in their natural habitats. Further, the recently described *L. srilankensis* also possess a silver margin. However, the silver margin in *L. srilankensis* appears faint against the light green colour of the leaf blade oppose to the dark green leaves of *L. thwaitesii* (Madola *et al.* 2021b). The leaves of *L. peradeniyae* exhibit potential characteristics for it to become a popular ornamental plant in the industry. This could be attributed to the variegated leaves, with silver patches in *L. peradeniyae* var. *peradeniyae* and green with the silver colour appearing towards either side of the mid rib in *L. peradeniyae* var. *speciosa*. In addition to the leaf characters, another feature of interest is the orientation of the spathe that stands well above the leaves that are aligned more or less parallel to the substrate. This feature highlights the inflorescence from the foliage. Therefore, both the spathe and the leaves are of ornamental significance. Consequently, with the disclosure of the species, the plant would be exposed to many risks, especially illegal collections, where a situation the authorities need to address immediately.

Lagenandra peradeniyae flowers from February-August, fruiting from April-September. The open inflorescence persists for 6–8 days.

The calculated AOO accounted to 4 km² while we were unable to calculate the EOO due to the presence of only one data point. Therefore, the EOO was also taken as equal to AOO. Considering the facts that *L. peradeniyae* being restricted to only one locality in the country, and the number of healthy individuals in the subpopulations are restricted to less than 30 mature individuals, could be considered as threatened. Due to the ornamental potential, illegal extractions are likely. Following the present IUCN guidelines (2019); based on geographic range, this species qualifies for Critically Endangered category (CR) under the thresholds for both B1 and B2, with number of locations is considered as 1 (a). Further, the subpopulations exhibited a continuing decline in the quality of habitat (iii) and number of mature individuals (v). When considering all these facts, *L. peradeniyae* qualifies for CR category under

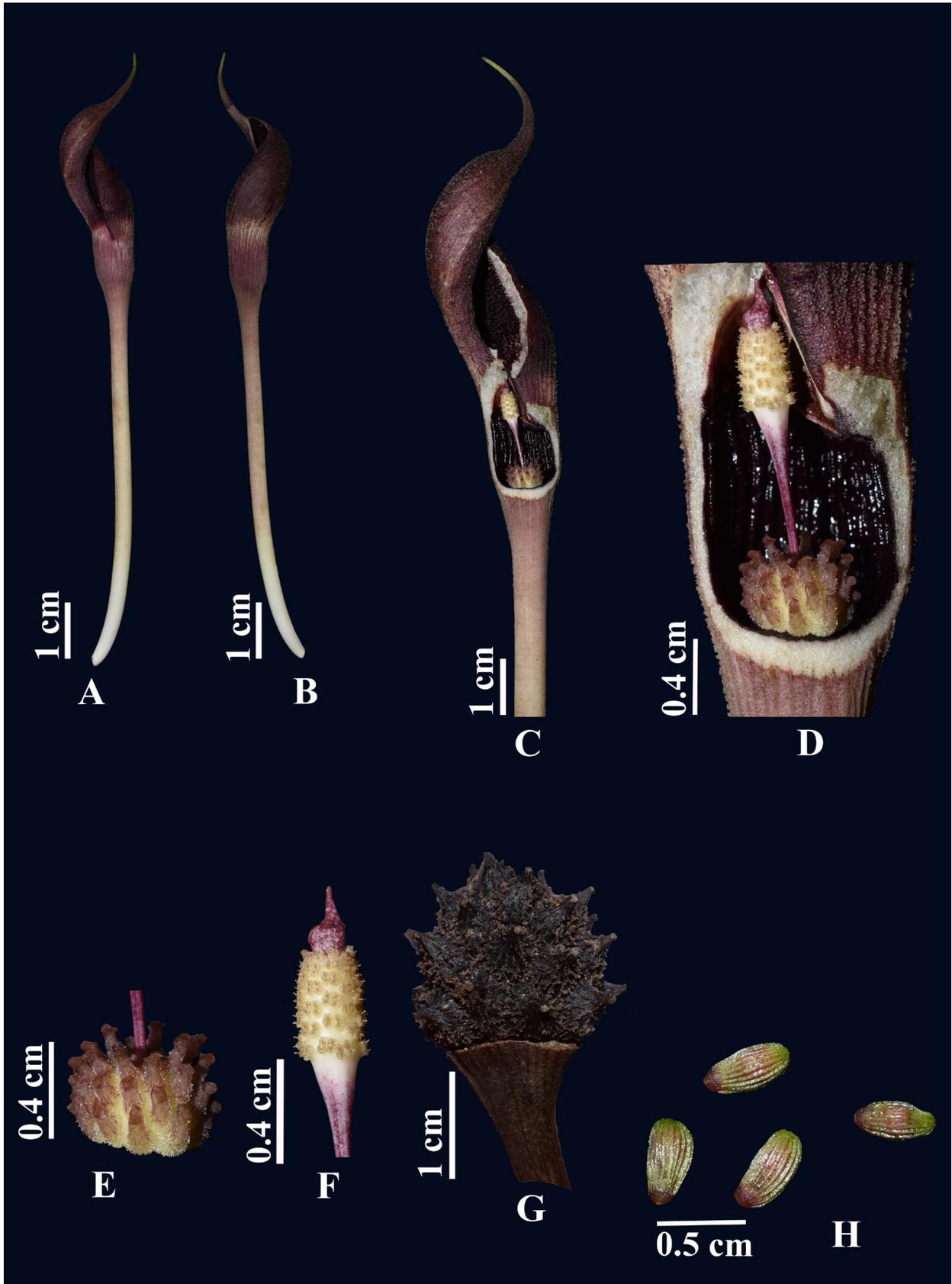


FIGURE 8. *Lagenandra peradeniyae* var. *peradeniyae*; A. and B. Spathe from different angles showing the opening in the limb. C. Spathe dissected and opened. D. Kettle with the spadix. E. Pistillate flower zone. F. Appendix and staminate flower zone. G. Infructescence and H. Seeds.

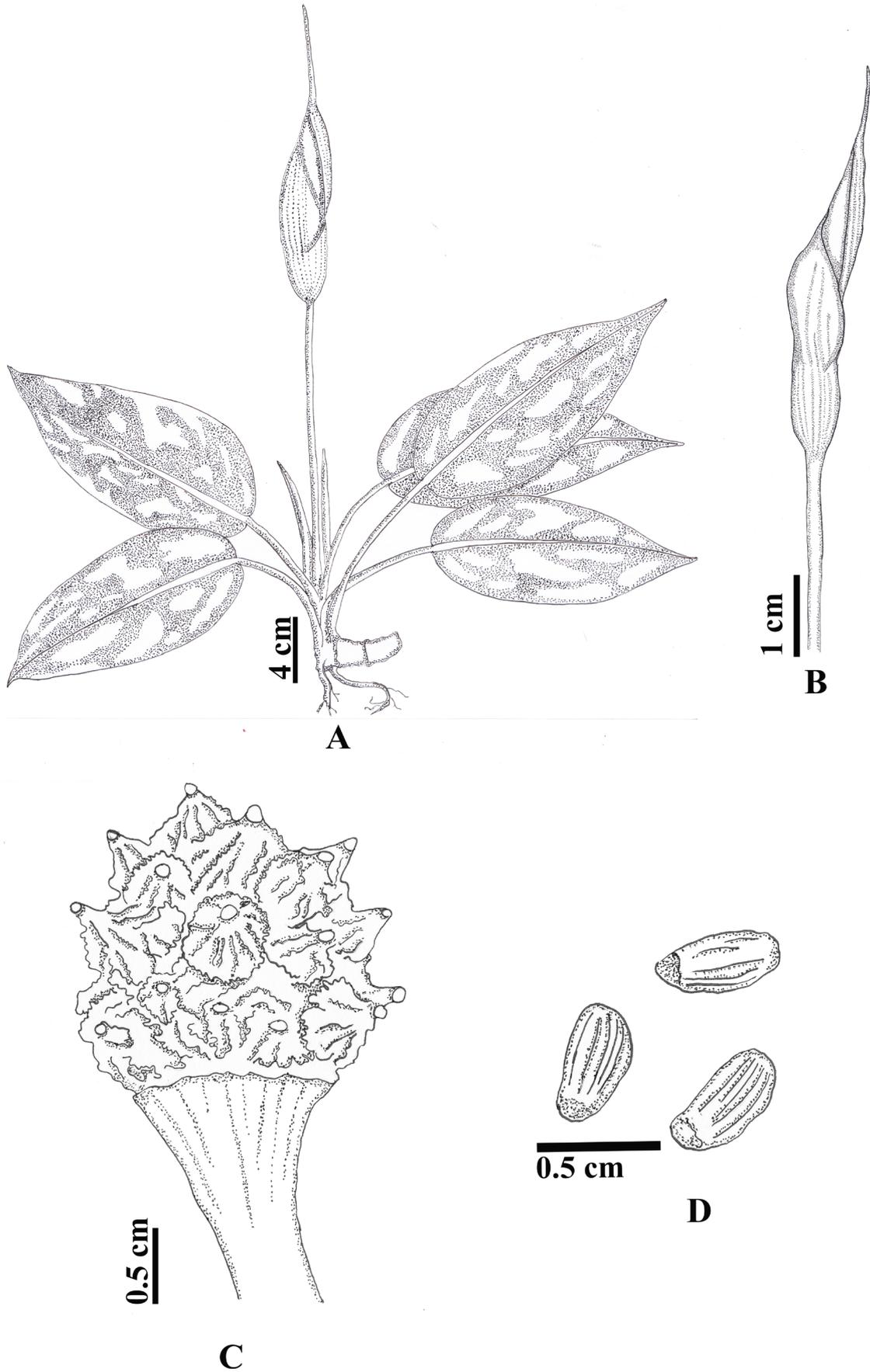


FIGURE 9. *Lagenandra peradeniyae* var. *peradeniyae*; A. Habit. B. Spathe. C. Infructescence. and D. Seeds.

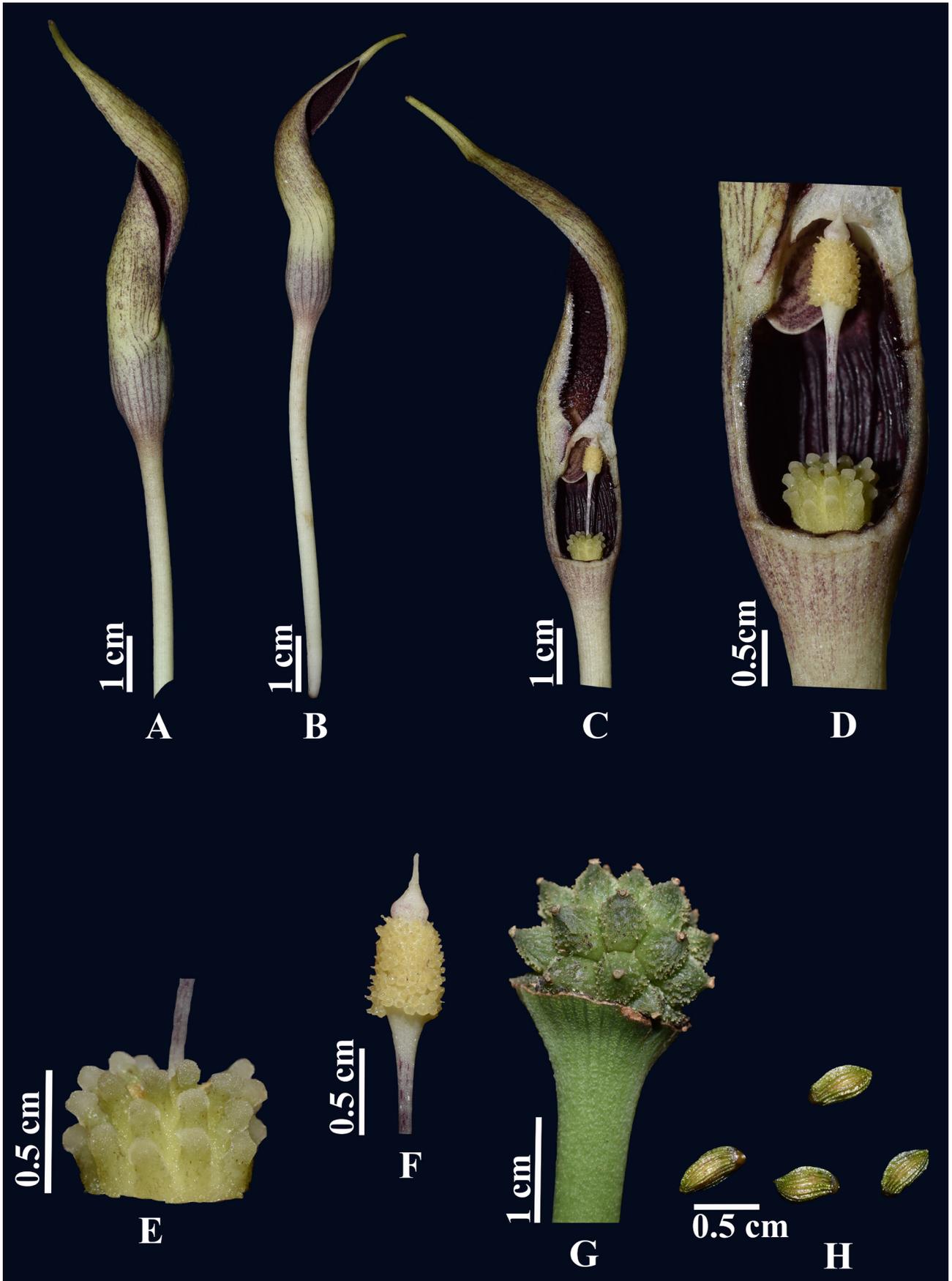


FIGURE 10. *Lagenandra peradeniyae* var. *speciosa*; A. and B. Spathe from different angles showing the opening in the limb. C. Spathe dissected and opened. D. Kettle with the spadix. E. Pistillate flower zone. F. Appendix and staminate flower zone. G. Infructescence and H. Seeds.

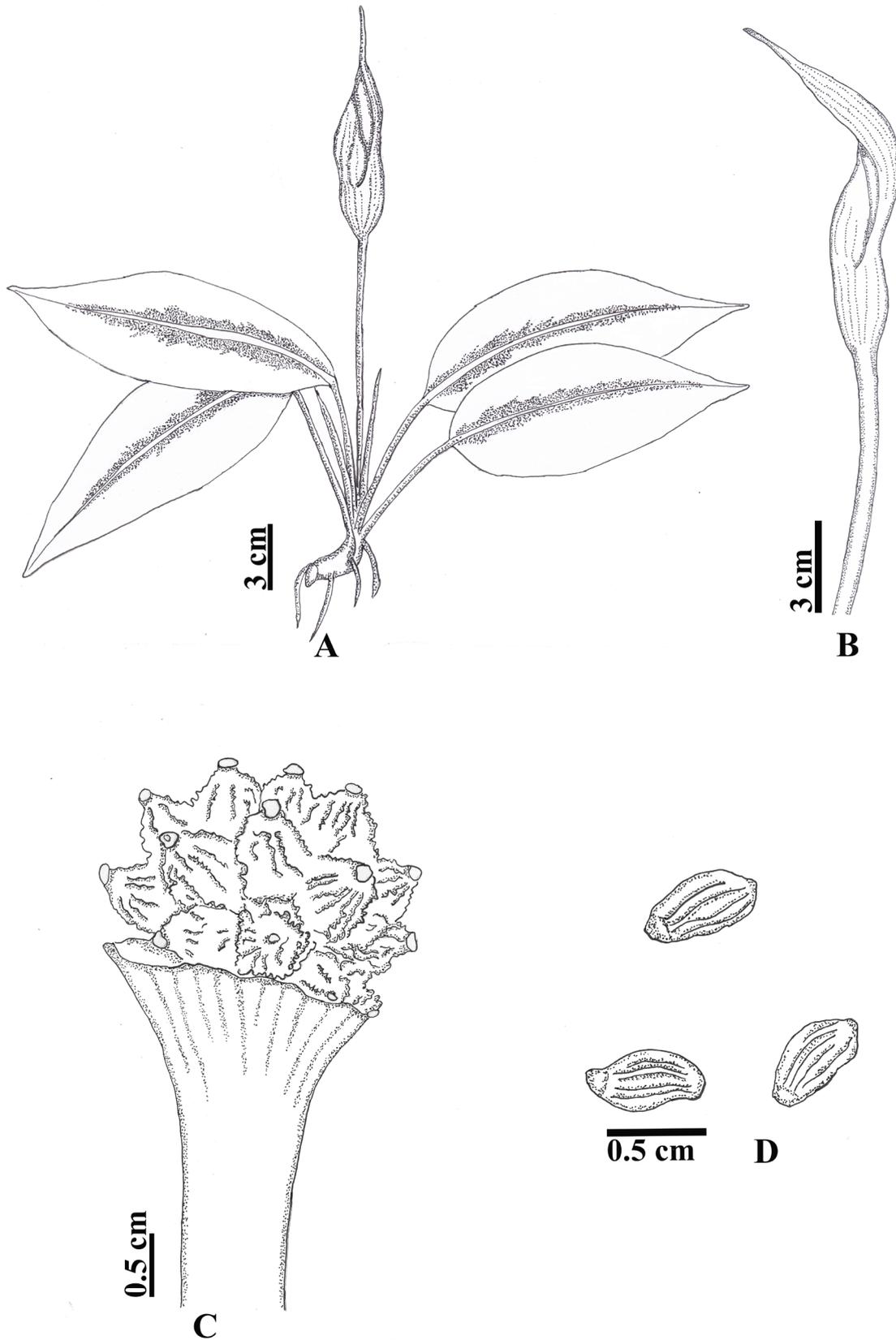


FIGURE 11. *Lagenandra peradeniyae* var. *speciosa*; A. Habit. B. Spathe. C. Infructescence. and D. Seeds.

Criterion B1ab (iii, v) + B2ab (iii, v). Evaluation under the Criterion C; Small population size and decline, where the number of mature individuals been < 250, and with an observed, estimated, projected, or inferred continuing decline in the number of mature individuals in each subpopulation C2 (i), *L. peradeniyae* qualifies for the CR category under Criterion C2. Therefore, the conservation status of *L. peradeniyae* based on IUCN (2019) is determined; B1ab (iii, v) + B2ab (iii, v) and C2 (a) (i).

Habitat:—The plants inhabit shady stream banks which are not directly interrelated with the water and in the crevices of the stones in the cascading systems of streams and streamlets of a low country evergreen rain forest.

As *L. peradeniyae* is the only Sri Lankan species which has a spathe that stands well above the leaves that are aligned more or less parallel to the substrate giving way to the spathe, it can key out as a first lead in the key presented in Madola *et al.* 2021b.

Key to the varieties of *L. peradeniyae*

1. Spathe maroon, leaves dark green, variegated with silver patches *L. peradeniyae* var. *peradeniyae*
- Spathe light green/yellow mixed with maroon/purple, leaves light green with silver colour appearing towards the either side of the mid rib *L. peradeniyae* var. *speciosa*

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