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Conservation status of *Rungia* (Acanthaceae) from Thailand

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Abstract. This study evaluates the conservation status of 14 *Rungia* Nees species occurring in Thailand. All species were assessed and assigned to an extinction risk category following the IUCN Red List Categories and Criteria. Justifications for the assessments, together with distribution maps for each species, are provided. The results show that more than half of the species are threatened, including five Critically Endangered (CR), five Endangered (EN) and two Vulnerable (VU). The remaining two species are not currently at risk of extinction, comprising one Near Threatened (NT) and one Least Concern species (LC). These conservation assessments offer a critical foundation for guiding and prioritising future *in situ* and *ex situ* conservation efforts.

Keywords: distribution, GeoCAT, IUCN Red List, threatened species

Introduction

The genus *Rungia* Nees (Acanthaceae) comprises *ca.* 87 species, primarily distributed throughout the Old World tropics (Manzitto-Tripp *et al.,* 2022; POWO, 2025). This genus is morphologically similar to *Justicia* L. but differs in having flat or cylindrical spikes and bracts and bracteoles consisting of one sterile and one fertile with or without hyaline margins. In Thailand, 14 native species of *Rungia* have been recorded, nine of which (64%) are endemic to the country (Rueangsawang *et al.*, 2020). Several species in the genus have ethnobotanical importance. For example, *R. pectinata* (L.) Nees has been traditionally used for the treatment of smallpox in children, inflammation, skin infections, dysentery, and hepatitis. Its leaf juice acts as a cooling agent and anti-inflammatory remedy (Forid *et al.*, 2024). Thailand is recognised as one of the world's

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FIGURE 1. *Rungia pectinata*: A. habit; B. inflorescences. Photos by K. Rueangsawang.

most biodiversity-rich countries. It lies within two major biodiversity hotspots: the Indo-Burma and Sundaland Hotspots. Biodiversity hotspots are regions characterised by exceptionally high species richness and endemism, yet they have experienced extensive habitat loss. These areas remained under severe threat from land-use change, deforestation, and agricultural expansion, all of which contribute to the ongoing decline in habitat extent and quality (Myers *et al.*, 2000). As a result, the region is regarded as one of the most biologically diverse in the world. Thailand harbours approximately 15,000 plant species, representing about 8% of the global total. Forests cover at least 33% of the country's land area, with roughly 18% designated as protected forest areas (Convention on Biological Diversity, 2025). In 2016, the Department of National Parks, Wildlife and Plant Conservation conducted a conservation assessment of Thai plant species and reported that 940 species are threatened including 715 VU species, 207 EN species and 18 CR species (Chamchumroon, *et al.* 2017). In 2020, the Office of Natural Resources and Environmental Policy and Planning (ONEP), carried out an assessment focusing on endemic and rare species. A total of 1,185 Thai plant species were evaluated, of which 999 were classified as threatened. These comprised 647 species categorise as VU, 259 EN and 93 CR, representing approximately 9% of all documented plant species in the country (Office of Natural Resources and Environmental Policy and Planning, 2020).

Additionally, the IUCN Red List website has assessed only three *Rungia* species, *i.e. R. eriostachya* Hua, *R. heterophylla* Bremek. and *R. schliebenii* Mildbr. none of which occurs in Thailand. To date, no global conservation assessments have been reported for the *Rungia* species found in Thailand. Thailand has developed the National Biodiversity Action Plan (2023–2027) to provide a strategic framework and operational mechanisms for conserving, restoring, and sustainably utilising the nation's biological diversity. This plan is aligned with Thailand's commitments under the Convention on Biological Diversity (CBD) and the Kunming–Montreal Global Biodiversity Framework (GBF). Therefore, this study aims to assess the conservation status of the genus *Rungia* in Thailand, providing a crucial foundation for supporting the implementation of national conservation actions. In addition, the findings will offer essential information for planning urgent *in situ* and *ex situ* conservation measures to help reduce the risk of future extinction.

Materials and Methods

Distribution and ecological data were compiled from herbarium specimen labels housed at AAU, BK, BKF, BM, K, KKU, L, P and QBG (herbarium abbreviations follow Thiers, 2025). These data were supplemented by combined field observations, expert consultations, relevant literature, the Global Biodiversity Information Facility (GBIF, 2025), and virtual herbaria to inform the

FIGURE 2. A. *Rungia rivicola*; B. *R. sinothailandica*. Photos by W. Thammarong.

conservation assessment. For specimens lacking precise geographic coordinates, collection localities were georeferenced using Google Earth and GeoNames based on the locality provided on specimen labels. Additionally, population and threat information obtained from field surveys were incorporated to provide a more comprehensive evaluation of the species' conservation status. The conservation status of each species was assessed following the IUCN Red List Categories and Criteria version 3.1 (IUCN Standards and Petitions Committee, 2012) and the Guidelines for Using the IUCN Red List Categories and Criteria version 16 (IUCN Standards and Petitions Committee, 2024). The Extent of Occurrence (EOO) was calculated using a minimum convex polygon generated from herbarium specimen point data mapped in GeoCAT (Bachman *et al.*, 2011). The Area of Occupancy (AOO) was estimated from georeferenced occurrence records using 2 × 2 km grid cells in GeoCAT (Bachman *et al.*, 2011). For species documented from fewer than three locations, the calculated EOO is expected to approximate the minimum AOO value (IUCN Standards and Petitions Committee, 2024).

Conservation information was reviewed for both *in situ* (UNEP-WCMC & IUCN, 2025) and *ex situ* measures (BGCI, 2025; Genesys, 2025), including seed banks, botanical gardens and gene banks, to support the conservation assessment. All georeferenced specimens were imported into SimpleMappr (Shorthouse, 2010) to generate distribution maps.

Results

Species assessments

1. *Rungia adnata* (J.B. Imlay) B. Hansen (Fig. 3A)
Habitat: In evergreen forest, 1,000–1,740 m alt.
EOO: 4 km^2; AOO: 4 km^2
Conservation status: CR D

This species is endemic to Thailand and is known only from a single location in Nakhon Si Thammarat province. It occurs within a protected area and no current threats are known to affect the species or its habitat. The total population is estimated at approximately 40 mature individuals, and the population trend is inferred to be stable. Based on the available evidence, this species is assessed as Critically Endangered (CR) under criterion D. *Ex situ* conservation measures are strongly recommended to safeguard the species against any potential further decline.

2. *Rungia brandisii* C.B. Clarke (Fig. 3B)
Habitat: In mixed deciduous forest on limestone hill, *ca.* 800 m alt.
EOO: 9,661 km^2; AOO: 12 km^2
Conservation status: EN B2ab(iii)

This species is native to Myanmar (Mawlamyine) and Thailand (Kanchanaburi and Tak provinces) and is known from three locations. All known collections were made between 1875 and 1971, but it remains uncertain whether these subpopulations are still extant or may be extinct in the wild. The species occurs outside protected areas in Myanmar and within a protected area in

Thailand. Its habitat is threatened by tourism, agricultural expansion and urbanisation, which are causing continuing declines in the extent and quality of habitat. Although the population size is unknown, the population trend is inferred to be decreasing due to ongoing habitat degradation. Based on the available evidence, the species is assessed as Endangered (EN) under criteria B2ab(iii). Further research on population size, distribution, and population trends is needed to clarify its current conservation status.

3. *Rungia diversibracteata* J.B. Imlay (Fig. 3C)
Habitat: In evergreen forest, 1,000–1,200 m alt.
EOO: 4 km^2; AOO: 4 km^2
Conservation status: CR B1ab(iii) + 2ab(iii)

This species is endemic to Thailand and is known only from a single location in Ranong province. All known collections were made in 1929. Although the site is situated within a protected area, the national park is under pressure from multiple threats, including agricultural expansion, surrounding communities and housing development, which are inferred to be causing a continuing decline in the area, extent and quality of suitable habitat. No quantitative information on population size is available. Based on the available evidence, the species is assessed as Critically Endangered (CR) under criterion B1ab(iii) + 2ab(iii). Although this species is currently known only from the type locality in Ranong province, the area remains underexplored, and additional populations may be discovered. Further field surveys are recommended to confirm its population status and to obtain more accurate information on population size and trends.

4. *Rungia maculata* Craib (Fig. 3D)
Habitat: In evergreen forest, 240–800 m alt.
EOO: 8 km^2; AOO: 8 km^2
Conservation status: EN B1ab(iii) + 2ab(iii)

This species is endemic to Thailand and is known from two localities in Phrae and Sukhothai provinces, based on historical records. It occurs outside protected areas and habitat degradation is driven by tourism, as the species grows near popular tourist attractions. The species is therefore inferred to occur at two locations, with a continuing decline in habitat quality. The population size is unknown, but the population trend is suspected to be decreasing. Monitoring will be needed to determine both population size and trends. Based on the available evidence, the species is assessed as Endangered (EN) under criterion B1ab(iii) + 2ab(iii). Further research on population size, distribution and population trends is required to clarify its current conservation status.

5. *Rungia minutiflora* C.B. Clarke (Fig. 3E)
Habitat: In the shade of limestone outcrops and mixed deciduous forest on limestone hills, 100–800 m alt.
EOO: 124,869 km^2; AOO: 24 km^2
Conservation status: VU B2ab(iii); D1

This species is native to Thailand (Khon Kaen, Loei, Satun and Surat Thani provinces) and Malaysia (Langkawi). It is known from six locations, with an estimated total population of fewer than 1,000 mature individuals. Population monitoring indicates that severe drought has caused declines in the number of mature individuals, with subsequent population decreases observed

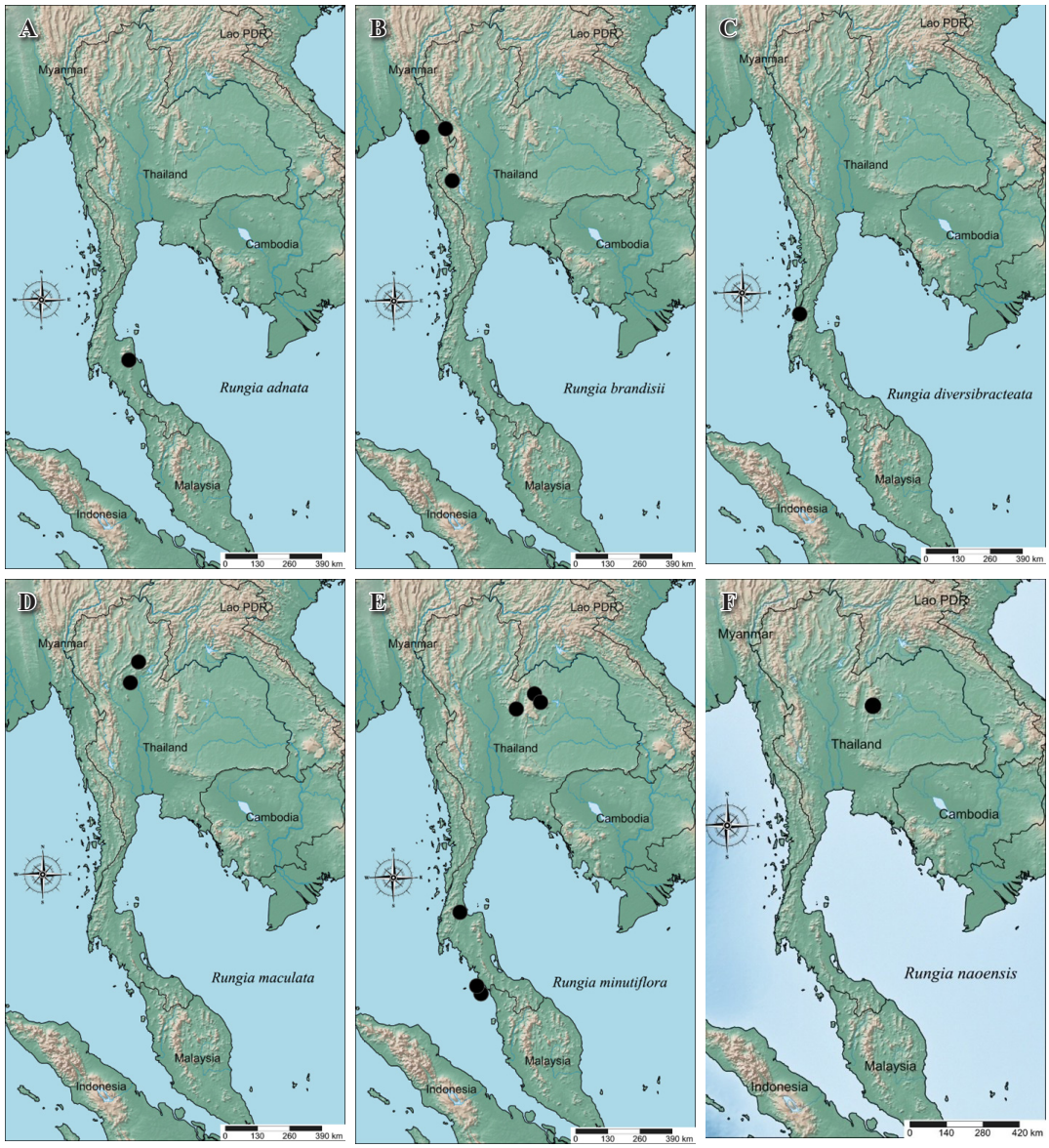

Figure 3. Distribution of *Rungia* in Thailand: A. *R. adnata*; B. *R. brandisii*; C. *R. diversibracteata*; D. *R. maculata*; E. *R. minutiflora*; F. *R. naoensis*.

in the following years. Drought is therefore considered a major ongoing threat contributing to the continuing decline of this species. Based on the available evidence, this species is assessed as Vulnerable (VU) under criteria B2ab(iii); D1. Regular population monitoring and *ex situ* conservation measures should be prioritised.

6. *Rungia naoensis* B. Hansen (Fig. 3F)
Habitat: In bamboo forest, on limestone, *ca.* 900 m alt.
EOO: 4 km^2; AOO: 4 km^2
Conservation status: CR B1ab(iii,v) + 2ab(iii,v); C2a(ii)

This species is endemic to Thailand and is known only from a single location in Nam Nao national park, Phetchabun province. It occurs in a bamboo forest, where fire events occur frequently. These fires have negatively affected the population, causing a continuous decline in the number of mature individuals. In addition, the construction of tracks within the national park, along with trampling and disturbance by tourists, poses major threats that have further degraded the habitat and contribute to population decline. The current population is estimated to be approximately 100 mature individuals, all belonging to a single subpopulation. Based on the available evidence, the species is assessed as Critically Endangered (CR) under criteria B1ab(iii,v) + 2ab(iii,v); C2a(ii). Given the severity of *in situ* threats, establishing *ex situ* conservation measures should be a high priority. Regular monitoring of habitat conditions and population trends is strongly recommended to prevent a rapid increase in extinction risk.

7. *Rungia oligoneura* (J.B. Imlay) B. Hansen (Fig. 4A)
Habitat: In evergreen forest, 100–300 m alt.
EOO: 4,524 km^2; AOO: 40 km^2
Conservation status: EN B1ab(iii) + 2ab(iii)

This species is endemic to Thailand, occurring in Chumphon, Phangnga and Ranong provinces. Most known sites are within protected areas, where tourism activities and the construction of infrastructure such as tracks and trails are causing ongoing habitat loss and degradation. Although no quantitative population data are available, a population decline is suspected. Based on the distribution of threats across its range, the species is estimated to occur at 10 locations. Using the available evidence, this species is assessed as Endangered (EN) under criterion B1ab(iii) + 2ab(iii). Research on population size and trends, as well as the establishment of *ex situ* conservation measures, is recommended.

8. *Rungia pectinata* (L.) Nees (Figs. 1 & 4B)
Habitat: In evergreen forest along rivers and slopes with large limestone outcrops, deciduous forest mixed with bamboo, dry ground in light shade, mixed montane forest, 20–1,000 m alt.
EOO: 14,153,072 km^2; AOO: 1,048 km^2
Conservation status: LC

This species has a widespread distribution and is native to Bangladesh, Cambodia, China, India, Indonesia, Laos, Myanmar, Nepal, Oman, Peninsular Malaysia, Philippines, Sri Lanka, Thailand, Vietnam and Yemen. Its Extent of Occurrence (EOO) is more than 10 million km^2, greatly surpassing the

threshold values for the threatened categories, which is likely reflected in its Area of Occupancy (AOO) and number of locations. Population data are limited, and the population trend is unknown; however, given its broad native range and reported abundance, the global population is suspected to be large. No major threats are identified that are likely to increase its extinction risk in the near future. Based on available evidence, the species is assessed as Least Concern (LC). It is also represented in *ex situ* conservation, including seed banks and botanic gardens.

9. *Rungia polyneura* (J.B. Imlay) Rueangs. (Fig. 4C)
Habitat: In evergreen forest along stream, *ca.* 900 m alt.
EOO: 8 km^2; AOO: 8 km^2
Conservation status: CR C2a(i); D

This species is endemic to Thailand and is known from two localities in Phangnga and Ranong provinces. It occurs within a protected area in evergreen forest, where the total suitable habitat covers approximately 200 m^2. The habitat is threatened by the construction of tracks and trampling by visitors, resulting in decline in habitat area, extent, quality and population size. Although the site liesa within a national park, effective management is needed to ensure long-term habitat protection. The population is estimated at 40 mature individuals, and a continuing decline observed. The population trend is therefore suspected to be decreasing. Based on the available evidence, the species is assessed as Critically Endangered (CR) under criteria C2a(i); D. Given the s *in situ* threats, establishing *ex situ* conservation measures should be a high priority. Regular monitoring of habitat and population trends is strongly recommended to prevent further increases in extinction risk.

10. *Rungia purpurascens* (Ridl.) B. Hansen (Fig. 4D)
Habitat: In evergreen forest, *ca.* 50 m alt.
EOO: 41,289 km^2; AOO: 20 km^2
Conservation status: EN B2ab(iii)

This species is native to Thailand (Chumphon and Ranong provinces) and Peninsular Malaysia. Urbanisation is the major threat across its range and is inferred to be causing a continuing decline in the area, extent and quality of suitable habitat. The species is estimated to occur at five locations. Population data are limited, but the population trend is suspected to be decreasing. Based on available evidence, the species is assessed as Endangered (EN) under criterion B2ab(iii). In Peninsular Malaysia, the species remains poorly studied is likely under-collected. Further research on its distribution and population status is needed to refine this assessment of extinction risk. *Ex situ* conservation measures are strongly recommended.

11. *Rungia rivicola* Craib (Figs. 2A & 4E)
Habitat: In deciduous forest mixed with bamboo, dry ground in light shade and along stream, *ca.* 1,500 m alt.
EOO: 270 km^2; AOO: 12 km^2
Conservation status: NT

This species is endemic to Thailand and is recorded from Chiang Mai, Chiang Rai and Lampang provinces. It is currently known from three locations. Its habitat faces minor threats, including the construction of

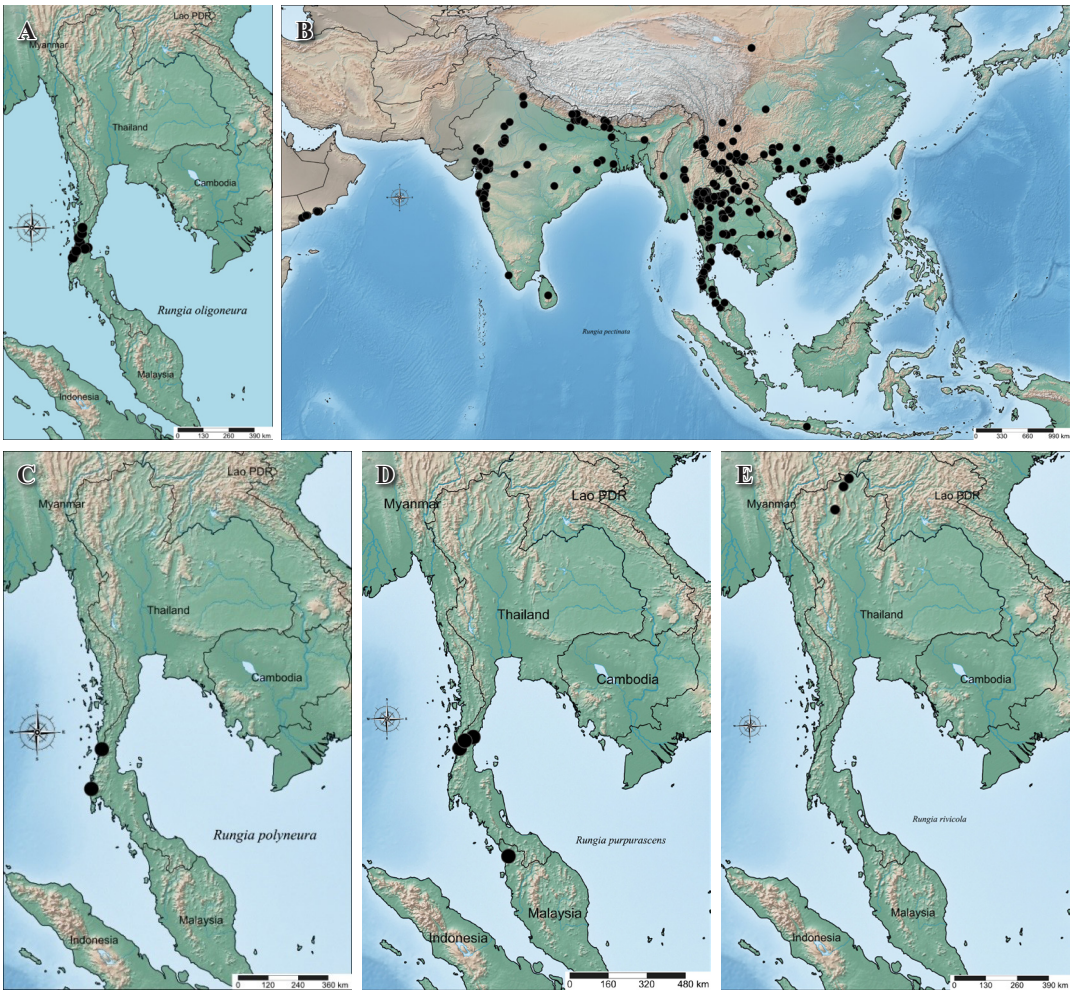

FIGURE 4. Distribution of *Rungia* in Thailand: A. *R. oligoneura*; B. *R. pectinata*; C. *R. polyneura*; D. *R. purpurascens*; E. *R. rivicola.*

tracks near collection sites and trampling by visitors. However, these threats do not appear to be causing declines in habitat quality or in the number of mature individuals at present. A plausible increase in tourism pressure could potentially elevate the species to the EN category in a short period, but it is unlikely to reach CR or Extinct (EX) status under current conditions. Information on the size and status of most subpopulations is lacking, except for the subpopulation at Khun Kon waterfall subpopulation, which has been reported to be very abundant. The overall population trend is suspected to be stable. Further research on population size, subpopulation structure and population trends is required to determine whether any declines are occurring or are ongoing. Based on the available evidence, this species is assessed as Near Threatened (NT).

12. *Rungia sinothailandica* Z.L. Lin & Y.F. Deng (Figs. 2B & 5A)
Habitat: In evergreen forest along stream, *ca.* 800 m alt.
EOO: 8 km^2; AOO: 8 km^2
Conservation status: VU D2

This species is native to China (Yunnan) and Thailand (Chiang Rai province), and is currently known from two localities. In China, it has been collected multiple times from the same locality (Meng Song Cun), whereas only a single collection has been recorded from Thailand. Its habitat is subject to minor threats, including track construction and trampling by visitors; however, these impacts do not currently appear to affect habitat quality or the population. A plausible increase in tourism pressure could rapidly elevate the species' extinction risk, potentially driving it to CR status or even to extinction in the near future. No population data are available, and further field investigations are needed to clarify the population size and trend. Based on the available evidence, this species is assessed as VU under criterion D2.

13. *Rungia subtilifolia* (J.B. Imlay) B. Hansen (Fig. 5B)
Habitat: In evergreen forest, *ca.* 700 m alt.
EOO: 4 km^2; AOO: 4 km^2
Conservation status: CR B1ab(iii) + 2ab(iii)

This species is endemic to Thailand and is known only from a single locality in Satun province. All known collections were made historically, in 1928. The site lies outside protected areas and is subject to multiple threats, including agricultural expansion, nearby settlements, and housing development. These pressures are inferred to be causing a continuing decline in the area, extent, and quality of its habitat. No quantitative data on population size are available but the population trend is inferred to be decreasing. Further field surveys are needed to confirm the current population status and trends. Based on the available evidence, this species is assessed as CR under criterion B1ab(iii) + 2ab(iii). It occurs near the Malaysian border and may also be present in Malaysia, although no specimens have yet been collected from that area. Further studies on population size, distribution, and population trends are required to better clarify its current conservation status.

14. *Rungia tenuissima* J.B. Imlay (Fig. 5C)
Habitat: In mixed deciduous and bamboo forest, 200–850 m alt.
EOO: 8,670 km^2; AOO: 24 km^2
Conservation status: EN B2ab(iii)

This species is endemic to Thailand (Kanchanaburi and Tak provinces) and is known from five localities. Four of these occur within protected areas, while one lies outside. Its habitat is threatened by tourism, agricultural expansion and urbanisation, all of which are contributing to a continuing decline in habitat quality. Although the population size is unknown, the population trend is inferred to be decreasing due to ongoing habitat degradation. Based on the available evidence, this species is assessed as EN under criterion B2ab(iii). Further research on population size, distribution, and trends is required to clarify its current conservation status.

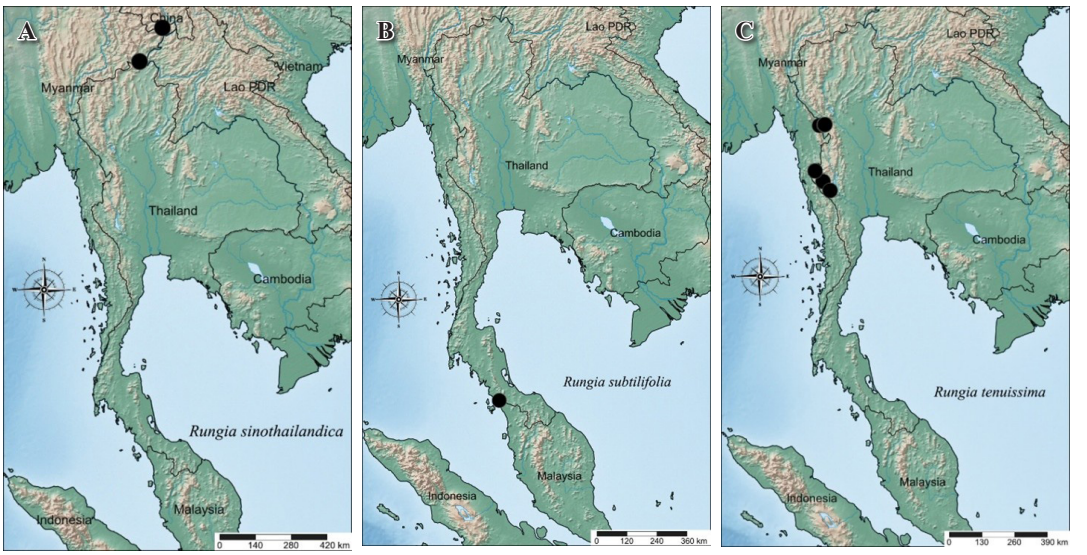

FIGURE 5. Distribution of *Rungia* in Thailand: A. *R. sinothailandica*; B. *R. subtilifolia*; C. *R. tenuissima*.

DISCUSSION AND CONCLUSIONS

The conservation assessment of *Rungia* in Thailand indicates that the genus is of significant conservation concern. Of the species evaluated, nine (64%) are endemic to Thailand, reflecting a high level of national endemism. Twelve Thai *Rungia* (86%) fall within the threatened categories (CR, EN and VU) according to IUCN Red List Categories and Criteria (Table 1). The results show that five species are assessed as CR, five species as EN, and two species as VU. The remaining two species are considered not currently at risk of extinction: one NT species (*R. rivicola*) and one LC species (*R. pectinata*). In 2017, Lin & Deng assessed *R. sinothailandica* as Data Deficient (DD). However, in the present study, the species is reassessed as VU under criterion D2. Although the overall population size remains unknown, no specific threats have been identified that are likely to cause declines in either population size or habitat quality. Moreover, despite its occurrence in both Thailand and China, the species exhibits a relatively narrow EOO and a restricted AOO, supporting its placement in the VU D2 category.

For each of 12 threatened species (Table 1), the percentage of collection known from protected areas is as follows: *R. adnata* (100%), *R. bransidii* (33%), *R. diversibracteata* (0%), *R. maculata* (100%), *R. minutiflora* (33%), *R. naoensis* (100%), *R. oligoneura* (50%), *R. polyneura* (0%), *R. purpurascens* (20%), *R. sinothailandica* (0%), *R. subtilifolia* (0%) and *R. tenuissima* (40%). Four species have recorded population sizes: *R. adnata* (40 mature individuals), *R. minutiflora* (1,000 mature individuals), *R. naoensis* (100 mature individuals) and *R. polyneura* (40 mature individuals). The two species, *R. pectinata* (LC) and *R. rivicola* (NT), are not classified

as threatened. Although the precise number of mature individuals is not yet known, field surveys indicate that both species are relatively abundant and maintain comparatively large population sizes.

Many species are known from only a single locality (*e.g. R. adnata*, *R. diversibracteata*, *R. naoensis* and *R. subtilifolia*) or from very few locations and they possess extremely small AOO, sometimes as low as 4–8 km². Several species are represented solely by historical herbarium collections (*e.g. R. brandisii*, *R. diversibracteata*, *R. maculata*, *R. naoensis* and *R. subtilifolia*), with no recent confirmations despite repeated botanical surveys. Among the five species that are not endemic to Thailand, four are categorised as threatened, namely *R. brandisii* (EN), *R. minutiflora* (VU), *R. purpurascens* (EN) and *R. sinothailandica* (VU). Although these species are not endemic, their distribution ranges are narrow and highly restricted, resulting in elevated extinction risk. In contrast, one species that is endemic to Thailand, *R. rivicola*, is not currently considered at risk of extinction. Despite being known from only three locations, its population are abundant, appears to be stable, and faces no major identified threats that would result in habitat loss or a decline in the number of mature individuals.

The major threats identified across Thai *Rungia* species include tourism, agricultural expansion, fire, infrastructure development and urbanisation, all of which contribute to a decline in both habitat extent and quality. Tourism pressure is evident at several sites where species occur near waterfalls, trails and other visited areas. Trampling and trail construction can directly impact plant survival and regeneration. Fire disturbance, particularly within bamboo forests and seasonally dry habitats, poses a significant threat to several species (*e.g. R. minutiflora*, *R. pectinata, R. rivicola* and *R. tenuissima*), leading to repeated habitat damage and continued reduction in population size. Overall, these findings indicate that human activities occurring both inside and adjacent to protected areas continue to undermine the conservation of *Rungia*, despite the formal legal protection of these sites. Based on existing *ex situ* conservation records for *Rungia* species in Thailand, only a single species, *R. pectinata*, has been documented as being conserved in seed banks and botanical gardens (BGCI, 2025; Genesys, 2025). Therefore, future *ex situ* conservation efforts should prioritise the collection and preservation of Thai *Rungia* species that are currently assessed as being at risk of extinction.

This study provides the first comprehensive assessment of the conservation status of the genus *Rungia* in Thailand and underscores its national conservation importance The assessment reveals that more than 80% of Thai *Rungia* species fall within threatened categories, primarily due to their extremely restricted distributions, small population sizes, and ongoing habitat degradation associated by tourism activities, agricultural expansion, forest fires, and urban development. Many species are confined to only one or a

Table 1. Conservation assessments of *Rungia* species in Thailand.

Species	Endemic to Thailand	Habitat	Altitude (m)	EOO (km^2)	AOO (km^2)	Population size (mature individuals)	IUCN assessment in present study
1. *R. adnata* (J.B. Imlay) B. Hansen	yes	evergreen forest	1,000–1,740	4	4	40	CR D
2. *R. brandisii* C.B. Clarke	no	mixed deciduous forest	*ca.* 800	9,661	12	unknown	EN B2ab(iii)
3. *R. diversibracteata* J.B. Imlay	yes	evergreen forest	1,000–1,200	4	4	unknown	CR B1ab(iii) + 2ab(iii)
4. *R. maculata* Craib	yes	evergreen forest	240–800	8	8	unknown	EN B1ab(iii) + 2ab(iii)
5. *R. minutiflora* C.B. Clarke	no	mixed deciduous forest	100–800	124,869	24	1,000	VU B2ab(iii); D1
6. *R. naoensis* B. Hansen	yes	bamboo forest	*ca.* 900	4	4	100	CR B1ab(iii, v) + 2ab(iii, v); C2a(ii)
7. *R. oligoneura* (J.B. Imlay) B. Hansen	yes	evergreen forest	100–300	4,524	40	unknown	EN B1ab(iii) + 2ab(iii)
8. *R. pectinata* (L.) Nees	no	evergreen, deciduous & mixed montane forest	20–1,000	14,153,072	1,048	unknown (It appears to be very abundant)	LC
9. *R. polyneura* (J.B. Imlay) Rueangs.	yes	evergreen forest	*ca.* 900	8	8	50	CR C2a(i); D
10. *R. purpurascens* (Ridl.) B. Hansen	no	evergreen forest	*ca.* 50	41,289	20	unknown	EN B2ab(iii)
11. *R. rivicola* Craib	yes	deciduous forest	*ca.* 1,500	270	12	unknown (It appears to be very abundant)	NT
12. *R. sinothailandica* Z.L. Lin & Y.F. Deng	no	evergreen forest along stream	*ca.* 800	8	8	unknown	VU D2
13. *R. subtilifolia* (J.B. Imlay) B. Hansen	yes	evergreen forest	*ca.* 700	4	4	unknown	CR B1ab(iii) + 2ab(iii)
14. *R. tenuissima* J.B. Imlay	yes	mixed deciduous & bamboo forest	200–850	8,670	24	unknown	EN B2ab(iii)

few localities, and some are known solely from historical herbarium collections, with no recent confirmations of extant populations. Although several species occur within protected areas, threats persist, particularly from the development of nature trails and other tourism-related infrastructures that involve habitat modification and lead to direct disturbance or loss of individuals. Such disturbances can directly damage or remove these herbaceous plants, further elevating their extinction risk.

Several conservation actions are urgently required. Priority should be given to field observations and population monitoring, along with strengthened habitat protection and improved management within protected areas. *Ex situ* conservation measures such as seed banks, gene banks and botanical gardens should also be developed for threatened species. Effective habitat protection remains essential, particularly through reducing pressures associated with tourism, infrastructure developments and fire disturbances. The results of this study also have important implications for national biodiversity policy. They support the inclusion of *Rungia* species in Thailand's national Red List, help guide conservation priority-setting, and contribute to the country's commitments under the Convention on Biological Diversity and the Global Strategy for Plant Conservation. Based on our assessment, we recommend that the 12 threatened Thai *Rungia* species be formally evaluated for inclusion on the IUCN Red List to ensure their official recognition and to strengthen the development of an effective conservation strategy.

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References

Bachman, S., Moat, J., Hill, A.W., de la Torre, J. & Scott, B. 2011. Supporting red list threat assessments with GeoCAT: geospatial conservation assessment tool. **ZooKeys** 150: 117–126.

BGCI. 2025. **Botanic Gardens Conservation International (BGCI)–Plant Search**. Available from: https://tools.bgci.org/plant_search.php. Accessed on: 15 October 2025.

Chamchumroon, V., Suphuntee, N., Tetsana, N., Poopath, M. & Tanikkool, S. 2017. **Threatened plant in Thailand**. Department of National Parks, Wildlife and Plant Conservation, Bangkok.

Convention on Biological Diversity. 2025. **Thailand-Country Profile**. Available from: https://www.cbd.int/countries/profile?country=th. Accessed on: 1 October 2025.

Forid, M.D., Azuri, M.S., Ishak, W.M.W. & Hossain, M.S. 2024. *Rungia pectinata* (Linn.) Nees: a review of phytochemical analysis and pharmacological activities. **Journal Farmasi Indonesia** 20(1): 104–110.

GBIF. 2025. **The Global Biodiversity Information Facility Home Page**. Available from: https://www.gbif.org. Accessed on: 1 October 2025.

Genesys. 2025. **Genesys Global Portal on Plant Genetic Resources**. Available from: https://www.genesys-pgr.org. Accessed on: 15 October 2025.

IUCN Standards and Petitions Committee. 2012. **IUCN Red List Categories and Criteria**. Available from: https://portals.iucn.org/library/sites/library/files/documents/RL-2001-001-2nd.pdf. Accessed on: 1 October 2025.

IUCN Standards and Petitions Committee. 2024. **Guidelines for Using the IUCN Red List Categories and Criteria**. Available from: https://www.iucnredlist.org/documents/RedListGuidelines.pdf. Accessed on: 1 October 2025.

Lin, Z.L. & Deng, Y.F. 2017. *Rungia sinothailandica* sp. nov. (Acanthaceae) from China and Thailand. **Nordic Journal of Botany** 35(4): 488–493.

Manzitto-Tripp, E.A., Darbyshire, I., Daniel, T.F., Kiel, C.A. & McDade, L.A. 2022. Revised classification of Acanthaceae and worldwide dichotomous keys. **Taxon** 71(1): 103–153.

Myers, N., Mittermeier, R.A., Mittermeier, C.G., Fonseca, G.A.B. & Kent, J. 2000. Biodiversity hotspots for conservation priorities. **Nature** 403*:* 853–858.

Office of Natural Resources and Environmental Policy and Planning. 2020. **Thailand's National Biodiversity Action Plan 2023–2027**. Ministry of Natural Resources and Environment, Bangkok.

POWO. 2025. **Plants of the World Online**. Available from: https://powo.science.kew.org/. Accessed on: 1 October 2025.

Rueangsawang, K., Suddee, S., Chantaranothai, P. & Simpson, D.A. 2020. A synopsis of *Rungia* Nees (Acanthaceae) in Thailand. **Thai Forest Bulletin (Botany)** 48(1): 61–71.

Shorthouse, D.P. 2010. **SimpleMappr, an online tool to produce publication-quality point maps**. Available from: https://www.simplemappr.net. Accessed on: 14 November 2025.

Thiers, B. 2025. **Index Herbariorum: a global directory of public herbaria and associated staff**. Available from: http://sweetgum.nybg.org/science/ih/. Accessed on: 1 October 2025.

UNEP-WCMC & IUCN. 2025. **Protected Planet: The World Database on Protected Areas (WDPA) and World Database on Other Effective Area-Based Conservation Measures (WD-OECM)**. Available from: https://www.protectedplanet.net. Accessed on: 15 October 2025.