Conservation Gap Analysis of Select Native

Asian Oaks


Min Deng

Species profile: ***Quercus austrocochinchinensis***

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CRITICALLY ENDANGERED

Quercus baniensis
Quercus baolamensis
Quercus bidoupensis
Quercus blaoensis
Quercus cambodiensis
Quercus camusiae
Quercus dankiaensis
Quercus dilacerata
Quercus donnaiensis
Quercus honbaensis
Quercus mangdenensis
Quercus ngochoaensis
Quercus pseudoverticillata
Quercus sontraensis
Quercus trungkhanhensis
Quercus xuanlienensis

ENDANGERED

Quercus arbutifolia
Quercus asymmetrica
Quercus bambusifolia
Quercus chrysotricha
Quercus disciformis
Quercus edithiae
Quercus kinabaluensis
Quercus kingiana
Quercus lenticellata
Quercus lodicosa
Quercus nivea
Quercus percoriacea
Quercus petelotii
Quercus ramsbottomii
Quercus rupestris
Quercus steenisii
Quercus xanthotricha

VULNERABLE

Quercus austrocochinchinensis
Quercus braianensis
Quercus gaharuensis
Quercus hondae
Quercus kerangasensis
Quercus merrillii
Quercus quangtriensis
Quercus treubiana

Quercus austrocochinchinensis Hickel & A.Camus

IUCN Red List Category and Criteria: Vulnerable B2ab(iii)
Common Names: Yue nan qing gang (越南青冈), Ko aep (ก่อแอบ)

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DISTRIBUTION AND BIOLOGY

Quercus austrocochinchinensis has scattered distribution in China (southwest Yunnan province and Hainan), Viet Nam, Laos, and Thailand (Figure 1). Herbarium records show that it once dominated seasonal tropical forests within these regions, but has since declined dramatically primarily due to agricultural expansion (Li & Deng, 2014). It is found within subtropical moist forest, with occasional occurrences in subtropical wet forest, at 700–1,000 m elevation (Carrero, 2019; Figure 2). It prefers closed and shady habitats with high humidity (An et al., 2017).

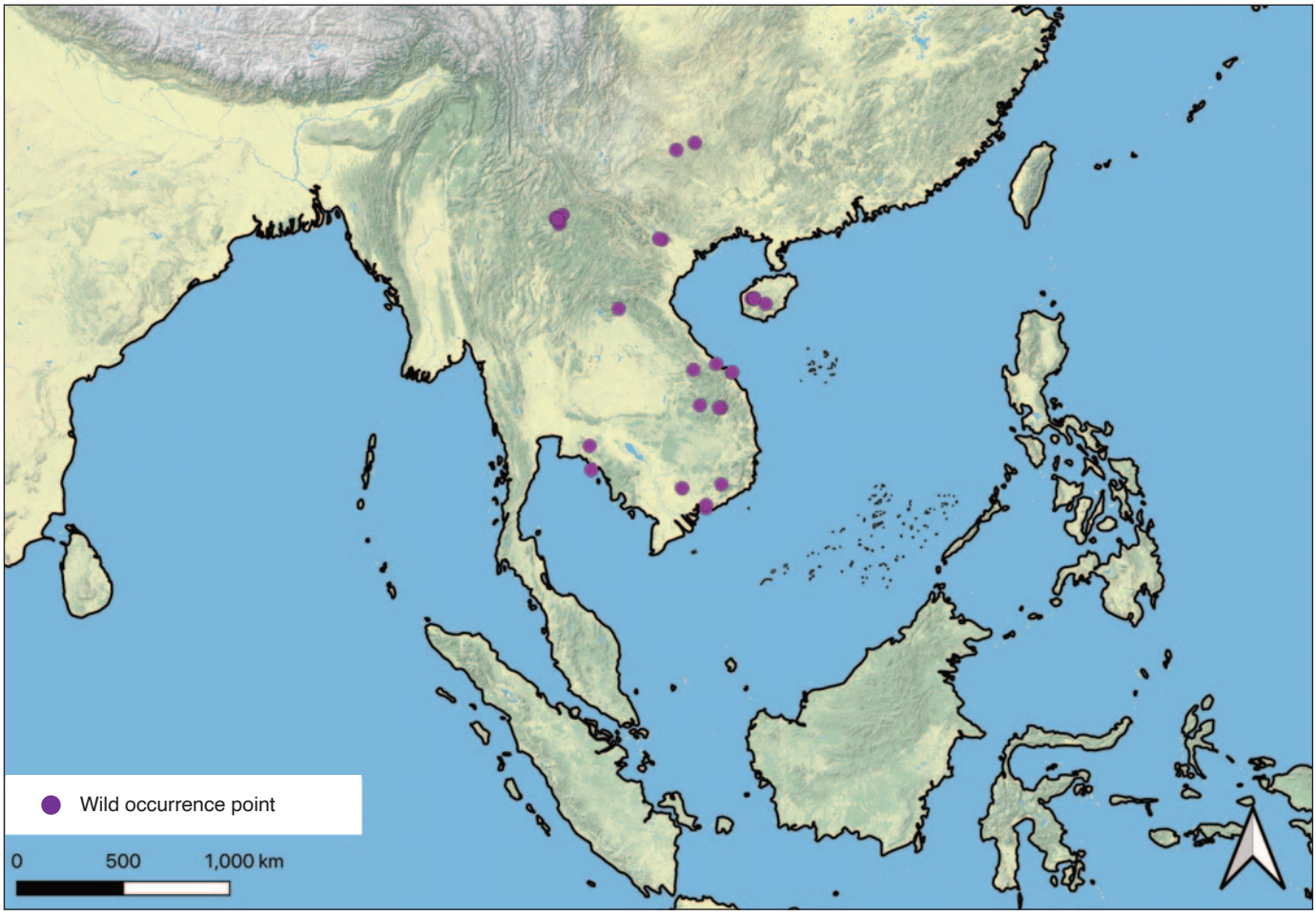

Figure 1. Wild (i.e., *in situ*) occurrence points for *Quercus austrocochinchinensis*.

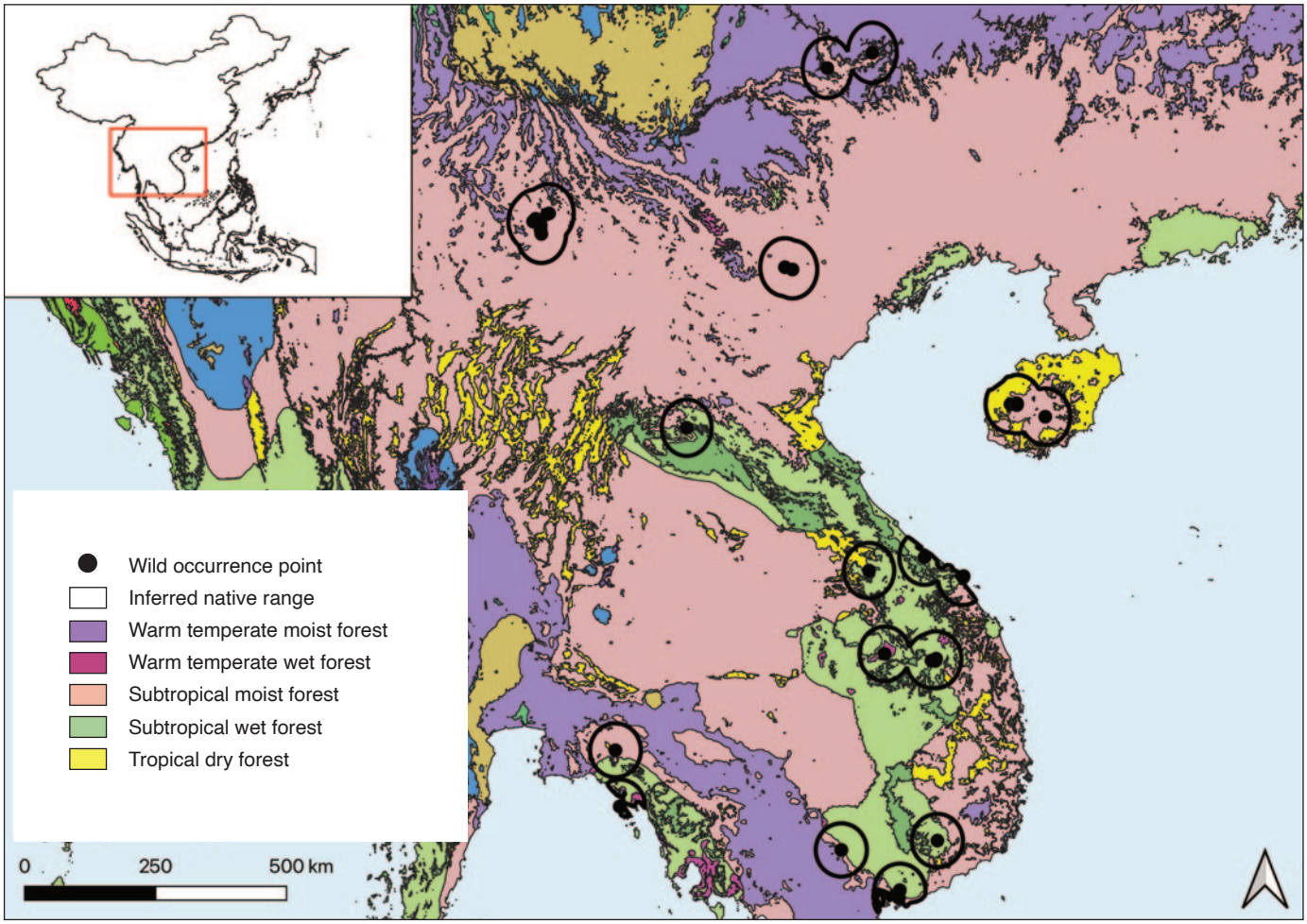

Figure 2. Holdridge life zones within the inferred native range of *Quercus austrocochinchinensis*. Map legend includes the HLZs with at least one occurrence point of *Q. austrocochinchinensis*. For a full map of HLZs within the study region, see Appendix B in Good et al. (2026).

Quercus austrocochinchinensis is a large tree that can grow up to 50 meters, with a girth of 80–150 cm (e-Flora of Thailand, 2008; Li & Deng, 2014). The leaves are oblong-elliptic to lanceolate, measuring 10–20 × 3–5 cm, and are slightly leathery with a sharply toothed margin. When young, leaves are yellow to brown and densely covered with fasciculate hairs, becoming glabrous as they mature (Li & Deng, 2014). Acorns are oblate, 1.1–1.4 × 1.3–1.8 cm, angular, yellowish brown, and tomentose (Ferguson, 2003). The cap covers all but the nut apex.


Min Deng

THREATS TO WILD POPULATIONS

Biodiversity loss in Southeast and East Asia is primarily driven by habitat loss from rapid urbanization, industrialization, and agricultural expansion, resulting in some of the highest deforestation rates globally (Austin et al., 2017; Botterill-James et al., 2024; World Resources Institute, 2025). For oaks in Southeast and East Asia, agricultural expansion (including wood and pulp plantations) is the leading threat, followed by logging and wood harvesting (Good et al., 2026). While species-specific data remain limited, a literature review and consultation with species experts indicates that these broader pressures are applicable to *Q. austrocochinchinensis* and other terrestrial plant species.

Logging and wood harvesting: Logging and firewood harvesting are listed as threats on the species' Red List assessment (Carrero, 2019), but no additional information is provided.

Agriculture, wood and pulp plantations: The primary threat to *Q. austrocochinchinensis* is habitat loss due to development of rubber tree and banana farms.

Residential/commercial development, mining, roads: Infrastructure expansion, including road construction for agricultural access, poses an indirect threat to *Q. austrocochinchinensis* through habitat fragmentation and increased access for illegal resource extraction.

Tourism and recreation: As some of these trees are located within parks that are open to eco tourism, visitor infrastructure and trail development may contribute to localized disturbance of *Q. austrocochinchinensis* habitat inside protected areas.

Fire and fire suppression: Not a known threat at the time of publication.

Invasive species competition/disturbance: Invasive grasses and pioneer shrubs commonly colonize disturbed forest edges and roadsides, and may compete with *Q. austrocochinchinensis* seedlings for light and resources in the edge habitats this species occupies.

Climate change and severe weather: A study by Vyan et al. (2026) evaluated the ecological requirements of *Q. austrocochinchinensis* using species distribution modeling (SDM) and projected its distribution range under SSP2-4.5 and SSP5-8.5 climate scenarios. They found that the species is projected to lose up to 75% of its range by 2080.

Genetic material loss: A study by An et al. (2017) documented ongoing introgression between *Q. austrocochinchinensis* and the common and widespread *Q. kerrii*, identifying a hybrid swarm at the contact zone of the two species within Xi-Shuang-Ban-Na Nature Reserve, Yunnan Province, China. The study also found that the number of admixed *Q. austrocochinchinensis* individuals was larger than previously anticipated based solely on morphological traits. Further study is needed to understand the impact of introgression on genetic diversity.

Pests/pathogens: Unknown. No pest or pathogen data have been reported for *Q. austrocochinchinensis*.

Extremely small populations: The total population size of *Q. austrocochinchinensis* is unknown. According to Lin and Deng (2014), population size has decreased dramatically and this species is currently only found in nature reserves.

CONSERVATION ACTIVITIES

Once per year between 2021 and 2025, *Quercus* accessions data were requested from *ex situ* collections globally. A total of 45 institutions from 12 countries submitted data for Southeast and East Asian (SE-E Asian) oak species, including *Q. austrocochinchinensis*. We also included *ex situ* collections data in our analysis from the 267 institutions that responded to surveys conducted in 2017–2022 for previous gap analysis of oaks led by The Morton Arboretum, as these often included all *Quercus* level accession data at an institution and could have included one or more of our target species. Past, present, and planned conservation activities for SE-E Asian oak species of concern were also examined through literature review and expert consultation.

Two institutions reported ex *situ* collections of *Q. austrocochinchinensis* (Table 1), both of which are located in Asia. Provenance type was reported as wild for all twelve individuals. A spatial analysis was conducted to estimate the geographic and ecological coverage of ex *situ* collections using methods adapted from Khoury et al. (2020). Fifty-kilometer buffers were placed around each wild occurrence point as well as the source locality of each plant living in ex *situ* collections. Collectively, the buffer area around the wild occurrence points represents the inferred native range of the species. The buffer area around ex *situ* points serves as the native range represented in ex *situ* collections. Geographic coverage of ex *situ* collections was estimated by dividing the ex *situ* buffer area by the area of the inferred native range. Ecological coverage of ex *situ* collections was estimated by dividing the number of Holdridge life zones present under the ex *situ* buffer by the number of Holdridge life zones under the inferred native range. The species representativeness ex *situ* was calculated by counting the number of ex *situ* institutions that currently have one or more living individuals of wild provenance in their collections, up to a maximum of ten. In order to maintain a consistent scale across all scores, this number was multiplied by ten. All three scores range from 0–100. A final ex *situ* conservation score was calculated by taking an average of the three scores above. Final scores range from 0–100, with scores near 100 indicating comprehensive ex *situ* conservation, and scores near 0 indicating poor ex *situ* conservation (Table 2).

Table 1. Results of 2017–2022 ex *situ* surveys.

Number of ex *situ* collections reporting this species	2
Number of plants in ex *situ* collections	12
Average number of plants per institution	6
Percent of ex *situ* plants of wild origin	100%
Percent of wild origin plants with known locality	100%

Table 2. *Ex situ* conservation scores for *Quercus austrocochinchinensis* with all scores ranging from 0–100. A final score of 100 indicates comprehensive ex *situ* conservation, and a score of 0 represents poor ex *situ* conservation.

Geographic coverage ex *situ*	6
Ecological coverage ex *situ*	29
Representation in ex *situ* collections	20
Final ex *situ* conservation score	18

Using methods adapted from Khoury et al. (2020), we estimated the degree of representation of *Q. austrocochinchinensis* in protected areas in order to identify *in situ* conservation gaps. Wild occurrence points were mapped and overlaid with protected areas from the World Database on Protected Areas (UNEP-WCMC & IUCN, 2025) and the Data Resources of Nature Reserves in China Repository (National Specimen Information Infrastructure, 2020; Figure 3). A fifty-kilometer buffer was placed around each occurrence point to represent the species inferred native range. Geographic coverage *in situ* was estimated by calculating the proportion of a species inferred native range that is covered by protected areas. Ecological coverage *in situ* was estimated by identifying the Holdridge life zones in the inferred native range as well as the Holdridge life zones in protected areas within the inferred native range and calculating the percentage of life zones that are conserved in protected areas. Species representativeness *in situ* was estimated by calculating the percentage of known occurrence points within the species inferred native range that fall inside protected areas. All three scores range from 0–100. A final conservation score *in situ* was calculated by taking an average of the three scores above. Final scores range from 0–100, with scores near 100 indicating comprehensive *in situ* conservation, and scores near 0 indicating poor *in situ* conservation.

The final conservation score *in situ* for *Q. austrocochinchinensis* is 54/100 (Table 3). As a reference, the threatened or Data Deficient SE-E Asian oaks with the highest *in situ* conservation scores are *Q. blaoensis* with a score of 77/100, and *Q. xuanlienensis* with a score of 79/100.

Table 3. *In situ* conservation scores for *Quercus austrocochinchinensis* with all scores ranging from 0–100. A final score of 100 indicates comprehensive *in situ* conservation, and a score of 0 represents poor *in situ* conservation.

Geographic coverage *in situ*	13
Ecological coverage *in situ*	100
Species representation in *in situ* collections	49
Final *in situ* conservation score	54

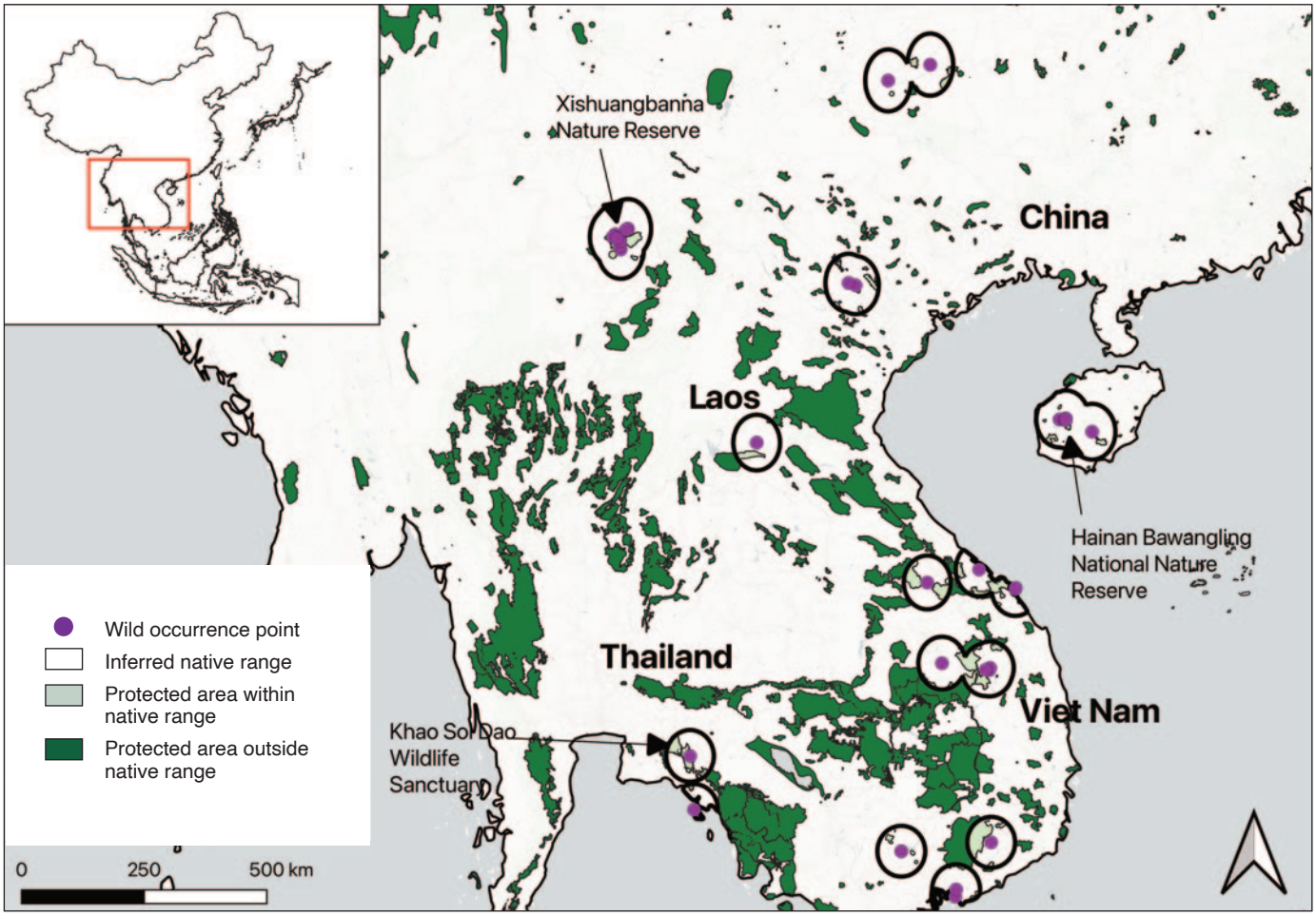

Figure 3. Wild occurrence points and inferred native range of *Quercus austrocochinchinensis* in relation to protected areas. Protected areas are from the World Database on Protected Areas (UNEP-WCMC & IUCN, 2025) and the Data Resources of Nature Reserves in China Repository (National Specimen Information Infrastructure, 2020).

Land protection: Within the inferred native range of *Q. austrocochinchinensis*, 13% is within protected areas (Table 3). Protected areas include Xi-Shuang-Ban-Na Nature Reserve in Yunnan Province, China, Ba-Wang-Ling Nature Reserve in Hainan Province, China and Khao Soi Dao Wildlife Sanctuary, Thailand.

Sustainable management of land: While *Q. austrocochinchinensis* is found within protected areas in China, Viet Nam, and Thailand, it is unknown whether the protected areas have sustainable land management plans that would impact *Q. austrocochinchinesis*, specifically.

Population monitoring and/or occurrence surveys: There has been no formal population monitoring or systematic occurrence surveys for *Q. austrocochinchinensis*. This is largely due to high Asian elephant activity within the habitat of this species, which makes fieldwork challenging and unsafe (M. Deng, pers. comm. 2026).

Wild collecting and/or *ex situ* curation: According to the results of our *ex situ* surveys, there are 12 individuals of *Q. austrocochinchinensis* in two collections in Asia.

Propagation and/or breeding programs: Acorns germinate readily and seedlings grow quickly in a humid greenhouse. Seedlings have been successfully asexually propagated via micropropagation using young, lateral roots (Li & Deng, 2014).

Reintroduction, reinforcement, and/or translocation: This is not currently a conservation activity for this species

Research: Research to-date has primarily focused on introgression and hybridization of *Q. austrocochinchinensis*, as well as the development of SSR markers (Song et al. 2015; An et al. 2016; An et al. 2017). A recent phylogenetic study of four *Quercus* section Cyclobalanopsis species, including *Q. austrocochinchinensis*, aimed to investigate the characteristics and differences of chloroplast genomes (CPGs) among the four species, and their phylogenetic status (Chen et al., 2023). They found six Compound Trichome Base species gathered together in pairs to form three branches respectively: *Quercus kerrii* with *Q. chungii*, *Q. austrocochinchinensis* with *Q. gilva*, and *Q. helferiana* with *Q. rex*.

Min Deng

Education, outreach, and/or training: To enhance the capacity building of Lao botanists, two workshops on identification and taxonomy of Fagaceae (especially in genus *Quercus*) for students and young researchers of the National University of Laos and other research institutions were held (Souladeth, 2022). *Quercus austrocochinchinensis* was one of the focal species of the workshop. In addition, in early 2026 members of the Global Conservation Consortium for Oak (GCCO) from The Morton Arboretum led a conservation action planning workshop for the threatened Fagaceae of Vietnam at Dalat University, Dalat, Vietnam. Over 20 participants representing the universities, NGOs, and government sectors were in attendance to contribute to the development of the conservation action plan. The action plan will be drafted in and produced in late 2026 in collaboration with the participants.

Species protection policies: No species-specific protection policies exist for *Q. austrocochinchinensis*.

PRIORITY CONSERVATION ACTIONS

Quercus austrocochinchinensis is a threatened species that once dominated seasonal tropical forests within Southeast Asia and southern China. Its habitat has declined dramatically in recent years due primarily to the rapid growth of banana tree and rubber farms, and *Q. austrocochinchinensis* is now restricted to nature reserves. This species has been successfully asexually propagated and it grows well in a humid greenhouse setting. Conservation priorities include population monitoring and occurrence surveys, reintroduction into established protected areas, and increasing the number of *ex situ* collections with wild provenance throughout the species' range.

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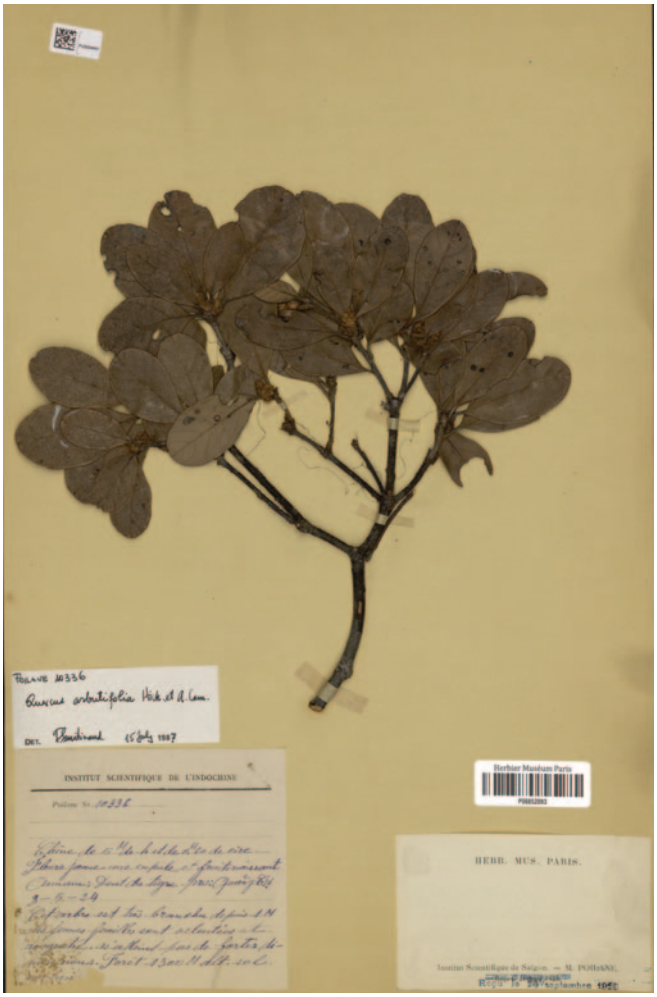

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