# Addition of four invasive alien plant species to state flora of Mizoram, India

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**Cover: Orange Oakleaf *Kallima inachus* with colour pencils and watercolor wash by Elakshi Mahika Molur adapted from a workshop by Lenin Raj.**

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SHORT COMMUNICATION

# Addition of four invasive alien plant species to state flora of Mizoram, India

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**Abstract:** Four alien plant species that have been naturalized in the state of Mizoram are reported for the first time as an addition to the state flora. These are *Achimenes longiflora* DC. & *Chrysothemis pulchella* (Donn ex Sims) Decne. from Gesneriaceae family and *Cuscuta campestris* Yunck. & *Stylosanthes guianensis* (Aubl.) Sw. from Convolvulaceae & Fabaceae families, respectively. The present report of the occurrence of these four invasive alien plant species in the state will allow for early detection, risk assessment, and effective management to mitigate against their potential negative impacts on the native ecosystem and biodiversity.

**Keywords:** IAPS, Indo-Burma hotspot, native plants, naturalized, northeastern India, taxonomy.

Invasive alien plant species are exotic or non-indigenous plants which have been introduced to intentionally or unintentionally by human activities outside their natural range and have acclimatised themselves in the new ecosystem. Some of the alien plant species established in such a way become invasive by invading and outcompeting the native plant species affecting the natural biological diversity (Chaudhary et al. 2022). So, identification of the alien plant species is very important as they are agents of change that threaten the native biological diversity. They are known to be one of the greatest threats to biological diversity globally in many ecosystems. They are the second most important factor after habitat destruction for species endangerment and extinction (Clout 1997; Mc Neely & Strahm 1997; Wilcove et al. 1998; Hadjisterkotis et al. 2000).

Mizoram is a hilly state located in the northeastern part of India. The state is endowed with rich diversity of flora and fauna as it is a part of Indo-Burma biodiversity hotspot which encompasses many endemic plant taxa with many of them highly threatened. When the alien plant species become naturalized, some of them become invasive due to disturbance created by human activities and affects the native population. This study is crucial because introduced alien species can have a significant impact on the local ecosystem, often outcompeting native plants for resources such as light, water, and nutrients. This can lead to a loss of biodiversity and changes in the structure and function of the ecosystem. By studying introduced plant species, researchers can better understand their ecological impacts and develop strategies to manage them.

## Materials and Methods

During random survey works conducted (2021

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to 2023) in and around Aizawl District, Mizoram, four naturalized plant species in the state could be identified and reported as new addition to state flora. The specimens of these four taxa were collected during their flowering period from different localities of Aizawl District. The characters and measurements of the plants were done and after critical examination of characters, perusal of literatures, and consultation of online herbarium (POWO 2023; Tropicos 2023; WFO 2023), the plants were identified. All the collected plants were processed for herbarium preparation following Jain & Rao (1977) and the herbarium vouchers were deposited in Mizoram University Herbarium (MZUH), Department of Botany.

## Results

### Taxonomic Treatment

***Achimenes longiflora*** DC. Prodr. 7: 536 (1839) [Gesneriaceae] (Image 1A & B)

Herbaceous, up to 70 cm tall, brown to maroon stem, pubescent. Leaves arranged in whorl, green upper surface and maroon lower surface, pubescent, margin serrate. Petiole 1.3–1.7 cm long, pubescent, green. Peduncle absent. Pedicel 1.5 cm long, densely pubescent, maroon. Calyx 1.8 × 0.2 cm long, divided up to base, lanceolate, pubescent, re-curved at tip. Inflorescence 2–4 flowered, axillary. Corolla 4.8 cm long, tube glabrous, yellow to maroon, 5 lobes, purple, inner corolla having dark brown patches. Stamen 4, glabrous, 2 cm long, anther inserted, all 4 anthers fused at one point. Staminode white, one in number, 0.1 cm long. Pistil 2.8 cm long, stigma densely pubescent, bilobed white, 0.1 cm long, style densely pubescent.

Common name: Cupid's Bow

Vernacular name: Not found

Flowering & Fruiting: July–November

Mode of Propagation: Rhizomes and seeds

Habitat & ecology: Adapted to a tropical climate, with high humidity and consistent temperatures throughout the year. In cultivation, it can be grown in a range of temperatures, but it prefers warm, humid conditions and will not tolerate frost.

Native range: Tropical regions of Mexico and Central America

Distribution: India (Meghalaya & Sikkim), Central America, Caribbean.

Economic Importance: The plant is commonly cultivated as ornamental plant in the botanical gardens, ecotourism sites, parks and landscapes. It has huge potential for development into new cultivars by horticulturists for their commercialization and providing economic values to growers and florists.

Species examined: India, Mizoram, Aizawl District, Lungleng, 23.6656$^0$N 92.6635$^0$E, 980 m elevation, 07 November 2022, Lal Tlanhlui & Margaret Lalhlupuii, 129815 (MZUH).

Notes: The plant is introduced into various parts of the world due to its beautiful flowers and become naturalized in the non-native habitats. The vigorous growth and the ability for prolific reproduction through seeds and vegetative means can outcompete the native plants affecting the natural flora and fauna by affecting even the pollinators.

***Chrysothemis pulchella*** (Donn ex Sims) Decne., Rev. Hort. (Paris) sér. 3, 3: 242 (1849) [Gesneriaceae] (Image 1C & D)

Perennial, 20–80 cm long, stem sparsely pubescent, succulent, green. Leaves opposite decussate, 11–24 × 4.6–11.2 cm long, pubescent on upper surface but glabrous on lower surface, margin serrate, base oblique, secondary venation 6–9, rough. Petiole 0.5–3 cm long, succulent, green. Bract pubescent. Pedicel 1 cm long, pubescent. Calyx 5, brick red, teeth pubescent, serrate. Inflorescence corolla 2.5 cm long, pubescent at lower tube, yellow, 5 lobes, inner lobe having maroon streaks. Stamen 4, glabrous, filament coil at the upper end. Pistil glabrous, 1.5 cm long, ovary 0.3 cm long.

Common name: Sunset Bells /Yellow Mellow

Vernacular name: Not found

Flowering & Fruiting: July–October

Mode of Propagation: Seeds

Habitat & Ecology: The plant is often cultivated for ornamental and decorative uses. It is also commonly found to be naturalized in proximity to gardens, alongside roads and near houses as an escapee.

Native Range: Mexico to Tropical America

Distribution: India (Kerala, Manipur); Central America and South America (Introduced in various parts of countries as ornamental plant).

Economic Importance: It is commonly cultivated as ornamental plant in gardens, landscapes as well as their use in cut flower industry. When the plant becomes naturalized in a new environment, it can become invasive and have negative impacts to the native biodiversity.

Species examined: India, Mizoram, Aizawl District, Mizoram University, 23.7386$^0$N, 92.6701$^0$E, 890 m elevation, 23 September 2021, Lal Tlanhlui & Margaret Lalhlupuii, 129812 (MZUH).

Notes: The plant is generally introduced for its ornamental purposes. However, its aggressive growth

can have adverse effects to the non-native environment.

***Cuscuta campestris*** Yunck. Mem. Torrey Bot. Club 18: 138 (1932) [Convolvulaceae] (Image 1E, F & G)

Vine, annual (perennial herb if on perennial host), rootless, obligate stem parasitic climber with filiform stems attached to the host by numerous haustoria, leafless. Stem cylindrical, solid, thread like less than 1 mm in diameter, abundantly branched twinning, glabrous. Along the stem, groups of 5–15 suckers (haustoria) are regularly found aligned. Inflorescence consists of dense glomerules, evenly spaced along the stems, comprising of many flowers, 0.7 cm long. Flowers 0.4 cm long, white or yellowish white, pedicel 0.4–0.5 cm long. Calyx consists of 5 ovate sepals, 0.1 cm long, fused at base with rounded lobes, corolla is campanulate (bell shaped) 0.2 cm long, lobes 5 nos., sharp, persistent, tube is same length as lobe. Stamens 5, ovary glabrous, 0.1 cm in diameter, style bifid, stigma globular.

Common name: Field dodder; golden dodder; yellow dodder

Vernacular name: 'Japanhlo ral'

Flowering & Fruiting: September–December

Mode of Propagation: Seeds and stem fragments

Habitat & Ecology: Found as a parasite to many herbaceous plants like *Acmella ciliata* (Kunth) Cass., *Polytoca wallichiana* (Nees ex Steud.) Benth. and very commonly with the invasive alien plant species (IAPS) *Mikania micrantha* Kunth with even the vernacular name Japanhlo ral means enemy to this plant (Image 1F). Locally abundant in moist open grassland along streams associated with *Clinopodium umbrosum* (M. Bieb.) Kuntze, *Chlorophytum nepalense* (Lindl.) Baker, *Oplismenus composites* (L.) P. Beauv., *Pedicularis gracilis* Wall. ex Benth. etc.

Native Range: North America, Caribbean, and western South America.

Distribution: India (Andhra Pradesh, Gujarat, Jammu & Kashmir, Madhya Pradesh, Orissa, Tamil Nadu, Uttar Pradesh, Assam, Meghalaya); Africa, Asia, Australia, Europe, North America, Pacific Island, South America.

Economic Importance: *Cuscuta* spp. including *C. campestris* have become a serious issue for many agricultural crops and other economically important plants that lead to great reduction in their yield. However, *C. campestris* was reported to be an effective biocontrol agent against another invasive alien plant species (IAPS) Mikania *micrantha* (Yu et al. 2008), which is also commonly seen as a host plant in the present study.

Specimens examined: India, Mizoram, Aizawl District, Mizoram University, 23.7386$^0$N, 92.6722$^0$E, 888 m elevation, 18 October 2022, Lal Tlanhlui & Margaret Lalhlupuii, 129811(MZUH).

Notes**:** Although commonly distributed in different parts of Mizoram, the plant is generally misidentified as *Cuscuta reflexa* Roxb. which is already reported from the state. The present report is important for various ecosystems and conservation efforts for the native plants as the plant is under obnoxious IAPS affecting the native plant diversity.

***Stylosanthes guianensis*** (Aubl.) Sw., Kongl. Vetensk. Acad. Handl. 1789: 296 (1789) [Fabaceae] (Image 1G & H)

Herb, spreading shrub, up to 100 cm tall, invasive weed; stem green, pubescent, round; leaf 3 foliate, leaf margin entire, pubescent, pinnate, leaflets sub-sessile, stipules sheathing, inflorescence 2–4 flowered, bract pubescent primary bracts 0.9–2.1 cm long, the outer densely covered with mostly spreading long bristles; secondary bracts 2–5 mm long, 0.7 mm wide; bracteole 1.9–4 mm long, lanceolate, green, calyx pale green, lobes elliptic or oblong, glabrous, corolla yellow, 3–5 mm, vexillum with maroon streaks, keel yellow. Pods ovoid, glabrous, brown, 2 × 1.4 mm, one article, beak 0.4 mm, inflexed, the article ovoid, 2–3 mm long, 1.8 mm wide, glabrous or minutely short pubescent near the apex; beak minute, 0.1–0.4 mm long, inflexed. Seeds pale brown, glabrous compressed-ellipsoid, beaked or pointed near the hilum, shiny.

Common name: Stylo

Vernacular name: Not found

Flowering & Fruiting: September – December

Mode of Propagation: Seeds

Habitat & Ecology: Commonly seen growing along roadsides and open grasslands.

Native Range: Mexico to southern Tropical America

Distribution: India (Kerala, Manipur); Taiwan, China, North America, Central America, South America.

Economic Importance: Tropical perennial forage crop with high forage yield.

Specimens examined: India, Mizoram, Aizawl District, Mizoram University, 23.7375$^0$N, 92.6622$^0$E, 854m elevation, 18 December 2022, Lal Tlanhlui & Margaret Lalhlupuii, 129801(MZUH).

Notes: The plant is commonly introduced to different parts of the world as an important forage and fodder legume and found naturalized in many tropical regions.

## Discussion and Conclusion

The four naturalized alien plant species *Achimenes*

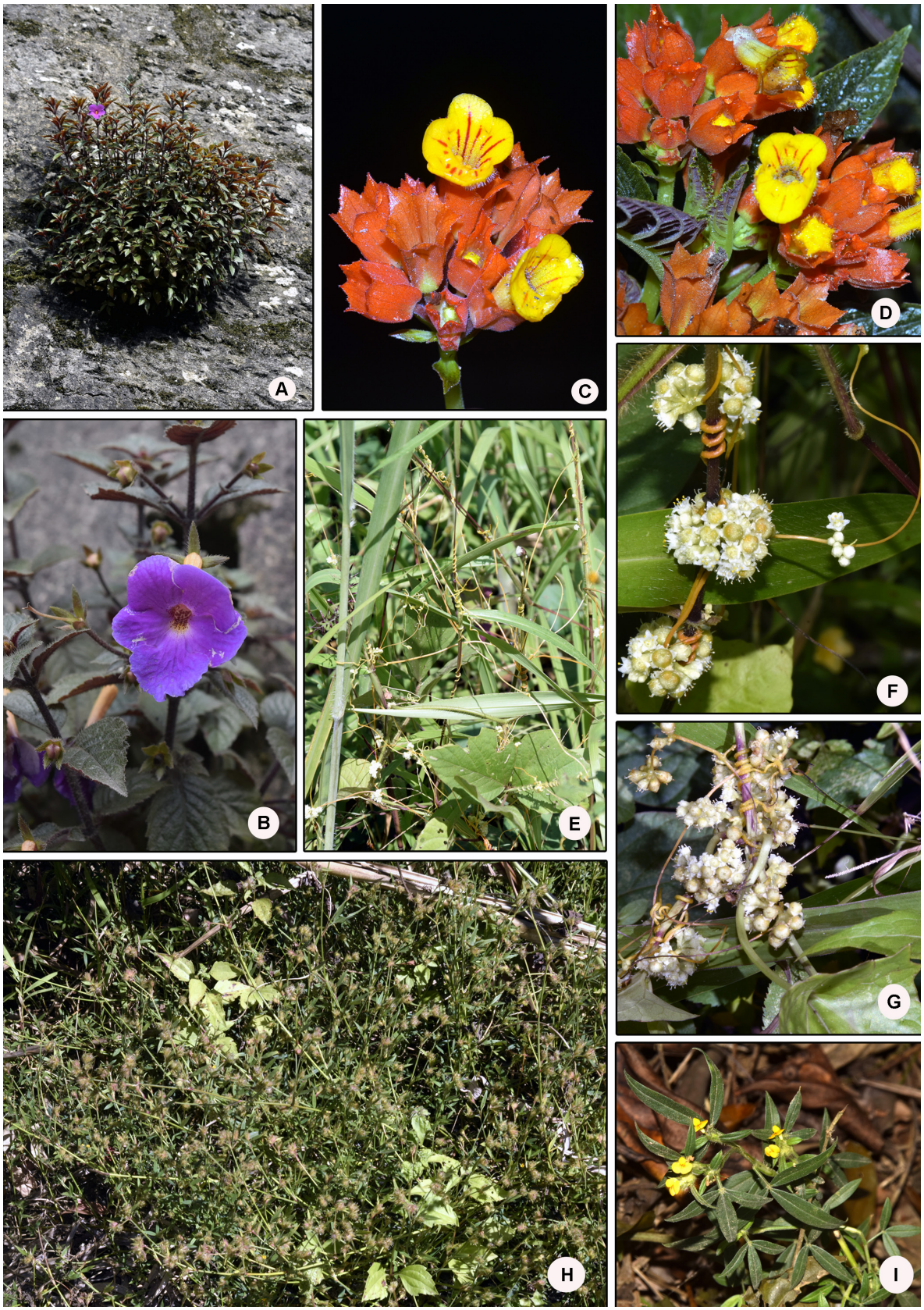


**Image 1. A & B—*Achimenes longiflora* (A—habit| B—close up) | C & D—*Chrysothemis pulchella* (close up). E, F & G—*Cuscuta campestris*: E—Habit | F—Close up on the host plant | G—Close up on host *Mikania micrantha*. H & I—*Stylosanthes guianensis*: H—Habit | I—Close up. © Lal Tlanhlui & Margaret Lalhlupuii.**

*longiflora*, *Chrysothemis pulchella*, *Cuscuta campestris* and *Stylosanthes guianensis* with the first two taxa belong to Gesneriaceae and the other two from Convolvulaceae and Fabaceae family respectively are reporting for first time from Mizoram, northeastern India. Except for *Cuscuta campestris*, the other three taxa represent the first generic new record from the state. Also, *C. campestris* is a well-known IAPS which are obligate stem parasite and agricultural pest creating huge economic losses due to its ability to infest wide range of host plants from economically important cultivated plants (Baráth 2021). The two taxa *Achimenes longiflora* and *Chrysothemis pulchella* are generally introduced as ornamental plants which later on become naturalized to the new place and this introduction for horticultural purpose is an important parameter for naturalization and invasion process necessary for becoming IAPS (Rojas-Sandoval & Acevedo-Rodríguez 2015). Many species of *Stylosanthes* including *Stylosanthes guianensis* have been introduced to different parts of India as a forage and fodder legume (Chandra et al. 2006). However, *Stylosanthes* species in particular *S. guianensis* have been identified from Australia as a conservation threat due to their aggressive nature and ability to invade areas beyond pastures (Maass & Sawkins 2004). As Mizoram being a part of Indo-Burma hotspot, which is recognized as one of the most important biodiversity hotspot, early identification and detection of these alien naturalized plants in the state will be crucial to prevent the establishment and their spread to the native ecosystem and for promoting sustainable biodiversity conservation.

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