

ADDITIONS TO THE FLORA OF PAKISTAN: THREE NEW RECORDS IN THE GENERA *ACHILLEA*, *AMARANTHUS* AND *CICER*

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Abstract

This study is based on field surveys conducted during 2022-2024, during which three vascular plant species were recorded first time for the Flora of Pakistan. The newly recorded species *Achillea ptarmica* (Asteraceae), *Amaranthus polygonoides* (Amaranthaceae), and *Cicer chorassanicum* (Fabaceae) are documented here. *Achillea ptarmica* was collected from Khaplu in Ghanche district of Gilgit-Baltistan and subsequently cultivated in Islamabad for detailed study and identification. *Amaranthus polygonoides* was collected from the Lower Dir district, Khyber Pakhtunkhwa and Islamabad Capital Territory and *Cicer chorassanicum* was found above Kuragh in Upper Chitral district, Khyber Pakhtunkhwa. Detailed morphological characteristics, descriptions, illustrations, and a distribution map are provided for the newly recorded species.

Key words: Biodiversity; Flora; Invasive Plants; New records; Pakistan

Introduction

Pakistan is a vast country with a total land area of 804,152 km², located in South Asia between 23°–37° N latitude and 61°–81° E longitude (Frodin, 1984; Ali & Qaiser, 1986). Altitudinally, the country ranges from sea level along the Arabian Sea coast to 8,611 m at K2, the second-highest peak in the world (Qaiser *et al.*, 2025; Rahim *et al.*, 2025). Such extreme variations in altitude (0–8,611 m above sea level), temperature, rainfall, topography and edaphic conditions contribute to a unique diversity of plant life (Ali, 2008). Pakistan is home to a rich and unique vascular plant flora, estimated to comprise approximately 6,000 species (Shinwari & Shinwari, 2011). This floristic diversity is largely attributed to the country's varied climatic conditions, geographical position and wide range of habitats and topographic features (Ali & Qaiser, 1986; Ali, 2008; Rahim *et al.*, 2025).

Pakistan has considerable potential for the discovery of new plant taxa and new distributional records, including both native and invasive plant species (Mujahid & Shabbir, 2017; Rashid & Sultan, 2023; Sultan *et al.*, 2022; Amin *et al.*, 2024; Khan *et al.*, 2025). In recent years, extensive field surveys conducted by the National Herbarium of Pakistan, in collaboration with researchers and botanical collectors from different regions of the country, have substantially contributed to improving knowledge of the national flora (Amin *et al.*, 2024; Ullah *et al.*, 2024; Ali *et al.*, 2025). These field investigations, complemented by examination of herbarium collections, have resulted in the documentation of numerous new distributional records and the description of previously unrecognized taxa, highlighting the continued importance of botanical exploration in Pakistan (Ishaq *et al.*, 2020; Rashid & Sultan,

2023; Sultan *et al.*, 2022, 2024b; Amin *et al.*, 2024; Khan *et al.*, 2026b). The newly reported taxa belong to a wide range of genera, including *Alternanthera* Forssk., and *Amaranthus* L. (Rashid & Sultan, 2023), *Allium* L. (Khan N. *et al.*, 2021, 2022a), *Astragalus* L. (Khan N. *et al.*, 2023a; Ullah *et al.*, 2024; Khan *et al.*, 2025; Khan *et al.*, 2023a, 2023b, 2024, 2025, 2026a, 2026b, 2026c), *Anisochilus* Wall. ex Benth. (Ali *et al.*, 2017), *Cicer* L. (Khan N. *et al.*, 2022b), *Ludwigia* L. (Hameed *et al.*, 2019), *Nannorrhops* H.Wendl. (Ali *et al.*, 2025), *Neotrinia* (Tzvelev) M. Nobis, P.D. Gudkova & A. Nowak (Sultan *et al.*, 2025a), *Nepeta* L. (Sultan *et al.*, 2021, 2024a, 2025b), *Anredera* Juss., *Oenothera* L., and *Dentella* J.R. Forst. & G. Forst. (Sultan *et al.*, 2022), *Oxytropis* DC. (Khan *et al.*, 2023b), *Solanum* L. (Ishaq *et al.*, 2020; Amin *et al.*, 2024), *Soliva* Ruiz & Pav. (Mujahid & Shabbir, 2017), *Lepidium* L., and *Shangwua* Yu J. Wang, Raab-Straube, Susanna & J. Quan Liu (Amin *et al.*, 2024), *Salvia* L. (Hussain *et al.*, 2019), *Semenovia* Regel & Herder (Khan N. *et al.*, 2025), *Vincetoxicum* Wolf (Shah *et al.*, 2018, 2021), and *Zhobia* A. Sultan, N.Khan, Kljuykov & Lyskov (Sultan *et al.*, 2024b). However, these findings demonstrate that substantial gaps remain in the documentation and taxonomic understanding of Pakistan's flora and underscore the importance of continued field exploration, herbarium studies, and integrative taxonomic research for accurately assessing and documenting the country's plant diversity.

Most recent botanical expeditions aimed at enriching the collections of the National Herbarium with specimens from different regions of the country, three species representing three genera *Amaranthus* L. (Amaranthaceae) (Townsend, 1974), *Achillea* L. (Asteraceae) (Podlech, 1986; Bremer, 1993; Ghafoor, 2002; Qaiser *et al.*, 2025), and *Cicer* L. (Fabaceae) (Ali, 1978; Khan *et al.*, 2022b) were collected. These species had not previously been

recorded in the Annotated Catalogue of the Vascular Plants of West Pakistan and Kashmir (Stewart, 1972), or documented in the respective family accounts in the Flora of Pakistan (Townsend, 1974; Ali, 1978; Ghafoor, 2002), indicating that they represent previously undocumented occurrences in the flora of Pakistan.

In the Flora of Pakistan, the genus *Achillea* (yarrow) belongs to the tribe Anthemideae within the family Asteraceae (Podlech, 1986; Ghafoor, 2002). The genus *Achillea* is relatively small, comprising 5 native species and 2 subspecies in Pakistan (Ghafoor, 2002). *Achillea ptarmica* L. is reported here as a new addition to flora of Pakistan which seems to be a new introduction. The species is native to southeastern Europe and southwestern Asia and extends across Eurasia into North America (Guo *et al.*, 2004; Anon., 2026). In addition, it has been introduced into several regions of North America, Europe and Asia (Ehrendorfer & Guo, 2006; Anon., 2026).

Amaranthus is a relatively small genus within the Flora of Pakistan, comprising 11 species, 5 subspecies, and 2 varieties (Townsend, 1974; Rashid & Sultan, 2023). *Amaranthus polygonoides* L. is reported here as a newly recorded species for the country. It is an annual herb that grows predominantly in tropical and dry regions of Americas (Iamonico, 2011). The species was validly published by Linnaeus (1759: 27) and belongs to *Amaranthus* subgen. *Albersia* (Kunth) Gren. & Godr. (Bayón, 2015). Its native distribution extends across parts of the North and Central America, Caribbean and Mexico (Iamonico, 2020; Anon., 2026). In addition to its native range, *A. polygonoides* has been introduced into several regions Asia, Europe and Caribbean (Anon., 2026).

The genus *Cicer* L. comprises 6 native species previously reported from Pakistan (Ali, 1978; Khan *et al.*, 2022b). *Cicer chorassanicum* (Bunge) Popov is reported here as a new addition to the family Fabaceae in the Flora of Pakistan. The species is native to Iran, Tajikistan and Afghanistan (Van der Maesen, 1979; Anon., 2026).

The present study reports the occurrence of *Achillea ptarmica*, *Amaranthus polygonoides* and *Cicer chorassanicum* in Pakistan, representing new records for the Flora of Pakistan. Among these taxa, *A. ptarmica* and *A. polygonoides* are invasive species, commonly observed along the margins of agricultural fields and roadsides. Although alien to the region, both species appear to be naturalized. In contrast, *Cicer chorassanicum* was collected from montane steppe slopes. Its native range lies in close proximity to the newly documented locality in Pakistan, suggesting a natural range extension rather than recent introduction.

Materials and Methods

Plant specimens were collected during field surveys conducted in Pakistan between 2022 and 2024. Specimens of *Achillea ptarmica* were collected from floriculture fields at the National Agricultural Research Centre (NARC), Islamabad. This species was originally collected from Khaplu, Ghanche district, Gilgit-Baltistan, where it had been misidentified as an ornamental *Gypsophila* species. Specimens of *Amaranthus polygonoides* were collected from Timergara City in Lower Dir district, while *Cicer chorassanicum* was collected from the Soran Lasht track above Kuragh in Upper Chitral district, Khyber Pakhtunkhwa. All studied specimens were deposited in the National Herbarium of Pakistan (RAW). Distribution maps were generated using ArcGIS software (version 10).

Results and Discussion

Achillea ptarmica L. (Fig. 1)

Description: Perennial, 30–45 cm tall, pubescent and aromatic herb. Plants can form colonies from spreading rhizomes. **Stems** are mostly erect, solitary, branched, pubescent-villous, lower nearly glabrescent to glabrous. **Leaves** sessile, linear-lanceolate, 4 × 3–5 mm wide, biserrate-serrulate, sparsely hair along veins adaxially. **Receptacle** flat to convex, pale green, oblanceolate, **palea** pale green, oblanceolate-oblong, 2.5–3 mm, with transparent margins, hairy at the tips. **Ray florets** in two-three series (15–30), lamina white, orbiculate, apically 2–3 notched, sterile, 3 × 2.5 mm, arranged in 3–4 whorls. **Disc florets** 10–20 in each whorl, corolla white (c. 3 mm), anthers yellow-orange. **Phyllaries** 20–35, 2–3 mm long, densely hairy, margin transparent, midrib prominent, green. **Cypsela** (immature), 1–2 mm.

Phenology: Flowering from June to August and fruiting in August to September.

Specimens examined: Pakistan, Islamabad Capital Territory, National Agricultural Research Centre, Floriculture fields, September, 2022, Mahrine Rashid *s.n.* (barcode: 102891 (RAW))

Notes: *Achillea ptarmica* is native to southeastern Europe and southwestern Asia and extends across Eurasia into North America (Guo *et al.*, 2004; Anon., 2026). In addition, it has been introduced into several regions of North America, Europe and Asia (Ehrendorfer & Guo, 2006; Anon., 2026). The species typically inhabits sunny, disturbed sandy or gravelly soils along roadsides, railways, agricultural fields, waste areas and in gardens. In Pakistan, *A. ptarmica* was originally collected from Khaplu, Ghanche District, Gilgit-Baltistan, by members of the Floriculture Department, National Agricultural Research Centre (NARC), Islamabad (Fig. 5). A review of the relevant literature indicates that *A. ptarmica* is a potentially invasive species, highlighting the importance of documenting and monitoring the introduction of alien invasive taxa.

Amaranthus polygonoides L. (Fig. 2)

Description: Annual plant, pubescent distally with glandular hairs. **Stem** erect-ascending, branched, sparsely glandular hairy below. **Leaves** petiolate, petiole 2–2.5 cm long, leaf ovate, obovate to rhomboid. Leaf base cuneate, margins entire, apex round or emarginate, sometimes mucronate, with a 0.5 mm long mucro. **Inflorescence** axillary, clustered, two linear-lanceolate bracts present besides pistillate flowers. **Male flowers** bearing five tepals, 1–1.2 mm long, white with a green vein, spatulate, acuminate to mucronate, stamens two. **Female flowers** bearing five hyaline to white tepals, 2–2.3 mm long, papillate, with green vein in middle, spatulate, acuminate to mucronate. **Utricles** narrow turbinate, cylindrical, 2 mm long, slightly longer than tepals, smooth proximally, rough at apex, non-circumscissile, indehiscent, rupturing on maturity. **Seed** dark-brown to black, lenticular, 0.5–0.6 × 0.4 mm.

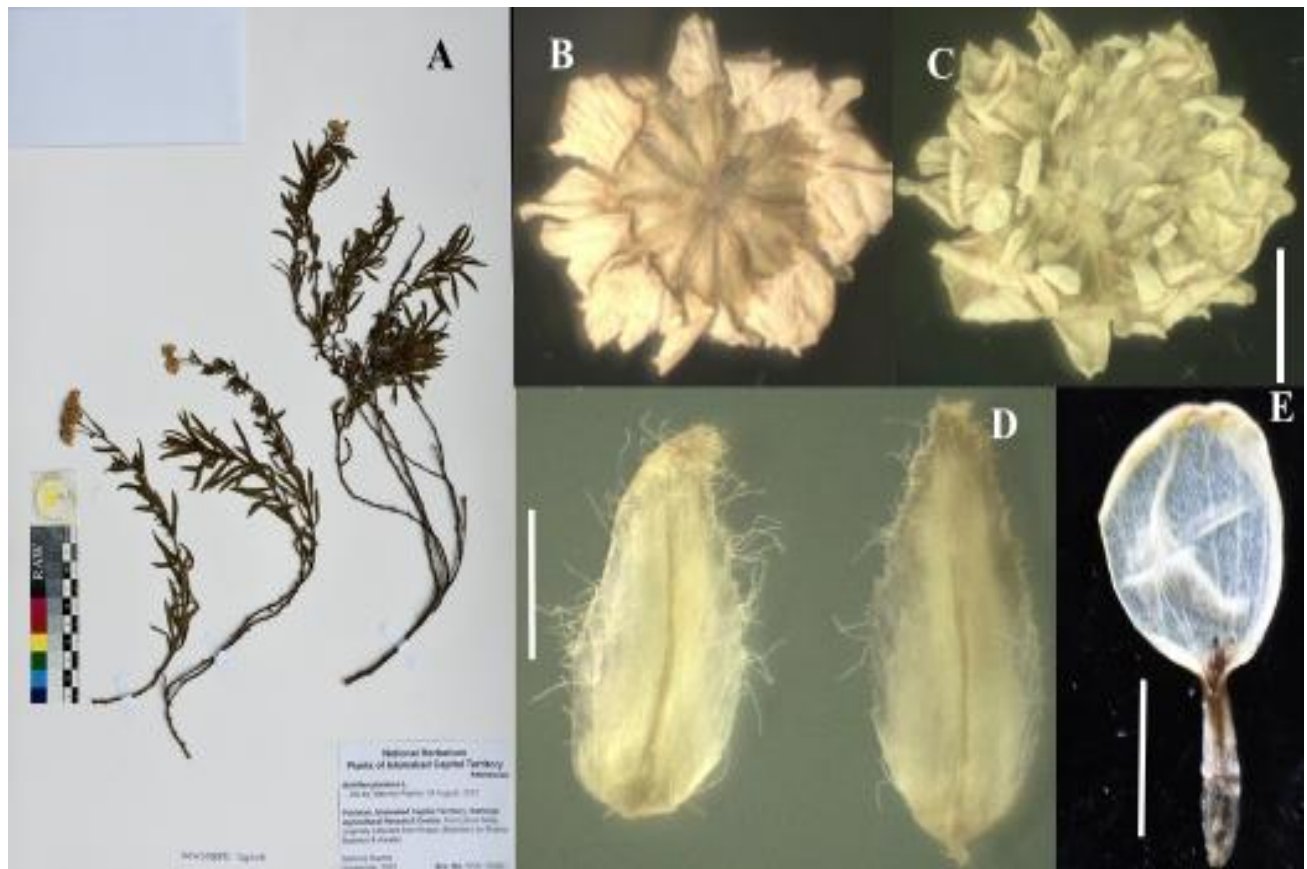


Fig. 1. *Achillea ptarmica*: (A) Habit; (B) Phyllaries; (C) Capitulum (scale bar = 4mm); (D) Palea (scale bar= 1mm); (E) Ligule (scale bar= 2mm).



Fig. 2. *Amaranthus polygonoides*: (A) Habit; (B) Male flower (scale bar = 1 mm); (C) female flower (scale bar= 2 mm); (D) Female ovary with seed (scale bar = 0.7 mm); (E) Seed.

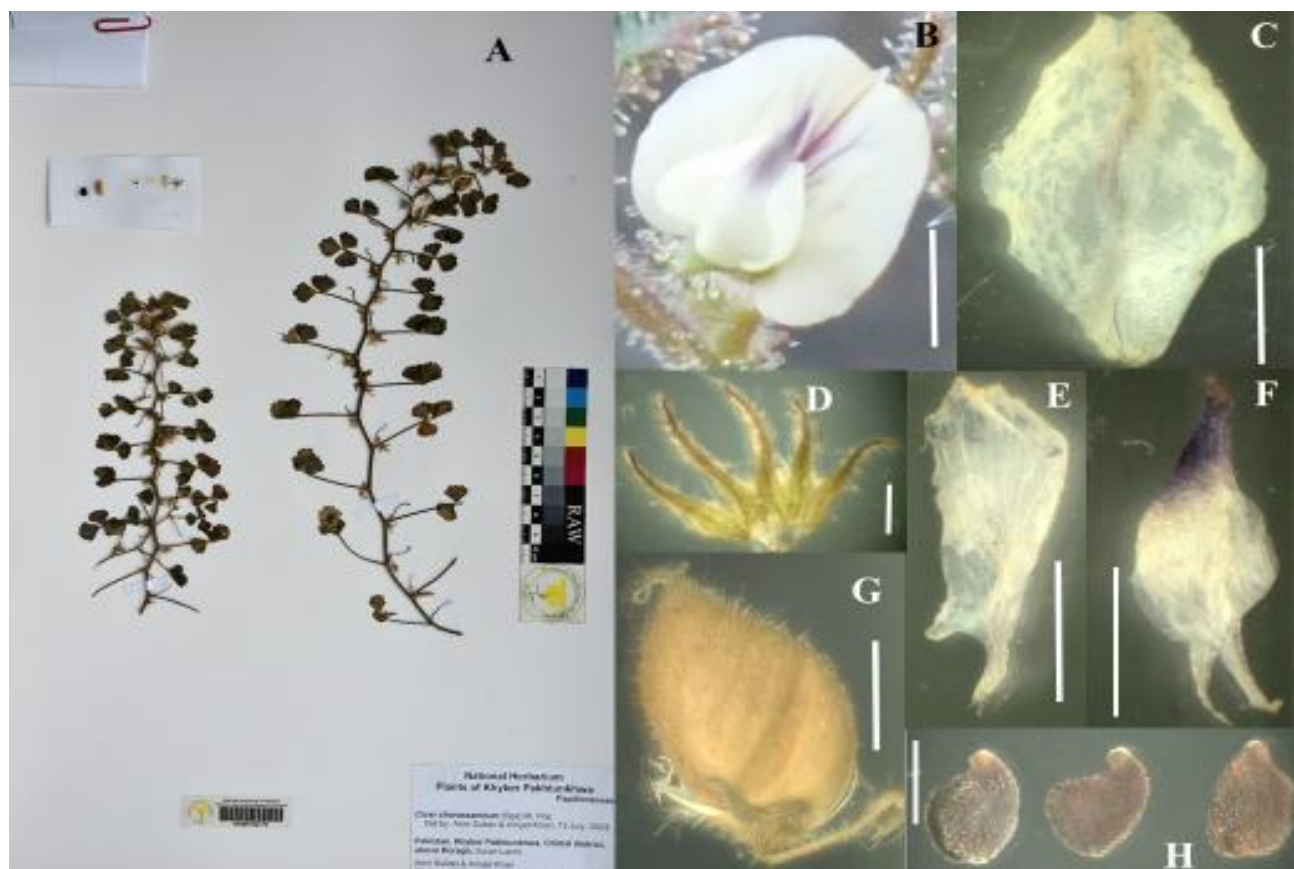


Fig. 3. *Cicer chorassanicum*: (A) Habit; (B) Flower (scale bar = 2 mm); (C) Vexillum (scale bar = 2 mm); (D) Calyx (scale bar = 2 mm); (E) Wing (scale bar = 2 mm); (F) Keel (scale bar = 2 mm); (G) Pod (scale bar = 2 mm); (H) Seed (scale bar = 2 mm).

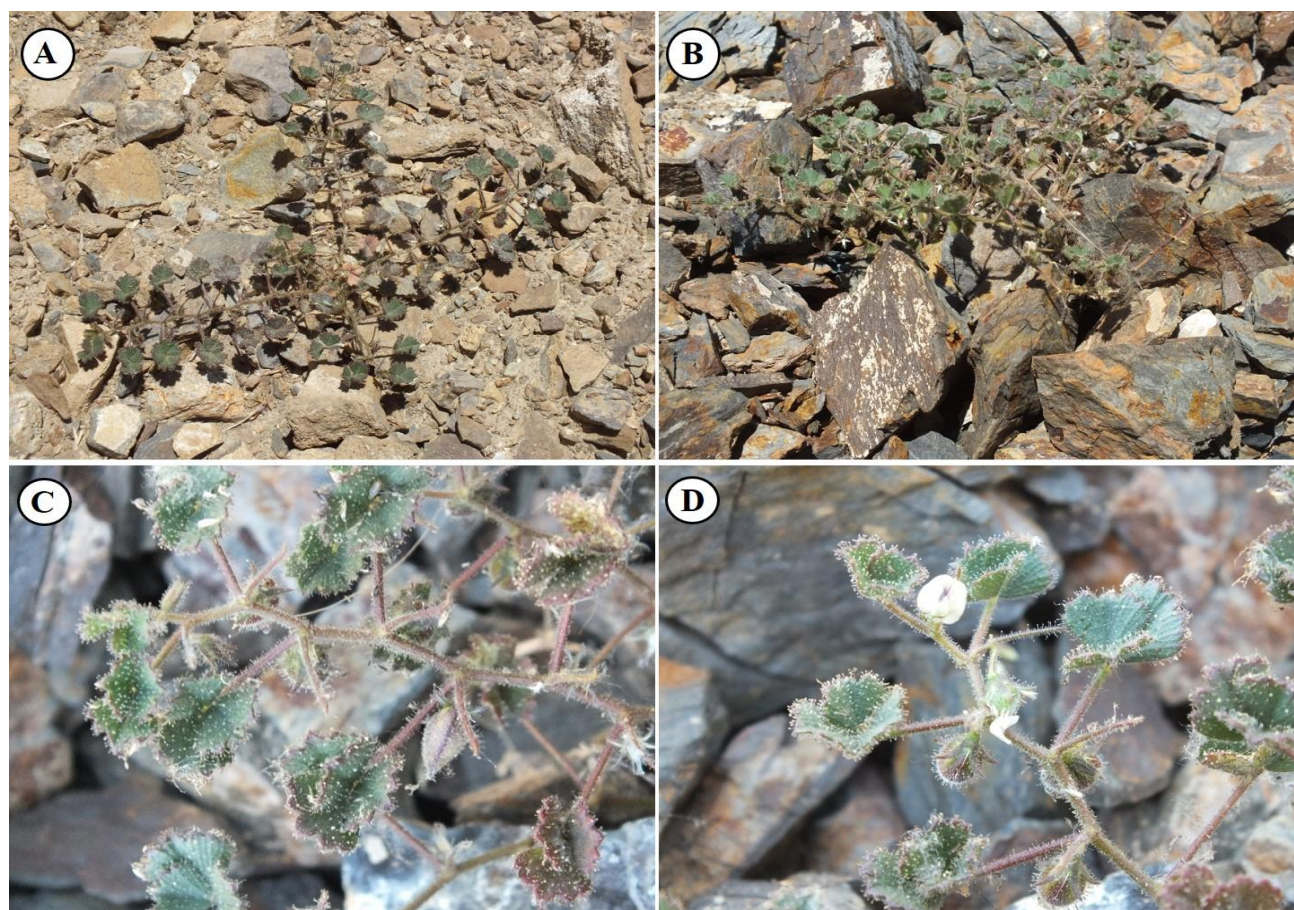


Fig. 4. *Cicer chorassanicum* in natural habitat: (A–B) Habits; (C–D) Flowering and fruiting branches.

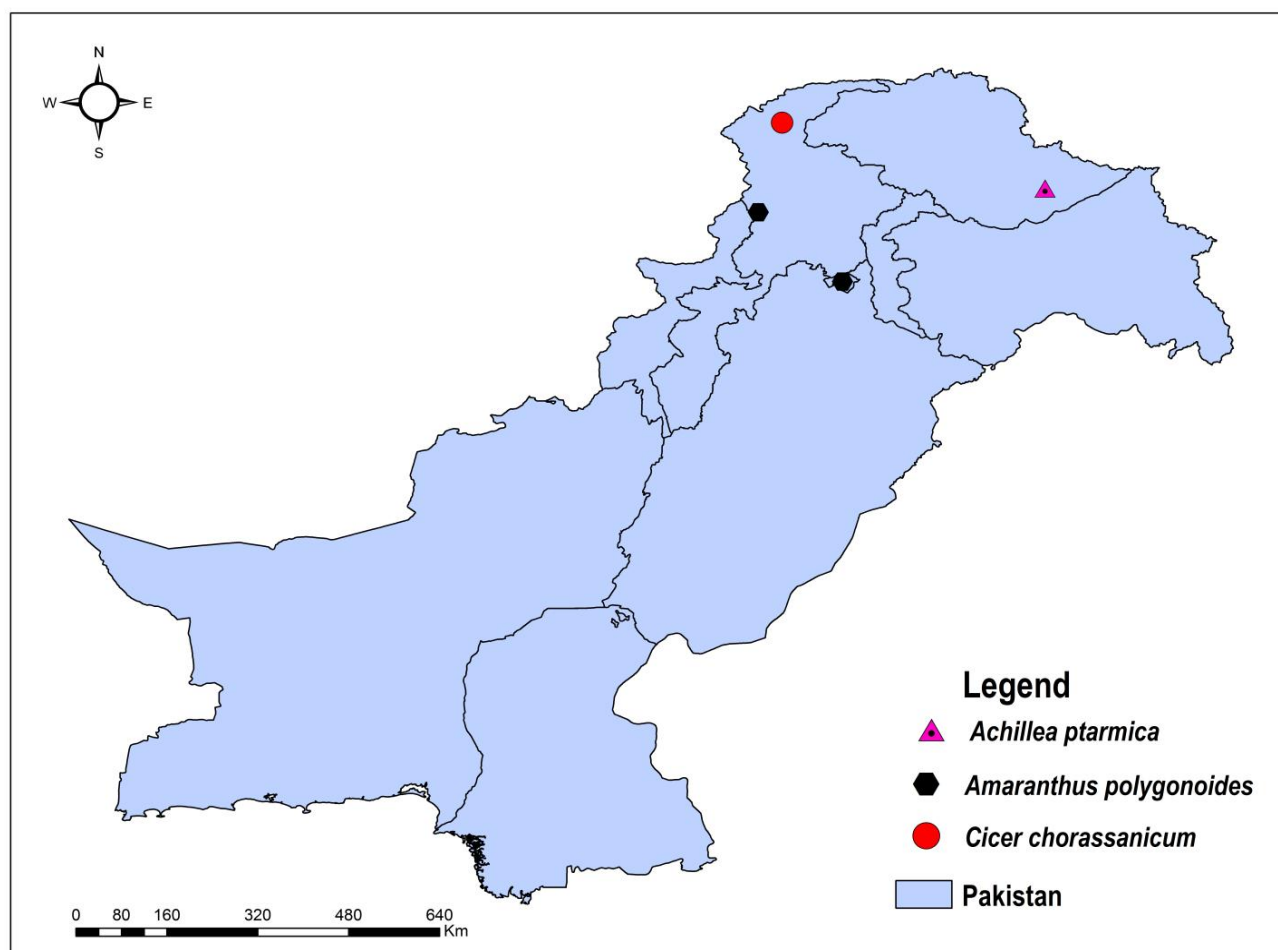


Fig. 5. Distribution of newly recorded *Achillea ptarmica*, *Amaranthus polygonoides* and *Cicer chorassanicum* in Pakistan.

Phenology: Flowering from May to July and fruiting in August.

Specimens examined: Khyber Pakhtunkhwa, Lower Dir, Timergara, 3 June, 2023, Amir Sultan, Amjad Khan & Mahrine Rashid *s.n.* (barcode: 102775 (RAW)); Islamabad Capital Territory, National Agricultural Research Centre, Botanical Conservatory, 27 July, 2023, Mahrine Rashid *s.n.* (barcode: 102890 (RAW)).

Notes: *Amaranthus polygonoides* is native to Argentina and has been reported from several regions of North America. In North America, the species commonly occurs in disturbed habitats, particularly along railways and roadsides (Mosyakin & Robertson, 2003). During recent field surveys in Timergara (Lower Dir District, Khyber Pakhtunkhwa) and the Islamabad Capital Territory, this species was recorded for the first time in Pakistan (Fig. 5). It was typically observed along roadsides and at the margins of agricultural fields. The species appears to be a recent introduction to the region and is now becoming naturalized in these areas.

Cicer chorassanicum (Bunge) Popov (Figs. 3–4)

Description: Annual, prostrate, densely pubescent and glandular. **Stem** prostrate-erect to semi-erect, branched. **Leaves** trifoliate, petiolate, petiole 1–2.5 cm long with

grooved upper part. **Leaflets** cuneate-flabellate, 10–15 × 5–10 mm, dentate, segments mucronate to acuminate, densely glandular pubescent, upper and lower surface ribbed, green to purplish in color. **Stipules** minute, 1–1.5 mm long, with a prominent midrib, dark green to purple. **Flower** borne single in leaf axil, pedicel 1–1.4 cm long, purplish, ending in an awn, 3–4.5 (–5) mm, recurved upon drying. **Calyx** gibbous at base, tube up to 2 mm long, teeth lanceolate, 3 mm long, each sepal with three prominent ribs. **Corolla** creamy-yellowish, purplish tinged on keel tips and vexillum. Vexillum 5.5 × 4.5 mm, obovate, mucronate, wings obovate with an auriculate base; wing 5 × 2 mm; keel 4.5 × 1 mm. **Stamens** persistent, anthers dorsifixed. **Ovary** ovoid, densely pilose with glandular hairs, ovule single. **Pods** ovoid, 7–8 × 4–5 mm, densely glandular hairy, single seeded, yellow, purplish tinged. **Seeds** grayish-brown, ovate, beaked, 4–5 mm broad, tubercled, chalazal end rounded.

Phenology: Flowering from March to April and fruiting in May to June.

Specimens examined: Pakistan, Khyber Pakhtunkhwa, Chitral District, above Kuragh, Soran Lasht track, 21 June, 2023, Amir Sultan & Amjad Khan *s.n.* (barcode: 102774 (RAW)); Ibid, 23 May, 2024, Amir Sultan & Amjad Khan *s.n.* (barcode: 103111 (RAW)).

Notes: *Cicer chorassanicum* is a small, prostrate annual plant occurring on rocky and rubbly slopes, occasionally on calcareous or granitic substrates, gneiss and in dry valleys (Van der Maesen, 1973). The species is native to northern Afghanistan, northern and northeastern Iran and Tajikistan (Van der Maesen, 1973, 1979; Anon., 2026) and an Irano-Turanian floristic element. Its previously known distribution lies in close proximity to the newly discovered locality in Pakistan, suggesting a natural range extension (Fig. 5).

At the newly recorded site, the species was found to be rare, with only 10–20 individuals observed in the population. The habitat is located near a village and is currently under threat from overgrazing by sheep and goats. In addition, road construction activities were observed in the area, posing further risks to the persistence of the population. These factors indicate that *C. chorassanicum* requires conservation attention at the national level.

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Data Availability: No datasets were generated or analyzed during the current study. Any relevant data is in the text or on the herbarium sheets consulted.

Conflict of Interest: The authors declare no competing interests.

Author’s Contribution: Mahrine Rashid: Conceptualization, Investigation, Writing – original draft. Amir Sultan: Supervision, Validation, Project administration, Writing – review and editing. Amjad Khan: Data curation, Investigation, Writing – review and editing. Shazia Erum: Methodology and Investigation.

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