

# New distributional records of four grass species (Poaceae: Panicoideae) to the Flora of Nepal

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**Abstract:** Four species of grasses (Poaceae: Panicoideae), viz., *Acroceras munroanum* (Balansa) Henrard, *Cyrtococcum oxyphyllum* (Hochst. ex Steud.) Stapf, *Hymenachne aurita* (J. Presl ex Nees) Balansa, and *Ischaemum timorense* Kunth, collected from Jalthal forest in eastern Nepal, are reported here for the first time from Nepal. A detailed description of the species, notes on habitat, photographs of spikelets and selected specimens, and identification keys to these species with respective congeners in Nepal are provided.

**Keywords:** *Acroceras*, *Cyrtococcum*, *Hymenachne*, *Ischaemum*, Jalthal.

## Introduction

Poaceae is one of the largest families of flowering plants, with c. 780 genera and 12000 species worldwide (Christenhusz & Byng, 2016). Soreng *et al.* (2022) classified Poaceae into 12 subfamilies, seven supertribes, and 54 tribes. The subfamily Panicoideae is the second largest subfamily in Poaceae, whose species are predominantly distributed in tropical to warm-temperate regions of the world (Soreng *et al.*, 2015). Morphologically, most members of the Panicoideae are characterized by the presence of two-flowered, dorsally compressed spikelets with the lower floret staminate or sterile.

In Nepal, Poaceae is represented by 426 species belonging to 132 genera (Shrestha *et al.*, 2022). During a floristic survey of Jalthal forest in eastern Nepal, specimens of a few grasses were collected. After a critical examination of the specimens and review

of literature on Nepalese grasses, it was found that some collected specimens did not match any of the grass species reported from Nepal so far (Hara *et al.*, 1978; Rajbhandari & Rai, 2017; Shrestha *et al.*, 2022). Then the literature on grass flora of surrounding areas outside of Nepal (Bor, 1940; Noltie, 2000; Chen *et al.*, 2006a, b; Singh & Rao, 2008) were referred, and based on morphological studies and perusal of literature, it was found that the specimens belong to *Acroceras munroanum* (Balansa) Henrard, *Cyrtococcum oxyphyllum* (Hochst. ex Steud.) Stapf, *Hymenachne aurita* (J. Presl ex Nees) Balansa, and *Ischaemum timorense* Kunth, species not previously recorded from the country. Therefore, these four grass species are reported here as new distributional records to the flora of Nepal. With this report, the total number of species becomes 430 in 133 genera. Among the four taxa reported here, *Acroceras* Stapf is a new generic record for Nepal. The genera *Acroceras* Stapf, *Cyrtococcum* Stapf, *Hymenachne* P.Beauv., and *Ischaemum* L. all fall under the subfamily Panicoideae. All the specimens collected during the study were deposited at the National Herbarium and Plant Laboratories (KATH).

## Taxonomic Treatment

***Acroceras munroanum*** (Balansa) Henrard, Blumea 3: 445, in obs., 448. 1940. *Panicum munroanum* Balansa, J. Bot. (Morot) 4: 140. 1890. **Figs. 1, 5a-c**

Annual or perennial herbs. Culms up to 80 cm, decumbent, usually branched, glabrous, rooting from lower nodes. Leaf blades lanceolate, 20–87 × 3–8 mm, base rounded or sub-cordate, margins

entire, apex finely acuminate, minutely hispid, both surfaces glabrous, sometimes with few long hairs at extreme base, usually with faint transverse veinlets; sheaths' margins ciliate on one side, glabrous; ligule less than 0.5 mm, membranous, shortly ciliate. Inflorescence a panicle, 3.8–7 cm; branches sub-erect, borne singly, the lowest up to 4.5 cm, minutely hispid, branches hairy at the junction with the rachis. Spikelets usually borne in unequally pedicelled pairs, similar, oblong-ellipsoid, symmetrical, 4–4.5 mm, pale green; florets 2. Longer pedicels up to 4 (–7) mm; shorter pedicels up to 2 mm. Lower glume ovate, *c.* 3.5 mm, not keeled, 5–7-nerved, margins hyaline, apex apiculate, herbaceous, glabrous or minutely hispid on nerves. Upper glume oblong-lanceolate, *c.* 4 mm, not keeled, 7-nerved, margins hyaline, apex apiculate, herbaceous, glabrous. Lower floret sterile; lemma oblong-lanceolate, 3.5–4

mm, not keeled, 5–7-nerved, margins hyaline, apex apiculate, herbaceous, glabrous; palea poorly developed, oblong-lanceolate, *c.* 2 mm, hyaline. Upper floret bisexual; lemma ovate-lanceolate, 3–3.5 mm, not keeled, apex apiculate, sub-coriaceous, shiny, glabrous, creamy; palea elliptic, subequalling lemma, not keeled, apex notched, reflexed, sub-coriaceous, shiny, glabrous, creamy.

*Flowering & fruiting:* Flowering and fruiting from August to November.

*Habitat:* Moist habitats along the forest edges.

*Distribution:* Bangladesh, Cambodia, China, India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam (Chen *et al.*, 2006a; POWO, 2023) and now in Nepal.

*Specimens examined:* NEPAL, **Koshi province**, Jhapa district, Haldibari rural municipality, Chauki Biran community forest, N 26.51°, E 88.02°, 79 m,



**Fig. 1.** A specimen of *Acroceras munroanum* (Balansa) Henrard © National Herbarium and Plant Laboratories (KATH).



**Fig. 2.** A specimen of *Cyrtococcum oxyphyllum* (Hochst. ex Steud.) Stapf © National Herbarium and Plant Laboratories (KATH).

04.11.2020, Y.B. Poudel JF521 (KATH); Pathibhara Kalika community forest, N 26.50°, E 88.00°, 91 m, 23.08.2019, Y.B. Poudel & K. Panthi JCF41 (KATH).

*Notes:* *Acroceras munroanum* (Balansa) Henrard is close to a widespread species *A. zizanioides* (Kunth) Dandy, but can be distinguished by its smaller spikelets (less than 5 mm), 5–7-nerved lower glume and 7-nerved upper glume (Bor, 1940; Noltie, 2000).

**Cyrtococcum oxyphyllum** (Hochst. ex Steud.) Stapf, Hooker's Icon. Pl. 31: sub t. 3096. 1922. *Panicum oxyphyllum* Hochst. ex Steud., Syn. Pl. Glumac. 1(1): 65. 1853. **Figs. 2, 5d & e**

Perennial herbs. Culms up to 75 cm, decumbent, branched, glabrous, rooting from basal nodes. Leaf blades narrowly lanceolate, 3.5–11 × 3.0–10 mm, base rounded, margins entire, eciliate, apex acuminate, both surfaces glabrous or appressed pubescent specially on lower surface; sheaths' margins ciliate on one side, glabrous or sometimes appressed pubescent; ligule 1–1.5 mm, membranous, eciliate. Inflorescence a panicle, contracted, dense, 5.5–7.5 cm; branches ascending, borne singly, the lowest up to 2.4 cm, with long ascending scattered hairs. Spikelets borne singly, obovate, distinctly asymmetrical, c. 2 mm, sometimes with some hairs near base, orange-brown; florets 2. Pedicels 0.3–1 mm. Lower glume ovate, 1.1–1.3 mm, keeled, 3-nerved, margins orange, apex acute, herbaceous, minutely hispid on keel. Upper glume ovate, 1.5–1.8 mm, keeled, 3-nerved, margins orange, apex apiculate, herbaceous, glabrous. Lower floret sterile; lemma ovate, c. 1.5 mm, keeled, 5-nerved, margins orange, apex obtuse, herbaceous, glabrous; palea absent. Upper floret bisexual; lemma obovate, 1.3–1.5 mm, keeled, abruptly contracted at base, apex with a brown scar, coriaceous, shiny, glabrous, creamy; palea oblong, subequalling lemma, keeled, apex blunt, coriaceous, glabrous, creamy.

*Flowering & fruiting:* Flowering and fruiting from January to February.

*Habitat:* Moist places on the forest ground floor.

*Distribution:* Australia, Bangladesh, Bhutan, China, Cook Island, Fiji, India, Indonesia, Laos, Malaysia, Myanmar, New Caledonia, New Guinea, Niue, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Tonga, Vanuatu, Vietnam, Wallis-Futuna Islands (Chen *et al.*, 2006a; POWO, 2023) and now in Nepal.

*Specimens examined:* NEPAL, **Koshi province**, Jhapa district, Haldibari rural municipality, Pathibhara Kalika community forest, N 26.49°, E 87.99°, 106 m, 22.01.2020, Y.B. Poudel JF116, JF121 (KATH).

#### Key to the species of *Cyrtococcum* in Nepal

1. Inflorescence contracted, dense; pedicels shorter than spikelets; spikelets orange-brown ..... *C. oxyphyllum*
1. Inflorescence lax; pedicels longer than spikelets; spikelets purplish ..... *C. patens*

**Hymenachne aurita** (J. Presl ex Nees) Balansa, J. Bot. (Morot) 4: 144. 1890. *Panicum auritum* J. Presl ex Nees, Fl. Bras. Enum. Pl. 2(1): 176. 1829. **Figs. 3, 5f & g**

Perennial herbs. Culms up to 1.5 m, ascending, basally geniculate, branched or unbranched, glabrous, rooting from basal nodes. Leaf blades linear, 11–35 × 0.7–1.7 cm, base sub-cordate, margins entire, eciliate, apex acuminate, both surfaces glabrous but with few long cilia at base; sheaths' margin eciliate or ciliate on one side especially at upper half and throat, glabrous; ligule c. 0.5 mm, membranous, shortly ciliate. Inflorescence a panicle, contracted, dense, 26–41 cm; branches sub-erect or erect, borne singly, the lowest up to 14 cm, minutely hispid in lines. Spikelets borne singly, oblong-lanceolate, symmetrical, 2–3 mm, purplish-green; florets 2. Pedicels up to 1.5 mm. Lower glume ovate, 1–1.2 mm, keeled, 3-nerved, margins hyaline, apex acute or obtuse, herbaceous, minutely hispid on keel. Upper glume lanceolate, c. 2.5 mm, keeled, 5-nerved, margins hyaline, apex acute, herbaceous, minutely hispid on keel. Lower floret sterile; lemma lanceolate, c. 2.5 mm,



not keeled, 5-nerved, margins hyaline, apex acute, herbaceous, glabrous or sparsely pubescent at apex; palea poorly developed, oblong-lanceolate, c. 1 mm, hyaline. Upper floret bisexual; lemma lanceolate, c. 2 mm, not keeled, apex acuminate, thinly coriaceous, shiny, glabrous or sparsely pubescent at apex, creamy; palea oblong-lanceolate, c. 2 mm, not keeled, apex obtuse, thinly coriaceous, shiny, glabrous, creamy.

*Flowering & fruiting:* Flowering and fruiting from June to February.

*Habitat:* Moist and damp places in the forest.

*Distribution:* Bangladesh, Bhutan, China, India, Indonesia, Laos, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam (Chen *et al.*, 2006a; POWO, 2023) and now in Nepal.

*Specimens examined:* NEPAL, **Koshi province**, Jhapa district, Haldibari rural municipality, Chauki

Biran community forest, N 26.51°, E 88.02°, 79 m, 04.11.2020, Y.B. Poudel JF519 (KATH); Chauki Biran community forest, N 26.49°, E 88.01°, 95 m, 09.07.2022, Y.B. Poudel, B. Adhikari, L.N. Sharma & G. Parmar YBLG02 (KATH); Pathibhara Kalika community forest, N 26.50°, E 88.02°, 94 m, 24.01.2020, Y.B. Poudel JF215 (KATH).

**Key to the species of *Hymenachne* in Nepal**

1. Spikelets more than 4 mm long; panicles very dense and spike-like; upper glume apex aristate..... *H. amplexicaulis*

1. Spikelets 2–3 mm long; panicles dense but not spike-like; upper glume apex acute..... *H. aurita*

***Ischaemum timorense* Kunth, Révis. Gramin. 1: 369. 1830. Figs. 4, 5h**

Annual or perennial herbs. Culms up to 70 cm, decumbent, branched, pubescent at nodes,



**Fig. 3.** A specimen of *Hymenachne aurita* (J. Presl ex Nees) Balansa © National Herbarium and Plant Laboratories (KATH).



**Fig. 4.** A specimen of *Ischaemum timorense* Kunth © National Herbarium and Plant Laboratories (KATH).



**Fig. 5.** a-c. *Acroceras munroanum* (Balansa) Henrard: a. Spikelet showing lower glume; b. Spikelet showing upper glume; c. Upper floret. d & e. *Cyrtococcum oxyphyllum* (Hochst. ex Steud.) Stapf: d. Spikelet; e. Upper floret. f & g. *Hymenachne aurita* (J. Presl ex Nees) Balansa: f. Spikelet showing lower glume; g. Spikelet showing upper glume. h. *Ischaemum timorense* Kunth: Side view of sessile spikelet.

rooting from lower nodes. Leaf blades lanceolate or linear-lanceolate, 2–11 × 0.2–0.7 cm, base narrowed into petiole-like structure up to 3.5 cm, margins entire, minutely hirsute, apex acute or shortly acuminate, both surfaces pilose with tubercle-based hairs, sometimes glabrous on upper surface; sheaths' margins ciliate on one side and at throat, keeled, glabrous or pilose on upper half or throughout with tubercle-based hairs; ligule c. 1 mm, membranous, shortly ciliate. Inflorescence of paired racemes; racemes 2–5 cm; rachis fragile, jointed, zig-zag, rachis internodes ciliate along angles and apex. Spikelets borne in pairs, one sessile and other pedicelled, similar in form and sex, different in size, ovate-lanceolate, symmetrical, 4–5 mm (excluding awns), pale green or purple-green; florets 2. Sessile spikelets: lower glume lanceolate, 3.5–4.5 mm, 2-keeled, 7 or more-nerved at upper part, margins hyaline, apex bicuspidate, sub-coriaceous on lower part, herbaceous on upper part, lower part smooth, glabrous, upper part hispid, especially on nerves; upper glume lanceolate, 4–5 mm (excluding awn), keeled, 5-nerved, margins hyaline, ciliate, apex bicuspidate with middle awn of 1–4 mm, awn straight, herbaceous, lower part smooth, glabrous, upper part hispid. Lower floret male or sterile; lemma ovate-lanceolate, 2.5–4.5 mm, keeled, 3-nerved, margins ciliate, apex acuminate, sub-membranous, glabrous, hyaline; palea ovate-lanceolate, 2.5–3 mm, 2-nerved, margins ciliate, membranous, glabrous, hyaline. Upper floret bisexual; lemma oblong, 3–3.5 mm, margins ciliate, apex 2-lobed, awned, awn 7–12 mm, geniculate or straight, membranous, glabrous, hyaline; palea oblong, 3–3.5 mm, apex acute, membranous, glabrous, hyaline. Pedicelled spikelets narrower than sessile, awned; pedicels 2–2.5 mm, ciliate along angles and apex.

*Flowering & fruiting:* Flowering and fruiting from August to November.

*Habitat:* Open grasslands in the forest margins.

*Distribution:* Bangladesh, Cambodia, China, Fiji, India, Indonesia, Laos, Malaysia, Myanmar, Sri Lanka, Taiwan, Thailand, Vietnam (Chen *et al.*, 2006b; POWO, 2023) and now in Nepal. It is introduced in Africa and America (Chen *et al.*, 2006b).

*Specimens examined:* NEPAL, **Koshi province**, Jhapa district, Haldibari rural municipality, Chauki Biran community forest, N 26.51°, E 88.01°, 85 m, 04.11.2020, Y.B. Poudel JF506 (KATH); Radakali community forest, N 26.50°, E 88.03°, 86 m, 24.08.2019, Y.B. Poudel & K. Panthi PCF46 (KATH).

*Notes:* *Ischaemum timorense* is a highly variable species (Singh & Rao, 2008), and in our specimens it mainly varies in indumentum and size of leaf, and size of petiole-like base.

#### Key to the species of *Ischaemum* in Nepal

1. Lower glume transversely 4–6 ridged, apex obtuse..... *I. rugosum*
1. Lower glume without transverse ridges, apex bicuspidate..... *I. timorense*

#### Conclusion

Even though all the four grass species, *Acroceras munroanum*, *Cyrtococcum oxyphyllum*, *Hymenachne aurita*, and *Ischaemum timorense* have a wide global distribution, however this is the first time they have been recorded in Nepal. The present study provides a detailed description of all four grass species based on Nepalese collections, including notes on habitat, photographs of selected specimens and spikelets, and identification keys. Furthermore, it emphasizes the importance of floristic surveys for documenting Nepal's flora, particularly in the lowland areas of the country.

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