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Caption: Malabar Slender Loris *Loris lydekkerianus malabaricus* © Dileep Anthikkad.

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SHORT COMMUNICATION

Glyphochloa acuminata (Hack.) Clayton var. *laevis* (Poaceae): a new variety from central Western Ghats of Karnataka, India

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Abstract: This communication describes a new variety of *Glyphochloa acuminata* var. *laevis* from the lateritic plateau of central Western Ghats of Karnataka, southern India.

Keywords: Endemic grass, lateritic plateau, southern India.

The genus *Glyphochloa* is endemic to peninsular India and consists of 13 species and four varieties (Prasad et al. 2021). This genus is characterized by the presence of turbinate callus with knob at the center and ornamentation in the crustaceous lower glume of sessile spikelet. Bor (1960) reported five species under the genus *Manisuris* L., later Clayton (1981) transferred all *Manisuris* species to the new genus *Glyphochloa* W.D. Clayton. excluding *M. myuros* L. and *M. clarkei* (Hack.) Bor ex Sant (Fonseca & Janarthanam 2003). Fonseca (2003) clearly separated the varieties of *Glyphochloa acuminata* on the basis of transverse and vertical ridges on lower glume of sessile spikelets. In the varieties *acuminata* and *stocksii,* the ridges and furrows are prominent while in the variety *woodrowii* there are shallow depressions on the lower glumes of sessile spikelet and short awns. We compared our specimen with these varieties but no depressions or ridges on the lower glumes of sessile spikelets were observed and also length of the awns are not short it is up to 7mm long (Fonseca 2003). During the exploration of central Western Ghats of Karnataka the first author collected an interesting specimen close to *Glyphochloa acuminata* (Hack.) Clayton from the lateritic plateaus of Udupi and Uttara Kannada Districts. After critical examination of the specimens, types and literature (Bor 1960; Sreekumar & Nair 1991; Bhat & Nagendran 2001; Potdar et al. 2012) authors recognize it as a new variety of *G. acuminata*, *G. acuminata* var. *laevis*. A detailed description, photographs and illustration for the variety are provided.

Glyphochloa acuminata (Hack.) Clayton var. _laevis_ Abhijit & Krishnamurthy var. nov.

(Image 1)

Type: India, Karnataka, Udupi district, Kamalshile pari (lateritic plateau), Abhijit & Krishnamurthy. 30.ix.2019, (Holotype, CAL0000033734 and isotype KUAB- 454)

Diagnosis: - *G. acuminata* var *laevis* differs from other verities of *G. acuminata* by the smooth lower glume of sessile spikelets without any ridges and furrows and long

Editor: Anonymity requested.

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Competing interests: The authors declare no competing interests.

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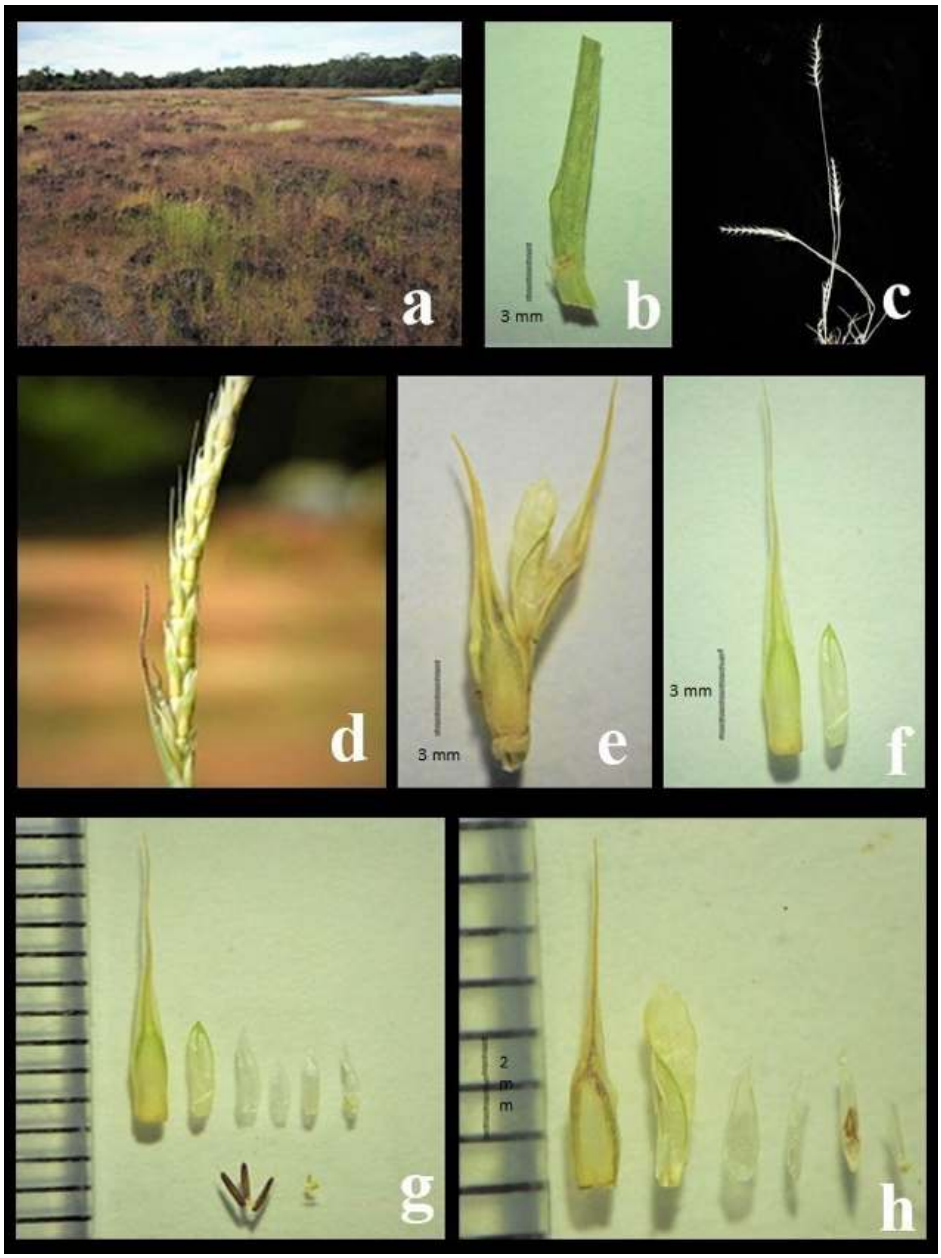

Image 1. *Glyphochloa acuminata* (Hack.) Clayton var. *laevis* Abhijit & Krishnamurthy, var. nov.: a—habitat | b—part of Leaf with ligule | c—habit | d—raceme | e—spikelet's | f—lower & upper glume of sessile spikelet | g—lower & upper glumes, lower lemma, upper lemma, palea, stamens & pistil of sessile spikelet | h—dissected pedicelled spikelet (lower & upper glumes, lower & upper lemma, paleas, respectively). © H.U. Abhijit.

pedicelled (Figure 1).

Annuals. Culms herbaceous, 25–30 cm long, erect with glabrous nodes. Leaf sheath slightly compressed; leaf blade linear-ovate, 4–6 × 0.3 cm; ligule membranous, 0.8–1 mm long. Racemes solitary, up to 6 cm long; joints and pedicels club- shaped, 0.2–0.3 cm long, spikelets are arranged in pairs. Sessile spikelets narrow, ovate, Bisexual, 1–1.2 × 0.15 cm (including awn), acuminate. Lower glume crustaceous, narrow, ovate 1.0 – 1.2 × 0.15 cm, 8–10 nerved, ridges absent, winged margins, apex awned. Upper glume smooth, 0.35 × 0.8 cm, 3-nerved, acute at apex. Lower florets are neuter and upper florets are bisexual. Lower lemma membranous, ovate, 0.3 cm long, apex acute. Palea ovate, hyaline, 0.2 cm long. Upper lemma hyaline, ovate, 0.2 × 0.6 cm. Palea hyaline, ovate, 0.15 cm long. Lodicule 2. Stamens 3; Anthers 0.12–0.16 cm long. Pistil 2 mm long. Caryopsis not seen. Pedicelled spikelets ovate, narrow, 0.65–0.7 cm long (including awn). Lower glume crustaceous, ovate, narrow 0.7 × 0.15 mm, keel-2, winged on margin,

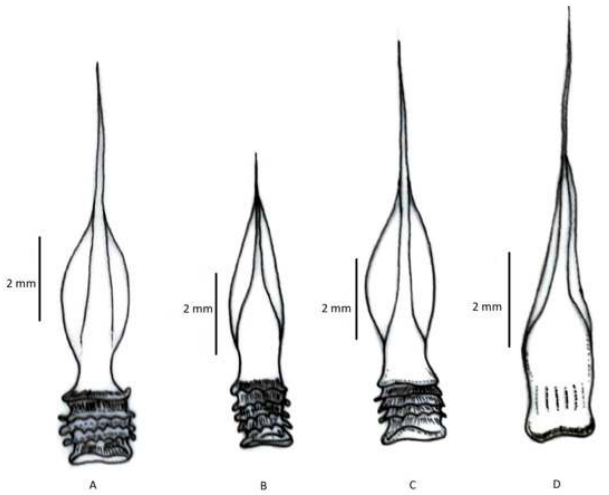

Figure 1. Morphology of lower glume of sessile spikelet in different varieties of *Glyphochloa acuminata*: A—*Glyphochloa acuminata* (Hack.) Clayton var. *acuminata* | B—*Glyphochloa acuminata* (Hack.) Clayton var. *woodrowii* (Bor) Clayton | C—*Glyphochloa acuminata* var. *stocksii* (Hook.f.) W.D. Clayton | D—*Glyphochloa acuminata* (Hack.) Clayton var. *laevis* Abhijit & Krishnamurthy. © H.U. Abhijit.

aristate at apex. Upper glume papery, boat shaped, 0.5 cm long, keel-1 with wavy wing on upper side, wing up to 0.3 cm long. Lower lemma membranous, ovate, 0.15 cm long. Palea hyaline, 0.15 cm long. Upper florets are male. Upper lemma hyaline, lanceolate, 0.15 cm long. Palea hyaline, ovate, 0.15 cm long, Lodicule 2. Stamens 3; anthers 0.12 cm long.

Etymology: The epithet '*laevis*' refers to its smooth ornamentation on the lower glume of sessile spikelet.

Distribution: The new variety grows in open areas of the lateritic plateaus of Kamalshile pari, Vate bachalu pari, Kamarapalu and its surroundings in Udupi district. The species is also found in Castle rock and its surroundings of Uttara Kannada district during monsoon to post monsoon season (Image 2).

Species distribution modeling of this grass variety is analyzed by using Maxent version 3. 4. 1. The color indicated in the Image 2 is help to explain the distribution of this variety in the Karnataka state. In the model, color towards green is more preference of species occurrence and towards red is the less preference of species occurrence in the particular area.

The Table 2 gives estimates of relative contributions of the environmental variables extracted from world claim data to the MaxEnt model version 3.4.1 (Philips et al 2004). To determine the first estimate, in each iteration of the training algorithm, the increase in regularized gain is added to the contribution of the corresponding variable, or subtracted from it if the change to the absolute value of lambda is negative. For

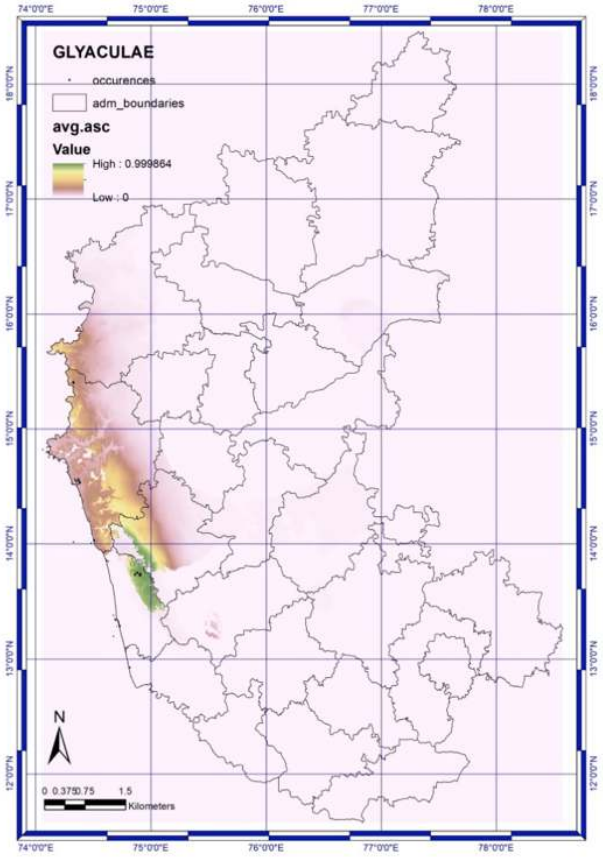

Image 2. Species Distribution model (SDM) of *Glyphochloa acuminata* (Hack.) Clayton var. *laevis* Abhijit & Krishnamurthy.

the second estimate, for each environmental variable in turn, the values of that variable on training presence and background data are randomly permuted. The model is reevaluated on the permuted data, and the resulting drop in training AUC is shown in the table, normalized to percentages. As with the variable jackknife, variable contributions should be interpreted with caution when the predictor variables are correlated. Values shown are averages over replicate runs.

Habitat and ecology: Lateritic rocky plateaus of open area and altitude about 150 m.

Flowering and fruiting: August to October

Specimens examined: 0000033734 (CAL). 30.ix.2019. 13.723N & 74.905E, 177m.

Kamalshile pari, Udupi district, Karnataka, India. Coll. H.U. Abhijit.

Conservation status: Data deficient but appears to be restricted to this particular region.

Field notes: Lower glume of sessile spikelet smooth, without ridges and furrows. The species is always associated with *Bhidea burnsiana* Bor. and *Danthonidium gammiei* (Bhide) C.E. Hubb. on lateritic rocks.

Table 1. Diagnostic morphological differences between varieties of species *Glyphochloa acuminata*.

Characters	*Glyphochloa acuminata* var. *acuminata*	*Glyphochloa acuminata* var. *woodrowii*	*Glyphochloa acuminata* var. *stocksii*	*Glyphochloa acuminata* var. *laevis*
Length of sessile spikelets (including awn)	0.8–1 cm	0.4–0.5 cm	0.7–1.2 cm	1–1.2 cm
Lower glume of Sessile spikelets	Coriaceous with ridges and furrows	Coriaceous with ridges and furrows	Coriaceous with ridges and furrows	Not coriaceous, without ridges and furrows
Length of pedicelled spikelets (excluding awn)	3–4 mm	3–4 mm	4.5–5 mm	5–5.5 mm

Keys to the varieties of *Glyphochloa acuminata* (Hack.) Clayton

1a. Pedicelled spikelets less than 0.4 cm long 2
1b. Pedicelled spikelets more than 0.4 cm long 3

2a. Sessile spikelet 0.8–1 cm long; lower glume awned and coriaceous ..... *Glyphochloa acuminata* (Hack.) Clayton var. *acuminata*
2b. Sessile spikelet up to 0.5 cm long; lower glume shortly awned or awnless and coriaceous .... *Glyphochloa acuminata* (Hack.) Clayton var. *woodrowii* (Bor) Clayton

3a. Lower glume of sessile spikelet is coriaceous with ridges and furrows and pedicelled spikelet 0.5 cm long ..... *Glyphochloa acuminata* (Hack.) Clayton var. *stocksii* (Hook. f.) Clayton
3b. Lower glume of sessile spikelet is not coriaceous without ridges and furrows and pedicelled spikelet 0.7cm long ..... ***Glyphochloa acuminata* (Hack.) Clayton var. *laevis***

Table 2. Relative contribution of environmental variables.

Variable	Percent contribution	Permutation importance
karnataka_bio_30s_13	62.3	36.9
karnataka_bio_30s_14	22.1	56.7
karnataka_bio_30s_15	13.6	1.2
karnataka_bio_30s_3	1.3	1.8
karnataka_bio_30s_2	0.5	1.3
karnataka_bio_30s_17	0.2	2.3

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