

Two new varieties of *Alysicarpus* (Fabaceae) from Peninsular India

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Abstract: *Alysicarpus tetragonolobus* Edgew. var. *falcatus* and *A. tetragonolobus* var. *micranthus* are described here as two new varieties of *Alysicarpus tetragonolobus* from Maharashtra. Both varieties are morphologically close to *A. tetragonolobus* var. *tetragonolobus* but differ in their morphology and all grow sympatrically. Observations in the field as well as in cultivation for four years showed that all the varieties retain their diagnostic characters and no intermediates were observed.

Keywords: *Alysicarpus*, Desmodieae, Fabaceae, Maharashtra.

Introduction

Alysicarpus Desv. belonging to tribe Desmodieae (Fabaceae) comprises 35 species and 20 infra-specific taxa worldwide. India is the centre of diversification for the genus and is represented by 18 species and 9 varieties of which 8 species and 4 varieties are endemic (Pokle, 2017; Dalavi *et al.*, 2019).

During field explorations in Kolhapur district, the authors came across two interesting specimens of *Alysicarpus* which were further studied in natural and cultivated conditions for four years. Perusal of the literature (Sanjappa, 1992; Gholami & Pandey, 2016; Pokle, 2017; Dalavi *et al.*, 2019) and comparison with specimens housed at BLAT, BSI, CAL, E, MH, K (Thiers, continuously updated), it is concluded that they belong to undescribed infra-

specific taxa of *A. tetragonolobus* Edgew. Hence, both are described here as new varieties and are further discussed below with detailed descriptions and figures.

Material and Methods

Materials were collected in the months of September to December from 2016–2020 at Kolhapur (Maharashtra). All specimens collected were processed using standard herbarium techniques (Jain & Rao, 1977). The authors have collected and recorded the necessary data regarding habitat, habit, morphological variations, phenology and geographic information such as coordinates of the type localities during the field visits. The comprehensive photography of the morphological characters was taken by using D6000 camera (Nikon, Japan) and some microphotographs were taken under CMZ-6 stereomicroscope (Labomed, Japan). The specimens collected from the type localities are deposited in the Herbarium of Department of Botany, Shivaji University, Kolhapur, Maharashtra (SUK!), India, for detailed study. The scientific novelty of the specimens was confirmed by a critical survey of the literature (Sanjappa, 1992; Gholami & Pandey, 2016; Pokle, 2017; Dalavi *et al.*, 2019) and comparing with specimens available at BLAT, BSI, CAL, E, MH, K (Thiers, continuously updated) and images of specimens available in the virtual database of JSTOR (2020), Edinburgh herbarium (<https://data.rbge.org.uk/search/herbarium/>) and Kew Herbarium (<http://apps.kew.org/herbcat/navigator.do>).

Taxonomic treatment

Alysicarpus tetragonolobus* Edgew. var. *falcatus Dalavi, Bramhad., P.R.Mane & S.R.Yadav, **var. nov.** Fig. 1

Morphologically allied to *A. tetragonolobus* Edgew. var. *tetragonolobus* but distinct by its habit (procumbent and slender *vs.* procumbent to erect and robust), corolla (mono-coloured *vs.* mono to bi-coloured), pod (falcate *vs.* straight), articles (compressed, bi-convex, isobilateral *vs.* tetragonolobus or quadrangular), terminal article (continued into a stout beak *vs.* minute and articulated beak) and beak (persistent *vs.* caducous).

Type: INDIA, Maharashtra, Kolhapur district, N 16.678644, E 74.263666, Rajaram lake, 05.11.2019, S.P. Bramhadande, J.V. Dalavi, P.R. Mane & S.R. Yadav JVD-1392 (holo CAL!; iso CAL!, SUK! & BSI!).

Annual, branched procumbent herbs, to 10–20 cm tall. Stems slender, sparingly branched, sparsely pilose. Leaves unifoliolate, elliptic-ovate to lanceolate, 1.5–3.5 × 0.3–0.5 cm., base rounded and apex acute to rounded, margins entire, dorsiventrally glabrous to sparsely pilose on both the surfaces; petioles 0.3–0.5 cm long. Racemes terminal, 4–10 cm long. Flowers 0.7–1 cm across; pedicels *c.* 5 mm long, usually paired; bracts ovate to broad lanceolate, *c.* 3 × 1.5 mm, acuminate, ciliate, faintly veined; bracteoles linear, *c.* 2 × 0.3 mm, ciliate along margins. Calyx *c.* 6 mm across; sepals 5, anterior two united forming V-shaped notch in the middle, scarious. Petals 5, papilionaceous; standard petal broadly ovate, 4–6 × 4–5 mm, emarginate at apex, clawed at base, glabrous, dark pink; wing petals 0.5–0.6 × 0.2–0.4 cm, clawed, glabrous, pink to red; keel petals ovate-elliptic, *c.* 4 × 1 mm, clawed, pink. Stamens diadelphous (9+1); staminal column *c.* 3 mm long; filaments glabrous. Gynoecium *c.* 3 mm long; style bent at middle, sparsely hairy on the apical portion. Pods sickle shaped or falcate, 1–1.5 cm long, dorsiventrally compressed, articles 2–6, terminal article continued into thick stout beak; beak *c.* 3 mm, non-articulated, persistent; article *c.* 3 × 2.5 mm, more or less biconvex, isobilateral, slightly longer than broader, deeply reticulated,

green when young, black to brown when mature. Seeds ovate to spherical, *c.* 2 × 1.5 mm, slightly compressed, yellowish brown, polished.

Flowering & fruiting: Flowering from September to November and fruiting from October to January.

Habitat: Common along lakesides in wet grasslands in association with *Alysicarpus tetragonolobus* var. *tetragonolobus*, *A. vaginalis* (L.) DC., *Desmodium triflorum* (L.) DC., *Zornia gibbosa* Span. (all Fabaceae), *Eleocharis atropurpurea* (Retz.) J.Presl & C.Presl. (Cyperaceae), and *Pulicaria wightiana* Clarke (Asteraceae).

Etymology: The variety epithet '*falcatus*' comes from the falcate shape of the pods.

Distribution: Rajaram Lake (Kolhapur), Maharashtra, India.

Conservation status: No detailed data is available on the distribution of this variety, hence assessed here as Data Deficient (DD) as per the guidelines of IUCN (2019).

Notes: The variety has a very distinct pod in the whole genus, as the majority of species have pods showing a distinct articulation at the base of the beak, but here, the terminal article is directly converted into beak.

Alysicarpus tetragonolobus* Edgew. var. *micranthus Dalavi, Mane, & S.R.Yadav **var. nov.**

Fig. 2

Closely allied to *A. tetragonolobus* Edgew. var. *tetragonolobus* but differs by its racemes (congested *vs.* elongated), flowers (4–6 mm across *vs.* > 8 mm across), corolla (included in the calyx *vs.* exerted from calyx), standard petal (longer than broad *vs.* broader than long), claw (nearly equal to limb *vs.* much smaller than limb) and articles of pods (longer than broad *vs.* as long as or broader than long).

Type: INDIA, Maharashtra, Kolhapur district, Ujalaiwadi, N 16.662947, E 74.27649112, 12.11.2020, J.V. Dalavi, R.N. Mane & S.R. Yadav JVD-1393 (holo CAL!; iso CAL!, SUK! & BSI!).

Annual, sub-erect, sparingly branched herbs, to 15–30 cm high. Stems sparingly branched, terete, with

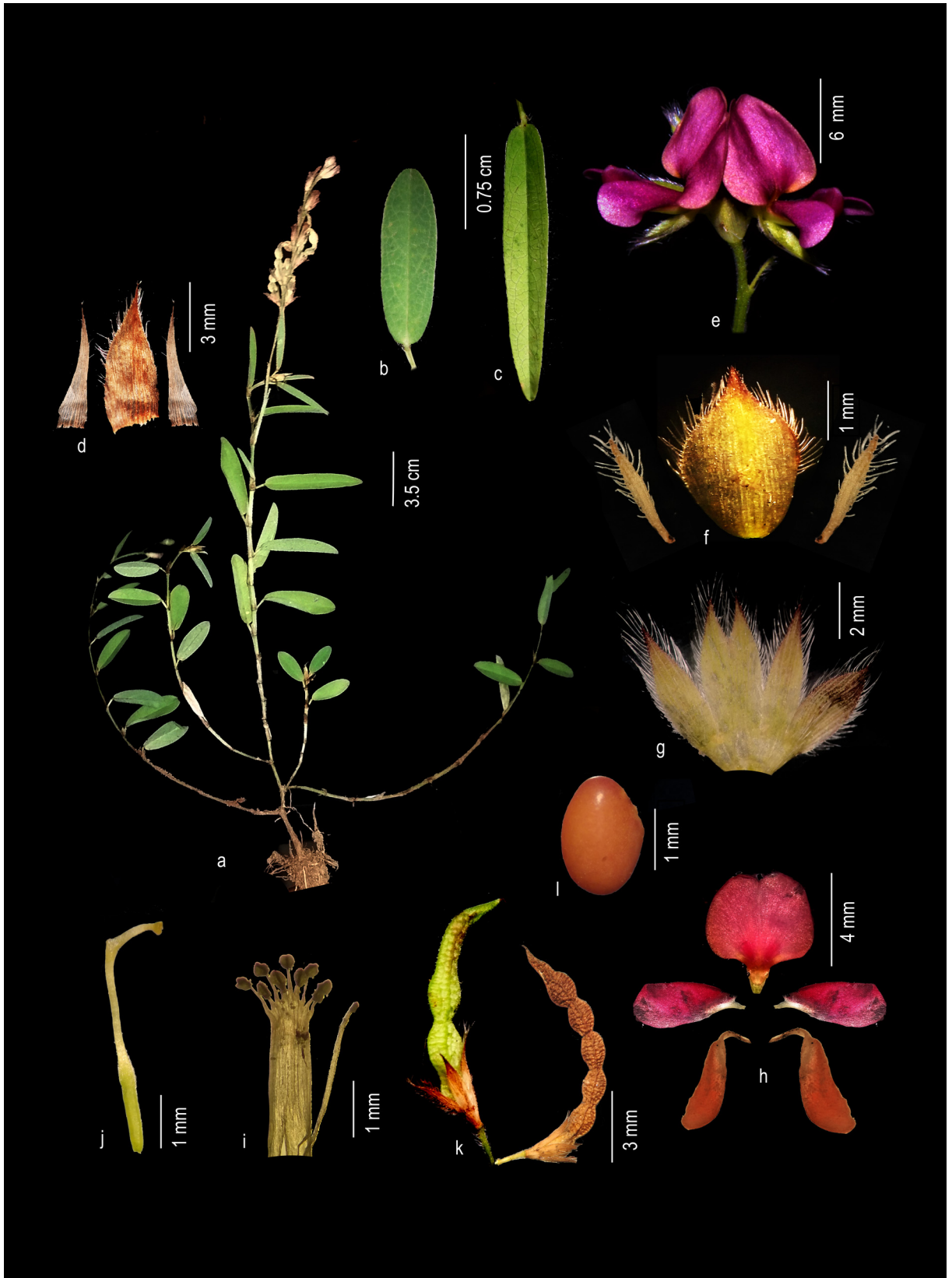


Fig. 1. *Alysicarpus tetragonolobus* var. *falcatus* Dalavi, Bramhad., P.R. Mane & S.R.Yadav: **a.** Habit; **b.** & **c.** Leaves; **d.** Stipule and stipels; **e.** Flowers; **f.** Bract and bracteoles; **g.** Calyx; **h.** Dissected corolla; **i.** Androecium; **j.** Gynoecium; **k.** Pods; **l.** Seed (from JVD-1392; photos by J.V. Dalavi).

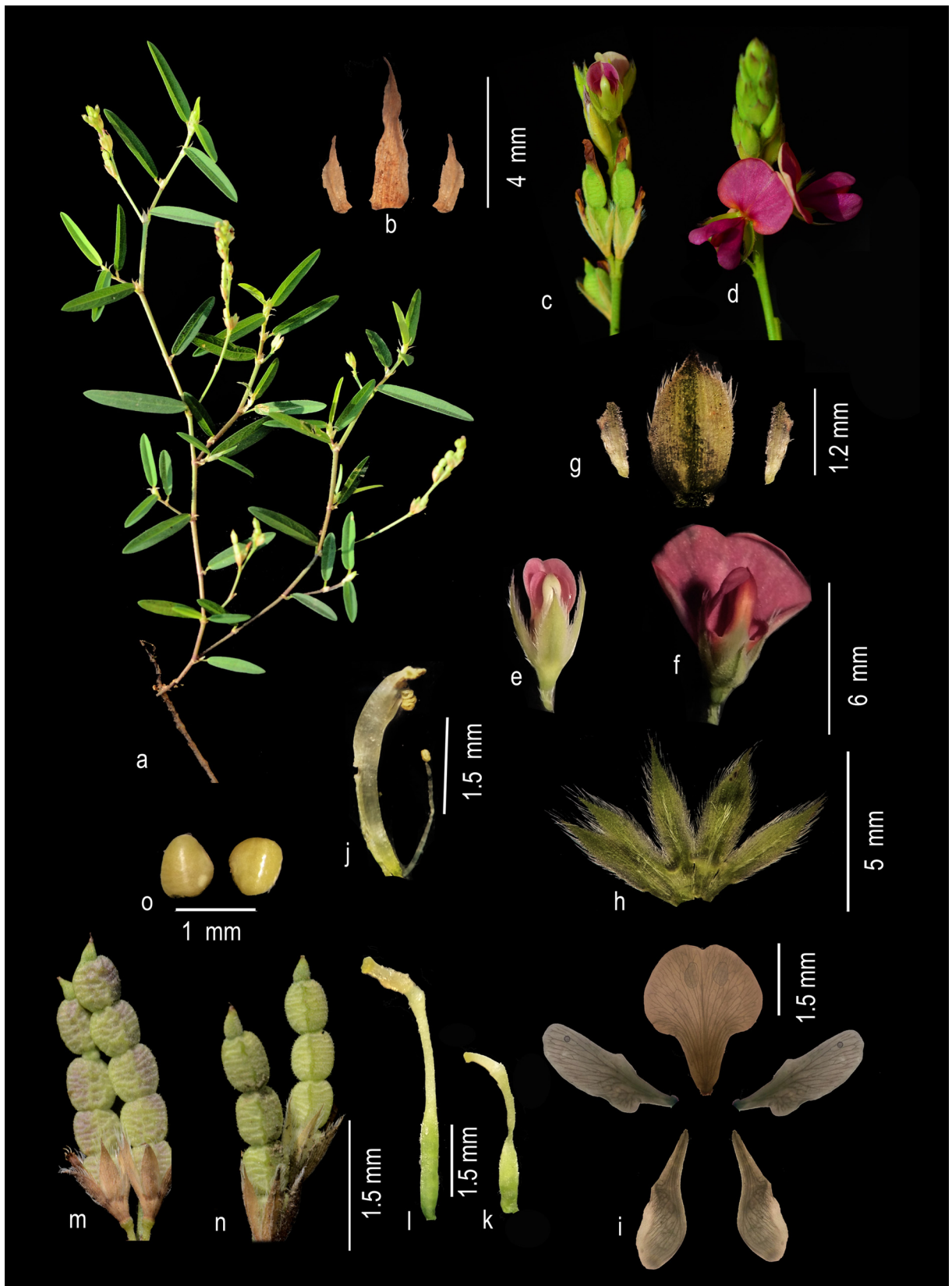


Fig. 2. Images of *Alysicarpus tetragonolobus* var. *micranthus* Dalavi, Mane & S.R.Yadav (a-c, e, g-k, m, n, o) and *Alysicarpus tetragonolobus* Edgew. (d, f, l, m): a. Habit; b. Stipule and stipels; c & d. Inflorescence; e & f. Flower; g. Bract and bracteoles; h. Calyx; i. dissected corolla; j. Androecium; k & l. Gynoecium; m & n. Pods; o. Seeds (from JVD-1393; photos by J.V. Dalavi).

woody root stock, c. 0.3 cm in diam., minutely hairy to glabrous, with distinct nodes due to remnants of scarious stipules and stipels, internodes as long as or longer than leaves. Leaves unifoliolate, ovate, oblong to elliptic, 1–2.5 × 0.25–0.5 cm, thick, rounded at base, sub–acute at apex, glabrous to pilose at both the surfaces, green above pale beneath; stipules scarious, c. 4 × 1 mm, striated, acute at apex, ciliate and deltoid along margin; stipels lanceolate, c. 2 mm long, striated, ciliated and minutely deltoid at margins; petioles c. 0.25 cm long, sparsely ciliate. Inflorescence congested, unbranched racemes, 2–4.5 cm long. Flowers 0.4–0.6 cm across; pedicel 1.5–2 mm, straight, sparse ciliate; bracts broad ovate, c. 2.5 × 1.5 mm, acute to acuminate at apex, striate, ciliate throughout; bracteoles linear–lanceolate, 1–1.2 × c. 0.5 mm, striate, ciliate, green. Calyx 4–5 × 6.5–7 mm when fully dissected; sepals 5, scarious, connate at base, anterior two sepals united forming a deep notch in the middle; posterior one and lateral two ovate, acute to acuminate at apex; ciliate outside, striate. Corolla 4–6 mm across, as long as or shorter than calyx, mono–coloured, pink; standard petals narrow–ovate, c. 3 × 2 mm, longer than broad, claw as long as limb, triangular, limb shallowly notched at apex, pink; wing petals narrow ovate to elliptic, c. 3 × 1.5 mm, clawed; keel petals boat shaped c. 2.5 × 0.5 mm, pink. Stamens diadelphous (9+1); staminal column c. 2.5–3 mm long; filaments glabrous. Gynoecium c. 3 mm long; ovary elongated, sub–terete, style curved, stigma capitate. Pods, 1–2.5 cm long, beaded, tetragonolobus, articles longer than broader, deeply reticulated, straw coloured. Seeds ovate, spherical to ovate–elongate, 1–1.5 × 1 mm, slightly compressed.

Flowering & fruiting: Flowering from September to November and fruiting from October to January.

Habitat: Common in open grasslands in association with *Aeschynomene aspera* L., *Alysicarpus bupleurifolius* (L.) DC., *A. naikianus* Pokle, *A. tetragonolobus*, *A. vaginalis* (L.) DC., *Mimosa pudica* L. (all Fabaceae), *Alternanthera tenella* Colla (Amaranthaceae), *Dichanthium annulatum* (Forss.)

Stapf. and *Eragrostis uniolooides* (Retz.) Nees (both Poaceae).

Etymology: The variety epithet ‘*micranthus*’ refers to the character of the flowers, which in the variety are very small and included in the calyx (micro=small, anthus= flower).

Distribution: Endemic to India.

Conservation status: This variety is only reported from its type locality and is uncommon in open grasslands. Since data on population and distribution is not available, it is provisionally assessed here as Data Deficient (DD) (IUCN, 2019).

Notes: It was observed that all flowers produced pods and it is suspected that the variety is adapted to self-pollination breeding, which, however, needs further detailed investigations.

Key to the varieties of *Alysicarpus tetragonolobus*

1. Pods falcate or sickle-shaped, beak non-articulated var. *falcatus*
1. Pods straight, beak articulated 2
2. Corolla included in calyx var. *micranthus*
2. Corolla exerted from calyx 3
3. Leaves ovate–oblong, few upper leaves linear; inflorescence many flowered; pod articles turgid var. *tetragonolobus*
3. Leaves linear, few lower leaves ovate; inflorescence few flowered; pod articles flattened var. *pashanensis*

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