


## ***SIDA PENAMBANGENSIS* (MALVACEAE), A NEW *SIDA* SPECIES FROM EAST JAVA, INDONESIA**

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### **ABSTRACT**

FELAYATI, T., RUSTIAMI, H. & SUSANDARINI, R. 2024. *Sida penambangensis* (Malvaceae), a new *Sida* species from East Java, Indonesia. *Reinwardtia* 23(1): 33–38. — A new species of *Sida* from Penambangan Village, Sidoarjo, East Java related to *Sida acuta* is described as *Sida penambangensis* Felayati, Rustiami & Susandarini. It is distinguished from *Sida acuta* Burm.f. with at least six characters such as stem covered with obvious long trichomes, reddish-purple at upper leaf margin, stipule subulate-falcate, pedicels not articulated, mericarps 9–11 with pair linear awns 0.8 mm long with simple and stellate pubescence. It is described and illustrated here as a species new to science.

**Key words:** East Java, Malvaceae, new species, *Sida penambangensis*, taxonomy.

### **ABSTRAK**

FELAYATI, T., RUSTIAMI, H. & SUSANDARINI, R. 2024. *Sida penambangensis* (Malvaceae), jenis baru Sidaguri dari Jawa Timur, Indonesia. *Reinwardtia* 23(1): 33–38. — Jenis baru *Sida* berkerabat dengan *Sida acuta* dari Desa Penambangan, Sidoarjo, Jawa Timur dipertelakan sebagai *Sida penambangensis* Felayati, Rustiami & Susandarini. Jenis ini dibedakan dari *Sida acuta* Burm.f. berdasarkan setidaknya enam karakter yaitu batang ditutupi trikoma panjang yang jelas, berwarna ungu kemerahan pada tepi daun bagian atas, stipula ‘*subulate-falcate*’, tangkai daun tidak berartikulasi, merikarpium berjumlah 9–11 dengan sepasang tanduk berbentuk linier, panjang tanduk 0,8 mm dengan rambut sederhana dan berbentuk bintang. Jenis ini dipertelakan dan diilustrasikan sebagai jenis baru dalam ilmu pengetahuan.

**Kata kunci:** Jawa Timur, jenis baru, Malvaceae, *Sida penambangensis*, taksonomi.

## **INTRODUCTION**

The species in the genus *Sida* L. (Linnaeus, 1753: 684) are widely distributed as weeds in the tropics and subtropics. *Sida* is one of the largest genera in subfamily *Malvoideae* (Grings & Bol-drini, 2022) and tribe *Malveae* (Brandao *et al.*, 2017), including 1730 species in the New World (Bayer & Kubitzki, 2003). *Sida* has undershrub habit with serrated margin leaf, solitary small flowers, one seeded schizocarp fruit with 5–14 mericarps, and the mericarp is trigonous with muc-ticous to prominently aristate (van Borssum Waalkes, 1966; Brandao *et al.*, 2017). The typical character of *Sida* in Java always has a yellow corolla (Backer & Bakhuizen van den Brink, 1963).

Previously, a taxonomic account of *Sida* in Java recorded by Backer & Bakhuizen van den Brink (1963) and van Borssum Waalkes (1966). Backer

& Bakhuizen van den Brink (1963) recorded nine species of *Sida*, there are *S. acuta* Burm.f., *S. balica* Miq., *S. cordifolia* L., *S. glutinosa* Cav., *S. mysorensis* Wight & Arn., *S. retusa* L., *S. rhombifolia* L., *S. subcordata* Span., and *S. veronicifolia* Lam. In 1966, van Borssum Waalkes also recorded nine species in Java namely *S. acuta* Burm.f., *S. cordata* (Burm.f.) Borss.Waalk., *S. cordifolia* L., *S. elongata* Blume, *S. glutinosa* Comm. ex Cav., *S. javensis* Cav., *S. rhombifolia* L., *S. spinosa* L., and *S. subcordata* Span. but some species were different from the previous one. There are several species already synonymised such as *S. balica* Miq. synonym of *S. elongata* Blume., *S. retusa* L. synonym of *S. rhombifolia* subsp. *retusa* (L.) Borss.Waalk. and *S. veronicifolia* Lam. synonym of *S. cordata* (Burm.f.) Borss.Waalk. Only four species recorded from Java included in POWO that are *S. javensis* Cav., *S. rhombifolia* L.,

Table 1. Species of *Sida* recorded from Java based on previous taxonomic study in 1963 and 1966

Backer & Bakhuizen van den Brink (1963)	van Borssum Waalkes (1966)
<i>S. acuta</i> Burm.f.	<i>S. acuta</i> Burm.f.
<i>S. balica</i> Miq.*	<i>S. cordata</i> (Burm.f.) Borss.Waalk.
<i>S. cordifolia</i> L.	<i>S. cordifolia</i> L.
<i>S. glutinosa</i> Cav.	<i>S. elongata</i> Blume
<i>S. mysorensis</i> Wight & Arn.	<i>S. glutinosa</i> Comm. ex Cav.
<i>S. retusa</i> L.*	<i>S. javensis</i> Cav.
<i>S. rhombifolia</i> L.	<i>S. rhombifolia</i> L.
<i>S. subcordata</i> Span.	<i>S. spinosa</i> L.
<i>S. veronicifolia</i> Lam.*	<i>S. subcordata</i> Span.

\*synonymised species.

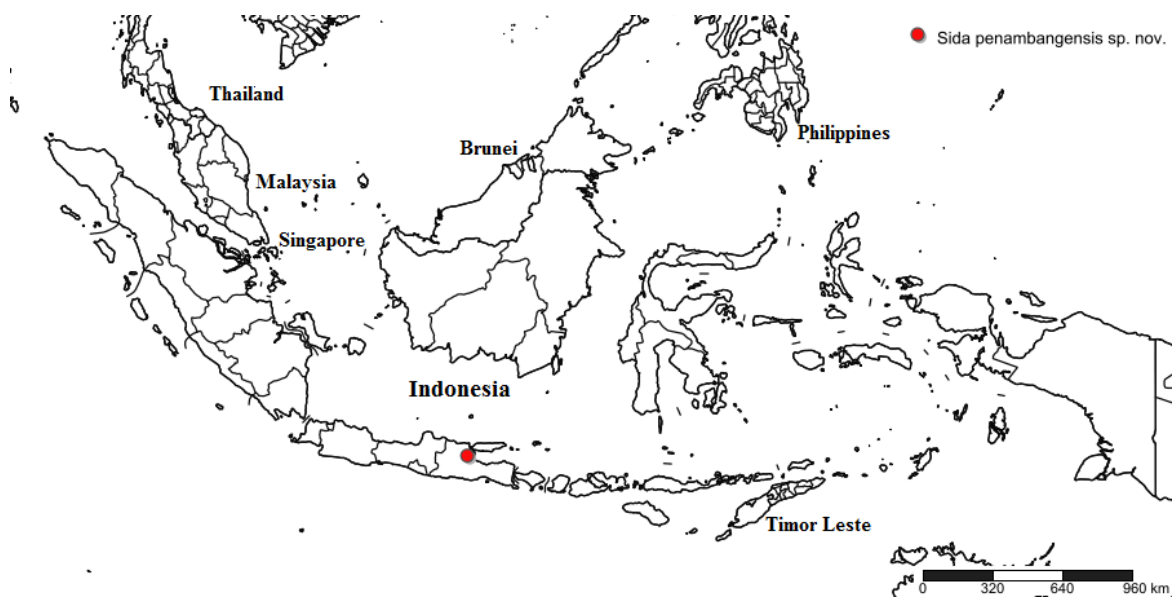


Fig. 1. Collection site of *Sida penambangensis* Felayati, Rustiami & Susandarini.

*S. rhombifolia* var. *maderensis* (Lowe) Lowe and *S. subcordata* Span. as can be seen in Table 1.

A new species of *Sida* was found in the urban area of Penambangan Village, East Java. Field sampling was conducted in 2020, and this plant mostly found on roadsides and dry waterways. It is distinguished from *Sida acuta* Burm.f. with at least six characters such as stem covered with obvious long trichomes, reddish-purple at upper leaf margin, stipule subulate-falcate, pedicels not articulated, mericarps 9–11 with pair linear awns 0.8 mm long with simple and stellate pubescence. A new species propose here will contribute updating

the diversity of Malvaceae in Indonesia since the last revision was made in 1966 by van Borssum Waalkes. Considering many species have been treated with new status taxonomically, updating the taxonomic status within the genera occurred in Java is needed .

## MATERIALS AND METHODS

The species found at Penambangan Village, Sidoarjo, East Java. The type material deposited in Herbarium Bogoriense (BO) (herbarium codes follow Thiers 2020+). The description were made

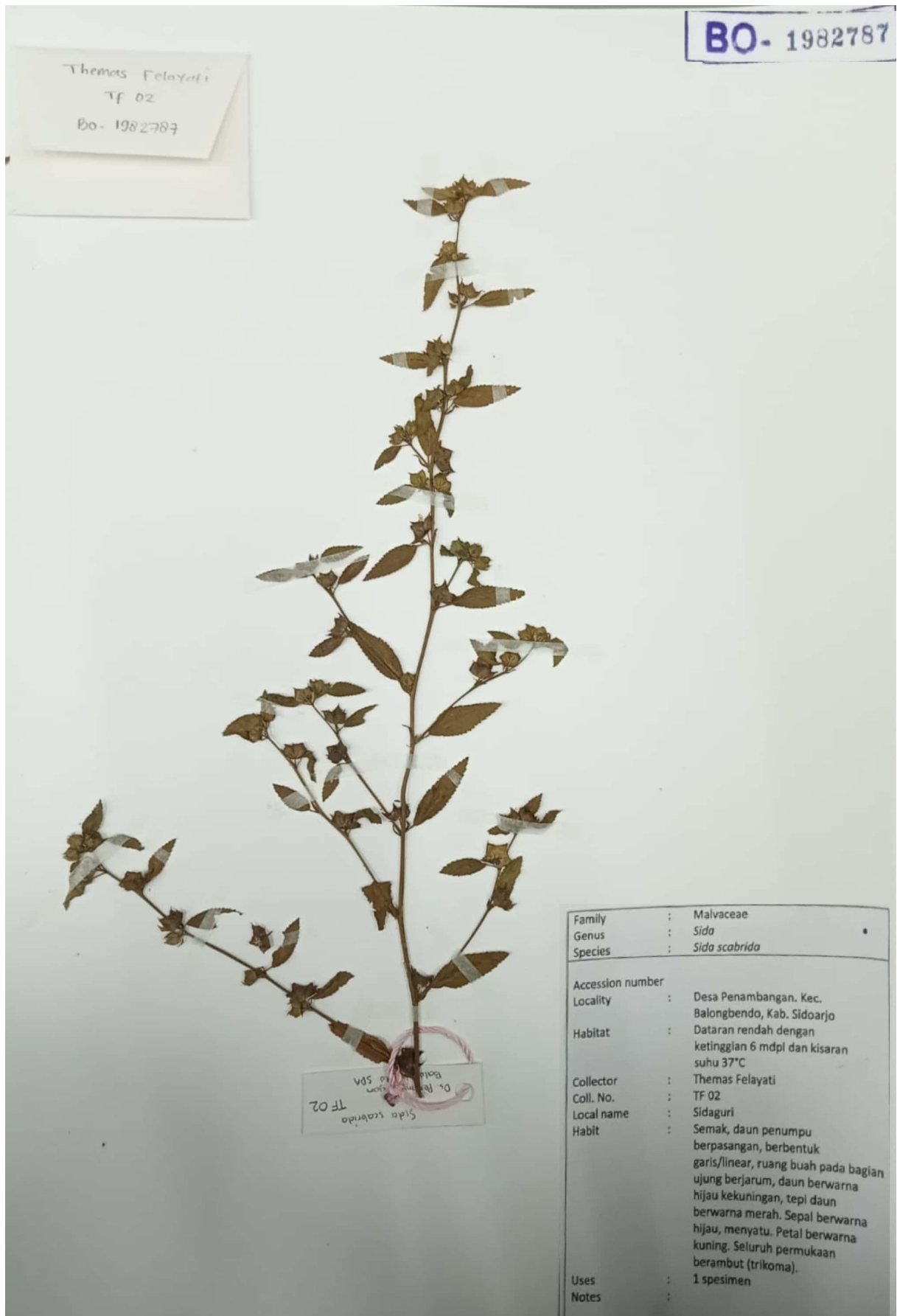


Fig. 2. Holotype of *Sida penambangensis* Felayati, Rustiami & Susandarini, showing stem, leaf, non anthesis flower and schizocarp.





Fig. 3. *Sida penambangensis* Felayati, Rustiami & Susandarini. A. Habit. B. Flower showing staminal column and detail of simple, prominent and long hairs on branch. C. Detail of the vein of the stipules and non-articulated pedicel. D. Detail of glabrous until puberulent pedicel, virogously pilose calyx and small tomentose lump. E. Mericarpium showing trichomes on awn or aristate. Scale bar: A= 20 cm; B= 2 cm; C-E= 500  $\mu$ m. Photos by Themas Felayati.

through examination of herbarium specimens of genus *Sida* deposited in BO. The terminology of structure following van Borssum Waalkess (1966), Brandao *et al.* (2017) and Beentje (2010). The map was made in <https://www.simplenampr.net/>.

## RESULTS AND DISCUSSION

***Sida penambangensis*** Felayati, Rustiami & Susandarini, *spec. nov.* Figs. 2 & 3 — TYPE: INDONESIA: East Java Province: Sidoarjo Regency, Balongbendo District, Penambangan Village, 7° 24'23.6"S 112°31'56"E, 15 m, 29 January 2020. *Felayati 2* (Holotype: BO!).

*Sida penambangensis* has several diagnostic characters such as stem covered with obvious long

trichomes, reddish-purple at upper leaf margin, stipule subulate-falcate, pedicels not articulated, mericarps 9–11 with pair linear awns 0.8 mm long, awns simple and stellate pubescence.

*Scandent undershrubs*, 60–100 cm height. *Stem* terete, green suffused with reddish-purple, covered with simple, prominent and long trichomes. *Stipules* subulate-falcate or subfalcate, 2 veins, 0.4–0.7  $\times$  ca. 0.1 cm, adaxial surface green-yellow, abaxial surface red purplish, 4–5-nerved, long ciliate along the margins. *Leaves*: petiole 0.5–0.7 cm long, pubescent, stellate hair, reddish-purple; blade ovate to lanceolate, 2.5–2.8  $\times$  1.5–1.6 cm, base rounded-subcordate, apex acuminate, margin serrate almost to the base, green-yellow and reddish-purple at upper margin sparsely stellate hairy above and more or less densely beneath; lateral nerves 5–8 pairs. *Flowers* axillary, solitary, ca. 3

Table 2. Comparison of diagnostic morphological characters of *Sida acuta* and *S. penambangensis*

Characters	<i>Sida acuta</i>	<i>Sida penambangensis</i>
Branchlets surface	Stellate hairs	Long simple hairs
Adaxial leaf margins	Green coloured	Reddish-purple coloured
Leaf apex	Acute	Shortly acuminate
Stipules	Linear-lanceolate	Subulate-falcate
Pedicels	Articulated	Not articulated
Mature mericarps colour	Broken-white coloured	Black coloured

Key to the species of *Sida* spp. in Java are presented here.

- 1 a Leaf palminerved; base deeply cordate ..... 2
- b Leaf penninerved; base subcordate to rounded ..... 4
- 2 a Procumbent herbs, staminal column pubescens ..... 3
- b Erect shrubs, staminal column glabrous ..... *S. mysorensis*
- 3 a Mericarps awnless, long triangular calyx ..... *S. elongata*
- b Mericarps awned, short triangular calyx ..... *S. javensis*
- 4 a Stipules subfalcate, short pedicel..... 5
- b Stipules filiform, long pedicel ..... 6
- 5 a Pedicel articulated, mature mericarp broken-white coloured ..... *S. acuta*
- b Pedicel not articulated, mature mericarp black coloured ..... *S. penambangensis*
- 6 a Leaf blade cordate, velutinous leaf surface ..... *S. cordifolia*
- b Leaf blade not cordate, non velutinous leaf surface..... 7
- 7 a Number of mericarps more than five, spine absent ..... 8
- b Number of mericarps five, spine present ..... *S. spinosa*
- 8 a Leaf blade rhomboid to lanceolate, awn length less than 2 mm ..... *S. rhombifolia*
- b Leaf blade ovate, awn length more than 2 mm ..... *S. subcordata*

cm across, yellow. *Pedicels* 0.3–0.4 cm long, not-articulated, glabrous to pubescent. *Calyx* 10 ribbed from the base, campanulate, 5-lobed; lobes ovate, 0.7–0.8 cm long, apex acute-acuminate, margins ciliate, vigorously pilose. *Corolla* 2.5–3 cm across, yellow; petals obliquely ovate, to 1 × 0.7 cm, base cuneate, glandular hairy at abaxial and adaxial. *Staminal column* to 2 mm long, monadelphous, glabrous. *Ovary* ovoid, minutely hairy towards the apex; styles 9–11; stigma capitate. In the axils, along with the petioles, pedicles and stipules, there is small tomentose lump. *Mericarps* 9–11, trigonous, each to 2 × 2 mm, enclosed in the calyx, black when mature, prominently reticulate and transversely rugose on sides and dorsal, apex with a pair of linear divergent awns of 0.8 mm long, pubescent. *Seeds* reniform, flattened, *ca.* 1.3 mm

high, brownish-black, glabrous except for the pubescent hilum at apex of seed.

**Distribution.** *Sida penambangensis* so far is only known from type locality (Fig. 1).

**Ecology & Habitat.** *Sida penambangensis* is found in the lowlands at altitudes between 10–15 m asl. The species is commonly occurred at roadsides and in a dry waterway. The main associated species are *Scoparia dulcis* L. (Plantaginaceae) and *Ageratum conyzoides* L. (Asteraceae). Flowering and fruiting throughout the year.

**Etymology.** The specific epithet is based on the type locality of the taxon, Penambangan village.

**Conservation status.** Based on IUCN (2012), this species categorized in Data Deficient (DD) because the appropriate data on abundance and distribution of this species are lacking. The species only found from type locality.

**Notes.** This species can be distinguished from the rest of the species by its clearly visible long simple trichomes on the branchlets and larger size of the flowers. The flowers open at 9 am and close at noon. *Sida penambangensis* is related to *Sida acuta* and likely belongs to section *Distichifolia* (Monteiro) Krapov. based on several characters such as distichous lateral branches, stipule subfalcate, short pedicels, mericarps more than five and a pair of awns. The petiole is articulated according to Brandao *et al.* (2017), but in van Borssum Waalkes (1966) it is known as jointed. In line with Krapovickas (2003), *Sida* section *Distichifolia* has erect shrubs or subshrubs, cylindrical central axis, with spiral branching, distichous lateral branches, usually with flattened stem, leaves elliptic, crenate-serrate, shortly petiolate, stipules subfalcate, dimorphic, with 1–6 nerves, short peduncles, corolla yellow, sometimes white, mericarps 5–12, submuculate to bi-aristate, laterally reticulate.

Van Borssum Waalkes (1966) and Fryxell (1985) placed *Sida acuta* in section *Sida*. Currently, *Sida acuta* is treated in section *Distichifolia* based on distichous branching, subfalcate stipules and relative length of articulated petiole and pedicels, petiole equal or longer than pedicels (Krapovickas, 2003; Brandao *et al.*, 2017). *Sida penambangensis* is considered to be included in the section *Distichifolia* and is distinguished from *Sida acuta* by branching surface, leaf margin, leaf apex, stipules, petiole, and mature leaf colour (Table 2).

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