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SHORT COMMUNICATION

# A new species of *Abelmoschus* Medik. (Malvaceae) from Chhattisgarh, India

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**Abstract** A new species of Malvaceae, *Abelmoschus palianus* Sutar, K. V. Bhat et S. R. Yadav is described and illustrated from Chhattisgarh, India. The morphological differences between the new species and related taxa are discussed.

**Keywords** *Abelmoschus* · Okra · Taxonomy · Wild germplasm · India

## Introduction

Medicus (1787) established the genus *Abelmoschus* with three species, viz. *A. moschatus, A. manihot* and *A. decandrus*. The genus *Abelmoschus* Medik. is of Asiatic origin (Bisht and Bhat 2006). Since the establishment of the genus, many species have been discovered. Van Borssum Waalkes (1966) had studied the genus and synonymised many species. He reduced the species number to six, viz. *A. esculentus, A. moschatus, A. ficulneus, A. manihot, A. crinitus* and *A. angulosus*. Van Borssum Waalkes's treatment of *Abelmoschus* was also followed in the International Okra Workshop (IBPGR 1991) with some minor changes. In this modified treatment *A. manihot* ssp. *tetraphyllus* was raised to specific rank and two more species viz. *A. tuberculatus* and *A. caillei* were included. This increased the total species count to nine. Recently, John et al. (2013) described a new species, *A. enbeepeegearense* from Kerala, India. They also reported its occurrence in Karnataka and Tamil Nadu. Hence, presently the genus comprises 10 species, 3 subspecies and 4 varieties.

The genus is of considerable economic importance. Two species of *Abelmoschus*, *A. esculentus* (L.) Moench and *A. caillei* (A. Chev.) Stevels are economically important, highly nutritious crops widely cultivated throughout the world. Although the latter is generally limited to West Africa. *Abelmoschus moschatus* Medik. is grown for aromatic seeds as well as an ornamental plant. Unripe fruits, leaves and new shoots of *A. moschatus* are consumed as vegetables. The remaining species namely, *A. angulosus* Wall. ex Wight and Arn., *A. crinitus* Wall., *A. enbeepeegearense* Joseph et al., *A. ficulneus* (L.) Wight et Arn., *A.*

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*manihot* (L.) Medik., *A. tetraphyllus* (Roxb. ex Hornem.) R. Graham and *A. tuberculatus* Pal et Singh are truly wild.

The present paper describes and illustrates a new species, *Abelmoschus palianus* Sutar, K. V. Bhat et S. R. Yadav from India. The species differs from its related species, *A. angulosus* in characters as mentioned in Table 1. A comparative morphological account and a key for identification of *Abelmoschus* species is also provided.

## Materials and methods

As a part of revisionary work on the genus *Abelmoschus*, extensive and intensive field surveys were made. Plant specimens were collected from different phytogeographical regions of India. The collected species were grown and maintained in the Botanical Garden of the Shivaji University, Kolhapur (Maharashtra) for detailed systematic studies. Critical observations on morphological characters were made both on cultivated plants and specimens collected from the wild.

## Results

***Abelmoschus palianus* Sutar, K. V. Bhat et S. R. Yadav, sp. nov. *Type:*** INDIA, Chhattisgarh, Durg district, Balod Tehsil, Pondi, N21$^0$ 14′.414″, E81° 42′.293″, altitude 283 m, 17 October 2012, SRYA 54 (Holotype: CAL!, Isotypes: BSI!, K!, SUK!). (Fig. 1).

***Latin diagnosis***: Abelmoscho anguloso similis, epicalycis segmentis 5–7 ovatis ad anguste ovatis liberis (contra 4 deltoideis latis coherentibus), capsulis late ovatis exsertis (contra ovoideis inclusis) differt.

Erect, branched subshrub up to 3 m tall. Stem terete, sparsely hairy; hairs 0.1 cm long, antrorse. Leaves petiolate, stipulate. Lamina orbicular, angular, palmilobed to palmisect, lower leaves usually angular or palmatifid, upper leaves palmisect, 3–7 lobed, 7–15 × 8–17 cm, base cordate, lobes lanceolate, acute-acuminate, margin sinuate to dentate, hairy on both surfaces, interveinal portion of dorsal surface covered with tribrachiate hairs. Petiole 5–15 cm long, terete, grooved above, hairy. Stipule caducous, 0.7–0.8 × 0.2 cm, lanceolate, hairy, apex acuminate. Flowers axillary, solitary, appears as terminal racemes by reduction of upper leaves, bisexual, pedicellate, drooping at anthesis. Pedicel 2–2.5 cm long, up to 4 cm long in fruit, sparsely hairy. Epicalyx 5–7, free, persistent, ovate to narrowly ovate; each segment 1.8–2 cm long, 0.3–0.5 cm wide at base, unequal, acute at apex, pubescent on both sides. Sepals 5, 2.5–2.8 cm long, spathaceous, caducous, green, split on one side after anthesis, densely hairy on both sides; hairs on outer side two armed; calyx teeth ca 0.1 cm long. Corolla 8.5–9 cm in diameter, convolute, yellow with dark purple eye at centre; petals 5, 6.5–7 × 5.5–6 cm, apex rounded, basally adnate to the androecium, sparsely hairy outside, glabrous within. Staminal column 2–2.2 cm long, dark purple at base, creamy-yellow above, antheriferous throughout, glabrous, 5-toothed at apex, filament 0.1 cm long, anthers monothecous, yellow, dorsifixed, dehiscing longitudinally. Ovary 0.7–0.8 × 0.6–0.7 cm, conical, pubescent, 5-loculed, many-ovuled; style single, 1.7 cm long, dilated at apex, glabrous, creamy yellow, apically divided into 5 lobes, each lobe with capitate stigma; stigma 0.5 cm long, 0.3 cm in diameter, hairy, purple. Capsule 3.5–4 × 2.5–2.7 cm, green when young, dark brown at maturity, broadly ovate, pentagonous, prominently 5-costate, dehiscing apically, densely hirsute outside; hairs ca 0.3 cm long, sparsely hairy within; rostrum short, ca 0.2 cm long. Epicalyx persistent, bent downward at fruit maturity. Seed 0.4 × 0.3 cm, reniform, dark brown, puberulent in concentric rings; hilum 2 × 1 mm, ovate.

***Distribution:*** India: Chhattisgarh.

***Phenology:*** Flowering—June to November; Fruiting—September to February.

***Specimens examined:*** INDIA. Chhattisgarh: Durg district, Balod Tehsil, Pondi, N21° 14′.414″, E81° 42′.293″, altitude 283 m, 17 Oct. 2012, SRYA 54 (holotype CAL!; isotypes BSI!, K!, SUK!).

***Note:*** The species grows along the waste land and on the bunds of cultivated fields. *Abelmoschus palianus* is similar to *A. angulosus* but differs in 5–7, ovate to narrowly ovate free epicalyx lobes (as against 4, deltoid, broad and coherent lobes) and broadly ovate exerted capsule (as against ovoid and included capsule). Figure 2, Table 1.

***Etymology***: The species is named in honour of Dr. Benjamin Peary Pal for his contributions to agricultural sciences.

**Table 1** Comparison of diagnostic characters to distinguish species of *Abelmoschus*

| Characters | | *A. angulosus* | *A. palianus* | *A. ficulneus* | *A. crinitus* | *A. caillei* | *A. tuberculatus* | *A. manihot* | *A. tetraphyllus* | *A. enbeepeegearense* | *A. moschatus* | *A. esculentus* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tap root | | Non tuberous | Non tuberous | Non tuberous | Tuberous | Non tuberous | Non tuberous | Non tuberous | Non tuberous | Tuberous | Non tuberous or tuberous | Non tuberous |
| Flower colour | | Yellow, white or pink to purple | Yellow | White turn pink | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow | Yellow |
| Epicalyx lobes | Number | 4 | 5–7 | 5–6 | 10–16 | 7–9 | 10–14 | 4–7 | 4 | 10–11 | 7–8 | 6–10 |
| | Shape | Deltoid | Ovate to narrowly ovate | Lanceolate to narrowly ovate | Linear | Ovate | Linear | Broadly lanceolate to ovate | Broadly lanceolate to ovate | Linear-lanceolate | Linear | Linear |
| | Coherent | Coherent | Non coherent | Non coherent | Non coherent | Non coherent | Non coherent | Non coherent | Non coherent | Non coherent | Non coherent | Non coherent |
| | Size (cm) | 2.5–3 × 1.3-1.5 | 1.8–2 × 0.3–0.5 | 0.5–1.1 × 0.1–0.3 | 2–2.5 × 1 | 1–3.5 × 0.4–1.5 | 0.5–0.9 × 0.1–0.15 | 0.8–1 × 0.4–0.5 | 0.8–1 × 0.4–0.5 | 2.1 × 0.2 | 0.8–0.9 × 0.1 | 2.1–2.4 × 0.5–0.6 |
| | Nature | Persistent | Persistent | Caducous | Persistent | Caducous | Caducous | Caducous | Caducous | Persistent | Caducous or persistent | Caducous |
| Capsule | Shape | Ovate | Broadly ovate | Ovate | Widely elliptic | Lanceolate to lance-ovate | Elliptic-lanceolate | Ovate to lance-ovate | Ovate to lance-ovate | Ovate | Lance-ovate | Lanceolate |
| | Surface when young | Densely hispid | Hirsute | Pilate-glandular hairy | Hirsute | Tomentulose | Tuberculate hairy | Hirsute | Hirsute | Soft strigulose | Soft strigulose | Tomentulose |
| | Size (cm) | 3–4 × 1.5–2 | 3.5–4 × 2.5–2.7 | 3–4 × 1.5–2.5 | 3–5 × 2.5–3 | 6–18 × 2–4 | 4–5 × 2–2.5 | 5–6 × 1.5–2 | 5–6 × 1.5–2 | 3.5 × 1.8 | 5–6 × 2–2.5 | 7–25 × 2–3 |
| | Beak | Beaked | Beaked | Beaked | Non beaked | Beaked | Beaked | Beaked | Beaked | Beaked | Beaked | Beaked |
| | Dehiscence | Apically | Apically | Apically | Apically | Laterally | Apically | Apically | Apically | Apically | Laterally | Laterally |
| Seed | Hair | Hairy | Puberulent | Pilose hairy | Glabrous | Glabrous | Villous hairy | Pilose hairy | Pilose hairy | Glabrous | Glabrous | Along hilum |
| | Wart | Absent | Absent | Absent | Warty | Warty | Absent | Absent | Absent | Warty | Warty | Warty |

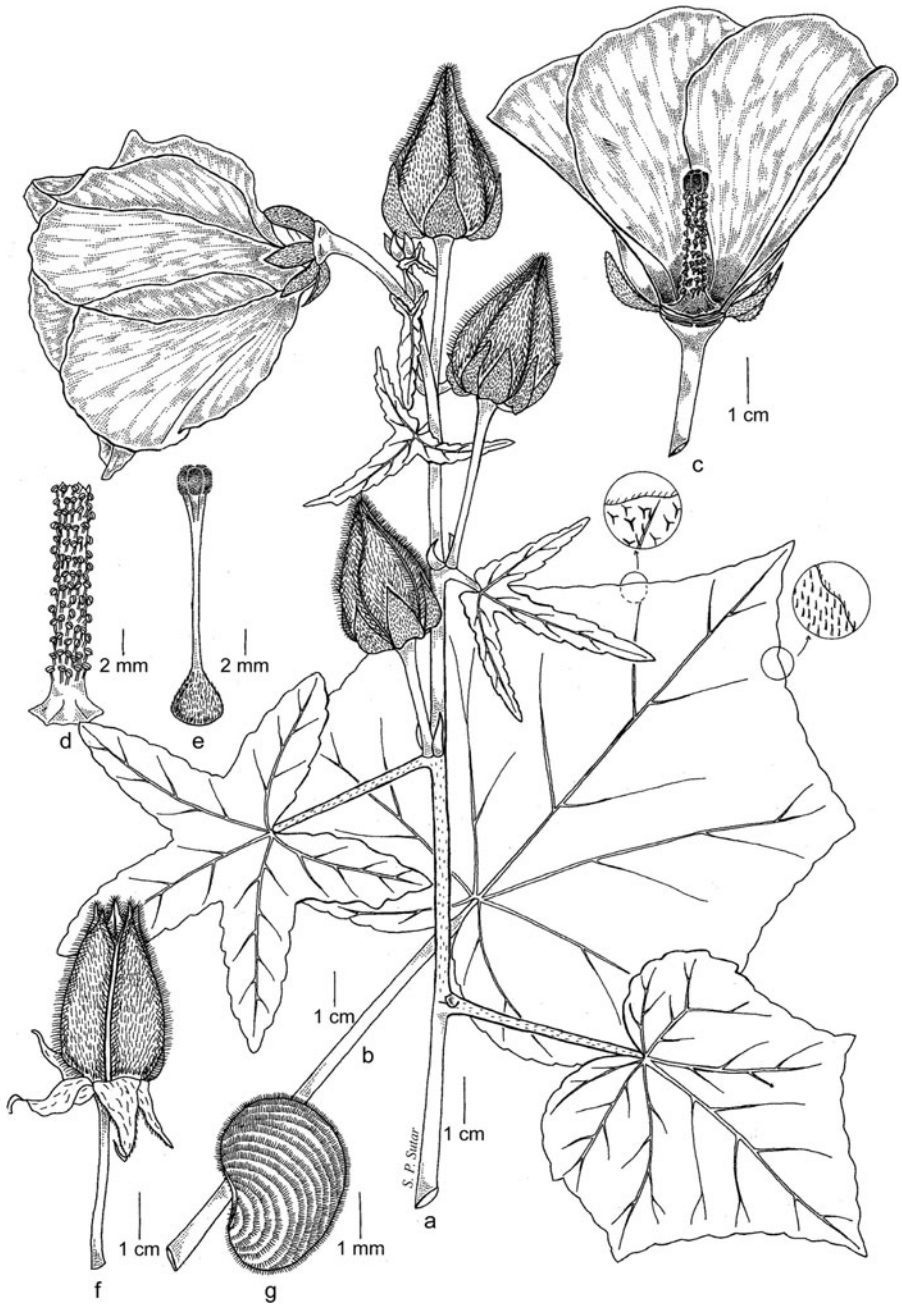


**Fig. 1** *Abelmoschus palianus*: *a* Habit, *b* Leaf, *c* Longitudinal section of flower, *d* Staminal column, *e* Gynoecium, *f* Fruit, *g* Seed

## Discussion and conclusion

The genus *Abelmoschus* now comprises 11 species for the world. All are found in India. The discovery of a new species from the centre of origin of the genus has great implications. This wild species of *Abelmoschus* will play a vital role in widening the genetic base of Okra. *Abelmoschus palianus* like its close relative *A. angulosus* may also be used as a candidate to confer disease resistance traits to the cultivated okra particularly against yellow vein mosaic virus (YVMV) and fruit borer. Moreover, it may be used in hybridization experiments with other *Abelmoschus* species. These hybridization programmes will definitely throw some light on its crossability which will be useful in elucidating interrelationships of species within the genus.

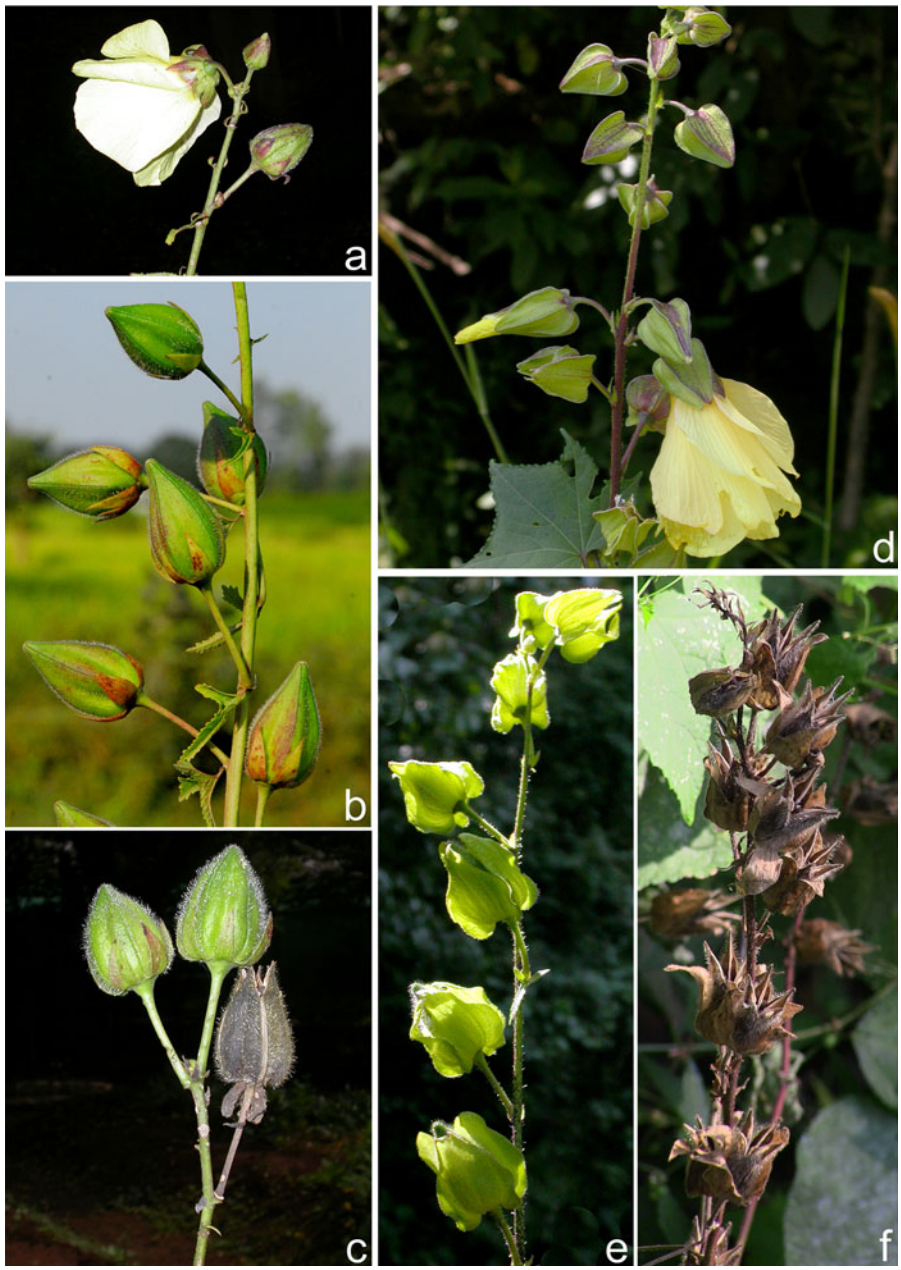


**Fig. 2** *Abelmoschus palianus*: **a** Flowering twig, **b**, **c** Fruits; *A. angulosus*: **d** Flowering twig, **e** Immature fruits, **f** Mature fruits

Key to the species of *Abelmoschus*

| | | |
|---|---|---|
| 1 | Epicalyx lobes deltoid, coherent, enclosing fruits | *A. angulosus* |
| 1* | Epicalyx lobes linear, lanceolate, ovate to narrowly ovate, free, not enclosing fruits | 2 |
| 2 | Flower white, turn pink; young fruits pilate-glandular hairy | *A. ficulneus* |
| 2* | Flower yellow; young fruits not pilate-glandular hairy | 3 |
| 3 | Epicalyx lobes lanceolate, ovate to narrowly ovate | 4 |
| 3* | Epicalyx lobes linear | 5 |
| 4 | Fruit widely ovate; epicalyx persistent | *A. palianus* |

| | | |
|---|---|---|
| 4* | Fruit lanceolate to lance-ovate; epicalyx caducous | 6 |
| 5 | Fruit widely elliptic, without rostrum; epicalyx longer than half length of fruits | *A. crinitus* |
| 5* | Fruit elliptic-lanceolate, with prominent rostrum; epicalyx less than half the length of fruits | 7 |
| 6 | Young fruit tomentulose; mature fruits dehisce laterally; seeds glabrous | *A. caillei* |
| 6* | Young fruit hirsute; mature fruits dehisce apically; seeds hairy | 8 |
| 7 | Young fruit tuberculate; seeds densely villous hairy | *A. tuberculatus* |
| 7* | Young fruit tomentulose, villous or soft strigulose; seeds warty or sparsely hairy around the hilum | 9 |
| 8 | Stem and petiole scabrous | *A. manihot* |
| 8* | Stem and petiole hispid | *A. tetraphyllus* |
| 9 | Plant with tuberous tap root; fruit villous hairy, dehisce apically; epicalyx persistent | *A. enbeepeegearense* |
| 9* | Plant without tuberous tap root; fruit tomentulose or softly strigulose, dehisce laterally; epicalyx caducous | 10 |
| 10 | Fruit lance-ovate, acute, soft strigulose; seeds reniform, laterally compressed, brown | *A. moschatus* |
| 10* | Fruit lanceolate, acuminate, tomentulose; seeds subglobose, greyish | *A. esculentus* |

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