

## SHORT COMMUNICATION

# Extended distribution of *Ficus costata* Aiton (Moraceae) in Western Ghats, India

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*Ficus costata* Aiton, hitherto known only from Western Ghats of Kerala and Karnataka, and Nicobar Islands is recorded from Goa thus extending its distributional range. A detailed description, field photographs, anatomy and SEM images of cystoliths and distribution are provided.

Submitted: January 14, 2019

Revised: November 13, 2019

Accepted: January 24, 2020

## Keywords:

Extended Distribution, Goa, *Ficus costata*, Cystoliths and SEM images

## 1 Introduction

*Ficus* L. (Moraceae) commonly known as 'Fig' constitutes one of the largest genera of angiosperms with almost 850 species distributed globally in the tropical and warm regions (Mabberley, 2017). Recently, Chaudhary *et al* (2012) recorded 89 species and 26 infraspecific taxa of *Ficus* from the political geography of India. *Ficus* is considered one of the most diversified genera due to its different type of lifeforms, i.e. free-standing tree, epiphytes, semi-epiphytes, rheophytes and lithophytes. They can be deciduous and evergreen trees, shrubs, herbs, climbers, stranglers and creepers (Berg & Corner 2005).

During the plant exploration in South Goa, the first author collected some interesting *Ficus* specimens. After critical examination of fresh, and herbarium specimens housed in BSI, Pune and perusal of literature (Sashidharan and Augustine, 1999; Sudhakar and Murthy, 2012), these interesting specimens were identified as *Ficus costata* Aiton, a monoecious species belonging to the subgenus *Urostigma*. This species was hitherto known only from Western Ghats of Kerala and Karnataka, and Nicobar Islands. Therefore, the present collection confirms its extended distribution to Goa and also forms a new distributional record to this state.

Field photographs, anatomy and SEM images of cystoliths are provided for the first time along with the detailed description.

## 2 Materials and Methods

The plant specimens were collected from adjacent to the Cotigao Wildlife Sanctuary, Goa on the way to Nadke and Kuske. Further, the samples were processed for the herbarium following the technique of Jain & Rao (1977) and deposited at Department of Botany, Goa University (GU). Photos of the fruiting twigs and figs were captured with Canon 700D camera. Microphotographs of the internal structures of the figs were taken using stereomicroscope (Leica WILD M3Z). Hand-sectioning of the leaves was carried out for the anatomical study and cystolith images were captured using Nikon Eclipse E200 microscope. To study the micromorphology of cystoliths, SEM images were taken using ZEISS scanning electron microscope.

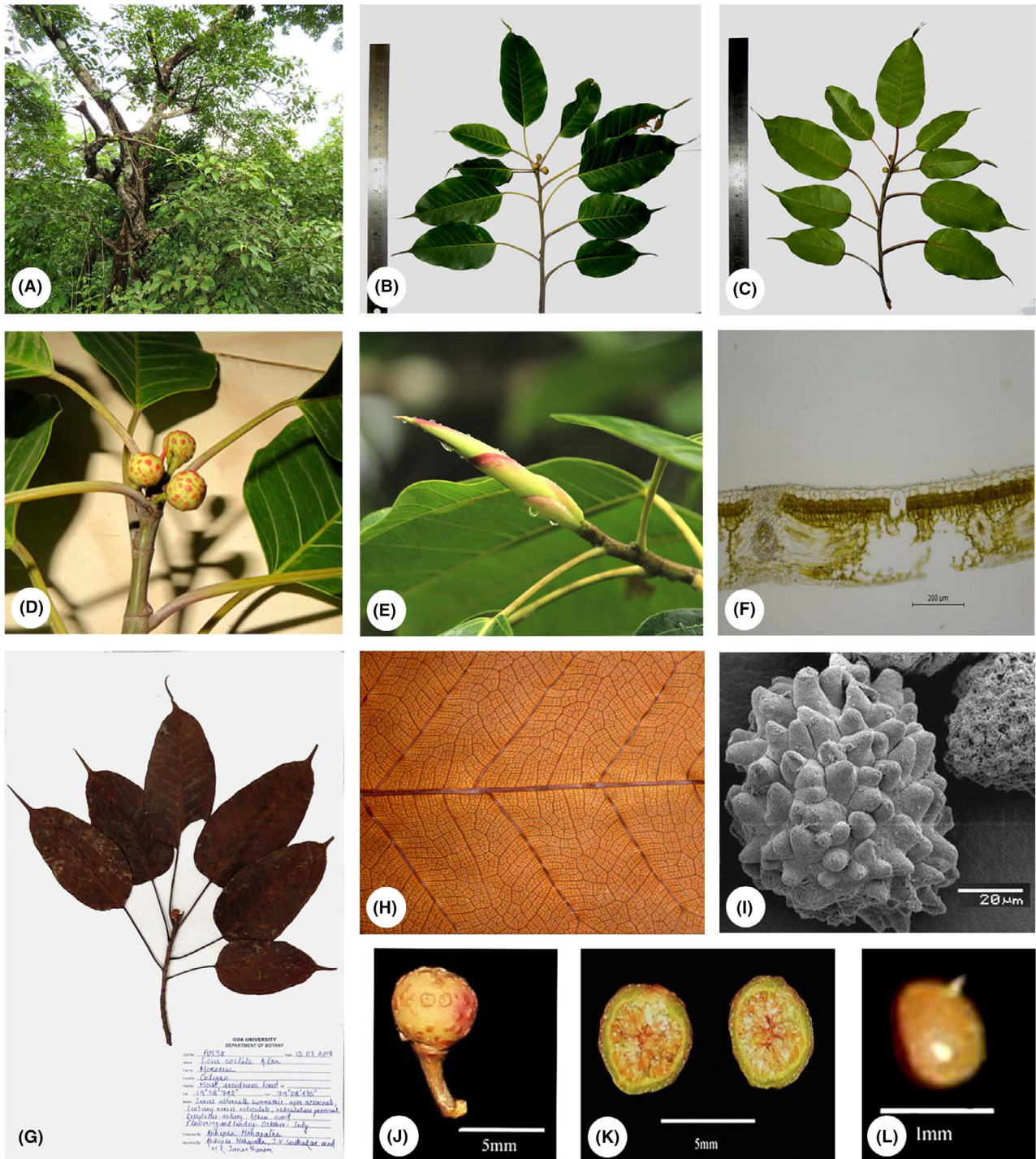
### Taxonomy and Distribution

*Ficus costata* Aiton Hort. Kew 3: 452. 1789; Corner, Gard. Bull. Singapore 17: 379. 1960; 21 (1): 11. 1965 & in Dassan. & Fosberg, Rev. Handb. Fl. Ceylon 3: 246. 1981; Sasidh. & Augustine, Rheedea 9 (1): 77. 1999; Kameswara Rao *et al.*, Red List of Thr. Pl.: 65. 2003; Sasidh., Biodiv. Doc. Kerala 6. Fl. Pl.: 439. 2004; Chaudhary *et al.*, Taiwan 57 (2): 211. 2012; Sudhakar & G.V.S. Murthy, Indian J. Forestry 35 (3): 346. 2012; T.S. Nayar *et al.*, Fl. Pl. of the Western Ghats: 654. 2014 (Figure 1).

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**Figure 1.** *F. costata* Aiton. (A) Habit; (B-D) Fruiting twigs; (E) Stipule; (F) Anatomy of leaf showing cystoliths; (G) Herbarium; (H) Leaf reticulation; (I) Cystolith morphology; (J) A fig; (K) Section of a fig; (L) Achene.

*Ficus mooniana* King in Ann. Roy. Bot. Gard. Calcutta 1: 57, t. 58 & 84 W. 1888.

Tree, up to 15 m tall, monoecious; branchlets slender, glabrous; bark grey. Leaves simple, alternate, stipulate,

petiolate, often crowded at apex; stipules terminal at apex near the leaf primordium, ovate to lanceolate, up to 3 cm long in younger shoots, puberulous, caducous; petiole slender, glabrous, 4-7 cm long, 1-2 mm thick,

channeled, unarticulated, dark brown when dry; lamina symmetric, oblong - elliptic or ovate - oblong, 6.5 - 17.5 × 4.5 - 7 cm, rounded to subcordate, rounded to cuneate or subtruncate at base, entire along margin, acuminate at apex, acumen 1.5 – 3 cm long, subcoriaceous, glabrous; lateral nerves 13 – 18 pairs, prominent and well distinguished reticulations formed by tertiary nerves, looped at margin, raised on both sides of lamina, minutely brown areolate beneath; cystoliths are present only on adaxial layer of the leaf lamina, 65-75 μm × 48-60 μm with stalk length up to 30 μm. Receptacles usually axillary or at nodes of the fallen leaves, found in a set of two or rarely three, pedunculate, globose to subglobose, 6 – 8 mm in diameter, glabrous, pale yellow in colour dotted with red spots, becomes maroon when ripe, wrinkled when dry; peduncle 4 – 7 mm long, slender, glabrous, brown when dry; basal bracts at apex of peduncle, 3, connate into a shallow cup, lobed at apex, broadly obtuse, 1.5 mm long, persistent, glabrous; ostiole 5 – 6 mm in diameter, flat or slightly raised (0.7 – 1 mm), 5 - 6 mm length, opened; ostiolar bracts 3, ovate – obtuse, c. 0.6 mm long; internal ostiolar bracts ovate – obtuse, 1 – 1.5 mm long, glabrous; interfloral bracts absent. Male flowers: scattered, sessile or subsessile, 1.3 – 1.5 mm long; tepals 3, united, linear – oblong, 1.3 – 1.4 mm long, reddish; stamen 1, c. 0.5 mm long; filament very short, c. 0.2 mm long, anther oblong, c. 0.5 mm long, submucronate. Female flowers: sessile, c. 2 mm long; tepals 3, united, cupular, c. 1 mm long, red; ovary sessile, c. 0.9 mm long, reddish on stylar side; style lateral, 1.5 mm long; stigma infundibuliform. Gall flowers: sessile or shortly pedicellate, 1 – 1.5 mm long, pedicel c. 0.5 mm long; tepals 3, united, cupular, 1 – 1.2 mm long, reddish; ovary ovoid, 0.8 – 1 mm long, reddish on stylar side, hyaline; style lateral, c. 0.8 mm long; stigma infundibular in shape. Achene ovoid, 0.7 – 1 mm long, surface mucilaginous, tuberculate with polygonal blocks.

*Flowering and Fruiting:* October–July.

*Habitat:* In semi evergreen and moist deciduous forests.

*Distribution:* INDIA: (Kerala, Karnataka and now in Goa, and Nicobar Islands) and SRILANKA.

*Specimen examined:* Butpal forest, 23.4.1963, K.C. Kandia 88231 (BSI); Cotigao, adjacent to WLS, 13.07.2018, Abhipsa Mohapatra AM38 (GU).

*Note:* Kameswara Rao *et al.* (2003) in 'Red List of Threatened Vascular Plant Species in India' listed *Ficus costata* as Indeterminate (I). During plant explorations from 2010 to 2015 for *Ficus* species, second author has

located this species from few localities of Karnataka (North Kanara and Udipi-Mookambika Wild Life Sanctuary) and Kerala (Kannur, Pathanamthitta and Thrissur), also studied some earlier collections deposited in various herbaria (BLAT, BSI, CAL and MH). No authentic specimen from Nicobar Islands found in PBL, Port Blair herbarium other than earlier literature citations (Chaudhary *et al.*, 2012 & Tiwari *et al.*, 2014) of its distribution in Andaman & Nicobar Islands. Now, first author has located only a single tree of this species in Cotigao, Goa. Earlier collection from Goa at BSI has been misidentified as *Ficus amottiana* Miq.. Hence, to determine the present IUCN and conservation status of this species further extensive and intensive explorations are needed to its distributional localities.

*The authors are thankful to the Director, NCAOR for providing SEM facilities and BSI for permission to consult herbarium.*

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