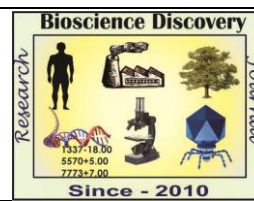


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**Research Article**



## Addition to the flora of Raigad District

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### Abstract

During study of Island flora along the Konkan Coast author came across few species which were not reported earlier from Raigad District of Maharashtra. These Islands are essentially known for presence of the forts of the earlier times which were built after 15<sup>th</sup> century. Regular field visits were made to study the vegetation of these areas (Year 2012 to 2016).

### INTRODUCTION

Raigad is a district in the state of Maharashtra, India. It lies between 18.39 North latitude and 72.55 East longitude. District is named after Raigad fort, which was the former capital of Maratha leader Shivaji Maharaj. Raigad district has 240 km of Arabian Sea coast line to its west. This coast line is known for presence of natural harbors and forts built on the islands. These islands have considerably small area and possess natural growing vegetation.

There are many small islands come under Raigad District which were unexplored, Plate no. 2 indicates location of those islands in the District. Islands like Elephanta, Khanderi, Under, Padamdurg and Murud-Janjira floristic study carried out, during botanical exploration come across few species which are reporting first time in Raigad District. Islands of Konkan have been explored by Dr.Arvind Untawale *et al.* in 1973 under topic 'Continental Shelf Islands of the Konkan coast' (Panikkar *et al.*, 1973) in this study the floristic study of Islands not paid much attention by the scientist. Dr. C.S. Latto explored Elephanta Island for 'ecological observation on vegetation of Elephanta Island' in 1987 (Latto, 1987) and reported 356 species of flowering plants from this region. In year 1993 documentation on flora of

Raigad done by Mr. M.J.Kothari and S. Moorthy and they reported 833 species of Dicot and 303 species of Monocot (Kothari and Moorthy, 1993) Later in 2003 the Phansad wild Life Sanctuary in Raigad district explored by Dr.Chandrashekhar Marathe who reported 737 species from Sanctuary and added 74 species 'new records' to the Flora of Raigad district (Marathe, 2003).

### MATERIALS AND METHODS

Regular field visit made on every island between periods of 2010 to 2016. List of plants prepared and some uncommon specimens were collected for further identification and authentication. During visit plant characters were noted and photographs were clicked. Herbarium sheets were prepared for the reference. The identification and authentication has been done with pertinent literatures, research papers; reports and various floras viz. Flora of Raigad District (Kothari and Moorthy, 1993), Flora of Maharashtra state vol. 2 (Singh *et al.*, 2001), Flora of Maharashtra state vol. 3 (Sharma *et al.*, 1996), Flora of Maharashtra vol.2 (Almeida 1998), Flora of Maharashtra vol.3 (Almeida 2001), Flora of Maharashtra vol.4 (Almeida 2003),

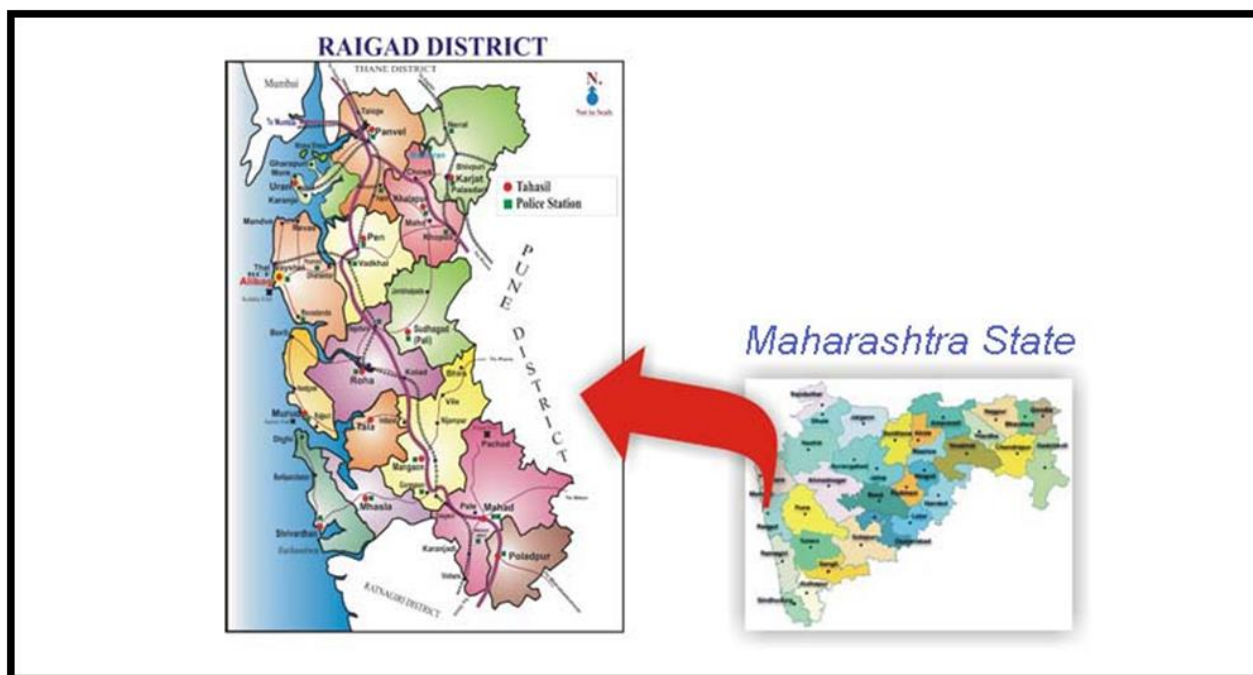


Plate no.1: Location of Raigad District

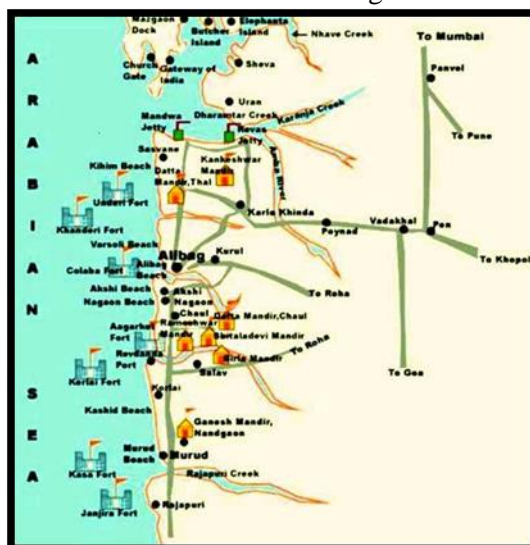


Plate no.2: Location of Islands

Flora of Maharashtra vol.5 (Almeida 2009), Grasses of Maharashtra (Potdar and Yadav, 2012)<sup>(5,6,7,8,9,10)</sup>, Which confirmed that these plants have not been collected and reported earlier from Raigad District. The voucher specimen has been deposited in Blatter Herbarium, St.Xavier's college, Fort, Mumbai, Maharashtra.

## RESULT AND DISCUSSION

### Fabaceae

*Indigofera santapau* Sanjappa in Bull. Bot. Surv. Ind. 25: 202, 1983.

Annual herb, 15-35 cm tall, branches few at the base. Leaves 3-6 cm long, pinnately trifoliolate, alternate: petiole 1-2 cm long, adpressed grey pubescent; leaflets 2.5-4 by 1.2-1.8 cm, obovate or obovate-oblong, cuneate the base, rounded and mucronate at apex, thinly adpressed pubescent on both surfaces, small gland-dotted (gland light brown initially turning dark brown), yellowish-green above, pale beneath;

stipules 2.5-3 mm long, adpressed pubescent; petiolules 2 mm long, pubescent. Racemes axillary, sessile, 6-12 flowered. Flowers 5 mm long, salmon red; pedicels 1-1.5 mm long, pubescent and glandular; bracts 1 mm long, pubescent and glandular without; calyx 2 mm long, adpressed pubescent and glandular without, lobes 5, 1.5 mm long, tube short, standard 4 mm long, mucronate, glandular, and strigulose without, persistent; wings 2.5-3 mm long, glabrous; keel 4 mm long, glandular and strigose without, spurred on sides; stamens diadelphous, filaments 3-3.5 mm long, persistent; ovary 1.5 mm long, oblong, puberulous and glandular at the tip; style 1 mm long, glabrous; stigma capitate. Pods 1-2 by 0.25 cm, subcylindric, straight, reflexed, 3-4 seeded, distinctly tortulose, shortly apiculate, densely spreading grey tomentose, glandular; sutures thin, obscurely winged on sides, valves twist on dehiscence, endocarp smooth; seeds 1.5 by 1 mm oblong, rounded at both ends, faintly angular on sides, smooth, shining, dark-brown.

**Flowering and fruiting:** August-October.

**GPS Reading:** 18°42'13.81"N, 72°48'48.41"E (Elevation 48 Meter)

**Distribution:** Khanderi Island.

#### Gentianaceae

*Enicostema axillare* (Poir. ex.Lam.) Raynal in Adansonia, 9: 75, 1969; P. Lakshmi. & B. D. Sharma, Fl. Nasik Dist. 308, 1991.

*Enicostema verticillare*(Retz.) Baill., Hist. Pl. 10: 131, 1891; Almeida, Fl. Maharashtra 3 (A): 275, 2001.

*Gentiana verticillata* Retz., Obs. 2: 15, 1781.

*Enicostema littorale* auct. (nonBl., 1826); Hook.f., Fl. Brit. Ind. 4: 101, 1883; Cooke, Fl. Pres. Bombay 2: 225, 1958 (Repr.ed.).

*Enicostemahyssopifolium*(Willd.) Verd. in Boyhalia, 7: 462, 1961.

Herbs, erect, perennial, 13 – 15 cm high. Leaves sessile, 2 – 4 × 0.1- 0.5 cm, linear, linear-oblong, elliptic-oblong or lanceolate, strongly 3-nerved. Flowers 0.5 cm long, white, in axillary clusters all along the stem. Flowers 0.4 long, ellipsoid, apiculate with remains of the style.

**Flowering and fruiting:** August-April

**GPS Reading:** 18°19'17.80"N, 72°55'56.59"E (Elevation 0 Meter)

**Distribution:** Padamdurg, Murud.

#### Linderniaceae

*Lindernia tenuifolia* (Colsm.) Alstonin Trimen Fl. Ceyl. 6: Suppl. 214, 1931; Philcox in Kew Bull. 22: 62, 1968.

*Gratiola tenuifolia* Colsm., Prodr Desc. Grat. 8, 1793, Vahl. Enum. 1: 95, 1790.

*Bonnaya tenuifolia* Spreng., Syst. Veg. 1: 42, 1825; Hook. f., Fl. Brit. Ind. 4: 286, 1884; Voight, Hort. Suburb. Cal. 504, 1884.

*Iysanthes tenuifolia* (Colsm.) Urban, Ber. Deutsch. Bot. Ges. 2: 435, 1884.

*Vandelia tenuifolia* (Colsm.) Haines, Bot. Bihar & Orissa 634, 1922.

Spreading herb about 7-8 cm tall. Leaves linear, 1.5 cm long and 1.5 mm broad, succulent, decurrent at base, entire, acute, flower axillary, leaf opposed. Calyx 5 lobed, free, 1.5 mm long, lanceolate, acute, Corolla 2 mm across, pinkish-white; tube 2 mm long; lobes 5, entire, 2.5 mm, obtuse. Stamen 2, included. Anthers unequal; staminode minute, 0.5 mm long, acute. Capsule linear, 7 mm long.

**Flowering and fruiting:** August-November

**GPS Reading:** 18°57'45.75"N, 72°56'20.62"E(Elevation 6 Meter)

**Distribution:** Elephanta Island.

#### Acanthaceae

*Blepharis maderaspatensis* (Linn.) Roth.Nov. Pl. Sp. 302, 1821; Bremek. In Verh. Nederl. Akad. Wet. 45.(2): 10, 1948; Santapau, Mem. Univ. Bombay 2: 15, 1951 & in JBNHS 51: 350, 1953; Malhotra & Moorthy, BOBSI 13: 309, 1971; Kamble & Pradhan, Fl. Marathwada 664, 1998; Yadav & Sardesai, Fl. Kolhapur Dist. 354, 2002.

*Acanthus maderraspatis* Linn. Sp. Pl. 639, 1753. *Blepharis ciliaris* Burm.f., Fl. Ind. T. 42, f. 42, f. 2, 1768

Prostrate herbs. Leaves ternate, unequal, 3-5 x 2 cm, obovate, apex apiculate, puberulus, margins distantly serrate; petiole to 3 cm. Flowers axillary; bracts 4 pairs, obovate, margins dentate with stiff elongated hairs, bracteoles 1.5 cm, spatulate; outer calyx lobes 1.3 cm and 1.8 cm, oblong, 2 and 3 veined, inner 8 mm; corolla tube urceolate, 5 mm, lower lip reduced, upper lip 3 lobed, 18 x 12 mm, white with pink nerves; filaments 4 and 5 mm, anthers 1-celled, apiculate, bearded; ovary 2.5 mm, oblong, style 1 cm, with a basal ring.

**Flowering and fruiting:** October-February

**GPS Reading:** 18°58'8.13"N, 72°56'5.83"E(Elevation 9.5 Meter)

**Distribution:** Elephanta Island.

**Araceae**

*Wolffia arrhiza* (L.) Horkel ex Wimm., Fl. Soehles ed. 3, 140, 1857; Woodrow in JBNHS 13: 428, 1901; Hk. f. Fl. Brit. Ind. 6: L 557, 1893; Birdwood, Cat. Pl. Matheran & Mahabaleshwar 29, 1897; Bole & Almeida, JBNHS 83: 598, 1986; Hartog Plas in Blumea 18: 3367, 1970; Naik, Fl. Osmanabad 348, 1979; Yadav & Sardesai, Fl. Kolhapur Distr. 521, 2002.

*Lemna arrhiza* Linn. Linn., Mant. Alter. 2: 294, 1771; Cyme, Eng. Bot. ed. 3, 9: 24, t. 1396, 1869.

*Wolffia michellii* Schleid., Beitr. Bot. 233, 1844; Cooke, Fl. Pres. Bombay 2: 832, 1907.

Rootless floating herb. Frond sub-globose, resembling grains of sand, proliferous. Flowering arising from upper surface of the frond. Spathes absent. Anthers sessile, 1 celled. Styles short, stigma depressed. Ovule solitary, erect.

**Flowering and fruiting:** October-May

**GPS Reading:** 18°17'57.93"N, 72°57'55.61"E (Elevation 7.6 Meter)

**Distribution:** Murud-Janjira Island.

**Poaceae**

*Dactyloctenium austral* Steud., Syn. Pl. Glume. 1: 212. 1854; Bor, Grass. Burma Ceylon India Pakistan 489. 1960; Laxmi. in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 447. 1996; S. Moulik, Grass.

Bamb. India 2: 587. 1997.

Perennials, stoloniferous. Back of the rachis keeled or grooved on each side of keel.

**Flowering and fruiting:** August-October

**GPS Reading:** 18°58'15.24"N, 72°56'22.68"E (Elevation 5.8 Meter)

**Distribution:** Elephanta Island.

*Melanocentris jacquemontii* Jaub. & Spach, Illustr. Pl. Orient. 4: 36, t. 325. 1851; Bor, Grass. Burma Ceylon India Pakistan 473. 1960; Laxmi. in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 447. 1996; S. Moulik, Grass. Bamb. India 2: 587. 1997; Naik, Fl. Marathwada 2: 1060. 1998. *Gracilea royleana* var. *plumose* Hook. f., Fl. Brit. India 7: 284. 1896; Cooke, Fl. Pres. Bombay 3: 553. 1958 (Repr. Ed.); Blatt. & McCann, Bombay Grass. 249. 1935.

5-15 cm tall, densely tufted, slender annuals. Culms terete, 6-30 cm tall, erect or

decumbent at base, very slender, branched; nodes glabrous. Leave 2.5-5 cm long, narrowly linear-lanceolate flat sheaths terete, 0.75-1.5 cm long, glabrous, pilose or hispid; ligule a fringe of hairs; blades flat or convolute, narrowly linear to setaceous, 2-7 x 0.1-0.2 cm, glabrous or margins beset with few bristles towards the base, finely acuminate at apex. Spike 3.5-7 cm long on a glabrous, long exserted, flexuous and often recurved peduncle; rachis trigonous, smooth; cluster of spikelets 0.4-0.6 cm long (including awns), greenish-white, at times tinged violet, at length silvery-white; spikelets 3-5 in a cluster, sessile, non-articulated at the base, with 2 perfect florets; rhachilla prolonged beyond the uppermost floret and bearing 1 or 2 abortive lemmas; lower glumecoriaceous, narrowly oblong, 0.75-0.85 cm long (including its arista), 3-nerved, ciliate with long hairs on margins, tapering into a scabrid arista; upper glume similar in texture, little broader than the ; lower glume, 0.7-0.9 cm long; margin hyaline. Lemma thinly membranous, cymbiform, 0.55-0.6 cm long (including cusps), 3-nerved; margins ciliate; apex 3-cuspidate, the middle cusp the longest. Palea similar in texture, narrowly oblong, 2-keeled; margins involute; apex 2-cuspidate; lodicules 2, small. Stamens 3. Grain oblong, 0.17-0.2 cm long. Abortive lemma obovate-cuneate, truncate.

**Flowering and fruiting:** July-December

**GPS Reading:** 18°58'13.57"N, 72°56'10.64"E (Elevation 11 Meter)

**Distribution:** Elephanta Island.

**Conclusion:**

We have gone through all literature related to Raigad flora and Checked Herbarium for Authentication of the species. We found that these species were not reported earlier in the floristic studies of the Raigad district. These species are new addition to the flora of Raigad district of Maharashtra state.

**Acknowledgment:**

We would like to express gratitude to Blatter Herbarium staff for kind help in Species authentication with help of Literature and herbarium.



Fig no. 1. *Blepharis maderaspatensis* (Linn.) Roth., 2. *Lindernia tenuifolia* (Colsm.) Alstonin, 3. *Melanocentris jacquemontii* Jaub. & Spach, 4. *Wolffia arrhiza*(L.) Horkel ex Wimm., 5. *Enicostema axillare* (Poir. ex.Lam.) Raynal, 6. *Indigofera santapau* Sanjappa, 7. *Dactyloctenium australe* Steud.

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