

## Four New Flowering Plant Records from Koraput District of Odisha, India

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**Abstract:** Koraput is one of the districts in Odisha endowed with enormous diversity of cryptogamic and phanerogamic flora. The present paper deals with the addition of 4 new species and one new variety of angiospermic taxa to the flora of this district as well as for state of Odisha. These taxa are *Rothea serrata* (L.) Steane & Mabb. var. *amplexifolium* (Lamiaceae), *Exacum trinervium* (L.) Druce ssp. *macranthum* (Gentianaceae), *Cyperus fuscus* L. (Cyperaceae), *Utricularia graminifolia* Vahl (Lentibulariaceae). The study provides a detailed taxonomic description, photographs and relevant information based on fresh collections of specimen.

**Key Words:** Phanerogamic, New records, Koraput, Odisha.

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### I. Introduction

The study of vegetation wealth of an area gives us correct understanding of bio-resources for the welfare of human beings. Koraput a southern district of Odisha lies between 18° 82' North latitude and 82° 72' East longitudes. It has an average elevation of 870 m (2,850 ft) and covers an area about 8,807 sq. km. The study area has a highest temperature of about 28.28 °C and lowest temperature of about 18.01 °C with an average rainfall of about 1604 mm. Some major rivers of Odisha passes through this district are Machhakunda, Vamsadhara and Kolab. It also contains the largest mountain of Odisha, called Deomali along with Chandragiri mountain. Deomali peak is 1672 m height above the sea level and is the highest point in Eastern Ghats. The forest of Koraput district is of the northern tropical semi-evergreen type. The vegetation varies with the changes in altitude and rainfall. The district has total cultivable land of 301,000 hectares (740,000 acres). The collected species like *Rothea serrata* (L.) Steane & Mabb. var. *amplexifolium* (Lamiaceae), *Exacum trinervium* (L.) Druce ssp. *macranthum* (Gentianaceae), *Cyperus fuscus* L. (Cyperaceae) from Koraput & Deomali, *Utricularia graminifolia* Vahl (Lentibulariaceae) are rare to Odisha and collected from only few places like Koraput, Tayaput, Panchpatmalli and Deomali. The study area though botanically rich in biodiversity have not been explored extensively except a few sporadic reports on floristic of Panda et al., 2014; Dash, 1994; Dash and Mishra, 1998; Rout et al., 2012; Satapathy et al., 2016).

### II. Material and Methods

Field visits were undertaken to different localities throughout the year (various seasons) and collected the digital photos of plants in their natural habitat and plant specimens for observation, identification and data preparation in the laboratory during the study period. During botanical exploration of Koraput district in Odisha four interesting species *Rothea serrata* (L.) Steane & Mabb., var. *amplexifolium* (Lamiaceae) from hill bases of Koraput & Tayaput, *Exacum trinervium* (L.) Druce ssp. *macranthum* (Gentianaceae) from marshy places of Koraput & Panchpatmalli, *Cyperus fuscus* L. (Cyperaceae) from cultivated lands of Koraput & Deomali, *Utricularia graminifolia* Vahl (Lentibulariaceae) from water bodies of Koraput & Panchpatmalli were collected. The species were identified with the help of pertinent literature (Zhenyu, 2008, Die et.al. 2010) and the taxa were confirmed by consulting the BSI, Calcutta, herbarium as well. The voucher specimens have been deposited in the herbarium of Post Graduate Department of Botany, Utkal University, Bhubaneswar, Odisha. It was found that the plants which are reported here did not match with any species recorded in the earlier flora of the region

(The Botany of Bihar and Orissa: Haines, 1921- 1925; Supplement to the Botany of Bihar and Orissa: Mooney, 1950; The Flora of Orissa: Saxena and Bramham, 1994 -1996).

### III. Results and Discussion

**Rothea serrata** (L.) Steane & Mabb., Novon 8: 206. 1998. var. **amplexifolium**  
*Clerodendrum serratum* (L.) Moon, Cat. Pl. Ceylon 46. 1824; Saxena & Brahman, The Fl. of Orissa 3:1407: 1995 & Haines, Bot. Bihar & Orissa 2: 722. 1922. (Fig.1, 2 & 3)

**Vernacular name:** Shyama Brajamalli (O), Blue fountain bush, Blue-flowered glory tree, Beetle killer (E)

**Family-** Lamiaceae

**Habit:** Perennial, suckering evergreen shrub with a somewhat open habit which grows rapidly to 1.5-2 m tall.

**Habitat:** terrestrial mesophyte. **Stem:** woody, herbaceous towards upper portion, lower portion scabrous and upper glabrous, quadrangular. **Leaves:** simple, sessile or sub-sessile, amplexiform, base of leaf blade clasping, entire, opposite, acute-acuminate, slightly scaberulous or glabrous, elliptic to narrow-obovate, bright green, 7.5-10 cm long and 5-10 cm wide, serrate margins and wedge-shaped bases; crushed leaves emit a pungent odour.

**Inflorescence:** appear at the end of long arching branches, panicles, 10-25 cm long composed of individual flowers about 2.5 cm long. **Flower:** bracteate, bracts sessile, ovate to broadly ovate, 0.5-1.8 cm, pubescent, conspicuous, five-petaled, complete, hermaphrodite, zygomorphic, pentamerous, hypogynous, curved, outward-arching, blue-white to milky white; **Calyx:** campanulate, pinkish-slight reddish, 1-2 cm long in flower, acuminate, accrescent, 2-3.7 cm in fruit, 5 lobed, persistent, valvate; **Corolla:** tube 5-7 mm long, purportedly resemble the shape of a butterfly in flight, variable flower colour ranges from blue to violet blue to white. Each flower has four caeruleous, light blue side petals (resembling butterfly wings), a fifth dark blue lower petal (resembling butterfly head, thorax and abdomen), imbricate; **Androecium:** stamens 4, long, milky white to bluish-purple (resembling butterfly antennae) arch over the petals and serve as a landing platform for insect pollinators, didynamous, epipetalous, far exserted, 3.5-6 cm long filaments filiform, bases cylindrical, ditheous, oblong, deep grayish to blackish; **Gynoecium:** bicarpellary, syncarpous, ovary superior, glabrous, imperfectly 4 celled, 1ovuled, ovules lateral, amphitropous, axile placentation, style filiform, long exserted, stigma shortly bifid. **Fruit:** drupe with 4, 1-celled pyrenes, green when young, becoming black, subglobose, succulent. **Seeds:** pyriform, fleshy and exalbuminous.

**Flowering:** June-October and **Fruiting:** November- December

**Distribution:** Native to eastern India also found in Sri Lanka and Malaysia.

**Specimen examined:** Koraput, Tayaput 27. 6. 2015, GSJP & RM 4356 (Herbarium, Utkal University, Vani Vihar, Bhubaneswar).

**GPS Reading:** N 18° 53' 115" & E 83° 03' 905"

**Associated species:** Plant is found along with *Lannea coromandelica*, *Memecylon umbellatum*, *Gardenia latifolia* and other herbs.

**N.B.** (1).The species which was recorded in the 'The Flora of Orissa' as well as in 'The Botany of Bihar and Orissa' is *Clerodendrum serratum* (L.) Moon var. *serratum* where the base of the leaf blade oblong-ovate, oblong, base is decurrent to cuneate, margin serrulate, inflorescence conical 12-19 cm.

(2). Earlier this species was included in the family Verbenaceae but due to the polyphyletic nature of this genus, it was again thoroughly studied and found that this has a close relation with Lamiaceae than Verbenaceae. Previously this genus was treated under *Clerodendrum* but later on separately treated under *Rothea* (Steane and Mabblerly, 1998)

**Key to the Genera:**

(a) Flower bud markedly asymmetrical, corolla expanding abruptly on lower side only; anterior corolla lobe frequently much larger than the other four; anthers usually basifixed (occasionally approaching versatile), stigma lobes frequently unequal..... *Rothea*

(b) Flower bud symmetrical or, if asymmetrical, usually expanding abruptly on upper side due to resupination: anterior corolla lobe only slightly (if, at all) larger than the others, anthers versatile; stigma lobes equal .....*Clerodendrum*

**Exacum trinervium** (L.) Druce Rep. Bot. Exch. Club Soc. Brit. Isles 3: 418. 1913. ssp. **macranthum** (Arnott) L.H. Cramer, *Exacum macranthum* Arnot ex Griesb. Gen. et Sp. Gent. Adj. Obs. Quib. Phytogeog. 111. 1838. (Fig. 4).

**Vernacular names:** Shyamalendu (O); Big Persian violet (E). **Family-** Gentianaceae

**Habit:** Erect herb. **Habitat:** marshy hydrophytes. **Stem:** erect, herbaceous, 25-60 cm, solid, 4-angled, dichotomously branched, glabrous, appears membranous from large distance, not deep green, branched in upper portion. **Leaves:** opposite, entire, semi elliptic-oval, oblong-lanceolate like that of petals of *Nelumbo*, acute-acuminate, upper surface glabrous, velvety lower surface appears to be lowly scabridulous, connate at the base,

prominently 3 nerved and 4<sup>th</sup> one is inconspicuous, 4-15 cm long x 1-5 cm wide, two leaf base clasping with each other, sessile, exstipulate. **Inflorescence:** paniculate cyme. **Flower:** terminal, petals 5, actinomorphic, hermaphrodite, hypogynous, bracteates, pentamerous, deep blue. **Calyx:** gamosepalous, deeply 4-5 lobed, lobes keeled, winged or flat on the back, lobes long campanulate, 5-10 mm long, acuminate, persistent, imbricate, deep green. **Corolla:** large, rotate, tube short, globose, deep blue lobes lanceolate, 1-1.5 cm long, lobe 4, overlapping to the right in bud, twisted. **Androecium:** stamens 4, acute, inserted on the throat of the corolla tube just below sinus between corolla lobes; filaments short, slender, 1.5-2 mm; anthers cylindrical, 5.7-6.9 mm, 2-locular, oblong, orangish-yellow, dehiscing by terminal pores, dorsifixed. **Gynoeceum:** bicarpellary, syncarpous; ovary superior, 1 celled, ovules many per cell on large fleshy placentae, adnate to the septum, parietal; style long, linear, 1-1.2 cm; stigma small, 2 lobed, sub capitates. **Fruit:** capsules globose, septicidally 2 valved. **Seeds:** many, minute, subcupoid, testa granular 0.7-1.5 cm long, smooth, shining, tipped with remains of style, yellowish brown

**Flowering and Fruiting:** August - November

**Distribution:** Native to Srilanka, also found in India, Pakistan and probably other Asian country.

**Specimen examined:** Koraput, Panchpatmalli 27. 6. 2015, GSJP & RM 4754 (Herbarium, Utkal University, Vani Vihar, Bhubaneswar)

**GPS Reading:** N 18° 56' 118" & E 83° 05' 912"

**Associated species:** Plant is found along with *Cynodon dactylon*, *Gynura lycopersicifolia*, *Centella asiatica*, *Richardia scabra* and *Oxalis corniculata* and others.

**Cyperus fuscus** L. Sp. Pl. 1: 46. 1753. (Fig.5)

**Vernacular name:** Pishangi Mutha (O), Brown galingale/ Brown flat sedge (E). **Family-** Cyperaceae

**Habit:** Annual, grass like herbs. **Habitat:** marshy hydrophytes. **Stem:** often called culms, culms tufted, 6-30 cm tall, slender, compressed triquetrous, soft, smooth, basally few leaved. **Leaves:** shorter than to sometimes sub equaling culm; three ranked with a close sheath, leaf blade 2-4 mm wide, flat, sometimes folded, margin not scabrous. Involucral bracts 2 or 3, leaf like, longer than inflorescence. **Inflorescence:** a compound or sometimes simple anthela; rays 3-5, most up to 3 cm, apex of each ray or raylet with 5 to more than 10 densely arranged spikelets; spikelets very narrowly ovoid to linear, 3-10 × ca. 1.5 mm, slightly compressed, 8-24-flowered; rachilla wingless. **Flower:** develop singly in the axis of glumes; glumes purplish brown, brownish, brown, or pale yellowish on both surfaces but middle yellowish green; hermaphrodite, trimerous, inconspicuous, slightly laxly imbricate, broadly ovate, ca. 1 mm, obscurely 3-veined, apex obtuse. **Perianth:** absent. **Androecium:** stamens 2, anthers ellipsoid, basifixed, ditheous, introrse, more or less reniform, yellowish to pale, filaments free, connective not prominent beyond anthers. **Gynoeceum:** bicarpellary, syncarpous, ovary superior, unilocular with 1 anatropous ovule, basal placentation; style short; stigmas 3 punctulate. **Fruits:** a triangular nutlet, ellipsoid, ca. 2/3 as long as subtending glume, 3-sided, base barely stipitate to cuneate, apex apiculate. **Seed:** one per fruit embedded in mealy endosperm, seed coat free from the pericarp.

**Flowering and fruiting :** June - October

**Distribution:** This plant is native to Europe, Asia and North Africa from England, Portugal and Morocco east to China and Thailand.

**Specimen examined:** Koraput, Deomali 27. 6. 2015, GSJP & RM 3669 (Herbarium Utkal University, Vani Vihar, Bhubaneswar)

**GPS Reading:** N 18° 58' 118" & E 83° 06' 914"

**Associated species:** Plant is found along with *Hoppea dichotoma*, *Blumeopsis flava*, *Fimbristylis miliacea*, *Allopterosis cimicina* etc.

**Utricularia graminifolia** Vahl, Enum. Pl. 1: 195. 1804. (Fig.6)

**Vernacular name:** Trunaparnnee, Sweutika (O) **Family-** Lentibulariaceae

**Habit:** perennials or perhaps sometimes annuals, terrestrial herb. **Habitat:** marshy hydrophytes, rhizoids and stolons with capillary, branched, traps on rhizoids, stolons 2-8 cm tall. **Leaves:** simple, alternate, exstipulate, stalked, globose, 0.5-1.3 mm; appendages 2, dorsal, subulate, numerous, from stolon nodes, glabrous; leaf blade linear to narrowly obovate, 0.4-2 cm × 0.8-3 mm, membranous, veins 3, base attenuate onto petiole, margin entire, apex rounded to subacute. **Inflorescence:** raceme, 1-6 flowered, glabrous, erect, 2.5-30 cm. **Flower:** bracteates, scale-like, basisolite (with base extending below point of insertion), basifixed, ovate, 2-2.5 mm, apex acuminate, peduncle terete, 0.4-1 mm thick, scales few to many, similar to bracts; pedicel ascending, 3-13 mm, filiform, narrowly winged; bracteoles basifixed, subulate, slightly shorter than bracts, zygomorphic, hermaphrodite, mauve to violet, hypogynous. **Calyx:** 2-5-lobed, lobes ovate, persistent, 3.5-6 mm; lower lobe slightly smaller than upper lobe, apex shortly 2-dentate; upper lobe apex acute to acuminate, imbricate. **Corolla:**

mauve to violet, gamopetalous, 0.7-1.3 cm; lower lip sub-orbicular, base with a conspicuous swelling, apex rounded; spur subulate, cylindric, conic,  $\pm$  as long as lower corolla lip and widely diverging from it, straight or slightly curved; palate with a raised ciliate margin; upper lip oblong, apex rounded. **Androecium:** stamens 2, inserted at base of corolla tube, included; filaments linear, short, straight, ca. 1.5 mm; anthers dorsifixed, ellipsoid; thecae 2, divaricate, sometimes distinct and  $\pm$  separated by a connective; staminodes absent. **Gynoecium:** bicarpellary, syncarpous, ovary superior, unilocular; placenta basal; ovules 2 to numerous, anatropous, somewhat sunken into placenta; style 1, stigma 2-lipped, lower and upper lips semicircular, upper lip reduced or obsolete, ovary ovoid. **Fruit:** capsule ellipsoid, 2-3 mm, slightly dorsiventrally compressed, dehiscent by a longitudinal ventral slit. **Seed:** ovoid to ellipsoid, 0.3-0.4 mm, minute, without endosperm; seed coat with prominent elongate reticulations, variously appendaged.

**Flowering:** May-December, **Fruiting:** June-January.

**Distribution:** It is native to Asia, where it can be found in Burma, China, India, Sri Lanka, and Thailand.

**Specimen examined:** Koraput, Panchpatmali 27. 6. 2015, RM 3445 (Herbarium Utkal University, Vani Vihar, Bhubaneswar).

**GPS Reading:** N 18° 57' 119" & E 83° 09' 924"

**Associated species:** Plant is found along with *Centella asiatica*, *Hypericum japonicum*, *Ceratophyllum demersum*, *Arundinella setosa*, *Arundinella holocoides* etc. and many other herbs.

#### IV. Conclusion

The authors have gone through published literature (Behera and Misra, 2007, Biswal et al., 2013, Das and Misra 2000, Dash and Mishra.1998, Kalidas and Murugan, 2016, Kar, et al., 2017, Mishra et al., 2009, Murugan et al., 2015, Panda et al., 2014, Pattanaik et al., 2006, Rath, 2011, Reddy and Pattanaik, 2011, Rout et al., 2012, Saravanan, et al., 2014) and visited the Utkal University Herbarium unit and the Herbarium of Regional Plant Resource Centre, Bhubaneswar, to find out the occurrence, distribution and habitat of these species. It was found that these species were not reported in any of the Odisha flora. This clearly indicates that, these species are rare to the Flora of Odisha. These species are new record to the flora of Koraput district of Odisha state. The voucher specimens are deposited in the herbarium of Department of Botany, Utkal University, Bhubaneswar, Odisha. On close examination of herbarium specimens and detailed scrutiny of literature published till date on these taxa, it can be claimed that these are new records for the Koraput district of Odisha.

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Fig.1. Base of the *Rothea* leaf clasp each other



Fig.2. Inflorescence axis



Fig.3. Individual Flower of *Rothea*



Fig.4. Whole plant of *Exacum trinervium* ssp. *macranthum*



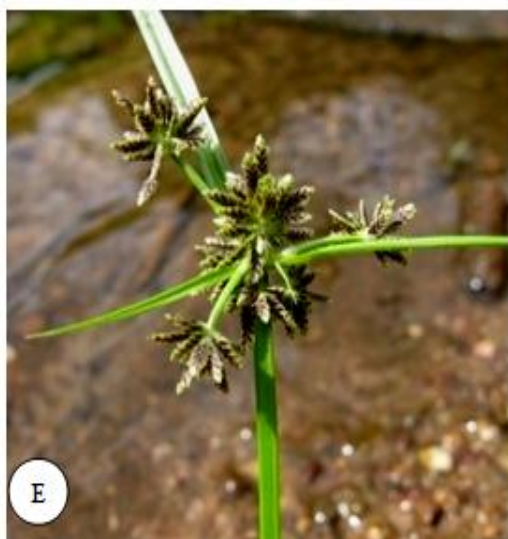


Fig 5. Whole plant of *Cyperus fuscus*



Fig 6. Whole plant of *Utricularia graminifolia*

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