ANGIOSPERM DIVERSITY OF SANDY COAST OF BALASORE DISTRICT, ODISHA, INDIA

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ABSTRACT

The paper deals with the angiosperm diversity of sandy coast of Balasore district, Odisha. The angiospermous flora consists of 352 species under 258 genera belonging to 84 families. Monocotyledons are represented by 20% (72 species). The flora consists of 212 herbs, 19 climbers, 51 shrubs and 70 tree species. Leguminosae are the dominant family followed by Poaceae, Euphorbiaceae, Cyperaceae, Asteraceae, Convolvulaceae and Verbenaceae.

Keywords: Backshore, Balasore, flora, Odisha, foreshore, vegetation.

INTRODUCTION

Balasore is one of the 30 districts of Odisha state and is one among the 6 coastal districts along the Bay of Bengal. The coastline of Odisha stretches about 481 km extends over 6 districts, viz. Balasore (89 km), Bhadrak (49.4 km), Kendrapada (79.4 km), Jagatsinghpur (61.4 km), Puri (138.0 km), and Ganjam (63.3 km) from north to south. The coastal region of Balasore district is the northern most part of Odisha coast. The width of the sandy coast of Balasore is more as compared to other coastal districts of Odisha.

The coastal vegetation of Odisha falls under littoral and tidal swamps under the tropical forests (Champion & Seth, 1968). However, the vegetation of Balasore coast can broadly be divided in to 10 types, viz. 1. Beach type vegetation, 2. Scrub vegetation, 3. Mangrove vegetation, 4. Neem vegetation, 5. Screw pine vegetation, 6. Cashew plantation, 7. Eucalyptus plantation, 8. Casuarina plantation, 9. Coconut plantation and 10. Betel nut crop. The vegetation of coastal Balasore is influenced and determined by rivers and estuaries. The rapid depletion of coastal vegetation and flora is due to biotic interferences connected with reclamation of forest land/scrub land for human settlement, establishment of port and factories, paddy cultivation, prawn culture, grazing and indiscriminate cutting of trees for fuel, timber and other purposes. Coastal vegetation has manifold socio-economic importance such as shore-line stabilizer, prevent oceanic cyclone, produce food, fodder, timber, medicine, tannin, etc.

The strand flora of Balasore coast has not been studied in detail, although some sporadic reports are available on the coastal flora and vegetation (Subudhi & Choudhury, 1989; Banerjee & al., 2002; Subudhi & al., 2002). In this paper, an attempt has been made to study in detail the strand flora of Balasore district, Odisha.

STUDY SITE

The floristic study was carried out in the Balasore district coastal region lies between 20° 44′–21° 57′ N and 86° 16′–87° 29′ E. The district is bounded by Badrak district in the south and Medinapur district of West Bengal in north.

The climate of the district is characterized by hot summer and high humidity during rainy season, dry winter and low diurnal range of temperature throughout the year. Annual average rainfall of the district is 1591 mm, which is almost 9% higher than rainfall of Odisha state. This is due to cyclones, which cause major precipitation in the area. Cyclones are frequent in the district because of its close proximity to the Bay of Bengal. More than 71% of rainfall is received between June and September through South-West monsoon. The year can broadly be divided into three seasons, viz. rainy (July–October), winter (November–February) and summer (March–June). The total annual rainfall during 2010 was 1413 mm, while it was 1536 mm during 2011.
METHODS

The width of the sandy coastal belt of Balasore district ranges from 100 to 1000 m from the seawater (drift line) to the interior. An extensive floristic survey of the sandy coast of Balasore district was carried out during 2007–2010. Plant specimens were collected by visiting different areas of Balasore coast every month. The collected specimens are dried and poisoned with ethyl alcohol saturated with mercuric chloride solution following standard herbarium techniques (Jain & Rao, 1977). During the plant collection, morphological features of plants and ecological notes were documented along with flowering and fruiting period. Identification of the collected coastal specimens were done with the help of local floras (Gamble, 1915–1936; Haines, 1921–1924; Mooney, 1950; Saxena & Brahmam, 1994–1996; Misra & al., 2009; Misra & Panda, 2013), and the voucher specimens were deposited in the Herbarium of the Department of Botany, Berhampur University (BOTB), Odisha.

The taxa are arranged according to Bentham and Hooker’s system of classification (1862–1883) and the species are arranged under each family alphabetically. For each taxon, the scientific name followed by habit, flowering and fruiting period, distribution status with habitat, locality, collectors name with field numbers followed by uses, if any, in the locality and local Odiya names are provided. The field number(s) cited in the enumeration of taxa are of M.K. Misra, D. Sahu and R.C. Sahoo.
RESULTS

Total number of angiosperm taxa collected during the study period (2007–2010) from the Balasore coast is 352 species under 258 genera, distributed in 84 families. The monocotyledons are represented by 72 species (20%), while dicotyledons are represented by 280 taxa (80%). The detail statistical account of the flora is shown in the table 1.

Habit-wise classification of plant species is depicted in table 2. Herbs are represented by 212 species, of which 72.2% are dicots and 27.8% are monocots. Shrubs are represented by 51 species, of which 46 (90.2%) are dicots and 5 (9.8%) are monocots, while trees are represented by 70 species and climbers are represented by 19 species only. Out of the total 352 species, 317 species are indigenous, while 35 species are introduced (Table 3). Leguminosae are the most predominant family followed by Poaceae, Euphorbiaceae, Cyperaceae, Asteraceae, Convolvulaceae and Verbenaceae. Orchidaceae are the fourth largest family in the flora of Odisha, but the family is represented by only one taxon in the Balasore coast.

ENUMERATION OF TAXA

DICOTYLEDONS

RANUNCULACEAE

Ranunculus scleratus L.

Herb. Fl. & Fr.: Jan.–Apr. Rare, in coastal water courses, channels joining the sea. Digha border: Misra, Sahu & Sahoo 1260.

DILLENIACEAE

Dillenia indica L.


ANNONACEAE

Annona reticulata L.


Annona squamosa L.


Polyalthia cerasoides (Roxb.) Bedd.


Polyalthia longifolia (Somn.) Thw.


Polyalthia suberosa (Roxb.) Thw.

Plate - 1: A. Polyalthia cerasoides (Roxb.) Bedd., inset-fruit; B. Polyalthia suberosa (Roxb.) Thwaites; C. Tiliacora acuminata (Lam.) Miers; D. Tinospora cordifolia (Willd.) Miers; E. Portulaca quadripida L.; F. Hibiscus tiliaceus L., inset-flower; G. Pterospermum xylocarpum (Gaertn.) Santapau & Wagh, inset-flower; H. Tribulus terrestris L.; I. Caesalpinia bonduc (L.) Roxb.; Glycosmis pentaphylla (Retz.) DC.; J. K. Caesalpinia digyna Rottler; L. Senna alata (L.) Roxb
1831, 2621. *Dulidia, Balbalua*

**ELATINACEAE**

*Bergia ammannioides* Roxb. ex Roth

Herb. Fl. & Fr.: Sept.–Mar. Frequent, along the seasonally inundated fallow fields, riverbanks and marshy areas near the coast. Talapada: *Misra, Sahu & Sahoo* 1347.

**TAMARICACEAE**

*Tamarix troupii* Hole


**CLUSIACEAE**

*Calophyllum inophyllum* L.


**BOMBACACEAE**

*Bombax ceiba* L.


*Ceiba pentandra* (L.) Gaertn.


**MALVACEAE**

*Abutilon indicum* (L.) Sweet.


*Gossypium hirsutum* L.


*Hibiscus tiliaceus* (L.) (Pl. 1F)


*Sida acuta* Burm.f.


*Sida cordata* (Burm.f.) Borss.


*Sida cordifolia* L.


*Sida rhombifolia* L.


*Sida spinosa* L.


*Thespesia populnea* (L.) Sol. ex Correa
MENISPERMACEAE

Cissampelos pareira L.

Cocculus hirsutus (L.) Diels

Stephania japonica (Thunb.) Miers

Tiliacora acuminata (Lam.) Miers

Tinospora cordifolia (Pl. 1D) (Willd.) Miers

PAPAVERACEAE

Argemone mexicana L.

CAPPARACEAE

Cleome viscosa L.

VIOLACEAE

Hybanthus enneaspermus (L.) F. Muell.

FLACOURTIACEAE

Casearia nigrescens Tul. (Casearia elliptica Tul.)

Flacourtia indica (Burm.f.) Merr.

CARYOPHYLLACEAE

Polycarpacea corymbosa (L.) Lam.

PORTULACACEAE

Portulaca quadrifida L.
Creeping herb. Fl. & Fr.: Most part of the year. Edge of foreshore. Aladiha, Bindha Padmapur: Misra, Sahu & Sahoo

STERCULIACEAE
Misra, Sahu & Sahoo 2659. Khandakoli, Kantakura.

**ANACARDIACEAE**

*Anacardium occidentale* L.


*Lannea coromandelica* (Houtt.) Merr.


**MANGIFERACEAE**

*Mangifera indica* L.


**MORINGACEAE**

*Moringa oleifera* Lam.


**LEGUMINOSAE** (Subfamily: CAESALPINIOIDEAE)

*Caesalpinia bonduc* (L.) Roxb.


*Caesalpinia digyna* Rottler


*Senna alata* (L.) Roxb.


*Senna occidentalis* L.


*Senna sophera* (L.) Roxb.


*Senna tora* (L.) Roxb.


**Tamarindus indica** L.


**LEGUMINOSAE** (Subfamily: MIMOSOIDEAE)

*Acacia auriculiformis* Benth.


*Acacia nilotica* (L.) Delile subsp. *indica* (Benth.) Brenan
Acacia polyacantha Willd.  

Albizia lebbeck (L.) Benth.  

Leucaena leucocephala (Lam.) de Wit  

Mimosa intsisia L. (M. rubicaulis Lam.)  

Mimosa pudica L.  

Pithecellobium dulce (Roxb.) Benth.  

Samanea saman (Jacq.) Merr.  

LEGUMINOSAE (subfamily: PAPILIONOIDEAE)

Abrus precatorius L.  

Alysicarpus hamosus Edgew.  

Alysicarpus heterophyllus (Backer) Jafri & Ali (A. vaginalis (L.) DC. var. heterophyllus Backer)  

Alysicarpus vaginalis (L.) DC.  

Canavalia gladiata (Jacq.) DC.  

Canavalia rosea (Sw.) (Canavalia maritima (Aubl.) Thouars)  

Clitoria ternatea L.  

Crotalaria nana Burm. f.

**Crotalaria pallida** Aiton


**Crotalaria verrucosa** L.


**Dalbergia sissoo** Roxb.


**Desmodium gangeticum** (L.) DC.


**Desmodium triflorum** (L.) DC.


**Dolichos trilobus** L.


**Erythrina variegata** L.


**Indigofera glabra** L. (Pl. 2B)


**Indigofera linnaei** Ali (*I. enneaphylla* L.)


**Indigofera tinctoria** (Pl. 2C) L.


**Mucuna pruriens** (L.) DC. (*Dolichos pruriens* L.)


**Pongamia pinnata** (L.) Pierre


**Rothia indica** (L.) Druce


**Tephrosia purpurea** (L.) Pers. var. *maritima* Haines

Diffuse undershrub. Fl. & Fr.: May. Rare, on the sandy coast. Chandipur, Talasari: *Misra, Sahu & Sahoo* 2635, 3137, 3256, 3682. *Chuchudi, Bana kulhi*.

**Tephrosia purpurea** (L.) Pers. var. *purpurea*
Erect undershrub. Fl. & Fr.: Throughout the year. Common, along the river banks and roadsides, frequent along the sandy seashore. Talasari, Barajdeuli, Inchudi Deulabada, Kirtinia, Digha border: Misra, Sahu & Sahoo 2635, 805, 905, 1731, 1243. Bana nila, Bana kulthi.

**Teramnus labialis** (L. f.) Spreng.


**Vigna trilobata** (L.) Verdc. (*Dolichus trilobus* L.)


**CRASSULACEAE**

**Kalanchoe pinnata** (Lam.) Pers. (Pl. 2D)


**COMBRETACEAE**

**Terminalia arjuna** (Roxb. ex DC.) Wight & Arn.


**MYRTACEAE**

**Eucalyptus globulus** Labill.


**Eugenia roxburghii** DC. [*Eugenia bracteata* (Willd.) Raeus. ex DC.] (Pl. 2E)


**Psidium guajava** L.


**Syzygium cumini** (L.) Skeels


**Syzygium samarangense** (Blume) Merr. & Pree.


**MELASTOMATACEAE**

**Melastoma malabathricum** L. (Pl. 2F)


**SONNERATIACEAE**

**Sonneratia apetala** Buch.-Ham.


**LYTHRACEAE**

**Ammannia baccifera** L.
NELUMBO


Lawsonia inermis L.


Nasaea lanceolata (B. Heyne ex C.B. Clarke) Koehne

Erect or decumbent herb. Fl. & Fr.: Nov.–Feb. Rare, in damp, moist places in the lee side of sand dunes. Tadarabadhia: Misra, Sahu & Sahoo 2484.

Rotala rosea (Poir.) Cook


Rotala verticillaris L.


ONAGRACEAE

Ludwigia linifolia Poir.


Ludwigia perennis L.


CARICACEAE

Carica papaya L.


CUCURBITACEAE

Citrullus lanatus (Thunb.) Matsum. & Nakai


Coccinia grandis (L.) Voigt


Diplocyclos palmatus (L.) Jeffrey


Momordica charantia L.


Momordica dioica Roxb. ex Willd.


Solena amplexicaulis (Lam.) Gandhi

Trichosanthes cucumerina L.


Trichosanthes tricuspidata Lour.


CACTACEAE

Cereus pterogonus Lém.


Opuntia dillenii (Ker Gawl) Haw. (O. stricta (Haw.) Haw. var. dillenii (KerGawl) Benson)


Opuntia ficus-indica (L.) Mill. (Mill.)

O. vulgaris


MOLLUGINACEAE

Gisekia pharnaceoides L.


Glinus oppositifolius (L.) DC. (Mollugo oppositifolia L.)


Mollugo pentaphylla L.


AIZOACEAE

Sesuvium portulacasturm (L.) L. (Pl. 2G)


Trianthema portulacastrum L.


APIACEAE

Centella asiatica (L.) Urban (Hydrocotyle asiatica L.)

Prostrate herb. Fl. & Fr.: Throughout the year. Frequent, along the moist sandy seashore plains and inland areas. Chandipur (Panthanivas), Digha border, Kirtinia, Talapada: Misra, Sahu & Sahoo 993, 1250, 1736, 1311 & 1385. Thalkuri.

Hydrocotyle sibthorpioides Lam.


ALANGIACEAE
**Alangium salvifolium** (L.f.) Wang.


**RUBIACEAE**

**Benkara malabarica** Lam.  
(Pl. 2H)


**Canthium parviflorum** Lam.


**Dentella repens** (L.) J.R. & G. Forst.

Dichotomously branched prostrate herb. Fl. & Fr.: Most part of the year. Common near paddy fields, grasslands, river and canal beds, road sides, low lying areas of lee side of sand dune. Talapada: *Misra, Sahu & Sahoo 1357.*

**Hydrophytis maritima** L.f.


**Neanotis calycina** (Wall. ex Hook.f.) Lewis (*Anotis calycina* Wall. ex Hook.f.)


**Oldenlandia affinis** (Roem. & Schult.) DC. (*Hedyotis affinis* Roem. & Schumach.)


**Oldenlandia corymbosa** (*Hedyotis corymbosa* (L.) Lam.)


**Oldenlandia diffusa** (Willd.) Roxb. (*Hedyotis diffusa* Willd.)

Diffused herb. Fl. & Fr.: Throughout the year. Frequent, on sandy beach, inside *Casuarina* plantation, near wet places, in coastal slacks. Anandapur, Sahabajipur, Talapada: *Misra, Sahu & Sahoo 2507, 2658, 1364.*

**Pavetta crassicaulis** Bremek.


**Spermacoce articulatis** L.f.


**Spermacoce hispida** L.


**ASTERACEAE**

**Ageratum conyzoides** L.


**Blumea lacera** (Burm. f.) DC.

Blumea obliqua (L.) Druce

Chromolaena odorata (L.) R. King & H. Robins.

Cyanthillium cinereum (L.) H. Rob. (Vernonia cinerea (L.) Less.)

Eclipta prostrata (L.) L.

Emilia sonchifolia (L.) DC. ex DC

Gnaphalium pensylvanicum Willd.

Grangea maderaspatana (L.) Poir.

Launaea sarmentosa (Willd.) Sch.-Bip. ex Kuntze

Mikania micrantha Kunth

Parthenium hysterophorus L.

Pentanema indicum (L.) Ling (Vicoa indica (L.) DC.)

Tridax procumbens L.

Wedelia chinensis (Osbeck) Merr.

SALVADORACEAE

Azima tetracantha Lam.
APOCYNACEAE

Alstonia scholaris (L.) R. Br.


Carissa carandas L. (Pl. 2L)


Carissa spinarum L.


Cascabela thevetia (L.) Lippold


Catharanthus roseus (L.) G. Don (Vinca rosea L.)


Holarrhena pubescens (Buch.-Ham.) Wall. ex G. Don


Ichnocarpus frutescens (L.) R. Br.


Rauvolfia tetraphylla L.


ASCLEPIADACEAE

Calotropis gigantea R. Br.


Hemidesmus indicus (L.) R. Br.


Pergularia daemia (Forssk.) Chiov. (Pl. 3A)


Tylophora indica (Burm.f.) Merr. (Pl. 3B)


STRYCHNACEAE

Strychnos nux-vomica L.

BORAGINACEAE

Heliotropium curassavicum L.
Erect herb. Fl. & Fr.: Mar.–Jan. Rare, in the coastal region, in the tidal areas, river beds, boundary of the prawn ponds. ITR 5000 outpost, Jamunasula, Talapada adia, Barajdeuli: Misra, Sahu & Sahoo 2753, 2420, 1383, 836. Lunna.

Heliotropium indicum L.

Heliotropium strigosum brevifolium (Wall.) Kazmi (H. brevifolium Wall.)

CONVOLVULACEAE

Cuscuta reflexa Roxb. (Pl. 3C)

Evolvulus alsinoides (L.) L.

Evolvulus nummularius (L.) L.

Ipomoea campanulata L.

Ipomoea fistulosa Mart. ex Choisy

Ipomoea pes-caprae (L.) R. Br. (Pl. 3D)

Ipomoea pes-tigrisidis L.

Ipomoea sepiaria Koenig ex Roxb.

Merremia tridentata (L.) Hallier f.

Merremia umbellata (L.) Hallier f.

Operculina turpethum (L.) SilvaManpo
Plate - 3 : A. Pergularia daemia (Forssk.) Chiov., inset-fruit; B. Tylophora indica (Burm.f.) Merr. 
C. Cuscuta reflexa Roxb.; D. Ipomoea pes-caprae (L.) R. Br.; E. Stictocardia tiliifolia (Desr.) Hallier f.;
F. Physalis angulata L.; G. Solanum americanum Mill., inset-fruit; H. Solanum sisymbriifolium Lam., inset-flower;
I. Solanum trilobatum L.; J. Solanum virginianum L.; K. Oroxylum indicum (L.) Benth. ex Kurz;
L. Acanthus ilicifolius L.
Stictocardia tiliifolia (Desr.) Hallier f. (Pl. 3E)

SOLANACEAE

Datura metel L.

Physalis angulata L. (Physalis minima L.) (Pl. 3F)

Solanum americanum Mill. (S. nigrum L.) (Pl. 3G)
Erect, brached, unarmed herb. Fl. & Fr.: Most part of the year. Rare, in backshore and inside Casuarina plantation. Dagara; Misra, Sahu & Sahoo 1603. Nunununua.

Solanum sisyphrifolium Lam. (Pl. 3H)

Solanum trilobatum L. (Pl. 3I)

Solanum violaceum Ortega

Solanum virginianum (Pl. 3J)

SCROPHULARIACEAE

Bacopa monnieri (L.) Wettst.

Centranthera tranquebarica (Spreng.) Merr.

Limnophila indica (L.) Druce

Limnophila repens (Benth.) Benth. (Limnophila conferta Benth.)

Lindernia anagallis (Burm.f.) Pennell

Lindernia caespitosa (Blume) Panigrahi

**Lindernia ciliata** (Colsm.) Pennell


**Lindernia crustacea** (L.) F. Muell.


**Lindernia oppositifolia** (Retz.) Mukherjee


**Scoparia dulcis** L.


**BIGNONIACEAE**

**Oroxylum indicum** (L.) Benth. ex Kurz


**PEDALIACEAE**

**Pedalium murex** L.


**MARTYNIACEAE**

**Martynia annua** L.


**ACANTHACEAE**

**Acanthus ilicifolius** L. **(Pl. 3L)**


**Andrographis paniculata** (Burm.f.) Wall. ex Nees


**Barleria prionitis** (Pl. 4A) **(Poir.) Nees** *(Ruella prostrata* Poir.)*


**Dipteracanthus prostratus** (Poir.) Nees *(Ruella prostrata* Poir.)*

Justicia adhatoda L.

Hygrophila auriculata (Schumach.) Heine

Rungia pectinata (L.) Nees

VERBENACEAE

Avicennia alba Blume

Avicennia officinalis L.

Volkameria inermis (L.) Gaertn. (Cl erodendrum inerme (L.) Gaertn.)

Clerodendrum infortunatum L. (Clerodendrum viscousum Vent.)

Gmelina arborea Roxb.

Lantana camara var. aculeata (L.) Moldenke

Lippia javanica (Burm.f.) Spreng.

Phyla nodiflora (L.) Greene

Premna tomentosa Wild.

Tectona grandis L.f.
Vitex negundo L.

LAMIACEAE

Anisomeles indica (L.) Kuntze

Hyptis suaveolens (L.) Poit.

Leucas aspera (Willd.) Link

Leucas cephalotus (Roth) Spreng.

Leucas lanata Benth.

Ocimum basilicum L.

Ocimum tenuiflorum L. (O. sanctum L.)

NYCTAGINACEAE

Boerhavia diffusa L.

Bougainvillea spectabilis Willd.

AMARANTHACEAE

Achyranthes aspera L.

Alternanthera paronychioides A. St.-Hil. (Pl. 4D)
Prostrate, perennial, glabrous or pubescent herb. Fl. & Fr.: Apr.–Dec. Rare, growing on baby dunes in the foreshore. Talasari Gambharia: Misra, Sahu & Sahoo 3138.

Alternanthera sessilis (L.) R. Br. ex DC.
Amaranthus spinosus L.


Amaranthus viridis L.


Pupalia lappacea (L.) Juss.


CHENOPODIACEAE

Suaeda maritima (L.) Dumort (Pl. 4E)


POLYGONACEAE

Persicaria barbata (L.) H. Hara (Polygonum barbatum L.)


ARISTOLOCHIACEAE

Aristolochia indica L.


PIPERACEAE

Piper betle L.


LAURACEAE

Cassia filiformis L. (Pl. 4F)


EUPHORBIACEAE

Acalypha indica L.


Breynia vitis-idaea (Burn.f.) C.E.C. Fisch.


Bridelia stipularis (L.) Blume


Croton bonplandianus Baill.

**Croton caudatus** Geiseler


**Euphorbia hirta** L.


**Euphorbia nivulia** Buch.-Ham.


**Euphorbia rosea** Retz.


**Euphorbia rothiana** Spreng.


**Euphorbia tirucalli** L.


**Excoecaria agallocha** (Pl. 4H)


**Jatropha curcas** L.


**Jatropha gossypifolia** L.


**Micrococa mercurialis** (L.) Benth.


**Phyllanthus acicuus** (L.) Skeels


**Phyllanthus fraternus** G. L. Webster


**Phyllanthus reticulatus** Poir.


**Phyllanthus virgatus** G. Forst.


**Ricinus communis** L.

Shrub. Fl. & Fr.: Most part of the year. Occasional, in coastal sandy waste places and backshore as an escape.
**Barajdeuli**: Misra, Sahu & Sahoo 1792. Jada, Gaba.

**Sauropus bacciformis** (L.) AiryShaw


**Tragia involucrata** L.


**MORACEAE**

**Ficus benghalensis** L.


**Ficus hispida** L.f.


**Ficus religiosa** L.


**Streblus asper** Lour.


**CASUARINACEAE**

**Casuarina equisetifolia** L.


**MONOCOTYLEDONS**

**ORCHIDACEAE**

**Eulophia graminea** Lindl. (Pl. 4J)


**MUSACEAE**

**Musa paradisiaca** L.


**ZINGEBERACEAE**

**Amomum dealbatum** Roxb.


**CANNACEAE**

**Canna indica** L.

AGAVACEAE

Agave americana L.


DIOECOREACEAE

Dioscorea pentaphylla L.


Dioscorea wallichii Hook.f.


LILIACEAE

Asparagus racemosus Willd.

Climber, perennial. Occasional, inside backshore plantation Balibil, Talasari: & 3268, Casuarina. Misra, Sahu & Sahoo 3106. Root and branches are used to check excess menstrual bleeding and urinary discharges. Satabari.

Gloriosa superba (Pl. 4K) L.


SMILACACEAE

Smilax zeylanica L.


COMMELINACEAE

Commelina attenuata K. D. Koenig ex Vahl


Commelina benghalensis L.


Murdannia nudiflora (L.) Brenan


Murdannia pauciflora (G. Bruckn.) G. Bruckn.


Murdannia spirata (L.) G. Bruckn.


ARECACEAE

Areca catechu L.

Tree. Fl. & Fr. Throughout the year. Frequent, planted around piper yard (pana baraja), in the villages and hamlets. Balibil, Kasafal: Misra, Sahu & Sahoo 3507, 3608. Nut is used as masticating agent. Gua, Supari.

Borassus flabellifer L.
Large tree. Fl. & Fr.: Mar.–May. Common, along the dry coastal sand and coastal plains. Includi: Misra, Sahu & Sahoo 1754. Fruit used as food and leaf as fibre. Tala.

_Calamus viminalis_ Willd. var. _fasciculatus_ Becc. (Pl. 4L)


_Cocos nucifera_ L.


_Phoenix sylvestris_ (L.) Roxb.


**Pandanaceae**

_Pandanus fascicularis_ Lam.


**Araceae**

_Colocasia esculenta_ (L.) Schott


**Eriocaulaceae**

_Eriocaulon echinulatum_ Mart.


**Cyperaceae**

_Bulbostylis barbata_ (Rotb.) C. B. Clarke


_Cyperus arenarius_ Retz.


_Cyperus cephalotes_ Vahl


_Cyperus compressus_ L.


_Cyperus corymbosus_ Rottb.


_Cyperus distans_ L.f.


_Cyperus halpan_ L.

Cyperus iria L.

Cyperus nivus Retz

Cyperus panicus (Rottb.) Boeckeler

Cyperus pumilis L.

Cyperus rotundus L.

Cyperus stoloniferus Retz.,

Eleocharis atropurpurea (Retz.) J. Persl. & Persl

Fimbristylis cymosa (R. Br. (Cyperus triceps Endl.)

Fimbristylis schoenoides (Retz.) Vahl

Fuirena ciliaris (L.) Roxb.

Rhynchospora colorata (L.) Pfeiff. (Cyperus kyllingia Endl.)

Schoenoplectiella senegalensis (Steud.) Lye (Schoenoplectus senegalensis (Hochst. ex Steud.) Palla ex J. Raynal)

POACEAE

Aeluropus lagopiodes (L.) Trin. ex Thiv.

Bambusa arundinacea (Retz.) Willd.

Bambusa tulda Roxb.
Brachiaria distachya (L.) Stapf


Chloris barbata Sw.


Cynodon dactylon (L.) Pers.


Dactyloctenium aegyptium (L.) P. Beauv.


Dendrocalamus strictus (Roxb.) Nees


Digitaria ciliaris (Retz.) Koeler


Digitaria longiflora (Retz.) Pers.


Diplachne fusca (L.) P. Beauv.


Eleusine indica (L.) Gaertn.


Eragrostis ciliaris (L.) R. Br.


Eragrostis coarctata Stapf


Eragrostis tremula (Lam.) Hochst. ex Steud.


Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult.


Oplismenus burmannii (Retz.) P. Beauv.


Oplismenus compositus (L.) P. Beauv.


Panicum repens L.

Paspalidium flavidum (Retz.) A. Camus

Paspalum distichum L.

Paspalum scrobiculatum L.
Annual or perennial. Fl. & Fr.: Most part of the year. Occasional, in the backshore inside Casuarina plantation, marshy swamp places. Jaleswar: Misra, Sahu & Sahoo 1681.

Perotis indica (L.) Kuntze

Pseudoraphis spinescens (R. Br.) Vickery

Saccharum bengalense Retz.

Saccharum spontaneum L.

Spinifex littoreus (Burm. f.) Merr.
Perennial creeper. Fl. & Fr.: Sept.–Mar. Rare, on sand dunes, sometimes inside Casuarina plantation facing sea side. It is restricted to the seashore, beaches and sand dunes and specially acts as a sand binder. Talapada, Inchudi, Tadarabadhia, Kirtinia: Misra, Sahu & Sahoo 1759, 921, 3533, 1326. Serves as good sandbinder. Rabana.

Sporobolus indicus (L.) R. Br. var. diander (Retz.) Jovot & Guedes

Zoysia matrella (L.) Merr.

DISCUSSION
Out of the 147 species of maritime strand flora of India (Rao, 1974), 75 species are reported from Odisha coast and 27 from Midnapur coast. Out of the species reported from Orisha coast, 26 are now observed only in Balasore and of the Midnapur coast, 17 species are reported from Balasore. During the present study, Nasaea lanceolata is reported for the first time from Orisha coast, while Aeluropus lagopoides was recollected from Rupakhandha, Barajdeuli area of Balasore other than a locality of its last collection from Gopalpurcoast, Ganjam. (Panigrahi, 1988).

The internal distribution pattern of the Indian maritime strand flora was divided into three types (Rao1974). First type includes those plants showing complete fidelity to inner strand. The second type comprises plants of mid/outer strand under the maritime influence. The third type consists of plants of inland extension. In the present study only the sand strand flora is observed in the coast. Some of the interesting elements of strand flora are Cyperus arenarius, Ipomoea pes-caprae, Hydrophyllax maritima, Alternanthera paronychioides, Sesuvium portulacastrum, Suaeda maritima and Spinifex littoreus etc.

The foreshore is poor in vegetation and at places, it is totally barren due to the harsh effect of spring tide. The dominant species observed in the foreshore are Paspalum distichum, Zoysia matrella, Saccharum bengalense,
and *Launaea sarmentosa*. Seedlings of *Acanthus illicifolius*, *Excoecaria agallocha* and *Avicennia* spp. are scattered along the foreshore.

Few mangrove patches such as *Acanthus illicifolius*, *Suaeda maritima*, *Excoecaria agallocha*, *Avicennia* scurrate along the foreshore. Few mangrove patches such as *Acanthus illicifolius*, *Suaeda maritima*, *Excoecaria agallocha*, *Heritiera littoralis*, *Sonneratia apetala*, *Avicennia* spp., *Tamarix troupii*, *Hibiscus* *tiliacus*, *Sesuvium* spp., associated with *Portulacastrum* and *Volkameria* inermis. are observed near Talapada (Jamkanai mouth), Kasafal (the confluencing point of Panchupada and Dhobi rivers), Kirtinia (north side of Subanarekha river). The dominant ground flora in the backshore, are *Calotropis gigantea*, *Pergularia daemia*, *Chromolaena odorata*, *Mikania micrantha*, *Cassia occidentalis*, *Evolvulus*., *Jatropha gossypifolia*, *Phyllanthus* spp., *Desmodium triflorum*, *Eugenia bracteata*, *Oldenlandia*., *Toddalia asiatica*, *Datura metel*., *Solanum* spp., and *Eugenia bracteata*, *Oldenlandia*., *Toddalia asiatica*, *Datura metel*, *Solanum* spp., and *Jatropha gossypifolia*, *Phyllanthus*., *Desmodium* triflorum., *Eugenia* bracteata., *Oldenlandia*., *Toddalia* asiatica., *Datura* metel., *Solanum* spp., and *Jatropha* gossypifolia., *Phyllanthus*., *Desmodium* triflorum. In the *Casuarina* plantation area near Gambharia, Talasari, many seedlings of *Azadirachta indica* and *Acacia auriculiformis* are also observed. In the backshore of Dagara and Choumukh a patch of Neem (*Azadirachta indica*) vegetation is present. Near Udayapur, a unique association of *Launaea sarmentosa* growing in close proximity with *Casuarina* is observed.

During the present work *Micrococc a mercurialis* which was last reported from Konark sandy coast (Haines, 1924) and from Ganjam coast (Fischer, 1905) about eight decade ago, recollected in the Balasore coast. The species has been considered threatened category in Odisha (Saxena & Bramham, 1996). *Calamus viminalis* var. *fasciculatus* which usually occur in the foothill forests found escaped in the *Casuarina* plantations and sandy village outskirts during the present study.

*Hydrophyllax maritima* is observed growing in pure stands on the sandy hillocks all along the coast of Balasore. This type of habitat differs from the Ganjam and Puri coasts (Sahu & Misra, 2010a, 2013) where the species usually grow associated with other species. It is also interesting to note that, dense rooting system of the species act as a strong sand binder which protecte the dome-like elevated structures of sand dunes. The species is absent in the West Bengal coast, which may be attributed to stiff clay and silt soil (Rao & al., 1970). *Chromolaena odorata*, *Hypit suaveolens*, *Lantana camara* Parthenium hysterophorus are some of the notorious invasive species found in the coast. However, *Parthenium hysterophorus* is occasionally observed in Balasore coast. Loss of common property resources in the coastal villages, fast urbanization are some of the reasons for rapid invasion of these species in the coast (Sahoo & Misra, 1994).

The old *Casuarina* plantation in the coast provides a suitable habitat for the growth of many climbers such as *Aristolochia indica*, *Coccinia grandis*, *Emilia sonchifolia*, *Micrococcus mercurialis*, *Pergularia daemia*, *Toddalia asiatica* and *Tylorrhapha indica*. Some other species which grow naturally are *Azadirachta indica*, *Glycosmis pentaphylla*, *Ficus benghalensis*, *Lannea coromandelica*, *Martynia annua*, *Pedalium murex*, *Phoenix sylvestris*, *Pitoccellobium dulce*, *Polychaly cerasoides*, *P. suberosa*, *Psidium guajava*, *Strychnus nux-vomica*, *Tamarindus indica* and *Ziziphus* etc.

Some of the important economic and commercial importat species found in the coast are *Coconut* (*Cocos nucifera*), betel (*Piper betle*), areca nut (*Areca catechu*) and cashew (*Anacardium occidentale*). Betel is cultivated extensively in this coast as a cash crop. The creeping stem of *Cyperus arenarius*, is used as traditional rope. The whole plant or plant parts of *Callocrypta gigantea*, *Cassia occidentalis*, *Chromolaena odorata*, *Lantana camara*, *Pandanus fascicularis* and *Borassus flabellifer* etc., are used as fuel. Male infl orescences of *Pandanus fascicularis* yield a volatile oil (kewda) has great potential in the perfumery, however not ben fully utilized in the Balasore coast unlike Ganjam coast. (Panda & al., 2000-2001, Sahu, 2011, Sahu & Misra, 2007, 2010b).

From the present study it can be inferred that, a number of species that are becoming rarer day-by-day in the coastal belt of Odisha. Various human activities are increasing in the coastal belt threatening even the survival of common taxa. The recurring natural calamitis that occur regularly in the Bay of Bengil coast also affects the biodiversity of the sandy coast.

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उड्डीसा, के बालासोर जिले के रेतीले तट की आवृत्तीजी किवियता
रामचन्द्र साहु, दिनकबुरु साहु, मलय कुमार मिश्र
सार सारांश
प्रस्तुत शोध प्रक उड्डीसा राज्य के बालासोर जिले के रेतीले तट की आवृत्तीजी किवियता से संबंधित है। इन आवृत्तीजी में कुल 84
tकुलों के 258 वंशों के तहत 352 जातियाँ सम्मिलित हैं। एकवीजीकी 72 जातियों के साथ वनस्पतिज्ञ अपना 20% हिस्सा व्यक्ति हैं।
वनस्पतिज्ञ में 212 शाखानाट, 19 ललाय, 31 उप 70 वृक्ष जातियाँ सम्मिलित हैं। यहाँ की वनस्पति में लेगुमिनोसी कुल, पोएडी,
पुलियारकमिये, साइपेरेसी, कॉनवालवुलेसी एवं बर्नानिसी के बाद सबसे बड़ा कुल है।