Additions to angiosperm diversity in Bhadrak region of Odisha, India
*Taranisen Panda, Master Apollo¹ and Manoj Kumar Kar²

¹Department of Botany, Chandbali College, Chandbali
BHADARAK-756133 (ODISHA) INDIA
²Department of Botany, Simulia College, MARKONA-756126, BALASORE (ODISHA) INDIA

ABSTRACT
This paper deals with the list of flowering plants from the Bhadrak district, Odisha, India. A total of 141 taxa (81 native species and 60 exotic species) have been recorded comprising 81 herbs, 22 climbers, 21 trees, and 17 shrubs that are distributed in 115 genera, represented in 48 families, three major clades, and 23 orders as per the APG IV classification. Lamids account for about 33.3% of the taxa. The family Fabaceae is the most species-diverse (14 species), followed by Convolvulaceae (10 species), Acanthaceae (9 species) and Poaceae (7 species). Of the total 141 plant species, most are economically useful as medicinal plants, and others are valuable as edible fruits, ornamentals, and fodders. It is believed that this inventory of angiosperm plant resources of the district provides a comprehensive and updated checklist of the floristic diversity of the Bhadrak district, Odisha.

Figures : 06 References : 42 Table : 01

KEY WORDS : Agricultural rituals, Horistic diversity, Life form composition, Medicinal plants

Introduction
The state of Odisha (81° 43’ and 87 ° 29’ east longitudes and 17° 49’ and 22 ° 34’ north latitude), India, consisting of 30 districts and geographically situated at the head of the Bay of Bengal, has a coastal stretch of around 482 km. It extends over an area of 155,707 sq. km accounting for about 4.87% of the total area of the country. Based on physico-geographical characteristics, the state has been divided into 5 major regions, i.e., the coastal plain in the east, the middle mountainous and highlands region, the central plateaus, the western rolling uplands, and the major flood plains. The varying climatic condition provides suitable habitats for supporting rich flora and fauna in the region. Furthermore, the Eastern Ghat range of hills runs through the heart of Odisha, i.e., it starts from north of Similipal and runs through Malkangiri crossing 17 districts of the state harbouring primarily moist deciduous vegetation. The state encounters a hot and humid climate round the year with short winters.

As far as the floristic study of the state of Odisha is concerned, it is in scattered form. The reports are available. The Flora of Orissa work that dealt with 2727 plant species included 2576 species of angiosperms belonging to 159 families. Recently some publications were made on floristic inventory and conservation aspects. A project was initiated to record the occurrence of species to supplement the angiosperm flora of Bhadrak district, Odisha, India.

Materials and Methods

Study site
Bhadrak district (20° 43¢-21° 13¢N and 86° 6¢-87° E) is located in northeast Odisha. It spreads over 2505 km² with 1.507 million inhabitants (2011 Census). Rice (Oryza sativa) is the major cereal crop cultivated by most of the people of the district. The district is located in the deltaic region close to the Bay of Bengal. Obviously, it has all the features of a coastal climate, i.e., saline weather, the influence of coastal wind, thunder storms.
| Major Clade/Order | Family / Species | Common Name | Habit | Nativity | Uses          |
|------------------|-----------------|-------------|-------|----------|---------------|
| Arecales         | Arecaceae       |             |       |          |               |
|                  | *Carpentaria acuminata* | Tree        | Australia | Ornamental |
|                  | *Caryota urens* | Tree        | Native  | Ornamental |
|                  | *Dypsis lutescens* | Tree        | Madagascar | Ornamental |
|                  | *Licuala grandis* | Tree        | West America | Ornamental |
|                  | *Rhapis excelsa* | Shrub       | China   | Ornamental |
|                  | *Roystonea regia* | Tree        | Mexico  | Ornamental |
| Commelinales     | Commelinaceae   |             |       |          |               |
|                  | *Commelina diffusa* | Herb       | Native  | Medicinal |
|                  | *Cyanotis axillaris* | Herb       | Native  | Medicinal |
|                  | *Murdannia nudiflora* | Kanduli    | Native  | Medicinal |
|                  | *Murdannia spirata* | Herb       | Native  | Fodder    |
|                  | *Murdannia vaginata* | Herb       | Native  | Fodder    |
| Poales           | Poaceae         |             |       |          |               |
|                  | *Brachiaria mutica* | Nardul     | Native  | Fodder    |
|                  | *Eragrostis ciliaris* | Herb       | Native  | Fodder    |
|                  | *Eriocaulon cinereum* | Herb       | Native  | Fodder    |
| Scientific Name                  | Family      | Common Name | Country of Origin   | Type       |
|---------------------------------|-------------|-------------|---------------------|------------|
| *Eriochloa procera*             | *Eriochloa* | Herb        | Native Fodder       |            |
| *Hymenachne amplexicaulis*      | *Hymenachne* | Herb        | Argentina Fodder    |            |
| *Myriostachya wightiana*        | *Myriostachya* | Herb      | Native Fodder       |            |
| *Saccharum munja*               | *Saccharum* | Anukha      | Native Fodder       | Ritual     |
| *Xyris indica*                  | *Xyris*     | Herb        | Native Medicinal    |            |
| *Cyperus corymbosus*            | *Cyperus*   | Mutha       | Native Not Known    |            |
| *Cyperus distans*               | *Cyperus*   | Herb        | Native Not Known    |            |
| *Cyperus iria*                  | *Cyperus*   | Swanti      | Tropical America    | Not known  |
| *Heliconia psittacorum*         | *Heliconia* | Herb        | South America       | Ornamental |
| *Calathea virginalis*           | *Calathea*  | Herb        | Tropical America    | Ornamental |
| *Ravenala madagascariensis*     | *Ravenala*  | Tree        | Madagascar          | Ornamental |
| *Aglaonema commutatum*          | *Aglaonema* | Herb        | Philippines         | Ornamental |
| *Dieffenbachia seguine*         | *Dieffenbachia* | Herb    | Tropical America    | Ornamental |
| *Epipremnum aureum*             | *Epipremnum* | Climber     | France              | Ornamental |
| Family                  | Genus                  | Type       | Origin                  | Use          |
|------------------------|------------------------|------------|-------------------------|--------------|
| Asparagales            | Syngonium podophyllum  | Herb       | Tropical America        | Ornamental   |
|                        |                        |            |                         |              |
| Amaryllidaceae         | Crinum viviparum       | Herb       | Native                  | Medicinal    |
|                        | Crinum latifolium      | Herb       | Native                  | Medicinal    |
|                        | Zephyranthes carinata  | Herb       | Mexico                  | Medicinal    |
| Asparagaceae           | Chlorophytum capense   | Herb       | South Africa            | Medicinal    |
| SUPERSROSIDS           |                        |            |                         |              |
| ROSIDS                 |                        |            |                         |              |
| Vitales                | Vitaceae               |            |                         |              |
|                        | Cayratia pedata        | Climber    | Native                  | Medicinal    |
|                        | Cayratia trifolia      | Climber    | Native                  | Medicinal    |
| ROSIDS I (FABIDS)      |                        |            |                         |              |
| Fabales                | Fabaceae               |            |                         |              |
|                        | Adenanthera pavonina   | Tree       | Native                  | Medicinal    |
|                        | Alysicarpus vaginalis  | Herb       | Native                  | Fodder       |
|                        | Canavalia gladiata     | Climber    | Native                  | Medicinal    |
|                        | Crotalaria pallida     | Herb       | Tropical America        | Medicinal    |
|                        | Crotalaria quinquefolia| Herb       | Tropical America        | Medicinal    |
|                        | Crotalaria verrucosa   | Herb       | Tropical America        | Medicinal    |
|                        | Desmodium gangeticum   | Herb       | Native                  | Medicinal    |
| Family          | Genus                  | Common Name | Native/Edible/Ritual/Ornamental | Region          |
|-----------------|------------------------|-------------|---------------------------------|-----------------|
| Indigofera      | astragalina            | Herb        | Tropical America                | Medicinal       |
| Indigofera      | linnaei                | Herb        | South America                   | Medicinal       |
| Indigofera      | linifolia              | Herb        | South America                   | Medicinal       |
| Mucuna          | monosperma             | Climber     | Native                          | Medicinal       |
| Parkinsonia     | aculeata               | Tree        | Tropical America                | Medicinal       |
| Vigna           | pilosa                 | Herb        | Native                          | Medicinal       |
| Uraria          | picta                  | Herb        | Native                          | Medicinal       |
| Polygalaceae    |                        |             |                                 |                 |
| Polygala        | arvensis               | Herb        | Native                          | Medicinal       |
| Rosales         | Moraceae               |             |                                 |                 |
| Ficus           | benjamina              | Tree        | Native                          | Medicinal       |
| Ficus           | racemosa               | Tree        | Native                          | Ritual/ Medicinal |
| Cucurbitales    | Cucurbitaceae          |             |                                 |                 |
| Cucumis         | melo                   | Climber     | Native                          | Edible          |
| Luffa           | cylindrica             | Climber     | Native                          | Medicinal       |
| Mukia           | maderaspatana          | Climber     | Native                          | Medicinal       |
| Malpighiales    | Euphorbiaceae          |             |                                 |                 |
| Chrozophora     | rottleri              | Herb        | Tropical Africa                 | Medicinal       |
| Codiaeum        | variegatum             | Shrub       | Indonesia                       | Ornamental      |
| Drypetes        | roxburghii             | Tree        | Native                          | Medicinal       |
| Euphorbia       | miliii                 | Herb        | Madagascar                      | Ornamental      |
| Scientific Name                  | Family         | Common Name         | Type          | Origin          | Use          |
|---------------------------------|----------------|---------------------|---------------|-----------------|--------------|
| *Euphorbia prostrata*           |                | Herb                | South America | Medicinal       |
| *Micrococcus mercurialis*       | Clusiaceae     | Herb                | Native        | Medicinal       |
| *Suregada multiflora*           |               | Tree                | Native        | Medicinal       |
|                                | Clusiaceae     |                     |               |                 |
| *Garcinia xanthochymus*         | Passifloraceae | Tamala              | Tree          | Native          | Edible       |
|                                |               |                     |               |                 |
| *Turnera ulmifolia*             | Phyllanthaceae | Herb                | Tropical      | Medicinal       |
|                                |               |                     | America       |                 |
|                                | Phyllanthaceae |                     |               |                 |
| *Phyllanthus acidus*            |               | Narkoli             | Tree          | Native          | Edible       |
|                                |               |                     |               |                 |
| *Phyllanthus virgatus*          |               | Bhuin aonla         | Herb          | Native          | Medicinal    |
|                                |               |                     |               |                 |
| *Sauropus bacciformis*          |               | Bila nadia          | Herb          | Native          | Edible       |
|                                |               |                     |               |                 |
| **ROSIDS II (MALVIDS)**         |               |                     |               |                 |
| **Myrtales**                    | Combretaceae   |                     |               |                 |
|                                |               | Combretum indicum   | Madhumalati   | Climber         | Native       | Medicinal    |
| **Lythraceae**                  |               |                     |               |                 |
|                                |               | Ammannia baccifera  | Ramdauni      | Herb            | Native       | Medicinal    |
|                                |               |                     |               |                 |
|                                |               | Ammannia multiflora | Herb          | Native          | Fodder       |
|                                |               |                     |               |                 |
| **Melastomataceae**             |               |                     |               |                 |
| *Melastoma malabathricum*       | Melastomataceae| Koralii           | Shrub         | Native          | Medicinal    |
|                                |               |                     |               |                 |
| **Myrtaceae**                   |               |                     |               |                 |
|                                |               | Melaleuca citrina   | Buttlebrush   | Tree            | Australia    | Medicinal    |
|                                |               |                     |               |                 |
| **Malvales**                    | Malvaceae     |                     |               |                 |
| Species                          | Common Name          | Type     | Origin                | Category          |
|---------------------------------|----------------------|----------|-----------------------|-------------------|
| *Hibiscus cannabinus*           | Kanuriya             | Shrub    | Native                | Ornamental        |
| *Hibiscus schizopetalus*        | Kata mandar          | Shrub    | Tropical Africa       | Ornamental        |
| *Thespesia lampas*              | Bankapsi             | Tree     | Native                | Medicinal         |
| *Pterospermum acerifolium*      | Muchukund            | Tree     | Native                | Medicinal         |
| *Urena lobata*                  | Mota bhindi          | Shrub    | Tropical America      | Medicinal         |
| **Brassicales**                 | Salvadoraceae        |          |                       |                   |
| *Azima tetracantha*             | Shrub                | Native   | Medicinal             |                   |
| **Sapindales**                  | Meliaceae            |          |                       |                   |
| *Melia azedarach*               | Mahalimba            | Tree     | Native                | Medicinal         |
| **SUPERASTERIDS**               |                      |          |                       |                   |
| **Caryophyllales**              | Petiveriaceae        |          |                       |                   |
| *Rivina humilis*                | Climber              | South America | Edible               |
| **Polygonaceae**                |                      |          |                       |                   |
| *Polygonum hydropiper*          | Herb                 | Native   | Medicinal             |                   |
| **Amaranthaceae**               |                      |          |                       |                   |
| *Alternanthera paronychioides*   | Herb                 | Tropical America | Fodder             |
| *Alternanthera philoxeroides*   | Ghoda madaranga      | Herb     | Tropical America      | Fodder            |
| *Amaranthus tricolor*           | Neutia               | Herb     | Native                | Edible            |
| *Celosia argentea*              | Manjur chulia        | Herb     | Tropical Africa       | Medicinal/Ornamental |
| *Pupalia lappacea*              | Kuya-duya            | Herb     | Native                | Medicinal         |
| Portulacaceae                      |                        |        |                  |
|-----------------------------------|------------------------|--------|------------------|
| *Portulaca grandiflora*           | Tablegolap             | Herb   | Argentina        |
| *Portulaca pilosa*                |                        | Herb   | South America    |

**ASTERIDS**

| Ericales                          | Balsaminaceae          |        |                  |
|-----------------------------------|------------------------|--------|------------------|
| *Impatiens balsamina*             | Haragoura               | Herb   | Tropical America |

**ASTERIDS I (COMPANULIDS)**

| Asterales                         | Asteraceae             |        |                  |
|-----------------------------------|------------------------|--------|------------------|
| *Calyptocarpus vialis*            |                        | Herb   | South America    |
| *Sphaeranthus indicus*            | Bhuinkadamba           | Herb   | Native           |
| *Sphagneticola trilobata*         | Bhimraj                | Herb   | Mexico           |

| Apiales                           | Apiaceae               |        |                  |
|-----------------------------------|------------------------|--------|------------------|
| *Foeniculum vulgare*              | Panmahuri              | Herb   | Mediterranean    |
| *Hydrocotyle sibthorpioides*      |                        | Herb   | Native           |

**ASTERIDS II (LAMIDS)**

| Solanales                         | Convolvulaceae         |        |                  |
|-----------------------------------|------------------------|--------|------------------|
| *Argyreia cymosa*                 |                        | Climber| Native           |
| *Ipomoea hederifolia*             | Panikoda               | Climber| Tropical America|
| *Ipomoea indica*                  |                        | Climber| Native           |
| *Ipomoea obscura*                 |                        | Climber| Tropical Africa  |
| Botanical Family | Scientific Name | Common Name | Life Form | Origin | Use |
|-----------------|-----------------|-------------|------------|--------|-----|
| Ipomoea nil     | Khami khondo    | Climber    | North America | Medicinal |
| Ipomoea pes-caprae | Kansari nata   | Climber    | Native      | Medicinal |
| Ipomoea quamoclit |                   | Climber    | Tropical America | Medicinal |
| Merremia hederacea |                | Climber    | Native      | Medicinal |
| Merremia tridentata |                     | Climber    | Native      | Medicinal |
| Hewittia malabarica |                        | Climber    | Native      | Medicinal |
| Hydroleaceae     | Hydrolea zeylanica | Herb      | Native      | Medicinal |
| Solanaceae       | Nicotiana plumbaginifolia | Herb | Tropical America | Medicinal |
| Physalis minima  | Tipai           | Herb      | Tropical America | Medicinal |
| Solanum torvum   | Kathkoli        | Shrub     | West Indies | Medicinal |
| Sphenocleaceae   | Sphenoclea zeylanica | Herb | Native      | Medicinal |
| Lamiales         | Acanthaceae     |            |            |        |
| Hemigraphis hirta |                | Herb      | Native      | Medicinal |
| Hygrophila difformis |                      | Herb      | Native      | Fodder |
| Justicia gendarussa |                  | Herb      | Native      | Medicinal |
| J. procumbens    |                | Herb      | Native      |       |
| Lepidagathis incurva |                       | Herb      | Native      | Medicinal |
| Peristrophe bicalyculata |            | Herb      | Tropical America | Medicinal |
| Species                        | Type   | Origin       | Use           |
|-------------------------------|--------|--------------|---------------|
| Ruellia tuberosa              | Herb   | Tropical     | Medicinal     |
| Thunbergia erecta             | Shrub  | Tropical     | Medicinal     |
| Rungia pectinata              | Herb   | Native       | Medicinal     |
| Lamiaceae                     |        |              |               |
| Anisomeles indica             | Herb   | Native       | Medicinal     |
| Basilicum polystachyon        | Herb   | Native       | Medicinal     |
| Clerodendrum thomsoniae       | Shrub  | Tropical     | Ornamental    |
| Hyptis suaveolens             | Ganga tulasi | Herb | Tropical | Medicinal |
| Ocimum americanum             | Kapur kanti | Herb       | Tropical      | Medicinal |
| Lentibulariaceae              |        |              |               |
| Utricularia stellaris         | Herb   | Native       | Medicinal     |
| Scrophulariaceae              |        |              |               |
| Lindernia antipoda            | Herb   | Native       | Fodder        |
| Plantaginaceae                |        |              |               |
| Limnophila indica             | Herb   | Native       | Medicinal     |
| Bignoniaceae                  |        |              |               |
| Pyrostegia venusta            | Climber| Brazil       | Medicinal     |
| Tecoma stans                  | Tree   | Tropical     | Medicinal/Ornamental |
| Verbenaceae                   |        |              |               |
| Gmelina philippensis          | Shrub  | Native       | Medicinal     |
| Phyla nodiflora               | Gosing | Herb         | South America | Medicinal |
| Scientific Name                  | Common Name          | Type   | Origin             | Use             |
|---------------------------------|----------------------|--------|--------------------|-----------------|
| Stachytarpheta jamaicensis      | Jatia                | Herb   | Tropical America   | Medicinal       |
| Gentianales Apocynaceae         |                      |        |                    |                 |
| Allamanda blanchetii            | Shrub                |        | Tropical America   | Ornamental      |
| Allamanda cathartica            | Shrub                |        | Tropical America   | Ornamental      |
| Carissa carandas                | Kerenda koli         | Shrub  | Native             | Edible/ Medicinal |
| Carissa spinarum                | Anku koli            | Shrub  | Native             | Edible/ Medicinal |
| Ichnocarpus frutescens          | Madhobi              | Shrub  | Native             | Medicinal       |
| Telosma pallida                 | Tokeikundhei         | Climber| Native             | Edible          |
| Rubiaceae                       |                      |        |                    |                 |
| Benkara malabarica              | Phiriki              | Shrub  | Native             | Medicinal       |
| Dentella repens                 |                      | Herb   | Native             | Medicinal       |
| Mussaenda frondosa              | Shrub                |        | Native             | Medicinal/ Ornamental |
| Mussaenda frondosa              | Shrub                |        | Native             | Medicinal/ Ornamental |
| Boraginaceae                    |                      |        |                    |                 |
| Cordia myxa                     | Guanlo               | Tree   | Native             | Ritual/ Medicinal |

during monsoons, dust storms in summer and cyclone proneness.

**Data collection**

To assess the diversity of angiosperms, field surveys were conducted monthly in different seasons (rainy, winter and summer) from July 2016 to July 2020. During field visits, plant samples were collected and photographs of plant species were taken from agricultural lands, wastelands, roadsides, railway tracks, parks, lawns, ponds, river banks and other appropriate places to cover almost whole district in a systematic manner. Information was collected from the respondents, especially the local farmers, elderly people, and local healers through interviews following standard procedures\(^{16,26}\). The questionnaire used was a semi-structured type followed by free interviews and informal conversations. Plant species were identified with the help of previous scientific literature\(^{12,41}\) and with live specimens on the field itself. However, plant samples were identified in the laboratory. During the survey, important taxonomic parameters such as vernacular names, botanical names, flowering time, and family were recorded from the respondents. The ecological parameters noted were the habit and habitat of the species. The economic uses of these species if any were discussed with the local people. The plant list was categorized according to their systematic positions following the APG IV\(^3\) classification system.

Altogether 141 species (81 native species and 60 exotic species) belonging to 115 genera distributed in 48 families from 23 orders and three major clades
Fig. 1: a. *Adenanthera pavonina*, b. *Allamanda blanchetii*, c. *Alternanthera paronichyoides*, d. *Alternanthera philoxeroides*, e. *Ammannia baccifera*, f. *Anisomeles indica*, g. *Argyreia cymosa*, h. *Azima tetracantha*, i. *Basilicum polystachyon*, j. *Benkara malabarica*, k. *Callistemon citrinus*, l. *Calyptocarpus vialis*. 
Fig. 2: a. Canavalia gladiata, b. Carissa carandas, c. Cayratia pedata, d. Cayratia trifolia, e. Celosia argentea, f. Clerodendrum thomsoniae, g. Cordia myxa, h. Crinum latifolium, i. Crotalaria quinguefolia, j. Crotalaria verrucosa, k. Cucumis melo, l. Cyanotis axillaris.
Fig. 3: a. *Desmodium gangeticum*, b. *Drypetes roxburghii*, c. *Ficus benjamina*, d. *Ficus racemosa*, e. *Garcinia xanthochymus*, f. *Gmelina philippensis*, g. *Heliconia psittacorum*, h. *Hemigraphis hirta*, i. *Hibiscus cannabinus*, j. *Hydrolea zeylanica*, k. *Hygrophila difformis*, l. *Hyptis suaveolens*. 
Fig. 4: a. Ichnocarpus frutescens, b. Impatiens balsamina, c. Indigofera linnaei, d. Indigofera linifolia, e. Ipomoea hederifolia, f. Ipomoea indica, g. Ipomoea obscura, h. Ipomoea nil, i. Ipomoea pes-caprae, j. Ipomoea quamoclit, k. Justicia procumbens, l. Limnophila indica.
Fig. 5: a. Lindernia antipoda, b. Melia azedarach, c. Melastoma malabathricum, d. Micrococca mercurialis, e. Mucuna monosperma, f. Mukia maderaspatana, g. Parkinsonia aculeate, h. Peristrophe bicalyculata, i. Phyllanthus virgatus, j. Phyla nodiflora, k. Physalis minima, l. Polygala arvensis.
Fig. 6: a. *Portulaca pilosa*, b. *Pupalia lappacea*, c. *Pyrostegia venusta*, d. *Quisqualis indica*, e. *Rivinahumilis* f. *Ruellia tuberosa*, g. *Rungina pectinata*, h. *Sauropus bacciformis*, i. *Stachytarpheta jamaicensis*, j. *Suregada multiflora*, k. *Thespesia lampas*, l. *Uraria picta*.
Results and Discussion

Commelinids (25 spp.), and Malvids (12 spp.) were the major groups representing a total of 116 taxa that constitute 82.3% of the flora. An analysis of the floristic diversity denoted that the family Fabaceae dominated the flora with 14 species, followed by Convolvulaceae (10 species), Acanthaceae (9 species) and Poaceae 7 species. The predominance of the family Fabaceae is also reported. The dominant genus of the flora was Ipomoea (6 spp.). The life form composition analysis showed that herbs dominated the flora of Bhadrak district with a total of 81 species (57.4%), followed by climbers with 22 species (15.6%), trees with 21 species (14.9%) and shrubs with 17 species representing 12.1% of the flora. Worldwide, a good number of plant species are in multipurpose use for instance as food, fodder, medicine, rituals and many more. In the present study, out of 141 species, 63% were used for medicinal purposes. Prominent species among them were Basilicum polystachyon, Commelina diffusa, Desmodium gangeticum, Euphorbia prostrata, Hyptis suaveolens, Ipomoea hederifolia L., I. nil, I. obscura, Ipomoea quamoclit, Suregada multiflora, Luffa cylindrica, Melia azedarach, Phyla nodiflora, Physalis minima, Sphenoclea zeylanica. These plants are utilized to cure various ailments such as anthelmintic, anti-inflammatory, asthma, cough, colic and stomach ache, diabetes, eye irritation, conjunctivitis and other eye problems like ophthalmia, fever, gastrointestinal disorders, gynaecology, leprosy, nausea, skin diseases, sores, swellings, ulcers, urinary disorders, rheumatism, wounds, and vomiting. The medicinal properties of the reported plants are also recorded in other studies. Similarly, some of the reported species, for instance, Amaranthus tricolor, Carissa carandas, Cucumis melo, Garcinia xanthochymus, Phyllanthus acidus, Saurous bacciformis, Telosma pallida were used for edible purposes. The edible uses of different parts such as leaves, flowers, and fruits of these plants were reported by various scholars. It was observed that 14.2% of recorded species were used for ornamental purposes; examples include, Aglaonema commutatum, Dieffenbachia seguine, Epipremnum aureum, Licuala grandis and Syngonium podophyllum. My findings in the current investigation are concomitant with previous studies. Similarly, plant species such as Alternanthera philoxeroides, Alysicarpus vaginalis, Brachtiaria mutica, Lindernia antipoda, Myriostachya wightiana. were used as feed for animals. The line of my results substantiates the earlier studies. Plant species like Saccharum munja Roxb. and Cordia myxa L. have great significance attached to the traditional agricultural rituals of the district. These plants are put by the farmers in the rice field during Garbhana Sankranti (Tula Sankranti) festival; celebrated on the first day of the solar month of Kartika. The name Garbhana Sankranti is attributed to the time of fertilization of the rice in the fields. The farmers pray to the goddess Lakshmi, believed to be the authority for the rice plants' wealth, prosperity, and fertility. This creates a linkage between agriculture and the rituals of the district.

Conclusion

The present study makes a significant contribution towards understanding floristic richness in Bhadrak district along with traditional knowledge-based information which can be helpful in providing sustainable utilization of resources. Despite the multipurpose significance, several ongoing anthropogenic factors (urbanization, overexploitation, deforestation, and habitat destruction) play a negative role in the survival of common taxa. Moreover, the recurring natural calamities that occur regularly on the Bay of Bengal coast also affect plant diversity. Biodiversity conservation requires balancing the needs of people and long-term sustenance within the natural habitats, which requires implementation of effective protection measures. It is imperative to develop strategic steps such as the involvement of local communities in management, regular monitoring, awareness programmes and collaborative research for the conservation of the phytodiversity of the region.

References

1. Acharya PK, Debata AK, Panda PC. Occurrence of Passiflora suberosa Linn.(Passifloraceae) in Orissa-A new plant record for Eastern India. Journal of Economic and Taxonomic Botany. 2009; 33(2): 423-425.
2. Ali S, Shrivastava P, Jazib Mod Junaid. Traditional use of medicinal plants: First record of Ethnomedicinal plants of Azmatabad village, Thahnamandi, District Rajouri (J. & K.). Flora and Fauna. 2022; 28(2): 197-294.
3. APG IV. An update of the angiosperm phylogeny group classification for the orders andfamilies of flowering plants. Botanical Journal of the Linnean Society. 2016; 181(1): 1-20.
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4. Behera SK, Mishra MK. 2007 Floristic analysis of the regenerating forest stands in Eastern Ghats of Orissa, India. *Indian Journal of Forestry*. 2007; 30: 343-348.

5. Biswal AK, Mandal KK, Reddy CS. *Uncaria sessilifructus* Roxb. (Rubiaceae): A new generic record for Odisha, India. *Annals of Plant Science*. 2013; 2(12):532-534.

6. Brooks R, Goldson-Barnaby A, Bailey D. Nutritional and medical properties of *Phyllanthus acidus* L. (Jimbilin). *International Journal of Fruit Science*. 2020; 20: 1-5.

7. Champion HG, Seth SK. A revised survey of the forest types of India. Manager Publications, New Delhi. 1968.

8. Chopra RN, Nayar SL, Chopra IC. *Glossary of Indian Medicinal Plants*. CSIR, New Delhi. 1956.

9. Chothani DL, Vaghasiy HU. A phyto-pharmacological overview on *Physalisminima* Linn. *Indian Journal of Natural Products & Resources*. 2012; 3: 477-482.

10. Dhaarani V, Sarvalingam A, Rajendran A. Medicinal uses of psammophytic plants in Tranquebar regions of Tamil Nadu, India. *J Herbs, Spices & Medicinal Plants*. 2018; 24(3) : 282-292.

11. Dwari S, Mondal AK. Studies on agrestal diversity in the sugarcane field of Howrah district, West Bengal, India: use as an important bioresource for human welfare. *International Journal of Biodiversity Conservation*. 2011; 3(13) : 686-704.

12. Haines HH. *The Botany of Bihar and Orissa*. Adland and Son, West Newman Ltd., London. 1925.

13. Haywood VH. Conservation of germplasm of wild species. In conservation of germplasm of Biodiversity for sustainable development. Scandinavian University Press, Oslo. 1992.

14. Hooker JD, Thomson T. *Flora Indica*. Reprinted Cambridge University Press, London. 1985.

15. Hooker JD. *The Flora of British India*. 7 vols. Reeve and Co., London. 1897.

16. Huntington HP. Using traditional ecological knowledge in science: Methods and applications. *Ecological Applications*. 2000; 10 : 1270–1274.

17. Irwin SJ, Thomas S, Rathinaraj P, Narasimhan D. Angiosperm diversity of the Theosophical Society campus, Chennai, Tamil Nadu, India. *Check List*. 2015; 11(2) : 1-36.

18. Jena GSJP, Mishra R, Satapathy KB. Four new flowering plant records from Koraput district of Odisha, India. *IOSR Journal of Pharmacy & Biological Science*. 2018; 13(4) : 23-28.

19. Kar T, Mohan M, Mandal KK. *Disperis* and *Epipogium* (Orchidaceae): Two new generic records for the flora of Odisha. *Nelumbo*. 2017; 59(2): 159-163.

20. Kallianpur SS, Gokarn RA, Rajashekhar N. Identity of *lankari* (*Physalis minima* Linn.) in Ayurvedic classics: A literature review. *Ancient Science of Life*. 2016; 36(1):6-11.

21. Kanakhara RD, Rudrappa HC, Shukla VJ, Acharya R. Detailed pharmacognostical and analytical profile of *Telosma pallida* (L.) Kurz. (leaf): A folklore medicinal plant of Gujarat State. *Ancient Science of Life*. 2018; 37: 120-126.

22. Kumari P, Kumari C, Singh PS. Phytochemical screening of selected medicinal plants for secondary metabolites. *International Journal of Life Science Research*. 2017; 3(4):1151-1157.

23. Kumar V, Akhtar M. Medicinal convolvulaceous plants of eastern Uttar Pradesh. *Indian Journal of Life Science*. 2013; 2(2): 63-65.

24. Mishra R, Jena GSJP, Satapathy KB. New distributional records of five angiospermic plant species for the flora of Odisha from Kotpad block of Koraput district. *International Journal of Research & Analytical Reviews*. 2018b; 5(3):330-336.

25. Mishra R, Jena GSJP, Satapathy KB. *Crassocephalum* Moench (Asteraceae) an invasive alien genus: a new record for the state of Odisha, India. *International Journal of Current Advanced Research*. 2018a; 7(6K):13859-13861.

26. Martin GJ. *Ethnobotany: A methods manual*. Chapman and Hall, London, 1995.
27. Mooney HF. Supplement to the Botany of Bihar and Orissa. Catholic press, Ranchi. 1950.
28. Murugan P, Kalidass C, Panda PC. *Acmella uliginosa* (Sw.) Cass. (Asteraceae): note on extended distribution to Odisha, India. *Journal of Economic & Taxonomic Botany*. 2015; 39(3-4):407-410.
29. Panda T, Pradhan BK, Mishra RK, Rout SD, Mohanty RB. Angiosperm diversity in Bhadrak region of Odisha, India. *Journal of Threatened Taxa*. 2020; 12(3): 15326–15354.
30. Partap S, Kumar A, Sharma NK, Jha KK. *Luffa cylindrica*: An important medicinal plant. *Journal of Natural Product Plant Resources*. 2012; 2(1): 127-134.
31. Parthipan B, Rajeeswari M, Jeeva S. Floristic diversity of south Travancore Hindu College (S. T. Hindu College) campus, Kanyakumari district (Tamil Nadu) India. *Bioscience Discovery*. 2016; 7(1): 41-56.
32. Patnaik SR. Orissa Today. An annual survey (Eds.), Sun-Times, Bhubaneswar. 1996.
33. Pattanaik C, Reddy CS, Dhal NK, Das R. Utilization of mangrove forest in Bhitarkanika wildlife sanctuary, Orissa. *Indian Journal Traditional Knowledge*. 2008; 7(4): 598-603.
34. Pergl J, Sadlo J, Petrik P, Danihelka J, Chrtek Jr, Hejda M, Moravcova L, Perglova L, Stajerova K, Pysek P. Dark side of the fence: ornamental plants as a source of wild-growing flora in the Czech Republic. *Preslia*. 2016; 88: 163–184.
35. Preeti, Raju PN. Comprehensive overview of *Cucumis melo*. *The Pharma Innovation Journal*. 2017; 6(10): 181-186.
36. Rastogi S, Pande MM, A.K.S. Rawat AKS. An ethnomedicinal, phytochemical and pharmacological profile of *Desmodium gangeticum* (L.) DC. and *Desmodium adscendens* (Sw.) DC. *Journal of Ethnopharmacology*. 2011; 136(2): 283-296.
37. Reddy CS, Pattanaik C. *Gomphostemma eriocarpum* Benth. (Lamiaceae) - A new record for the Eastern Ghats, India. *Journal of Threatened Taxa*. 2011; 3(10): 2147-2150.
38. Rout S, Sen S, Satapathy SK. An ethnobotanical survey of medicinal plants in Semiliguda of Koraput district, Odisha, India. *Research Journal of Recent Science*. 2013; 2(8):20-30.
39. Roxburgh W. Plants of the coast of Coromandel. London. 1819.
40. Saravanan R, Dhole PA, Sujana KA. *Dysoxylum* (Blume) - new generic record to Odisha, India. *International Journal of Advanced Research*. 2014; 2(8):543-545.
41. Saxena HO, Brahmmam M. The Flora of Orissa. Vol. I-IV. Orissa Forest Development Corporation, Bhubaneswar. 1996.
42. Srivastava D. Medicinal plants of genus *Ipomoea* found in Uttar-Pradesh, India. *Research Journal of Recent Science*. 2017; 6(12):12-22.