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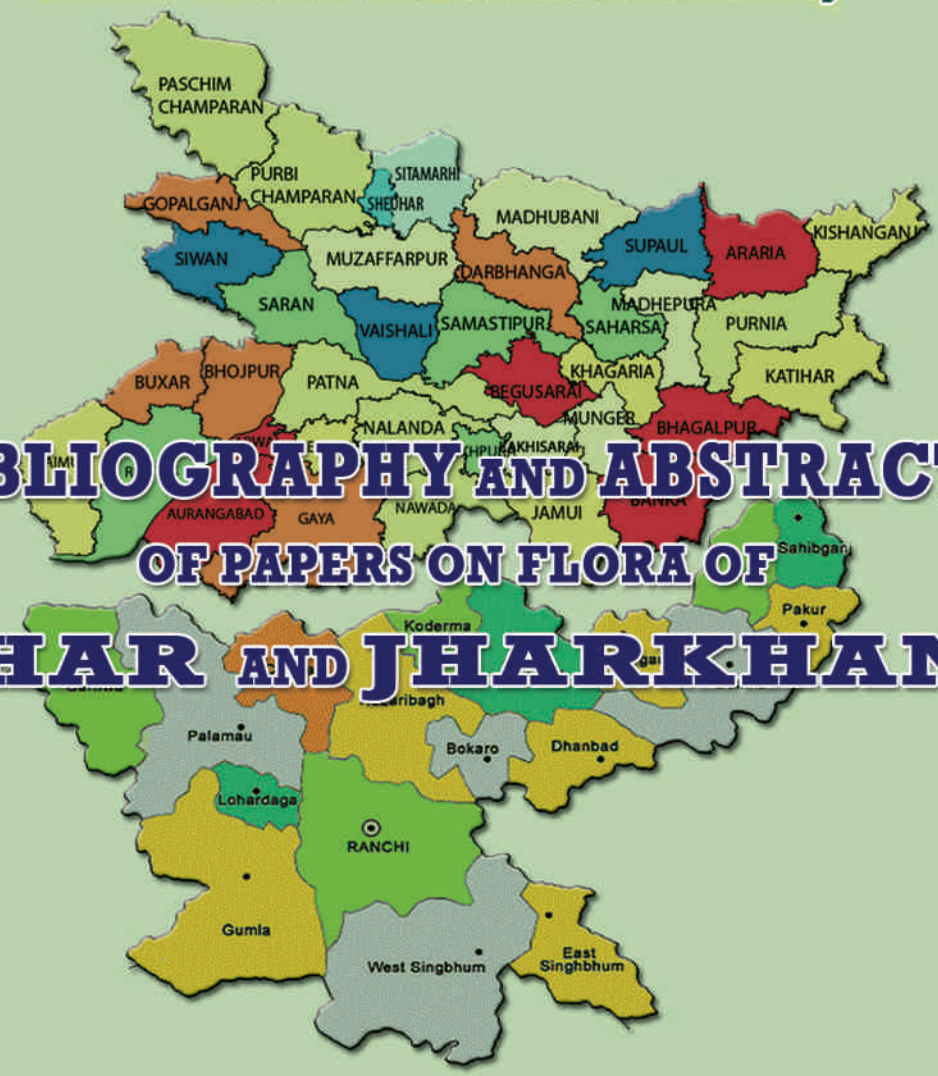

BIBLIOGRAPHY AND ABSTRACTS OF PAPERS ON FLORA OF BIHAR AND JHARKHAND

Ministry of Environment, Forest & Climate Change

ENVIS Resource Partner on Biodiversity

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BOTANICAL SURVEY OF INDIA

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MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

2018

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Compiled by

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&
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under ENVIS Programme

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2018

ISBN 978-81-934758-5-0

ENVIS

Government of India

Ministry of Environment, Forest and Climate Change

EI Division

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- Economic Advisor : Mr. Yashvir Singh
- Website : http://www.envis.nic.in

BSI ENVIS RESOURCE PARTNER ON BIODIVERSITY

Botanical Survey of India

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- Study Area : Floral Diversity
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Published by the Director, Botanical Survey of India, BSI ENVIS RP on Biodiversity, Botanical Survey of India, Central National Herbarium, P.O. Botanic Garden, Howrah 711103, West Bengal.

FOREWORD

The ENVIS Centre on Floral Diversity of the Botanical Survey of India has been publishing Bibliography and Abstracts of Papers pertaining to Floras of States and Union Territories of India. In this attempt, the Centre has already published consolidated bibliography and abstracts of papers on flora of West Bengal (in two parts), North East India I, Andaman and Nicobar Islands, Maharashtra, Kerala, Tamil Nadu, Karnataka, Goa, Andhra Pradesh (including Telangana), and Odisha. In continuation to this series of publication, compilation of wide range of papers pertaining to the flora of Bihar and Jharkhand states has been compiled by the ENVIS Resource Partner.

In the year 2000, the erstwhile state of Bihar was bifurcated into two independent states namely Bihar and Jharkhand. The two distinct geographical regions, the Chota Nagpur and the Santal Parganas were demarcated as the state of Jharkhand. The state of Bihar, located in the eastern part of the country, is lying between 24°20'10"27°31'15" N and 83°19'50"88°17'40" E, and bounded by Nepal in the north and by Jharkhand in the south. The state covers a total geographical area of 94,163 km^2, whereas Jharkhand, the forest and mineral rich state in India, lies between 22°00'24°37' N and 83°15'87°01' E, and has a total geographical area of 79,714 km^2.

These two states with diverse topography and variable climatic conditions support a rich and varied flora. In fact, this region is predominantly of a fertile alluvial plain, occupying the Gangetic Valley, and the plains extend from the Himalayan foothills in the north. According to "India State of Forest Report 2015", the forest-covered area of Jharkhand constitutes 29.4% of total geographical area of the state, whereas forest cover in Bihar constitutes only 7.73% of total geographical area of the state. These two states majorly support Sal forest, deciduous forest or scrub, and bamboo brakes. The analysis on the angiospermic flora of Bihar (undivided state) by the personnel of Botanical Survey of India in 2001 reported the occurrence of 2963 species of angiosperms under 1151 genera belonging to 186 families in the state.

Jharkhand and Bihar are an abode of about 60 different tribes, and Jharkhand is one of the Indian states with large population of tribal communities. Approximately 50% of population in these states is dependent on forests and their biological resources. To protect and conserve the existing biodiversity of these two states, the Government of India has established altogether 23 Wildlife Sanctuaries (12 in Bihar and 11 in Jharkhand), two National Parks (one in each state), two Tiger Reserves (one in each state) and one Elephant Reserve (in Jharkhand).

The present work was initiated with an objective to compile the scattered literature, and prepare a comprehensive bibliography and abstracts of research articles, floras/books/chapters in books/theses/reports pertaining to the vegetation and flora of Bihar and Jharkhand states. This present issue of bibliography and abstracts of papers on flora of these two states consists a total of 741 references, including 234 on flora, vegetation, and forestry and ecology, 124 references on fungi, lichens and algae, and other non-flowering plant groups and gymnosperms, 81 references on revision, monograph, new discovery, new reports and rediscovery, 08 references on endemism, IUCN threat status and conservation, and 294 references on ethnobotany, sacred groves and medicinal plants. An electronic version of this publication will be made available on BSI-ENVIS website (www.bsienvis.nic.in).

Botanical Survey of India
Kolkata

(**Paramjit Singh**)
Director

INTRODUCTION

The former undivided state of Bihar (21°55'10"–27°31'15" N and 83°19'50"–88°17'40" E) was bounded in the north by the international boundary of Nepal, in the south by the state of Orissa (now Odisha), in the east by the state of West Bengal and in the west by the states of Uttar Pradesh and Madhya Pradesh, and covered a total geographical area of 1,73,877 km^2. In the year 2000, the erstwhile state of Bihar was bifurcated into two independent states namely Bihar and Jharkhand. The two distinct geographical regions, the Chota Nagpur and the Santal Parganas were demarcated as the state of Jharkhand.

BIHAR

Bihar is an entirely land-locked state, located in the eastern part of the country, and lying between 24°20'10"–27°31'15" N and 83°19'50"–88°17'40" E. It is bounded by Nepal in the north and by Jharkhand in the south. The state covers a total geographical area of 94,163 km^2. The plains of the state divided into two unequal halves by the river Ganga, which flows through the middle from west to east. However, the state is administratively divided into 38 different districts. Patna is the capital city of the state, situated on the bank of the river Ganga.

Topography and Soil: The topography of the state is predominantly of a fertile alluvial plain, occupying the Gangetic Valley; the plains extend from the Himalayan foothills in the north to a few miles south of the river Ganges as it flows through the state from the west to the east. There are three major types of soils found in the state, they are: (i) Piedmont swamp soil (in north-western part of West Champaran district), (ii) Terai soil (northern part of the state along the border of Nepal) and (iii) the Gangetic alluvium (the plains are covered by new as well as old Gangetic alluvium).

Climate: Being situated in the tropical and subtropical region, the state exhibits a continental monsoon type of climate. The state receives rainfall from Southwest monsoon during June to September, and the retreating southwest monsoon during October–November, and the state receives an average annual rainfall of about 1200 mm; the climate is cold during December–February and hot from March to May.

Water Resources: Water resource of Bihar is rich with both the ground water and the surface water resources. River Ganga and its tributaries namely Saryu (Ghaghra), Gandak, Budhi Gandak, Bagmati, Kamla-Balan and Mahananda are the major water resources of the state. Besides, there are some other rivers, Sone, Uttari Koyal, Punpun, Panchane and Karmnasha, which meet in Ganges or its associate rivers.

Indigenous Tribal Communities: There are about 30 different tribal communities in the state of Bihar; Santal, Oraon, Kharwar, Gond, Munda, Lohara, Kisan and Kora are the major tribal communities with large population (with above 10,000 to more than one lakh) in the state (Bhatt & Bhargava, 2006a). The tribal population constitutes only 0.91% of the total population of the state.

Vegetation/Forest: The state has a total of 7,288 km^2 are under forest cover (FSI, 2015), which constitute 7.73% of total geographical region of the state. There are different recognised vegetation/forest types in the state (as per the revised classification of forests in India by Champion & Seth (1968), they are: (i) Cane brakes, (ii) Bhabar Dun Sal Forest, (iii) West Gangetic Moist Mixed Deciduous Forest, (iv) Eastern Wet Alluvial Grassland, (v) Dry Siwalik Sal Forest, (vi) Dry Peninsular Sal Forest, (vii) Northern Dry Mixed Deciduous Forest, (viii) Dry Deciduous Scrub, (ix) Boswellia Forest, and (x) Dry Bamboo Brakes (FSI, 2015).

Protected Areas: The state has 12 Wildlife Sanctuaries and one National Park, constitute 3.44% of its total geographical area. It also has one Tiger Reserve (Valmiki) that covers 899.38 km^2 area.

JHARKHAND

Jharkhand, a forest and mineral rich state in India, formed as a separate state after bifurcation of the erstwhile state of Bihar in the year 2000, and comprises two distinct regions namely the Chota Nagpur and the Santal Parganas. It lies between 22°00'–24°37' N and 83°15'–87°01' E. The state has a total geographical area of 79,714 km^2.

Topography and Soil: The state possesses undulating tracts, hills and ridges ranging from 300 to 900 m, and major part of the state lies on the Chota Nagpur plateau. There are many valleys and basins of rivers. Five different types of soils can be recognised in the state, they are: (i) Red soil (mostly in the Damodar valley and Rajmahal areas), (ii) Micacious soil, containing particles of mica (found in Koderma, Jhumri Telaiya, Barkagaon and areas adjacent to Mandar hill), (iii) Sandy soil (Hazaribagh and Dhanbad), (iv) Black soil (Rajmahal area) and (v) Laterite soil (western part of Ranchi, Palamau and parts of Santal Parganas and Singhbhum).

Jharkhand is a part of the Indian peninsular shield, which is stable cratonic block of the earth's crust. The state is known for its diversified geological set up. Geologically, Jharkhand consists of different types of rock formations ranging from Precambrian to Cenozoic era. The most predominant hard rocks in the state comprise of the Archaean metamorphic with associated intrusive and sedimentary belonging to Vindhyan and Gondwana Super Group with associated igneous rocks. The Raj Mahal hills, lying in the north-eastern extremity of the Chotanagpur Plateau consists of Jurassic volcanic lava flows.

Climate: The state exhibits three well-defined seasons: summer (March–mid-June), rainy monsoon (mid-June–October) and winter (November–February). During summer, May used to be the hottest month with temperature ranging from 25°C to 40°C (mean temperature 32°C), except in the extreme north and plateaus of Ranchi and Hazaribagh districts. January used to be the coldest month with temperature ranging from 6°C to 22°C (mean temperature 14°C). The average annual rainfall varies between 100 cm in the west-central to more than 150 cm in the extreme north and in the south-west.

Water Resources: The Chota Nagpur plateau is the source of the major rivers of the state namely Koel, Damodar, Brahmani, Kharkai and Subarnarekha.

Indigenous Tribal Communities: The state is an abode of many indigenous tribal communities. In fact, it is one among the Indian states with large population of tribal communities. The population of tribal communities in the state constitutes 26.30% of state's total population (Bhatt & Bhargava, 2006b). There are 30 different tribal communities in the state; Santal, Oraon, Munda, Ho, Kharwar, Bhumij, Kharia, Lohra, Mahli and Mal Pahariya are the larger tribal communities with more than one lakh population each, besides there are many other indigenous tribal communities in the state namely Bedia, Karmali, Gond, Chick Baraik, Kisan, Korwa, Parhaiya, Sauria Paharia, Asur and Birhor. Majority of these tribal communities especially those inhabiting in the woodlands are utilizing the available wide range of wild plant resources for various purposes.

Vegetation/Forest: According to State of Forest Report, the total forest cover of the state is 23,478 km^2 (FSI, 2015), which constitute 29.45% total geographical area of the state. There are five different forest types (as per the revised classification of forests in India by Champion & Seth (1968) in the state, they are: (i) Moist Peninsular low level Sal forest, (ii) Dry Peninsular Sal forest, (iii) Northern Dry Mixed Deciduous forest, (iv) Dry Deciduous Scrub, and (v) Dry Bamboo Brake (FSI, 2015).

Protected Areas: There are 11 Wildlife Sanctuaries and one National Park in the state that cover an area of about 2,182.15 km^2 and constitute 2.74% of the total geographical area of the state. Palamau is the only Tiger Reserve, located in the state covering an area of 1,026 km^2 (FSI, 2011), and Singhbhum is the only Elephant Reserve in the state that covers an area of 4530 km^2.

Botanical History (Bihar and Jharkhand): The rich vegetation and floristic diversity of the region have attracted the attention of number of explorers in the past. Hooker (1848) was the first botanist who made sporadic collections in the Parasnath hills to study the flora of Bihar. Anderson (1863) published an account on the flora of Bihar based on the collections of Hooker, Edgeworth and Thomson and also of his own. Subsequently, Ball (1866, 1867, 1869) made a study on the flora of Manbhum and Hazaribagh with particular reference to the food plants of the natives. Campbell (1886) had collected plants over 30 years in Chotanagpur region for his noteworthy work "The Descriptive Catalogue of Economic Products of Chutianagpur". Wood (1906) and Haines (1910) also did extensive work in Chotanagpur plateau and published a comprehensive account entitled, "A Forest Flora of Chotanagpur" in which a total of 275 species were recorded from Singhbhum. However, his most notable work was "Botany of Bihar and Orissa" which appeared in six parts during 1921–1925 in which 813 species from Singhbhum were reported. Later, a number of other botanists namely Bodding (1927), Biswas (1934, 1935), Mooney (1937, 1938, 1941, 1944, 1947, 1950), Mukherjee (1947, 1956), Bressers (1951), Ara (1954, 1960, 1966), Srivastava (1954, 1955a,

b, 1956a, b, 1958a–c, 1959, 1961), Sanyal (1957), Bhardwaja (1958), Jha (1965), Thothathri (1965), Thothathri & al. (1966), Kanodia & Malick (1966), Panigrahi (1966), Srivastava & al. (1966), Banerjee & Banerjee (1969), Mishra (1985), Meher-Homji (1971), Majumdar & Biswas (1971), Paul (1966, 1967, 1973, 1976, 1978, 1984, 1990), Jain & al. (1975), Paul & Prasad (1978), Raizada (1978), Biswas & Maheswari (1980), Paria & Chattopadhyay (2000, 2005), Singh & al. (2001), Sharma & Sarkar (2002) and others have extensively surveyed various areas and have made significant contributions on the flora and vegetation of Bihar and Jharkhand states.

Recently, some of the scientific officials of Botanical Survey of India explored some of the Protected Areas in the state of Jharkhand and comprehensively documented the plant diversity in the respective Protected Area: Magesh (2013) explored the flora and different habitats of Dalma Wildlife Sanctuary reported 417 taxa (including 412 species, 2 subspecies and 3 varieties) in 317 genera belonging to 94 angiospermous families, besides, 8 species of pteridophytes from the wildlife sanctuary; Mastakar (2018) reported a total 480 taxa of angiosperms belonging to 332 genera under 98 families, besides, 12 species of pteridophytes belonging to 8 genera under 4 families from Palkot Wildlife Sanctuary situated in the districts of Gumla and Simdega districts and Biswa (2018) explored the angiospermic flora of Koderma Wildlife Sanctuary, and recorded 437 taxa (432 species and 5 varieties) in 332 genera belonging to 100 families, and also reported 8 species of pteridophytes.

Plant Diversity: As there is no separate flora of Jharkhand and Bihar, no authenticate account on the species diversity of these two states is available separately. The details on the plant diversity of this region (the undivided Bihar state) are provided here on the basis of earlier publication. Singh & al. (2001) in their analysis on the Flora of Bihar (undivided state) enumerated a total of 2963 species under 1151 genera belonging to 186 families, of which 857 species in 276 genera and 38 families belong to monocotyledons and 2106 species in 875 genera and 148 families belong to dicotyledons. The analysis also revealed that the grass family Poaceae with 342 species is the largest among the angiospermic families, followed by Fabaceae (221 spp.), Asteraceae (152 spp.), Cyperaceae (140 spp.), Euphorbiaceae (105 spp.), Orchidaceae (100 spp.), Acanthaceae (94 spp.), Rubiaceae (87 spp.), Lamiaceae (71 spp.) and Scrophulariaceae (69 spp.), and among the genera, the genus *Cyperus* with 35 species is the largest genus, followed by *Ficus* (31 spp.), *Crotalaria* (30 spp.), *Fimbristylis* (27 spp.), *Euphorbia* (25 spp.), *Cassia* (23 spp.), *Ipomoea* and *Eragrostis* (21 spp. each), *Indigofera* (18 spp.) and *Leucas* (17 spp.).

Endemic and Rare Plants: According to Singh & al. (2001) there are only 15 taxa known to be endemic to the region, they are: *Clematis roylei* var. *patens*, *Carum villosum, Sophora bakeri, Tetrastigma alcicorne, Swertia angustifolia* var. *pyramidalis, Zingiber purpureum* var. *palamaunsis, Ligusticum alboalatum, Leucas helicterifolia, Agrostis brachiata, Leucas lanata* var. *nagpurensis, Chrysopogon hamiltonii, Dendrocalamus strictus* var. *sericeus, Dimeria ornithopoda* var. *gracillima, Iseilema holei* and *Lophopogon kingii*.

Besides, there are some other taxa which are endemic to Bihar and also its adjoining states, they are: *Acacia pseudoeburnea*, *Albizia thompsonii* var. *galbana*, *Alysicarpus roxburghianus*, *Apocopis vaginata*, *Chrysopogon lancearius*, *Crotalaria pusilla*, *C. quinquefolia*, *C. globosa*, *C. topouensis*, *Cymbopogon gidarba*, *Desmodium benthamii*, *Dimeria connivens*, *Eragrostiella brachyphylla*, *E. nardoides*, *Erythrina resupinata*, *Euclasta clarkei*, *Hardwickia binata*, *Ischaemum duthiei*, *I. hirtum*, *Mnesithea clarkei*, *Pseudoraphis minuta*, *Pterocarpus marsupium* var. *acuminata*, *Themeda strigosa* and *Tripogon capillatus*. About 250 species are rare in distribution.

Plants of Economic Importance: The forests in these states are the repositories of a variety of raw materials which include major and minor forest produces. Timber is the principal major forest resource, and there are many arboreal species that yield good timber (both hard and soft wood). Some of them are: *Dalbergia latifolia*, *D. sissoo*, *D. lanceolaria*, *Gmelina arborea*, *Lagerstroemia pavriflora*, *Pterocarpus marsupium*, *Shorea robusta*, *Terminalia alata*, *T. arjuna*, *T. chebula*, *Bombax ceiba*, *Erythrina variegata* and *Haldina cordifolia*. This region also has good population of variety of bamboo species, which are the source of valuable raw material for paper pulp and rayon production.

These two states possess wide range of minor forest produces, which play an important role in the livelihood support of tribal and forest dwellers in terms of subsistence and income generation. The indigenous people belonging to various communities are engaged in the collection of leaves, barks, gums, roots, flowers, fruits and entire plants from the forest areas for their livelihood. Approximately 50% of population is dependent on forests and their biological resources.

The seeds of *Shorea robusta* are made into cakes and used as a good cattle feed. Leaves of *Diospyros melanoxylon* (locally well-known as 'Kendu'), and of other species namely *Bauhinia racemosa, Butea monosperma, Diospyros malabarica* and *Shorea robusta* are used in wrapping beedis. *Butea monosperma, Bauhinia variegata, Mallotus philippensis, Mangifera indica, Morinda pubescence* and *Woodfordia fruticosa* are some of the dye yielding plants found in the region. The flowers of *Butea monosperma*, which yield a non-toxic natural colour, are used by the villagers during Holi festival.

Madhuca longifolia is widely used by the locals for making fermented drink called 'Mauha'. *Asparagus racemosus, Croton persimilis, Phoenix sylvestris* and *Pogostemon benghalensis* are the other species used in local drinks. Apart, there are a variety of medicinal plants in the forest areas used by various indigenous tribal communities for different ailments. *Achyranthes aspera, Amaranthus spinosus, Aristolochia indica, Curculigo orchioides, Gmelina arborea* and *Plectranthus mollis* are used by the locals as antidote for snake bite and scorpion sting, and to treat bone fractures *Gardenia gummifera* and *Tinospora cordifolia* are used. For treating cough, cold, asthma and bronchitis *Abrus precatorius, Achyranthes aspera, Adhatoda zeylanica* and *Chrozophora prostrata*, and for curing jaundice *Aegle marmelos, Cochlospermum religiosum* and *Gardenia turgida* are used by the locals. Likewise, many plant species are used by the locals and tribal communities for treating various ailments.

Conservation: Biodiversity of this region faces various threats. Illegal mica mining, illicit felling of trees, artificial forest fires and invasion of alien species, illegal poaching and conversion/encroachment of forest areas for cultivation are some of the major threats. Illegal mica mining in some of the Protected Areas of Jharkhand state leads to fragmentation of habitats, and the resultant fallow land is immediately colonised by the invasive species such as *Lantana camara, Argemone mexicana, A. ochroleuca. Buchanania cochinchinensis* and *Shorea robusta* are illegally felled in large number by the locals for fuel, firewood and timber and also for thatching and fencing purposes.

Cattle-grazing has been another serious problem posing an immense pressure on the ground vegetation of forest ecosystems. *Acmella paniculata, Chromolaena odorata, Hyptis suveolens, Lantana camara* and *Parthenium hysterophorus* are some of the alien invasive species found naturalized and competing with the native species in the forests. Similarly, the freshwater lakes and ponds in the region are completely invaded by *Eichhornia crassipes* and *Spirodela polyrhiza*. These weeds need to be controlled and their spread has to be monitored regularly. Illegal hunting of wild animals by tribal communities, and human interference mostly due to tourism also pose serious threat to the biodiversity of Protected Areas in both states.

A periodic monitoring by the personnel of the State Forest Department of both Bihar and Jharkhand and implementation of proper and effective conservation measures and strategies are necessary to protect and conserve the existing biodiversity of the region. Furthermore, awareness should be created by the government and non-governmental organisations through educating the local communities about the importance of conserving the flora, and fauna and sustainable utilization of NTFPs (Non Timber Forest Produces), for the posterity and also to involve them in conservation activities.

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BIHAR AND JHARKHAND

Flora, Vegetation, Forestry & Ecology

1. **Abdali, A. & Kumar, K. 2016.** "Karyomorphological and stomatal studies of *Avena sativa* L. var. LO – 1 of Ranchi, Jharkhand". *Ranchi Univ. J. Sci. Technol.* 4(1): 7-–9.

   Abstract: The variety of *Avena sativa* L. was collected from Birsa Agriculture University, Ranchi, Jharkhand, for the studies on karyotype and stomatal characters. The variety was reported to show hexaploid set of 42 chromosome (2n = 2x = 42) and was asymmetrical in nature. Graminacious type of stomata was found in this variety of *Avena sativa* L. var. LO – 1 with variation in size and distribution.

2. **Agarwal, V. & Paul, S.R. 1992.** "Floristic elements and distribution pattern in the flora of Chotanagpur (Bihar), India". *Feddes Repert.* 103(5 & 6): 381–398.

   Abstract: Eight types of floristic elements are recognized in the flora of Chotanagpur Plateau (23.5°–24° N and 83°–86° E), Bihar, India. The Eastern-South Eastern-Australian elements (57 spp. – 30.97%) have been found to be dominant. Six taxa are endemic to the region. Six main types of distribution patterns, mainly based on Paul's (1991) study on phytogeography of Netarhat (Chotanagpur), Bihar has been recognized. The study reveals that montane plants have stronger links with northeastern and southern regions.

3. **Agarwal, V. & Paul, S.R. 1996.** "Biological spectrum of Chotanagpur flora". *Indian J. Forest.* 19(1): 35–39.

   Abstract: The account presents a biostatistical study of the Chotanagpur by the application of Raunkiaer's life-form classification as modified by Braun-Blanquet (1932). The phytoclimate of the region under study has been found to be geo-hydrophytic. The groups in order of importance are found to be therophytes (19.11%), lianas (7.10%), parasites (2.73%) and hemicryptophytes (1.63%).

4. **Ambasta, N. 2016.** *Flora of Gautam Buddha Wildlife Sanctuary, Hazaribagh, Jharkhand (India). Sedges and Grasses.* Scientific Publishers, Jodhpur.

   Abstract: The book provides a comprehensive taxonomic account of 110 taxa of the sedges and grasses in which 76 belong to the grasses (Poaceae) and 34 to the sedges (Cyperaceae). Identification keys at different taxonomic hierarchy have been provided. Illustrations and photographs are also given. The book represents not only systematic enumeration of the sedges and grasses but also provides medicinal uses of some of the plants practiced by the local inhabitants. Economic and ritual aspects of the plants have also been focused. The cultivated grasses as well as grasses used for forestation and much more have been discussed in this book.

5. **Ambasta, N. & Singh, C.T.N. 2009.** "Summer grasses of Gautam Buddha Wilife Sanctuary, Hazaribagh". *Advances Pl. Sci.* 22(II): *575–576.*

Abstract: The intervening months of the study (2006–08) witnessed a prolonged period of dry months. The area of our study, i.e., Gautam Buddha Wildlife Sanctuary is situated in the path of monsoon winds and experience rich rains in the month ofjune to October. However, the climate is markedly periodic and is usually characterized by a dry and increaseingly hot season from March to June. The area experiences dust and hail storm very rarely. Thunderstorms may occur usually during the hot months of April and May, sometimes accompanied by winds and heavy rains. During this period, I visited the sancturay fortnighty. At detailed study of the topogaphy, boundaries and vegetation (grasses and sedges) was carried out by me. The Sanctuary is situated in the Chouparan block of Hazaribagh district. It is flanked by Chandwara, Jhumari Telaiya, Barhi and likhori Block. Towards north-west lies Gaya district of Bihar. This paper deals with the survey of some grasses found in the hot months April to June in the Gautam Buddha wild life sanctuary, Hazaribagh. During the survey, 20 plant species of grasses and sedges were identified an enumerated. Their botanical names, families, location, distribution, size of plant and size of inflorescences have been presented.

6. **Ambasta, N. & Singh, C.T.N. 2010**. "Taxonomical study on *Aristida setacea* Retz., a veritable treasure for tribals of Hazaribagh district". *Biospectra* 5(1): 83–84.

Abstract: *Aristida setacea* Retz. is a perennial plant belonging to the family Poaceae. Its subfamily is Pooideae. The main characteristics of the subfamily being: mature spikelets breaking up, leaving more or, less persistent glumes on the pedicel or, if falling entire then not consisting of heteromorphous florets. Its subtribe is Aristideae. The principle characteristic of the subtribe being - annual or, perennials herbs, leaf blades not articulate on the sheath; lodicules 2; spikelets many flowered; awn trifid. *Aristida* is moderately tall grass measuring up to 150 cm. Its culms are erect, simple or sub-fastigiately branched. The leaves are filiform, convolute, scaberulous with finely projected tip. It measures around 30 cms at maximum in length and is at the most 2 mm broad. The plant is securely attached to the soil by strong and elaborate fibrous root system. The plant is gregarious and is eaten by cattle when young. It has ubiquitous distribution and can be located practically through out India. However it has a liking for red laterite soil of Jharkhand and is found to be growing through out the year in the ravines and hills of Hazaribagh district and also other districts of Jharkhand. The culms bear elaborate panicles of 18-36 cms length which appear to be inclined in one direction or the other. They appear contracted and the branches are scaberulous and fascicled. The spikelets bear typical three partite awns. The plant is of great economical use for the tribes and forest dwellers. The culms are used extensively for making brooms and those can be

located in virtually every house hold in Jharkhand, so much so that broom making from *Aristida* culms has been a sort of cottage industry of this region. The other notable uses to which this grass is lend is making of brushes, screens frames and ropes.

7. **Ambasta, N., Singh, C.T.N. & Chaudhary, S.B. 2009.** "Distribution and morphological studies of *Cyperus rotundus*, a perennial grass of Chouparan". *Biospectra* 4(1): 115–116.

Abstract: *Cyperus* are perennial or annual herbs. The rhizomes, if present are short or long creeping. Stems are usually trigonous or triquetrous, sometimes terete. Leaves are mostly clustered at the base, lowermost or sometimes all reduced to bladeless sheaths. Inflorescence is capitate or anthelate; bracts are usually several and formed an involucre. The outermost bract is the longest one. Spikelets are digitately arranged. They are linear lanceolate oval, one to many flower rachilla sometimes are winged. Flowers are all bisexual, with a one or few male. Perianths are absent. Stamen number one to three. Ovary is caducous. There are 2-3 stigmas. Fruit is a nut. It is lenticular, trigonous or triquetrous.

8. **Ambasta, N., Singh, C.T.N. & Kumar, J. 2011.** "*Vetiveria zizanioides* (L.) Nash, a significant grass of Jharkhand". *Biospectra* 6(2) (Special Issue): 223–226.

Abstract: Defilement of wafer and deterioration of aquatic ecosystems is as old as civilization. Yet urbanization and various developmental activities have led to irreversible changes in such ecosystems. As lakes are fragile ecosystem, they are more vulnerable to such problems than other water bodies. Pollution caused by anthropogenic activities affects physico-chemical characteristics of water, leading to destruction of aquatic communities, disruption of delicate food web and an overall deterioration of the lake environment. The paper deals with pollution indicators in the HUDCO lake of Jamshedpur, a well known industrial city of the state of Jharkhand, India. Studies were done both at biological and physico-chemical levels. The results showed that the HUDCO Lake has a high algal biodiversity. It is home to 56 members of Cyanophyta, 18 members of Chlorophyta, 4 of Charophyta and 20 of Bacillariophyta. The higher level of biodiversity as well as the prominence of the Cyobacteria indicates eutrophication. Of the 60 genera listed as pollution tolerant by Palmer (1969), 21 are found growing in this lake. That the HUDCO lake is polluted has been corroborated by physic-chemical analysis of the water also as TSS and BOD have crossed desirable limit in some months in the HUDCO lake. The lake thus calls for management measures like source control, in-lake treatment etc. Awareness creation and people's participation are also essential.

9. **Anderson, T. 1863.** "On the flora of Bihar & the mountains of Parasnath with a list of species collected by Messrs Hooker, Edgeworth, Thomson and Anderson". *J. Asiat. Soc. Bengal* 32: 189–218.

Abstract: The paper reports the occurrence of 738 species belonging to 473 genera under 110 natural orders in the flora of Bihar and the mountains of Parasnath. Of which, 560 species are dicots, 157 monocots and rest 21 species are cryptogams.

10. Anita & Kumar, J. 2010. "Aquatic plant diversity of Jubilee Lake, Jamshedpur, Jharkhand". *Biospectra* 5(1): 139–142.

Abstract: The study reveals that *Hydrilla*, *Pistia*, etc. are the much larger species having 100% frequency. It is also found that highest density and abundance were shown by *Hydrilla* and *Pistia* followed by *Nymphaea*, *Eichhornia*, etc.

11. Ara, J. 1954. "Orchids of Chotanagpur". *J. Bengal Nat. Hist. Soc.* 26: 177–185.

Abstract: A total of 36 species of orchids under 20 genera, both terrestrial and epiphytic with a short description of Chotanagpur was given in the paper.

12. Ara, J. 1960. "A cursory ecological survey of the flora & fauna of Hazaribagh National Park (Bihar)". *J. Bombay Nat. Hist. Soc. 57*(2): 325–338.

Abstract: An ecological survey of the Hazaribagh National Park in Bihar was carried out in two attempts, one in 1959 and other in 1960. The survey revealed a distinct correlation between forest types and the distribution of the fauna, in respect of both the larger animals and the birds. The survey was carried out by intensively sampling 20% of the area of the National Park in which all the forest types were represented. The results show that the population of both animals and birds is low; there being only some 60 species of birds and the larger mammals totaling about 300 individuals.

13. Ara, J. 1966. "Hazaribagh National Park (Bihar) revisited". *J. Bombay Nat. Hist. Soc.* 63: 123–138.

Abstract: An ecological re-survey of the Hazaribagh National Park was carried out after five years, in two visits during 1965. The sampling method was the same as described in the earlier paper. The results show that both in number and species diversity, birds as well as Sambar and Spotted Deer have increased. The other animals have either diminished or remained static. Floristically, there are signs of seral retrogression, and gully erosion was increase.

14. Azam, F.R., Roy, P. & Thakur, V. 1969. "Cytotaxonomical studies in grasses of Bihar". *Proc. Indian Sci. Congr.* Part III. Abstract. pp. 353–354.

15. Ball, V. 1869. "Notes on flora of Manbhum". *J. Asiat. Soc. Bengal* 38: 112–124.

Abstract: The physical characters of the Manbhum district and flora of this area are discussed in this paper. An enumeration of timber trees was given along with scientific name, local names (Bengali) and characters of timber.

16. Bandopadhyaya, A. & Das, B. 2010. "A survey study on fruit diversity in Chotanagpur plateau region". *Biospectra* 5(1): 97–104.

Abstract: In order to assess available genetic diversity of different fruit crops in the Chotanagpur plateau region, a survey was conducted in 11 horticultural diversity rich districts in Jharkhand, Purulia and Midnapur districts of West Bengal and Jashpur district of Chhattisgarh. During the survey, information on people's perceptions and priorities on genetic resources of horticultural crops in their vicinity were collected through field visit, personal interaction and collection of data on predesigned questionnaire. A total of 47 numbers of fruit species belonging to 40 genera could be identified in the surveyed villages. With respect to availability status, the fruits such as Bael, Custard apple, Lakoocha, Papaya, Longan, Kend, Aonla, Fig, Mahua, Mango, Guava, Kusum, Jamun and ber could be found in almost all the localities surveyed. With respect to extent of consumption, fruits such as Guava, Bael, Banana, Custard Apple, Ber, Jackfruit, Pear, Litchi, Jharber, Mango, Chironji, Papaya, Tamarind, Citrus, Pomegranate, Aonla, Date and Jamun were responded to be amongst the frequently consumed fruits. Fruits namely Bael, Ber, Custard apple, Kadam, Jackfruit, Harra, Mango, Jharber, Chironji, Kend, Jungle jalebi, Fig, Imli, Aonla, Paniala, Bahera, Phalsa, Kusum, Bhelwa and Jamun were responded to be having high variability in the Chotanagpur plateau region. As perceived by the respondents, the fruits such as Guava, Singara, Jackfruit, Harra, Chironji, Papaya, Kusum and Jamun can be considered to have high genetic erosion whereas fruits such as Bael, Cashew, Custard apple, Jackfruit, Chironji, Papaya, Citrus, Coconut, Aonla, Litchi, Mango, Banana, Peach, Guava, Pomegranate, Pear, Jamun, Tamarind and Water Chestnut have high potential for commercial cultivation.

17. Banerjee, S.P. & Banerjee, R.N. 1968. "Materials for a flora of north Bihar – 1: Champaran district". *Bull. Bot. Surv. India* 10(2): 183–189.

Abstract: The paper deals with the vascular plants collected from Champaran district, north Bihar, deposited in Central National Herbarium (CAL). The enumeration includes 552 species, 16 varieties under 362 genera and 84 families. The leading families are Leguminosae with 61 species and 4 varieties, Gramineae with 55 species and 1 variety, followed by Cyperaceae with 30 species, Euphorbiaceae with 29 species and 1 variety and Compositae with 26 species, respectively. The arrangement of families and genera is according to that of Bentham and Hooker in Genera Plantarum (1862–1883) and the sequence of species and infraspecific taxa is according to the arrangement in J.D. Hooker's The Flora of British India (1872–1897). The nomenclature has been checked and revised wherever necessary.

18. Banerjee, S.P. & Banerjee, R.N. 1969. "A sketch of the vegetation of Champaran district of north Bihar". *Bull. Bot. Soc. Bengal* 23: 167–170.

19. Basri, F., Kumari, S., Kumari, S., Samad, S., Bage, S., Kumari, P. & Sharma, H.P. 2014. "Experimental morphogenic studies on some landraces of rice (*Oryza sativa* L.) growing in Jharkhand state, India". *Int. J. Advances Pharma. Biol. & Chem.* 3(3): 744–750.

Abstract: Cultivation of landraces of rice is declining globally due to introduction of high yielding varieties. In this study some of the local landraces of rice of Jharkhand have been subjected to callus induction and regeneration. MS medium supplemented with different concentration/combination(s) of phytohormones have been used. MS medium supplemented with 2, 4-D and NAA showed pronounced callusing while supplementation with IAA resulted only in germination. Regenerated plantlets were obtained in MS + IAA (2 mg/L) + Kinetin (4 mg/L) and MS + NAA (1 mg/L) + BAP (2 mg/L). The protocol can be helpful for conservation and preservation of these local cultivars which are on the verge of extinction. These local varieties carry desirable traits that can be utilized in advanced breeding programme.

20. Basri, F., Sharma, H.P., Jain, P. & Mahto, G. 2015. "Grain quality and starch evaluation of local varities of rice (*Oryza sativa* L.) growing in Jharkhand state, India". *Int. J. Curr. Res.* 7(1): 11895–11900.

Abstract: With the improvement of people's living standards and increasing awareness, focus is shifting towards staple food with added benefits that could be a part of healthy balanced diet. Many landraces or local varieties of rice harbour beneficial traits such as higher nutritional value and medicinal properties when compared to hybrid varieties. Efforts are required to increase public awareness about these varieties. Therefore, the study aimed at studying physico-chemical attributes and correlation among grain quality traits of four traditionally cultivated and consumed varieties of rice from the state of Jharkhand. Most varieties are of medium size and shape. Recovery of brown rice in selected varieties ranged from 75% to 79%. Variety Dani Goda was found to have the highest head rice recovery of 64.3%. Volume expansion ratio was observed to fall within the range of 2.11 to 2.70. Amylose content was found to range from 13 to 33% with the variety Karhani showing the maximum value. Various physiochemical and cooking properties exhibited convoluted relationship. Significant positive correlation was observed between grain weight and kernel length ($r = 0.87$. $p < 0.05$). Kernel length and volume expansion ($r = 0.74$. $p<0.05$) and a significant negative correlation between volume expansion and amylose content ($r = –0.65$, $p<0.05$).

21. BFR, 1989. *Report of Kawar Lake*. Bihar Forest Department (BFR), Begusarai.

22. Bharadwaja, R.C. 1958. "On the grasses of the Parasnath (Bihar)". *J. Indian Bot. Soc.* 37: 228–232.

Abstract: A total of 11 species of grasses under 10 genera have been recorded from Parasnath, Bihar.

23. Bhatt, S.C. & Bhargava, G.K. 2006. *Land and People of Indian States and Union Territories. Bihar*. Vol. 5. Kalpaz Publications, Delhi.

Abstract: This book provides general history of the state of Bihar, physiography, population with detailed account on the caste systems, government and its policies, language and literature, natural wealth, customs and festivals, industry, rural and urban development and planning outlay.

24. Bhatt, S.C. & Bhargava, G.K. 2006. *Land and People of Indian States and Union Territories. Jharkhand*. Vol. 12. Kalpaz Publications, Delhi.

Abstract: This book provides general history of Jharkhand state, physiography, population with detailed account on the caste systems, government and its policies, language and literature, natural wealth, customs and festivals, industry, rural and urban development and planning outlay.

25. Bhattacharya, R.P., Pal, D.C. & Pati, B.R. 2011. "Aquatic and wetland monocotyledons of Bihar and Jharkhand states". *J. Econ. Taxon. Bot.* 35(3): 486–496.

Abstract: The paper deals with enumeration of 213 aquatic and wetland monocotyledonous species of Bhar and Jharkhand states. The types of growth forms, phenology, ecological status and occurrence of the species within the states are also presented.

26. Bhattacharya, R.P., Pal, D.C. & Pati, B.P. 2014. "A systematic census of monocot climbers of Bihar & Jharkhand states". *Indian J. Forest.* 37(3): 317–324.

Abstract: This work deals with enumeration of 28 climbing monocotyledonous species of Bihar and Jharkhand states. Local names, phenology, distribution, ecological status and uses of the species within the states are also presented.

27. Bhattacharyya, P.K. & Sarkar, K. 1998. *Flora of West Champaran district, Bihar*. Botanical Survey of India, Calcutta.

Abstract: The Flora deals with 1040 species belonging to 632 genera under 146 familiesof which, 804 species belongts to dicots and rest 236 monocots.

28. Bimal, R., Verma, B.K. & Bimal, R. 1991. "Flora of Muzaffarpur district, Bihar (India) Part I: Wall flora". *J. Econ. Taxon. Bot.* 15(2): 261–263.

Abstract: The wall flora of Muzaffarpur district in Bihar has been studied. Though, the environmental complex from the view point of soil and biotic factors has been found to be very unfavourable to the proper and luxuriant growth of the vegetation of the walls,

so far only 28 species belonging to 14 families were collected. The dominant families were Compositae (6 spp.) and Solanaceae (4 spp.). Two tree species, namely *Ficus benghalensis* and *F. religiosa* were found to be most frequent and despite the stunted growth, these two trees were thriving well on nutritionally deficient substratum.

29. Biswa, S. 2018. *Floristic Diversity of Koderma Wildlife Sanctuary, Jharkhand*. Ph.D. Thesis, Visva-Bharati University, Santiniketan (Unpublished).

Abstract: The study reports occurrence of 437 angiospermic taxa (432 species and 5 varieties) in 332 genera belonging to 100 families, and 8 species of pteridophytes.

30. Biswas, D.K. & Maheshwari, J.K. 1980. "A contribution to the vegetation of Chaibasa, Singhbhum district in South Bihar". *Bull. Bot. Soc. Bengal* 25: 43–51.

Abstract: The paper reports 164 species distributed under 135 genera of 47 families from Chaibasa, Singhbhum district in south Bihar.

31. Biswas, K. 1934. "The vegetation of the neighbouring areas of the Raniganj and Jharia Coalfield". *Trans. Mining & Geol. Inst. India* 29: 61–63.

32. Biswas, K. 1935. "The vegetation of the Tundi and neighbouring areas of Hazaribagh district". *Trans. Mining & Geol. Inst. India* 30: 59–64.

33. Bresser, J. 1951. *The Botany of Ranchi district, Bihar, India*. Catholic Press, Ranchi.

34. Burkill, I.H. 1910. "A few observations made in the central Provinces and Bihar". *J. & Proc. Asiat. Soc. Bengal 6:* 101–107.

35. Chattopadhyay, S.P. & Paria, N.D. 2009. "Biological spectrum of flora of Hazaribagh district, Jharkhand (India)". *J. Econ. Taxon. Bot.* 33(3): 733–738.

Abstract: Life-forms of the vegetation and biological spectrum of the flora of Hazaribagh district, Jharkhand have been determined. The comparison of the obtained biological spectrum with the normal spectrum of Raunkiaer (1934) revealed that the per cent value of therophytes is much higher than that of any other life-forms in the obtained spectrum and it is more than twice and half of normal spectrum. This indicates the therophytic phytoclimate of the district. This is contrary to Raunkiaer's hypothesis. The predominance of therophytes over phanerophytes and nanophanerophytes is probably due to human action in disturbing the vegetation, cleaning of forests and utilization of forest lands for cultivation and urbanization, and grazing by livestocks.

36. Chaudhary, L.B., Kumar, P., Khan, Z.A. & Pandey, A.K. 2004. "A check-list of Asteraceae of Bihar". *J. Econ. Taxon. Bot.* 28(1): 249–256.

Abstract: The paper enumerates 77 genera and 135 species of the family Asteraceae from the present political boundary of Bihar. The study exhibits that *Blumea* is the largest genus with 12 species in the family and about 36% genera have only solitary species.

37. Clarke, C.B. 1884. "Notes on the flora of Parasnath, N.W. Bengal". *J. Linn. Soc. London* 21: 252–255.

38. Das, M., Bhattacharya, R.P. & Mudgal, V. 1999. Bihar. In: Mudgal, V. & Hajra, P.K. (eds.), *Floristic Diversity and Conservation Strategies in India*. Vol. 2. Botanical Survey of India, Calcutta. pp. 663–698.

Abstract: The chapter provides a comrephensive account on the flora of undivided Bihar. Based on earlier published literature the authors state there are about 2650 species of flowering plants distributed in 1108 genera and 189 families in the state. Of which, 1887 species are belonging to dicots and 736 species are monocots, which constitute about 15% and 17% of country's dicot and monocot species, respectively.

39. Das, M.N. & Maheshwari, J.K. 1982. "The legumes of Vaishali district, Bihar". *J. Econ. Taxon. Bot.* 3: 201–225.

Abstract: The study covers a systematic survey of wild and naturalized (46 spp.) and cultivated (47 spp.) leguminous plants of Vaishali district, Bihar and provides an up-to-date nomenclature of the taxa with important synonyms, diagnostic features, local names, economic uses, locality records, ecological amplitude and phenology. The wild and naturalized taxa are mostly found in pastures, wastelands, orchards, etc. The taxa, *Alysicarpus longifolius* Wight & Arn., *Astragalus graveolens* Buch.-Ham. ex Benth. and *Medicago laciniata* var. *brachycantha* Boiss. are new records for the state. *Astragalus graveolens* Buch.-Ham. ex Benth. appears to have extended its geographical range from the western hills to the eastern plains. The taxa, *Medicago falcata* L., *Psophocaprus tetragonolobus* DC. and *Trifolium alexandrium* L. have been introduced under cultivation for food and fodder. *Butea monosperma* (Lam.) Taub., although common in the hilly region of south Bihar, is planted in gardens in the district.

40. Ghosh, R.B. 1995. "Climbing taxa of Bihar – A census". *J. Econ. Taxon. Bot.* 19(2): 403–410.

Abstract: It is a preliminary survey of climbing taxa occurring in Bihar state. A total of 235 taxa have been recorded during the survey, and those have economic importance are marked with asterisk.

41. Ghosh, T.K. 1971. *Studies on the flora of Ranchi district*. Ph.D. Thesis, Ranchi University, Ranchi (unpublished).

42. Gope, S.K. & Mishra, G. 2014. "Study on tree diversity of western part of Bonkuchia forest of Kamalpur, Patamda, East Singhbhum, Jharkhand". *Advances Pl. Sci.* 27(I): 175–178.

Abstract: Located in East Singhbhum district of Jharkhand state, Kamalpur of Patamda Block has got a precious small piece of forest where many tree varieties are inhabiting.

The tree flora chiefly comprises of representatives of tropical dry mixed forest with major trees such as Teak, Sal, Ashan, Mahua, Amla, Tendu, Harad and Bahera in the outskirting zone. The longitude and latitude of Kamalpur is 22°54'60" and 86°22'53" with an area of 317.86 sq km^2. Bonkuchia forest is almost centrally located in Kamalpur and the western part of the forest is adhering with four villages namely Kantagora, Golkata, Phooljhama and Hutupathar. The tree assessment work of this forest was selected because this is an industrially undisturbed area with flora still conserved in most of its parts. Rural development survives and depends on trees for food, fuel, shelter, and medicine and income generation. The wild tree species thus become rare and scarce, for example, *Schleichera oleosa* (Kusum), *Buchanania lanzan* (Piyal) and *Diospyros melanoxylon* (Kendu), which were prevalent in the market 25–30 years before have now become scare commodities. Such type of work on tree diversity of forest focuses on documenting trees, analyzing the threats to trees and their genetic resources. It helps in learning to address the threats and their conservation with sustainable use and management of forest and woodlands.

43. **Gupta, H.S. & Kumar, A. 2007.** "A catalogue of orchids recorded in Saranda Forest Division, West Singhbhum district, Jharkhand". *Indian Forester* 133(7): 870–876.

Abstract: Floral diversity is depleting alarmingly due to anthropogenic activities such as encroachment and mining in Saranda. In recent years these activities have reached alarming levels such that many of the species or orchids are on the verge of extinction. An extensive survey and collection of specimens of 20 species of orchids was made in Saranda, West Singhbhum district, Jharkhand during the year 2003–04. The results are reported in this paper.

44. **Gupta, H.S. & Tripathy, K.K. 1997.** "Study of natural regeneration in forests of Garhwa (Bihar)". *Indian J. Forest*. 20(4): 324–327.

Abstract: The regeneration of different forest species in the area of Harhwa South Forest Division has been correlated with various factors affecting the natural regeneration by stool coppice. The species namely Kekar (*Garuga pinnata*), karam (*Adina cordifolia*), Sidha (*Lagerstriemia parviflora*), Sal (*Shorea robusta*), khair (*Acacia catechu*), Dhaura (*Anogeissus latifolia*), Gijan (*Lannea coromandelica*), etc. which have better coppicing power, can be allowed to be exploited to meet the basic needs as well as to promote natural regeneration by stool coppice. The species namely Kahua (*Terminalia rjuna*), Mahua (*Madhuca indica*) and other fruit bearing species may be left for soil for soil cover to check soil erosion and to get seeds to promote natural regeration by seedling coppice. Also the stumps bearing the height 15 cm and below has been found much suitable for the natural regeneration and hence the tree should be cut preferably almost flush to the ground level. Among the silvicultural system applied in this area, system like

coppice with selection system has been observed to be working better to some extent in achieving natural regeneration by stool coppicing and hence this system may be extensively used in this area. And last but not least it has been observed that the stool of some species produces numerous shoots, sometimes more than 17 in number and therefore tending operation is needed on selective basis for such type of species to get the good crop.

45. Gupta, R., Sadhu, D.N., Alam, N.M. & Sadhu, S. 2007. "Studies on planktons in relation to physicochemical characteristics of a fresh water pond at Ramgarh, Hazaribagh (Jharkhand)". *Columb. J. Life Sci.* 8(1): 81–84.

Abstract: The paper deals with study of physicochemical parameters of a freshwater pond in relation to the availability of planktonic population. Different characteristics such as pH, DO, free $C0_2$, alkalinity were studied for a period of two years from January 1999 to December 2000. A large number of phytoplanktons and zooplanktons were found in the pond showing its productive nature.

46. Gupta, S.K. & Kerketta, M. 2012. "Study of species diversity on the family Asteraceae of Ranchi district". *Biospectra* 7(1): 165–170.

Abstract: A study on the species diversity of the family Asteraceae in Ranchi district resulted in reporting a total of 67 species belonging to 45 genera.

47. Gupta, S.K. & Kerketta, M. 2015. "A study on stomatal pattern in some of the members of Asteraceae of Ranchi district". *Biospectra* 10(2): 99–102.

Abstract: A study on epidermal peels of some of the members of the family Asteraceae of Ranchi district revealed that hypoamphistomatic nature is common in the members. The size of stomata varied from one species to another as well within the species. The stomatal index, stomatal frequencies, length and breadth of stomata and l/b ratio of stomata were calculated for both the surfaces of these species. These studies were mainly based on tracing technique.

48. Gupta, S.P. 1963. "An appraisal of Chhotanagpur tribal pharmacopeia". *Bull. Bihar Tribal Res. Inst.* 5:1–18.

49. Haines, H.H. 1910. A forest flora of Chotanagpur including Gangapur and the Santal Parganas; a description of all indigenous trees, shrubs, and climbers, the principal economic herbs and most common cultivated trees and shrubs. Calcutta.

50. Haines, H.H. 1921–1925. *The Botany of Bihar and Orissa*. Adlard & Son Ltd., London. Abstract: This Flora gives an account of all the known indigenous plants of the province and of the most important or most commonly cultivated exotic ones with maps.

51. Hooker, J.D. 1848. "Observations made when following the Grand Trunk Road across the hills of Upper Bengal, Parasnath in the Sone valley, the Kumaon and the Vindhyan hills". *J. Asiat. Soc. Bengal* 17: 355–411.

52. Horo, M.R. & Choudhary, A.K. 2012. "Callus induction studies on *Cardiospermum halicacabum* Linn., a medicinal plant of Jharkhand". *Biospectra* 7(1): 201–204.

Abstract: *Cardiospermum halicacabum* L., is an important medicinal plant. The nodal and the leaf segment were cultured on Murashige and Skoog medium supplemented with 2, 4-D for callus indusction. Callus production was highest at 5 ppm 2, 4-D.

53. Jain, S.K., Banerjee, D.K. & Pal, D.C. 1975. "Grasses of Bihar, Orissa and West Bengal". *J. Bombay Nat. Hist. Soc.* 72(3): 758–773.

Abstract: The paper lists 489 species and varieties belonging to 155 genera of grasses occurring in Bihar, Orissa and West Bengal. The occurrence of these taxa in one or more of these three states is indicated. A total of 32 taxa are reported as new distributional records for these states.

54. Jaipuriar, M.K. 1996. "Trial of exotic species in Bihar *Simaruba glauca*". *Indian J. Forest.* 19(1): 58–68.

Abstract: *Simaruba glauca* is a native of El Salvador. It has been introduced in Bihar in 1988. Seeds were obtained from Soil Conservation Department, Orissa. The plant has naturalized ifself, in three different agroclimatic zones having acidic soil. The plant has also been tried as bio-barrier for grazed species makes it a suitable species. Branching habit makes it a suitable species for soil conservation.

55. Jaruhar, H.B. & Singh, A.K. 2012. "Study of microbiological analysis of drinking water during monsoon season from selected area of Garhwa (Jharkhand)". *Advances Pl. Sci.* 25(II): 403–404.

Abstract: The paper represents the analytical picture of portable water contamination with microbiological agents. It lays emphasis on access of poor quality of drinking water by the people from different sources such as borewell, public well and public fountain due to complete absence of infrastructure for supply of safe drinking water as per guideline suggested by WHO. Presence of coli form bacteria was detected in 15 out of 25 samples collected from different localities of densely populated area and *Salmonella paratyphi* B, *Pseudomonas putrifaciens, Streptococcus faecaelis, Shigella* spp. And *Escherichia coli* as well as protozoa. *Acanthoamoeba* were isolated which are pathogen of several types of serious diseases like gastroenteritis, typhoid fever and hepatitis. The most probable number (MPN) show all sample contains microorganism beyond permissible level varying from 7 to 170 100^{-1} mL.

56. Jha, H.K., Singh, B.S. & Singh, A.K. 2015. "Biodiversity of aquatic flora in Raja Bandh pond of Jamtara district of Jharkhand (India)'. *Biospectra* 10(1): 85–90.

Abstract: Raja Bandh is one of the most important and famous ponds of Jamtara Notified Area with some mythological beliefs. Its aquatic habitat existence is of more than hundred years old. The study compiles an account of aquatic flora in Raja Bandh pond of Jamtara district of Jharkhand. A field surveys were carried out on regular intervals to document and desescribe the aquatic plant diversity. During the case study a total of 16 aquatic plants belonging to 15 families were identified and studied. The paper provides habitat, botanical name, vernacular name(s), family name and a brief description of the plants.

57. Jha, R.K. 2008. "Preliminary studies on biomass and energetics of rhizomes and fruits of *Nelumbium speciosum* Willd. in a pond 'Padm Sarowar' at Pawapuri, Nalanda, Bihar, India". *Biospectra* 3(2): 329–332.

Abstract: The pond 'Padm-Sarowar' was controlled by 'Jain Management', so collection of any material from the pond was strictly prohibited. However, based on general survey in September, 2007, the pond was classified as a 'Mixed type'. The special features of the pond at that time were the macrophytes mainly dominated by red lotus and the carp fishes in central or deeper parts of the pond. In April, 2008, when the pond almost got dried and it was being excavated for renovation, there was no prohibition in collecting the materials. It was this period, when the thick or storage rhizomes and fruits of *Nelumbium speciosum* Willd. were collected, and their biomass and energetics were determined. Based on these findings, the pond was found highly productive and economically very important.

58. Jha, R.K. 2009. "Preliminary studies on biomass and energetics of rhizomes and fruits of *Nelumbium speciosum* Willd. in a pond 'Padma Sarowar' at Pawapuri, Nalanda, Bihar, India". *Biospectra* 4(2): 381–384.

Abstract: The pond 'Padma Sarowar' was controlled by 'Jain Management, so collection of any material from the pond was strictly prohibited. However, based on general survey in September, 2007, the pond was classified as a 'Mixed Type'. The special features of the pond at that time were the macrophytes mainly dominated by red lotus and the carps fishes in central or deeper parts of the pond. In April, 2008, when the pond almost got dried and it was being excavated for renovation, there was no prohibition in collecting the materials. It was this period, when the thick or storage rhizomes and fruits of *Nelumbium speciosum* Willd. were collected, and their biomass and energetics were determined. Based on these findings, the pond was found highly productive and economically very important.

59. Jha, R.R. & Varma, S.K. 1993. "Some notes on grasses of Bihar". *J. Bombay Nat. Hist. Soc.* 90(2): 317–318.

Abstract: Four species of grasses, viz., *Dactyloctenium aristatum* Link, *Digitaria stricta* Roth ex Roem. & Schult. var. *stricta*, *Digitaria stricta* var. *denudata* (Link) Henrard and *D. sanguinalis* (L.) Scop. var. *purpurea* Haines have been reported for the first time for Bihar.

60. Jha, U.N. 1965. "Hydrophytes of Ranchi". *Trop. Ecol.* 6: 98–105.

61. Jha, V., Verma, A.B. & Kumar, R. 2011. "Livelihood options in north Bihar flood plains – A case study of *Sesbania rostrata* Bremek. & Oberm." *Ethnobotany* 23: 143–146.

Abstract: Chronically flood-affected people of north Bihar have devised a number of ways to face prolonged water-logging of land. One of this is the domestication of an alien invasive plant species, *Sesbania rostrata*, which has emerged as a life-line of this flood plain. It was initially tipped for providing protection to the young paddy plantations from the onslaught of the ferocious water hyacinth, *Eichhornia crassipes*. Gradually, it emerged as promising firewood as well in view of the devastating loss of orchards, which earlier met the energy needs of local inhabitants. Farmers made it a habit to grow this fast growing plant in the water-logged areas, in which plantation of food crops was impossible. Apart from being a potential fence-cum-fuel crop, the plant provides green fodder to animals, particularly during the peak flood season. Its multifaceted use is further visible in the form of its emergence as a low-cost housing material. On account of its easy availability, it is also used as a flood protection measure when heaps of its stems are thrown at the erosion sites. Being a leguminous crop, it helps the soil retain its fertility as well. Of late, people have even started using its seeds in adulterating those of other legumes. This paper takes into account the multifaceted use of *S. rostrata*, which provides a fine example of how a plant has been domesticated in the last two to three decades to meet the demands of food, fodder, fence, biofertilizer as well as helping in flood control and also providing a potential low-cost housing material in Mithila area of north Bihar. It forms a component of mixed cropping with different varieties of wetland paddy, green gram and sorghum as well.

62. Jha, V., Kargupta, A.N., Dutta, R.N., Jha, U., Mishra, R.K. & Saraswati, K.C. 1991. "Utilization and conservation of *Euryale ferox* Salisb. in Mithila (north Bihar)". *Aquatic Bot.* 39: 295–314.

Abstract: *Euryale ferox* Salisb., locally known as 'makhana', is the main aquatic cash crop of Mithila (north Bihar). Thousands of natural and man-made water bodies of this region are ideal reservoirs for combined fish and makhana cultivation, which is a major source of livelihood for fishermen. *Euryale ferox* is an important ingredient of Hindu ritualistic oblations despite the fact that it finds no mention in old Sanskrit scriptures. The plant is unusual in having both cleistogamous and chasmogamous flowers. The seeds are edible and very nutritious. The expenditure incurred over its cultivation is modest as the

seeds left over after harvests germinate the next season. The only labour involves some thinning out of overgrowths, transplanting into sparse areas, the collection of dispersed seeds from the pond bed during harvest and their preparation for sale. According to traditional systems of Indian medicine *E. ferox* possesses medicinal properties against a number of human ailments involving respiratory, circulatory, digestive, renal and reproductive systems. Small starch grain dimensions (1–3 ȝm) make it effective against digestive disorders. *E. ferox* has become extinct in the temperate lakes of Kashmir and has become rare in the contemporaneous flora of Eurasia. Major parts of the flood-ravaged north-eastern districts of north Bihar have witnessed a virtual root-out of the crop on account of sand filling of the beds of water bodies.

63. Kerketta, M. & Gupta, S.K. 2012. "Taxonomic studies on the family Asteraceae of MECON colony, Ranchi". *Biospectra 7*(1): 179–182.

Abstract: Taxonomic investigation of the family Asteraceae growing throughout the MECON colony was carried out from February 2010 to February 2012. A total of 55 species under 39 genera of the family Asteraceae were collected and identified. A list of species is given with valid names. Amongst the species, *Ageratum conyzoides* L., *Blumea lacera* (Burm.f.) DC., *Eclipta prostrata* (L.) L., *Gnaphalium purpureum* L., *Tridax procumbens* L., *Vernonia cinerea* (L.) Less and *Xanthium indicum* Köing are much populated and found in roadside areas. Out of these species *Vernonia elaeagnifolia* is the only one climbing (vine) species, found all over the study area and *Parthenium hysterophorus* is the most common roadside weed.

64. Krishna, B. 1977. "Floristic studies in India – Present status and future strategies with special reference to Bihar". *Bull. Bot. Surv. India* 19(1–4): 33–38.

Abstract: Physiognomy, geology, soil, climate and vegetation of Bihar have been discussed in the paper. The vegetation of this state was broadly classified into five types, viz., (i) Evergreen forests, (ii) Dry decisuous forests, (iii) Thorny scrub forests, (iv) Waste land vegetation and (v) Aquatic vegetation.

65. Kumar, A. 2010. Macrophytes of the inland water bodies of Patna". *J. Indian Bot. Soc.* 89(1&2): 213–216.

Abstract: The scattered wetlands in the river valley of Patna are biologically one among the richest and most interesting ecosystems. A total of eleven seasonal and perennial water bodies were selected for the floristic study and were surveyed monthly for two continuous years, from March, 2002 to February, 2003. A total of 60 species of vascular macrophytes have been recorded from the different water bodies. Most of the species belong to the angiosperms and only two belong to pteridophytes. Among angiosperms 38 species belonging to dicotyledons spread over in 23 families and 20 species of monocotyledons belonging to 10 families. This paper deals only with the distribution

pattern of macrophytes in different water bodies with their ecological nature and flowering season.

66. Kumar, A. 2018. *Flora of Gautam Buddha Wildlife Sanctuary, Bihar and Jharkhand*. Andhra University, Visakhapatnam (Unpublished).

Abstract: This work reports occurrence of 499 angiospermic taxa from the Wildlife Sanctuary. It also reports the occurrence of three endemic species and two threatened species from the Sanctuary.

67. Kumar, A. & Bandyopadhyay, N.N. 2009. "Scanning electron microscopic study of pollen grains of some aquatic angiosperms". *Biospectra* 4(1): 171–176.

Abstract: In continuation with the floristic study in relation to physico-chemical properties of aquatic bodies of Patna, Scanning electron microscopic study has been made on selected taxa of angiosperms in order to determine the effect of altered environment on the pollen characters. The paper deals with the pollen fine structure of eight species of dicotyledonous angiosperms with a critical survey of earlier findings.

68. Kumar, A. & Chatterjee, P. 2011. "Recovery of *Xanthomonas campestris* pv *oryzae* (Ishiyama) dye from infected rice leaves of Chaibasa, West Singhbhum of Jharkhand". *Biospectra* 6(1): 147–150.

Abstract: Bacterial leaf blight caused by *Xanthomonas campestris* pv *oryzae* (Ishiyama) dye is one of the important bacterial diseases on rice. This disease causes typical symptoms on infected rice such as leaf blight which appears on leaves of young plants, after-planting out, as pale-green to grey and green water-soaked lesion near the tip as well as margins of leaf. For the estimation of susceptible and resistant variety of rice cultivars and percent disease index is essential to calculate the severity of this disease. The symptomatically study of four cultivars of rice, IR-64, KRH-2, MTU-7029 and Lalat was done and also assessment of percent disease index of all cultivars of rice caused by *Xanthomonas campestris pv oryzae* was carried out. The symptom expressions were generally similar in all four cultivars. In early stage, pale green to light brown spots appeared near the tip and margins of the leaves. Water soaking lesions are present on the young plant and later on water soaking lesions disappeared. At overall observations, the Percent Disease Index (PDI) value shows that "Lalat" among rice cultivars was more susceptible than KRH-2, MTU-7029, and IR-64. In Lalat cultivar the PDI value rose from 6% to 80.25% and in IR-64 cultivar the PDI value rose from 9% to 70% in 60 days.

69. Kumar, A. & Chatterjee, P. 2011. "Transmission and population dynamics of *Xanthomonas campestris* pv. *oryzae* in *Oryza sativa* of Chaibasa district of Jharkhand". *Biospectra* 6(2): (Special Issue): 171–176.

Abstract: Transmission is an important means of carryover of *Xanthomonas campestris pv. oryzae* in infested village of Chaibasa year after year in different cultivars of rice. These bacteria are usually found in leaves, stems and soil, but may also penetrate the endosperm. The bacterial population in infected lesions increase parallel to the maturation of the crop. Leaf lesion had higher bacterial numbers than those other region of the plant. There are three rice cutivars posses bacterial population in leaf lesion but the KRH-2 rice cultivar had highest bacterial numbers in comparison to other two cultivars of rice Jurly and Swarna. Sometime infected seed did not give rise to infected seedlings, but did introduce the bacterium into the soil and it may survive more at depth level of 2.5 cm to 7.5 cm. *Xanthomonas campestris pv. oryzae* survives from June to January in plant part but after harvesting it survives only for 3 to 4 months in straw as well as in fallow soil of that field. The fallow soil and the straw after harvest of rice are responsible for secondary inoculum for infection.

70. Kumar, A. & Chatterjee, P. 2012. "Protein content affected by the pathogen *Xanthomonas campestris pv. oryzae* in different parts of rice cultivars from Chaibasa district, Jharkhand". *Biospectra 7*(4): 133–136.

Abstract: *Xanthomonas campestris pv. oryzae* is the causal agent of rice bacterial blight disease (BLB). This article reviews current knowledge on the host bacterium interaction by the activity of *X. campestris pv. oryzae* for protein content and its diminishing effect on three rice plants. Faster rate of disease development was found in rice cultivar KRH-2 and followed by Swarna and Jurly. Least amount of protein content was found in rice cultivar KRH-2 after the infection of the bacterium *Xanthomonas campestris pv. oryzae*. The amount of protein diminished more vigorously in root and stem tissue extracts of the bacterium infected plants than the leaf tissue extracts of such healthy plants.

71. Kumar, A. & Sahu, R. 2012. "Ecological studies of cyanobacteria in sewage pond of H.E.C. Industrial area, Ranchi, India". *Biosci. Disc.* 3(1): 73–78.

Abstract: The ecological study of the sewage stabilization pond of HEC area, Hatia, Ranchi has been taken for the first time in this area. Studies were conducted to determine the occurrence and abundance of cyanobacteria in relation to physico-chemical characteristics of sewage pond. It assumes significance of algae mostly cyanobacteria can be used as bioindicators of water pollution in different water habitat of the area. Increased eutrophication from domestic effluent, sewage promotes the development of algal bloom. This study indicates the maximum occurrence and abundance of species of *Microcystis, Oscillatoria* and *Phormidium* in all sites of the sewage pond. The physico-chemical analysis shows maximum nitrogen, upto 35.4 mg l-1, 4.8 mg l-1 phosphate, 147.131 mg l-1 chloride and alkaline nature of water throughout the year favour the growth of cyanophycean members and promote algal bloom formation of *Microcystis aeruginosa*, *O. princeps* and *O. tenuis* in this pond.

72. Kumar, A. & Singh, N.K. 2013. "Phytoplanktonology of Chhinda dam at Simdega, Jharkhand". *J. Indian Bot. Soc.* 92(1 & 2): 21–26. .

Abstract: Keeping in view status evaluation as the cornerstone of environmental management, this investigation has been aimed at study the present status of the phytoplankton dynamics, which constitute the main fraction of food of the aquatic fauna, of Chhinda dam water at Simdega, Jharkhand. Seasonal fluctuation, percentage composition and yearly averages were computed taking monthly observation data from June, 2008 to May, 2010 in relation to abiotic spectrum of the dam water. Simple correlation as well as multiple correlation analysis was computed. Coefficient of determination (R2) was computed as 0.948, which indicated that 94.8% fluctuation in phytoplankton standing crop of the dam was dependent on the physico-chemical regime of the dam water considered for the investigation and 5.2% to other factors which were not taken into account in the investigation under study.

73. Kumar, A., Prasad, S. & Singh, S. 2013. "Climbers and lianas distribution in Jharkhand forests". *Indian Forester* 139(12): 1121–1125.

Abstract: This paper mainly focuses on the documentation of lianas and climbers in different forest habitats of five districts of Jharkhand namely Ranchi, East Singhbhum, Hazaribagh, Chatra and Latehar during 2009–2012. A total of 45 important climbers including 7 lianas were identified and thoroughly observed during the study period. Fabaceae are the dominant family with many climbers and lianas followed by Cucurbitaceae, Dioscoreaceae and Liliaceae.

74. Kumar, A.B. 2018. *Assessment of floristic diversity in Baraila Lake, Salim Ali Jubba Sahani Bird Sanctuary, Vaishali, Bihar*. Botanical Survey of India, Kolkata (Unpublished).

75. Kumar, B.N. & Choudhary, S.K. 2009. "Diversity of macrophytic species of Jagatpur wetland in the middle Ganga plain near Bhagalpur, Bihar". *J. Indian Bot. Soc.* 88(3 & 4): 12–18.

Abstract: The study documents the diversity and distribution of the freshwater macrophytes in the Jagatpur wetland, a perennial reservoir type of wetland in the middle Ganga plain near Bhagalpur in Bihar. Jagatpur wetland is located at about 14 km on the south-eastern side of the Bhagalpur city. The wetland at present is under high environmental stress due to cultural and chemical pollution. We listed the macrophytes on seasonal basis for a period of two years, i.e., from August 2003 to July 2005. Altogether 118 macrophytic species were recorded from the wetland during the study period which were categorised into marginal (58 species), submerged (12 spp.), floating (8 spp.) and emergent (40 spp.). Out of 118 macrophytic species 79 species belonged to dicotyledons, 33 species to monocotyledons and 3 species each to algae and pteridophytes. From the analysis of the distribution pattern of macrophytes in the wetland,

it appears that there is no well marked differentiation in colonies of marginal, submerged, floating and emergent species and as such all the communities were found in intermixed mats.

76. Kumar, B.N. & Choudhary, S.K. 2010. "Phytoplankton species diversity of Jagatpur wetland, Bhagalpur, Bihar (India)". *J. Indian Bot. Soc.* 89(3 & 4): 358–363.

Abstract: Jagatpur wetland in the middle Ganga flood plain in Bihar supports higher phytoplankton density and diversity. Chlorophyceae were dominant and had numerical superiority over the others with regard to density and diversity. Shannon and Weaver (1963) diversity index was calculated from the phytoplankton data recorded during the survey (August, 2003–July, 2005), and was found to be in the range of 2.8–4.7. Species diversity value when compared to be scales of Wilhm and Dorris (1968), and of Staub *et al.* (1970) suggested the wetland to be slightly or moderately polluted. The higher values of the sapecies diversity in most of the months indicate the absence of the stress factors in those months. The relatively low values during monsoon months may be due to more stressful environment of the wetland.

77. Kumar, J. 2009. "Study on the little known Yam of Jharkhand". *Biospectra* 4(1): 117–118.

Abstract: Wild yam has tuberous rhizomes, twining stems, heart shaped leaves, yellow green flowers, and winged seed pods. Wild yam is one of the several species containing diosgenin, a precursor of progesterone used to make contraceptive pills. It also yields steroids and cortisone, anti-inflammatories to treat rheumatism, and hydrocortisone creams for eczema. The tuber reduces painful labour spasm, colic, and leg and menstrual cramps. *Dioscorea* species tuber is a kidney, lung and stomach tonic. The mildly toxic tubers of *D. bulbifera*, the locally available yam treat sore throat, snakebites and boils.

78. Kumar, J., Khan, A.Z. & Kumar, A. 2000. "Aberrant protein metabolism of *Citrus aurantifolia* leaves infected with *Xanthomonas campestris* pv. *citri*". *J. Indian Bot. Soc.* 79(1–4): 207–208.

79. Kumar, J., Roy, B.P. & Sinha, R.P. 2007. "Role of physic-chemical properties of water in wetland diversity of Kuseshwarsthan, Darbhanga". *Int. J. Mendel* 24(3-4): 105–106.

Abstract: The study deals with the wetland diversity of Kuseshwarsthan. The physio-chemical characteristics of wetlands are described.

80. Kumar, K. 2014. "Assessment of genetic divergence among different species of *Aloe* collected from Jharkhand Ranchi". *Biospectra* 9(1): 197–200.

Abstract: Assessment of genetic divergence using Mahalanobis's D statistics was carried out with the help of karyotype analysis among six species of *Aloe* growing in Ranchi, Jharkhand. The six species of *Aloe* could be grouped into three constellations. The

clustering pattern indicated that clustering was due to genetic distance. These distances suggested that the genetic recombination among genotype of these clusters would result in considerable heterosis.

81. Kumar, K. & Kumar, J. 2012. "Karyological investigation on *Citrus aurantifolia* Swingle, growing in Ranchi (Jharkhand)". *Biospectra* 7(1): 175–178.

Abstract: *Citrus aurantiifolia* Swingle commonly known as Kagzi Nimbu, is a member of family Rutaceae. It grows commonly in Ranchi district of Jharkhand. A karyological study of this plant revealed that the diploid chromosome number (2n = 18) of this plant has karyotypic formula with 2 median, 4 nearly median, 2 nearly submedian and one nearly subterminal chromosome. The total chromation length is 40.73µ.

82. Kumar, K. & Kumar, J. 2014. "Studies on the cytotaxonomy among different species of *Aloe* collected from Ranchi, Jharkhand". *Int. J. Bioassays* 3(3): 1846–1850.

Abstract: Cytotaxonomical analysis is an important study in finding out phylogeny, evolution and interrelationships between the taxa. The finding provides karyotype analysis on six different species of *Aloe* of Ranchi. These species differed in uniformity of their chromosome numbers. They also differed from each other in their total chromatin length, arm ratio and position of centromere.

83. Kumar, K. & Singh, M. 2015. "Chromosomal diversity among different ecotypes of *Acorus calamus* L. reported from Ranchi, Jharkhand, India". *Int. J. Bioassays* 4(2): 3656–3658.

Abstract: The chromosomal diversity was studied among ten ecotypes of the medicinally important genus *Acorus calamus* L. from Jharkhand and their chromosome counts have been reported for the first time. The chromosome number and size are discussed in finding and phylogeny, evolution and interrelationship of taxa. The ten ecotypes of *A. calamus* reveal differences in chromosome number, i.e., 2n = 14, 18, 21, 27 with diploid, triploid and tetraploid status. Detailed chromosome analysis of the ecotypes reveals heretogeneity in size, form and number of chromosome between dissimilar ploidy level ecotypes. This is suggestive of the incidence of alteration in chromosome structure. The aberration coupled with ploidy appears to have played a major role in evolution among the ecotypes. The occurrence of chromosomal variations generates flexible variation among the ecotypes which are sustained through vegetative propagation. The karyomorphological studies provide insight into role of chromosomal and genomic versatility in diversification of the species.

84. Kumar, P., Jalal, J.S. & Rawat, G.S. 2007. "Lists of species. Orchidaceae, Chotanagpur, state of Jharkhand, India". *Check List* 3(4): 297–304.

Abstract: Orchids display a diversified range in terms of shape, size and colour of flowers. They have a unique floral morphology compared to other angiospermic plants. They have minute seeds that are dispersed through air, and that may be why they are distributed throughout the world, except for the hot deserts and Antarctica. Though the family Orchidaceae represents a highly advanced group of plants, they are highly susceptible to even slight changes in environmental conditions. In India, orchids are represented by 1,141 species belonging to 186 genera. This study was conducted on the Chotanagpur region of India, most of the part of which lies in the state of Jharkhand. A survey was conducted throughout the state from April 2002, in different forested regions in different seasons. A total of 63 species of orchids including 26 new records have been reported from this region.

85. **Kumar, P., Sharma, K.K. & Saha, D. 2006.** "Collection of three uncommon genotype of Palas (*Butea monosperma*) from Jharkhand". *Indian J. Forest.* 29(1): 45–56.

Abstract: Palas (*Butea monosperma*) is an important lac-host plant of all Indian importance. It bears orange-red flowers and has compound leaves with three leaflets. During a survey of selected districts of Jharkhand, three rare genotypes were collected. One genotype had unifoliolate leaves, while the other two had white and yellow flowers, respectively. All the genotypes have been recorded for the first time from the state.

86. **Kumar, P., Pandey, A.K., Rawat, G.S. & Jalal, J.S. 2005.** Diversity and conservation of orchids in Jharkhand. In: Pandey, A.K., Wen, J. & Dogra, J.V.V. (eds.), *Plant Taxonomy: Advances and Relevance*. CBS Publishers & Distributors, New Delhi. pp. 345–353.

Abstract: Orchidaceae are represented by 24 genera and 59 species in the state of Jharkhand. The terrestrial orchids are dominant, comprising 31 species, followed by 25 epiphytic species and one species each of aquatic and saprophytic habitat. *Pholidota imbricata* Lindl. is a lithophytic species, whereas, *Zeuxine strateumatica* (Linn.) Schltr. in semi-aquatic condition. Genera with higher species and abundance are *Habenaria* Willd. (10 spp.), *Dendrobium* Sw. (8 spp.) and *Eulophia* R. Br. ex Lindl. (7 spp.), *Acampe* Lindl., *Gastrochilus* D. Don, *Geodorum* Jacks., *Goodyera* R. Br., *Malaxis* Sol. ex Sw., *Oberonia* Lindl., *Pelatantheria* Ridl., *Pholidota* Lindl. ex Hook., *Rynchostylis* Blume, *Thunia* Rchb.f., *Tropidia* Lindl. and *Zeuxine* Lindl. are represented by one species each. The paper deals with latest update on the orchids of Jharkhand state.

87. **Kumar, P.S. & Banerjee, L.K. 2002.** 'Kawar Tal – A major freshwater wetland in Bihar". *ENVIS Newslett.* 8: 8–9.

Abstract: A general introduction about the lake, Kawar Tal and the plants growing in different seasons are given in this paper. Major problem for management of the lake and socio-economic condition of the lake basin are also given.

88. **Kumar, S., Kumari, B. & Srivastava, A.K. 2009**. "Probable impact of global warming on plant biodiversity in Jharkhand". *Biospectra* 4(1): 121–122.

Abstract: 'Global warming', a consequence of accumulation of green house gases in the surrounding atmosphere. The impact of this phenomenon can be observed in the area of Jharkhand also, where by the thermophilic plants such as *Sonchus* sp., *Ageratum conyzoides* L. and *Synedrella nodiflora* (L.) Gaertn. have been found to cross the limit of their habitat and invaded the niche of thermophobic plants (hight 2500 to 3000 ft). This has posed a serious threat to the existence of the population of thermophobic plants of great medicinal and economic value namely *Rubia manjith* Roxb. ex Fleming, *Thalictrum foliolosum* DC., *Pogostemon benghalense* (Burm.f.) Kuntze, etc., hence affecting the balance of plant biodiversity in Jharkhand.

89. **Kumar, S., Yadav, S. & Yadav, D.K. 2010.** "Study on biodiversity and edible bioresources of Betla National Park, Plamau, Jharkhand (India)". *J. Econ. Taxon. Bot.* 34(4): 725–730.

Abstract: Biodiversity is a concept about the range of variations among biological entities. Biodiversity provides basis of life on earth. Components of biodiversity include genetic diversity, species diversity and ecosystem diversity. Humans depend on biodiversity for food, medicine, housing and other materials and for ecological services. The paper reveals the rich and diverse floral and faunal diversity of the tropical forest ecosystem of Betla National Park, Palamau, Jharkhand. The assessment of biodiversity at species and ecosystem level of the National Park has been made. The wild edible resources in and around the National Park are also highlighted in this paper. Wild edible bioresources have been consumed as food since ancient times. The modern people have forgotten the ethnic food habits, which is still in practice among the tribals and other communities in and around the National Park area. Whole world is facing severe food problem due to population explosion, famine, drought, flood, Tsunami and other form of disasters due to depletion of biodiversity. The identification of ethnic edible resources and expansion of this knowledge by massive awareness among people of different areas will not only open the new avenues for solving the food problem but it will increase the availability of high quality of foods in India. Considering the above significance authors have attempted to make study on the wild edible resources of the study area.

90. **Kumar, V. & Sinha, R. 2015**. "Biodiversity of forest flora of Dalma forest in East Singhbhum district of Jharkhand". *Biospectra* 10(2): 119–122.

Abstract: Tropical forests are more diverse than the other terrestrial ecosystems by possessing greater number of life-forms. It is widely accepted that the identification and prioritization of important centres of biodiversity are necessary both at national and global scale for conservation. Indian subcontinent, with diverse bioclimatic regions

supports one of the richest flora and fauna. The increased human pressure and consequent effects on the landform and land use changes has a profound effect on the present vegetation and the biodiversity. They not only maintain the components and balance of forest ecosystem but also play vital role in the field of human welfare. The study compiles an account of biodiversity of forest flora of Dalma forest in East Singhbhum of Jharkhand state. A field survey of the study area was carried out regularly to describe the biodiversity on the basis of floristic study. The study area is a part of lower Gangetic plain which contains unique flora providing information on the present status of biodiversity.

91. Kumari, A. & Kumar, J. 2008. "Plant diversity of Zoo area of Jubilee Park, Jamshedpur, Jharkhand". *Biospectra* 3(1): 117–122.

Abstract: The study reveals that *Peltophorum* sp., *Cassia fistula*, *Syzygium cumini*, etc. are the much larger species having 100% frequency. It is found that highest density and abundance was shown by *Peltophorum* sp. and *Cassia fistula* followed by *Ficus religiosa*, *Terminalia arjuna*, etc. In case of grasses and herbs highest frequency and density was shown by *Cynodon* and *Diachanthium* sp. followed by *Phyllanthus* sp. and *Convolvulus* sp. Abundance was observed for *Cynodon* sp. and *Phyllanthus* sp. It is absolutely a natural as well as cultural diversity of floristic plants which can play a measure role to balance the ecosystem of the park.

92. Kumari, A. & Kumar, J. 2013. "Aquatic plant diversity of Gandak River, Bihar". *J. Econ. Taxon. Bot.* 37(2): 403–406.

Abstract: The paper deals with phytosociological study of aquatic plant diversity of Gandak River, Bihar. The predominant species are *Eichhornia crassipes* (Mart.) Solms, *Hydrilla verticillata* (L.f.) Royle, *Salvinia natans* (L.) All., i.e., 100% and *Azolla pinnata* R. Br. and *Lemna minor* L. which show 80% frequency. Study area shows species rarity of 40% in *Sagittaria sagittifolia* L., *Spirodela polyrhiza* (L.) Schleid. and *Justicia diffusa* Willd.

93. Kumari, A. & Kumar, J. 2015. "Tree diversity of Subarnarekha riverine area at Jamshedpur, Jharkhand". *J. Econ. Taxon. Bot.* 39(3-4): 446–448.

Abstract: The paper deals with phytosociological study of the tree diversity of Subarnarekha riverrine area, Jamshedpur. The study reveals that *Dalbergia sissoo, Albizia lebbeck, Centaurium centaurioides* are much larger species with 100% frequency. *Dalbergia sissoo* and *Albizia lebbeck* are found in abundance with highest density followed by *Ficus glomerata, Terminalia arjuna* and *Tectona grandis*.

94. Kumari, A., Kumar, R., Kumar, S. & Yadav, D.K. 1993. "Ecological study of the weeds of rabi crops in Diara area of Patna district (Bihar)". *J. Mendel* 10(2-4): 109–110.

Abstract: Survey of the weeds of rabi crops has been done during 1990–1993. It revealed the occurrence of 43 species belonging to 35 genera and 16 families of weeds from this area. The distribution pattern and crop weed association in rabi crops are also discussed.

95. **Kumari, M. & Shukla, K. 2015.** "Diversity of Mistletoes in Jharkhand: A Review". *Biospectra* 10(2): 51–60.

Abstract: Mistletoes are obligate hemi-parasites belonging to the family Loranthaceae and Viscaceae. They have developed haustoria to establish parasitic connections with different families of angiosperms called host which fulfill their need of water and nutrient. In Jharkhand, a lot of floristic study has been carried out previously but no specialized study on the mistletoes. Therefore, this study aimed to collect and enumerate the diversity and indigenous uses of mistletoes in Jharkhand. This exploration trip resulted with a total of 8 species belonging to 4 genera (*Dendropthoe*, *Macrosolen*, *Scurrula* and *Viscum*). A total of 59 dicotyledonous species are recorded as hosts of different parasitic angiosperms. The highest number of host plants recorded for *Dendrophthoe falcata* and the lowest numbers of host plants are recorded for *Scurrula cordifolia*, and *Viscum orientale*.

96. **Kumari, S. & Kumar, K. 2014.** "Comparative investigation of cytological and biochemical analyses among two species of *Cymbopogon* under the influence of ethyl methane sulphonate collected from Ranchi, Jharkhand, India". *Chromosome Bot.* 9: 31–34.

Abstract: The study provides cytological and biochemical changes (estimation of oil) by inducing chemical mutagen. Various abnormalities were observed after treatment in two species of *Cymbopogon*. *Cymbopogon martinii* var. *motia* was noted as sensitive and *C. flexuosus* as resistant in two generations. Percentage of oil was slightly higher after treatment with EMS in both the species of *Cymbopogon*.

97. **Lakra, S.G. & Kumar, K. 2015.** "Cytotaxonomy of *Trigonella foenum-graecum* L. collected from Jharkhand and Uttar Pradesh". *Int. J. Bioassays* 4(1): 3670–3672.

Abstract: Karyotypic studies on four species of *Trigonella* L were performed in the study. All the varieties were recorded with a diploid number of chromosome, i.e., 2n = 16, (n = 8). The study also includes measurement of total chromatin length as well as the comparison of chromosome morphology between species. Idiograms have been prepared on the basis of arm ratio.

98. **Lal, H.S. & Singh, S. 2012.** "Study of plant biodiversity of Hazaribag district, Jharkhand, India and its medicinal uses". *Biosci. Disc.* 3(1): 91–96.

Abstract: Jharkhand is rich in diversity of medicinal plants. The forest area is about 40% of the total area of Jharkhand. A total of 32 tribal communities are found in

Jharkhand. The traditional medicinal practitioners known as vaidays or kavirajas use medicinal plants, and are considered to be the primary health care providers in rural Jharkhand. The objective of this study is to conduct a value addition survey amongst tribal of Hazaribag and around the district of Jharkhand. Information on 95 plant species used by tribal vaidyas to treat various ailments is given in this paper. These medicinal plants belong to 95 genera and 51 families. All plants were grown or cultivated in home steads or fields as ornamental plant, shade giving plants, timber-yielding plants, home construction plants, medicinal plants, vegetable, fruits, etc. Whole plant or plant parts such as leaves, stems, roots, tubers, barks, flower, fruits and seeds are used. Traditional and ethnic knowledge generated from such leads has played most significant role in the discovery of novel products as well as newer ideas about conservation of natural resources. This paper deals the biodiversity of plant which is used by tribals in Hazaribag, Jharkhand.

99. **Lal, V.R. & Jha, R.K. 2011.** "Effect of IBA in the propagation of *Gymnema sylvestre* (Gurmar) – An important medicinal plant under climatic conditions of Jharkhand". *Biospectra* 6(2) (Special Issue): 167–170.

Abstract: *Gymnema sylvestre* is an important medicinal plant, native to Deccan Peninsula is also found in different parts of Chota Nagpur pleateau region, commonly known as Gurmar. The plant is being used extensively in herbal formulation to bring about blood glucose homeostasis. Gymnemic acid, the active principle obtained from the leaf of the plant has anti diabetes property. *Gymnema sylvestre* is rare in nature due to poor seed germination. Planting materials of Gurmar were collected during February 2010 from ICAR Research Complex for Eastern Region Research Centre, Plandu, Ranchi. The explants were first treated with fungicide and were later dipped in different concentration of growth regulators (IBA), viz, IBA (1000 ppm), IBA (1500 ppm), IBA (2000 ppm), IBA (2500 ppm), and plus a control. Higher percentage of rooting (70%) was recorded in apical shoot cuttings with IBA 2500 ppm and longer roots were observed in cuttings treated with IBA 2500 ppm than the control.

100. **Lal, V.R. & Jha, R.K. 2012.** "Standardization of Gurmar (*Gymnema sylvestre* R. Br.) propagation in climatic condition of Jharkhand". *Biospectra* 7(1): 139–144.

Abstract: Most medicinal plant species have become rare due to over-exploitation from natural habitats. In general, a little emphasis has been placed on production of planting material for commercial cultivation of medicinal plant species. *Gymnema sylvestre* is one of the important medicinal plant species, which is rare in nature due to poor seed germination. The plant is being used extensively in herbal formulation to bring about blood glucose homeostasis. Gymnemic acid, the active principle obtained from the leaf of the plant has antidiabetic property. Planting materials of Gurmar were collected

during March 2009 from ICAR Research Complex for Eastern Region Research Centre, Plandu, Ranchi. The attempt for its production and conventional propagation is hampered due to its poor seed viability, low rate of germination and poor rooting ability of vegetative cuttings. Alternative propagation methods would be beneficial in accelerating large scale multiplication, improvement and conservation of the plant. An experiment was conducted to standardize the type of propagation material (softwood, semi-hardwood and hardwood) and growth regulators (IBA, NAA, IAA) for propagation of *G. Sylvestre*. The effect of the environment and plant growth regulators on the rooting of *G. sylvestre* cuttings was studied in Ranchi, Jharkhand, India. The softwood, semi-hard wood and hardwood cuttings were treated with different concentration of IAA (1000 ppm, 1500 ppm and 2000 ppm), IBA (1000 ppm, 1500 ppm and 2000 ppm), NAA (1000 ppm, 1500 ppm, 2000 ppm) were treated using the 'quick dip' method and pregnant cow's urine for 5 minutes plus a control and rooted under mist chamber and open conditions. Data were recorded for rooting percentage, longest root length, number of new leaves, days taken for sprouting. In general, semi-hardwood cuttings treated with 1000 ppm IBA gave the highest rooting percentage (68.50%), longest root length (30.25 cm) and number of new leaves. The hardwood cuttings treated with 1000 ppm IAA and 2000 ppm IBA gave the earliest days taken for rooting and sprouting respectively. The hardwood cuttings treated with 1500 ppm IAA or 2000 ppm IBA gave the highest field survival. Rooting was slow in NAA and in the absence of hormone treatment. It is concluded that these medicinal plants can be successfully propagated vegetatively by treating with IBA, IAA or NAA, for large-scale multiplication in times of low seed availability.

101. Magesh, C.R. 2013. *Studies on the flora of Dalma Wildlife Sanctuary, Jharkhand, India*. Ph.D. Thesis, Bharathiar University, Coimbatore (Unpublished).

Abstract: A total of 417 taxa (including 412 species, 2 subspecies and 3 varieties) in 317 genera belonging to 94 angiospermous families, and 8 species of pteridophytes are reported in this work from the Dalma Wildlife Sanctuary, Jharkhand.

102. Mahato, S. & Mishra, P.K. 2007. "Phytoplankton dynamics in three water bodies of Govindpur (Jharkhand)". *Columb. J. Life Sci.* 8(1): 76–80.

Abstract: Phytoplankton dynamics of three ponds of Govindpur (Jharkhand) namely Purana Bandh, Mohal Goria and Bara Bandh have been studied to assess the level of polution in these water bodies.

103. Maheshwari, J.K. & Paul, S.R. 1975. "The exotic flora of Ranchi". *J. Bombay Nat. Hist. Soc.* 72(1): 158–188.

Abstract: Ranchi, the summer capital of Bihar, has a rich exotic flora which forms a dominant part of the landscape. The study covers 209 exotic species and varieties of

gymnosperms and angiosperms that are cultivated or naturalized in the district. An attempt has been made to determine the country of origin of the exotics, aliens and neophytes of Ranchi which were studied both in the field and in the laboratory during the year 1957–59, 1964–67 and 1970. The study reveals that exotic plants were introduced in this region both adventitiously and intentionally for purposes of food and fodder, forage, medicine, ornament, afforestation, green manuring and soil conservation. In addition, a large number of exotic weeds have been introduced in the district, either intentionally as ornamental plants or accidentally with food grains, ballast, packing materials and seeds of economic plants.

104. Majumdar, N.C. & Biswas, S.N. 1971. "An account of the vegetation of Chaibasa-Singhbhum Dist. in south Bihar". *Bull. Bot. Soc. Bengal* 25: 43–51.

Abstract: A total of 164 species distributed under 135 genera under 47 families including one species of fern, viz., *Lygodium flexuosum* (L.) Sw. (Schizaeaceae) has been reported from this area.

105. Majumdar, N.C. & Biswas, S.N. 1979. "A bibliography of the botany of Bihar". *Botanique* 10(1–4) (Issued in July 1982).

106. Majumdar, N.C., Ghosh, B. & Singh, G.P. 1990. "Observations on the wetland ecosystem of Kabar Lake in Begusarai, Bihar, with special reference to vegetation". *Bull. Bot. Surv. India* 30(1–4): 134–139.

Abstract: The article presents the results of observations on vegetation, flora, fauna, human habitations and environment of the wetland ecosystem of Kabar Lake and surrounding areas in the district of Begusarai, Bihar.

107. Mastakar, V.K. 2018. *Flora of Palkot Wildlife Sanctuary, Jharkhand*. Ph.D. Thesis, Barkatullah University, Bhopal (Unpublished).

Abstract: This study reports occurrence of 480 taxa of angiosperms belonging to 332 genera under 98 families, besides, 12 species of pteridophytes belonging to eight genera under four families from the Palkot Wildlife Sanctuary situated in the districts of Gumla and Simdega districts of Jharkhand.

108. Maurya, O.N. 2018. Floristic assessment of Udhwa Lake Bird Sanctuary, Sahibganj, Jharkhand. In: H.K. Chourasia (Ed.), *Plant Systematics & Biotechnology: Changes & Opportunities*. Today & Tomorrow Printers & Publishers, New Delhi. pp. 245–254.

Abstract: In this chapter, occurrence of 113 species of angiosperms belonging to 92 genera in 47 families is reported from Udhwa Lake Bird Sanctuary, Sahibganj, Jharkhand.

109. Meher-Homji, V.M. 1971. "A sketch of the vegetation of the Chota Nagpur plateau and its environs". *J. Indian Bot. Soc.* 50(2): 162–174.

Abstract: Geography, climate and vegetation of the Chota Nagpur plateau are discussed. Flora of the forest and other degraded types is enumerated and floristic and ecological peculiarities are pointed out. The plateau bears *Shorea robusta-Syzygium operculatum-Toona-Symplocos* of potential vegetation, quite distinct from the adjoining areas. *Shorea-Terminalia-Adina* type occurs in the regions lying to the northwest of the plateau, *Shorea-Cleistanthes* type to the W and S and *Shorea-Cleistanthes-Croton oblongifolius* type to the E of the plateau. Almost all the species of these three types occur in Chota Nagpur; exception is *Cleistanthus collinus*, very poorly represented over Hazaribagh plateau. *Croton oblongifolius* does not extend to the areas to the W of the plateau where dry season is of seven months duration.

110. Mishra, K.K. 1995. "A census of the exotic species of *Alternanthera* Forssk. (Amaranthaceae) in Bihar". *J. Econ. Taxon. Bot.* 19(3): 613–619.

Abstract: The paper deals with five exotic species of *Alternanthera* Forssk. (Amaranthaceae), namely, *A. paronychioides* St.-Hill, *A. philoxeroides* (Mart.) Griseb., *A. pungens* Kunth, *A. tenella* Colla and *A. tenella* Colla var. *versicolor* (Lem.) Veldk., growing in Bihar. Except the last one, all the taxa are wild. Latest botanical names along with synonyms, taxonomic citation, short description, phenology, ecology and distribution have been provided for each exotic taxon. An artificial key has also been prepared for easy identification of five exotic taxa of *Alternanthera*, which have invaded and naturalized in Bihar.

111. Mishra, K.K. 1997. "A census of the exotic species of *Alternanthera* Forssk. (Amaranthaceae) in Bihar". *Higher Plant of India Sub-continent* Vol. VI (*Indian J. Forest., Addit. Ser.* VIII): 1–9.

Abstract: It deals with five exotic species of *Alternanthera* Forssk., namely, *A. paronychioides* St.-Hill., *A. philoxeroides* (Mart.) Griseb., *A. pungens* Kunth, *A. tenella* Colla and *A. tenella* Colla var. *versicolor* (Lem.) Veldk., which are introduced, naturalized and behaving like native elements in the flora of Bihar.

112. Misra, A.K. 1969. "Angiospermic flora of Darbhanga (Mithila, north Bihar) – I". *Bull. Bot. Surv. India* 11(3 & 4): 322–329.

Abstract: This communication is the first of a series of preliminary reports of angiospermic plants growing Dharbhanga and around. This includes 287 species, 243 genera and 93 families in total. Monocots are represented by 51 species, 47 genera and 18 families; and dicots by 236 species, 196 genera and 75 families. The arrangement of families is according to Bentham & Hooker's system of classification (1862–1883).

113. Misra, A.K. 1970. "Angiospermic flora of Darbhanga (Mithila, north Bihar) – II". *Bull. Bot. Surv. India* 12(1–4): 132–138.

Abstract: This communication is the second of a series of preliminary reports of angiospermic plants growing Dharbhanga and around. This includes 262 species, 203 genera and 63 families in total. Monocots are represented by 29 species, 27 genera and 10 families; and dicots by 233 species, 176 genera and 53 families. The arrangement of families is according to Bentham & Hooker's system of classification (1862–1883).

114. Misra, A.K. 1971. "Angiospermic flora of Darbhanga (Mithila, north Bihar) – III". *Bull. Bot. Surv. India* 13(3 & 4): 212–216.

Abstract: This includes a total of 147 species, 114 genera and 49 families. Monocots are represented by 38 species, 24 genera; and dicots by 109 species, 90 genera. In addition, seven gymnosperms and 13 pteridophytes have also been listed. This makes the last part of the work, as far as this author could do.

115. Misra, A.K. & Agarwal, R.P. 1969. "Preliminary notes on plants of Darbhanga". *Videha* 1969: 11–24.

116. Misra, A.K. & Jha, D. 1972. "Floristics in Darbhanga". *Planta* 2(1): 136–143.

117. Misra, M.P., Pandey, B.N. & Mishra, P.N. 1980. "Biological spectrum of the flora of Brahmyoni hills (Gaya)". *Geobios (Jodhpur)* 7: 76–77.

Abstract: The paper deals with the life-forms of the flora with a view to drawing the biological spectrum and to analyse how far it is related with the general climate of the area. A total of 156 species were collected from this area, of which 47 are phanerophytes, seven chamaephytes, 13 hemicryptophytes, three cryptophytes and 86 are therophytes.

118. Mohanta, K. & Mahata, M.C. 2009. "Freshwater weeds of Rourkela steel city, Sundargarh, Orissa". *Biospectra* 4(1): 181–184.

Abstract: This paper is a preliminary one and deals with the aquatic weeds found in and around of the Rourkela Steel City lies between 22.34° N and 84.20° E, and situated approximately at an elevation of 219 m above sea level with maximum summer temperature of 45.3° C and minimum winter temperature of 7° C). During; the survey from February 1982 to January 1983, a total of 45 species of aquatic weeds belonging to 31 families are recorded from the city, of which eight are emergent species, 13 are marginal species, nine are submerged species and 15 are floating species of aquatic weeds. Their occurrences are more in lentic water in contrast to lotic water. The lotic water have only five marginal, two submerged and six floating types of weeds, whereas the lentic waters have eight emergent, 10 marginal, nine submerged, and 14 floating types of weeds. The *Aschyonomene asper* L. and *Riccia* spp. are exclusively found in lotic water only.

119. Mooney, H.F. 1937. A synecological study of the forests of Western Singhbhum. *Indian Forest. Rec., Sylvic. 7*: 259–365.

120. Mooney, H.F. 1937. Third revised working plan for the reserved and protected forests of Saranda Division, Bihar. (1936–37 to 1955–56). Patna.

121. Mooney, H.F. 1944. "A list of plants recorded from the parts of Ranchi and Palamau districts and the States of Jashpur and Surguja". *J. Roy. Asiat. Soc. Bengal* 10: 59–118.

122. Mooney, H.F. 1947. "The occurrence of some indigenous species of Rosaceae in Bihar, Orissa and neighbouring states". *J. Indian Bot. Soc.* 26: 75–83.

Abstract: Thirteen species belonging to seven genera of the family Rosaceae have been reported from this area.

123. Mooney, H.F. 1950. *Supplement to the Botany of Bihar and Orissa*. Catholic Press, Ranchi.

124. Mukherjee, P. 2009. "Aquatic biodiversity of Victoria Lake of Lohardaga (Jharkhand), India". *Biospectra* 4(2): 417–420.

Abstract: A total of 38 aquatic and semi-aquatic angiospermic species belonging to 23 families and 31 genera were recored from Victoria Lake during the inventory conducted during 1994–2008. Out of those 12 families, 14 genera and 18 species belong to dicotyledons and 17 genera and 20 species in 11 families belong to monocotyledons.

125. Mukherjee, S.K. 1947. "A botanical tour to Chotanagpur". *Bull. Bot. Soc. Bengal* 1: 27–28.

Abstract: Six species, viz., *Pseudarthia viscida* Wight & Arn., *Mimosa himalayana* Gamble, *Begonia picta* Sm., *Gomphrena decumbens* Jacq., *Acalypha ciliata* Forssk., *Eriocaulon truncatum* Ham. ex Mart. have been reported from Chotanagpur which were not included in Haines flora.

126. Nandan, K.B. & Singh, C.B. 2008. "Utilization of macrophytes in north Bihar, India". *J. Econ. Taxon. Bot.* 32(Suppl.): 296–304.

Abstract: Over sixty macrophytes growing profusely in the wetlands of north Bihar are utilized for food, fodder, fish food, poultry/duck feed, medicine, basketry material, eating plates, worship, handicraft, etc. The exploitation of wild macrophytes frames economic backbone of the region and that the aquatic cash crops (*Euryale ferox, Trapa natans* var. *bispinosa*) further boost it up. Their sale for medicine (red flowers of *Nymphaea nouchali*), fish food (*Ceratophyllum demersum, Hydrilla verticillata*) and handicraft/basketry materials/products consolidate economy of poor native folk whose upliftment calls for encouragement of basketry, handicraft, integrated aquaculture, etc.

127. Nandi, S.C. & Mukherjee, P.K. 1980. "Vegetation of the Pathorgora phosphate mines area, Singhbhum district, Bihar". *Bull. Bot. Surv. India* 22: 63–67.

Abstract: Vegetation of the phosphate mine area at Pathorgora in Singhbhum district, Bihar is discussed. Near absence of Sal (*Shorea robusta* C.F. Gaertn.) is the most dominant feature. Occurrences of plants in relation to phosphate ore are also discussed.

128. Nandi, S.C., Mukherjee, P.K. & Adhikary, D. 1995. "Observations on the vegetation of copper mines areas of Singhbhum district, Bihar". *J. Econ. Taxon. Bot.* 19(3): 595–606.

Abstract: The Singhbhum copper-belt, one of the important mineralized belts in the Indian Peninsula has been mainly known for the occurrence of copper ore deposits. During the recent years, it has been proved to be equally important for a host of other strategic minerals. Vegetation of this area is mainly a tropical dry deciduous mixed forest. A correlation of the vegetation with the geological occurrence has been attempted. The highest frequency, abundance and density are compared in copper outcrop and non outcrop areas.

129. Oraon, B.C., Sivaji, V. & Bijalwan, A. 2011. "Flowering and fruiting behaviour of some economically important trees in Ranchi, Jharkhand". *J. Trop. Forest.* 27(1): 43–48.

Abstract: Flowering and fruiting behaviour of 20 economically important tree species were studied in three different localities of Ranchi district, Jharkhand. Observations on various parameters of flowering were recorded, i.e., time of appearance of buds, period of buds, time and period of maximum flowering (bloom period), total flowering time and total flowering period. Fruiting behaviour was studied by recording the observations on different parameters, viz., starting of fruiting, completion of appearance of fruits, fruit development period, seed collection time, total fruiting time, total fruiting period, weight of fruits/seeds. All observations were recorded on five selected sample trees of each species at an interval of week days. The results obtained were compared with the flowering and fruiting period from other locations of the country. The differences observed in flowering and fruiting behaviour were attributed to the internal and locality factors.

130. Oraon, B.C., Malik, M.S., Bijalwan, A. & Dobriyal, M.J.R. 2016. "Growth and biomass of three important energy plantation tree species in Jharkhand state of India". *Indian Forester* 142(9): 833–842.

Abstract: Growth and biomass of three important energy plantation tree species, viz., *Acacia auriculiformis, Cassia siamea* and *Eucalyptus* hybrid were studid in three districts (Deoghar in subzone IV, Ranchi in subzone V and East Singhbhum in subzone VI of agro climatic zone VII (Eastern plateau and hill region) of Jharkhand. The measurement was taken during 2011–12, when plantation reached at an age of four years. The comparison of growth performance in terms of survival per cent, plant height, diameter and total biomass of tree were done. Among three species, *Eucalyptus hybrid* was better as compared to other two species in terms of survival, growth and biomass. Survival percent

of all three species were found more than 75%. Growth performance (height and diameter) of *Eucalyptus hybrid* was found better as compared to other species. The tree height and diameter of *Eucalyptus hybrid* was recorded maximum 11.42 m and 9.14 cm followed by *Acacia auriculiformis* (5.54 m and 4.69 cm) and *Cassia siamea* (5.03 m and 3.85 cm). The data for fresh biomass of different above ground parts (bole, branches, leaves and barks) and below ground parts (roots) were also collected. The result indicated that *Eucalyptus hybrid* (average 307.69 kg/tree) had maximum fresh biomass as compared to other two species, whereas below ground maximum fresh biomass obtained by *Acacia auriculiformis* (average 19.33 kg/tree) followed by *Cassia siamea* (average 14.61 kg/tree) and the minimum fresh biomass of root obtained by *Eucalyptus hybrid* (13.45 kg/tree).

131. Panda, P.C. & Das, P. 1997. "Identity, nomenclature and distribution of some rare flowering plants of Orissa and its adjoining states in India". *Rheedea* 7(1): 57–63.

Abstract: Nomenclature and distribution of *Aglaia haslettiana* Haines, *Weihea ceylanica* (Gardn.) Baill., *Indochloa clarkei* (Hack.) Bor, *Lasiococca comberi* Haines, *Mucuna minima* Haines, *Tragia gagei* Haines, *Pomatocalpa decipiens* (Lindl.) J.J. Sm., *Cedrela brevipetiolulata* Haines and *Uvaria eucincta* Bedd. ex Dunn which are rare and so far considered as endemic to Odisha and the adjoining states of Andhra Pradesh, Madhya Pradesh and Bihar have been discussed.

132. Panigrahi, H. 1966. "A botanical tour in the Rajmahal hills of Bihar". *Bull. Bot. Surv. India* 8: 1–15.

Abstract: The paper presents the main features of geology, topography, climate and vegetation met with in Rajmahal hills and enumerates 364 species of angiosperms, 13 species of pteridophytes, and 16 species of mushrooms collected during a short tour undertaken in December, 1957. An analysis of different plant communities characterizing various habitats and of the floristics and distribution of species collected brings up nine species, viz., *Anthraxon castratus* (Griff.) Naray., *Bidens biternata* (Lour.) Merr. & Sherff., *Carpesium cernuum* L., *Cyathula prostrata* Blume, *Echinocarpus murex* Benth., *Epilobium angustifolium* L., *Evolvulus nummularius* L., *Hygrophila salicifolia* T. Anderson, *Inula eupatorioides* DC. as new records of species and *Cyathula* as new record of genus for Bihar. A new combination, viz., *Embelia tsjeriam-cottam* (Roem. & Schult.) A. DC. var. *ferruginea* (Wall.) Panigrahi, comb. nov. is proposed.

133. Paria, N.D. & Chattopadhyay, S.P. 2000 & 2005. *Flora of Hazaribagh district, Bihar*. Vol. I (Magnoliaceae to Oxalidaceae) and Vol. II (Tropaeolaceae to Orchidaceae). Botanical Survey of India, Calcutta.

Abstract: The work deals with 972 species of angiosperms belonging to 615 genera under 142 families. Among the total species dicotyledons comprise 114 families, 478

genera and 745 species and monocotyledons comprise 28 families, 137 genera and 227 species.

134. Parween, R. & Kumar, K. 2010. "Karyotype analysis of a rare herb *Chlorophytum laxum* collected from Ranchi, Jharkhand". *Advances Pl. Sci.* 25(2): 485–486.

Abstract: The study provides a first report of the karyotype analysis of *Chlorophytum laxum* 2n = 4x = 28 collected from Ranchi, Jharkhand suggesting it to be a tetraploid. Secondary constriction was completely absent and the karyotype was symmetric in nature.

135. Parween, R. & Kumar, K. 2010. "Karyomorphological investigation on *Chlorophytum* of Ranchi, Jharkhand, India". *Advances Pl. Sci.* 23(2): 721–725.

Abstract: Two varieties of *Chlorophytum borivilianum* white, purple and *Chlorophytum tuberosum* were exploited for karyomorphological studies. The tubers were collected from NBPGR farms, Ranchi and Birsa Agriculture University, Ranchi, Jharkhand. In this investigation an attempt has been made to find out the relationships based on chromosome number and morphology of the species and varieties under consideration. Both the species were found to be tetraploid with 2n = 4x = 28 chromosomes. Chromosomes with secondary constriction were common in all the species. The karyotypes of both the species showed nearly submedian chromosomes in high proportion while submedian and nearly subterminal chromosomes were very few in number.

136. Pathak, S.K. & Kumar, J. 2015. "Comparative studies of two species of genus *Oxalis*". *Biospectra* 10(2): 125–128.

Abstract: A comparison of anatomical features of *Oxalis corniculata* L. *and O. latifolia* Kunth was undertaken. The results of abaxial leaf surfaces showed that the epidermal cells of these species have variable shapes that are irregular. Ranunculous type of stomata occurred in both the species investigated. These species showed variations in stomata types and size, transverse section of root, petiole and stem. Most of the characters especially stomata were diagnostic and used for distinguishing taxa. Leaf epidermal anatomy was found taxonomically useful in the identification at the species level.

137. Paul, S.R. 1966. "Rice field weed flora of Bhagalpur district (Bihar)". *Proc. Bihar Acad. Agric. Sci.* 15: 15–24.

138. Paul, S.R. 1967. "Studies on the grasses of Bhagalpur district, Bihar". *Indian Forester* 93: 169–179.

Abstract: In this paper, a total of 81 species of grasses belonging to 45 genera have been reported from Bhagalpur district. Only 16 genera belong to subfamily Pooideae, while 29 genera are from the sub-family Panicoideae. Most of the genra of Panicoideae are from tribes Andropogoneae and Paniceae, while from Pooideae the tribes

Eragrosteae and Chlorideae has more than one genra. Tribe Maydeae is only represented by a single cultivated genus. Majority of the genera are from moist habitats and annuals.

139. Paul, S.R. 1973. "On the aquatic and marsh plants of Monghyr, Bihar". *Botanique* 4(2): 140–151.

140. Paul, S.R. 1984. "Vegetation types of Netarhat, Bihar". *J. Econ. Taxon. Bot.* 5: 65–74.

Abstract: In this paper description of vegetation types of Netarhat are discussed under (a) tropical deciduous forest, (b) bamboo forest, (c) semi-evergreen forests, (d) vegetation of exposed or open areas, (e) grasslands, (f) ruderal formations, (g) aquatic vegetation and (h) Rheophytic vegetation. Netarhat bears *Shorea robusta-Cleistocalyx operculatus-Toona- Symplocos* type. The vegetation of exposed areas is of Savannah type.

141. Paul, S.R., Prasad, S.S. & Husain, T. 1991. "Taxonomic studies in the genus *Desmodium* Desf. (Papilionaceae) from Chotanagpur plateau (Bihar)". *J. Econ. Taxon. Bot.* 15(1): 219–226.

Abstract: The paper provides a taxonomic account of the genus *Desmodium* sensu lato from Chotanagpur plateau, Bihar. A revised key for the determination of eleven species and other significant notes on distribution are provided supplemented by distributional map.

142. Pragya, S., Kumar, A. & Pandey, A.K. 2008. "Alien flora of Bihar and Jharkhand". *J. Non-Timber Forest Prod.* 15(2): 111–116.

Abstract: An attempt has been made to prepare a detailed account of alien/exotic flora of Bihar and Jharkhand. A total number of 155 exotic species are recorded from various localities of Bihar and Jharkhand.

143. Prasad, B.N. 1965. "Bamboo plantations in Dhalbhum tract of Singhbhum district of Bihar". *Indian Forester* 91: 10–21.

Abstract: Dhalbhum tract in contrast to the other portions of Singhbhum district of Chotanagpur is characterised by plane configuration of land and red soil. Extensive waste lands are available in and outside forest demarcation. Bamboo plantation in smaller scale was tried in the fourties with very good result. With the evolution of the technique of raising large scale bamboo plantation with seeds, a target of 11,882 acres has been kept for plantation in this tract in the 3rd Five-Year Plan. The article describes the salient features, technique and various problems of the first large scale bamboo plantation. It may be of some help in organising large scale bamboo plantation in other states.

144. Prasad, U.N. 1966. "On *Cuscuta reflexa* Roxb., in Namkum, Ranchi, Bihar". *Indian Forester* 92(3): 203–208.

Abstract: The paper deals mainly with the parasitism and the wide range of host-species of *Cuscuta reflexa* Roxb. in Namkum, Ranchi, Bihar. The parasitism in this case is of 'diffuse-type'. Even though it is chiefly parasitic on woody and arborescent species of the dicotyledons; its record on a number of herbaceous plants belonging to Compositae, the Cyperaceae and the Gramineae is of great interest.

145. Raizada, G. 1978. "Some interesting plants from Bihar". *Indian J. Forest.* 1: 61–155.

146. Ranjan, V. 2007. "Preliminary studies on flora and vegetation of Parasnath Wildlife Sanctuary, Giridih, Jharkhnad". *Indian J. Forest.* 30(3): 339–342.

Abstract: Parasnath Wildlife Sanctuary is situated at Giridih district of Jharkhand. The Sanctuary covers an area of about 48 km^2 with many irregularly shaped rocky peaks (4480 ft) of the Parasnath Hill in the Jharkhand state. After the notification of Parasnath Hill as a Wildlife Sanctuary, a comprehensive flora of the Sanctuary was felt essential for sustainable utilization and effective conservation measures. The extensive plant collections made during 2003–2006 revealed the occurrence of 538 species in 346 genera belonging to 98 families as floristic composition of Parasnath Wildlife Sanctuary.

147. Ranjan, V. 2008. "Additions to the flora of Parasnath Hill, Giridih, Jharkhand". *J. Non-Timber Forest Prod.* 15(3): 193–205.

Abstract: Parasnath Hill is situated in Giridih district of Jharkhand. The extensive plant collections between 2003 and 2006 revealed that 568 species under 360 genera belonging to 101 families as floristic composition of Parasnath Hill (Wildlife Sanctuary). Out of these, 138 species under 105 genera of 49 families are reported to be new additions to the flora of Parasnath Hills. The paper includes the enumeration of 109 species belonging to 81 genera of 38 families. Correct nomenclature with a brief description, phenology of each taxon is given.

148. Ranjan, V. 2009. "Contribution to the flora of Parasnath Wildlife Sanctuary, Giridih, Jharkhand". *Phytotaxonomy 7*: 56–59.

Abstract: The communication enumerates 26 species belonging to 23 genera of 9 families as new additions to the flora of Parasnath hills.

149. Ranjan, V. 2010. "A note on phytogeographical analysis of the flora of Parasnath Hill, Jharkhnad". *Indian J. Forest.* 33 (1): 117–118.

Abstract: The paper deals with the phytogeographical analysis of the flora and shows that the native flora is composed of 12 various phytogeographical elements and predominant elements are Indian wides, tropical and subtropical and Indian.

150. Ranjan, V. 2010. "Angiospermic flora of Parasnath Wildlife Sanctuary – An assessment". *Phytotaxonomy* 9: 75–96.

Abstract: The paper deals with a floristic account (angiosperms) of Parasnath Wildlife Sanctuary, which was surveyed during 2003–2006 and reports the occurrence of 568 species under 360 genera belonging to 101 families of angiosperms.

151. Ranjan, V. 2012. "Life forms and biological spectrum of the flora of Parasnath Hill, Chota Nagpur Plateau (Jharkhand), India". *Indian J. Forest.* 35(4): 513–515.

Abstract: A total of 568 species of higher plants have been classified into different life-forms and biological spectrum of the flora of Parasnath Wildlife Sanctuary (Parasnath Hill), Chota Nagpur plateau, Jharkhand has been prepared and compared with Raulkiaer's normal spectrum that depicts thero-phaenophytic phyto-climate of the area.

152. Ranjan, V. 2014. *Flora of the Parasnath Wildlife Sanctuary, Jharkhand*. Bishen Singh Mahendra Pal Singh. Dehra Dun.

Abstract: The book deals with taxonomic account of 586 taxa belonging to 367 genera under 102 families of angiosperms based on author's own collection, available plant materials in herbaria (CAL and LWG) and literature. Keys to various taxa (families, genera and species) have been provided for identification. Recent binomials with basionym (if any) and synonyms are cited for each taxa followed by taxonomic description, phenology and collection number. Coloured photographs and line drawing of some plants are provided. The study has resulted in the discovery of one new species and 138 taxa as new to Parasnath Hills.

153. Ranjan, V. & Srivastava, S.C. 2010. "Changes in the floristic composition in Parasnath Hill". *Indian J. Forest.* 33 (4): 653–657.

Abstract: An attempt has been made to record the changes in floristic composition in Parasnath Hill during the past 150 years. In all, 568 taxa belonging to 360 genera and 101 families are reported from the area, out of that 188 taxa (33.09%) recorded on or before 1955 have diminished or untraceable and 136 taxa (23.94%) are reported as additions during the survey. The possible reasons for the changes are also discussed.

154. Rath, S.P., Choudhury, B.P. & Patnaik, S.N. 1979. "Cyperaceae of Orissa". *Bull. Bot. Surv. India* 21: 156–162.

Abstract: As a part of the programme of study of the flora of Odisha, Cyperaceae, one of the dominant families in this region was taken up first. Through an exhaustive collection of Cyperaceae along with others for about seven years and survey of specimens and literature at Central National Herbarium, Shibpur, 112 species belonging to 19 different genera of this family were found to occur in the state. A total of 81 species of sedges from various parts of Odisha, and 11 species are new reports for the state. The enumeration of species with latest nomenclature and localities of collection are presented

in this paper. The collected specimens are deposited in the Herbarium of Botany Department of Utkal University (BOTU).

155. Saha, B., Chakravorty, C. & Mukherjee, P.K. 1990. "Survey of the flora of coal mine waste dumps – A case study of Chasnala mines, Dhanbad, Bihar". *Bull. Bot. Surv. India* 32: 86–93.

Abstract: The paper deals with the flora of Chasnala mine complex including various dump sites. The survey of flora deals with enumeration of species, their life forms and dispersal types. It is evident that the dumps can acquire flora and advent of the species is contributed by flora of adjacent areas. The wind dispersed species are rich and the herbaceous species predominate initially. Chemophytes and hemicryptophytes have advantage in the pioneer stage. Grasses and legumes also appeared in the early successional stages.

156. Saha, B., Chakrabarty, C., Mukherjee, P.K. & Santra, S.C. 1991. "Studies on successional changes of plant community on waste dumps of coal mines". *J. Indian Bot. Soc.* 70(1–4): 71–74.

Abstract: The early successional plants are herbaceous, ruderals with C anatomy and peripherally spread root systems. The late successional ones show maximum vegetative growth in the post-monsoon period as compared to the summer vegetative growth of the early successional species. While grasses and weedy herbs establish themselves on open spaces, shelters provided by boulders facilities the growth of the tree species; the propagules of all originate from surrounding areas. This study was conducted in the coal mine complex of Chasnala Mines of IISCO, Dhanbad, Bihar.

157. Sahay, S. & Kumar, J. 2015. "Morphological and anatomical studies of the leaf and stem of *Lippia nodiflora* (L.) Michx. and *Lippia alba* (Mill.) N.E. Br. ex Britton & P. Wilson". *Biospectra* 10(2): 129–136.

Abstract: A comparative study of the morphological and anatomical features of the leaves and stems of *Lippia nodiflora* (L.) Michx. and *L. alba* (Mill.) N.E. Br. ex Britton & P. Wilson was undertaken, both species have been widely reported in several medicines. The presence of quadrangular stem in the latter distinguishes it morphologically from the former, which is characterized by smooth circular stems and glabrous leaves. The study reports variations in the structure and distribution of stomata in *Lippia nodiflora* (L.) Michx. and *L. alba* (Mill.) N.E. Br. ex Britton & P. Wilson. The type of stomata, stomatal index, size of stomata (average length and width), T.S of stem and leaf were examined. Differences in epidermal structure and stomata arrangements were also prominent features for separating between these species.

158. Salini, R. & Jha, V. 2015. "*Schoenoplectiella articulata* (L.) Lye (Khubahi): A basis of suitable livelihood in flood plains of north Bihar". *Ethnobotany* 27: 102–107.

Abstract: The paper provides an illustrated account of the cultivation and processing of *Schoenoplectiella articulata* (L.) Lye in the water-logged sites of Madhubani district of north Bihar. It is locally called 'Khubahi' but is sold under the name of 'Ramdana' on account of similarity in appearance of pops of amaranth. The infructescences are collected from the wild. Minute seeds are separated and roasted to form one of the lightest pops known. Granular sweets are prepared and sold commercially. Weaker sections of the people get involved with Khubahi business when they are free from cultivation and harvest of main arable crops. It is generally the women of fishing community who perform the popping operations. Green immature plants are used as fodder to increase lactation among the cattle, while chaff is used for strengthening the mud walls in rural areas. There is a possibility of providing an organized shape to the integration of Khubahi as an example of rotational cropping with paddy as well as that of mixed cropping with *Trapa* sp.

159. Sannigrahi, A. & Pal, P.K. 1997. "Megaspore succession through the Raniganj-Panchet transition in the Raniganj coalfield, India". *Bull. Bot. Surv. India* 39: 157–178.

Abstract: Megaspores from the uppermost horizon of Raniganj formation and the lowerrnost strata of Panchet formation exposed in the Raniganj Coalfield, West Bengal, have been analysed both qualitatively and quantitatively. The assemblage recovered from the Raniganj formation qualitatively comprises *Banksisporites psilatus* (Bharadwaj & Tiwari) comb. nov., *B. panchetensis* (Maheshw. & Banerji) Banerji & al., *Biharisporites maiturensis* Maheshw. & Banerji, *B. raniganjensis* sp. nov. and *Maiturisporites indicus* Maheshw. & Banerji. The genus Biharisporites is the most commonly occurring from in this assemblage. The Maitur member of Panchet formation yields *Banksisporites panchetensis* (Maheshw. & Banerji) Banerji & al., *B. gondwanensis* Maheshw. & Banerji, *B. granulosus* Maheshw. & Banerji, *Biharisporites maiturensis* Maheshw. & Banerji, *B. luguensis* Pal & al., *Verrutriletes obscurus* (Mahesw. & Banerji) Banerji & al., *V. distinctus* (Maheshw. & Banerji) Banerji & al., *Talchirella sinuata* Maheshw. & Banerji, *T. dubia* Maheshw. & Banerji, *T. flavata* (Kar) Bharadwaj & Tiwari, *Pantiella bosei* Maheshw. & Banerji, *P. bharadwajii* Maheshw. & Banerji, *P. maheshwarii* sp. nov., *Maiturisporites indicus* Maheshw. & Banerji, *M. distinctus* Maheshw. & Banerji, *M. spinotriletus* Maheshw. & Banerji and *M. banerjii* sp. nov. Some abnormal forms with tetralete sutures have also been recovered from this horizon. Maitur assemblage is characterized by the preponderance of the genus *Maiturisporites* followed by *Banksisporites*.

160. Santapau, H. 1951. 'Supplement to the Botany of Bihar and Orissa' by H.F. Mooney, 1930. *J. Bombay Nat. Hist. Soc.* 49: 768–770.

Abstract: It briefly reviews the 'Supplement to the Botany of Bihar and Orissa' by Mooney.

161. Sanyal, A. 1957. "Additional notes on the Botany of Bihar and Orissa by H.H. Haines and its supplement by Herbert Mooney". *Indian Forester* 83: 230–235.

Abstract: The paper reports 50 additional species to Botany of Bihar and Orissa by H.H. Haines and its supplement by Herbert Mooney, including nine species collected from this area, which were not mentioned in Haines's Botany of Bihar and Orissa and its supplement by Herbert Mooney.

162. Sarma, J. 1971. "Plants of Raj area, Darbhanga". *Planta* 1(2): 41–44.

163. Sarma, T.K. & Sarkar, A.K. 1994. "Exotic species of Palamau district (Bihar)". *J. Natl. Bot. Soc.* 48: 7–17.

164. Sarma, T.K. & Sarkar, A.K. 2002. *Flora of Palamau district, Jharkhand*. Botanical Survey of India, Calcutta.

Abstract: The Flora deals with 824 species of angiosperms belonging to 530 genera under 136 families. Among the total species dicotyledons comprise 110 families, 427 genera and 654 species and monocotyledons comprise 26 families, 103 genera and 170 species.

165. Saxena, H.O. 1976. Additions to the Flora of Bihar and Orissa. *J. Bombay Nat. Hist. Soc.* 73(3): 553–554.

Abstract: Nine species are reported as additions to the flora of Bihar and Odisha region.

166. Saxena, H.O. & Brahmam, M. 1978. "Additions to the Flora of Bihar and Orissa – II". *J. Bombay Nat. Hist. Soc.* 75: 941–942.

Abstract: A total of ten plant species, viz., *Cyperus pubisquama* DC., *Fimbristylis polytrichoides* Vahl, *Hydrocera triflora* (L.) Wight & Arn., *Jatropha glandulifera* Roxb., *Momordica cochinchinensis* (Lour.) Spreng., *Mucuna gigantea* DC., *Oldenlandia biflora* L., *Neopeltandra suberosa* (Müll.Arg.) Gamble, *Pittosporum napaulense* (DC.) Rehder & E.H. Wilson and *Sphaeranthus africanus* L. have been recorded for the first time for the flora of Bihar and Orissa, from Ganjam, Bhubaneswar, Barang, Dhenkanal, Bhitarkanika and tidal forests of river Brahmani.

167. Sharma, A. & Sahu, R. 2009. "Community structure of phytoplankton at junction of Damodar & Konar river in Jarangdih colliery (Dist.: Bokaro), Jharkhand". *Biospectra* 4(1): 109–112.

Abstract: The study focuses attention on a comprehensive study of phytoplankton community with reference to their population density, species diversity, species richness

and equitability. Damodar and its tributary Konar River are well-known for establishment of coal mining industries along their basin areas. Jarangdih coal mines are situated at the junction of Damodar and Konar rivers. Three sampling sites were selected for the study area. Algal samples were regularly collected from the above three sites throughout the year. Altogether 48 taxa of three different classes, viz., Cyanophyceae, Chlorophyceae and Bacillariophyceae has been recorded. The results indicate dominance of Cyanophyceae and Chlorophyceae throughout the year, which are important pollution indicators.

168. Sharma, B.D. 1969. "On some fossil Cycadean fronds from India". *Bull. Bot. Surv. India* 11(1 & 2): 115–119.

Abstract: The paper deals with the description of some of the fossil cycadean fronds collected from the Rajmahal Hills. The author has also tried to redefine the systematic positions of certain doubtful species and has suggested a key for the identification of different species of the genus *Nilssonia* from India.

169. Sharma, P.C. 1989. "Additions to the flora of Rajgir (Bihar)". *Bull. Med.-Ethno-Bot. Res.* 10: 11–22.

Abstract: Rajgir, situated at about 104 km south-east of Patna in Nalanda district (Bihar) is one of the ancient monuments of historical importance. The area, covered with scrub, jungles, was not explored botanically till recent times. Paul (1981) reported 399 vascular plants from the locality. The author during the course of medico-ethno-botanical explorations from 1971 to 1973 collected more than 400 species, out of which 94 are found to be not reported by Paul. This paper presents an enumeration of these species.

170. Singh, A. 2012. "Diversity of aquatic and marshy angiosperms of freshwater bodies under Bhagalpur district in Bihar, India". *J. Indian Bot. Soc.* 91(4): 379–385.

Abstract: The study has been carried out to explore the diversity and distribution of the aquatic and marshy angiosperms of the five freshwater bodies under Bhagalpur district of Bihar. A total of 75 aquatic angiosperms were recorded during the study period with 64 genera and 30 families. These plants were categorized into submerged (7 spp.), floating (11 spp.), emergent (32 spp.) and marginal (25 spp.). Out of 75 angiospermic species, 43 species belonged to dicotyledons and 32 species to monocotyledons.

171. Singh, C.B. 2011. "Diversity and perspective of macrophytes in the wetlands of north Bihar, India". *Indian J. Forest.* 34(2): 229–238.

Abstract: The wetlands of north Bihar harbour diverse macrophytes, free-floating (8.55%), rooted floating (12.82%), unanchored submerged (3.42%), anchored submerged (6.84%) and emergent (68.37%) forms. The emergent habit appears to be fittest for

survival in all the wetlands (ditches, lakes, ponds, chaurs, marshes). Amongst the recorded 117 species of macrophytes, the monocots (50.42%) dominate over algae (1.71%) ferns (2.57%) and dicots (45.30%).

172. Singh, C.T.N., Ambasta, N. & Kumar, J. 2009. "Umbrella plant – A natural growing horticulture crop of Jharkhand". *Biospectra* 4(1): 119–120.

Abstract: A few well selected houseplants can add immeasurably aesthetic values to any room in the house, but choosing the right ones and looking after them can sometimes be very tricky even for experienced gardeners. All the more, the plants are exorbitantly priced in nurseries. The forest of Jharkhand provides us a jem house of wild plants which effortlessly fill in our needs. The umbrella plant is one such plant which provides greenery to our surrounding.

173. Singh, D. 1989. "The genus *Vigna* Ravi (Fabaceae) in Bihar". *J. Econ. Taxon. Bot.* 13(2): 401–404.

Abstract: The paper deals with seven species of the genus *Vigna* Savi, viz., *V. aconitifolia* (Jacq.) Marechal, *V. mungo* (L.) Hepper, *V. radiata* (L.) Wilczek, *V. pilosa* Baker, *V. trilobata* (L.) Verdc., *V. unguiculata* (L.) Walp. and *V. vexillata* (L.) A. Rich. in the context of correct name, citation, taxonomic account, phenology and distribution, etc. from the state of Bihar.

174. Singh, D.K. & Siddiqui, M.O. 1996. "Biological spectrum of the flora of Buxar district, Bihar". *Bull. Bot. Surv. India* 38: 60–63.

Abstract: Buxar forms a district of Patna division in the Ganga valley and is under intense cultivation and irrigation by an efficient sone canal system. In the paper life-forms of 540 angiospermic species have been studied and the same have been compared with Raunkiaer's normal biological spectrum and other spectra of the adjoining regions of Ganga valley. This reveals the dominance of therophytes which indicate that the phytoclimate of the district is therophytic. The area is devoid of its original natural vegetation and the dominance of therophytes is due to the introduction of weeds of cultivation.

175. Singh, D.K. & Singh, R. 2014. "Study of angiospermic wall floristic composition of city Buxar, (Bihar) India". *J. Pharmacogn. Phytochem.* 2(5A): 52–54.

Abstract: A study was conducted to analyze the seasonal angiospermic wall floristic composition of city Buxar of state Bihar, covering the total land area of 24.7 km^2. A total of 78 angiospermic wall flora was recorded. The angiospermic wall flora was represented by 64 genera belonging to 29 different families. Asteraceae, Poaceae and Amaranthaceae were dominant families of the angiospermic wall flora of city

Buxar. Majority of the non woody wall flora appear in the rainy and winter seasons of the year. Among the woody perennials *Azadirachta indica*, *Ficus benghalensis* and *F. religiosa* were the most common wall flora of city Buxar.

176. Singh, J.P. & Kumar, I. 2007 "Causes, effects and solution of acid rain: A case study of analysis of wet acid deposition near Patratu thermal power station". *Biospectra* 2(2): 351–354.

Abstract: Acid rain has been a serious problem in the past century. It is the consequence of the industrial revolution. Nitrogen dioxide and sulphur dioxide produced by the combustion of fossil fuels dissolve in rain water causing acid rain. The acid rain affects animals and plants adversely and cause damage to marble monuments. Acid rain can be controlled by taking certain measures. This research paper deals with chemical analysis of wet acid deposition near Patratu Thermal Power Station, Ramgarh district, Jharkhand.

177. Singh, L.B. 1987. "Monocots of Saharsa district, Bihar". *J. Econ. Taxon. Bot.* 10: 223–227.

Abstract: Floristic survey of Saharsa district of north Bihar has revealed the occurrence of 145 species of monocots belonging to 27 families and 94 genera. 50 genera and 61 species of non-cyperaceous and non-poaceaous monocots are recorded here for the first time.

178. Singh, M. 1990. "Hydrophytes of Ranchi, Bihar". *J. Econ. Taxon. Bot.* 14(3): 573–577.

Abstract: The paper shows that the various aquatic and marsh habitats (perennial ponds, lakes, rivers and lowlying areas) are rich in vegetation having 72 species belonging to 29 families of angiosperms, and three of pteridophytes. The angiospermic plants belong to both primitive and advanced families of dicotyledons and monocotyledons. Presence of these plants in the various habitats clearly shows that the seasonal rainfall water level in ponds and lakes, period of holding water in low lying areas and rivers, influence their distribution. Soil analysis and the pH test of water habitats indicate the possibility that pH and soil nitrogen content may also influence the distribution of some hydrophytic plants in the area.

179. Singh, M. & Kumar, K. 2013. "On the cytotaxonomy in five ecotypes of *Acorus calamus* L. collected from Jharkhand". *Biospectra* 8(2): 117–120.

Abstract: Cytotaxonomical studies have been carried out on some ecotypes of *Acorus calamus* L. Mitotic studies were made in five ecotypes, two of them were collected from Hazaribagh, and three of them were collected from Khunti, Tamar and Birsa Chowk, Ranchi. Parameters for cytotaxonomical comparison included, type of chromosome, haploid chromosome number, arm length, (long arm, short arm), length of chromosome, total chromatin length, and arm ratio (L/S).

180. Singh, M. & Kumar, K. 2013. "Karyophomological studies in five ecotypes of *Acorus calamus* L. collected from Palandu, Ranchi (Jharkhand)". *Columb. J. Life Sci.* 14(1&2): 1–3.

Abstract: Karyomorphological studies have been carried out on some ecotypes of *Acorus calamus* L. Mitotic studies were made in five ecotypes, four of them collected from NBPGR, ICAR-RCER, Palandu, Ranchi and one was from Namkum (roadside area). Parameters for karyomorphological comparision included, type of chromosome, haploid chromosome number, arm length (long arm and short arm), length of chromosome, total chromatin length and arm ratio (L/S).

181. Singh, M.P. 1986. *Flora of Patna (Dicotyledons*). International Books & Periodicals Supply Service, New Delhi.

Abstract: The Flora presents a floristic enumeration of 674 species belonging to 434 genera and 110 families of dicots. A family-wise list of genera and species (both wild and cultivated) is also given.

182. Singh, N.P., Mudgal, V., Khanna, K.K., Srivastava, S.C., Sahoo, A.K., Bandyopadhyay, S., Aziz, N., Das, M., Bhattacharya, R.P. & Hajra, P.K. 2001. *Flora of Bihar Analysis*. Botanical Survey of India, Calcutta.

Abstract: The book enumerates 2963 angiospermous species under 1151 genera belonging to 186 families. Of which, 2106 species belong to docotyledons and remaing 857 species are monocotyledons.

183. Singh, P. & Singh, A.K. 1993. "Floristic analysis of Aurangabad". *Columb. J. Life Sci.* 1(2): 123–125.

Abstract: The paper deals with the floristic analysis of Aurangabad district. Species of 606 dicotyledonous angiosperms excluding cultigens belonging to 393 genera distributed over 114 families have been recorded. The proportion of the family to genera is 1:3.45 and the ratio between genera and species is 1:1.54, respectively. The family Papilionaceae occupies first among dicots. Compositae, the largest family of the world, ranks the second position. By perusal of the available literature, it appears that out of 606 species, 327 species have been recorded for the first time from the district.

184. Singh, R.K. 2007. "Floristic wealth of Valmiki National Park, Bihar – An overview". *Indian J. Forest.* 30(2): 159–166.

Abstract: In this paper, a general account of the vegetation pattern of the Valmiki National Park has been described. About 700 species spread over 459 genera and 117 families are reported. Apart from this, rare and threatened plants, endemic species, economically important plants and factors affecting the vegetation are discussed. Conservation measures are proposed to protect the natural vegetation.

185. Singh, S. & Chowdhery, H.J. 2007. "Floristic diversity of Betla National Park, Palamau district, Jharkhand – An overview". *J. Econ. Taxon. Bot.* 31(2): 351–360.

Abstract: Betla National Park is a protected area of Palamau district in Jharkhand state. The National Park is rich in floristic diversity with more than 600 species. The unique geographical position, topography and climate of this region represent all major forest types. The dominant floristic components include species of *Crotalaria, Ficus, Cassia, Acacia, Desmodium, Cyperus*, etc. The important medicinal plants include *Andrographis paniculata, Asparagus racemosus, Phyllanthus emblica, Hemidesmus indicus*, etc. to name a few. The other important plant species with lesser known ethnomedicinal uses in this area are also dealt with.

186. Singh, S. & Jee, J. 2012. "Empowering the fisher community through promotion of scientific Makhana cultivation in Antarathari block of Madhubani district in Bihar, India for livelihood security". *Biospectra* 7(2): 25–28.

Abstract: The article deals with the scientific approach for empowering the socioeconomically challenged fisher community of Antarathari block of Madhubani district, north Bihar by motivating them to adopt the Makhana cultivation with R & D approach. The statistics of Makhana cultivation produce has supported the hypothesis that it can easily elivate the socio economic condition of fisherman of this locality who target only fish in their net but ignore the Makhana submerged plants. It is therefore a good measure for livelihood security.

187. Singh, T.B. 1955. *Bihar ki vanaspatiyan*. Sree Baidyanath Ayurveda Bhawan Pvt. Ltd. Publication, Patna.

188. Sinha, A. & Singh, M. 2010. "A study of taxonomic diversity of species of tribe Detarieae (Ceasalpiniaceae) of Patna district". *Biospectra* 5(2) *Special Issue*: 411–416.

Abstract: In the tribe Detarieae, only two species, viz., *Saraca indica* L. and *Tamarindus indica* L. have been recorded from Patna district. *Saraca indica* L. is distinguished from *Tamarindus indica* L. in possessing apetalous and incomplete flowers with 6–8 fertile stamens, which are free, exserted and forming a ring at the top of each calyx-tube giving the flower clusters a hairy appearance, whereas the flowers of *Tamarindus indica* L. has three petals, short calyx-tube and three fertile stamens, the filaments connate high up into a sheath (monadelphous) with upper part free. Both the species display a rich morphological diversity.

189. Sinha, A.K. & Varma, S.K. 1988. "Aquatic and wetland angiosperms of Saharsa district (Bihar)". *J. Econ. Taxon. Bot.* 12: 153–162.

Abstract: The paper deals with the survey of aquatic angiosperms of Saharsa district of the Bihar state, which is botanically underexplored area. Geography, climate, vegetation and

ecological classification of the species along with distribution and phenology have been described. The survey of this area during 1980–1986 revealed the occurrence of 134 species of aquatic and wetland angiosperms, which constitute nearly 10% of the totalo plant wealth of the area surveyed. The ratio of dicot and monocot is 3:1. Poaceae, Asteraceae and Scrophulariaceae constitute the dominant families in the area.

190. Sinha, J.P. & Ghosh, T.K. 1962. "A note on the Angiospermic plants growing around Ranchi during rainy season". *Ranchi Univ. J.* 1: 57–62.

191. Sinha, L. 1957. *The Wealth of Mithila.* Mithila Mandal, Darbhanga, Bihar.

192. Sinha, M.K., Mishra, R.K., Sharma, K.K., Singh, B.M.K. & Suryanarayana, N. 2008. "Adoption of improved technologies by Tasar farmers in Shikaripara block of Dumka district, Jharkhand: A case study". *Biospectra* 3(1): 163–166.

Abstract: Tasar culture in Jharkhand is an important livelihood of the tribal population, who practice it as a subsidiary occupation. They continue to adopt the age old practices resulting in poor cocoon yield and in many instances complete crop failure. With the development of improved technologies in tasar culture, the productivity level has shown a quantum jump, however, the reality at field is different. Thus, in order to formulate strategies for improving the field productivity, it is important to analyse the ground level truth with regard to the adoption level. This study was undertaken to find out the adoption level of the technologies among the tasar farmers of Shikaripara block of Dumka district in Jharkhand state, which is a traditional belt of tasar culture.

193. Sinha, N.K., Singh, M. & Chand, G.B. 2010. "A study of flavonoids of *Bauhinia* Linn, species". *Biospectra* 5(2): 403–406.

Abstract: The distribution pattern of flavonoids have been studied in three species of *Bauhinia* L., viz., *B. purpurea* L., *B. racemosa* Lam. and *B. variegata* L.. which were collected from different localities of Patna. It was found that Myricetin and Isorhmnetin were specific to *B. racemosa* and *B. purpurea*, respectively while *B. variegata* did not exhibit the presence of any specific compound.

194. Sinha, R. & Kumar, K. 2014. "Estimation of pollen fertility and pollen size in two varieties of *Urginea indica* Kunth. collected from Ranchi, Jharkhand". *Biospectra* 9(2): 99–102.

Abstract: *Urginea indica* Kunth (Liliaceae) is a medicinal plant with considerable morphological variations. Two varieties of *Urginea indica* Kunth collected from Ranchi, Jharkhand have been studied for percentage pollen fertility and for size and shape of pollen grains. High pollen fertility in both the varieties shows their general stability. The size of pollen grains is important traits that may be the factors in reproductive behavior for the two varieties directly affecting the genetic flow for each variety.

195. Sinha, R. & Kumar, K. 2015. "Comparative stomatal studies in two varieties of *Urginea indica* Kunth collected from Ranchi, Jharkhand". *Biospectra* 10(1): 157–160.

Abstract: *Urginea indica* Kunth is a plant with high therapeutic values, and has long been used as a source of natural product with pharmaceutical and biocidal applications. Comparative stomatal studies on the two varieties of *Urginea indica* Kunth conducted in the materials collected from Ranchi, Jharkhand are presented. Anomocytic type of stomata was observed in both the varieties of *Urginea indica* Kunth. Maximum stomatal index and stomatal size were recorded in VI variety, i.e., in White bulb variety of *Urginea indica* Kunth.

196. Sinha, R. & Kumar, K. 2016. "Comparative cytological and stomatal studies in two cytotypes of *Urginea indica* Kunth collected from Ranchi, Jharkhand". *Ranchi Univ. J. Sci. & Technol.* 4(1): 16–19.

Abstract: Two cytotypes of *Urginea indica* Kunth were selected from Ranchi, Jharkhand for the comparative studies on cytology and stomatal characters. Both the cytotypes were reported to have diploid set of 20 chromosomes (2n = 20) and were found to show asymmetrical karyotype. On the other hand, the stomata were found to be of anomocytic types in both the cytotypes of *Urginea indica* Kunth, with variation in size and distribution.

197. Sinha, S.B. & Sharfuddin, M. 2007. "Phenological behavior of some weeds of wheat crop field". *Int. J. Mendel* 24(3-4): 103.

Abstract: In this investigation, the vegetative and reproductive life period of three species, viz., *EcJipta prostrata* L., *Croton bonplandianus* Baill. and *Euphorbia hirta* L. growing as weeds in the crop fields in and around Patna have been studied under uniform cultural conditions.

198. Sinha, S.K. 2016. "Restoration of wetland in Jharkhand in view of changing climate: An overview". *Ranchi Univ. J. Sci. & Technol.* 4(1): 55–60.

Abstract: Rivers with other wetlands are lifeline of living ones making food chain, strengthening ecosystem and biosphere. Jharkhand state is a plateau, and surrounded with mountains and lush green Sal forests streams. Wetlands in the form of ponds and lakes are main sources of ground water in this region. These are gradually disappearing. Climate is changing with rising temperature every coming year in Jharkhand. An approach has been made to register these changes. Decreasing ground water in villages and towns of Jharkhand, changes in the river-course with their environmental parameters are not healthy. Important wetlands of this region such as Kanke Dam, Rukka Dam and Hatia Darn show alarming decrease of water level during summer and onset of winter. Decrease of water level and shrinkage of most of the ponds, reservoirs and other

wetlands are having environmental effects. Lately government is taking interest and trying to understand the great contribution of wetlands in ground water recharging capacity as units. The regular decrease in ground water level in Ranchi and other places of Jharkhand need special attention. Recorded data show their link with rising temperature and associated anti-scientific approach towards maintenance and conservation of water bodies. Reclamation of land regulation for new construction should be enforced without delay.

199. Sinha, U.K., Rai, P.K. & Pandit, V. 2010. "Phytochemical studies on some *Cassia* Linn. *sensu lato* of Buxar district". *J. Econ. Taxon. Bot.* 34(4): 767–768.

Abstract: Studies on phytochemical analysis of plants seem to be a matter of extensive deal because only 10–15% plants of angiospermic taxa have been studied for their chemical constituents (Farnsworth & Bengel, 1977). In this study, eight species of the genus *Cassia* L. *sensu lato* (Caesalpiniaceae) have been screened for their alkaloids, saponins and tannins contents.

200. Srivastava, A.K. & Kumar, S. 2012. "Control of rat population through Bhelwa oil in Panch-Pargana area of Jharkhand". *Int. J. Recent Trends Sci. & Technol.* 4(2): 104–105.

Abstract: Rat has always been a problem for agricultural fields. Farmers of Jharkhand are always troubled by these rodents who damage grains in fields or in store. The cost of various chemicals to kill or repel rat is beyond the affordable limit of the poor tribal farmers in Jharkhand. Farmers of Panch-Pargana area of Jharkhand have developed an indigenous way to get rid of rats from their fields and prevent damage caused by them below economic injury level. Bhelwa (*Semicarpus anacardium* L.f.) seed oil is used for this purpose. Though the practice is quite old and time tested it is still not known to modern scientific world. The aim of this communication is to study the detailed method of rat population management through the Bhelwa seed oil.

201. Srivastava, D.P., Paul, S.R. & Sinha, B.C. 1966. "Weed of wheat fields in Bihar". *Proc. Bihar Acad. Agric. Sci.* 15: 1–10.

202. Srivastava, J.G. 1951. "On aerial roots of *Vitis quadrangularis* Wall.". *Curr. Sci.* 20(5): 133.

203. Srivastava, J.G. 1954. "His contribution to our knowledge of the Flora of Bihar". J. *Bombay Nat. Hist. Soc.* 52: 663–665.

204. Srivastava, J.G. 1954. Vegetation of Purnea in the Gazetteer for the district Purena. Government Press, Patna.

205. Srivastava, J.G. 1955. "Botanical tour to Parasnath hills, Bihar". *J. Indian Bot. Soc.* 34(3): 196–206.

Abstract: In this paper, the author noted the presence of 39 trees, 35 shrubs, 28 lianas and climbing shrubs, 3 orchids, 4 mistletoes and 146 annuals that had not previously been recorded from Paresnath and 26 others that are new to Bihar. The author also found that some interesting plants such as *Santalum album* L., *Kalanchoe heterophylla* Prain and *Pygeum andersonii* Hook.f. are not to be seen from this area.

206. Srivastava, J.G. 1956. "On the recent introduction in the flora of Purnea (Bihar)". *J. Indian Bot. Soc.* 35(3): 308–322.

Abstract: The virgin soils and open areas of the Purnea district that are being formed in various ways have invited plants from outside to settle on them. The larger number of these has been brought by water, winds and birds from the adjoining states. A few have been brought by birds even from distant lands. In this way 36 plants have been introduced in the Purnea district within the last 30 years or so. The progressive desiccation of the district has made the hardier plants from the western districts to come and settle down here.

207. Srivastava, J.G. 1956. "The vegetation of the Patna district (Bihar)". *J. Indian Bot. Soc.* 35(4): 391–401.

Abstract: This paper shows that the progressive desiccation brought about due to the interaction of various factors, mainly the biotic one, has made the Patna district, which lies further east, to acquire the same type of succession and vegetation as are typical of the eastern districts of the upper Gangetic plains, e.g., Allhabad (Dudgeon, 1919–1920) and Benaras (Misra, 1946).

208. Srivastava, J.G. 1958. The Vegetation of Hazaribagh district. Revised District Gazetteer, Hazaribagh, Patna.

209. Srivastava, J.G. 1958. The Vegetation of Champaran district. Revised District Gazetteer, Champaran.

210. Srivastava, J.G. 1958. The Vegetation of Saran district. Revised District Gazetteer, Saran.

211. Srivastava, J.G. 1958. The Vegetation of Muzaffarpur district. Revised District Gazetteer, Muzaffarpur.

212. Srivastava, J.G. 1958. The Vegetation of Hazaribagh district and the Parasnath Hills. Revised District Gazetteer of Bihar State, Hazaribagh.

213. Srivastava, J.G. 1958. Vegetation of the Singhbhum district. Revised District Gazetteer of Bihar (Singhbhum district), Patna.

214. Srivastava, J.G. 1959. "Recent trends in the flora of the Bihar state". *J. Indian Bot. Soc.* 38(2): 186–194.

Abstract: Due to natural causes and also due to the interference by human, flora of the state of Bihar is undergoing changes, both progressive and retrogressive. These have been dealt with here in detail.

215. Srivastava, J.G. 1964. "Some tropical American and African weed that has invaded the state of Bihar". *J. Indian Bot. Soc.* 43(1): 102–112.

Abstract: The first systematic enumeration of foreign weeds, 'Flora Advena' of Bengal and Bihar, was made by Brühl in the paper, 'Recent Plant Immigrant' in 1908. Haines in Botany of Bihar and Orissa (1921–1925) mentioned many foreign weeds that had got introduced into Bihar. From that time to date, a large number of papers have been published that mention the foreign weeds. In this paper, a systematic study of 47 foreign weeds has been done.

216. Srivastava, N. & Kumar, K. 2013. "Karyotype analysis in two varieties of *Iberis amara* L. collected from Jharkhand". *Biospectra* 8(2): 121–124.

Abstract: Somatic chromosome number and detailed karyotype analysis were carried out in two varieties of *Iberis amara* L., viz., Hyacinth-flowered and Iceberg, which are available in Jharkhand. The somatic chromosome number was reconfirmed in *Iberis amara* L., i.e., 2n = 14.

217. Srivastava, S. 2006. "Dependence of local people and issues in conserving local resources: Case of Dalma Wildlife Sanctury, Jharkhand". *Indian Forester* 132: 31–42.

Abstract: The management of Protected Areas (PA) is increasingly becoming complex due to high pressure of people living in and around them. Upgrading of PA management inputs requires a fuller understanding of both biological well as sociological issues. This assumes greater importance in high human density regions. It is now becoming clear that PAs in such areas need detailed studies in tandem with a documentation of biotic pressure profile in order to fully assimilate the new participatory approaches to the management. This paper deals with a case study of Dalma Wildlife Sanctuary in the newly created State of Jharkhand where local communities in and around the sanctuary have organized themselves in form of informal village Forest Protection Committees and controlled the grazing of cattle, illicit felling and annual tribal hunt and catalyzed the natural regeneration without much financial support. However there are sustained losses to local communities from the Govt. policies of wildlife management and the laws governing the protected areas. The study shows that there is a strong requirement for the institutional arrangements for the sanctuary which can safeguard the interests of local communities and ensure their participation in the protection of wildlife for conservation of sanctuary's resources.

218. Suman, S. & Kumar, J. 2009. "Foliar epidermal studies on some ethnomedicinal climbers of family Fabaceae growing in and around Jharkhand". *Biospectra* 4(2): 421–424.

Abstract: This paper deals with the foliar epidermal studies of some ethnomedicinal climbers of family Fabaceae. Foliar epidermal characters such as number and type of stomata, number and shape of epidermal cells, stomatal index and trichomes were analysed in some ethnomedicinal climbers, viz., *Clitoria ternatea* L., *Pisum sativum* L., *Mucuna pruriens* (L.) DC. and *Dolichos lablab* L. of family Fabaceae. Diacytic and tricytic stomata were in abundance on both surfaces of leaves in most of the plants. Tetracytic stomata were recorded only in *Pisum sativum* and *Mucuna pruriens*. The stomatal index in the four climbers ranges between 21.82 and 34.05. Unicellular and uniseriate multicellular, non-glandular trichomes in wavy and irregular epidermal cell were also recorded in all the climbers.

219. Suman, S. & Kumar, J. 2012. "Phytochemical studies on some ethno-medicinal trees of family Fabaceae of Ranchi". *Biospectra* 7(1): 149–152.

Abstract: The paper deals with the phytochemical studies of some ethnomedicinal trees of family Fabaceae. An attempt has been made to trace the chemical constituents present in three trees, viz., *Dalbergia sissoo* Roxb., *Pongamia pinnala* L. and *Butea monosperma* (Lam.) Kuntze of family Fabaceae. For phytochemical study, the extraction of plant was done by the hot maceration method (Soxhlet apparatus) with ethanol used as a solvent. Chemical group test detected the presence of alkaloid, flavanoid and amino acid in all the three plants.

220. Suresh, G. & Krishnan, M. 2012. "Studies on pollution indicators of HUDCO Lake, Jamshedpur, Jharkhand, India, with special reference to lake management". *Biospectra* 7(1): 135–138.

Abstract: Defilement of water and deterioration of aquatic ecosystem is as old as civilization. Yet urbinization and various developmental activities have led to irreversible changes in such ecosystems. As lakes are fragile ecosystems, they are more vulnerable to such problems than other water bodies. Pollution caused by anthropogenic activities affects physico-chemical characteristics of water, leading to destruction of aquatic communities, disruption of delicate food webs and an overall deterioration of the lake environment. The paper deals with pollution indicators in the HUDCO Lake of Jamshedpur, a well-known industrial city of the state of Jharkhand. Studies were done both at biological and physico-chemical levels. The results showed that the HUDCO Lake has a high algal diversity. It is home to 56 members of Cyanophyta, 18 members of Chlorophyta, four of Charophyta and 20 of Bacillariophyta. The higher level of biodiversity as well as the prominence of the Cyanobacteria indicates eutrophication. Of the 60 genera listed as pollution tolerant by Palmer (1969), 21are found growing in this lake. That the HUDCO

Lake is polluted, which has been corroborated by physico-chemical analysis of the water also as TSS and BOD have crossed desirable limit during some months in the HUDCO Lake. The lake thus calls for management measures such as source control, in-lake treatment, etc. Awareness creation and people's participation are also essential.

221. Thakur, S. & Kumar, S. 2010. "A check list of some wild leafy vegetables sold in the vegetable market in Dumka town of Jharkhand". *Biospectra* 5(2) (Special Issue): 473–476.

Abstract: Dumka, popularly known as the second capital of Jharkhand, is one of the oldest cities of the state. The main vegetable market here is 'Tin-bazaar', the other one being 'Municipality chawk', where there is a 'haat' on Monday and Friday. Local folks (belonging to ethnic groups such as Santhal, Mundas, Oraons, Paharias, etc.) come to these 'haats', travelling 20 to 25 km, to trade agricultural and forest produces, either cultivated or collected. Interestingly, many varieties of potherbs (Sag), both cultivated and wild are sold in these local markets. Some of these potherbs are also sold in dried forms. The aim of the survey is to study the leafy vegetables sold in the vegetable markets of Dumka and to know their therapeutic and prophylactic values.

222. Thakur, S. & Kumar, S. 2011. "A report about the Sags (leaves) sold in dried form from the village Haats around Dumka town". *Biospectra* 6(1): 189–192.

Abstract: Dumka is the second capital of Jharkhand state. Several biweekly and daily haats (vilage markets) are a regular feature in Dumka and surrounding villages and tolas. Villagers, especially tribals from surrounding areas come here to sell their agricultural and forest produces. It is interesting to see that some potherbs in dry form are sold here as an alternative source of vegetables. These dry plants serve as diet supplements for the poor who cannot afford the cost of fresh vegetables. The specific taste of the sag in off season is another interesting factor. This study was conducted with an objective to identify scientifically those potherbs and also to get information about their medicinal value.

223. Thakur, S., Kumar, S. & Kumar, A. 2011. "Potential of some wild leafy vegetables as natural source for supplementation of micronutrients in vegetarian diets of Jharkhand area". *Biospectra* 6(2) (Special Issue): 199–202.

Abstract: Jharkhand is land of forest and hills. Tribal and other people residing in the area are dependent on forest produces besides agriculture. Many potherbs are consumed by the population of this area as nutritional supplement. Most of them are growing as weed. Some of these potherbs are sold in the village markets either fresh or in dried state. Authors have surveyed these village markets with an aim to identify scientifically those potherbs and also to get information about their medicinal value. This communication reports about the micronutrient of some less-known potherbs which are wild in nature.

224. Thomson, S.L. 1917. *The Botany of Parasnath hills*. Hazaribagh District Gazetter, Calcutta.

225. Thothathri, K. 1965. "A contribution on some plants from Champaran district, north Bihar". *Indian Forester* 91(10): 743–746.

Abstract: Critical notes on *Eulophia graminea* Lindl., *Leucas helicterifolia* Haines, *Ludwigia prostrata* Roxb., *Adhatoda vasica* Nees, *Hemigraphis hirta* T. Anderson and *Najas marina* L., collected from the Chaparan district, north Bihar are presented in this paper.

226. Thothathri, K., Shetty, B.V. & Hajra, P.K. 1966. "A contribution to the flora of Udaipur forests in Champaran district, north Bihar". *Bull. Bot. Surv. India* 8(2): 133–141.

Abstract: The paper relates to a floristic account of Udaipur forests in Champaran district, north Bihar. The vegetation can broadly be classified as follows: Deciduous forest, evergreen forest, vegetation in plantation and open areas and aquatic vegetation. A total of 215 species belonging to 177 genera in 56 families have been reported from this area. The occurrence of *Arnebia hispidissima* DC. in Udaipur forests constitutes a new record for Bihar state.

227. Tomar, J.B. & Somkuwar, R.G. 1997. "Cowpea germplasm exploration in Bihar". *J. Econ. Taxon. Bot.* 21(3): 689–690.

Abstract: In this paper, 42 cowpea germplasm that have been collected from 10 districts of Bihar is discussed. The seed samples were collected either from the traditional markets (shandys) of villages or from the farmers' stock.

228. Verma, D.M. 1961. Ecological studies of Grasslands of Champaran (north Bihar). *Proc. 56 Indian Sci. Cong.* Ill. Abstract. p. 362.

229. Verma, H.K. 1993. "Systematic survey of Asteraceae Dumort. (Compositae) nom. alt. of Saran district, Bihar". *J. Mendel* 10(2-4): 87–88.

Abstract: The paper enumerates 46 species belonging to 40 genera of the family Asteraceae from Saran district of Bihar. Of this 46 species, 5 are cultivated.

230. Verma, S.K. 1981. *Flora of Bhagalpur*. Dicotyledons. Today & Tomorrow's, New Delhi.

Abstract: The Flora deals with 679 species belonging to 441 genera distributed over 110 families. A concise description of the plant together with keys to the identification of the families, genera and species has been provided.

231. Verma, S.K. & Pandey, P.K. 2008. "Floristic studies of aquatic and semiaquatic angiosperms of Ratu Maharaja Pond, Ranchi, Jharkhand". *Nat. Environm. & Pollut. Technol.* 7(2): 371–372.

Abstract: The paper is the outcome of extensive study of Ratu Maharaja Pond, situated about 6 km away from Ranchi, Jharkhand. The study was conducted in the year 2005–

2006. A total of 32 aquatic and semi-aquatic angiosperms were collected from the pond, belonging to 22 families under 26 genera. Out of these 12 families with 16 species in 12 genera belong to dicots, and 10 families with 16 species in 14 genera belong to monocots.

232. Verma, S.K., Pandey, P.K., Mukherjee, P. & Kumar, S. 2007. "Some water loving plants sold as pot-herb (Sag) in the village markets of Ranchi district". *Biospectra* 2(1): 139–141.

Abstract: Ranchi is the largest district of Jharkhand state. It is a land of forest and hills. Tribals and other people residing in the area are dependent on forest produces besides agriculture. Many potherbs are consumed by the population of this area as nutritional supplement. Most of them are growing as weed. Some of these potherbs are sold in the village markets either fresh or in dried state. Authors have surveyed these village markets with an aim to identify scientifically those potherbs and also to get information about their medicinal value. This paper reports about only those potherbs that are aquatic in nature.

233. Wood, J.J. 1903. "Plants of Chutia Nagpur including Jaspur and Sirguja". *Rec. Bot. Surv. India* 2: 1–170.

Abstract: A total of 1433 species including angiosperms, pteridophytes, fungi and algae have been recorded from Chutia Nagpur including Jaspur and Sirguja.

234. Yadav, D.K., Kumar, S., Murari, K. & Singh, V.K. 1993. "Aquatic angiosperms of Bodh Gaya, Bihar". *Biojournal 5*(1 & 2): 91–94.

Fungi, Lichens, Algae, Bryophytes, Pteridophytes & Gymnosperms

235. Ahmad, K., Siddiqui, E.N. & Rizwi, M.A. 1977. "Some new host records for *Cladosporium cladosporioides*". *Geobios (Jodhpur)* 4: 270.

Abstract: Five new hosts, viz., *Antigonon leptopus, Adhatoda vasica, Melia azadirachta, Solanum indicum* and *Vitex negundo* are new host records for *Cladosporium cladosporioides* from Bhagalpur.

236. Ahmed, M.R. & Kargupta, A.N. 1991. "New records of some green algae from Bihar". *J. Econ. Taxon. Bot.* 15(1): 239–242.

Abstract: This paper deals with four taxa belonging to genera *Bulbochaete, Chaetophora* and *Stigeoclonium* inhabiting the fresh water habitats of Darbhanga in north Bihar. Each taxon has been described along with its distribution on Indian mainland. All the taxa except *Chaetophora attenuata* Hazen constitute new records for the state of Bihar.

237. Anamika, A. & Khatibullah, H.M. 2012. "Algal spectrum of the Belahi Neelkantha pond, Bihar'. *Biospectra* 7(1): 109–118.

Abstract: The algal spectrum of the Belahi Neelkantha pond was studied for two consecutive years 2009 andd 20J0. A total of 47 species of algae belonging to 33 genera were identified during the two years of observation. The Chlorophyceae were represented by 23 species belonging to 15 genera, the Cyanophyceae by 13 species belonging to 9 genera the Bacillariophyceae by 9 species belonging to 7 genera, and the Euglenophyceae by 2 species belonging to 2 genera. The Chlorophyceae were the most dominant group of algae which accounted for an overall 48.94% followed by Cyanophyceae accounting for 27.66%, the Bacillariophyceae accounting for 19.15%, and the Euglenophyceae accounting for a mere 4.24%. Both the clean water and the pollution tolerant species of algae were found in the pond water.

238. Basu, S.N., Gope, I. & Prasad, U. 1999. "Occurrence of *Goniophlebium amoenum* (Wall. ex Mett.) J. Sm. in Bihar". *J. Bombay Nat. Hist. Soc.* 96(3): 496.

Abstract: *Goniophlebium amoenum* (Wall. ex Mett.) J. Sm. has been reported for the first time for the state of Bihar from Meghahatuburu, Singhbhum district.

239. Bharti, M. & Pravesh, R. 2010. "Diversity, distribution and conservation priorities for pteridophytic flora of Ranchi and Latehar district of Jharkhand, India". *The Bioscan* 1: 123–133.

Abstract: A total of 27 species of pteridophytes and their distribution in Ranchi and Latehar districts have been recorded in the study. The effect of altitudinal variation in distribution of genera and species is evident by absence of species on increasing altitude and appearance of new members. Since, Jharkhand is rich mineral zone of the country the increasing trends of mining, urbanization and industrialization of the area have put a threat of extinction of the rare and even unexplored species of fern and fern allies. These districts are rich in biodiversity. The vegetation is rich in medicinal herbs and pteridophytes. But unfortunately much more attention has not yet been given to conserve plant diversity of this geographically important area. The geographical condition of the state is congenial for the growth of pteridophytes. But the floral diversity has not been explored except some pioneer workers. Pteridophytes of this area are still little-known therefore, the study has been conducted. There is need of evolving conservation techniques to save pteridophytic flora of this unexplored belt of the country. Thick Sal forest of Saranda and Netarhat constitutes the belt of biosphere of the state.

240. Bharti, M. & Pravesh, R. 2012. "Studies on the rhizosphere and non rhizosphere mycoflora of *Lygodium flexuosum* (L.) Sw. and *Ampelopteris prolifera* (Retz.) Copel of Ranchi district of Jharkhand". *The Ecoscan* 1: 61–68.

Abstract: Rhizosphere and non-rhizosphere mycoflora of the selected ferns, viz., *Lygodium flexuosum* and *Ampelopteris prolifera* have been studied. A total 14 fungal genera isolated, of which species of *Aspergillus* and *Trichoderma* were found to be dominant. Non-rhizosphere zone was found with highest fungal association. Out of these two ferns studied highest fungal association was found with *L. flexuosum*. The highest percentage of fungal genera was found associated with *L. flexuosum* (L.) Sw., i.e., 50% in non-rhizosphere and 35.7% in rhizosphere whereas lowest percentage of fungal genera was found associated in *Ampelopteris prolifera*, i.e., 35.71% in non-rhizosphere and 21.42% in rhizosphere. The lowest fungal association was observed with *Ampelopteris prolifera*. There were only 5 genera found in association with non-rhizosphere of *A. prolifera*, viz., non-sporulating demitaceous form, *Cladosporium oxysporus* Berk. & Curt, species of *Fusarium*, *Penicillium* and *Curvularia*. Interaction of fungal population with these two fern genera has also been discussed in the light of antifungal chemicals present in them. Soil mycoflora and vesicular arbuscular mycorrhizal interaction has also been studied in the laboratory and it is observed that out of these two ferns *A. prolifera* shows the high percentage of mycorrhizal colonization, i.e., 86% while in case of *L. flexuosum* only 43% colonization was observed. So, it might be a major cause of low fungal association with *A. prolifera* and high level of fungal association with *L. flexuosum*.

241. Bharti, M. & Pravesh, R. 2012. "Mycorrhizal associates of *Lygodium flexuosum* (L.) Sw. and *Ampelopteris prolifera* (Retz.) Copel of Ranchi and Latehar district of Jharkhand, India". *The Ecoscan* 1: 133–138.

Abstract: Mycorrhizai association with roots of *Lygodium flexuosum* and *Ampelopteris prolifera* is a symbiotic association. The two pteridophytic species that are examined during the study exhibited the presence of vesicular arbuscular mycorrhizal association and the levels of association varied between the two genera. Studies were conducted mainly on the two members of the fern mentioned above belonging to the family Schizaeaceae and Thelypteridaceae, respectively. During investigation presence of large number of fungal mycelium (branched and unbranched) was observed which forms vesicles, arbuscles, Y and H- connections. Several types of spores were present in each rhizosphere. Heavy arbuscular and vesicular infections were observed during investigation period. The maximum arbuscular root colonization was recorded in *Ampelopteris prolifera* (86%), which is comparatively much lower in *L. flexuosum* (43%). VAM colonization was more in *L. flexuosum* than in *A. prolifera*. Frequency of infection by VAM was optimum in rainy season. VAM colonization showed a variable response to different season depending upon climatic factors (Temperature and pH of soil), season, rainfall and age of the plant. Fairly a good diversity of arbuscular mycorrhizal fungi was observed in the rhizosphere of two members of the fern.

242. Bharti, M. & Pravesh, R. 2012. "Antibacterial activity of *Lygodium flexuosum* (L.) Sw. and *Ampelopteris prolifera* (Retz.) Copel. of Ranchi district of Jharkhand". *The Ecoscan* 1: 397–401.

Abstract: The main objective of this research work was to screen selected unexploited ferns for their antimicrobial activities as this unexploited pteridpphytic plant were being used ethnomedicinaliy but, very little work has been done on antimicrobial aspects. This investigation was made to evaluate the anti-bacterial potential of different plant parts of *Lygodium flexuosum* (L.) Sw. and *Ampelopteris prolifera* (Retz.) Copel. Antibacterial activity evaluated by disc diffusion method towards the MTCC strain. It was obbserved that the rhizome of the plant possess maximum antibacterial activity compared to petiole and leaf. Rhizome extracts were found to be more effective against gram positive bacteria like *M. luteus* (MTCC Code: 4428) and *S. aureus* (MTCC Code: 7405) compared to gram negative bacteria. The rhizome exhibited maximum activity in both plants. The leaf extracts showed moderate inhibition diameter of less than 15 mm in *L. flexuosum* where as no inhibition was recorded in *A. prolifera*, and in petiole it was moderate, i.e., less than 10 mm in *L. flexuosum* and less than 7 mm in *A. prolifera*. Rhizome extract possess antibacterial particles soluble in methanol and acetone that could regulate growth and multiplication of tested bacterial species.

243. Bharti, M. & Pravesh, R. 2014. "Seasonal variation of vesicular arbuscular mycorrhiza in *Lygodium flexuosum* (L.) Sw. and *Ampelopteris prolifera* (Retz.) Copel. of Ranchi district, Jharkhand, India". *The Ecoscan* 6: 133–140.

Abstract: The study deals with the seasonal variation in vesicular arbuscular mycorrhizae of *Lygodium flexuosum* (L.) Sw. and *Ampelopteris prolifera* (Retz.) Copel. Maximum arbuscular colonization occurred in *A. prolifera* (arbuscular frequency 86% and vesicular frequency 52%) with a soil pH of 6.60 and temperature 29°C at Bandhgaon, whereas *L. flexuosum* exhibited maximum colonization of VAM at Ormanjhi (arbuscular frequency 43% and vesicular frequency 78%) with a soil pH of 7.0 and 24°C, respectively. Both these sites have support of luxuriant vegetation. Different climatic and soil factor (temperature, pH of soil, season, rainfall and age of the plant), affects colonization of *L. flexuosum* and *A. prolifera*. Vesicles are more frequently found during winter season. Soil pH has a marked effect on root colonization of the species studied. The lesser VAM colonization of *A. prolifera* at Panch Gagh (soil pH 6.04, temperature 21°C) and of *L. flexuosum* at Ormanjhi (soil pH 7.0, temperature 29°C) is due to the disturbances at the sites of collection and very less vegetational cover. Some of the frequently occurring taxa of the mycorrhizae are *Acaulospora*, *Glomus*, *Gigaspora*, *Sclerocystis* and *Scutellospora*. Out of these two fem species studied, frequency of infection by vesicular arbuscular mycorrhizae is maximum in rainy season.

244. Bharti, M. & Pravesh, R. 2014. "Phytochemical analysis of *Lygodium flexuosum* (L.) Sw. and *Ampelopteris prolifera* (Retz.) Copel. of Ranchi district of Jharkhand, India". 101st Indian Science Congress, Jammu. Section Plant Science. pp. 232–233.

Abstract: Fems grow under different environmental conditions. So, the content of different bio-macromolecules and secondary metabolites are different in *Lygodium flexuosum* and *Ampelopteris prolifera*. Phytochemical studies have been performed on *A. prolifera* and *L. flexuosum* of Ranchi district of Jharkhand. Fems are least exploited group of plants in India when compared to other countries of the world. Phytochemical srudies of the two plants under investigation are important while evaluating plant wealth of the region under study. *Ampelopteris prolifera* was growing under high water and moisture content whereas *L. flexuosum* growing under comparatively less water availability. *Lygodium flexuosum* and *A. prolifera* contains lots of pigments, carbohydrates, amino acids, proteins, lipids and several secondary metabolites. The study was made to find out the chemical composition and their relationship with antimicrobial activity of these two plant species. The presence of phenolics, flavonoids and triterpenoids in acetone extract might be responsible for its maximum anti bacterial activity in *L. flexuosum* and little in *A. prolifera* when compared.

245. Bose, M.N. 1952. "*Brachyphyllum spiroxylum* sp. nov. from the Rajmahal hills, India". *J. Indian Bot. Soc.* 31(4): 287–296.

Abstract: The paper records a new species of *Brachyphyllum* namely *B. spiroxylum* collected from Amarjola in the district of Amrapara, Rajmahal hills of Bihar. The type specimen is a portion of silicified foliage shoot, measuring to 2.1 cm in length and 0.4 cm in thickness. The secondary wood differs from that in other species of the genus by the presence of uniseriate bordered pits associated with spiral bands in the tracheids. The epidermal structure of the leaves closely resembles the other European and Indian species of *Brachyphyllum*.

246. Choudhary, M.C. & Choudhary, R. 1994. "Characeae of the Eastern Bihar (North) and South of the Ganges plain". *Columb. J. Life Sci.* 2(1-2): 75–76.

Abstract: Earth of recent origin comprising of districts of Saharsa, Purnea, North Munger and North Bhagalpur have 13 taxa of Characeae while soil of older origins such as South Munger, South Bhagalpur and old Santhal Parganas have 34 taxa of Characeae.

247. Das, R.N. & Purty, N. 1991. "Desmids from Khunti (Ranchi)". *Advances Pl. Sci.* 4(2): 346–353.

Abstract: Twenty-seven taxa of Desmids, i.e., seven taxa of *Closterium*, two taxa of *Eucutrum* single taxon each to genera *Staurastrum* and *Pleuretaenium* and sixteen taxa belonging to genus *Cosmarium* have been studied morphotaxonomically. These taxa of

desmids were collected from freshwater habitats of Khunti sub-division of Ranchi district and have been recorded for the first time from this place.

248. Das, S.K. & Gupta, R.K. 2015. "Cyanobacterial diversity and their colonization at different temperature gradient in a remote hot spring of Jharkhand, India". *Bioglobia* 2(2): 12–17.

Abstract: A total of 19 taxa of cyanobacteria belonging to 13 genera are documented from a thermal spring of Dumka district in Jharkhand. Information on the distributional pattern and mat formation of these thermal cyanobacteriain different temperature gradients are also discussed in this paper.

249. Das, S.K. & Maurya, O.N. 2015. "Floristic survey of algae in Vikramsila Gangetic Dolphin Sanctuary, Bihar (India)". *Nelumbo* 57: 124–134.

Abstract: Algal flora of Vikramsila Gangetic Dolphin Sanctuary in Bihar is documented for the first time. This paper reports occurrence of 65 taxa, including 13 taxa of Cyanophyceae of 11 genera, 24 taxa of Chlorophyceae of 15 genera, 21 taxa of Bacillariophyceae of 16 genera, 5 taxa of Euglenophyceae of 1 genus and one species each belonging to Dinophyceae and Xanthophyceae from this Sanctuary. Six algal taxa, namely *Aphanocapsa incerta* (Lemmerm.) Cornberg & Komarek, *Chroococcopsis epiphytica* Geitler, *Cosmarium ornatum* Ralfs ex Ralfs, *Euastrum verrucosum* Ehrenb. ex Ralfs var. *reductum* Nordst., *Navicula parietina* Kutz. and *Entomoneis alata* (Ehrenb.) Ehrenb. are new distributional records from India.

250. Dash, P.P., Lele, N.V., Joshi, P.K. & Roy, P.S. 2006. "Note on an interesting wood rot fungi from Dalma Wildlife Sanctuary, Jharkhand". *Indian J. Forest.* 29(1): 95–97.

Abstract: The Kingdom Fungi includes some of the most important organisms, both in terms of their ecological and economic roles. It comprises about 4% of the known species of life on earth and about 8% of estimated unknown species. In spite of their importance, only less than 5% of the estimated 1.5 million fungi have been identified so far. Wood rot fungi are important elements of tropical forest ecosystem as they take care of decomposition of fallen woody branches, trunks and stumps.

251. Das Guru, S. 2007. "Effect of xenobiotic pollution on the algal (Chlorophyceae) population of some freshwater lakes of Jharkhand". *Biospectra* 2(1): 143–147.

Abstract: The paper deals with the effect of sewage release in four water bodies on the distribution and morphological variations of *Oedogonium*. Individual specimens with morphological variations in shape, size, chloroplast pattern, abnormal morphology, etc. were encountered. It was concluded that *Oedogonium* is a pollution tolerant species with rapid adaptability. They are quite abundant in this region but faces survival threat

due to pollution load as evident from the occurrence of abnormal forms. The morphological alterations encountered are not heritable as confirmed by cultural experiments.

252. Das Guru, S. 2007. "A comparatives study of the species richness and diversity of Chlorophycean assemblage of two city based polluted tanks of Ranchi". *Biospectra* 2(2): 343–345.

Abstract: A status report of algal (Chlorophyceae) community and species richness of two city based tanks of Ranchi has been investigated. The present status report contains 52 species belonging to 22 genera recorded from two tanks. The species-rich genera are *Oedogonium, Closterium, Scenedesmus* and *Cosmarium*. The richness has been attributed to nutrient-rich polluted environment of the tanks. The data present herein can be used for biomonitoring the pollution level in this region.

253. Girach, R.D. & Aminuddin 1989. "Ethnopteridological notes on *Lygodium flexuosum* (Linn.) Sw.". *J. Econ. Taxon. Bot.* 13(2): 255–257.

Abstract: Unreported uses of less known climbing fern, *Lygodium flexuosum* (L.) Sw. among the tribals of Bihar and Orissa are reported for ethnopteridological records.

254. Gupta, R.K. & Das, S.K. 2013. "A new species of *Johannesbaptistia* from Jamtara, Jharkhand, India". *Nelumbo* 56: 283–285.

Abstract: A new coccoid cyanobacterial species *Johannesbaptistia desikacharyi* Raj. K. Gupta & Sudipta Das, sp. nov. described from Jamtara, Jharkhand. Though the species has some similarities with the taxa *Johannesbaptistia pellucida* (Dickie) Taylor & Drouet, certain morphological features such as cellular dimension, presence of chromatoplasma and mode of fragmentation separate it from all the six species reported so far under the genus.

255. Gupta, R.K. & Das, S.K. 2016. "Note on the occurrence of two species of *Volvox* (Volvocales, Chlorophyceae) from Jharkhand, India". *Nelumbo* 58: 174–176.

Abstract: Two green algal species of the genus *Volvox* namely *V. aureus* Ehrenb. and *V. carteri* F. Stein are documented from Lohardaga district of Jharkhand, which is a new record of the genus from the state.

256. Gupta, R.K. & Majumdar, K. 2013. "Notes on algal association on the roots of *Drosera burmanni*". *Nelumbo* 55: 211–213.

Abstract: Three species of microalgae, viz., *Netrium digitus* (Bréb. ex Ralfs) Itzigs. & Rothe, *Zygnema stellinum* (O.F. Müll.) C. Agardh and *Spondylosium planum* (Wolle) West & G.S. West were associated on the roots of *Drosera burmanni* Vahl from Kelaghat Dam of Simdega district of Jharkhand.

257. Gupta, R.K. & Srivastava, O.N. 1993. "Studies on Euglenineae of Ranchi, India. The genus *Euglena* Ehr. 1". *Advances Pl. Sci.* 6(2): 299–304.

Abstract: The paper deals with systematic account of taxa of *Euglena*, collected from different localities of Ranchi. All the taxa described in the paper are new to Indian phycoflora.

258. Gupta, R.K. & Srivastava, O.N. 1993. "Studies on Euglenineae of Ranchi, India – II. Additions to Bihar phycoflora". *Bull. Bot. Surv. India* 35: 1–5.

Abstract: The paper deals with 18 taxa of *Euglena* Ehrenb., collected from a wide variety of freshwater habitats in and around Ranchi. All the taxa described here are new to Bihar phycoflora.

259. Gupta, R.K. & Srivastava, O.N. 1994. "A ckeck list of Euglenineae and Dinophyceae of Ranchi, Bihar". *J. Econ. Taxon. Bot.* 18(3): 514–516.

Abstract: A total of 97 taxa belonging to four genera, viz., *Euglena, Phacus, Trachelomonas* and *Peridinium*, respectively, comprising of 54 and 10; 8; 16 and 6; 2 and 1 species and varieties are being reported for the first time from Ranchi.

260. Gupta, R.K. & Srivastava, O.N. 1995. "Studies on some *Trachelomonas* Ehr. from Ranchi, India – II". *Advances Pl. Sci.* 8(1): 33–35.

Abstract: The paper deals with taxonomic consideration of three taxa of *Trachelomonas* collected from different localities of Ranchi. All the taxa described here are new to India.

261. Gupta, R.K. & Srivastava, O.N. 1995. "Taxonomical studies on Euglenoids of Ranchi, India – The genus *Euglena* Ehr. VI". *Advances Pl. Sci.* 8(2): 323–325.

Abstract: The paper embodies the systematic enumeration of two taxa belonging to one euglenoid genus collected for the first time from Ranchi.

262. Gupta, R.K. & Srivastava, O.N. 1995. "On some *Trachelomonas* Ehr. From Ranchi, India". *Advances Pl. Sci.* 8(2): 345–348.

Abstract: The paper deals with the taxonomic consideration of 17 taxa of *Trachelomonas* (Euglenaceae) hitherto unreported so far from Ranchi.

263. Gupta, R.K. 1995. "Studies on the species of *Spirogyra* Link from Ranchi, Bihar". *J. Econ. Taxon. Bot.* 19(2): 457–460.

Abstract: The paper enumerates the species of *Spirogyra* from Ranchi district, Bihar. Out of 19 species recorded from the area, five species, viz., *Spirogyra lagerheimii* Wittrock, *S. miennigensis* Li, *S. porangabae* Transean, *S. rhizopus* Jao and *S. transeauiana* Jao are new records for Indian phycoflora. It is observed that the maximum growth of those

species occurs in the month of August to November and growth decreases from December to April.

264. Hembrom, M.E. 2017. Taxonomic study on the Corticoid fungi of Rajmahal Hills, Jharkhand. Ph.D. Thesis, University of Kalyani, Kalyani (Unpublished).

Abstract: In this thesis, 53 species of corticoid fungi belonging to 41 genera in 16 families is reported from Rajmahal Hills, Jharkhand.

265. Hembrom, M.E., Parihar, A. & Das, K. 2016. "Three interesting wood rotting macro-fungi from Jharkhand, India". *J. Threat. Taxa* 8(2): 8518–8525.

Abstract: Routine surveys of mycologically unexplored forest areas of Jharkhand, followed by a thorough examination of macrofungal collections reveal two hitherto unrecorded poroid species (Basidiomycete) for Indian mycobiota namely *Ganoderma elegantum* and *Perenniporia bambusicola*, and a less known hydnoid wood-rotting species *Beenakia fuliginosa*. Detailed taxonomic descriptions coupled with illustrations are provided for all three taxa and compared with allied taxa.

266. Hota, S.S. & Suresh, G. 2012. "Cyanobacteria of river Kharkai and river Subarnarekha at Domuhani, Jamshedpur, Jharkhand". *Biospectra 7*(1): 127–130.

Abstract: Kharkai and Subarnarekha are the two rivers flowing through Jamshedpur, on the important industrial cities of India. These two rivers meet at a place called 'Domuhani' or 'Rivers Meet' in Jamshedpur, and thereafter flow as one river. In fact, Kharkai is one of the tributaries of Subarnarekha. Discharges from many small and medium scale industries of Jamshedpur are seen to flow into Kharkai, which empties into Subarnarekha at Domuhani. Water from river Subarnarekha is used for drinking after treatment by the JUSCO Water Treatment Plant, located only in the TISCO areas. People living in non TISCO areas use water from Subarnarekha directly. Thus it is essential to study water pollution in both the rivers. This study comprises identification of the cyanobacteria or the blue green algae of Kharkai and Subarnarekha at Domuhani, because it is well known that blue green algae are more abundant in polluted waters than green algae. While 28 different blue green algal taxa have been seen growing in River Kharkai, only 14 were there in River Subarnarekha at Domuhani. This information can be used by concerned authorities for taking corrective measures.

267. Kargupta, A.N. & Ahmed, M.R. 1991. "Fresh water green algal flora of north Bihar – II". *J. Econ. Taxon. Bot.* 15(1): 203–209.

Abstract: The paper describes eleven taxa of green algae belonging to genera *Cylindrocapsa, Stigeoclonium, Ulothrix* and *Uronema* collected from freshwater bodies of Darbhanga and proposes a new combination [(*Mougeotia laetevirens* (A. Br.) Wittrock

var. *acadiana* (Transeau) comb. nov.)] of a form of *Mougeotia*. Of these, ten taxa appear to be new records for the state of Bihar.

268. Kargupta, A.N. & Bose, S.K. 2012. "Morphotaxonomy of some Chlorococcales from Darbhanga, north Bihar". *Biospectra* 7(1): 119–126.

Abstract: The paper deals with morphotaxonomy of 12 species under nine genera of Chlorococcales (Chlorophyceae) collected during 2008–2009 from some fish ponds of Darbhanga township area. Some of these forms have already been reported as pollution tolerant forms by many workers in the past. However, all the taxa reported in this paper form the first record from this part of Bihar. The genus *Palmellococcus* is probably the first record from Indian subcontinent.

269. Kujur, C. & Srivastava, M. 2007. "Biodiversity of algae in the fresh water biotopes of Ranchi district, Jharkhand State, India". *Biospectra* 2(1): 133–137.

Abstract: The paper deals with the diversity of algae in the freshwater biotopes of Ranchi district in Jharkhand state with special reference to Division Chlorophyta, Class Chlorophyceae, Order Chlorococcales and Ulotrichales members; 1 taxon of Chlorococcales: *Hydrodictyon*, 5 taxa of Ulotrichales: 3 species of *Uloihrix*, 1 species of *Pseuphonema* and 3 species of *Microspora* have been described.

270. Kumar, B.N. & Choudhary, S.K. 2009. "Algal flora of Jagatpur wetland in the middle Ganga flood plain near Bhagalpur, Bihar (India)". *J. Indian Bot. Soc.* 88(3-4): 8–11.

Abstract: A total of 159 taxa were recorded from a perennial wetland in the middle Ganga flood plain in Jagatpur wetland located near Bhagalpur in Bihar. The algal flora of this area was clearly dominated by diatoms and green algae, which represented respectively 26.58% and 50.63% of the 159 taxa recorded for the first time. Other algal groups were blue green algae (19.62%), Euglenophyceae (2.53%) and Dinophyceae (0.63%). The large number of algal taxa recorded suggests that this wetland is rich in algal diversity.

271. Kumari, A., Maurya, S. & Pandey, P.K. 2015. "*Trichoderma*: A novel soilborne mycoparasitic fungi used as biocontrol agent for sustainable plant disease management". *Biospectra* 10(2): 141–146.

Abstract: *Trichoderma* are soil-borne, green-spored, ascomycetes fungal bioagents that are ubiquitous in nature. *Trichoderma* species are characterized by rapid growth, mostly with bright green conidia and a repetitively branched conidiophores structure. As opportunistic plant symbionts and effective mycoparasites, numerous species of this genus have the potential to become commercial biofungicides. This biocontrol agent has no harmful effects on humans, wildlife and other beneficial organisms. It is safe and effective in both natural and controlled environments.

272. Kumari, A. & Srivastava, R.B. 2003. Pteridophytic Flora of Northern Part of Bihar (India) Adjacent to Indo-Nepal Border. In: Chandra, S. & Srivastava, M. (eds.), *Pteridology in the New Millennium*. Springer, Dordrecht. pp. 165–175.

Abstract: A floristic survey of the pteridophytic flora of northern part (Champaran) of Bihar state adjacent to Indo-Nepal border was conducted from 1999 to 2001. The study on the ferns and fern-allies of Champaran Border reveals 41 species of pteridophytic flora (27 ferns and 14 fern-allies), which constitute 3.4% of the pteridophytic flora of Bihar. Species richness along an altitudinal gradient was examined with geographical details.

273. Kumari, K. & Prasad, S. 2014. "Quantitative estimation of carbohydrates in indigenous blue green algae from the wetlands of Bihar". *Biospectra* 9(2): 89–94.

Abstract: Concern over energy, the environment and natural resources, is increasing across the globe. Production of biofuels from less exploited resources is now emerging as a topic of intensive research. Biomass is an attractive feedstock, as it is a renewable resource that could be sustainably developed in the future. Algal biomass viewed as a simple, fast growing biomass that has the potential to act as an excellent source of biofuels. Bihar being rich in algal biodiversity, it is holding a massive potential of these resources for energy production. Utilization of algal biomass for bioethanol production is an eco-friendly and sustainable approach for biofuel production. This investigation exhibits the age dependent quantitative estimation of carbohydrates in four genera of blue green algae, viz., *Eucapsis minuta, Anabaena laxa, Arthrospira platensis* and *Scytonema coactile*, collected from wetlands of Muzaffarpur (Bihar). It was found that the amount of total intracellular carbohydrates have shown increasing tendency in all the four genera under investigation, during their exponential phase, i.e., up to 30 days in *E. minuta* and up to 25 days in *A. laxa*, *A. platensis* and *S. coactile*. The amount of carbohydrates gradually decreased in decline growth phase in all the four genera of blue green algae under investigation. The increase in the amount of carbohydrates in the exponential phase might be due to gradual accumulation of polysaccharides and decrease in the amount of carbohydrates in their decline growth phase might be the age influenced photosynthetic efficiency of organisms or might be due to cell autolysis.

274. Kumari, N. & Srivastava, A.K. 2010. "Isolation and identification of blue green algae in paddy field of Ranchi district". *Biospectra* 5(2) (Special Issue): 443–446.

Abstract: The paper deals with the occurrence and distribution of cyanobacteria in the paddy field of Ranchi district, differeing in soil characteristics nitrogen fixation and morphological characteristics of the organisms inhabiting there in. It also deals about isolated and identified cyanobactria of the paddy field of Ranchi district.

275. Kumari, N. & Srivastava, A.K. 2010. "Nitrogen fixation by selected Cyanobacteria in the paddy field of Ranchi district". *Biospectra* 5(2) (Special Issue): 461–464.

Abstract: This paper presents the important results of the nitrogen fixation of certain number of blue green algae in separate and mixed cultures collected from different paddy fields of Ranchi district. The results obtained in above experiments showed that *Aulosira fertilissima* produced the highest growth and nitrogen fixation among separate cultures of above mentioned blue green algae.

276. Kumari, S. & Guru, S. 2014. "Studies on seasonal variations of Cyanophycean flora in response to abiotic factors in Ranchi Lake of Jharkhand, India". *J. Indian Bot. Soc.* 93(3 & 4): 229–235.

Abstract: An investigation on the seasonal fluctuation of blue green algae in relation to physico-chemical parameters of Ranchi Lake was carried out for a period of two years from March 2009 to February 2011. The physico-chemical parameters of water, viz., temperature, pH, transparency, conductivity, turbidity, total dissolve solids, total suspended solid, total hardness, total alkalinity, chloride, free CO_2, dissolved oxygen (DO), biological oxygen demand (BOD), sulphate, phosphate, nitrate, calcium andmagnesium were recorded during the study period. Altogether 29 species of blue green algae were identified belonging to 12 genera. Among the recorded species *Microcystis aeruginosa, M. stagnalis, Merismopedia* sp. and *Oscillatoria* sp. were dominant. Further, the study revealed that Cyanophyceae attains a maximum growth in summer months and reach to its minimum during rainy months.

277. Labh, L. & Verma, B.N. 1983. "*T. jwalai*, a new species of *Tolypella* from India". *Biblioth. Phycol.* 66: 379–388.

Abstract: A new species of *Tylopella*, viz., *T. jwalai* of the class Charophyta has been described from north Bihar. *Tylopella nidifica* and *T. nidifica* var. *nidifica* f. *stenhammariana* has been reported for the first time from Bihar.

278. Lal, S.N., Ranjan, S. & Kumar, P. 2011. "Cyanobacterial abundance and diversity in rice fields soils of Nalanda district". *Biospectra* 6(1): 161–164.

Abstract: Pollen fertility was recorded in different species and varieties of *Chlorophytum*, i.e., *C. borivilianum* (with white flowers), *C. borivilianum* (with purple flowers), *C. tuberosum, C. comosum* (with green leaves), *C. comosum* (with striped leaves) and *Chlorophytum laxum*. The percentage of pollen fertility was maximum (96.47%) in *C. laxum* and minimum (80.29%) in *C. borivilianum* (with purple flowers).

279. Lal, S.P. & Yadav, A.S. 1965. "Addition to microfungi of Bihar. III. Fungi Imperfecti associated with the decaying graminaceous stems". *J. Indian Bot. Soc.* 44(3): 402–406.

Abstract: While studying the synecology of microfungi associated with the decaying stems of *Andropogon sorghum* L. and *Triticum vulgare* L. 21 different fungi imperfecti were observed which were either new to science or new records for this state of Bihar.

280. Mahato, A.K. 1995. "Two new species of the genus *Spirogyra* (Zygnemaceae, Chlorophyceae) from south Bihar, India". *J. Econ. Taxon. Bot.* 19(2): 464–468.

Abstract: Two new species of the genus *Spirogyra* Link., viz., *S. chaibasaensis* allied to *S. azygospora* Singh and *S. khuntiensis* allied to *S. azygospora* Singh and *S. wightiana* Transeau has been described and illustrated from Chotanagpur plateau, Bihar.

281. Mahato, A.K. 2008. "Two new terrestrial species of *Oedogonium* (Chlorophyceae: Oedogoniales) from Bihar, India". *J. Econ. Taxon. Bot.* 32(3): 605–609.

Abstract: The paper describes two new terrestrial species of *Oedogonium* Link, viz., *O. mungericum* allied to *O. randhawae* and *O. pushpae* has been collected and described from soil of Munger, Bihar. The former species is poriferous whereas the latter bears subpyriform or triangular oospores with rounded ends.

282. Mahato, A.K. & Mahato, N. 2012. "New records of the genus *Pediastrum* from Jharkhand, India". *Advances Pl. Sci.* 25(II): 571–572.

Abstract: Three species of the genus *Pediastrum* collected from freshwater habitats of Saraikela-Kharswan district of Jharkhand are described in this paper. These are: *Pediastrom integram* var. *scutum* Raciborski, *P. kawraiskyi* Schmidle, *P. simplex* var. *duedenarium* (Bailey) Rahenhorst. All these three species are new records from Jharkhand.

283. Mahato, A.K. & Mahato, N. 2012. "New records of the genus *Scenedesmus* from Jharkhand, India". *Advances Pl. Sci.* 25(II): 577–580.

Abstract: Twelve species of the genus *Scenedesmus*, collected from freshwater habitats of Seraikela-Kharswan district of Jharkhand are described in the paper. These are: *Scenedesmus abundans* (Kirch.) Chod., *S. acutiformis* Schroeder, *S. bijuga* (Turp.) Lagerheim, *S. bijugatus* f. *parvus* G.M. Sm., *S. hystrix* Lagerheim, *S. incrassatulus* var. *mononae* G.M. Sm., *S. longus* Meyen, *S. longus* var. *naegeli* de Breb., *S. quadriquada* var. *westii* G.M. Sm., *S. quadriquada* var. *longispina* (Chod.) G.M. Sm., *S. quadriquada* var. *parvus* G.M. Sm., *S. quadriquada* var. *quadrispina* (Chod.) G.M. Sm. All these 12 species are new records from Jharkhand.

284. Mahato, A.K. & Mahato, N. 2012. "Contribution to our knowledge of Chaetophorales of Jharkhand, India". *J. Econ. Taxon. Bot.* 36(1): 12–15.

Abstract: Six species Chaetophorales, collected from freshwater habitats of Seraikela-Kharswan district of Jharkhand are described in the paper. These are: *Drapanaldia*

acuta (C. Agardh) Kuetzing, *D. glomerulata* (Vaucher) C. Agardh, *Stegeoclonium polymorphum* (Franke) Heering, *S. nanum* Kuetzing, *Chaetophora elegans* (Rath) C. Agardh and *Coleochaete nitellarum* Jost. All the six species are new records from Jharkhand.

285. Mahato, A.K. & Mahato, P. 1996. "*Sirogonium pseudocanalis* – A new member of Zygnemaceae (Chlorophyceae) from the Chhotanagpur plateau, Bihar". *J. Econ. Taxon. Bot.* 20(3): 745–749.

Abstract: A new species of the genus *Sirogonium* Kutzing, viz., *S. pseudocanalis* allied to *S. illinoiense* (Transeau) G.M. Sm. and *S. inflatum* Dixit has been described and illustrated from Chhotanagpur plateau, Bihar. The species is characterized by the presence of 3–5 chloroplasts, conjugation canals and smooth walled zygospores. The new species is compared with other described species of this genus and its evolutionary significance is also discussed.

286. Mahato, P. & Mahato, A.K. 1996. "Some Cladophorales from Singhbhum district, Bihar, India". *Advances Pl. Sci.* 9(1): 159–161.

Abstract: Four species of the order Cladophorales, viz., *Cladophora glomerata* (L.) Kutzing, *C. fracta* (Dillw.) Kutzing, *Pithophora cleveana* Wittr. and *P. oedogonia* (Mont.) Wittr. are reported for the first time from Singhbhum district, Bihar.

287. Mahto, A. & Sahu, R. 2010. "*Anabaena azollae*: A potential algal biofertilizer for rice crop". *Biospectra* 5(1): 89–92.

Abstract: *Anabaena azollae*, a filamentous nitrogen fixing cyanobacterium is found in symbiotic association with a heterosporous water fern *Azolla*. It multiplies rapidly by vegetative means and its growth is prolific. Its application increases the yield of rice by 12.7%. Its application as a green manure has been used in China and other Asian countries. A field study was conducted at Kokar Ranchi with rice IR 64. For this purpose two field plots of 10 m^2 area were prepared one without *Azolla* which acted as control and other with *Azolla*. The soil was found to be acidic after testing in BAU, Ranchi. Rice seedlings were transplanted in the flooded field. Ten days after transplantation fresh *Azolla* were inoculated in the ratio of 0.4–0.5 kg/m^2. The symbiotic association of *A. azollae* fixes the atmospheric nitrogen gas (N_2) and combines with H_2 to form NH_3. This vital process along with nitrification (formation of nitrites and nitrate) and ammonification (formation of ammonia from protein decay) make nitrogen available to rice plants. N_2 gas (atmospheric nitrogen): N = N+12ATP Nitrogenase NH_3+ADP+Pi. The effect of *Anabaena azollae* biofertilizer on rice plants was seen by its rapid growth. It has bright green and thick, fleshy stem having large number of leaves. The tilleres were seen after 80 days and showed large thick and healthy food grains as compared with the control. The grain yield was found to be increased in the tune of 10–13% over control. This

observation clearly indicates that the application of *Azolla* as manure can replace the chemical fertilizers.

288. Mahto, A. & Sahu, R. 2011. "Morphotaxonomical studies of some species *Cylindrospermum* Kutz. Cyanoprokaryote, from Ranchi district". *Biospectra* 6(1): 139–142.

Abstract: *Cylindrospermum* are heterocystous filamentous algal taxa belonging to the order Nostocales and family Nostocaceae. *Cylindrospermum* retaining their motile power throughout life may be regarded as permanent hormogonia in the latter movement and continuous even during akinete formation. Nitrogen fixation is known to occur in *Cylindrospermum*. In India, 14 species of *Cylindrospermum* found and all are N_2 fixers. This paper deals with the total four species of *Cylindrospermum*, *C. michailovskoense* Elenkin, *C. indicum* C.B. Rao, *C. doryphorum* Brühl, *C. musicola* Kützing ex Bornet & Flahault collected for the first time from the fields of Jharkhand during July 2008–July 2010. In a mixed bloom of algae, *C. doryphorum* Brühl was observed in stagnant water of rice fields of Karamtoli at Ranchi. *Cylindrospermum michailovskoense* was found in floating rice field of Silli block, *C. indicum* C.B. Rao from Angara block in cultured rice field at Ranchi. *Cylindrospermum musicola* Kützing from Buti at Ranchi in water-logged soil of rice field. The entire above habitat has pH value ranging from 6.5 to 7.5.

289. Mandal, S., Mandal, P. & Kumar, M. 1989. "Additions to the Aspergilli of Patna". *Geobios, New Rep.* 8: 118–120.

Abstract: A survey of soil inhabiting Aspergilli from January 1985 to December 1986 reveals altogether 23 species found in three types of soil of Sanjay Biological Garden, Kumbhrar and A.N. College. Out of 23 species, 20 are common and *A. Niger* is most common in all three soil types.

290. Mehta, A.S. 1956. "Some unreported ferns of Bihar". *J. Indian Bot. Soc.* 35(2): 165–166.

Abstract: Four species of ferns, viz., *Dennstaedtia appendiculata* (Wall. ex Hook.) J. Sm. of family Pteridaceae from Purnea, two species of family Aspidiaceae, *Athyrium drepanopterum* (Kunze) A. Braun and *A. macrocarpum* (Blume) Bedd. from Parasnath Hills and *Drynaria propinqua* (Wall. ex Mett.) J. Sm. ex Bedd. of Polypodiaceae from Parasnath Hills have been reported for the first time for the state of Bihar.

291. Mehta, A.S. 1956. "Ferns of Parasnath, Bihar". *J. Indian Bot. Soc.* 35(3): 241–244.

Abstract: In this paper the author has described fourteen fern species (except *Pteris quadriaurita*) from the Parasnath hills for the first time.

292. Mehta, S. & Sahu, R. 2011. "*Scenedesmus* species diversity of Ranchi Lake, Ranchi, Jharkhand". *Biospectra* 6(1):185–188.

Abstract: The paper deals with morphotaxonomical investigation of *Scenedesmus* species diversity, which is an economically important alga, growing in Ranchi Lake, Ranchi. *Scenedesmus* is a colonial alga of Chlorococcales which grows well in ponds, lakes and rivers. A total of 21 taxa have been reported in this investigation during winter (2010).

293. Mehta, S. & Sahu, R. 2014. "Seasonal variation of algal vegetation in Karkari River at Ranchi, Jharkhand". *J. Indian Bot. Soc.* 93(1 & 2): 12–15.

Abstract: The paper deals with the seasonal variation of algal vegetation growing in Karkari River at Tamar block of Ranchi district. First report on this river for exploration and documentation of the fresh water algae has been done by the authors. A regular seasonal collection has been made during several field trips between the March 2009 and February 2011. In total 74 taxa belonging to four different classes, viz., Cyanophyceae (21), Chlorophyceae (36), Euglenophyceae (2) and Bacillariophyceae (15) were identified. All taxa have been allotted to their suggested orders. Important genera recorded were *Gloeotrichia, Nostoc, Scenedesmus, Ulothrix, Cladophora, Zygnema, Sirogonium*, etc. It was observed that the algal vegetation was recorded maximum during winter and minimum during rainy season.

294. Parihar, A. 2017. *Wood rotting fungi of Koderma Wildlife Sanctuary, Jharkhand.* Botanical Survey of India, Kolkata (Unpublished).

Abstract: A total of 99 species under 51 genera belonging to 15 families of wood rotting fungi are reported in this work report from Koderma Wildlife Sanctuary, Jharkhand.

295. Parihar, A., Hembrom, M.E. & Das, K. 2014. "*Borofutus dhakanus* (Boletaceae) – An addition to India mycobiota". *Nelumbo* 56: 342–345.

Abstract: *Borofutus dhakanus* Hosen & Zhu L. Yang has been reported for the first time for India from Chatarbar, Koderma Wildlife Sanctuary, Jharkhand. Earlier this macrofungus was reported from Bangladesh.

296. Parween, R. & Kumar, K. 2009. "Cytotaxonomic studies in *Chlorophytum of* Ranchi, Jharkhand". *Biospectra* 4(2): 393–400.

Abstract: Tubers of the species and varieties of *Chlorophytum* under consideration were collected from different places of Ranchi and cytotaxonomical studies were carried out. All the species and varieties were found to be tetraploid with 2n = 28. The karyotypes of all the species showed 'nearly submedian' and 'submedian' chromosomes in high proportion, whereas 'subterminal' chromosomes were very few. Chromosomes with

secondary constrictions were common in both the varieties of C. *borivilianum* and C. *tuberosum*, whereas it was completely absent in the other two species and varieties under consideration.

297. Patralekh, L.N. 1991. "Euglenineae and Bacillariophyceae algae recorded from the Ganges at Bhagalpur, Bihar". *J. Econ. Taxon. Bot.* 15(1): 17–19.

Abstract: Four algal forms of Euglenineae and sixteen of Bacillariophyceae have been recorded from the Ganges at Bhagalpur, Bihar during 1985-1986.

298. Patralekh, L.N. 1993. "Systematic account of green algae collected from river Ganga at Bhagalpur, Bihar". *J. Econ. Taxon. Bot.* 17(1): 71–73.

Abstract: Thirty algal forms of Chlorophyceae have been recorded from rive Ganga at Bhagalpur, Bihar during 1985–86.

299. Patralekh, L.N. 1993. "Cyanophycean of Rani-talab, Bhagalpur". *J. Econ. Taxon. Bot.* 17(1): 113–114.

Abstract: Twenty-five blue green algae were collected from Tani-talab, Bhagalpur, Bihar during January 1985 to December 1986.

300. Patralekh, L.N. 1994. "Algal form of Xanthophyceae, Bacillariophyceae, Dinophyceae and Euglenophyceae of Rani-talab, Bhagalpur, Bihar". *J. Econ. Taxon. Bot.* 18(3): 581–584.

Abstract: Thirty-two algal forms including Xanthophyceae (1), Bacillariophyceae (19), Dinophyceae (1) and Euglenophyceae (11) were collected from Tani-talab, Bhagalpur, Bihar during January 1985 to December 1986.

301. Patralekh, L.N. 1994. "Systematic enumeration of blue green algae of river Ganga at Bhagalpur, Bihar". *J. Econ. Taxon. Bot.* 18(3): 735–737.

Abstract: Twenty-one forms of blue green algae were collected from Bararighat of river Ganga at Bhagalpur, Bihar during 1985–86.

302. Pravesh, R. & Singh, S.R. 2001. "Distribution and ecological studies on members of *Ophioglossum* of South Chotanagpur plateau of Bihar". *Indian Fern J.* 18: 39–43.

Abstract: *Ophioglossum* is represented by five species in Chotanagpur plateau. These are common herbs in certain parts of the plateau. Their distribution and ecology has been discussed. The vegetative and reproductive characters are taken into account for identification of the species.

303. Purti, N. 2008. "Blue green algae from Khunti district, Jharkhand, India". *Biospectra* 3(1): 127–132.

Abstract: Five taxa of *Anabaena*, four taxa of *Aphanocapsa*, three taxa of each genus of *Chroococcus*, *Calothix* and *Gloeotrichia*, twelve taxa of *Oscillatoria*, nine taxa of *Nostoc*, seven taxa of *Scytonema*, single taxon of each genus of *Microcystis*, *Glaeocapsa*, *Merismopediaj, Coelospharium* and *Phormidium* collectively representing 51 taxa of blue green algae are reported in this work. These taxa of blue green algae collected from freshwater habitats of Khunti have been recorded for the first time.

304. Saha, L.C. 1984. "Blue green algae of Bhagalpur, Bihar". *J. Econ. Taxon. Bot.* 5(4): 881–885.

Abstract: In this paper forty nine taxa belonging to twenty genera of class Myxophyceae have been reported from Bhagalpur, Bihar.

305. Saha, L.C. 1985. "Eugleninae, Dinophyceae and Xanthophyceae of Bhagalpur, Bihar". *J. Econ. Taxon. Bot.* 7(3): 667–669.

Abstract: In this paper, 17 taxa belonging to Eugleninae (9 taxa), Dinophyceae (6 taxa) and Xanthophyceae (2 taxa) have been reported for the first time from Bhagalpur, Bihar.

306. Saha, L.C. 1985. "Ulotrichales, Cladophorales, Chaetophorales and Oedogoniales of Bhagalpur, Bihar". *J. Econ. Taxon. Bot.* 7: 676–679.

Abstract: In this paper seventeen taxa belonging to Ulotrichales (7 taxa), Cladophorales (6 taxa), Chaetophorales (1 taxon) and Oedogoniales (3 taxa) have been reported for the first time from Bhagalpur, Bihar.

307. Saha, L.C. 1985. "Periodicity of algal flora in Bhagalpur ponds in relation to ecological factors". *J. Indian Bot. Soc.* 64: 25–30.

Abstract: Out of 280 taxa recorded, Chlorophycean forms were found to be most dominant which was followed by the members of Bacillariophyceae and Cyanophyceae. The members of other classes were poor in distribution. Different abiotic factors showed significant correlationships with phytoplankton population.

308. Sahay, S. & Sinku, U. 2009. "Ecology and distribution of the Pteridophytes of Ranchi district (Jharkhand)". *Biospectra* 4(2): 371–374.

Abstract: The Paper deals with the ecological account of 33 ferns species occurring at different areas of Ranchi district of Jharkhand. The ferns are classified into four major ecological groups on the basis of habitats. Terrestrial (15 species), Lithophytes (6 species), Xerophytes (5 species) and Hydrophytes (7 species). The concern is required for the conservation of these ferns for which proper protection and relation of their habitats should be done. This would lead to the conservation of our flora and fauna at the same time serve to protect the environment of Ranchi, Jharkhand.

309. Sahay, S., Singh, A. & Sinku, U. 2008. "Diversity and distribution of water ferns in Ranchi districts – Jharkhand". *Biospectra* 3(1): 133–136.

Abstract: The paper deals with a survey work conducted for two years to observe the diversity and distribution of water ferns in Ranchi district. Six species of water ferns under four genera belonging to four families were collected from different parts of Ranchi district and were identified.

310. Sahu, H.B. & Sahu, R.K. 2001. "Some new fungal records from Jharkhand, India". *Geobios (Jodhpur)* 28: 69–70.

Abstract: Four wood rooting fungi, viz., *Polyporus ostreiformis* Berk., *Trametes lactinea* Berk., *Fomes caryophylli* (Rec.) Bras and *Cubamyces cubensis* (Mont.) Murr. have been reported for the first time for Jharkhand from Ranchi, Gumla, Lohardaga, Palamau, Hazaribagh, Deoghar, Dumka, Dhanbad and West Singhbhum districts.

311. Sharma, A. & Sahu, R. 2009. "Algal diversity richness in Tenughat thermal power station at Lalpania (Dist. Bokaro), Jharkhand". *Biospectra* 4(2): 367–370.

Abstract: The study focuses attention on a comprehensive study of algal community with reference to their species diversity index, species richness and analysis of water to assess the impact of waste disposal of TTPS (Tenughat Thermal Power Station) on algae in different seasons. The Tenughat thermal power station under Jharkhand Government was designed with the objectives to supply an assured quantum of 25 to 47 cu secs of water throughout the year for industrial use in the basin area. The Tenughat dam is on Damodar River. Tenughat thermal power plant releases effluents in the form of total suspended solid, ash content coal as well as oils and grease which is directly added to the river. Three sampling sites were selected from the study area. Algal samples were collected from the three different sites in different seasons during July 2007 to July 2008 and arranged class-wise in tabular form. The species diversity index (H') was calculated using the Shannon & Wiener's (1949) formula. Average of the ash concentration and load data of river Damodar was also compared with dominancy of phytoplankton. Altogether 55 phytoplankton taxa of three different classes viz. Cyanophyceae, Chlorophyceae and Bacillariophyceae were recorded from the above three sites. Higher abundance of Cyanophyceae and Bacillariophyceae due to the presence of higher ash content and suspended particulate matters at all the sites indicated the pollution status.

312. Singh, A. & Sinku, U. 2009. "Phytochemical studies on medicinal water fern- *Ceratopteris* and *Marsilea* used by tribal people of Ranchi district". *Biospectra* 4(2): 385–388.

Abstract: This investigation deals with the phytochemical and medicinal properties of two water ferns *Ceratopteris* and *Marsilea*. An attempt has been made to trace the chemical constituents present in the plants. For phytochemical study the extraction of

plant was done by cold maceration method. The extractive value was high in methanol so the extraction was done in solvent methanol. Chemical group test detected the presence of alkaloid, flavonoid, tannin, reducing sugar and saponin in plants.

313. Singh, A., Sahay, S. & Sinku, U. 2007. "Morphological, anatomical & phytochemical observations on *Selaginella bryopteris* (L) Baker of Ranchi district". *Biospectra* 2(2): 319–321.

Abstract: It deals with the macroscopic, microscopic and phytochemical study of complete plant. The extractive value is highest in methanol. Therefore exatraction of *Selaginella* is done in methanol. The chemical tests confirm the presence of alkaloid in plant.

314. Singh, A.K. 1985. "*Thyridium lividum* (Fries) Sacc. – A fungal record for India". *Geobios, New Rep.* 4: 166.

Abstract: *Thyridium lividum* (Fries) Sacc. has been reported for the first time for India from Bhagalpur, Bihar. This fungus was collected from dead twigs of *Saccharum spontaneum* L.

315. Sinha, B.D. & Srivastava, N.K. 1980. "Algal flora of Balmikinagar, Bihar". *Phykos* 19(2): 171–174.

316. Singh, M. & Srivastava, M. 2006. "A new species of *Spirogyra* from Dhanbad, India: *Spirogyra pattnaikensis* sp. nov." *Biospectra* 1(1): 101–104.

Abstract: The paper is concerned with a new species of *Spirogyra*, viz., *S. pattnaikensis* sp. nov. to be a member of Conjugatophyceae. The morphological characteristics on the basis of which the new species is proposed, has been discussed with essential morphometric measurements.

317. Singh, M. & Srivastava, M. 2007. "A new species of *Spirogyra: Spirogyra nizamaii* sp. nov. from India". *Biospectra* 2(1): 129–132.

Abstract: *Spirogyra nizamaii* sp. nov. collected from a pond of Maithan in Dhanbad district, Jharkhand state. The alga belongs to Class Conjugatophyceae. This species is characterised by its certain features which demonstrate separation. The alga has been illustrated and discussed.

318. Singh, M. & Srivastava, M. 2010. "A new Zygnemaceae from India: *Spirogyra kumarii* sp. nov." *Biospectra* 5(2) (Special Issue): 481–484.

Abstract: The paper deals with a new species of *Spirogyra*, viz., *S. kumaraii*, a member of Zygnemaceae has been described from Maithan, Dhanbad district of Jharkhand. The morphological features on the basis of which the new species has been created and discussed.

319. Singh, N.K. & Saha, L.C. 1982. "Chlorococcales of Bhagalpur – I, Bihar". *J. Econ. Taxon. Bot.* 3: 197-–200.

Abstract: In this paper, a total of 40 taxa belonging to 16 genera of the order Chlorococcales are reported from freshwater pond at Bhagalpur, Bihar.

320. Singh, N.K. & Saha, L.C. 1982. "Diatoms of Bhagalpur ponds – I, Bihar". *Phykos* 21: 128.

321. Singh, R.S., Choudhary, D.P. & Prasad, P.K. 1999. "Studies on the distribution of *Fusarium moniliforme* Sheldon in the corn fields of north Bihar". *Advances Pl. Sci.* 12(II): 465–470.

Abstract: Sample of five varieties of "Rabi" as well as "Kharif' maize of 489 crop fields spreading over eight districts of north Bihar were surveyed for the presence of *Fusarium moniliforme* Sheldon and it was recorded the highest in Purnea district and the low-est in Begusarai district. Amongst the different varieties, the 'Locals' were found to be the most susceptible and 'Vijay' as the let to the infections of *F. moniliforme*, *In* general, the 'Rabi' maize was found least vulnerable to this infection, as a whole, as compared to 'Kharif' maize, which confirms to the findings of earlier workers that high temperature and humidity favours the growth and infection of *F. moniliforme* in the maize.

322. Singh, S.N. 1980. "An addition to Indian soil fungi". *Geobios (Jodhpur)* 7: 25–26.

Abstract: A total of 74 fungal species have been isolated during the survey of rhizosphere microflora of papilionaceous plants common at Bhagalpur and its suburbs.

323. Sinha, A. & Kandir, K. 2009. "*Pinus roxburghii* Sarg. – A plant with resins of medicinal importance". *Biospectra* 4(2): 389–392.

Abstract: *Pinus roxburghii* Sarg. is the main source of resins since ancient time which is used ethnomedicinally as well as for making dyes, paints, etc. In this paper, the ethnomedicinal use of pine resin has been shown. Anatomy of *Pinus* needle (leaves) and *Pinus* stem shows the presence of resin ducts which confirms the secretion of resins from the plant. The resin and its derivative turpentine are very useful ethnomedicinally and are used by tribal people to cure several diseases. Resin is used as a basis for plaster, in abscesses, its paste is used in painful chest and also it is used in snake bite and scorpion sting. Its derivative turpentine is used as antiseptic, diuretic, also used in skin complaints such as burns sores, wounds, and in herbal steam bath and as inhalers.

324. Sinha, A., Kandir, K. & Kumar, J. 2009. "Medicinal value of some gymnospermic plants". *Biospectra* 4(1): 113–114.

Abstract: The paper deals with the use of three gymnospermic plants as medicines namely *Cycas revoluta* Thunb., *Pinus roxburghii* Sarg. and *Thuja occidentalis* L. in Ranchi, Jharkhand. The gymnospermic plants are frequently used in the treatment of dysentery,

cough, toothache and different kinds of skin diseases. The paper shows the use of these plants as medicines beside their ornamental uses.

325. Sinha, J.P. & Mishra, G.D. 1966. "Review on Algal flora (Chlorophyceae) of Ranchi district –I". *J. Ranchi Univ.* 3: 35–48.

Abstract: In this paper 61 species of algae of the family Chlorophyceae have been reported from the Ranchi district.

326. Sinha, J.P. & Mishra, G.D. 1967. "Some Desmids of Ranchi". *Phykos* 6 (1 & 2): 102–105.

Abstract: Eighteen species belonging to seven genera of desmids have been recorded from Ranchi (Bihar) for the first time.

327. Sinha, R. 2006. "Edible wild mushroom of tribals of Jharkhand, Orissa and West Bengal". *Int. J. Mendel* 23(3-4): 147–148.

Abstract: The tribal dominated districts in Jharkhand, Odisha and West Bengal were studied for wild mushroom consumption pattern in ten tribal groups. Data were collected through PRA exercises and interview schedules. Altogether 18 species of wild mushrooms have been reported to be consumed by these tribals. Of the 18 species, 11 are collected from the forest. The place and season of availability of these mushrooms have been discussed.

328. Sinha, S.K. & Srivastava, O.N. 1989. "Systematics and ecology of freshwater diatoms of Bihar, India – Part III". *Acta Bot. Indica* 17(1): 26–33.

329. Sinku, U. 2008. "Effect of some plant powder on mycoflora of Mahuwa seeds during storage". *Biospectra* 3(1): 123–126.

Abstract: Dry seeds of Mahuwa are stored in different storage systems traditionally by the tribes of South Chotanagpur. The tribal people store the seeds in earthen pots, gunny bags, metal containers and poora. These seeds are contaminated with a number of storage fungi. In this study, the seeds are stored in gunny bags and 14 species of fungi were isolated from these stored seeds. To minimize the mycoflora, stored seeds were supplemented with some plant powder which acted as fungicide.

330. Soreng, P.K. & Srivastava, A.K. 2014. "Identification and classification of some common wild edible mushrooms collected and consumed by the tribes of Jharkhand". *Biospectra* 9(1): 261–266.

Abstract: As Jharkhand is thickly populated with different tribes, its ethno-mycological knowledge is rich. During the rainy season especially in the beginning of the season, varieties of wild edible as well as poisonous mushrooms appear in the forest of Jharkhand. The tribal people over here have traditional knowledge which is based on their

experiences. They collect many wild edible mushrooms for their consumption or for sale and earn quite a good sum of money because these mushrooms are sold with high price in the village market as well as in the city. The tribal women play a vital role in collecting these mushrooms since they have to look for nutritional food for their children. This paper is an effort to identify these wild edible mushrooms, their uses, scientific names and classifications so that they could be known to others and could be used for further research.

331. Srivastava, A.K. & Soreng, P.K. 2012. "An effort to domesticate wild edible mushrooms growing in the forest of Jharkhand'. *Int. J. Recent Trends Sci. & Technol.* 3(3): 88–92.

Abstract: Jharkhand has a rich biodiversity of wild edible mushrooms. A number of edible mushrooms growing in their natural habitats are being collected by the local people during the rainy season for their consumption or sale. Some of the common wild edible mushrooms of Jharkhand are *Macrolepiota procera, Termitomyces clypeatus, T. heimii, Lycoperdon, Calvatia, Geastrum, Boletus edulis, Russula, Termitomyces microcarpous, Amanita, Clitocybe, Armillaria,* etc. They are rich in protein and can easily fit into all's platter, being a vegetarian product. The villagers are acquainted with them, but they just collect them and consume. The idea to conserve and cultivate them is still eluding them. The ongoing study is an effort to domesticate some of these wild edible mushrooms in an artificial condition that they can be conserved and grown all throughout the year and standardize a package of practice for these mushrooms so that villagers could find some avenues to generate income through mushroom cultivation and marketing.

332. Srivastava, A.K. & Soreng, P.K. 2014. "Some common wild edible mushrooms growing in Jharkhand". *Int. J. Sci., Environm. & Technol.* 3(2): 577–582.

Abstract: Jharkhand is potentially a rich state but the average villagers continue to live a life of penury. With no money and no productive work just rain fed mono crop is all they have to cheer about. For half of the year they are thrown out of work, i.e., disguised unemployment. The children are sorely protein-malnourished. However, the forest provides large and diverse options to the villagers in the form of varieties of wild edible mushrooms. *Macrolepiota procera* (Scop.) Singer, *Termitomyces clypeatus* R. Heim, *T. albuminosa* (Berk.) R. Heim, *T. heimii* K. Natarajan, *Lycoperdon, Calvatia, Geastrum, Boletus edulis* Bull, etc. are commonly collected and consumed wild edible mushrooms. They are rich in protein and can easily fit into all's platter, being a vegetarian product. The villagers are acquainted with them, but they just collect them and consume. The idea to conserve and cultivate them is still eluding them. This paper is an effort to document these wild edible mushrooms so that in the further studies a protocol for their domestication could be developed so that villagers could find some avenues to generate income through cultivation and marketing.

333. Srivastava, M. 1981. "A new species of *Sirogonium* Kützing from Bihar (India): *Sirogonium iyengarai* sp. nov.". *Cryptog. Algol.* 11: 221–226.

334. Srivastava, M. 1981. "A new variety of *Sirogonium*: *S. floridanum* var *morabadensis* var. nov. from Ranchi". *J. Indian Bot. Soc.* 60(1): 84–85.

Abstract: A new variety of *Sirogonium*, viz., *S. floridanum* (Transeau) Sm. var. *morabadensis* has been described and illustrated from a paddy field of Morabadi, Ranchi.

335. Srivastava, M. 1985. "A new variety of *Spirogyra singularis* Nordstedt from south hilly region of Bihar, India". *Geobios, New Rep.* 4: 61–62.

Abstract: A new variety of *Spirogyra singularis* Nordstedt, viz., *S. singularis* Nordst. var. *macrospora* has been described and illustrated from Jagannathnagar, Ranchi.

336. Srivastava, O.N. & Kumar, N. 1995. "*Pleurochloris commutata* Pascher – A new record from India". *J. Econ. Taxon. Bot.* 19(2): 492.

Abstract: *Pleurochloris commutata* Pascher (Xanthophyceae) has been reported for the first time for India from Masaunda, Aurangabad, Bihar.

337. Srivastava, O.N. & Pati, T.P. 1996. "*Striptococcus urceolatus* – A new addition to the algal flora of India". *Advances Pl. Sci.* 9(2): 207–208.

Abstract: *Striptococcus urceolatus* West & West is unrecorded from India and this was collected in epiphytically on *Spirogyra* filaments from a road side puddle, West Singhbhum, Bihar, which is described and discussed in this paper.

338. Srivastava, O.N. & Prasad, S. 1996. "*Mantoniella squamata* (Maton *et* Parke) Desikachary: A new record from India". *J. Econ. Taxon. Bot.* 20(3): 735.

Abstract: *Mantoniella squamata* (Maton & Parke) Desikachary has been reported for the first time for India from Jamshedpur, East Singhbhum district of Bihar.

339. Srivastava, O.N. & Sinha, S.K. 1986. "A new species of *Nitzschia* – *N. godwardense* sp. nov.". *Geobios, New Rep.* 5: 153–154.

Abstract: A new diatom species of *Nitzschia*, viz., *N. godwardense* allied to *N. obtusa* W. Sm. has been described and illustrated from a pond at Singhbhum, Bihar.

340. Srivastava, O.N. & Sinha, S.K. 1988. "Systematics and ecology of freshwater diatoms of Bihar, India Part – I". *New Botanist* 15(4): 235–243.

341. Srivastava, O.N. & Srivastava, M. 1983. "A check-list on the algae of Bihar". *New Botanist* 10: 73–89.

Abstract: The preliminary list of some of the phyla of the algae has been prepared to form a basis on which to work for the eventual compilation of a complete check and

locality list of all species of Bihar algae. The phyla of algae treated in this list are the Cyanophyta (37 genera, 112 species, 17 varities and 3 forms), Chlorophyta (31 genera, 71 species, 9 varieties and 4 forms) and Charophyta (2 genera, 22 species, 6 varities and 18 forms).

342. Srivastava, O.N. & Srivastava, M. 1985. "On *Botrydium granulatum* from Ranchi, Bihar". *Geobios, New Rep.* 4: 73–75.

Abstract: *Botrydium granulatum* (L.) Grev. has been reported for the first time for Bihar from Kanke reservoir, Ranchi.

343. Srivastava, O.N. & Srivastava, M. 1986. "A new record of *Gloeotilopsis planctonica* Iyengar et Philipose from Bihar". *Geobios, New Rep.* 5: 55–56.

Abstract: *Gloeotilopsis planctonica* M.O.P. Iyengar & Philipose has been reported for the first time for Bihar from Ranchi.

344. Srivastava, O.N. & Srivastava, M. 1996. "New record of *Ophiocytium lagerheimii* Lemmermann from India". *Advances Pl. Sci.* 9(2): 229.

Abstract: *Ophiocytium lagerheimii* Lemmerm. not known from India was collected from a man-made perennial kachha pond, Gordih, Aurangabad, Bihar, which is described and illustrated.

345. Srivastava, O.N., Srivastava, M. & Prasad, U.S. 1985. "*Chlorothecium capitatum* Pascher – A new record from India". *Bull. Bot. Surv. India* 27(1–4): 251.

Abstract: *Chlorothecium capitatum* Pascher (Xanthophyceae) has been reported for the first time for India from Kanke River, Ranchi.

346. Srivastava, O.N., Srivastava, M. & Prasad, U.S. 1987. "*Tribonema subtilissimum* Pascher, a new record for India". *J. Indian Bot. Soc.* 66(1–4): 423.

Abstract: *Tribonema subtilissimum* Pascher has been reported for the first time for the state of Bihar, from a temporary pond at Sultanpur in Aurangabad district.

347. Srivastava, O.N., Srivastava, M. & Prasad, U.S. 1988. "Report on the occurrence of *Vaucheria longata* Blum from India". *J. Econ. Taxon. Bot.* 12(3): 312.

Abstract: *Vaucheria longata* Blum (Xanthophyceae) has been reported for the first time for India from a pond of Upper Bazar, Ranchi.

348. Srivastava, O.N., Srivastava, M. & Prasad, U.S. 1995. "*Chlorobotrys polychloris* Pascher – A new record to the Xanthophycean flora of India". *J. Econ. Taxon. Bot.* 19(2): 491.

Abstract: *Chlorobotrys polychloris* Pascher (Xanthophyceae) has been reported for the first time for India from Kanke River, Ranchi.

349. Suresh, G. & Krishnan, M. 2009. "Algal diversity of a lake in Jamshedpur, Jharkhand, India, with special reference to pollution indicating taxa". *Biospectra* 4(2): 441–444.

Abstract: A study was conducted to obtain information on the algal diversity and the pollution indicating forms in a lake in Jharkhand. Of the 96 taxa of algae identified, 56 belonging to Cyanophyta, 18 to Chlorophyta, 3 to Charophyta and 19 to Bacillariophyta. Many of them were pollution indicating taxa. This shows that this particular lake is in need of biomonitoring.

350. Suresh, G. & Krishnan, M. 2011. "Algal biodiversity of Sitarampur Dam, Jharkhand, India and sustainable livelihod in the surrounding areas". *Biospectra* 6(1): 165–168.

Abstract: Algae form the basis of the food chain in aquatic habitats, and this is where study of algal diversity acquires its significance from. This study is on one of the most important dams of Jharkhand, the Sitarampur Dam, situated in the district of Seraikela-Kharsawan. Algae were collected from this dam on a monthly, and where necessary on a fortnightly basis, from January 2002 to December 2003. They were identified and an extensive list was made of the same. It was observed that 33 taxa belonging to Division Cyanophyta, 34 to Division Chlorophyta, six to Charophyta and 10 to Bacillariophyta, making a total of 83 taxa. Of these, polluting algae were almost entirely absent. Water was clean, with abundant growth of *Chara* and *Nitella*. Though some runoff from agricultural fields nearby was seen, there has been no case of fish or bird mortality in the recent past. Present legal conservation status of the dam is that it is protected fully. The local people were found to be moderately concerned of aquatic biodiversity and its conservation. The dam is thus promoting sustainable livelihood in the surrounding areas.

351. Suresh, G. & Mukherjee, S. 1990. "Studies on some blue-green algae from Jamshedpur, Bihar, India". *Advances Pl. Sci.* 3(2): 287–290.

Abstract: This work is part of the extensive investigation being carried out by the authors to study the morphotaxonomy of the algae of Jamshedpur. In this paper, two genera of blue-green algae, viz., *Aphanocapsa* Nag and *Aphanotheca* Nag are described.

352. Thakur, C. & Sahu, R. 2008. "A new report on the occurrence of terrestrial Euglenoid flagellates from Ranchi, Jharkhand, India". *Biospectra* 3(1): 137–138.

Abstract: The paper provides the systematic enumeration of nine species of Euglenaceae collected from moist soil of different spots of Swarnrekha River running through Namkom and from soil of the sewage drain at Railway colony, particularly polluted by animals and decaying organic matter in Ranchi district. They seem to prefer acidic soil (pH 6.5–7.0). The genera *Euglena acus*, *E. limnophila*, *E. deses*, *E. charkowiensis*, *E. oxyuris*, *E. proxima*, *E. anabaena*, *E. polymorpha* and *Phacus curvicauda* are being reported for

the first time from Jharkhand. The occurrence of the genus *Phacus* as solitary cells in the potamoplankton collected from the soil rich in high molecular decomposable organic matter and deficient of oxygen, also support the view that it is a good pollution indicator.

353. Thakur, C. & Sahu, R. 2013. "A note on the occurrence of a new species of *Fischerella* (Cyanobacteria) from Ranchi, Jharakhand (India)". *J. Indian Bot. Soc.* 92(3 & 4): 221–224.

Abstract: One taxon of *Fischerella* with variation in the morphological features of the known species of this genus has been found in vegetative and reproductive stages. On the basis of distinguishable morphological characters an attempt has been made to establish a new species of genus *Fischerella*, i.e., *F. ranchiensis* sp. nov. belonging to order Stigonematales of Cyanophyceae. The specimens of *F. ranchiensis* were collected from terrestrial habitat (earthen pot, bricks) and aerial (tree-bark) at Morabadi, Ratu and proper Ranchi during the years 2005–2007. The gelatinous material secreted by the cells form a cylinder investing the entire trichome and violet or deep brown in colour. This species identified is a new report from India.

354. Tiwari, M.G. 1993. "Some new records of freshwater algae *Ulothrix* from Bihar". *Geobios, New Rep.* 12: 113–115.

Abstract: During a taxonomic survey of the Ulotrichalean members of certain parts of Bihar from 1984 to 1986, a large number of species have been collected. Out of these, four freshwater species of *Ulothrix*, viz., *U. oscillarina* Kutzing, *U. subtilissima* Rabenh., *U. tenerrima* (Kutzing) Kutzing and *U. variabilis* (Kutzing) Kutzing have been collected for the first time from Bihar.

355. Toppo, K. & Suseela, M.R. 2013. "Enumeration of fresh water algal flora of Ranchi, Jharkhand, India". *J. Indian Bot. Soc.* 92(1 & 2): 89–96.

Abstract: The paper enumerates 61 taxa of freshwater algae from Ranchi district of Jharkhand state. Out of these, 47 were Chlorophyceaen, 11 were Cyanophyceaen and 3 were Bacillariophyceaen algae. Chlorophyceaen algae were the dominant in all the localities.

356. Verma, P.K., Rai, D.N. & Datta Munshi, J. 1982. "On the freshwater diatoms of Bihar". *Geobios, New Rep.* 1(1): 55–56.

Abstract: A total of 29 forms of diatoms belonging to 19 genera have been recorded from Bihar. Important morphological features were observed both in living condition as well as from the materials preserved in 4% formalin.

357. Zadi, N. & Sinha, M.R. 2007. "Two edible *Agaricus* from Saranda forest of Jharkhand state". *Int. J. Mendel* 24(1 & 2): 11–12.

Abstract: The edible mushrooms, *Agaricus compestris* and *A. silvicola* were found to grow naturally in habitats where lots of organics were available. These fleshy fungi were an integral component of the forest ecosystem.

358. Zadi, N. & Sinha, M.R. 2007. "*Amanita phalloides* Vaill. ex Fr. – A deadly poisonous mushroom from Saranda forest of Jharkhand state". *Int. J. Mendel* 24(1 & 2): 26.

Abstract: A deadly poisonous mushroom and highly toxic, *Amanita phalloides* has been recorded from Saranda forest, Jharkhand. This deathcap is fairly small, wrapped up in smooth, while skin called a universal veil. As the stem elongates and the cap expands, the Deathcap breaks through that veil. The cup-like volva at the base of the stem is a remnant of that universal veil.

Revision, Monographs, New Discoverirs, New Reports, Rediscovery

359. Bagga, J. & Mallik, K. 2017. "Some new distributional records of angiospermic plants from Palamau division of Jharkhand". *J. Indian Bot. Soc.* 96 (1&2):140–143.

Abstract: The paper reports the occurrence of some important plants namely *Senna hirsuta* (L.) H.S. Irwin & Barneby (Caesalpiniaceae), *Adansonia digitata* L. and *Ceiba pentandra* (L.) Gaertn. (Bombacaceae), *Ruellia tuberosea* L. and *R. brittoniana* Leon (Acanthaceae), *Tinospora cordifolia* (Willd.) Miers (Menispermaceae), *Dioscorea alata* L. (Dioscoreaceae), *Millingtonia hortensis* L.f. (Bignoniaceae) from Palamau division of Jharkhand state for the first time.

360. Bahadur, K.N. & Naithani, H.B. 1973. "New distributional records of *Richardia scabra* Linn. in India". *Indian Forester* 99(7): 449–453.

Abstract: *Richardia scabra* L. (Rubiaceae), a native of tropical America and now naturalized in many parts of the world, has hitherto been reported in India from Assam, Meghalaya, Andhra Pradesh and Rajasthan. It is now recorded from Uttar Pradesh, Bihar and Mysore states. Notes on its previous records from India and other tropical countries, nomenclature (of genus as well as species), description, distribution, ecology, economic uses and affinities are provided with illustrations.

361. Bakshi, M.K., Sajan, S.K., Xaxa, S., Srivastava, D.S., Mishra, A.K. & Kazmi, S. 2017. "Record of carnivorous plant *Drosera burmanii* Vahl (Caryophyllales: Droseraceae) from Palamau Tiger Reserve, Jharkhand, India". *Indian Forester* 143(6): 612–613.

Abstract: *Drosera burmanii* Vahl popularly known as Sundews, a red listed medicinal plant belongs to the family Droseraceae has been reported for the first time from Kutku range of Palamau Tiger Reserve, Jharkhand.

362. Bandyopadhyay, S., Das, D. & Das, M. 2002. "Notes on the distribution of *Bauhinia semla* Wund. (Leguminosae: Caesalpinioideae) in Bihar". *J. Econ. Taxon. Bot.* 26(3): 550.

Abstract: Discussion has been made on the distribution of *Bauhinia semla* Wund in Bihar.

363. Banerjee, D.K. & Pal, D.C. 1970. "Some new distributional records in Indian grasses". *Bull. Bot. Surv. India* 12: 70–72.

Abstract: The paper records new distributional areas in India for 12 grasses, namely *Arthraxon quartinianus* (A. Rich.) Nash, *Brachiaria subquadripara* (Trin.) Hitchc., *Dimeria hohenackeri* Hochst. ex Miq. from Bihar, *Brachiaria mutica* (Forssk.) Stapf from Orissa and *Brachiaria subquadripara* (Trin.) Hitchc., *B. villosa* (Lam.) A. Camus var. *barbata* Bor, *Coelorhachis khasiana* (Hack.) Stapf ex Bor, *Echinochloa cruspavonis* (Kunth) Schult., *Eragrostis riparia* (Willd.) Nees, *Iseilema anthephoroides* Hack., *Melinis minutiflora* P. Beauv., *Microstegium vagans* (Nees ex Steud.) A. Camus and *Setaria paniculifera* (Steud.) E. Fourn. ex Hemsl. from West Bengal.

364. Banerjee, S.P. & Banerjee, R.N. 1967. "Notes on *Argyreia involucrata* Clarke (Convolvulaceae) with a plate". *J. Bombay Nat. Hist. Soc.* 64(3): 586–587.

Abstract: *Argyreia involucrata* C.B. Clarke, endemic to west Deccan peninsula has been reported for the first time from Champaran district, Bihar.

365. Banerjee, S.P. & Banerjee, R.N. 1969. "On the occurrence of *Solanum khasianum* Clarke var. *chatterjeeanum* Sen Gupta in Bihar". *Bull. Bot. Surv. India* 11(1&2): 192.

Abstract: *Solanum khasianum* C.B. Clarke var. *chatterjeeanum* Sen Gupta has been reported for the first time for Bihar from Madanpur-Bhainsalotan forests. Earlier this species was reported from different parts of Eastern India and the Nilgiris.

366. Biswa, S., Lakshminarasimhan, P. & Lokho, A. 2016. "A new locality for *Malva parviflora* var. *microcarpa* (Pers.) Loscos (Malvaceae)". *Indian J. Forest.* 39(2): 197–199.

Abstract: *Malva parviflora* var. *microcarpa* (Pers.) Loscos, a Mediterranean taxon hitherto known to occur in Rajasthan and West Bengal, is reported from Koderma Wildlife Sanctuary, Jharkhand.

367. Chattopadhyay, S.P. 1994. "Notes on the distribution, identification and nomenclature of *Mitracarpus villosus* (Sw.) DC. (Rubiaceae) in India". *J. Econ. Taxon. Bot.* 18(2): 427–432.

Abstract: *Mitracarpus villosus* (Sw.) DC., a native of West Indies, is recorded for the first time from Hazaribagh district of Bihar in general and Indo-Gangetic Plains in particular. On thorough scrutiny of available literature and herbarium sheets deposited in CAL and CUH, it reveals that the first record on its occurrence had been made in 1958 by G.S.

Puri from Kerala, bur unfortunately misidentified as *Spermacoce hispida* L. The two plants bear similarities in certain characters as a result the former species has been wrongly identified as the latter in many instances. Thorough verification of the type specimens of the former species is needed to find out its correct nomenclature.

368. Chaudhury, S. & Ranjan, V. 2012. "*Habenaria pantlingiana* Kraenzl: a new distributional record from Jharkhand". *Indian J. Forest.* 35(1): 103–104.

Abstract: The paper deals with the new distributional record of *Habenaria pantlingiana* Kraenzl. (Orchidaceae) from Parasnath Wildlife Sanctuary, Jharkhand. Detailed taxonomic description along with illustration is provided.

369. Chaurasia, H.K., Kumar, A. & Krishna, G. 2015. "*Wrightia coccinea* (Roxb. ex Hornem.) Sims (Apocynaceae): An addition to the flora of Bihar". *Indian J. Forest.* 38(1): 85–86.

Abstract: *Wrightia coccinea* (Roxb. ex Hornem.) Sims (Apocynaceae) is recorded for the first time for Bihar from T.N.B. College campus, Bhagalpur. Detailed morphological description, distribution and photograph of the species are provided to facilitate easy identification of the species in the field.

370. Giri, G.S. & Majumdar, N.C. 1982. "A new variety of *Lindernia crustacea* (Scrophulariaceae)" from India". *J. Econ. Taxon. Bot.* 3: 253–254.

Abstract: A new variety of *Lindernia crustacea* (L.) F. Muell., viz., *L. crustacea* var. *clarkei* has been described and illustrated from Noatolee, Lohardurga, Bihar.

371. Govindarajalu, E. & Varma, S.K. 1997. "Monographia Indicorum Fimbristylium Precursores– Novelties". *J. Econ. Taxon. Bot.* 21(2): 377–380.

Abstract: Two new species of *Fimbristylis*, viz., *F. cuneata* allied to *F. miliacea* (L.) Vahl and *S. diglumoides* allied to *F. dichotoma* (L.) Vahl have been described and illustrated from Bihar.

372. Gupta, S.K. & Kerketta, M. 2011. "A new record of Asteraceae from Ranchi, Jharkhand, India". *Biospectra* 6(2) Special Issue: 163–166.

Abstract: The paper deals with the species diversity of Asteraceae flora of Ranchi district. A total of 67 species belonging to 45 genera were collected and identified. *Synedrella nodiflora* (L.) Gaertn., a naturalised weed, is reported for the first time from Ranchi district of Jharkhand.

373. Gupta, S.K. & Kerketta, M. 2012. "A new record of Asteraceae fro Ranchi, Jharkhand, India". *Advances Pl. Sci.* 25(II): 561–562.

Abstract: *Sonchus wightianus* subsp. *wightianus* DC., is reported for the first time from Ranchi district of Jharkhand, India.

374. Haines, H.H. 1919. "Some new species of plants from Bihar and Orissa". *J. & Proc. Asiat. Soc. Bengal* 15: 309–311.

375. Jagtap, A.P. & Singh, N.P. 1997. "Two noteworthy plants of Asclepiadaceae from India". *Indian J. Forest.* 20(1): 101–102.

Abstract: Two noteworthy plants of Asclepiadaceae, viz., *Ischnostemma carnosum* (R. Br.) Merr. & Rolfe and *Philibertia viminalis* A. Gray have been reported from Car Nicobar from Chota Nagpur, Bihar, respectively. Both species are reported for the first time from the repective state.

376. Jha, R.R. & Varma, S.K. 1989. "*Cleome rutidosperma* DC. – A new record for Bihar". *Geobios, New Rep.* 8: 152–153.

Abstract: *Cleome rutidosperma* DC. has been reported for the first time for Bihar from Bhagalpur district, earlier reported from Uttar Pradesh and West Bengal.

377. Jha, R.R. & Varma, S.K. 1993. "On the occurrence of *Panicum elegantissimum* Hook.f. (Poaceae) in India". *J. Bombay Nat. Hist. Soc.* 90(2): 316–317.

Abstract: *Panicum elegantissimum* Hook.f. has been reported for the first time from India from Sahibganj, Bihar.

378. Kanodia, K.C. & Malick, K.C. 1966. "New plant records & critical notes on some plants from south Bihar". *Indian Forester* 92: 707–708.

Abstract: *Begonia concanensis* A. DC., *Anotis foetida* Benth. & Hook.f., *Physalis longifolia* Nutt., *Vanda coerulea* Griff. ex Lindl., *Ischaemum timorense* Kunth and *Setaria pallide-fusca* Stapf & Hubb. have been collected from Chhotanagpur area (Ranchi and Hazaribagh districts) in South Bihar and reported for the first time from Bihar. Additional critical notes on some of these and in particular on *Pennisetum hordeoides* Steud. and *Chrysopogon serrulatus* Trin. have also been presented in this paper.

379. Krishna, G., Kumar, A., Lakshminarasimhan, P. & Kumar, A. 2016. "Distributional note on *Fernandoa adenophylla* (Wall. ex G. Don) Steenis (Bignoniaceae)". *Indian J. Forest.* 39(2): 173–174.

Abstract: During the botanical exploration tour to Aurangabad and Nawada districts of Bihar in 2014–2015, *Fernandoa adenophylla* (Wall. ex G. Don) Steenis (Bignoniaceae), a species hitherto not recorded from Bihar, was collected, and reported in this paper as a new record of this genus from Bihar. Detailed morphological description, habitat and distribution in India are presented in this paper.

380. Kumar, A., Krishna, G. & Prasad, V.P. 2017. "Three species of sedges (Cyperaceae) new to Bihar, India". *Nelumbo* 59(2): 164–167.

Abstract: Three species of Cyperaceae, *Fimbristylis alboviridis* C.B. Clarke, *Kyllinga bulbosa* P. Beauv. and *Lipocarpha squarrosa* (L.) Goetgh., are reported for the first time from Bihar, India based on the collections from Aurangabad and Nawada districts. This paper provides a brief description, phenology and a photoplate of these species for easy identification.

381. Kumar, A., Venu, P. & Rao, Y.V. 2014. "Rediscovery of *Typhonium inopinatum* (Araceae) from India with notes on the identity of *T. khandwaense*". *Rheedea* 24(2): 120–123.

Abstract: *Typhonium inopinatum* Prain is rediscovered after a lapse of 115 years from Gautam Buddha Wildlife Sanctuary in Bihar. As the species is very rare and without sufficient details in any of the Indian Floras, a detailed taxonomic description, photo plates and note on distribution are provided to facilitate easy identification. A lectotype is also designated for the name. The identity of recently described *T. khandwaense* is deliberated and is reduced to a synonym of *T. inopinatum*.

382. Kumar, S. & Varma, S.K. 2012. "An interesting alien medicinal plant from Eastern Bihar: A new record for India". *J. Econ. Taxon. Bot.* 36(1): 86–89.

Abstract: The taxon *Vernonia amygdalina* Del. (Asteraceae) so far known from Sub-Saharan Africa (Angola, Burundi, Congo, Ethiopia, Ghana, Kenya, Nigeria, Tanzania, Uganda, Zimbabwe) is reported as a new record for India from Eastern Bihar. A detailed description, illustration and relevant notes are provided here for easy identification. It is interesting to note that this plant possesses several important medicinal properties. Local people and herbal practitioners are utilizing the leaves of this plant for controlling diabetes mainly. It is also used as a blood purified and curing cough, fever and parasitic infection and against malarial, hepatic and liver troubles. Powdered roots and twigs are also used after food as appetizer.

383. Kumari, M. & Shukla, K. 2015. "*Aeginetia indica* L.: An interesting root parasite of Dalma Wildlife Sanctuary, Jharkhand". *Biospectra* 10(2): 83–86.

Abstract: *Aeginetia indica* L. is a root holoparasitic herb of family Orobanchaceae. This paper deals with the distribution, ecology and conservation status of the *A. indica*. It is a threatened species of Dalma Wildlife Sanctuary. This species is under threat because of habitat loss and climate change.

384. Magesh, C.R., Lakshminarasimhan, P. & Venu, P. 2012. "New plant records for Jharkhand". *ZOO's Print* 27: 24–25.

Abstract: Three species namely, *Bambusa teres* Buch.-Ham. ex Munro (Poaceae), *Crotalaria burhia* Buch.-Ham. ex Benth. (Leguminosae) and *Ipomoea triloba* L. (Convolvulaceae) were collected from Dalma Wildlife Sanctuary which are new records to the flora of Jharkhand.

385. Maheshwari, J.K. 1964. "*Alternanthera philoxeroides* (Mart.) Griseb. – A new record for India". *Bull. Bot. Surv. India* 6(2–4): 313–314.

Abstract: *Alternanthera philoxeroides* (Mart.) Griseb. (Amaranthaceae) is recorded for the first time from the lakes and water pools in the eastern parts of India, namely West Bengal (Dum Dum area) and Bihar (Ranchi). This species is described in detail together with notes on its synonymy, ecology, teratology, distribution and naturalization.

386. Maheshwari, J.K. & Ghosh, T.K. 1971. "New distributional areas of *Aeschynomene americana* Linn. (Fabaceae)". *Bull. Torrey Bot. Club* 98: 111–112.

387. Maheshwari, J.K. & Pandey, R.S. 1973. "*Parthenium* weed in Bihar state". *Curr. Sci.* 42(20): 733.

Abstract: *Parthenium hysterophorus* L. has been reported for the first time for Bihar from Motihari, Narkatiagang and Balmikinagar in Champaran district.

388. Maheshwari, J.K. & Paul, S.R. 1974. "Occurrence of *Lepidum virginicum* L. in Netarhat plateau (Bihar)". *J. Bombay Nat. Hist. Soc.* 70: 575–576.

Abstract: *Lepidum virginicum* L. has been reported for the first time from India from Netarhat plateau of Bihar.

389. Manna, M.K. & Samaddar, U.P. 1984. "On a collection of plants from Netarhat plateau, Palamau dist., Bihar – A critical area of botanical importance". *Bull. Bot. Surv. India* 26(1 & 2): 133–141.

Abstract: Two plant species collected from Netarhat Plateau, Bihar by the authors is apart from its enumeration, an addition to Haines' record (1921) from Netarhat, mention of which was made by H.F. Mooney (1944). And since the region is phytogeographically important, the paper also deserves its utility from conservation point of view.

390. Mastakar, V.K., Lakshminarasimhan, P. & Modak, M. 2015. "*Crotalaria bifaria* L.f. (Leguminosae – Papilionoideae): A new distributional record for Eastern India". *Indian J. Pl. Sci.* 4(3): 13–16.

Abstract: *Crotalaria bifaria* earlier known from Peninsular India, Gujarat and Rajasthan is reported as a new record for Eastern India from Palkot Wildlife Sanctuary, Jharkhand. A detailed description, photographs and distribution map are provided for facilitating easy identification of this species.

391. Mastakar, V.K., Lakshminarasimhan, P. & Modak, M. 2015. "A report on the extended distribution of *Polycarpaea aurea* (Caryophyllaceae), an endemic herbaceous species, to Chota Nagpur Plateau, Jharkhand, India". *J. Threat. Taxa* 7(12): 7950–7952.

Abstract: The extended distribution of *Polycarpaea aurea* (Wight) Dunn to the Chota Nagpur Plateau is discussed with a detailed description, illustration and images. The collection from the Palkot Wildlife Sanctuary also forms a new record to the flora of Jharkhand. This species is endemic to peninsular, Central and Eastern India.

392. Maurya, O.N., Kumar, A., Krishna, G. & Halder, S. 2015. "On the occurrence of a non-native plant species *Bromelia penguin* L. (Bromeliaceae) in India". *Phytodiversity* 2(1): 32–38.

Abstract: During the floristic study at the Vikramshila Gangetic Dolphin Wildlife Sanctuary, Bhagalpur during 2014, *Bromelia penguin* L. (Bromeliaceae), a species native to Mexico and South America was collected. Morphological description, habitat and geographical distribution of this species are provided in this paper.

393. Mishra, K.K. 1983. "Two new plant records from Bihar". *Geobios, New Rep.* 2: 133–134.

Abstract: Two plant species, viz., *Rothia indica* (L.) Druce and *Trigonella occulta* Delile of the family Papilionaceae were found to be new records for the state of Bihar from Gaya district.

394. Mishra, K.K. 1984. "Note on the occurrence of *Alternanthera philoxeroides* (Mart.) Griseb. in Bihar". *J. Econ. Taxon. Bot.* 5: 225–226.

Abstract: This note presents *Alternanthera philoxeroides* (Mart.) Griseb., a member of the family Amaranthaceae, as new plant record for the central Bihar. It also provides information regarding distribution, morphological characters, citation, phenology and frequency of the said exotic weed.

395. Mishra, K.K. 1985. "New plant record from Bihar". *J. Econ. Taxon. Bot.* 6: 410–412.

Abstract: This note aims at presenting *Gisekia pharnaceoides* L., *Mollugo cerviana* (L.) Ser. and *Trianthema triquetra* Rottler & Willd., members of the family Aizoaceae, as new plant records for the flora of Bihar. It also furnishes information regarding morphological features, citation, distribution, phenology, frequency and the uses.

396. Mishra, K.K. 1998. "Less known angiospermic taxa of Bihar – I". *J. Econ. Taxon. Bot.* 22(3): 729–730.

Abstract: Three less-known weeds, viz., *Elatostema cuneatum* Wight (Urticaceae), *Mollugo nudicaulis* Lam. (Molluginaceae) and *Oryza rufipogon* Griff. (Poaceae) have been reported for the first time for the flora of Bihar. A short description, latest taxonomic citation, distribution, frequency and phenology of these taxa have been provided.

397. Mishra, K.K. 2000. "Two little known *Euphorbia* L. in Bihar". *J. Econ. Taxon. Bot.* 24(1): 81–82.

Abstract: The paper deals with two rare and less-known species of *Euphorbia* L., of the family Euphorbiaceae in the flora of Bihar. Two species namely *E. caducifolia* Haines and *E. perbracteata* Gage are collected and studied from Magadh division of central Bihar. A short description, botanical name, taxonomic citation, frequency, phenology and distribution of each taxon have been provided.

398. Mishra, K.K. 2000. "*Merremia aegyptia* (L.) Urban – A new plant record from Bihar". *J. Econ. Taxon. Bot.* 24(1): 83–84.

Abstract: In this paper, *Merremia aegyptia* (L.) Urb., a member of the family Convolvulaceae, has been described as a new plant record from Pretshila, hill, Gaya district, Bihar. Latest botanical name along with synonyms, frequency, phenology and distribution of the said taxon have also been provided.

399. Mishra, K.K. & Bandana 1996. "Two sedges new to Central Bihar". *J. Econ. Taxon. Bot.* 20(3): 661–662.

Abstract: The paper aims at presenting, two species of *Schoenoplectus* (Reichb.) Palla, namely *Schoenoplectus maritimus* (L.) Lye and *S. roylei* (Nees) Ovcz. & Czukav., members of the family Cyperaceae as new plant records for the flora of central Bihar.

400. Mishra, K.K. & Kumar, D. 1992. "Note on the occurrence of *Solanum sisymbriifolium* Lamk. (Solanaceae) in Bihar". *J. Econ. Taxon. Bot.* 16(3): 562–564.

Abstract: This communication aims at presenting an exotic taxon, *Solanum sisymbriifolium* Lam., member of the family Solanaceae, as a new plant record from south and central Bihar. Taxonomic citation, morphological characters, ecology, phenology, frequency and distribution have also been provided for easy identification of the said exotic weed.

401. Mishra, K.K. & Ojha, C. 1993. "*Cassia alata* L. – A new plant record from Bihar". *J. Econ. Taxon. Bot.* 17(2): 437–438.

Abstract: This note presents an exotic species of *Cassia* L. namely *C. alata* L., a member of the family Caesalpiniaceae, as a new plant record for the flora of the state of Bihar. It also furnishes important information regarding morphological features, citation, distribution, phenology, frequency and the uses of the said exotic taxon.

402. Mishra, K.K. & Singh, D.P. 1997. "A note on the occurrence of *Gliricidia sepium* (Jacq.) Kunth ex Walp. (Papilionaceae) in Bihar". *J. Econ. Taxon. Bot.* 21(1): 243–244.

Abstract: The paper deals with an exotic legume, namely, *Gliricidia sepium* (Jacq.) Kunth ex Walp. of the family Papilionaceae collected from Magadh division of central and south Bihar.

403. Mishra, K.K., Ojha, C. & Nath, V. 1991. "Notes on the occurrence of *Alternanthera pungens* Kunth (Amaranthaceae) in Bihar". *J. Econ. Taxon. Bot.* 15(2): 498–500.

Abstract: This communication aims at presenting *Alternanthera pungens* Kunth, as a new plant record from Darbhanga division and some of the districts of Bihar. It also furnishes information regarding citation together with synonymy, morphological characters, ecology, distribution, phenology and frequency of the said exotic weed.

404. Molla, H.A. & Pal, D.C. 1995. "Observation on *Eulaliopsis binata* (Retz.) C.E. Hubb. (Sabai grass)". *J. Econ. Taxon. Bot.* 19(2): 443–445.

Abstract: Observation on the habit, habitat and uses of *Eulaliopsis binata* (Retz.) C.E. Hubb. based on the material collected in the forest of Bihar, Odisha and West Bengal and those lodged in the Central National Herbarium, Botanical Survey of India, Howrah (CAL) are given. Certain uses attributed to this plant by the tribal people of Bihar, Odisha and West Bengal not well-known so far.

405. Mondal, S. & Chowdhury, H.R. 2015. "New record of *Jatropha nana* var. *bengalense* C.H. Rahman & S. Mondal (Euphorbiaceae) for the state of Jharkhand, India". *J. Non-Timber Forest Prod.* 22(1): 17–20.

Abstract: *Jatropha nana* var. *bengalense* is reported here from Dumka and Jamtara districts of Jharkhand. A short description along with illustration, distribution map and a short note on conservation status of the variety is provided.

406. Mooney, H.F. 1941. Some additions to the Botany of Bihar and Orissa. *Indian Forest Rec., Bot.* 3: 63–119.

407. Mukherjee, S.K. 1956. "Some new records of plants from the Parasnath Hill". *J. Indian Bot. Soc.* 35(3): 245–247.

Abstract: Five species of angiosperms, viz., *Bidens pinnata* L. (Asteraceae), *Euphorbia microphylla* B. Heyne (Euphorbiaceae), *Habeneria stenopetala* Lindl. (Orchidaceae), *Setaria intermedia* Roem. & Schult., *Themeda villosa* Dur. & Jack (*Poaceae*) and two species of pteridophytes, viz., *Tectaria macrodonta* (Fee) C. Chr. (Aspidiaceae) and *Pleopeltis linearis* Bedd. (Polypodiaceae) have been recorded from Parasnath Hill.

408. Pal, D.C. 1971. "The identity and distribution of certain taxa in Bihar and Orissa". *Indian Forester* 97(5): 264–265.

Abstract: The identity and distribution of three grass species namely *Brachiaria miliiformis* (C. Presl) Chase from Bihar and Odisha, *Digitaria preslii* (Kunth) Henrard from Bihar and *Trachys muricata* (L.) Pers. from Odisha are discussed in the paper.

409. Panda, S.P., Sahoo, H.K., Sahu, A.K. & Subudhi, H.N. 2014. "*Solanum sisymbrifolium* Lam. – An addition to the flora of Jharkhand, India". *J. Bombay Nat. Hist. Soc.* 111(2): 147–148.

Abstract: *Solanum sisymbrifolium* Lam. of the family Solanaceae has been recoded for the first time for Jhakhand from Ranchi.

410. Paul, S.R. 1976. "New plant record for Bihar from Netarhat plateau – I". *Botanique* 7(1): 29–32.

411. Paul, S.R. 1977. "*Mimosa prainiana* Gamble – A new record for Bihar". *Geobios (Jodhpur)* 4: 124.

Abstract: *Mimosa prainiana* Gamble has been reported for the first time for Bihar from Sabour village, Bhagalpur district. Earlier this species was reported from southern India.

412. Paul, S.R. 1978. "New plant records for Bihar from Netarhat Plateau – 5". *Bot. Reg.* 1: 16–19.

413. Paul, S.R. 1990. "New Plants from Netarhat Plateau, Bihar – II". *Geophytology* 20(1): 21–23.

414. Paul, S.R. & Kharbanda, A.L. 1975. "Revision of the genus *Polygala* from India (Polygalaceae) I. The species of Bihar and Orissa". *Bangladesh J. Bot.* 4(1 & 2): 49–58.

Abstract: Eight species of *Polygala* are recognised from Bihar and Odisha, among which *P. persicariaefolia* DC. is a new record for Bihar. A key is provided for identification with notes on phenology, local name, uses and distribution. Detailed illustrations of *P. chinensis, P. erioptera* and *P. elongata* have been made.

415. Paul, S.R. & Prasad, S.S. 1978. "New Plant records for Bihar from Netarhat Plateau – 3". *Proc. Natl. Acad. Sci. India* 48B: 93–98.

416. Ranjan, V. & Srivastava, S.C. 2009. "A New species of *Saurauia* (Actinidiaceae) from Jharkhand State, India". *J. Jap. Bot.* 84: 233–236.

Abstract: *Saurauia parasnathensis* V. Ranjan & S.C. Srivastava allied to *S. cerea* Dyer is described from Parasnath Wildlife Sanctuary, Jharkhand as new to science. This species is characterised by having cymose inflorescence with many-flowered fascicles, yellow flowers and 27-35 stamens in two rows.

417. Sah, B.N. & Pathak, R.D. 1988. "First record of *Mimosa pudica* Linn. As host of *Kusmi* lac *Kerria lacca* Kerr. From Namkum, Ranchi". *Indian Forester* 114(2): 93–94.

Abstract: In this paper, *Mimosa pudica* L. is reported for the first time as *kusmi* lac host from Namkum, Ranchi. *Aghani* crops could be raised successfully on it.

418. Sen Gupta, S. 1990. "*Centrostachys aquatica* (R. Br.) Wall. ex Moq., a rare plant of threatened habitats". *Higher Plant of India Sub-continent* Vol. I (*Indian J. Forest., Addit. Ser.* IV): 31–33.

Abstract: *Centrostachys aquatica* (R. Br.) Wall. ex Moq. has been rediscovered from roadside jheels on way from Madhipura to Saharsa in Madhipura district of Bihar after a lapse of over a century. Brief notes on its taxonomy alongwith a description of the species with flowering and fruiting periods are also appended.

419. Singh, C.T.N. & Kumar, J. 2003. "*Allmania nodiflora* (L.) R. Br., a less-known medicinal plant of Hazabibagh, Jharkhand". *Advances Pl. Sci.* 16: 403–404.

Abstract: The experiments conducted revealed that the little-known medicinal plant, *Allmania nodiflora*, in combination with *Celosia argentea* L. and Karanja oil was effective in the control of eczema.

420. Singh, C.T.N. & Kumar, J. 2004. "Occurrence of *Aganosma caryophyllata* (Roxb. ex Sims) G. Don – A less-known medicinal plant of Ranchi plateu, Jharkhand". *Advances Pl. Sci.* 17(I): 45–46.

Abstract: *Aganosma caryophyllata* (Roxb. ex Sims) G. Don has been collected from Ranchi plateau during the surveys in the year 2001–2002. It was noticed that the medicinal value of this plant is not well-known to most of the local healers of this area. The plant is an evergreen climber with considerable medicinal properties (Singh & Chunekar, 1972; Kapoor & Mitra, 1979).

421. Singh, K.K. & Varma, S.K. 1990. "On the occurrence on *Lepisanthes rubiginosa* (Roxb.) Leenhouts in Bihar". *Geobios, New Rep.* 9: 63–64.

Abstract: *Lepisanthes rubiginosa* (Roxb.) Leenh. has been reported for the first time for Bihar from Rajmahal hills. This species was earlier reported from West Bengal, Odisha and Assam.

422. Singh, K.L.B. 1990. "Twinners and climbers of Monghyr district (Bihar)". *Higher Plant of India Sub-continent* Vol. I (*Indian J. Forest., Addit. Ser.* IV): 183–199.

Abstract: This paper records 98 species of the twinners and the climbers growing in different localities of Monghyr district of Bihar. The creepers and scandent species are excluded from this enumeration.

423. Singh, L.B. 1985. "*Tephrosia strigosa* (Dalz.) Santapau & Maheshwari – A new record for Bihar". *Indian Forester* 111(7): 553.

Abstract: The occurrence of *Tephrosia strigosa* (Dalzell) Santapau & Maheshw. has been recorded for the first time from the state of Bihar from Munger. Earlier this species was reported from upper Gangetic plains, Punjab and Maharashtra.

424. Singh, L.B. 1986. "*Solanum sisymbrifolium* Lamk. (Solanaceae), new record for Bihar". *Indian J. Forest.* 9(1): 78–79.

Abstract: *Solanum sisymbrifolium* Lam. (Solanaceae) has been recorded for the first time for Bihar from Munger district.

425. Singh, L.B. 1989. "*Mollugo nudicaulis* Lamk.: A new record for Bihar". *India J. Forest.* 12(4): 332.

426. Singh, M.P. 1990. "New record of plants from Patna". *J. Econ. Taxon. Bot.* 14(3): 585–590.

Abstract: The paper deals with a systematic list of 33 species of flowering plants recorded for the first time from Patna. Information about diagnostic features, locality, phenology, etc. in respect of these plants is appended for ready reference.

427. Singh, R.K. 2004. "New plant records for Bihar". *J. Econ. Taxon. Bot.* 28(3): 521–522.

Abstract: The paper reports collection of four species, viz., *Colocasia affinis* Schott (Araceae), *Eriochloa fatmensis* (Hochst. & Steud.) W.D. Clayton (Poaceae), *Orthosiphon incurvus* Benth. (Lamiaceae) and *Scleria stocksiana* Boeckeler (Cyperaceae), which are new to the flora of Bihar from Valmiki Tiger Reserve, West Champaran district.

428. Singh, R.K. 2005. "Additions to the flora of West Champaran district, Bihar". *J. Econ. Taxon. Bot.* 29(1): 187–189.

Abstract: The paper deals with 54 species, which are additions to the flora of West Champaran, Bihar. For each species, correct botanical name, family name, habit, flowering and fruiting period and collection number have been given.

429. Singh, R.K. 2005. "Some new plant records for Bihar". *J. Econ. Taxon. Bot.* 29(1): 190–191.

Abstract: The paper reports the collection of three species, viz., *Capillipedium filiculme* (Hook.f.) Stapf (Poaceae), *Paspalum conjugatum* P.J. Bergius (Poaceae) and *Polygonum pulchrum* Blume (Polygonaceae), which are new to the flora of Bihar from Valmiki Tiger Reserve, West Champaran district.

430. Singh, T.P. 1986. "*Oxalis latifolia* H.B.K. – A new record from the plains of Bihar". *Geobios, New Rep. 5*: 67.

Abstract: *Oxalis latifolia* Kunth has been reported for the first time for Bihar from Madhubani district.

431. Srivastava, J.G. 1954. "Some recently introduced newly recorded plants from Patna district and its neighbourhood'. *J. Bombay Nat. Hist. Soc.* 52: 659–660.

Abstract: Thirty introduced plants have been newly recorded from Patna district and its neighbourhood.

432. Srivastava, J.G. 1961. "Some recently introduction wild grasses of Bihar". *J. Indian Bot. Soc.* 40(3): 465–472.

Abstract: In this paper, 41 species and varieties of grasses have been reported from Bihar which were not included in the Haines Flora.

433. Srivastawa, D.K. & Varma, S.K. 1987. "New plant records for Bihar from Santhal Pargana Division". *J. Econ. Taxon. Bot.* 10: 406–410.

Abstract: Eight dicotyledonous taxa, viz., *Ageratum houstonianum* Mill. (Compositae), *Alternanthera tenella* Colla (Amaranthaceae), *Argemone ochroleuca* Sweet (Papaveraceae), *Callicarpa candicans* (Burm.f.) Hochr. (Verbenaceae), *Exacum bicolor* Roxb. (Gentianaceae), *Phyllanthus amarus* Schumach. & Thonn. (Euphorbiaceae), *Spermacoce decandollei* Deb & Ratna Dutta (Rubiaceae) and *Tephrosia strigosa* (Dalzell) Santapau & Maheshw. (Papilionaceae) new to Bihar flora are reported in this paper from Santhal Pargana Division of Bihar state.

434. Thothathri, K. 1965. *"Arnebia hispisissima* DC.: A new record for Bihar state". *Curr. Sci.* 34.

435. Varma, S.K. 1978. "New plant for Bihar State". *Geobios (Jodhpur)* 5-6: 223–224.

436. Varma, S.K. 1979. "*Plantago* – A new record for Bihar". *Indian J. Forest.* 2(4): 306.

Abstract: *Plantago major* L., *P. ovata* Forssk. and *P. exigua* Murr. have been reported for the first time for Bihar from the T.N.B. college, Aliganj and Jogsar of Bhagalpur, respectively.

437. Varma, S.K. & Jha, R.R. 1992. "Additions to the flora of Bihar". *J. Bombay Nat. Hist. Soc.* 89(1): 146–149.

Abstract: Eleven species, *Blumea obliqua* (L.) Druce (Asteraceae), *Calamus latifolius* Roxb. (Arecaceae), *Canavalia cathartica* Thouars (Fabaceae), *Dendrobium peguanum* Lindl. (Orchidaceae), *Elatostema cuneatum* Wight (Urticaceae), *Eragrostis aspera* (Jacq.) Nees (Poaceae), *Exacum carinatum* Roxb. (Gentianaceae), *Fimbristylis alboviridis* C.B. Clarke (Cyperaceae), *Premna coriacea* C.B. Clarke (Verbenaceae), *Spilanthes iabadicensis* A.H. Moore (Asteraceae) and *Stephania glandulifera* Miers. (Menispermaceae) have been recorded for the first time for the flora of Bihar.

438. Varma, S.K. & Kumar, S. 1999. "*Aeginetia pedunculata* (Roxb.) Wall. (Orobanchaceae) – A new record from Bihar". *J. Bombay Nat. Hist. Soc.* 96(2): 354–355.

Abstract: *Aeginetia pedunculata* (Roxb.) Wall. (Orobanchaceae) has been reported for the first time for the state of Bihar from 2 km north of Durgastham (canal side), Rajendra Nagar, Katihar district.

439. Varma, S.K., Sriwastawa, D.K. & Das, N.N. 1984. "New plant records for Bihar from Santhal Parganas". *J. Econ. Taxon. Bot.* 5: 750–752.

Abstract: Two plant species, viz., *Emex spinosa* (L.) Campd. (Polygonaceae) and *Eleutherine palmifolia* (L.) Merr. (Iridaceae) new to Bihar flora are reported in this note from Santhal Pargana district of Bihar.

Endemism, IUCN threat and Conservation

440. Choudhary, S., Mishra, S., Lakra, H. & Agrawal, R. 2013. "Utilisation and conservation of bamboo: a natural resource of Jharkhand". *Biospectra* 8(2): 199–206.

Abstract: Bamboo has been documented with over 1500 different uses world over. It is identified as an important and a sustainable resource by communities across the world. The paper therefore aims to identify the potential of bamboo as a natural resource; to provide a preliminary overview of the status of bamboo as a resource in India and in Jharkhand; to identify its sought contribution towards socio-economic development of the country and the region. The paper also looks at efforts necessary to maintain a regular supply of this natural resource, which can be derived from a set of clear objectives; mechanisms for action; and commitment from all stakeholders.

441. Jaipuriar, M.K. 2003. "Threatened herbal heritage of tribal land Jharkhand". *Indian Forester* 129(1): 48–54.

Abstract: The paper deals briefly about threatened herbal flora of Jharkhand. The threatened status has been classified as suggested by IUCN for conservation-prone plants. Eight species belonging to seven families have been listed under endangered category, while 18 species of 13 families have been included in vulnerable category. Indeterminate category has 16 species spread among 10 families. A total of 30 species belonging to 24 families are identified as endemics. It has been suggested that process should be started for the creation of 'herbal sanctuaries' at different places to conserve the gene pool of herbs of Jharkhand.

442. Kumar, M. & Kumar, J. 2009. "Conservation of traditional knowledge of Hazaribagh Wildlife Sanctuary, Hazaribagh district, Jharkhand, India". *Biospectra* 4(2): 445–448.

Abstract: Hazaribagh district of Jharkhand state is immensely rich in biodiversity and ethno medicinal information. Ethnomedicinal survey was conducted during 2007 in Hazaribagh Wildlife Sanctuary. The ethnomedicinal plants used to cure different diseases are documented through this survey. Ethnomedicinal survey based on the exhaustive interview with local traditional herbal practitioners and other knowledgeable persons. A total of 26 medicinal plants that are used in curing 17 diseases are reported in this paper.

443. Kumar, S. 2007. "A study of endangered plants of 'Gorkha Hill' in the Ormanjhi block of Jharkhand". *Biospectra* 2(2): 347–349.

Abstract: This study aims to identify some endangered plants of 'Gorkha Hill' also called 'Barka Pahar' of Ormanjhi block of Ranchi, Jharkhand. The plants are over-exploited for medicinal and other purposes and carry a threat of extinction in the area. The information gathered demographically during the year 2005–2006, from the native

residents revealed that many precious plants are getting endangered due to over exploitation for medicinal uses. This study focuses for sustainable management of such plants for improved environment and economic gain.

444. Neelu & Praveen, P. 2013. "Role of tribal women in the conservation of agricultural biodiversity in Jharkhand". *Biospectra* 8(2): 109–116.

Abstract: The study shows the significant contribution of tribal women towards the conservation of agriculture biodiversity in Jharkhand. Women help in the in situ conservation of many traditional cultivars thus helping to preserve them.

445. Singh, C.B. 1994. "Conservation strategy for some economic plants in the Santhal Parganas of Bihar". *Indian J. Forest.* 17(3): 267–269.

Abstract: This paper aims to highlight ethnological behaviour of the seven major ethnic groups living in the Santhal Parganas of Bihar. The origin and culture of these ethic groups play important role in conserving some of the economic plants of ethnic valuenaturally.

446. Singh, C.B. 2017. "Rare and threatened medicinal plants of Santhal Pargana, Jharkhand". *J. Indian Bot. Soc.* 96(1 & 2): 94–99.

Abstract: The paper deals with 18 rare/threatened medicinal plants of forests of Santhal Pargana Division, Jharkhand. Out of such medicinal plants, 10 are rare in occurrence. The threatened categories encompass near threatened (05), vulnerable (01) and endangered (02) medicinal plant species. The list of rare medicinal plants includes *Aegle marmelos, Asparagus racemosus, Dillenia pentagyna, Emblica officinalis, Oroxylum indicum, Sterculia urens, Tacca leontopetaloides, Terminalia bellirica, Terminalia chebula,* and *Vitex peduncularis*. Among threatened medicinal plants, *Acorus calamus, Costus speciosus, Diospyros malabarica, Rauvolfia serpentina, Strychnos nux-vomica* represent near threatened; *Pterocarpus marsupium vulnerable; Clerodendrum serratum, Gloriosa superba* endangered status. All these medicinal plants need urgent conservation and large scale cultivation giving top priority.

447. Singh, S., Singh, S.K. & Chowdhery, H.J. 2006. "Some rare and endangered plants of Palamau Tiger Reserve with special reference to ethnomedicinal value". *J. Econ. Taxon. Bot.* 30(4): 891–895.

Abstract: Palamau Tiger Reserve situated in the Jharkhand state is endowed with rich forests and mineral wealth. The area was intensively and extensively explored and it was observed that several plants are localized only in one or two areas and their density were also very low. The natural resources of this area have been depleting due to destruction of habitats. If the current human interference and their causal factors continue operating, the days are not far when these plants will vanish for ever. In this

paper, correct name, brief description and ethnomedicinal values of 27 rare and endangered plants of Palamau Tiger Reserve are given.

Ethnobotany, Sacred Groves and Medicinal Plants

448. Aditya, P. 2001. *Study of medicinal plants of Gaya district*. Ph.D. Thesis, Magadh University, Bodh Gaya (unpublished).

449. Aditya, P., Kumar, A. & Yadav, D.K. 2006. "Herbal remedies for dental care system in Gaya district, Bihar". *J. Econ. Taxon. Bot.* 30(Suppl.): 167–170.

Abstract: This paper outlines the traditional herbal remedies for dental care system in Gaya district of Bihar. About 30 species belonging to 19 families have been used traditionally by tribal and local inhabitants of Gaya district, Bihar. They frequently use them as tooth stick in dental care system.

450. Aditya, P., Kumar, A. & Yadav, D.K. 2009. "Some unrecorded psychoactive plants and their less known ethnomedicinal uses in Gaya district, Bihar". *J. Econ. Taxon. Bot.* 33 (2): 313–317.

Abstract: Ethnobotanical uses of 32 psychoactive plant species from Gaya district are discussed based on survey and cross examination from traditional medical practitioner and Vaidhyas. The study revealed that though there are many literature on ethnobotanical uses of plant, comparatively less known information is available about psychoactive plants. The paper provides local name, botanical name, family name, plant parts used, mode of administration and application in different ailments.

451. Aditya, P., Yadav, S., Kumar, A. & Yadav, D.K. 2009. "Indigenous knowledge of wild plant resources used as food in Gaya district, Bihar". *J. Non-Timber Forest Prod.* 16(1): 85–88.

Abstract: The wild food plant resources fulfil the basic need as the dietary requirements of the rural people during famine and flood. These species play a vital part in the survival of both individuals and entire communities during the period of food scarcity. The aim of the paper is to explore the wild plant resources and their sustainable consumption by rural people in Gaya district, Bihar. Some of them are semiwild or partially domesticated. Altogether 79 wild food plant species have been documented with their botanical names followed by family name, local name, parts consumed and way of consumption.

452. Ahmad, A.S.M., Kumar, B. & Kumar, N. 2016. "Floristic composition of medicinal plants of Nawada district, Bihar, India". *Int. J. Curr. Microbiol. Appl. Sci.* 5(6): 806–826.

Abstract: The biodiversity, floristic composition and structure of medicinal plants in the fourteen blocks of Nawada district were studied. A total of 105 plant species belonging to 34 families, 75 genera and 5 life-forms were recorded. Fabaceae, Moraceae, Meliaceae and Apocynaceae were the overall diverse families (in terms of species richness) of the adult species, contributing 44.5% of all the species in the study. Trees were the most dominant life-forms (48.5%) followed by lianas (16.8%), herbs (10.9%), epiphytes (8.9%), shrubs (3.9 %) and the others (4.7%). Species richness among all life forms was highest in the Nawada (90.5%) followed by Akbarpur (87.6%), Pakribarawanb (77%), Sirdala (73%), Hisua (70.25%) and Gobindpur (68.95%). Fabaceae, Moraceae and Meliaceae and Apocynaceae were the most diverse families distributed in all the fourteen blocks of Nawada. The trees in all the forest types studied were generally tall. The difference in height of tree species could be partly explained by degradation in the form of logging of tall and big trees which has undoubtedly affected the vertical structure. Even though tree size (dbh) correlated with tree height in all the forest types, the relationship was stronger (r = 0.741 to 0.368; p = 0.000–0.002). Thus, dbh of trees could be a better predictor of tree height. The forest reserve of Nawada looks floristically rich and structurally complex in the face of logging, farming activities and invasion in some parts of the forest. Thus, there is the need to curb the anthropogenic activities and plant invasion so as to protect the integrity of the forest including medicinal plants.

453. Aminuddin & Girach, R.D. 1991. "Pluralistic folk uses of *Hemidesmus indicus* (L.) R. Br. from south Eastern India". *J. Econ. Taxon. Bot.* 15(3): 715–718.

Abstract: *Hemidesmus indicus* (L.) R. Br., a twining shrub belonging to the family Asclepiadaceae, is a common medicinal plant. It is used in indigenous system of medicine including Unani Tib for skin diseases, fever, diarrhoea, rheumatism, snake bites, etc. Less known or unreported pluralistic uses of this plant recorded from the tribal and rural societies of Bihar and Odisha during the survey of medicinal plant reported in this paper with the view of establish genuinity of the claims using scientific parameters.

454. Anamika, A. & Kumar, K. 2016. "An ethnobotanical survey of medicinal plants used by traditional healers (Vaidyas) of Topchanchi Wildlife Sanctuary area, Dhanbad district, Jharkhand, India". *Ranchi Univ. J. Sci. & Technol.* 49(1): 26–27.

Abstract: Ethnobotanical surveys were conducted quarterly from 2013 to 2014 in Chirunad, Karmatand, Nero, Gangapur, Jamdiha, Matari, Khambardih villages of Topchanchi and Tundi block of Dhanbad district. Jharkhand, India. Information on different angiospenns belonging to eleven families were gathered with regard to their ethnomedicinal plants used by the ethnic and non ethnic groups for treatment of various diseases. Three vaidyas were interviewed through different questionnaire and a list of plants was made. The medicinal plants were arranged alphabetically followed by local

name, botanical name, family, parts used and diseases. Information regarding methods of preparation of some medicines are also given in this paper.

455. Anamika, A. & Kumar, K. 2016. "Ethno medicinal plants used in the treatment of skin diseases by the tribals of Topchanchi Wildlife Sanctuary area, Dhanbad, Jharkhand, India". *Int. J. Bioassays 5*(3): 4902–4904.

Abstract: Topchanchi Wildlife Sanctuary, Dhanbad is less studied and investigated, as this area is far from town. Ethnic and non-ethnic communities of this area are using medicinal plant for the treatment of many ailments. An ethnomedicinal plant survey was conducted among vaidyas of this area. A list of plants was prepared which they use for skin diseases. A total of 12 plants of various species were documented in curing various types of skin diseases like eczema, cellulites, swellings and sores.

456. Ball, V. 1866. "Notes on the principal jungle forests used as article of food by the natives of the district of Manbhum & Hazaribagh". *Proc. Asiat. Soc. Bengal* 36: 273-282.

457. Ball, V. 1867. "On the jungle products used as articles of food by the inhabitants of the district of Manbhum & Hazaribagh". *J. Asiat. Soc. Bengal* 36: 73–82.

Abstract: The paper provides information on jungle products derived from 80 distinct species of plants used as articles of food by the inhabitants of the district of Manbhum and Hazaribagh. Scientific name, local name (Bengali) and some remarks on each species are provided in a table.

458. Ball, V. 1867. "Notes on the principle jungle forests used as article of food by the natives of the districts of Manbhum & Hazaribagh". *Proc. Asiat. Soc. Bengal 37:* 110–111.

459. Bardhan, B. & Kandir, K. 2008. "Ethnomedicinal plants used by the tribals of Jharkhand against human skin- diseases". *J. Haematol. & Ecotoxicol.* 3(1&2): 7–10.

Abstract: This paper is about 27 ethnomedicinally important plant species, which are effectively used in the treatment of skin diseases. Plant species were collected with the help of tribal vaidyas or knowledgeable persons. Information about skin diseases in which a particular plant species is used and part of the plant and method of use in particular skin diseases have been provided in this paper.

460. Bardhan, B. & Kandir, K. 2010. "Ethnomedicinal plants used against intestinal parasites by the tribals of Jharkhand". *Biospectra 5*(1): 85–88.

Abstract: About 20 ethnomedicinally important plant species, which are effectively used by the tribals of Jharkhand in the treatment of intestinal parasites, are discussed in this paper.

461. Bhanu Priya & Jha, R.K. 2016. "Some ethnomedicinal plants used by tribals of south Chotanagpur, Jharkhand". *Ranchi Univ. J. Sci. & Technol.* 4(1): 20–22.

Abstract: South Chotanagpur division is one of the five divisions of Jharkhand. The division comprises of five districts namely Gumla, Khunti, Lohardaga, Ranchi and Simdega. The total tribal population of this region mainly includes Oraon, Munda, Ho, Kharwar, Lohra, Bhumij, and Kharia. This study is an effort to document the ethnomedicinal plants used by various tribes and inhabitants of this region for the remedy of several diseases. This article describes the identification of plants, their uses, local names as described by the local herbal practitioners and knowledgeable ethnic persons. The article includes 12 plant species belonging to 11 families.

462. Bharti, M. 2011. "Ethno-medicinal importance of some common pteridophytes used by tribals of Ranchi and Latehar district of Jharkhand, India". *The Socioscan* 3(1&2): 5–8.

Abstract: The study deals with ethnomedicinal uses of common pteridophytes used by the tribal community of Ranchi and Latehar districts of Jharkhand, in the treatment of various diseases. Apart from the higher angiospermic plants, the tribal communities of the study areas are found to use some common pteridophytic plants in their ethnomedicinal health care system. This paper documents ethnomedicinal uses of 23 pteridophytic plants, which are prevalent in study areas along with botanical name, family name, parts and mode of ethnomedicinal use.

463. Bodding, P.O. 1925. "Studies in Santhal medicine and connected folklore – I. Santhal and disease". *Mem. Asiat. Soc. Bengal* 10(1): 1–132.

464. Bodding, P.O. 1927. "Studies in Santhal medicine and connected folklore – II. Santhal medicine". *Mem. Asiat. Soc. Bengal* 10(2): 133–426.

465. Bondya, S.L. & Bodra, P. 2014. "*Borassus flebellifer* L. (tale dare) Arecaceae – An integral component in the life pattern of Santhal tribe of Dumka district in Santhal Pargana, Jharkhand, India". *Ethnobotany* 26: 28–31.

Abstract: Wild plant play a significant role in the sustenance of rural life in Santhal tribe of the study area. They use different plant species both wild and cultivated for their day-to-day need. Of these, *Borassus flabellifer* is an important species for the Santhal tribe in the study area for its multipurpose uses such as making household articles, agriculture equipments, food, fuel, medicine, craft items and fibre from different parts of the plant. The paper presents an overview of the utilization of this palm tree.

466. Bondya, S.L. & Das, A. 2014. "Touch therapy: Socio-cultural beliefs maintaining health of tribal communities". *The Biobrio* 1(1): 29–34.

Abstract: The life of ethnic communities residing in this region, mainly pivot round their rich phytodiversity, of which they are a part. They have deep faith in supernatural

powers of the plants; this may be due to their intense knowledge about their ambient phyto-diversity. Touch therapy is a process of treatment in which medicines (i.e., locally available plant parts) are made to touch a specific part of the body (superficially), of the patient or domestic animals and thus cure various ailments. It is one of the common socio-cultural beliefs and being practiced mainly by the women and herbal healers of the tribes, mainly the Santhal and the Paharias of Santhal Parganas. These plants are mainly, associated with festive and auspicious days, riddance from disease, safeguards against animals and evil spirits. The paper deals with such ethnomedicinal plants, which are being used in touch therapy. Also it highlights this prospect for further researches for its impact, along with the constructive scientific application of this traditional knowledge in the area and our country as a whole.

467. Bondya, S.L. & Sahu, H.B. 2010. "Plant diversity and ethnobotany of chotanagpur plateau of Jharkhand". *Advances Pl. Sci.* 23(I): 279–283.

Abstract: A comprehensive survey of plant biodiversity and ethnobotanical studies were continuously conducted in different areas of Chotanagpur plateau of Jharkhand during the year 2003–2005, and a total of 320 plant species distributed among 197 genera and 69 families have been documented as important plant species, which include trees (40%), herbs (27%), shrubs (21%), wood climbers (06%), grasses (05%) and succulents (01%). The study revealed that the aboriginal people, both tribes and non-tribes of Chotanagpur plateau are very expertise in utilizing the different plants as food, medicines, fodder and other needs. The study also revealed that indigenous knowledge of aboriginal, people (both tribes and non-tribes) on use and management of plant resources could serve as a valuable source for conservation and sustainable utilization.

468. Bondya, S.L. & Sharma, H.P. 2005. "Impact of biotic interference to the medicinal plants of Bharagora block of Jharkhand and its adjacent border areas of West Bengal and Orissa". *Adavances Pl. Sci.* 18(I): 143–146.

Abstract: A survey has been done to study the impact of biotic interference on the ethnomedicinal plants of Bharagora block of Jharkhand and its adjacent border areas of West Bengal and Orissa. In the paper, plants on the basis of their status have been categorized into three types: (i) Medicinal plants depleting from adjacent border, (ii) medicinal plants of rare occurrence or on way to extinction and (iii) lost medicinal plants. A total of 43 plant taxa have been enumerated in this paper.

469. Bondya, S.L. & Sharma, H.P. 2004. "Ethnobotanical studies on plants used in diabetes (Madhumeha) under the Baharagora Block of Jharkhand". *Ethnobotany* 16:139–140.

Abstract: A short note on 11 ethno-medicinal plants used in Bharagora block of Jharkhand state for the treatment of diabetes is provided in the paper.

470. Bondya, S.L., Sahu, H.B., Srivastava, A.K. & Choudhary, A.K. 2007. "Some rare and endangered medicinal plants of Ranchi district, Jharkhand, India". *Int. J. Mendel* 24(3-4): 75–76.

Abstract: Periodical field survey on ethnomedicinal plants of Ranchi district was conducted during the years 2001–2005, and recorded 20 different genera, as threatened species having immense medicinal value, struggling for their survival in their natural habitats, being used by the ethnic tribes for the cure of different ailments varying from simple cold and cough to fever to various chronic diseases. These plants are listed under various red list categories in the Red Data Book.

471. Campbell, A. 1886. *Descriptive Catalogue of the Economic Products of Chutia Nagpur sent to the Colonial and Indian Exhibition held in London in 1886*. Superintendent, Government Printing, India.

472. Chandra, K. 1995. "An ethnobotanical study on some medicinal plants of district Palamau (Bihar)". *Sachitra Ayurveda* 48: 311–314.

473. Chandra, K. & Pandey, B.N. 1984. "Some folk medicine of Singhbhum". *Sachitra Ayurveda* 36: 253–257.

474. Chandra, K. & Pandey, B.N. 1985. "Medicinal plants of Santal Pargana, district Dumka (Bihar) Part I". *Sachitra Ayurveda* 37: 307–314.

475. Chandra, K. & Pandey, P. 1993. "Social forestry – Afforestation vis-à-vis medicinal plants special reference to Bihar". *Bull. Med.-Ethno-Bot. Res.* 14: 150–157.

Abstract: The forest cover in the country is fast depleting. This is no exception in Bihar. Hence it is unwise to further exploit the forest wealth even for medicinal purposes. In the paper, the importance of introduction of more indigenous species of medicinal plants in afforestation and social forestry programme of the state has been highlighted.

476. Chandra, K., Pandey, B.N. & Lal, V.K. 1985. "Folk-lore medicinal plants of Dumka (Bihar)". *Ancient Sci. Life* 4(3): 181–185.

Abstract: The paper reports medicinal properties of 69 plants of Dumka forest division of Dumka district of Bihar. The information is gathered from the tribals and local physicians inhabiting the forest.

477. Chandra, K., Pandey, P. & Pandey, B.N. 1987. "Ethnobotany of Santhal Pargana district Dumka (Bihar)". *Bull. Med.-Ethno-Bot. Res.* 8:134–146.

478. Chandra, K., Pandey, R.N., Sinha, G.N. & Pandey, P. 1989. "Medicinal plants wealth of Rajgir, Bihar". *Bull. Med.-Ethno-Bot. Res.* 10: 124–161.

Abstract: In this paper, 232 medicinal plant species have been reported from Rajgir through preliminary and exhaustive medico-ethnobotanical explorations undertaken

during the years 1971–73. Sanskrit names, local names, Hindi names, medicinal uses and folklore claims besides habit, habitat, local distribution and field number have been provided.

479. Chandra, R. & Pandey, V.N. 1984. "Some folk medicine of Singhbhum". *Sachitra Ayurveda* 4: 253–257.

480. Chandra, R., Mahato, M., Mandal, S.C., Kumar, K. & Kumar, J. 2007. "Ethnomedicinal formulations used by traditional herbal practitioners of Ranchi, Jharkhand". *Indian J. Tradit. Knowl.* 6(4): 599–601.

Abstract: Ranchi district of Jharkhand state is immensely rich in biodiversity and ethnomedicinal information. Ethnomedicinal survey was conducted during 2004. The information on ethnomedicinal formulation is based on the exhaustive interview with local traditional herbal practitioners and other knowledgeable persons, who prescribe their herbal preparation to treat various ailments. Twelve ethnomedicinal formulations reported in the paper include 28 medicinal plants. These research finding need to be integrated with national healthcare systems, which requires further pharmacological validation.

481. Choudhury, S. & Sharma, A. 2015. "Ethnobotanical study of cosmetics used in Kosi area of Bihar". *Biospectra* 10(1): 59–60.

Abstract: In the village area of Kosi division, women generally use different plants and plant parts for cosmetic purposes such as beautifying face, shining hairs, removing dandruff and shining skin. The most important plants used for these purposes are *Aloe*, *Aegle*, Neem, Amala, Bargad, Aadi, etc.

482. Chourasia, H.K. & Roy, A.K. 1992. "A survey of drug plants of Bhagalpur and Santhal Pargana Division Bihar for therapeutic potentiality". *J. Econ. Taxon. Bot. Addit. Ser.* 10: 323–329.

Abstract: The paper provides details on 58 medicinal plants with various therapeutic values occurring in Bhagalpur and Santhal Pargana Division of Bihar.

483. Dash, S. & Jha, R.K. 2010. "Certain herbal medicinal plants specially used for gynecological disorders by the tribal of Seraikela-Kharsawan district, Jharkhand, India". *Biospectra* 5(1): 121–124.

Abstract: This paper deals with 23 herbal plant species used by adivasi tribes inhabited in Seraikela-Kharsawan district, Jharkhand, for the treatment of gynecological disorders. These herbal folk medicines are being traditionally used by them since ancient times. The information about these medicinal plants and their uses from the studied sites are not reported earlier.

484. Dash, S. & Jha, R.K. 2010. "Ethnomedicinal plants specially used for skin diseases by the tribals of Seraikella-Kharsawan district, Jharkhand, India". *Biospectra* 5(2) Special Issue: 393–396.

Abstract: The paper deals with 15 selected plant species of ethnomedicinal wild plants, which are specially used as medicine in curing skin diseases such as scabies, eczema, boils, wounds, itches and leucoderma. The modes of administration and preparations as suggested by the tribals of remote area of Seraikella-Kharsawan district, Jharkhand are discussed in the paper.

485. Dey, P. & Sarkar, A.K. 2011. "Revisiting indigenous farming knowledge of Jharkhand (India) for conservation of natural resources and combating climate change". *Indian J. Tradit. Knowl.* 10(1): 71–79.

Abstract: As in other parts of the world, the indigenous people of Jharkhand hold important context relevant knowledge and strategies for addressing dwindling natural resources base and climate change. The paper documents some of the collective wealth of indigenous knowledge related to agricultural practices, including land preparation/ manuring/soil treatment, cropping systems, input management, water resource management and utilization, and soil and water conservation practices, used especially by tribal farmers of the region. Related research and policy issues essential for successful amalgamation of such indigenous knowledge in resource conservation and climate change adaptation are also discussed. It concludes that the indigenous knowledge will help to address food and nutritional security in the face of climate change.

486. Dipti, S., Kerketta, M. & Oroan, S. 2014. "Study of ethnomedicinal plants related to family Euphorbiaceae in Ranchi district". *Biospectra* 9(1): 165–168.

Abstract: The article represents traditional medicinal uses of members of the family Euphorbiaceae found in Ranchi district of Jharkhand. It was found that plants used by local tribes possess good healing properties.

487. Divakara, B.N. & Prasad, S. 2015. "Ethnomedicinal importance of invasive alien flora of Latehar and Hazaribagh districts: Jharkhand". *Indian Forester* 141(11): 1172–1175.

Abstract: During the process of investigation and documentation on invasive alien flora available in Latehar and Hazaribagh districts, some of the interesting facts on potential medicinal uses were closely noted based on experimented and proven evidences by interrogation with the ethnic people, especially Munda and Birhore tribal communities. In this paper the most commonly used invasive alien medicinal species, viz., *Ageratum conyzoides, Argemone mexicana, Calotropis procera, Cassia alata, C. tora, Cuscuta reflexa, Datura metel, Eclipta prostrata, Emilia sonchifolia, Eupatorium odoratum, Hyptis suaveolens, Leonotis nepataefolia, Opuntia stricta, Scoparia dulcis, Sida acuta, Solanum torvum* and

Tridax procumbens possessing different medicinal properties such as expectorant, styptic, antibiotic, antifungal, antispasmodic, anodyne, febrifuge, refrigerant and enteritis are discussed.

488. Fatma, S.K. & Kandir, K. 2016. "Folk herbal remedies for jaundice by the tribal's of Jharkhand". *Ranchi Univ. J. Sci. & Technol.* 4(1): 23–25.

Abstract: An ethnomedicinal investigation was carried out on herbs used for jaundice in Jharkhand state during 2014–15. Jaundice is common water borne disease. Some common plants such as *Andrographis paniculata, Centella asiatica, Boerhavia diffusa* are used in the treatment of jaundice. Ethnobotanical inventories were made by conducting interviews with tribal people, formal surveys in the field, collection and identification of plant specimen. Herbs are traditionally used by tribal communities as recipe during Jaundice. The species are conservation oriented and agro-economic and pharmaceutical prospect.

489. Ghosh, B. 1987. "Some unreported medicinal uses of plants used by the tribals of district Begusarai, Bihar". *J. Econ. Taxon. Bot.* 10: 187–190.

Abstract: Hitherto unreported medicinal uses of 16 species of plants used by the tribals (Musahar and Mallha) of district of Begusarai of Bihar have been dealt in this paper.

490. Ghosh-Jerath, S., Singh, A., Kamboj, P., Goldberg, G. & Magsumbol, M.S. 2015. "Traditional knowledge and nutritive value of indigenous foods in the Oraon tribal community of Jharkhand: An exploratory cross-sectional study". *Ecol. Food Nutr.* 54(5): 493–519.

Abstract: Traditional knowledge and nutritional value of indigenous foods of the Oraon tribal community in Jharkhand was explored. Focus group discussions were conducted with adult members to identify commonly consumed indigenous foods. Taxonomic classification and quantitative estimation of nutritive values were conducted in laboratories or utilized data from Indian food composition database. More than 130 varieties of indigenous foods were identified, many of which were rich sources of micronutrients such as calcium, iron, vitamin A, and folic acid. Some were reported having medicinal properties. Utilization and ease of assimilation of indigenous foods into routine diets can be leveraged to address malnutrition in tribal communities.

491. Girach, R.D. & Aminuddin 1994. "Ethnomedicinal studies on *Elephantopus scaber* L.". *Higher Plant of India Sub-continent* Vol. III (*Indian J. Forest., Addit. Ser.* VI): 167–172.

Abstract: Pluralistic uses of *Elephantopus scaber* L. recorded from several tribal communities of Orissa and Bihar during the last nine years are presented in this paper.

492. Girach, R.D. & Aminuddin 1995. "Ethnobotanical uses of plants among the tribals of Singhbhum district, Bihar, India". *Ethnobotany* 7: 103–107.

Abstract: The paper deals with new or less known medicinal uses of 46 plant species recorded from the tribal communities dominated by 'Ho' in the Singhbhum district of Bihar.

493. Goel, A.K. & Mudgal, V. 1988. "A survey of medicinal plants used by the tribals of Santhal Pargana (Bihar)". *J. Econ. Taxon. Bot.* 12: 329–335.

Abstract: A number of villages of Santhal Pargana district are inhabited by the Santhals, Paharia and Mahli tribals. During an ethnobotanical survey 25 plants were found to be used medicinally by these tribals for the treatment of their various ailments. The paper deals with the medicinal uses of the plants along with other information gathered during the field studies.

494. Goel, A.K. & Rajendran, A. 1999. "Cross-cultural ethnobotanical studies of Santhal Pargana (Eastern India) and Western Ghats (Southern India)". *J. Econ. Taxon. Bot.* 23(1): 147–150.

Abstract: The paper has focused on the tribal communities living in two relatively distinct and isolated geographical regions of the country. This analysis has been made for the attitude of tribals towards plants and the norms for their uses and comparison of the effectiveness of traditional medicinal systems. After the comparative analysis, it is found that 20 plant species have been commonly used by these tribals to cure similar or different ailments.

495. Goel, A.K., Sahoo, A.K. & Mudgal, V. 1984. *A contribution to the ethnobotany of Santal Pargana (Bihar)*. Botanical Survey of India, Howrah. pp. 1–37.

496. Goel, A.K., Sahoo, A.K. & Mudgal, V. 1987. "Ethnobotanical notes on some plants used for birth control in Santhal Pargana (Bihar)". *J. Econ. Taxon. Bot.* 11: 493–495.

Abstract: The paper deals with five species, viz., *Alysicarpus vaginalis* (L.) DC. (Fabaceae), *Annona squamosa* L. (Annonaceae), *Croton roxburghii* N.P. Balakr. (Euphorbiaceae), *Dendropthoe falcata* (L.f.) Etting. (Loranthaceae) and *Plumbago zeylanica* L. (Plumbaginaceae), which have been used in the folk medicine for birth control by the tribal ladies of the Santhal Parganas. Suggestions have been given for the further confirmation of folk claims pharmacologically.

497. Goel, A.K., Sahoo, A.K. & Mudgal, V. 1987. "Medico-ethnobotany of Santal Pargana (Bihar): Stomach and gastric troubles". *East. Anthropol.* 40:161–167.

498. Gopal, G.V. & Sinha, M.P. 1999. "Medicinal uses of various beads used in rosaries". *J. Econ. Taxon. Bot.* 23(1): 131–133.

Abstract: The paper deals with the medicinal uses of various seeds used commonly as beads in rosaries in Rajgir areas of Bihar and and Puri district of Orissa. Nine species,

viz., *Ocimum sanctum* L. (Lamiaceae), *Pterocarpus santalinus* L.f. (Fabaceae), *Drypetes roxburghii* Wall. (Euphorbiaceae), *Elaeocarpus sphaericus* (Gaertn.) K. Schum., *E. tuberculatus* Roxb. (Eleaocarpaceae), *Nymphaea nouchali* Burm.f. (Nymphaeaceae), *Ficus religiosa* L. (Moraceae), *Ziziphus mauritiana* Lam. (Rhamnaceae) and *Aegle marmelos* Corrêa (Rutaceae) were used in preparing various rosaries commonly sold in markets.

499. Guha, U. 1957. "Five folk tales of the Santal". *Indian Folklore* 2: 34–40.

500. Gupta, D.S., Sinha, M.R. & Linda, P.S. 2014. "Ethnomedicinal plants of Tamar block of Ranchi district, Jharkhand". *Biospectra* 9(2): 79–82.

Abstract: Herbal medicine has been widely practiced throughout the world since ancient times. These medicines are safe and environmental friendly. In the study, 144 medicinal plant species belonging to 98 genera and 57 families have been recorded. Out of these the most important species found were *Abrus precatorius*, *Acacia arabica, A. catechu, Achyranthes aspera, Aegle marmelos, Albizia lebbeck, Adhatoda vasica, Allium* spp., *Brassica campestris, Cajanus cajan, Calotropis procera, Carica papaya, Cassia angustifolia, Chenopodium album, Cucurbita maxima, Curcuma longa, Datura metel, Daucus carota, Eclipta prostrata, Emblica officinalis*, *Ficus benghalensis, Helianthus annuus, Holarrhena antidysenterica, Lantana camara, Rauvolfia serpentina, Shorea robusta, Sesamum indicum, Tamarindus indica, Terminalia arjuna, T. bellirica, Tectona grandis, Ziziphus jujube*, etc. The natural distribution of these medicinal plant species in 25 revenue villages of Tamar block of Ranchi district of Jharkhand were marked with the help of map, location, and distribution of forest area. The study revealed that the documented ethno-medicinal plants have potentially curative properties with immense commercial value. Moreover, the medicinal plants can be grown commercially by the villagers of Tamar block through improved modern technique.

501. Gupta, S.K. & Kerketta, M. 2013. "Medicinal and aromatic plant diversity of Asteraceae in Ranchi district". *Advances Pl. Sci.* 26: 645–646.

Abstract: Members of Asteraceae in Jharkhand are used as medicinal and aromatic plants in this region by local tribal people from time immemorial. Out of 84 species reported 34 of them are being used by the local people in traditional health care system.

502. Gupta, S.P. 1981. Folklore about plants with reference to Munda culture. In: Jain, S.K. (ed.) *Glimpses of Indian Ethnobotany*. Oxford & IBH Publishing Co., New Delhi. pp.199–207.

503. Gupta, S.P. 1981. Native medicinal uses of plants by the Asurs of Netarhat plateau (Bihar). In: Jain, S.K. (ed.), *Glimpses of Indian Ethnobotany*. Oxford & IBH Publishing Co., New Delhi, pp. 218–231.

Abstract: The Asurs live and enjoy the life amidst nature in the area of Netarhat plateau within Chotanagpur Division of south Bihar, collecting tubers, roots, fruits, flowers, leaves, fibre, lac, honey and gums from the forest and using them in various ways. This paper deals with certain mythological notions about diseases and their cure and natural remedies, decoctions and lotions of herbs, which come from the neighbouring forests. Many of these uses are not known outside their tribal community. The available information regarding the native uses of medicinal plants by the Asurs has been discussed here under ten categories, viz., (i) Fever, body pain and headache, (ii) Langhan (rheumatism, gout and paralysis), (iii) cough and asthma, (iv) cholera, diarrhoea and dysentery, (v) urinary complaints, (vi) skin diseases, (vii) burns, cuts and wounds, (viii) snakebites and poisoining, (ix) weakness and (x) miscellaneous diseases.

504. Gupta, S.P. 1987. Study of plants during ethnobiological research among tribals. In: Jain, S.K. (ed.), *A Manual of Ethnobotany*. Scientific Publishers, Jodhpur. pp.12–22.

505. Hembrom, P.P. 1991. "Tribal medicine in Chotanagpur and Santhal Parganas of Bihar, India". *Ethnobotany* 3: 97–99.

Abstract: A brief account of some general aspects of tribal medicine, like the kind of medicinemen and diagnosis of diseases is given. A few prescriptions for polio, asthma, tuberculosis, epilepsy, cancer and leprosy are given as examples of the vast ethnomedicinal heritage of the region.

506. Hembrom, P.P. 1996. "Contact therapy practiced by Mundas of Chotanagpur (Bihar)". *Ethnobotany* 8: 36–39.

Abstract: Contact therapy, one of the common practices applied in Munda medicine for curing various ailments, mainly in children below five years and also in women, is described. Munda tribe people, concentrated in Chotanagpur Division of Bihar, have faith in their own system of medicine. In contact therapy, a part of a locally available medicinal plant is made to touch the body of the ailing person, tied to different parts of the body, or hung around the neck. The diseases for which this is practised are: acidity, urticaria, goitre, polio and epilepsy in children. It is also used to accelerate delivery and prevent miscarriage in women. Plants used for various ailments are: seeds of 'pitaunji' for acidity and urticaria, banana for goitre, *Helecteres isora* fruits and whole plant of *Leucas cephalotes* for polio, and fresh root of *Achyranthes aspera* for accelerating delivery.

507. Hembrom, P.P. & Goel, A.K. 2005. "Horopathy: Ethnomedicine of Mundas". *Ethnobotany* 17: 89–95.

Abstract: Mundas are an ethnic group from Chhotanagpur region in Jharkhand state of India. Their main concentration has been in Ranchi district. This tribe belongs to the Austric-Asiatic group. They have been practising ethno-medicine since time immemorial. In this paper, ethnomedicine of Mundas, known as Horopathy, has been discussed.

508. Islam, M.A & Jha, R.K. 2001. "Ethnobotanical studies of wild edible plants of Ranchi district in Jharkhand". *J. Non-Timber Forest Prod.* 8(1 & 2): 29–33.

509. Islam, M.A. & Jha, R.K. 2003. "Ethnopharmacology of tribals of Ranchi district in Jharkhand". *J. Econ. Taxon. Bot.* 27(2): 300–310.

Abstract: The paper communicates information on 83 ethnomedicinally important plant species belonging to 77 genera and 41 families and being utilized for 57 common diseases by the tribal people of Ranchi district in Jharkhand. These plants have been arranged alphabetically with their family name, vernacular names, life-form, flowering and fruiting period, plant parts used and specific uses. Several of the plant species are likely to go under the category of threatened due to overexploitation and habitat destruction, if appropriate scientific conservation measures are not adopted immediately.

510. Jain, S.K. & Tarafder, C.R. 1970. "Medicinal plant-lore of the Santal (A revival of P.O. Bodding's work)". *Econ. Bot.* 24: 241–278.

Abstract: The paper deals with 377 plant species employed by the Santals (a tribe inhabiting the region of the Bengal-Bihar border in eastern India) in their indigenous medical system. The information is based on a valuable (but near forgotten) report of Reverend P.O. Bodding, published about forty years ago.

511. Jain, S.P. 1989. "Tribal remedies from Saranda forest, Bihar, India". *Int. J. Crude Drug Res.* 27(1): 29–32.

Abstract: Saranda Reserve Forest in the Singhbhum district of Biha has one of the least disturbed forests in India, still inhabited by tribes living in traditional ways. These people have their own well-developed system of medicine, said to be fairly effective. Our studies have shown that 21 medicinal plant species are commonly used to treat various ailments.

512. Jain, S.P. 1996. "Ethno-medico-botanical survey of Chaibasa, Singhbhum district, Bihar". *J. Econ. Taxon. Bot., Addit. Ser.* 12: 403–407.

Abstract: This paper provides a brief account of 32 plants associated with herbal remedies among the Ho and Oraon tribes of Chaibasa, Singhbhum district, Bihar. The data are compared with information obtained from some other tribal societies of Bihar. For each species, botanical name, vernacular name(s), collection number, locality and medicinal uses are given.

513. Jain, S.P. 2003. "Comparative ethno-medico-botanical studies of tribes of Netarhat plateau, Chhotanagpur and Singhbhum districts of Jharkhand, India". *J. Econ. Taxon. Bot.* 27(2): 295–299.

Abstract: Comparative uses of 19 plants by Munda and Asur tribals of Netarhat plateau, Chhotanagpur and Singhbhum districts of Jharkhand are presented in this paper.

514. Jain, S.P. & Singh, J. 2004. "Depleting medicinal and aromatic plants of Jharkhand state". *Bull. Bot. Surv. India* 46: 390–397.

Abstract: The newly created state of Jharkhand is very rich in the plant wealth and other natural resources. The area has maximum concentration of tribal population in North India. The forests have several medicinal and aromatic plants that are being used as a source of medicines in various systems, viz., Ayurveda, Siddha, Unani and Homeopathy. Due to continuous habitat desctruction, fragmentation of forests, urbanization coupled with population explosion and agricultural growth, there is unprecedented pressure on plant wealth culminating into loss of biodiversity at an alarming rate. The authors have regularly been surveying the state for the last fifteen years. Based on the field survey, literature and screening of 24 medicinal plants whose populations have been continuously depleting are identified and reported in this communication.

515. Jain, S.P., Abraham, Z. & Shah, N.C. 1990. Herbal remedies among 'Ho' tribes in Bihar. In: Jain, S.K. (ed.), *Contribution to the Ethnobotany of India*. Scientific Publishers, Jodhpur. pp. 115–122.

516. Jain, S.P., Singh, S.C. & Puri, H.S. 1994. "Medicinal plants of Netarhat, Bihar, India". *Int. J. Pharmacogn.* 32(1): 44–50.

Abstract: In a programme to study tribal medicines, particularly for diseases for which the modern medical system has no effective treatment, localities on the Netarhat plateau and adjoining were surveyed. Visits were made in different seasons, four times in two years, and tribal herbalists or individuals having medicnal knowledge of the local flora and living in the area were interviewed. Data on the medicinal uses of 105 plants species were gathered, of which 46 were recorded as new.

517. Jha, A.K., Jha, S. & Mishra, I.N. 1990. "The ethnobotanical studies of plants from Darbhanga district (Bihar)". *Geobios, New Rep.* 9: 40–42.

Abstract: Enumeration of 35 medicinally important plants from Darbhanga district, Bihar for their phytochemical analyses was undertaken to find out the active principles in them and their medicinal importance.

518. Jha, H.K. & Singh, B.S. 2014. "Ethnobotanical studies of aquatic flora of Jamtara district of Jharkhand, India". *Biospectra* 9(2): 75–78.

Abstract: The study shows very remarkable and significant footing in the pond ecosystem. Study on ethnobotanical and medicinal aspects includes the local survey of some of the major aquatic vegetation and their utilization by the native inhabitants. The study shows that in addition to use in the field for food, pollution control, compost and production of bio-energy, aquatic plants have been playing very determining and decisive role in the

field of medicine since the ancient period. This work is the compilation and documentation of the aquatic plants used for medicinal purpose. However, it is not so easy to estimate ethnobotanical aspects of aquatic plants however efforts were taken to make people of Jamtara district of Jharkhand state make aware about their economic importance.

519. Jha, H.K., Singh, B.S. & Varshney, A.K. 2016. "Ethnomedicinal plants used by Paharia tribe in Santhal Paragana division of Jharkhand". *J. Indian Bot. Soc.* 95(3 & 4): 297–300.

Abstract: The ethnobotanical study was carried out in Santhal Paragana division of Jharkhand state, which has been vividly recognized as the dense forest area and is dominated by tribal communities namely Paharia, Santhal, etc. This work comprises the survey of ethnomedicinal plants and their parts most commonly used by the Paharia tribe for preparing herbal medicines to cure various ailments. This ethnic community inhabits in the forest area and use effective and potential plants for health care. These herbal healers are commonly known as Kaviraj or Gunnia. The composition of different parts of plants for preparing medicines is based on the traditional knowledge acquired by these herbal healers. The study includes compilation and documentation of 24 medicinal plants belonging to 23 genera and19 families along with their floristic study including botanical names, local names, and parts used along with their pharmacological role for mankind.

520. Jha, P.K., Chaudhari, R.S. & Chaudhari, S.K. 1997. "Studies of medicinal plants of Palamau (Bihar) – (II nd part)". *Biojournal* 9: 21–38.

521. Jha, R.K. 2001. "Ethnomedicinal plants used against 'Asthma' at Chhotanagpur, Jharkhand, India". *Advances Pl. Sci.* 14(1): 95–97.

Abstract: An ethnobotanical study of Chhotanagpur has been carried out by the tribal, who live in dense forest far away from the hospitals. The local inhabitants have developed and preserved a very old and strong tradition for folk medicine. This paper brings out 19 medicinal plant species used specially for the treatment of 'asthma'.

522. Jha, R.K. 2007. "Ethnomedicinal values of some herbal plants in Chotanagpur, Jharkhand". *Biospectra* 2(2): 311–313.

Abstract: An ethnomedicinal study of some herbal plants of Chotanagpur has been carried out by the people of Chotanagpur, who live in the dense forest far away from the hospitals. The local inhabitants have developed and preserved a very old and strong tradition for using different type of plants for their treatment. The paper identifies 15 medicinal plant species that have the highest level of ethnomedicinal values and are usually used regularly for various ailments.

523. Jha, R.R. & Varma, S.K. 1996. "Ethnobotany of Sauria Paharias of Santhal Pargana, Bihar: I. Medicinal Plants". *Ethnobotany* 8: 31–35.

Abstract: Native medicinal uses of 58 plants, common among the Sauria Paharia tribe inhabiting Rajmahal Hills of Santhal Pargana Division (Bihar State) are reported. These plants have either not been reported by earlier workers or their uses mentioned here are unrecorded. Information is given on local name, locality, voucher number, native uses, mode of administration and doses.

524. Jha, V. & Basak, P.K. 1994. "Ethnobotanical aspects of Mithila paintings". *Ethnobotany* 6: 9–18.

Abstract: The paper enumerates 40 plants used for making colours utilized in Mithila paintings, 10 plant extracts added as fixatives to the colours and 14 plants symbolising fertility, potency, good omen and reverence to deities in these paintings.

525. Jha, V. & Goel, A.K. 2006. "Botanical rosaries and non-flower garlands in folklore life of Mithila region (north Bihar)". *Ethnobotany* 16: 27–32.

Abstract: The paper deals with some plant species utilized for preparing rosaries and non-flower garlands in Mithila region of north Bihar. These rosaries, basically meant for counting the prayers ('mantras'), are made of the seeds of *Abrus precatorius, Canna* sp., *Drypetes roxburghii, Elaeocarpus ganitrus, Nelumbo nucifera, Ocimum* sp. and *Sapindus mukorossi*; twigs (stems) of *Aegle marmelos* and *Ocimum* sp.; heartwood of *Pterocarpus santalinus* and *Santalum album*; rhizome of *Curcuma domestica* and roots of *Desmostachya bipinnata*. The non-flower garlands are also prepared from the popped seeds of *Euryale ferox* and *Aeschynomene* sp. The local inhabitants wear these rosaries around their neck and other parts of the body to get relief from various kinds of skin and nervous disorders. In general, these rosaries are used by the people for their mental peace, well-being and overall prosperity.

526. Jha, V. & Goel, A.K. 2006. "Vetiver worship (*Katarapuja*) in Mithila region (north Bihar): An ancient practice of land conservation in India". *Ethnobotany* 18: 166.

Abstract: 'Kataraghas' is botanically known as *Vetiveria zizanoides* (L.) Nash (Poaceae), and has formally been worshipped in the rural parts of Mithila region (north Bihar) on the first and the last Sundays in the bright fortnights of Agrahayan (November–December) and Baisakh (April–May). Womenfolk in the villages take holy bath in the nearby river/ pond and move in a procession to the site of vetiver plants where they offer flowers, fruits and vegetables. They avoid taking salt on every Sunday for all the six months. This practice is observed as a sequel to sun worship coupled with a symbolism for soil conservation. Vetiver is potential sand and soil binder on account of its deep parenchymatous roots which withstand the ferocity of floods is rampant in this region of Bihar.

527. Jha, V. & Shalini, R. 2016. "Wood of *Aeschynomene* sp. (*Korhila*): A significant wicking material used by watchmakers in north Bihar". *Ethnobotany* 28: 31–34.

Abstract: Technological advancements during recent decades have led to replacement of natural plant products with those of the synthetic ones. But the use of *Aeschynomene* wood (locally called 'Korhila', growing lavishly in water logged areas and rice paddies) in north Bihar in watch industry is still intact. Possible reason behind it could be its low specific gravity coupled with high rates of absorbency of volatile liquids as well as their high evaporation rates as compared with other wick materials. Synthetic thermocol has replaced natural 'Korhila' at a number of places including packaging items, fish floats as well as angling indicators but its use is still intact in watch industry. The paper discusses the use of one of the lightest wood of *Aeschynomene* sp. (Korhila/Sola/Indian Cork) in the watch making and repairing process in the districts of north Bihar.

528. Jha, V., Choudhary, U.N. & Saraswati, K.C. 1991. "Botanical aspects of an ethno-veterinary prescription in Mithila, north Bihar (India)". *Ethnobotany* 3: 101–104.

Abstract: This note deals with 23 plants utilized as veterinary medicine in Darbhanga district and emphasizes the need for a comprehensive ethnobotanical survey of the entire north Bihar.

529. Jha, V., Jha, J.K. & Goel, A.K. 2013. "*Calotropis procera* based 'Aartak Paat' cottage industry related with 'Chhath' festival in north Bihar". *Ethnobotany* 25: 166–168.

Abstract: Several plants are specifically associated with various rituals and festivals in different parts of the world. *Calotropis procera* (Aiton) Dryand finds its association with 'Chhath' festival observed alongside rivers, ponds and other water bodies in the state of Bihar, Jharkhand and Uttar Pradesh (eastern part). 'Aartak Paat', made from the seed floss of *Calotropis procera* is offered on this occasion along with several other seasonal horticultural products. 'Aartak Paat' is commercially prepared in 'Jhauan' and adjoining villages in Dighwara block of Saran district in north Bihar and provides a basis to livelihood of the local people. A good number of Muslim population is also associated with this cottage industry and this makes a basis for communal harmony in the region. The paper provides the details of this cottage industry in north Bihar.

530. Jha, V., Mishra, S., Kargupta, A.N. & Jha, A. 1996. "Leaves and flowers utilized as supplementary vegetables in Darbhanga (north Bihar) and their ethnobotanical significance". *J. Econ. Taxon. Bot., Addit. Ser.* 12: 395–402.

Abstract: The paper enumerates leaves of over four dozen plants (belonging to 23 angiospermic families) and flowers of 21 plants (belonging to 12 angiospermic families) utilized as supplementary vegetables. It discusses the period of their availability alongwith mode of utilization and preservation.

531. Jha, V., Verma, A.M. & Choudhary, N.J. 1997. "Biodiversity survey report on baits and bait-aids utilized in angling method of fishing in Darbhanga (north Bihar)". *Ethnobotany* 9: 85–89.

Abstract: The paper presents a survey report on plant and animal biota utilized as bait and bait aids in the angling method of fishing in north Bihar. The plant products utilized comprise rice, wheat, gram, linseed, caraway, mustard cake and dried mahua (*Madhuca indica* var. *latifolia*) flowers. A bait formulation under brisk sale in the local market includes the rhizomes of *Hedychium spicatum* (as major item), *Acorus calamus* and *Curcuma zedoaria*, root of *Nardostachys jatamansi*, seeds of *Psoralea corylifolia, Trigonella foenum-graecum, Zanthoxylum alatum* and *Carum carvi* and fine wood powder of *Santalum album*. The animal baits used include mole cricket, frog tadpole, earthworm, larvae of red ant, wasp and honey bee; snails (buccal mass) and fish spp. belonging to *Puntius* and *Channa* species and an arthropod belonging to *Macrobrachium* sp. Firefly is utilised as an indicator for angling under darkness, while *Polygonum hydropiper* is utilised for making a forced exit of earthworms from inside the soil due to a fatal principle present in its aqueous extract. Animal baits are exclusively used in hooked form, while plant baits are hooked as well as sprayed in the form of mud balls.

532. Jha, V., Verma, A.B., Kumar, R. & Jha, M. 2014. "Ethnic and economic aspects of some emergent aquaphytes in Mithila region of north Bihar". *Ethnobotany* 26: 10–15.

Abstract: Mithila area in north Bihar is a land of high floods and major portion of its remains water-logged for a considerable part of the year. As such the area witnesses the growth of a number of aquaphytes, of which *Acorus calamus* (Achhaini), *Asteracantha longifolia* (Talmakhana), *Cyperus esculentus* (Chichorh), *Scirpus articulatus* (Khubahi) and *Vetiveria zizanioides* (Katara) constitute the most utilised low emergent plants. *Acorus calamus* is an aquatic medicinal plants used in skin and speech related problem. Leaves of *Asteracantha longifolia* are used as greens to increase the level of haemoglobin in blood. Light pops of *Scirpus articulatus* seeds provide a basis to the 'Khubahi Ramdana' sweet industry. Vetiver has since emerged as a promising wetland grass of economic significance it is being cultivated for its aromatic oil and is a basis of the 'Sikki' art. *Cyperus esculentus* hinders paddy cultivation as an invasive weed. However, its subterranean tubers are used as emergency food. Plants such as *Aeschynomene* sp. (Korhila), *Typha* sp. (Pater), *Cyperus rotundus* (Mothi), *Ipomoea carnea* (Patit/Behaya) and *Sesbania rostrata* (Manager) constitute the emergent aquaphytes, which are utilised by local people for a number of livelihood purposes. A number of items carved out from these plants are in high demand here during marriage ceremonies and other rituals. People earn their livelihood by utilizing these plants as base material. Besides acting as a natural bio-fertilizer in paddy fields, *Aeschynomene* sp. (Korhila) is a basis of livelihood

for the gardener community, who use is lightest wood for curving a number of art items. Bhaptiyahi village of Supaul district on NH-57 (East-West Corridor) has emerged as a major centre of production of Patar mats. Coarse mats are made from the leaves of *Typha* sp. (Pater) where as soft mats (Sitalpati) are carved from the culms of *Cyperus* sp. (Mothi). The tuber of 'Mothi' is a source of aromatic oil and forms a component of 'sarvaushadhi' during 'Deepawali'. The paper takes into account the ethnic and economic aspects of some low and long emergent aquaphytes which provide a basis to sustainable rural development in north Bihar.

533. Jyotsna, J. & Kumar, B. 2015. "Biodiversity and floristic composition of medicinal plants of Darbhanga, Bihar, India". *Int. J. Curr. Microbiol. Appl. Sci.* 4(12): 263–283.

Abstract: The biodiversity, floristic composition and structure of medicinal plants in the eighteen blocks of Darbhanga were studied. A total of 101 plant species belonging to 32 families, 71 genera and 5 life-forms were recorded. Fabaceae, Moraceae, Meliaceae and Apocynaceae were the overall diverse families (in terms of species richness) of the adult species, contributing 44.5% of all the species in the study. Trees were the most dominant life-form (46.5%) followed by lianas (14.8%), herbs (9.9%), epiphytes (7.9%), shrubs (2.9%) and the others (3.7%). Species richness among all life-forms was highest in the Darbhanga Block (90.5%). Fabaceae, Moraceae and Meliaceae were the most diverse families distributed in all the eighteen blocks of Darbhang. The trees in all the forest types studied were generally tall. The difference in height of tree species could be partly explained by degradation in the form of logging of tall and big trees which has undoubtedly affected the vertical structure. Even though tree size (dbh) correlated with tree height in all the forest types, the relationship was stronger ($r = 0.741–0.368$; $p = 0.000–0.002$). Thus, dbh of trees could be a better predictor of tree height. The forest reserve of Mithila looks floristically rich and structurally complex in the face of logging, farming activities and invasion in some parts of the forest. Thus, there is a need to curb the anthropogenic activities and plant invasion so as to protect the integrity of the forest including medicinal plants.

534. Kandir, K. 2007. "Need for conservation, enhancement and utilisation of medicinal and aromatic plants as natural pesticides in Jharkhand". *Biospectra* 2(2): 339–341.

Abstract: Plants have always been an inevitable part of life and culture of the tribal people of Jharkhand. Hence, it is natural that all aspects of the folk life and belief of the people of this area have sufficient narration about plants and their parts. Many medicinal and aromatic plants are used by tribals of this area as botanical pesticides, eg., *Vitex negundo* (Sinduwar), *Semecarpus anacardium* (Bhelwa), *Pongamia pinnata* (Karanj), *Azadirachta indica* (Neem) and *Madhuca indica* (Mahua) since very long time.

535. Kandir, K. 2008. "Ethnobotanical value of some food plants of south Jharkhand curative against diabetes mellitus". *Biospectra* 3(2): 325–328.

Abstract: Jharkhand state has been the reservoir of enormous natural resources including vegetational wealth. The population of the area has distinct traditions and taboos in their lives. Likewise, local people have certain traditions to cure prevailing human ailments. Firsthand information on 19 medicinal plants and their mode of therapeutic action was gathered from tribal medicine men and other experienced tribals. Some of the important medicinal plants widely used by tribals for treatment of diabetes are *Cassia tora* L., *Centella asiatica* L., *Cinnamomum tamala* (Buch.-Ham.) Nees & Eberm., *Eleusine coracona* (L.) Gaertn., *Moringa oleifera* L. etc.

536. Kandir, K. 2011. "Studies of herbal plants used to promote haemoglobin in blood in Jharkhand". *Biospectra* 6(2) (Special Issue): 227–230.

Abstract: Medicinal plants are of great interest to mankind due to its curative properties, cheaper and easily available in backward areas and having no side effect. Chotanagpur plateau having enormous natural resources, large number of plant species are used as herbal remedies by the tribal population. In this investigation, 18 plant species have been reported, which are highly effective in anaemia. Some important plants which are used for anaemia are: *Asparagus racemosus*, *Centella asiatica*, *Tinospora cordifolia*, *Cynodon dactylon*, etc.

537. Kandir, K. & Nag, K.K. 2004. "Ethnomedicinal plants used by the tribals of Jharkhand as preventive against diabetes". *Ranchi Univ. J. Sci. & Technol.* 1(1): 57–59.

Abstract: Jharkhand state has been the reservoir of enormous natural resources including vegetational wealth. The population of the area has distinct traditions and taboos in their lives. Likewise, local people have certain traditions to cure prevailing human ailments. They have good ideas about such plants, which prevent them from many diseases like diabetes, jaundice, dysentery, malaria, etc. First hand information on 17 medicinal plants was gathered from experienced tribals, which are being used as preventive against diabetes. Some of the important plants widely used by tribals as preventive are *Aegle marmelos* L., *Azadirachta indica* A. Juss., *Centella asiatica* L., *Coccinia cordifolia* Cogn., *Emblica officinalis* Gaert., etc.

538. Kandir, K., Sinku, U. & Bardhan, B. 2007. "Ethnomedicinal plants used against jaundice by the tribals of Jharkhand". *Biospectra* 2(1): 149–152.

Abstract: The paper brings about information on 25 ethnomedicinally important plant species, which are effectively used by the tribals of Jharkhand in the treatment of jaundice.

539. Kaneez, F.S. & Kandir, K. 2016. "Folk herbal remedies for jaundice by the tribal's of Jharkhand". *Ranchi Univ. J. Sci. & Technol.* 4(1): 23–25.

Abstract: An ethnomedicinal investigation was carried out on herbs used for jaundice in Jharkhand state during 2014–2015. Jaundice is a common water-borne disease. Some common plants such as *Andrographis paniculata, Centella asiatica* and *Boerhavia diffusa* are used in the treatment of jaundice. Ethnobotanical inventories were made by conducting interviews with tribal people, formal surveys in the field, collection and identification of plant specimen. Herbs are traditionally used by tribal communities as recipe during jaundice. The species are conservation oriented and agro-economic and pharmaceutical prospect.

540. Kerketta, M. & Oraon, S.C. 2012. "Ethnomedicinal values of some indigenous plants for treatment of leucoderma and other skin diseases in Lapung block of Ranchi district, Jharkhand". *Biospectra* 7(4): 129–132.

Abstract: Medical ethnobotany deals with the nature and application of plants used in traditional medical systems and it involves the identification of plants used in traditional remedies. Often ethnobotanical inventories are made by conducting interviews with the tribal people. Formal surveys in the field and by collection and identification of plants specimen used. This article deals with 21 plant species used in treatment of leucoderma and other skin diseases by ethnic population of Lapung block.

541. Khan, A.A. & Shukla, K. 2011. "Ethnomedicinal and pharmacognostic studies on the stem bark of *Erythrina variegata* Linn." *Biospectra* 6(1): 135–138.

Abstract: *Erythrina variegata* L. is an important ethno-medicinal plant of Jharkhand used by the locals and ethnic population of this area. This investigation was aimed at documentation of ethno-medicinal uses of the plant and pharmacognostic evaluation of the stem bark. Microscopic studies of stem bark showed prism-shaped calcium oxalate crystals, various shapes and sizes of sclereids and presence of starch grains in cortical cells. These findings can be utilized in quality control of the crude drug of stem bark.

542. Khatoon, N., Naaz, A., Swaroopa, S., Kumar, V. & Choudhary, A.K. 2015. "Ethnomedicinal uses and phytochemical screening of a medicinal plant *Solanum torvum* Sw.". *Biospectra* 10(1): 175–178.

Abstract: *Solanum torvum* Sw. (Solanaceae) is a popularly used medicine in Jharkhand for treating various illnesses in the native system of medicine. It is a commonly used shrub in traditional medicine. The plant extract has been widely used for the treatment of a large number of human ailments. The chemical entities of this plant has been used as antihypertensive, antioxidant, cardiovascular, anti-microbial, sedative, digestive, haemostatic and diuretic activities, etc.. The identification of phytochemical has become

the most important tool to know the active principles of this medicinal plant. The pharmaceutical significance of *S. torvum* is mainly because of the leaf and seed contain various bioactive compounds such as saponin, alkaloid, tannins, steroids, etc. The work was aimed at identification of phytochemical constituents of leaves and seeds of *S. torvum* used in folk and traditional medicine for treatment of various diseases such as asthma, diabetes, gastro-intestinal diseases, etc. The two different aqueous and ethanolic extracts of the leaf and seed were used for identification of phytochemical constituents. The analysis revealed the presence of phytochemicals namely alkaloids, flavonoids, saponins, steroids, tannins, terpenoids and phenolic compounds. The investigation provides a novel broad spectrum protocol for further research and investigation.

543. Kumar, A. 2014. "Indigenous knowledge of using medicinal plants in treating skin diseases by tribe's in West Singhbhum district of Jharkhand (India)". *Advances Pl. Sci.* 27: 413–415.

Abstract: The paper provides the ethnobotanical studies carried out on the four different tribal communities, naemly Ho, Munda, Santhal and Birhor. Tribal healers utilize several locally available plants used in ethnomedicinal practices. The paper reports the use of 10 species of plants variously used by the tribal communities in curing skin diseases.

544. Kumar, A. & Chatterjee, P. 2012. "Survey of rice for preparation of germplasm in tribal belts of Chaibasa, Jharkhand". *Biospectra* 7(2): 155–158.

Abstract: In this study, field survey was undertaken in the major rice growing regions of Jharkhand, Chaibasa, a south plateau zone of west Singhbhum, which revealed three selected rice cultivars Jurly, Swama and KRH-2, in which Jurly is the resistant wild cultivar and act as germplasm for future use.

545. Kumar, A. & Kumari, P. 2014. "Herbal remedies by tribals and herbal practitioners of Ranchi district of Jharkhand for treatment of skin disease". *Biospectra* 9(1): 249–252.

Abstract: At present, skin disease become a widely spread disease and is increasing day by day in our country as well as at global level. Thousands of people are suffering from various types of skin problems and diseases. The reason for all these are climatic changes , life style of people, radiation effects, different types of pollution, use of different types of pesticides, insecticides, herbicides, side effects of synthetic drugs, etc. This paper deals with some medicinal plants which are used by herbal healers (practitioners) in villages in treating skin disease in Jharkhand state of India. Some plant species reported along with mode of administrations.

546. Kumar, A. & Yadav, D.K. 2004. "Significance of sacred plants in *Shraddh* ritual (Pindadan) in Gaya, Bihar". *Ethnobotany* 16: 103–107.

Abstract: Worship for blessings and betterment of life is common among all human beings. For worship, traditional rituals are performed from time immemorial. Such customs have been observed by Hindus and Indian tribals too. They offer suitable articles to the deities right from the ceremony of birth to mourning for the dead. Different plant parts are used during worship. Most of these offerings possess medicinal value; it is believed that by practice of collecting specific botanical materials for offering a person comes to know about medicinal plants. The paper deals with plants used in worship in *Shraddh* ritual by Hindus, and also includes observations on their ethnic and medicinal values.

547. Kumar, A. & Yadav, D.K. 2006. "Important ethnomedicinal plants of family Poaceae in Gaya district, Bihar". *J. Econ. Taxon. Bot.* 30(Suppl.): 171–176.

Abstract: Altogether 42 species of family Poaceae were found to be in common ethnomedicinal uses in the rural parts of Gaya district of Bihar state. The medicinal use of *Cynodon dactylon* (L.) Pers., *Hygroryza aristata* (Retz.) Nees ex Wight & Arn., *Bambusa arundinacea* (Retz.) Roxb., *Triticum aestivum* L., *Oryza sativa* L., etc. are not described in standard text (Chopra & al., 1986; Kirtikar & Basu, 1985; Watt, 1889), but these are in common use in the village area of the district.

548. Kumar, A. & Yadav, D.K. 2009. "Ethnobotanical and mythological importance of *Calotropis* (Milkweed) in Bihar". *Ethnobotany* 21: 124–126.

Abstract: Information on folklore uses of milkweed (*Calotropis*) was collected during an ethnobotanical survey among different tribal, non-tribal and rural communities of Bihar. This paper incorporates some new and interesting uses of this plant-like spell therapy. The powder of dried leaf is dusted upon wounds for rapid healing; the patient takes rest lying on pillow and mattresses stuffed with floss of fruits of the plant to get relief in rheumatic pain; matured yellow leaves are bandaged on head in the form of cap and also kept at the sole of foot to prevent the effect of sunstroke; the young matured leaves are kept under the sole of foot to prevent the vomiting tendency during travel by car or bus; leaves crushed with curd water are applied to prevent the elephantiasis (Filariasis). These uses differ from the previous reports either with respect to use of parts of this plant or the treatment of various ailments.

549. Kumar, A. & Yadav, D.K. 2013. "Ethnobotanical and mythological importance of betel vine with special reference to traditional farming, custom and Barai caste in Gaya district (Bihar)". *Ethnobotany* 25: 172–174.

Abstract: This study discusses the history and present day cultivation of the betel vine by small farmers, highlighting the relationship of 'Barai" caste with the betel vine and the various ways in which it contributes to their livelihood. In Gaya district, betel farming and related issues still represent traditional knowledge and custom. This has been of significant as a model of sustainable use and management.

550. Kumar, K. 1997. "*Pharmacognostical studies on some Ethnomedicinal plants of Santhal Parganas (Bihar)*". Ph.D. Thesis, Banaras Hindu University, Varanasi (unpublished).

551. Kumar, K. 2013. "Studies on the cytotaxonomy of a few important medicinal plants of Ranchi, Jharkhand**".** *Biospectra* 8(2): 133–142**.**

Abstract: Karyotype analysis has been widely employed in cytotaxonomy in describing the phylogeny, evolution and interrelationships of taxa. The study provides karyotype analysis on various medicinally important plants of Ranchi. Some of the medicinal plants showed uniformity in their diploid chromosome content. They also differed from each other in their total chromatin length, arm ratio and position of centromere.

552. Kumar, K. 2015. "Studies on some herbal composition based on ethnomedicinal plants in Jharkhand". *J. Non-Timber Forest Prod.* 22(4): 229–232.

Abstract: Extensive surveys have been carried out to explore the ethnomedicinal plants of Jharkhand. The composition of plant ingredients utilized for preparation of herbal recipes for the treatment of various diseases and disorders have been described in this paper. Further research on ethnopharmacological observation and further scientific validation are essential to understand the potential of formulations in primary healthcare.

553. Kumar, K. & Goel, A.K. 1998. "Little known ethno-medicinal plants of Santhal and Paharia tribes in Santhal Pargana, Bihar, India". *Ethnobotany* 10: 66–69.

Abstract: The communication deals with the little-known or new ethnomedicinally important plants of Santhal and Paharia communities in Santhal Pargana region of Bihar. During ethnobotanical explorations in this region, 29 speeies have been collected and new uses for them noted.

554. Kumar, K. & Goel, A.K. 1999. "Frequently used ethno-medicinal plants of Bihar". *J. Econ. Taxon. Bot.* 23(2): 661–665.

Abstract: The paper deals with ten ethnomedicinal plant species frequently used among the various tribal communities of Bihar with their documented uses for the remedies of 30 ailments.

555. Kumar, K. & Goel, A.K. 2008. "A purview of odoriferous plants found around Itchagarh hills in Ormanjhi block of Jharkhand". *Ethnobotany* 20: 135–137.

Abstract: Itchagarh hill is the tallest one in Ormanjhi block of Jharkhand state. This foothill harbours a number of villages inhabited by several ethnic groups. Some of the plant species or their parts found in this area bear a distinct smell. For example, fruit of 'Dhela' (*Alangium salvifolium*) reminds one of fish smell, while the plant of 'Kado sag' (*Limnophila rugosa*) is redolent of 'Fennel'. The study documents 12 such plant species

bearing peculiar smells and also lists information about their medicinal and other ethnobotanical uses.

556. Kumar, K., Abbas, S.G. & Siddiqui, M.H. 2015. "Observation on potential ethnobotanical wild edible plants of Jharkhand". *Biospectra* 10(1): 99–104.

Abstract: In Jharkhand state due to tribal wisdom and their attachment to the ambient vegetation, the ethnobotanical study becomes an important aspect. The tribal communities mainly Santhal, Pahraia, Oraon, Munda, Kol, Kharwar, Ho, etc. have rich knowledge on plant and plant-based products because many wild plants supplement nutritional requirements and also useful as ethnomedicines for primary healthcare in treating many diseases. There are more than 400 plants having tribal or ethnobotanical names by the practical knowledge and experience of local tribal communities in their own ethnic culture. The ethnobotanical traditional knowledge has been transmitted orally from one generation to next. In this paper some wild edible plants, which are widely utilized by the tribal and rural people of Jharkhand and fulfilling the requirement of nutritional components in day-to-day life are documented. The plants namely *Amaranthus spinosus* L. ('Kanta bhaji' – twigs), *Bauhinia purpurea* L. ('Koinar sag' – leaves), *Boerhaavia diffusa* L., *Trianthema monogyna* L. ('Khapra arak' – twigs), *Cassia tora* L. ('Chakundi arak' – leaves), *Centella asiatica* (L.) Urban ('Beng sag'/'Rote ara' – whole plant), *Hibiscus sabdariffa* L. ('Kudroom' – flowers and fruits), *Indigofera pulchella* ('Jirhul' – flowers), *Limnophila indica* (L.) Druce ('Nanha-hemcha' – twigs), *Marsilea minuta* L. ('Susni sag' – whole plant), *Portulaca* spp. ('Nuni sag'/'Jitia sag' – twigs) and *Sesbania grandiflora* (L.) Poir. ('Agust phool' – flowers) are most commonly used amongst all the tribal communities and rural people. Most of the plant species are collected by the people from wild and their cultivation practices are very rare. Various studies have been carried out in the past and the diversity of wild edible plants in Jharkhand has been documented. However, the above ethnobotanical data documented in this paper based on wild edible plants that have most significance. These species are cooked as vegetable and are found effective for treating different ailments and disorders. Hence, there is a need to explore the biodynamic nutritive compounds and to promote the cultivation practices for benefits of societies in terms of healthcare. Besides, some wild edible mushrooms namely 'Rugra' (*Geastrum* sp.) and 'Khukri' (*Termitomyces heimii*) are widely utilized by the people of Jharkhand, which require scientific evaluation.

557. Kumar, M. 1992. "Ethnomedicinal studies of plants of Chotanagpur Plateau, Bihar". *Int. J. Mendel* 9: 137–139.

558. Kumar, M., Srivastava, R.R. & Mallick, M.A. 2007. "The medicinal plants used by birhor tribes of north Chotanagpur of Jharkhand". *Columb. J. Life Sci.* 8(1): 85–87.

Abstract: An attempt of exploration of ethnomedicinal plants used by Birhor tribes of North Chotanagpur division of Jharkhand was made. Eleven species of medicinal plants belonging to different families have been described, of which *Cissus quadrangularis, Gymnema sylvestre, Mucuna pruriens, Cassia tora, Centella asiatica* and *Urginia indica* are frequently used by them.

559. Kumar, P., Ranjan, R.K. & Gupta, I.P. 2009. "Treatment of jaundice and asthma by ethnic people of Mandu Block, Ramgarh, Ranchi, Jharkhand". *Biospectra* 4(1): 143–146.

Abstract: Recording of traditional knowledge in India can be dated back to several millennia, since the time of the Vedas. In modem times, ethnographers have recorded traditional knowledge with their own perspectives. During the last six decades, ethnobotanists have extensively studied and documented the traditional ethnobotanical knowledge. This study aims to identify the medicinal plants of Mandu Block used by the ethnic people for treatment of jaundice and asthma.

560. Kumar, R. & Pandey, O.N. 1995. "Forest based socioeconomic and livelihood of tribals of Chotanagpur, Bihar". *Indian Forester* 121: 51–54.

Abstract: The tribals of Chotanagpur region are still dependent on the primitive methods of agriculture and their livelihood is supported by different forest produces. In this study, forest produces and different parts of plant species exploited from nearby forests and utilised by tribals for food, medicine and to fulfil their other daily requirements including as a source of income, are identified.

561. Kumar, S. 2014. "Use of plants as colour material in *Pytkar* and *Jadopatia* folk arts of Jharkhand". *Indian J. Tradit. Knowl.* 13(1): 202–207.

Abstract: This paper is an outcome of study of ethnobotanical aspect of folk and tribal art of Jharkhand. It was observed that the people use plants not only for their requirement of food, medicine, shelter, clothing, etc, but also to express their feelings through colours and brushes. Jadopatia of Santhal Pargana, Pytkar of East Singhbhum, Khovar and Soharai of Hazaribagh are important forms of such paintings. Festivals and rituals based on forests and nature get prominent place in their theme. People practicing these art forms are still using natural colours prepared from plants and minerals. Such painting can be called ethnopainting. In this paper, fourteen plants that are used in the preparation of colours with the help of other natural ingredients have been described. Use of natural colours to paint subjects related to nature is an honour to nature.

562. Kumar, S. 2015. "Study of some wild tubers and rhizomes as possible food supplement to the ethnic people of Jharkhand". *Ethnobotany* 27: 16–20.

Abstract: Jharkhand is a land of vivid cultural practices and traditional food habits. Most of the ethnic people here are dependent on forest for their livelihood. The Mundas, Oraons, Santhals, Kharias, Birhors, Paharias and Asurs constitute the prominent ethnic groups of Jharkhand. The Below Poverty Line people of those communities work hard and the source of their good health is the minerals and vitamins, they take as vegetable, corms and rhizomes from wild sources. This survey of the wild tubers/rhizomes of Jharkhand has been done with an objective to know particularly those wild tubers/ rhizomes, which though found in this area, but yet not used as vegetable or spices by the folk in this region. Based on the reports from other places outside Jharkhand, this study reports that certain tubers/rhizomes are being used as vegetable or spices in those places but not here. After their identification this would add up varieties as vegetable and spices to the folk of Jharkhand also.

563. Kumar, S. 2015. "Survey and documentation of some wild tubers/rhizomes and their various uses in Jharkhand". *Indian J. Pl. Sci.* 4(2): 36–45.

Abstract: Jharkhand, a land of forests and tribals with flora and fauna, is itself an interesting subject to be studied extensively. Recent revival of interest in documenting medicinal plants used by tribal is a centre of focus for different government institutions, NGOs and Science and Technology Department of Jharkhand state. Most of the ethnic people in the state are dependent on forest for their livelihood. The Mundas, Oraons, Santhals, Kharias, Birhors, Paharias and Asurs constitute the prominent ethnic groups of Jharkhand. The Below Poverty Line people of those communities work hard and the source of their good health is the leafy vegetables, corms and rhizomes from wild sources which supplement their mineral and vitamin requirement and also as substitute of medicine in general health problems. A survey of the wild tubers/rhizomes of Jharkhand has been done with an objective to know particularly those wild edible tubers/rhizomes which area used as vegetable or spices and medicine by the folk in this region.

564. Kumar, S. 2015. "Use of traditional herbal medicines for treatment of water borne diseases in Jharkhand, India". *Ethnobotany* 27: 73–78.

Abstract: People living in or around forest area use their traditional wisdom to cure various water-borne diseases. They use medicinal plants in the treatment of such diseases. This study was carried out in the districts of Singhbhum and Chotanagpur areas of Jharkhand. This paper describes application of 62 ethnomedicinal plants by the villagers to cure water-borne diseases in these areas.

565. Kumar, S. & Kumari, B. 2006. "Study of some plants used as repellents to some insects and animals in Jharkhand". *Biospectra* 1(1): 123–126.

Abstract: Tribals face bites and obstructions of different insects or animals in their daily life for which they use herbal repellents in crude form. Thirteen such plants are identified in this paper.

566. Kumar, S. & Kumari, B. 2007. "Some less-known 'Sags' (leafy vegetables) utilized by the tribals and others of Panch Pargana area in Jharkhand". *Ethnobotany* 19: 62–66.

Abstract: Panch Pargana area of Jharkhand covers five Blocks namely Silli, Bundu, Sonahatu, Arki and Tamar in Ranchi district. "Botha Bhat and Chotha Sag" (stale rice and sag) is the only food of the local poor people in this area. Sags like *Cassia tora* are used as famine food. In addition to their nutritional value, 'Sags' have been used for therapeutical purposes. The aim of the last five years of investigation of these wild leafy vegetables was to acquire knowledge about their nutraceutical values, medicinal uses and their palatability. Plantation of these potherbs in wasteland should be encouraged so as to make it a source of earning for poor communities. This would be aided by making the urban population well informed of their better taste and nutritional values. More than 51 such plant species are listed along with their voucher specimens. In this paper, out of 51 only a few less-known wild potherbs are described.

567. Kumar, S. & Kumari, B. 2010. "Identification of the adulterant plants being used ignorantly in rice beer (Handia) making in Jharkhand" *Biospectra* 5(2) (Special Issue): 477–480.

Abstract: Rice beer or Handia has been an integral part of life and death of an individual, especially among the tribes of the state of Jharkhand. It has been culturally so deep rooted that a new born is given to taste it as an immunostimulant, as well as the last rites of a dead person is not complete without its consumption. Recently, due to lack of knowledge in choosing the right plant some adulterant plants are being used in its making, which spoil the medicinal value of this traditional rice beer. Thus, the aim of this investigation is to identify those plants being used and also those useful plants which are not being used these days due to their lesser availability.

568. Kumar, S. & Kumari, B. 2011. "A Check list of medicinal plants used in making Rice Beer (Handia) in Jharkhand" *Biospectra* 6(2) (Special Issue): 185–190.

Abstract: The rice beer (Handia) of today which is commonly used is having high intoxicating properties instead of traditional nutritive ones. Reasons are evident as most of the medicinal herbs which were used in preparation of rice beer earlier have been given way to toxicating substances such as urea, raw Mahua liquor and spirit. The approach of makers has been shifted from a healthy and nutritive drink to more and more intoxicating one. Originally rice beer acted as an antidote to fatigueness and also as prophylactic against sun stroke, snake bite, gastric problems and other stomach

problems, which they usually face during their work in fields. The medicinal herbal mix, which impart such prophylactic properties to rice beer are not widely known to the present users due to their lesser availability now. A checklist of more than 53 such plants used by local people in Jharkhand has been documented in this paper.

569. Kumar, S. & Varma, S.K. 2012. "Ethnobotanical investigations on *Vernonia* amhgdalina (Asteraceae) in Bihar". *Ethnobotany* 23: 135–137.

Abstract: During an ethnobotanical survey of eastern Bihar, information about the folklore uses of an interesting plant species, *Vernonia amygdalina* Del. (Asteraceae) was gathered. Some cuttings of this plant were collected and raised in the garden. This paper focuses some new and interesting uses of this plant against diabetes, cough, fever, helminthes and malaria, and as a blood purifier. Local Vaidyas also recommend the extract of leaves against liver and kidney disorders and parasite worms. It is an exotic species and being reported for the first time from India.

570. Kumar, S., Kumari, B. & Srivastava, A.K. 2008. "Medicinal value of some potherbs (*Sag*) consumed on the different auspicious occasions in Panch Pargana area of Jharkhand". *Biospectra* 3(1):153–158.

Abstract: *Sag* (potherbs) is a distorted form of the Sanskrit word 'Sak' (Herb). The edible leaves and tender twigs of a plant are called Sag. The Panch Pargana area of Jharkhand is very rich, both in the number of species and its variety. Most of them grow wild in nature while some of them are cultivated. Around 100 varieties of Sag with medicinal values are consumed by local folks. *Botha Bhat* and *Chotha Sag* (Stale rice and cooked Sag) is a popular food of the villagers living below poverty line in this area. The Panch Pargana area of Jharkhand covers five Blocks namely Silli, Bundu, Sonahatu, Arki and Tamar of Ranchi district. The ethnic groups in this area are Mundas, Oraons, Bedias, Purans, Santhals and Kurmis. Other ancient groups residing in this region are Paik, Pakhur and Kundu. Besides, Bengali, Bihari and Odiya population are remarkable in size. It is interesting to see that the different species of Sag are essential part of many festivals and rituals celebrated in these blocks. This investigation identifies sacred potherbs, their medicinal uses and also their palatability. Specimens have been collected after proper survey covering remote tribal areas, village hats and other places of festivity. More than 22 such plants are documented and electronic herbarium of these Sags has been prepared.

571. Kumar, S., Kumari, B. & Goel, A.K. 2013. "Study of leafy vegetables supplemental to malnutrition among tribals in Jharkhand". *Ethnobotany* 25: 135–138.

Abstract: Panch Pargana area is a blend of vivid cultural practices and traditional food habits with its five blocks namely Silli, Bundu, Sonahatu, Arki and Tamar. First three

blocks come under Ranchi and Arki and Tamar are in Khunti districts. The ethnic groups residing in this area are Mundas, Oraons, Santhals, Paharias and Kuarmies. 'Bothal Bhat and Chothal Sag' (stale rice and minced leafy vegetable) is the only food of the local people living Below Poverty Line in this area. Below Poverty Line people work hard and the source of their good health is the minerals and vitamins they get from leafy vegetables. More than 80 wild plants have been reported from these areas which are being eaten as leafy vegetable or sag. However, this survey on the wild plants of Panch Pargana was done with an objective to know those plants which though found in this area but yet not used as vegetable here. This would add up the varieties of leafy vegetables in this area. This study has observed their use as potherbs based on the reports from across the country and outside it.

572. Kumar, S., Kumari, B. & Goel, A.K. 2014. "Survey and documentation of some wild flowers sold as vegetables and food supplements in Jharkhand". *Ethnobotany* 26: 32–36.

Abstract: Village haats (local weekly markets) serve as the back bone of rural economy in Jharkhand region. Several biweekly and daily haats are a regular feature in this area. Villagers, specially the tribals, from surrounding localities visit these haats to sell their agricultural and minor forest produces. It is interesting to note that some flowers are sold in thee haats as an alternative source of vegetables. These flowers serve as the dietary supplements for the poor who cannot afford the cost of fresh vegetables.

573. Kumari, B. & Kumar, S. 2000. "A checklist of some leafy vegetables used by tribals in and around Ranchi, Jharkhand". *ZOO's Print* 16(3): 442–444.

Abstract: A total of 33 types of vegetables used by the tribal people and sold in markets in and around Ranchi are reported in this paper along with their tribal names. They are still not commonly used by nontribals.

574. Kumari, B. & Kumar, S. 2007. "An indigenous way of management of rat population by Bhelwa seed oil treatment in and around Silli, Jharkhand State, India". *Biospectra* 2(1): 185–186.

Abstract: Rat has always been a problem for agricultural areas. Farmers of Jharkhand are always troubled by these rodents who damage grains in fields or in store. The cost of various chemicals to kill or repel rat is beyond the affordable limit of the poor tribal farmers of Sili, Bundu and Sonahatu blocks of Ranchi district in Jharkhand. They have developed an indigenous way to get rid of rats from their fields and prevent damage caused by them below economic injury level. Bhelwa (*Anacardium semicarpus* Buch.-Ham.) seed oil is used for this purpose. Though the practice is quite old and time tested it is still not known to modern scientific world. The aim of this communication is to study the detailed method of rat population management through the Bhelwa seed oil.

575. Kumari, B., Kumar, S. & Goel, A.K. 2010. "Ethnobotanical studies on some mosquito repellent herbs used by tribals of Jharkhand to protect from malaria". *Ethnobotany* 22: 118–120.

Abstract: Jharkhand is a malaria-prone region. People in interior villages of the state have no option other than herbs to protect themselves from mosquitoes. During monsoon period Malaria becomes frequent in interior localities of Jharkhand encircled by rich vegetation. The only remedy available to people is use of herbal plants to repel the vectors. This study has documented seven such plant species [2008–2010] along with the methodology of their application.

576. Kumari, B., Kumar, S. & Goel, A.K. 2011. "Study of *Plectranthus mollis* (Lamiaceae) as a mosquito repellent to check malaria in Jharkhand region". *Ethnobotany* 23: 141–142.

Abstract: Jharkhand is well-known for its rich floristic diversity possessing diverse medicinal properties. A study about the prevention of malaria through herbal management in the malaria-prone Bundu subdivision of Ranchi district in Jharkhand is the subject of the study. It has been observed that *Plectranthus mollis* (Aiton) Spreng., a common species in Jharkhand state, is remarkably effective in repelling the mosquito vectors of malaria in its natural form.

577. Kumari, J. & Pandey, M.K. 2015. "Studies on the utilization of medicinal plants by the people of Mandar block, Ranchi, Jharkhand, India". *Biospectra* 10(2): 65–68.

Abstract: The people of Mandar block of Ranchi district of Jharkhand have been using different kinds of vegetables, cereals, shrubs, herbs, forages and fruits as medicine since time immemorial. This particular area is a natural abode of large number of valuable medicinal plants. The tribals who are mostly dependent on the forests, apply their traditional knowledge of use of medicinal plants for the cure of various diseases. It is still unfortunate that their traditional knowledge has not been properly identified, standardized and documented for the better use by modern society. Due to indiscriminate and rapid devastation of our forest wealth, a sizeable number of plants are on the verge of becoming rare or extinct. No systematic study and documentation of this area has been done, therefore this article aims for identification and documentation of about 35 top medicinal plant species.

578. Kumari, J. & Pandey, M.K. 2015. "Ethno medicinal importance of indigenous plants for the use of leucoderma and other skin diseases of the Mandar block, Ranchi, Jharkhand, India**".** *Biospectra* 10(2): 69–72.

Abstract: This article deals with 21 plant species used in the treatment of leucoderma and other skin diseases by the ethnic population of Mandar block.

579. Kumari, M. & Sharma, H.P. 2014. "Hulling-milling values and nutritional evaluation of local varieties of rice (*Oryza sativa* L.) consumed by the tribal communities of Jharkhand". *Biospectra* 9(1): 229–234.

Abstract: Rice (*Oryza sativa* L.) is one of the most important food crops grown all over the world. Jharkhand is inhabited by large numbers of tribal and other ethnic communities. Rice is their main food and they cultivate different types of rice varieties which possess many important characters, such as short maturation, biotic and abiotic resistance, good scent, low glycaemic index, antioxidant activity and grow easily without any input. In recent past local varieties are under negligence due to introduction of high yielding varieties. If this cultivation trend continues it is apprehended that valuable local varieties will be endangered and will be lost soon. However, one negative aspect of high yielding varieties is that they require much care, synthetic fertilizer and treatment with chemical pesticides and insecticides, which is not good for soil health and also for the environment. Therefore, there is an urgent need to focus and to take qualitative and quantitative improvement on the local varieties which are good source of valuable genes. Agronomical characters and nutritional values need investigation, before to start any breeding programme or in vitro studies, for improvement of local varieties. In this investigation four local varieties of rice, namely Goda Dhan, Karhani, Pasara and Senegal Baba are identified for their nutrition and hulling milling values. The variety showing degree of milling percentage in order of merit are Senegal Baba (97%) followed by Karhani (95%), Pasara (90%) and Goda Dhan (86%). Moreover, the proximate nutritional values are variable for different varieties.

580. Kumari, M., Tirkey, P. & Singh, M.P. 1991. "Studies of tribal medicinal plants of Hazaribagh". *New Botanist* 18:105–107.

581. Kumari, N. & Shukla, K. 2012. "Ethno-pesticidal trees of East Singhbhum, Jharkhand". *Biospectra* 7(4): 123–128.

Abstract: Plant pesticides are good alternatives of chemical pesticides. They are eco-friendly, economic, target-specific and biodegradable. The rich traditional knowledge prevalent among tribes, village farmers and local people regarding the use of plant products for pest control and crop protection in reference to traditional folk practices is discussed in this paper. A study was conducted to record the ethnobotanically important trees of East Singhbhum district of Jharkhand through questionnaire; personal interviews and conversation. A total of 20 trees species belonging to 11 families were recorded with the help of tribes, village farmers and local people of this area. The family Fabaceae was having maximum number of (7) insecticidal plants used by tribes followed by Euphorbiaceae, Annonaceae, Anacardiaceae (2 each) and rest have one. The study indicates that the traditional insecticidal system is well functioning in the area. The survey

of the area shows that some of the important plants are declining because of over exploitation and environmental disturbances.

582. Kumari, S. 2015. "Modern value of some microbes and ethnobotanical plants especially used as biopesticides". *Biospectra* 10(2): 73–78.

Abstract: An ethnobotanical survey was conducted for the purpose of standardizing modern use of microbes and traditional use of plants as biopesticides. There is prominent need of documentation for validating the claims of efficacy of these biopesticides for control of various diseases and pest. This paper brings out list of plant species and microbes that are being reported for the use in organic farming. These microbes and plants used as biopesticides have the highest level of modem and ethnobotanical value, which is usually used especially in the control of plant diseases.

583. Kumari, S. & Kandir, K. 2009. "Some ethnomedicinal plants used in the treatment of bone fracture by the tribal of Ranchi district". *Biospectra* 4(1): 135–138.

Abstract: This investigation deals with the uses of ethnomedicinal plants in the treatment of bone fracture. In Ranchi district, Jharkhand has been reservoir of enormous natural resources including vegetational wealth. Local people use *Butea monosperma, Cissus quadrangularis*, *Curcuma longa* and *Terminalia arjuna* to treat bone fracture.

584. Kumari, S. & Kandir, K. 2012. "Comparative study of stomatal index of some ethno-medicinal plant used in the bone disease." *Biospectra* 7(4): 157–160.

Abstract: This investigation deals with the study of stomata. The stomata allow gaseous exchange. In leaves they occur either on one surface or on both surfaces. Stomatal index in some of the ethnomedicinal plants namely *Adhatoda vasica*, *Cissus quadrangularis*, *Curcuma longa* and *Tinospora cordifolia* used in bone diseases has been determined.

585. Kumari, S. & Kandir, K. 2012. "Traditional uses of some medicinal plants in arthritis by the tribal of Ranchi district". *Biospectra* 7(1): 191–192.

Abstract: This investigation deals the use of nine ethnomedicinal plants for Arthritis by aboriginals and rural of Ranchi district in Jharkhand. First hand information with respect to plant and parts used, family name, local name(s), drug preparation, application, doses, duration and other related information were recorded with traditional healer and other knowledgeable persons of the locality.

586. Kumari, S. & Pandey, R.K. 2010. "Studies on sacred plants of Palamau district of Jharkhand". *Biospectra* 5(1): 111–114.

Abstract: State of Jharkhand is rich in flora and fauna constituting a high profile biodiversity. The prospects of recording the biodiversity in terms of species richness and abundance are enormous for the benefit of the human society and nature. This research

communication is an innovative attempt to bring on record the invaluable religious plants of Palamau district having age old sacred as well as medicinal importance.

587. Lakra, V., Singh, M.K., Sinha, R. & Kudada, N. 2010. "Indigenous technology of tribal farmer in Jharkhand". *Indian J. Tradit. Knowl.* 9(2): 261–263.

Abstract: Tribals are known to have rich knowledge of indigenous technology pertaining to agriculture practices and an attempt was made to document the indigenous knowledge. Data were collected from 225 farmers in nine villages under three administrative districts with the help of a structured questionnaire. In all, indigenous knowledge of 26 different broad categories was identified in the study area.

588. Lal, H.S. & Mishra, P.K. 2012. "Study of aquatic medicinal plants of Hazaribag district of Jharkhnad, India". *Int. Res. J. Pharma.* 3(4): 405–409.

Abstract: A total of 24 species belonging to 20 families of medicinally important hydrophytes have been recorded from water bodies of Hazaribag, and nine plants were found to possess diuretic properties and six have astringent properties, and two were useful in ophthalmic ailments.

589. Lal, H.S., Singh, S. & Kumari, P. 2012. "Study of ethno medicinal uses of weeds in rice field of Hazaribagh district of Jharkhand, India". *Int. J. Integr. Sci., Innov. & Technol.* 1(2): 23–26.

Abstract: The state of Jharkhand is a hotspot of ethnomedicinal uses of natural and exotic plants, which are found in ricefields. Tribal communities use these weeds in traditional way and the practitioners known as Vaidays are the primary healthcare providers in rural Jharkhand. The objective of this study is to conduct an ethnomedicinal survey of weeds of rice field and document amongst tribal communities of Hazaribagh district. Ethnomedicinal survey conducted periodically in Hazaribagh during summer and winter seasons in 2011.The climatic condition of this area support the survival of weeds. A total of 45 species of weeds belonging to 30 families were recorded from the ricefields. These weed species and their uses arranged alphabetically. This paper deals with the ethnomedicinal formulation of these weeds species used in the treatment of different disorders of human beings.

590. Mahato, A.K. & Mahato, P. 1996. "Ethnobotanical wealth of Chhotanagpur plateau – IV. Some medicinal plants used against intestinal worms". *J. Econ. Taxon. Bot., Addit. Ser.* 12: 389–391.

Abstract: The paper deals with information of 26 medicinal plants of Singhbhum district, Bihar, used against intestinal worms. Plants are listed alphabetically with their vernacular names, families, parts used and process of administrations.

591. Mahato, A.K. & Mahato, P. 2011. "*Caesalpinia bonduc* (L.) Roxb. a rare species of medicinal plant of Jharkhand, India". *J. Non-Timber Forest Prod.* 18(1): 59–62.

Abstract: The plant *Caesalpinia bonduc* (L.) Roxb. is highly medicinal, besides many other uses it is commonly used in malaria, various types of fevers, piles and skin diseases including leprosy. Though the plant is common in hotter parts of India, it is rare in Jharkhand, probably due to very hard nature of seed coat and non availability of moisture during the dehiscence of fruit.

592. Mahato, A.K., Mahato, P. & Prasad, R. 1996. "Ethnobotanical wealth of Chhota Nagpur plateau, India. Part – III: Some medicinal plants used against diarrhoea by the people of Singhbhum district, Bihar". *Advances Pl. Sci.* 9(1): 25–28.

Abstract: The people of Chhota Nagpur depend upon plants for their daiy needs including medicine. In fact, they are inseperable from trees as forest is their natural habitat. During the survey of medicinal plants 27 plant species recorded which are being used to cure diarrhoea by the people of Singhbhum district of Chhota Nagpur, Bihar. Among them 12 plant species are known to control dysentery also.

593. Mahato, A.K., Ram, R.L. & Mahato, P. 1992. "Ethnobotanical wealth of Chhotanagpur plateau – I. Some medicinal plants used in dysentery". *Geobios, New Rep.* 11: 123–124.

Abstract: The paper deals with new records of 23 species of medicinal plants used in dysentery by the people of Singhbhum district of Bihar. Plants are listed alphabetically with their vernacular names, parts used and process of administrations.

594. Mahato, M., Kumar, K. & Kumar, J. 2007. "Studies on stomata and epidermal cells of some medicinal plants of Khunti sub-division". *Int. J. Mendel* 24(1 & 2): 33–34.

Abstract: The number of stomata and the epidermal cells on the leaves of different medicinal plants growing in Khunti subdivision of Jharkhand state were recorded. Stomata are present on both the surfaces of the leaves. They may be anomocytic, paracytic and diacytic. The most frequent type is anomocytic. The shape of the epidermal cell is irregular to polygonal. The ranges of stomatal indices in different species of plants were also recorded between 7.8 and 34.9.

595. Mahato, M., Singh, C.T.N. & Kumar, J. 2007. "Some religious plants of Jharkhand and their medicinal uses". *Int. J. Mendel* 24(1 & 2): 47–48.

Abstract: A total of 28 plant species were recorded which were used in worship as well as for medicinal purposes in Jharkhand state. Botanical name, family name, vernacular names, religious virtue, parts used, active principles and medicinal uses are also given in a tabular form.

596. Mahato, P. & Mehta, S. 2009. "Medicinal plants of Jharkhand: Crisis and extinction". *J. Econ. Taxon. Bot.* 33(2): 476–481.

Abstract: The Jharkhand state is very rich in minerals. Adequate availability of minerals has resulted in repid industrialization and urbanization. Besides industries, a large number of coal mines, iron-ore mines, etc. are also situated in this state. Mining operation, industrialization, dams and projects are the reasons for fast depletion of the forest cover. Due to reckless cutting of dominant trees, the medicinal plants which grow in controlled habitats under the canopies of trees are now on the verge of extinction. On the other hand, threatened and aquatic floras are equally threatened by pollution. Afforestation by monoculture practice is another factor for the extinction of medicinal plants. Thus considering the importance of plant species and the role of biodiversity immediate action must be taken to stop deforestation and to control pollution. To maintain biodiversity pure plantation by *Eucalyptus* and *Acacia* spp. should be discouraged and mixed plantation should be practiced.

597. Mahto, R. & Sahu, H.B. 2007. "Horopathic treatment of spermatorrhoea among the ethnic people of Chandil block of Jharkhand state". *Int. J. Mendel* 24(3-4): 95–96.

Abstract: This article deals with the documentation of 16 plant species being practiced as ethnomedicinal plants for the treatment of spermatorrhoea by the horopaths (indigenous tribal medicine practitioners) in different villages of Chandil block under Seraikela-Kharsawan district of Jharkhand.

598. Mairh, A.K., Mishra, P.K., Kumar, J. & Mairh, A. 2010. "Traditional botanical wisdom of *birhore* tribes of Jharkhand". *Indian J. Tradit. Knowl.* 9(3): 467–470.

Abstract: The state, Jharkhand, as the name suggests, is rich in biodiversity and their traditional usage. Birhore, a dwindling tribe of Jharkhand, is the custodian of traditional botanical knowledge. Their day-to-day life is dependent solely on forest. Their ways of utilizing plants as food, medicine and for other house hold purposes are not only novel but scientific also. Because of various anthropogenic as well as natural reasons, the population of Birhores is declining rapidly. It is, therefore, urgent to document their knowledge. Conservation and proper management of local vegetation is required for sustainable existence of the tribe. The paper deals with the plants used by this tribe for various purposes.

599. Manna, M.K. & Samaddar, U.P. 1984. "On the occurrence of useful plants of Netarhat Plateau of Palamau district, Bihar". *J. Econ. Taxon. Bot.* 5: 539–546.

Abstract: The paper deals with 103 species of useful plants reported from Netarhat plateau of Palamau district, Bihar.

600. Marandi, R.R. & John Britto, S. 2015. "Medicinal properties of edible weeds of crop fields and wild plants eaten by Oraon tribals of Latehar district, Jharkhand". *Int. J. Life Sci. & Pharma Res.* 5(2): 9–20.

Abstract: Latehar district of the state of Jharkhand is inhabited by several tribal groups which constitute 40% of the total population of the district. The Oraons are one of the major tribal communities in Latehar, dwelling in hills and valleys of the district. They depend on plants or plant products to maintain their livelihood. Ethnobotanical field studies reveal that the Oraons of the district have considerable amount of traditional knowledge of edible weeds from the crop fields and edible wild plants from the forests and hills. During the field study, 101 plant species belonging to 63 genera in 43 families have been recorded which are commonly used by the Oraon community as leafy vegetables. Further study reveals that the edible weeds and the wild plants consist of several medicinal properties.

601. Mastakar, V.K., Lakshminarasimhan, P. & Modak, M. 2016. Ethnomedicinal plants of Palkot Wildlife Sanctuary, Jharkhand, India. In: Chourasia, H.K. (ed.), *Conservation of medicinal plants conventional and modern approaches*. Omega Publication, New Delhi. pp. 270–280.

Abstract: Agriculture is the mainstay of the forest tribes of Palkot Wildlife Sanctuary. Wild plant resources collected from different forest areas of the Sanctuary is vital for food security, medicine and socio-cultural well-being of these tribes. Their indigenous way of resource utilization and beliefs have elements of sustainability. In this study, interactions of the tribals residing in Palkot Wildlife Sanctuary of Gumla and Simdega districts, Jharkhand and their dependence on the Sanctuary were studied. A total of 39 plant species used by the tribals residing in and around Palkot Wildlife Sanctuary with potential medicinal value is documented.

602. Minz, S.S. & Kandir, K. 2010. "Folk herbal medicine used for male sterility in Ranchi districts of Jharkhand". *Ann. Pharma. Pharmaceut. Sci.* 1(2): 56–58.

Abstract: Ranchi is located in Jharkhand state. The total area is 7574.17 km^2. Jharkhand state has been reservoir of enormous natural resources including vegetational wealth. The ethnic communities of the area have distinct traditions and taboos in their lives. Local people have good ideas about such plant which prevent many diseases such as sterility, diabetes, jaundice, dysentery, etc. The medical ethnobotany deals with the nature and application of plants used in traditional medical system and it involves the identification of plants used in traditional remedies. Ethnobotanical inventories are made by conducting interviews with the tribal people, formal surveys in the filed, collection and identification of plant specimen used. The information on medicinal plants was gathered from experienced tribal vaidyas which are being used as preventive against male sterility.

603. Minz, S.S. & Kandir, K. 2010. "Plants used against female sterility by the tribals of Ranchi districts of Jharkhand". *Biospectra* 5(1): 79–82.

Abstract: Our country is blessed by valuable plants which are used as medicine. Jharkhand state is very rich in medicinally important plant. Ranchi is also blessed with these medicinal plants. This investigation deals with the uses of plants in the treatment of female sterility by tribals in the Ranchi district of Jharkhand. Female sterility is the one of the major problem in India and all over the world. Female sterility means female unable to conceive a baby. They have good idea about such plants which are used in treatment of female sterility. These are *Achyranthes aspera*, *Daucas carota*, *Saraca indica*, etc.

604. Minz, S.S. & Kandir, K. 2010. "Folk herbal remedies used in birth control in Ranchi district of Jharkhand". *Biospectra* 5(2): 397–402.

Abstract: Ranchi is the capital of Jharkhand. The main dominated tribes are Oraon, Munda, Ho, Santhali, etc. Medical ethnobotany deals with the study and application of plants used within traditional medical systems and it involves the identification of plants used in traditional remedies. This investigation deals with the uses of ethnomedicinal plants in birth control. Population is the worldwide problem. Many modem techniques are used for birth control. But in remote areas where no any facilities, tribals and other people use some plants which are helpful in birth control. Birth control means control in birth. Some plants like *Ricinus communis, Carica papaya, Lawsonia inermis*, etc. are used in birth control.

605. Minz, S.S. & Kandir, K. 2011. "Comparative study of moisture content of herbal plants used in female sterility in Ranchi district of Jharkhand". *Biospectra* 6(2) (Special Issue): 181–184.

Abstract: Jharkhand state has been the reservoir of enormous natural resources including vegetable wealth. The population of the area has distinct traditions and taboos in their lives. Female sterility is the one of the major problems in India and all over the world. Some common plants such as *Asparagus racemosus*, *Ficus benghalensis* and *Ficus religiosa* are used in treating this disease. The paper deals with the comparison of moisture content of three plants.

606. Mishra, R. & Ram, R.L. 2013. "Endangered medicinal plants used against skin diseases by the tribals of Ranchi district" *Advances Pl. Sci.* 26(2): 421–424.

Abstract: The paper deals with 37 endangered ethnomedicinal plant species belonging to 26 families along with their plant parts used and preparation and process of administration against various skin ailments.

607. Mishra, S., Jha, V. & Jha, S. 1996. Plants in ethnoveterinary practices in Darbhanga (North Bihar). In: Jain, S.K. (ed.), *Ethnobiology in Human Welfare*. Deep Publication, New Delhi. pp. 189–193.

608. Mohan, K. & Singh, A.K. 1996. "Ethno-medico-botany of Tharus". *Advances Pl. Sci.* 9(2): 1–16.

Abstract: Ethno-medicobotany has assumed greater relevance in the modern times. In this paper, an attempt has been made to highlight the plants of medicinal importance after an ethno-botanic survey of the Tharu belt of West Champaran district of Bihar. A total of 92 plant species belonging to 52 families used in 57 maladies have been covered.

609. Mondal, S. & Rahaman, C.H. 2012. "Medicinal plants used by the tribal people of Birbhum district of West Bengal and Dumka district of Jharkhand in India". *Indian J. Tradit. Knowl.* 11(4): 674–679.

Abstract: An ethnomedicinal survey was carried out to collect information on the uses of medicinal plants used by the tribal people of some selected areas of Birbhum district of West Bengal and Dumka district of Jharkhand. A total of 28 ethnomedicinal plants have been recorded here which are used in formulation of 10 different ethnomedicinal preparations for curing 10 types of diseases. Many of these ethnomedicinal preparations are new as they have not been recorded earlier in standard literature. Studied taxa have been considered under 28 species, 27 genera and 25 families of flowering plants. Finally, the investigated plant species have been enumerated according to the formulation prescribed by the medicine men, along with botanical names, families, local or tribal names, parts used and mode of administration.

610. Mukherjee, P., Topno, S. & Kumar, S. 2007. "Some less known edible fruits recommended as minor forest products of Khunti district, Jharkhand, India". *Biospectra* 2(2): 327–329.

Abstract: An ethnomedicinal investigation undertaken in the Khunti subdivision of Ranchi district, Jharkhand during 1991–97, revealed that various fruits are being eaten by the tribals. Some of these edible fruits and seeds are the important source of income to the tribals. Employment can be provided to the local people by collection and processing of these fruits and seeds. Some of these fruits and seeds also have the medicinal important.

611. Naaz, A., Swaroopa, S., Khatoon, N. & Chaudhary, A.K. 2015. "Anti-bacterial and anti-fungal activity of some medicinal plants". *Biospectra* 10(1): 171–174.

Abstract: Anti-bacterial and anti-fungal activity of three medicinal plants *Lantana camara* L., *Catharanthus roseus* (L.) G. Don and *Calotropis procera* W.T. Aiton were investigated. Extract of these three plants were used to inhibit the growth of plant-pathogens. Disc

diffusion method is applied to measure the anti-microbial activity against three types of bacteria and five types of fungi. Our data express, all three plants extract have great potential as antimicrobial compound against microorganism. Thus they can be used in the treatment of infectious disease caused by resistant microbes.

612. Nandan, K.B. & Singh, C.B. 2004. "Useful macrophytes in Kawar Lake, north Bihar, India". *Indian J. Forest.* 27(3): 241–244.

Abstract: A sizable number of macrophytes growing luxuriantly in Kawar Lake, the largest one of its kind in Bihar, are utilised by the native folk for food (*Euryale ferox, Ipomoea aquatica, Nelumbo nucifera, Nymphaea nouchali, Nymphaea* sp. – a probable hybrid, *Cyperus rotundus*), fodder (*Commelina benghalensis, Cynodon dactylon, Cyperus iria, C. rotundus, Echinochloa colonum, E. crus-galli, Leersia hexandra, Oryza rufipogon, Phragmites karka, Saccharum spontaneum, Schoenoplectus articulatus, S. supinus*), fuel (*Ipomoea aquatica, Saccharum spontaneum*), medicine (*Centella asiatica, Nymphaea nouchali*), fish food/duck feed (*Ceratophyllum demersum, Hydrilla verticillata*), decoration (*Nelumbo nucifera*), worship (*Nelumbo nucifera, Nymphaea nouchali*), etc. Besides fulfilling household requirements, the sale of certain macrophytes for medicine (flower of *Nymphaea nouchali*), fish food (whole plant of *Ceratophyllum demersum* and *Hydrilla verticillata*) and multipurpose materials (*Cyperus iria, Phragmites karka*) boosts up their economy. These aquatic resources need optimum commercial exploitation for the uplift of poor people residing around the lake.

613. Nidhi & Sinha, J.P. 2007. "Medicinal value of Kantakari, *Solanum xanthocarpum* Schrad. & Wendl". *Biospectra* 2(1): 155–156.

Abstract: *Solanum xanthocarpum* Schrad. & Wendl. is considered to be a herbal remedy. It is used as a carminative, an expectorant or a decongestant. It was found in the survey that the leaves together with the seeds and the root are considered to be the valuable parts for the indigenous people of Gumla district of Jharkhand.

614. Ojha, N. & Kumar, S. 2011. "Documentation of some wild flowers used as food supplement by the tribal and others in Jharkhand". *Biospectra* 6(2) (Special Issue): 177–180.

Abstract: Village haats are the backbone of the rural economy in Jharkhand. Several biweekly and daily haats (village market) are a regular feature. Villagers, especially tribals, from surrounding areas come here to sell their agricultural and forest produces. It is interesting to see that some flowers are sold here as an alternative source of vegetables. These flowers serve as diet supplements for the poor who cannot afford the cost of fresh vegetables.

615. Pal, D.C. 1972. "Medico-religious beliefs about plants among adibasis of Bihar". *Folklore* 13: 479–483.

616. Pal, D.C. 1980. "Observations on folklore about plants used in veterinary medicine in Bengal, Orissa and Bihar". *Bull. Bot. Surv. India* 22: 96–99.

Abstract: During the exploration of Bihar, Odisha and West Bengal ethnobotanical information was collected from the tribes of Kondh, Munda, Oraon, Santhal and Lodha along with plants. It is found that 20 species under 19 genera and 16 families are used by them as veterinary medicine. It is further discovered that most of them are new to the present day knowledge. Hence an attempt has been made to enumerate all such folklore plants in the work incorporating its botanical name, local name, locality, traditional uses with voucher specimens deposited in Economic Botany Section of Botanical Survey of India.

617. Pal, D.C. & Srivastava, S.N. 1976. "Preliminary notes on the ethnobotany of Singhbhum district, Bihar". *Bull. Bot. Surv. India* 18: 247–250.

Abstract: The paper is the preliminary ethnobotanical account of Singhbhum district, Bihar. The chief aim of this work is to find out the uses made of 22 plants by the 'Hos' for various purposes, viz., food, medicine, fibre, fuel, shelter, dye, narcotic oil seeds and other material culture.

618. Pal, D.C., Soren, A.M. & Sen, R. 1989. "Ethnoinsecticides". *J. Econ. Taxon. Bot.* 13(2): 377–379.

Abstract: The paper presents an account of different means of killing or repelling insects by ethnic tribes of Bihar, West Bengal and Odisha. Special mention of plants which are used as insecticide or insect repellent or the ash of plant parts or plant products has been made.

619. Pandey, B.N., Das, P.K., Jha, A.K. & Ojha, A.K. 1998. "Ethnobotanical profile of South Bihar with special reference to East Singhbhum, Jamshedpur". *Acta Bot.* 20(1): 31–38.

620. Parveen, S. & Nag, A.K. 2014. "Plants being used to cure diabetes by the local inhabitants of Ranchi district of Jharkhand (India)". *Biospectra* 9(1): 285–288.

Abstract: Diabetes is a deadly disease of the modern world. It shows very little symptom but harms all body parts of humans. Ethnic population due to their changing life style & hereditary reasons are also suffering in great number with this disease. A study was undertaken in Ranchi district of Jharkhand to know about the remedies of diabetes being in used by the local inhabitants. In this paper, a total of 40 medicinal plants have been enumerated, the way of administration is also described which the local people of Ranchi district mainly the tribes use against diabetes.

621. Parween, S. & Kandir, K. 2016. "Ethnomedicinal plants used in high blood pressure in Ranchi district of Jharkhand". *Ranchi Univ. J. Sci. & Technol.* 4(1): 40–42.

Abstract: Jharkhand state has a rich diversity of medicinal plants. The population of the area has distinct traditions and taboos in their lives. Likewise, local people have certain traditions to cure prevailing human ailments. The paper deals with eight ethnomedicinal plants which are used in high blood pressure in Ranchi district of Jharkhand. First hand information was gathered by tribal baidays and knowledgeable persons regarding the medicinal plants, their use, and method of drug preparation, doses and duration of treatment. All the investigated plants have certain bioactive compounds which are responsible for curing the ailments. Few examples of the plants which are used to control high blood pressure are *Rauvolfia serpentina, Moringa oleifera, Trachyspermum ammi, Allium sativum*, etc.

622. Pathak, P., Rani, N. & Kumar, K. 2006. "Survey and study of medicinal plants curing different diseases in and around Birsa Agricultural University, Kanke, Ranchi". *Int. J. Mendel* 23(1 & 2): 19–20.

Abstract: An attempt has been made for the documentation of commonly used herbal preparations for the treatment of different diseases as skin diseases, jaundice, rheumatism, urinary problems in and around Birsa Agricultural University, Kanke, Ranchi. The place has a rich population of tribals among whom the use of herbal medicine is very popular. Further plants curing skin diseases, jaundice, urinary problems and rheumatism were categorized and there methodology was also recorded.

623. Patnaik, A. & Sharma, H.P. 2013. "Anti-cancer ethnomedicinal plants of Jharkhand state, India". *J. Ethnobiol. Tradit. Med. Photon* 119: 475–483.

Abstract: Plants are known to be of medicinal values since the pre-historic times. The use of plants as medicine for the remedy of cancer is also very old. The worst part of the modern medicine is the emergence of many side effects. In this perspective an alternative medicine especially herbal drugs hold much promise as it is target specific and show minimum side effects. The state of Jharkhand, India is very rich in plant and ethnic diversity. Here many ethnic communities still leads a primitive life style and having rich cultural back ground. They are entirely dependent upon plants and plant products for their subsistence and health security. In the recent past there are many unscrupulous and unplanned developmental activities underway leading to deforestation and displacement of tribal population who are repository of plant based knowledge. In this investigation, 58 plants have been reported against cancer, which are widely used parts and their bioactive compounds have described. This work is based on collection, identification and documentation of tribal knowledge. The herbal drug practice is depending on the experience only and passed to next generation with words of mouth, therefore, a scientific authentication is necessary.

624. Patnaik, A., Kumar, S., Sharma, H.P. & Srivastava, A.K. 2016. "Morphogenetic studies on some ethno-medicinal plants practiced against cancer in the state of Jharkhand, India". *Ranchi Univ. J. Sci. & Technol.* 4(1): 12–15.

Abstract: The beneficial effects of medicinal plants to cure many dreadful diseases were discovered long before scientific advancement. The active principle contained in the plants consists of a number of chemical compounds which have a specific action on different types of organisms and cells. The regeneration of medicinal plants through the induction of callus is an inherent part of different research activities related to them. Developing an efficient protocol for the large scale cultivation of study plants can be beneficial in many ways. The chances of exploitation of tissue culture technique for large scale production of useful metabolites are bright. Tissue culture techniques are also used for virus eradication, genetic manipulation, somatic hybridization, plant improvement and basic research. In this study, four different medicinal plants have been chosen and different hormonal concentrations and culture conditions were provided to induce efficient callus induction followed by subsequent plant regeneration protocols. The plants chosen for the investigation include *Boerhavia diffusa, Centella asiatica, Coccinia grandis* and *Solanum nigrum*. *Boerhavia diffusa* L. showed best callus induction when 2 ppm 2,4-D were used. *Centella asiatica* L. showed regeneration when 0.5 ppm BA, 0.5 ppm 2,4-D, 0.5 ppm EBA were used as hormonal concentration. *Coccinia grandis* L. showed best callus induction when 1 ppm BA and 1.5 ppm NAA were used as hormonal concentration. *Solanum nigrum* L. showed best callus induction when 0.5 ppm BA, 0.5 ppm IBA, 0.5 ppm 2,4-D were used as hormonal concentration.

625. Patnaik, A., Sharma, H.P., Fatma, B., Anita, R., Ajit, K., Jain, P. & Basri, F. 2012. "Phyto-chemical screening of some medicinal plants used by the ethnic communities of Jharkhand state". *Int. J. Biol. Sci. & Eng.* 3(3): 203–209.

Abstract: Plants are the source of many medicinal compounds, sources of relief and cure ailments. Ethnic communities of Jharkhand state are using different types of herbal drugs in their traditional medicinal system from time immemorial. Recently, various developmental activities are underway in the newly created state, which has resulted in the loss of forest cover and migration of forest dwellers to different places and to adopt alien professions. The tribes and indigenous people have very rich cultural heritage which needs to be protected. Especially, their knowledge about plants and plant medicines are worth to be documented before it is too late. Therefore, it is essential to make scientific authentication of the widely used plants so that the sensible use of plants/ plant parts can be done. The proposed tropic aims at screening of secondary metabolities and amino acids in six medicinal plants, i.e. *Oxalis corniculata, Boerhavia diffusa, Achyranthes aspera, Centella asiatica, Annona squamosa* and *Tinospora cordifolia* which

are widely of ethno-medicinal importance. All the plants have been found to be positive in terms of alkaloids, phenols, flavonoids, glycosides and amino acids.

626. Paul, S. & Jha, R.K. 2011. "Ethnomedicinal values of *Piper longum* Linn., *Piper betle* Linn. and *Piper nigrum* Linn. of family Piperaceae". *Biospectra* Vol. 6(1): 129–130.

Abstract: This communication brings out, ethnomedicinally valuable three plant species, i.e., *Piper longun* L., *P. betel* L. and *P. nigrum* L. belonging to family Piperaceae. These medicinal plants have the highest level of ethnomedicinal values which are used in the treatment of different ailments in the urban as well as rural areas of Jharkhand. These medicinal plants used as folk and traditional treatment of cough and cold, bronchitis, constipation, fever, ulcer, anti-malarial, antibacterial, etc. by the tribals and others.

627. Paul, S. & Jha, R.K. 2012. "Ethnomedicinal and pharmacognostical study of *Piper longum* Linn". *Biospectra* 7(2): 143-–146.

Abstract: *Piper longum* L., is an important ethnomedicinal plant of Jharkhand used by the local tribal and ethnic population of this area. It is also widely used in Ayurvedic and Unani systems of medicine. This investigation was aimed at documentation of ethnomedicinal uses of the plant and pharmacognostic evalution of the fruit. Ethnomedicinal study showed some very effective ethno medicines, which not show any side effect in normal doses. These can be used as general home remedies.

628. Paul, S.R. 1977. "Medicinal plants of Netarhat, Bihar (India)". *Quart. J. Crude Drug Res.* 15: 79–97.

Abstract: The knowledge of ancient Indians about medicinal plants and their various applications to human's suffering dates back to Vedic times. The Rigveda and Atharvaveda of the 2nd millennium BC mention about 2000 plants of medicinal value. Several excellent treatises on this subject have been published in recent years. Nadkarni (1908), Basu and Kirtikar (1918), Mohan (1930), Cius (1938–1945), Dastur (1952), Singh (1955), Chopra (1956, 1959), Jain (19165, 1970), De *et al*. (1968) have added commendably to the literature on Indian plants of medicinal importance. However, there is still the possibility of unfolding hitherto hidden medicinal plant wealth from this part of the world to add to the existing species of the Indian meteria medica.

629. Prabha, S., Dutta, R., Prabha, S., Sharma, H.P. & Prasad, R. 2007. "Studies on nutritional and medicinal uses of 'Punarnawa Sag' (*Boerhaavia diffusa*) by the tribals and indigenous people of Ranchi district of Jharkhand". *Int. J. Mendel* 24(1 & 2): 17.

Abstract: 'Punarnawa Sag' (*Boerhaavia diffusa*) is profusely found in the forest areas of Ranchi district of Jharkhand during rainy and winter seasons. The tribal and indigenous people of the area frequently use this plant as leafy vegetable in their daily diet. *Boerhaavia diffusa* is rich in term a vitamins and minerals. Besides the nutritional utility in

daily diet on the basis of their traditional knowledge, this plant resource is also used against various diseases like oedema, heart problems, urinary disorders, low blood pressure, anaemia and leprosy.

630. Prasad, A.N., Singh, B.K. & Dangi, M.K. 1998. "Ethnomedicinal plants of Hazaribagh forest mine region (Series – I)". *Int. J. Mendel* 15: 47–48.

631. Prasad, K. 2015. "Current status of medicinal plants in the Bokaro district of Jharkhand". *Int. J. Sci. Res. Publ.* 5(10): 1–5.

Abstract: Local inhabitants in rural areas of Jharkhand rely on traditional medicine as their primary form of health care, yet they are in danger of losing both their knowledge and the plants they have used as medicines for millennia. The study was conducted in the rural areas of Bokaro district. The aim of this study which included an ethnobotanical survey was to assess the current level of knowledge about medicinal plants and to analyze and catalogue such knowledge based on relative frequency citation (RFC) and use value (UV).

632. Prasad, U.N. 1988. Survey report on availability resources of medicinal plants in the tribal and other areas of north and south Chhotanagpur division as well as tribal area of Dumka and other areas of Gaya, Aurangabad, Nawada and Monghyr districts (unpublished). Chapter 9, pp. 56–62.

633. Raghav, C.S., Suneja, P., Bhatt, K.C., Tomar, J.B. & Malik, S.S. 2005. Exploration of medicinal and aromatic plants in tribal areas of Jharkhand and West Bengal for Chemo-ethnobotanical studies. In: Prabhuji, S.K., Rao, G.P. & Patil, S.K. (eds.), *Recent Advances in Medicinal Plant Research: Vision 21st Century*. Satish Publication House, New Delhi. pp. 147–158.

634. Ram, R.L. 2001. "Preliminary phytochemical analysis of medicinal plants of south Chotanagpur used against dysentery". *Advances Pl. Sci.* 14(2): 525–530.

Abstract: A preliminary phytochemical analysis for medicinal plants which act against dysentery has been carried out. In the first phase of chemical analysis 10 medicinal plants have been screened which are used in the treatment of dysentery. It is found that the plants contain a number of secondary metabolities and have the pharmacological actions. Phytochemical analysis confirms that alkaloids and saponin promptly act against the treatment of dysentery.

635. Ram, R.L. 2002. "Phytochemical analysis of some medicinal plants used against dysentery by the tribals of south Chotanagpur". *Geobios (Jodhpur)* 29: 164–166.

Abstract: Phytochemical analysis of herbal medicinal plants used in the treatment of dysentery by the tribals of south Chotanagpur confirms that the chemicals present in these plants promptly act against dysentery.

636. Ram, R.L. & Saha, V. 1998. "Ethnobotanical wealth of Ranchi district, Bihar. Part – I: Herbal medicinal plants used against dysentery". *Advances Pl. Sci.* 11(1): 249–252.

Abstract: Preliminary studies have been carried out to find out the herbal medicinal plants used against dysentery. The people of Chotanagpur depend upon the herbaceous plants for medicinal use in their daily life. During the survey of Ranchi district 15 medicinal plant species have been recorded which are used in the treatment of dysentery. In the first phase, the vernacular names, plant parts used, dosage and process of administration have been listed.

637. Ram, R.L., Mishra, R. & Kumar, S. 2004. "Medicinal wealth of Jharkhand used against skin diseases by tribals". *Advances Pl. Sci.* 17(I): 49–52.

Abstract: A survey of medicinal plants has been carried out in different regions of Jharkhand especially which are used in the treatment of skin diseases. The paper deals with 10 plants of medicinal value used by the tribals of Jharkhand to treat various skin diseases. It provides botanical names, local names, plant parts used and method of administration in various skin diseases.

638. Rani, N., Pathak, P. & Kumar, K. 2006. "Medicinal plants in and around Birsa Agricultural University, Kanke, Ranchi". *Int. J. Mendel* 23(1-2): 21–22.

Abstract: A total of 25 plants which are used as medicine in and around Birsa Agricultural University, Kanke, Ranchi were presented in the paper. The taxonomical profile of all the medicinal plants was tabulated with their therapeutic properties and chemical composition or alkaloid.

639. Ranjan, P. 1999. "A contribution to some of the medicinal plants of Indo-Nepal border area adjoining the districts of Madhubani and Sitamari". *J. Econ. Taxon. Bot.* 23(2): 667–675.

Abstract: The use of plants and plant products as medicines could be traced as far back as the beginning of human civilization. The earliest mention of the medicinal uses of plants is found in the Rig Veda, perhaps the oldest repository of human knowledge. Normally rural people of Indo-Nepal border area use medicinal plants for their requirement from their own areas. The paper deals with a preliminary contribution to the use of medicinal plants by the rural and tribal people of Indo-Nepal border area. In all 75 medicinal plants were collected and documented. The plants were identified botanically, arranged alphabetically along with their family names, local names (Hindi and Nepali), method of application of their parts and medicinal importance.

640. Ranjan, P. 1999. "A contribution to some wild edible plants of Indo-Nepal border area". *J. Econ. Taxon. Bot.* 23(2): 677–682.

Abstract: The paper reveals the availability of 60 wild edible angiospermic plants of Indo-Nepal border area during the exploration work. Attempts were made to collect information from local people regarding the uses of different parts of the plant. Besides, botanical names, local names and flowering period are also recorded.

641. Ranjan, R.K., Kumar, P. & Gupta, I.P. 2009. "Ethnomedicinal values of some indigenous plants for treatment of leucoderma and other skin diseases in Mandu block, Ramgarh, Jharkhand". *Biospectra* 4(1): 139–142.

Abstract: Medical ethnobotany deals with the nature and application of plants used within traditional medical systems and it involves the identification of plants used in traditional remedies. Often ethnobotanical inventories are made by conducting interviews with the tribal people; formal surveys in the field and collection and identification of plant specimen used. This article deals with 21 plant species used in treatment of leucoderma and other skin diseases by the ethnic population of Mandu block.

642. Ranjan, R.K., Gupta, I.P., Sharma, H.P. & Sinha, S.K. 2008. "Studies on the medicinal plants utilized by indigenous people of Mandu block, Ramgarh, Jharkhand (India)". *Biospectra* 3(2): 335–338.

Abstract: The people of Mandu block of Ramgarh district of Jharkhand have been using different kinds of forages, herbs, shrubs, vegetables, cereals and fruits as medicine since time immemorial. This particular area is a natural abode of large number of valuable medicinal plants. The tribals who are mostly dependent on the forests, apply their traditional knowledge of use of medicinal plants for the cure of various diseases. It is still unfortunate that their traditional knowledge has not been properly identified, standardized and documented for the better use by modem society. Due to indiscriminate and rapid devastation of our forest wealth, a sizeable number of plants are on the verge of becoming rare or extinct. No systematic study and documentation of this area has been done, therefore this article aims for identification and documentation of about 35 top medicinal plant species.

643. Ranjan, V. 2016. Survey of ethnomedicinal plants of Parasnath Wildlife Sanctuary, Giridih, Jharkhand. In: Chourasia, H.K. & Roy, A.K. (eds.), *Conservation, cultivation, diseases and therapeutic importance of medicinal and aromatic plants*. pp. 289–305.

Abstract: The lush green Parasnath Hill, a part of Chota Nagpur Plateau has been potent source of a variety of medicinal plants since long back. The chapter deals with 44 ethno-medicinal plants of Parasnath Wildlife Sanctaury with their therapeutic uses and suggestions for their proper utilization and conservation.

644. Ranjan, V., Singh, H. & Singh, L.J. 2016. Medicinal and aromatic plants of Bihar with their biological activity and strategies for their conservation. In: Chourasia, H.K. (ed.),

conservation of medicinal plants conventional and modern approaches. Omega Publications, New Delhi. pp. 142–166.

Abstract: This chapter deals with 380 medicinal and aromatic plants of Bihar which exhibit significant 65 biological activities. These bioactive principles could be further developed into new drugs for specific diseases. Out of 380 medicinal and aromatic plants, 90 species shows spasmolytic bioactivity is followed by antifungal (74 species), antibacterial (74 species), hypoglycaemic (67 species), diuretic (66 species) and anti-inflammatory (57 species). Due to revival of interest in indigenous medicines in recent years, a very large number of pharmacies are coming up at an unforeseen rate. This is caused many times increase in consumption and demand of crude drugs. To fulfil the demand of regional, national and international markets, the plants are harvested in increasing volumes and largely from wild populations. Therefore, some general conservation recommendations/ strategies are also proposed.

645. Rawal, A.K., Sharma, H.P., Singh, B., Sharma, L.K., Pandey, N.K. & Pandey, R.K. 2013. "Study on under-utilized nutraceuticals plants (potherbs) of tribal belts of Jharkhand, India". *Amer. J. PharmTech Res.* 3(6): 591–606.

Abstract: Ethnic communities inhabiting Jharkhand state are living in true harmony with nature. They entirely depend on plants and plant resources for their livelihood. Plants use in tribal belt is as diverse as the ethnic diversity. The paper focuses on lesser known nutraceutical plants, usually not known to the modem society but form an important dietary part of the ethnic people and provide them both nutritional and health security. These vegetables are lesser known and under-utilized resources, which are rich both in nutrients and secondary metabolites, providing nutritional and health security (nutraceutical). These plant resources grow their own, thrive easily on inhospitable conditions without any input, give new taste and are free of chemical pesticides and insecticides. In view of the large scale utilization of land area in the name of various kinds of developmental activities there is an urgent need of enlisting wild nutraceutical potherbs and documentation of their therapeutic uses before it is too late. The paper describes 35 plants species which are widely consumed amongst ethnic communities.

646. Rawal, A.K., Singh, S.L., Ranjan, A., Singh, B., Sharma, L. & Sharma, H.P. 2014. "Ethnomedicinal plants of Khunti district of Jharkhand state (India)". *Biospectra* 9(1): 237–242.

Abstract: Khunti is a newly formed district of Jharkhand created by separating out from Ranchi. Majority of the population is tribes and indigenous people who live close to nature with their rich cultural heritage. The area is also very rich in plant biodiversity because yet not disturbed by human intervention. Being very close to capital city Ranchi shortly its natural green canopy will be disturbed. The cost of various developmental

programmes and also the permanent settlers will be forced to leave their natural home. Therefore, there is an urgent need to take up ethnobotanical studies in general and ethnomedicinal studies in particular before it is too late. This type of study will give new impetus to the traditional system of healthcare. In view of the importance of traditional medicine which provides health services to large population, increased demand of herbal drugs by the pharmaceuticals and depleting plant resources, it is high time to document the medicinal utility of plants available in remote areas of the district. In the paper, a total of 40 plant species belonging to 26 families used to treat different types of diseases and disorders have been enlisted and their parts used have been focused.

647. Sahoo, A.K. & Mudgal, V. 1993. "Ethnobotany of south Chotanagpur (Bihar)". *Bull. Bot. Surv. India* 35: 40–59.

Abstract: Ethnobotanical studies made among the tribals of Ranchi, Gumla, Lohardaga and Palamau districts of Bihar are presented. The paper provides uses of 146 plants for medicines, veterinary medicines, food, fodder, household items, building materials, various social and religious ceremonies. A comparison with the literature reveals that 42 uses of various plants reported in the paper are new. Besides nine plant species reported to be used by the tribals of Chotanagpur for various purposes have not been mentioned in the earlier literature.

648. Sahu, H.B., Choudhary, A.K. & Mahato, S.C. 2014. "Weeds utilized in the rapeutical purposes by the ethnic tribes of Khunti district (Jharkhand) India". *Biospectra* 9(1): 185–190.

Abstract: The ethnic tribes of Khunti district are very expertise in utilizing different weeds as medicine for the treatment of various ailments/diseases. Altogether 22 species of weeds, belonging to 19 families, have been documented during the ethno-medico-botanical survey in Khunti district. The weeds are used by the local horopaths, vaids, kabirajs, pahans and other knowledgeable indigenous people for the treatment of various ailments/diseases such as jaundice, fever, gastro-intestinal problems, spermatorrhoea, rheumatism and skin problems. Prominent weeds are *Achyranthes aspera*, *Boerhavia diffusa, Cyanodon dactylon, Euphorbia hirta, Phyllanthus niruri, Commelina benghalensis, Cyperus rotundus, Eclipta alba* and *Leucas aspera*.

649. Sahu, H.B., Choudhary, A.K. & Mahato, S.C. 2014. "Use of different plant tubers for therapeutic purposes by the ethnic tribes of Khunti district Jharkhand, India". *Biospectra* 9(1): 267–276.

Abstract: The paper enumerates different tubers that are widely used as medicine by the ethnic tribes and other indigenous non-tribe communities of Khunti district of Jharkhand. During the ethnomedicinal field survey of Khunti district, altogether 26 species of plant tubers belonging to 22 genera and 11 families, growing in remote areas, which are

used for curing various diseases like cough, asthma, diorrhoea, skin diseases, piles and other common diseases have been identified. This article reports such tubers, their local names, botanical name, family, availability, and method of use for curing diseases. Some of the important such tubers are *Acorus calamus* (Ghora buch), *Amorphophallus paeoniifolius* var. *campanulatus* (Ol), *Chlorophyton tuberosum* (Safed musli), *Coccinia grandis* (Van Kundru), *Curculigo orchioides* (Kali musli), *Curcuma decipiens* (Jangli haldi, Van Haldi), *Cyperus rotundus* (Nagarmotha), *Gloriosa superba* (Kalihari), *Pueraria tuherosa* (Patal Kohra), *Urginia indica* (Jangli piyaz).

650. Sahu, H.B., Bondya, S.L., Kumar, J. & Sharma, H.P. 2003. "Studies on ethno-medicinal properties of plant barks used as drugs by the indigenous people of Ranchi district of Jharkhand". *Int. J. Meddel.* 20(3-4): 83–84.

651. Sahu, S.C. 1986. *Ethnobotany and medico-botanical studies in some important plants of Santhal Pargana and Chotanagpur*. Ph. D. Thesis, Ranchi University, Ranchi (unpublished).

652. Sangeeta, S.N. & Nag, A.K. 2014. "A study of plants used by ethnic tribal population of Ranchi district against malaria". *Biospectra* 9(1): 281–284.

Abstract: Malaria is one of the most harmful diseases in Ranchi district. It is known that malaria is a mosquito-borne infectious disease of humans. It is caused by the genus *Plasmodium*. In Ranchi district there are many plants which are being used by the ethnic tribal population to cure malaria. In this paper, 38 plant species have been identified with the help of herbal practitioners which are claimed to be effective against malaria. There are 32 castes which are enlisted in the category of the scheduled tribes in Jharkhand. Out of these 32 castes are the original inhabitats of the present Ranchi district who have been using some plants traditionally to treat malaria.

653. Saren, A.M., Halder, A.C. & Singh, H. 2009. "Ethnomedicinal plants of Mahilong forest range in Ranchi district, Jharkhand". *J. Econ. Taxon. Bot.* 33(4): 803–810.

Abstract: This paper provides brief ethnomedicinal uses of 69 plant species belonging to 63 genera and 43 families used by the Munda and Santhal tribes of Mahilong forest range of Ranchi district, Jharkhand. These plant species have been arranged alphabetically with their family, life form, local name, locality, ethnomedicinal uses and voucher number.

654. Sarkar, P.K. & Agarwal, V.S. 1978. "Notes on *Pholidota imbricata* Lindl. (Orchidaceae) and its local uses in Ranchi district, Bihar". *Bull. Bot. Surv. India* 20(1–4): 182–183.

Abstract: The pseudobulb of *Pholidota imbricata* Lindl. finely macerated in mustard oil is applied on joins to alleviate rheumatic pain and water extracts of crashed pseudobulb was credited with curative properties if taken internally in the Lohardanga, Ranchi district of Chotanagpur region.

655. Sen, R., Pal, D.C. & Roy, B. 1984. "Botany and ethnobotany of *Parashi*". *J. Econ. Taxon. Bot.* 5(4): 857–858.

Abstract: Ethnobotanical uses of "Parishi", botanically known as *Cleistanthes collinus* (Roxb.) Benth. & Hook.f. in respect of medicine, poison, charm and for the purposes of other material culture among the ethnic group of Bihar, Odisha and West Bengal has been reported in the paper.

656. Sen, R., Pal, D.C. & Soren, A.M. 1983. "Traditional uses and ethnobotany of 'Kuchila'". *J. Econ. Taxon. Bot.* 4(2): 575–578.

Abstract: 'Kuchila' and 'Chhotokuchila' are botanically known as *Strychnos nux-vomica* L. and *S. potatorum* L.f., respectively. Ethnobotanical and folk uses of these plants, such as medicinal, application of poison, as charm, clearing and purifying drinking water, etc. in respect of Bihar, Odisha and West Bengal states in India have been reported.

657. Sharma, L.K., Sharma, H.P., Kumar, B., Patnaik, A., Pandey, N.K. & Pandey, R.K. 2013. "Herbal remedy for gynecological problems in ethnic communities of Jharkhand state, India". *Amer. J. PharmTech Res.* 3(6): 659–670.

Abstract: Plants are known to be associated directly or indirectly with the needs of human since time immemorial. In addition to the basic needs, i.e., food, shelter and clothing, plants are utilized for fodder, fuel, timber, tannins, colours, oils and medicines, etc. History reveals that uses of plants as medicine is known in different parts of the world, especially in India there are evidences which suggest its therapeutic role since Rig Veda. There are 32 ethnic communities in Jharkhand, which constitute about 33% of total population. They have their own self-managed traditional system for primary healthcare (Horopathy). Women are traditionally using herbal medicines for the remedy of different types of gynecological problems. In this investigation 30 plants species have been reported on the basis of ethno-medicinal information extracted from ethnic communities. All the parts of plants such as root, bark, leaf, flower, fruit and tubers are used as medicines, either preparation from single plant is used as drug or in some cases decoction or paste are made with more than one herb. There is very wide scope for the pharmacological studies of the reported plants in future.

658. Sharma, P.C. 1981. "Folklore antifertility plant drug of Bihar". *Bull. Med.-Ethno-Bot. Res.* 2: 296–302.

659. Sharma, P.C. 1988. "Some interesting medicinal folklores from Bihar". *Bull. Med.-Ethno-Bot. Res.* 9: 89–95.

Abstract: A considerable percentage of the total population of our country living in villages, particularly the tribal people, still depend on natural resources, especially the plant kingdom, for the treatment of their ailments. Bihar is one of the leading states in

respect of tribal population and a large portion of its total area is covered with forests. The author while conducting Medico-ethno-botanical explorations from 1971 to 1980 visited several forest localities and tribal pockets and gathered more than 350 folk-lore medicinal claims. The paper deals with 33 interesting claims related to the treatment of a few troublesome diseases such as rheumatoid arthritis, gout, asthma, malaria, venereal diseases, epilepsy and pulmonary tuberculosis, etc.

660. Sharma, P.C. & Sinha, G.N. 1980. "Folklore medicinal plants of Ranchi district (Bihar)". *Nagarjun* 24(1): 1–3.

661. Sharma, S. & Choudhary, A.K. 2013. "Ethnobotanical Studies of some plants species used for skin care and skin diseases in Jharkhand". *Biospectra* 8(1): 143–150.

Abstract: Ethnobotanical studies on some plants used for skin care or diseases in Jharkhand are discussed in the paper. Now-a-days people are attracted towards the nature and natural medicines due to their less side effects and low cost. Some of the common medicinal plants of Jharkhand that are frequently used by the ethnic people or tribals for treatment of skin diseases by traditional knowledge are are provided in the paper. Many of these plants are becoming endangered. Some of the plants are presented in this paper.

662. Sharma, S. & Choudhary, A.K. 2014. "Ethnomedicinal studies on threatened, endangered plant species *Centella asiatica* Linn." *Biospectra* 9(1): 235–236.

Abstract: The paper deals with ethnomedicinal studies on endangered plant species of Jharkhand. *Centella asiatica* locally called "Beng sag" because of the shape of the leaves. It is one of the chief herbs for treating skin problems, for revitalizing the nerves and brain cells. *Centella asiatica* is claimed to have preventive and curative properties against several diseases by the traditional herbal medicinal practitioners of Jharkhand.

663. Shukla, G. & Verma, B.K. 1996. "Roots – A vital plant part to cure body ailments among tribals/rural folklore of Western Bihar". *J. Econ. Taxon. Bot., Addit. Ser.* 12: 392–394.

Abstract: The paper reports medicinal uses of roots of 21 plant species from district Rohtas of Western Bihar. Out of these, three plant species are used each for the treatment of skin diseases and rheumatism while two plant species each for spermatorrhoea, fever and as antidote to scorpion sting and snake bite. On the other hand only one plant species has been observed each for the treatment of asthma, physical weakness, stomachache, dog-bite, lactation, urinary trouble, cough and cold, sunstroke and leprosy.

664. Singh, B., Kumari, M., Jha, S.K. & Sharma, H.P. 2014. "Ethnomedicinal plants used to treat epilepsy in Jharkhand state". *Biospectra* 9(1): 217–222.

Abstract: Epilepsy is a neuropsychological disorder, caused due to discharge of neurotransmitter. From time immemorial, plants have been used for their healing and

therapeutic abilities, thus healing action. The aim of the study was to highlight the antiepileptic activity of some medicinally important plants of Jharkhand state namely *Acorus calamus*, *Artemisia vulgaris, Bacopa monnieri*, *Centella asiatica*, *Caesalpinia crista* and many more. The role of such plants and the specific properties of their parts have been documented through exploration and interview with the people. This paper reviews the potential of such plants that can be explored to ascertain antiepileptic activity.

665. Singh, B.N., Singh, P.K., Kumar, P. & Kumard, S. 2014. "Study of some ethnomedicinal plants of Gopalganj used to cure diabetes mellitus". *Biospectra* 9(2): 87–88.

Abstract: The paper deals with the enumeration of 15 ethnomedicinal plants which are commonly used for the treatment of a silent killer disease diabetes mellitus in Gopalganj, Bihar.

666. Singh, C.B. 2003. "Forest flora in the life and economy of the tribals of Santhal Parganas, Jharkhand". *J. Non-Timber Forest Prod.* 10(1&2): 20–33.

Abstract: The forest of Santhal Parganas (Jharkhand) is rich in the diversity of flora. Its extant flora affords the basic needs of the tribals living amidst the forest for centuries. The tribals put the forest flora and its parts/products in their diverse domestic uses as food, fuel, fodder, fibre, bamboowares, timber, medicine, oil, fish poison, etc., and also they sell these things to earn money. To sustain both the surviving forest as well as the tribal dwelling therein, it is imperative to stop deforestation, set-up/encourage forest-based labour intensive works (*sabai* grass-based rope making industry, bamboo-based basketry, fruit based preservation industry, *bidi* industry, lac-tusar-mulberry silk culture, gum-resin-dye extraction, eating plate preparation, etc.) and emphasize plantation as per preference of the tribal race of the concerned area.

667. Singh, C.B. 2014. "Folk uses of common weeds from the crop fields of Bhagalpur district, Bihar, India". *J. Econ. Taxon. Bot.* 40(1&2): 18–22.

Abstract: The folk uses of 47 common weed species of the crop fields of Bhagalpur district, Bihar are discussed. Among the commonly used weeds in the district, *Aeschynomene indica* L. (Sola), *Cannabis sativa* L. (Bhang), *Chenopodium album* L. (Bathua) and *Cucumis melo* L. (Gurmi) have the potential for commercial exploitation for the economic benefit of the rural folk.

668. Singh, C.B. 2016. "Ethnomedicinal uses of wild herbs in Bhagalpur district, Bihar". *Ethnobotany* 28: 35–39.

Abstract: The paper deals with 73 species of wild herbs used in the traditional practices to cure various diseases of rural folks of Bhagalpur district of Bihar. These herbs are belonging to 68 genera and 41 families of angiosperms. The commonly used wild

medicinal herbs are *Achyranthes aspera, Alternanthera sessilis, Andrographis paniculata, Asparagus racemosus, Bacopa monnieri, Catharanthus roseus, Centella asiatica, Chenopodium album, Coccinia grandis, Cuscuta reflexa, Datura metel, Eclipta prostrata, Enhydra fluctuans, Hygrophila auriculata, Leucas aspera, Nymphaea nouchali, Phyllathus niruri, Solanum nigrum, S. surattense* and *Vetiveria zizanioides*. All the recorded wild herbs are useful in the treatment of diverse diseases such as anaemia, asthma, cough, cold, diabetes, diarrhoea, dysentery, earache, indigestion, jaundice, leucorrhoea, piles, rheumatism, stomachache, skin diseases, urinary troubles, etc. of folks of the survey area.

669. Singh, C.B. & Pandit, N. 2015. "Ethnomedicinal studies of Bhagalpur district, Bihar". *J. Econ. Taxon. Bot.* 39(2): 315–322.

Abstract: The paper deals with 75 medicinal plant species used in the traditional practices to cure various diseases by rural people of Bhagalpur district of Bihar. These species belong to 70 genera and 39 families of angiosperms. The dicotyledonous taxa are dominant over monocotyledonous ones. Amongst the dicotyledonous families, Euphorbiaceae and Fabaceae with six species each are dominant. The prevalence of use of the herbal drugs in the area appears to be mainly due to their low cost, easy availability and least side effects.

670. Singh, C.B., Deo, S. & Vicky, A.K. 2016. "Traditional medicinal plants of Apocynaceae of Santhal Pargana Division, Jharkhand". *J. Non-Timber Forest Prod.* 23(3): 131–133.

Abstract: Ethnomedicinal studies of Santhal Parganas (Jharkhand) reveals that eleven plant species belonging to altogether different genera of Apocynaceae are used by Santhal and Paharia tribes of the division in the treatment of dibetes, dysentery, eye troubles, indigestion, jaundice, malarial fever, skin diseases, stomachache, toothache, etc. The useful species for primary health care of these tribes are *Allamanda cathartica* L., *Alstonia scholaris* (L.) R. Br., *Carissa spinarum* L., *Catharanthus roseus* (L.) G. Don, *Holarrhena pubescens* (Buch.-Ham.) Wall. ex G. Don, *Ichnocarpus frutescens* (L.) R. Br., *Nerium indicum* Mill., *Plumeria acuminata* W.T. Aiton, *Rauvolfia serpentina* (L.) Benth. ex Kurz, *Thevetia peruviana* (Pers.) Mill. and *Vallaris solanacea* (Roth) Kuntze. Unfortunately, these valuable natural resources are becoming rare and threatened mainly due to their over-exploitation, improper collection, trade of plant parts, habitat destruction and invasion of exotic weeds in the region. The rare and threatened taxa of medicinal value need urgent *ex-situ* conservation.

671. Singh, C.B., Pan, T.K. & Pandit, N. 2015. "Ethnomedicinal plants used as antidiabetic by Santhal and Paharia tribes of Santhal Parganas, Jharkhand". *Ethnobotany* 27: 69–72.

Abstract: This paper deals with 27 antidiabetic plant species, belonging to 26 genera and 21 families of angiosperms, used by Santhal and Paharia (Mal Paharia/Sauria Paharia) tribes of Santhal Parganas (Jharkhand). The identified species are arranged alphabetically followed by family, vernacular name, habit, uses, interacting tribal community/communities and district. The plant taxa such as *Achyranthes aspera, Azadirachta indica, Boerhavia diffusa, Butea monosperma, Ficus bengalensis, F. racemosa, Gymnema sylvestre, Mangifera indica, Semecarpus anacardium, Solanum surattense* and *Syzygium cumini* are commonly used by the above tribes in the treatment of diabetes. Out of these species, *F. bengalensis, F. racemosa, M. indica* and *S. cumini* are considered to be the most effective drugs to cure the disease. Unfortunately, the prospect of antidiabetic plants is dwindling with shrinkage of forest cover of the area.

672. Singh, C.T.N. 2007. "Medicinal uses of *Terminalia* spp. of Chutupalu, Jharkhand, India". *Biospectra* 2(2): 305–306.

Abstract: All the species of *Terminalia* are widely distributed in the forests of Jharkhand. Ethnobotanically they are of great importance. The aborigins have been traditionally using them as drug source for different ailments. The drug properties are fair and wide. In action they are aperient, antipyretic, attenuant, astringent, digestive, laxative, narcotic, ophthalmic and tonic.

673. Singh, C.T.N. & Kumar, J. 2007. "*Stereospermum personatum* Hassk. – A drug plant source for Paharia tribes of Parasnath hills". *Columb. J. Life Sci.* 8(1): 98–99.

Abstract: In this paper, Paharia tribes of Parasnath Hills used different part of *Stereospermum personatum* plant in their daily life. The root bark is considered cooling, diuretic and toxic; flowers with honey checks hiccough and also an aphrodisiac; seeds cure rheumatism and a paste is prepared with fruit and water and applied on forehead for checking headache.

674. Singh, G. & Kumar, J. 2012. "Traditional knowledge on some less known wild edible plants used among Munda tribe of Jharkhand". *The Ecoscan* 6(3&4): 153–155.

Abstract: Jharkhand, one of the main centres of indigenous tribal communities in India, is endowed with rich floristic diversity and ethnobotanical heritage of ancient lineage. The Mundas are the third leading tribe of the state. Ethnically, they are Proto-Austroloids and are considered as the earliest aboriginals of the state. The Munda people are very close to nature; largely depend on forests for their livelihood and have acquired vast knowledge about plant wealth and utilization of forest products. They have hereditary traditional knowledge of consuming wild edible plants as a source of food. It is interesting to note that much of the folk knowledge is endemic. This paper deals with ethnobotanical documentation on some less known wild edible plants, viz., *Antidesma ghaesambilla,*

Indigofera pulchella, Olax scandens, Rivea hypocrateriformis, Atylosia cajanifolia, etc.; which plays a significant role in the sustenance of rural life in this region. The documented information on wild edible plants may serve as the potential sources which could be utilized at the time of scarcity or during normal days or can be cultivated as a source of food material for an ever increasing population.

675. Singh, G. & Kumar, J. 2013. "Studies on traditional knowledge of wild edible climbers among Munda tribe of Khunti district, Jharkhand, India". *J. Ethnobiol. Tradit. Med. Photon 120: 693–700.*

Abstract: The climbers are important but understudied growth form, common in the deciduous forest/vegetation of Khunti district, Jharkhand. They are widely used by the local tribal communities for food and medicines. Khunti district is a tribal dominated region, and Mundas are the dominant tribal community, and considered to be the earliest aboriginals of Jharkhand.

676. Singh, G. & Kumar, J. 2014. "Studies on Indigenous traditional knowledge of some aquatic and marshy wild edible plants used by the Munda tribe of district Khunti, Jharkhand, India". *Int. J. Bioassays* 3(2):1738–1743.

Abstract: Wild plants have provided an important source of food since time immemorial and even in present scenario. The Mundas are the dominant tribal community of Khunti district and are considered as the earliest aboriginals of the state Jharkhand. The Munda people are very close to nature and have hereditary traditional knowledge of consuming aquatic and marshy wild plants and plant parts, viz., tuber, shoots, leaves, fruits, etc. as a source of food. It is interesting to note that much of their folk knowledge is endemic. Although, these wild edible plants play an important role in rural food security, they are mostly ignored during land use planning and implementation, economic development and biodiversity conservation. Moreover, due to modernization of society and change in their lifestyle, indigenous traditional knowledge is rapidly eroding. This paper compiles and evaluates the ethnobotanical data on 17 wild edible aquatic and marshy plants traditionally used in various forms by the Munda tribe. The study is an effort to fulfill a part of the knowledge gap by providing data on the diversity and traditional knowledge as required for People's Biodiversity Register. The documentation of these uncultivated and underutilized wild edible plants will make them popular and can provide an alternative, inexpensive and healthier source of food for an ever increasing population.

677. Singh, G. & Kumar, J. 2015. "Diversity of wild edible yams and its traditional knowledge among Munda tribe of district Khunti, Jharkhand, india". *Int. J. Bioassays* 4(10): 4440–4442.

Abstract: Yams are common name for some plant species in the genus *Dioscorea* (Dioscoreaceae) that forms edible tubers. These are monocotyledonous, perennial, herbaceous vines constituting an important part of the forest flora of district Khunti. The Munda tribe is dominating tribal community of the district. They live in close vicinity of nature. They have indigenous traditional knowledge of identifying and consuming wild edible plants and plant parts as food. This indigenous traditional knowledge is passed on orally from one generation to the other. But due to urbanization, change in the lifestyle, deforestation, unplanned developmental activities, etc., the biodiversity and its associated traditional knowledge is declining at a rapid rate. Therefore, it is necessary to document the traditional knowledge of indigenous tribal people before it is been lost. This paper deals with the ethnobotanical study of nine wild edible *Dioscorea* spp. of the region.

678. Singh, G. & Kumar, J. 2016. "Diversity and traditional knowledge on some less known edible wild herbaceous plant resource from district Khunti, Jharkhand, India." *Int. J. Bioassays* 5(5): 4557–4562.

Abstract: The studies on the importance of wild edible herbaceous species to combat food insecurity and to resource poor household in most of the rural economics of the state Jharkhand had been almost neglected. This is because most of the wild herbaceous species grows in forests, marginal lands or in barren fields, and are considered of no use. The aim of this research paper is to prepare an inventory of some less known wild herbs which are used as edibles by the indigenous Munda tribe of district Khunti. As a result of ethnobotanical study about thirty-two less known edible herbaceous species were recorded. The local people had noted a decline in the availability of these wild herbs and related traditional knowledge, although not much had been done to cultivate them. However, these underutilized wild growing herbs if popularized and cultivated in large scale have the potentiality to combat food scarcity, food insecurity and malnutrition and could eventually raise the socio-economic status of rural households.

679. Singh, H. 2008. Ethno-medicinal plants of Jharkhand, India. In: Patil, D.A. (ed.), *Herbal cures: Traditional Approach*. Aavishkar Publishers, Jaipur. pp. 248–263.

Abstract: The chapter describes some important ethnomedicinal plants of Jharkhand, which are being used by various tribes for the treatment of forty major groups of diseases, disorders and ailments (abortion, asthma, bone fracture, dog bite, ear trouble, epilepsy, eye complaints, fever, gum diseases, headache, jaundice, leprosy, leucorrhoea, miscarriage, pain, piles, post delivery complaints, rheumatism, scorpion sting, skin diseases, veterinary vomiting, vermifuge, weakness, wound and as wormicide). These plant species have been arranged alphabetically in each group along with author citation, parts used and local names in parenthesis.

680. Singh, K.K. & Kumar, K. 1999. "Ethnotherapeutics of some medicinal plants used as antipyretic agents among the tribal of India". *J. Econ. Taxon. Bot.* 23(1): 135–141.

Abstract: The term 'Ethnotherapeutics' refers to the beliefs, claims, herbal medicine preparations and practices in alleviating disease and disorders among the tribals and aboriginal populations. During our ethnobotanical surveys and studies among the tribals and indigenous communities namely Tharu, Kol, Gond, Kharwar, Korwa of Uttar Pradesh and Santhal, Paharia, Oraon, Munda of Bihar, some valuable and less known information were gathered about the ethnomediocinal plants used as antipyretic agents. The indigenous preparations are widely taken in fever, malarial fever and kala-azar. Some of the less known and effective species recorded for this purposes are namely *Andrographis paniculata, Bacopa monnieri, Boerhavia diffusa, Caesalpinia bonduc, Cissampelos pareira, Cyperus scariosus, Hemidesmus indicus, Limnophila gratioloides, Luffa graveolens, Marsdenia tanacissima, Moringa oleifera, Nyctanthes arbor-tristis, Vitex negundo, V. peduncularis, Ziziphus nummularia*, etc. The ethnomedicinal recipes, mode of administration, dosage along with chemical constituents and biological activities of some potential plants are provided in this paper, which would be useful for development of some effective herbal medicine for human welfare.

681. Singh, L.B. & Singh, C.L. 1992. "An Ethno-Medico-Botanical study of Deoghar district (Bihar)". *Biojournal* 4: 83–86.

682. Singh, L.B. & Singh, C.L. 1994. "An ethnobotanical study of Deogarh district (Bihar)". *Higher Plant of India Sub-continent* Vol. III (*Indian J. Forest., Addit. Ser.* VI): 273–279.

Abstract: A preliminary account of 40 medicinal plants along with their correct botanical name, Santhali name, family name, plant parts used and process in specific diseases have been given in the paper.

683. Singh, L.B. & Sinha, S.K. 1991. "Ethnobotany of Paharia tribes of Sahibganj district, Bihar". *Environm. Ecol.* 9(2): 541–543.

Abstract: This paper lists 30 plant species including botanical name, family name and local names and which are used for nutritional, medicinal and miscellaneous purposes by the Paharia tribes of Sahibganj district, Bihar.

684. Singh, L.B., Verma, A.K. & Sinha, S.S.N. 1992. "Preliminary observations on the ethnomedicinal plants of Godda district (Bihar)". *J. Econ. Taxon. Bot., Addit. Ser.* 10: 205–208.

Abstract: Thirty-five plant species of medicinal importance among Paharia tribes of Godda district of Bihar are enumerated along with their botanical and Paharia names, the parts used and method of administration.

685. Singh, M.P. 1987. "Tribal medicinal plants used in animals diseases of Chotanagpur". *Indian Forester* 113: 758–759.

Abstract: Thirteen plants are prescribed to cure different animal diseases in the Chotonagpur area. The data have been collected either from tribal medicine men or from old tribals who are very experienced.

686. Singh, R.K. 1992. *Ethnomedico-botanical study of Magadh Region*. Ph.D. Theses, Magadh University, Bodh Gaya, Bihar (unpublished).

687. Singh, R.K. 2005. "Medicinal plants of Valmiki Tiger Reserve (Bihar)". *J. Econ. Taxon. Bot.* 29(1): 1–17.

Abstract: During the survey tour to Valmiki Tiger Reserve situated in West Champaran district of Bihar, different plants were collected. Among them 113 species have medicinal values. The medicinal importance of these plants is enumerated in this paper.

688. Singh, R.K. & Garg, A. 2014. "*Parthenium hysterophorus* L. – Neither noxious nor an obnoxious weed". *J. Non-Timber Forest Prod.* 21(4): 223–225.

Abstract: The useful properties of *Parthenium hysterophorus* L. in terms of its multifarious utility in medicinal, pharmaceutical, pharmacognostic, cosmetic and agricultural sectors are elucidated and the species is established as a medicinal herb with enormous potential in drug designing for diabetes mellitus and cancer, as well as with wide scale application in cosmetic and nano-technology based industries. One more ethnomedicinal use of this plant in joint pains reported from some districts of Bihar and Uttar Pradesh.

689. Singh, R.K. & Singh, V. 2014. "Ethnomedicinal plants of Valmiki Tiger Reserve, West Champaran district, Bihar, India". *J. Non-Timber Forest Prod.* 21(3): 185–191.

Abstract: The ethnomedicinal uses of 70 plant species belonging to 62 genera and 39 families found in Valmiki Tiger Reserve are provided in this paper. Among 82 ethnomedicinal preparations of the local communities and Tharu, 39 preparations of 36 species are new as they have not been reported in earlier published literature.

690. Singh, R.K. & Singh, V. 2015. "Hitherto unreported ethnomedicinal uses of plants by Tharu tribe of Valmiki Tiger Reserve, West Champaran district, Bihar". *Indian Forester* 141(7): 771–778.

Abstract: The 'Tharu' tribe within and around the vicinity of Valmiki Tiger Reserve mainly depends on the vegetation around them for their daily needs as well as for the treatment of different ailments. The ethnobotanical exploration of Valmiki Tiger Reserve documents the unreported ethnomedicinal uses of 58 plant species belonging to 53 genera and 41 families use by the 'Tharu'.

691. Singh, R.K., Singh, S. & Chowdhery, H.J. 2009. "Medicinal plants used by tribals of Palamau Tiger Reserve, Palamau district, Jharkhand". *J. Non-Timber Forest Prod.* 16(3): 245–248.

Abstract: The paper provides information on some little known medicinal plants used by the tribals of Palamau Tiger Reserve for the treatment of various ailments. Medicinal uses of 49 plant species have been given in the paper.

692. Singh, S. 2013. "Studies on ethnomedicinal plants used in the treatment of menstruation problems in Bermo sub-division of Damodar Basin in Jharkhand". *Advances Pl. Sci.* 26: 251–252.

Abstract: A survey has been made to study the impact of biotic interference on the ethnomedicinal plants of Bermo Subdivision of Damodar basin in Jharkhand. This paper is based on information gathered from the practitioners, local knowledgeable persons, patients and villagers of the tribal sects. Information is collected concerning the use of plants as medicine, and the parts used, mode of preparation of drug, mode of its administration and the doses. The leaf pulp of *Aloe vera,* juice of the plant of *Cynodon dactylon,* fruits powder of *Emblica officinalis,* petals of the flowers of red variety of *Hibiscus rosasinensis* and die bark of the stem of *Terminalia arjuna* as medicines by the tribes of Bermo sub-division of Damodar basin in Jharkhand for different types of menstruation problems. There are also a number of other herbs which have come to light in the recent years with miraculous therapeutic effects. It is hoped that some new and powerful medicines could soon be developed from the above plants that have been used by the tribals.

693. Singh, S. & Chowdhery, H.J. 2005. "Alien medicinal flora of Betla National Park, Palamau district, Jharkhand, India". *J. Non-Timber Forest Prod.* 12(3): 131–133.

Abstract: The paper enumerates 33 exotic angiospermic taxa used by the tribals inhabiting in the Betla National Park, for curing various diseases. The ethnobotanical uses recorded in the paper are hitherto unknown or less known to the world.

694. Singh, S.L., Sharma, H.P., Rawal, A.K. & Kanak. 2009. "Lesser known nutraceutical plants of Bermo sub-division of Damodar basin area of Jharkhand State". *Biospectra* 4(1): 103–108.

Abstract: The paper deals with the nutraceutical plant resources of Bermo subdivision of Damodar basin area. Such plants which meet both nutritional and health security come under the category of nutraceutical terminology. Vegetables play an important role in food and nutritional security for our population. In addition to carbohydrates, proteins and fats vegetables supplement the minerals and vitamins requirement of the body. Of the large numbers of vegetables only 20–25 species are in common use, whereas other

vegetables are either not known to the urban society or one feels inferiority to consume lesser-known vegetables because it is considered poor's diet. The basin area is inhabited by different ethnic groups, who still lead a simple life, generally forest dwellers, very close to nature and derive their requirements from natural resources. They consume large number of lesser-known vegetables which ensures nutritional, health and remedial measures. However, these plant genetic resources and the cultural heritage of the tribes are under various degrees of threats due to rapid modernization. It is therefore, imperative to document the existing information on nutritional and herbal therapy of the plant resources to popularize their consumption in urban society and evolve strategies to generate employment in neglected society and conserve these valuable genetic resources, before it is too late. In this paper 25 plant species of nutraceutical properties are described.

695. Singh, T.N. & Singh, M.P. 2008. "Ethnomedicinal uses of some weeds of Rohtas district (Bihar), India". *Advances Pl. Sci.* 21(2): 607–610.

Abstract: This work relates to the ethnomedicinal study of 53 species of field weeds belonging to 26 families as used by native tribals and local inhabitants of Rohtas disrict of Bihar. These species are mostly used as medicines. Maximum number of medicinal weed species belong to families Asteraceae (8 species), followed by Amaranthaceae (7 species), Euphorbiaceae (5 species), Solanaceae (3 species), Oxalidaceae, Malvaceae, Convolvulaceae, Tiliaceae, Lamiaceae and Fabaceae with 2 species each, and so on. About 9% of taxa are medicinal weed species in Rohtas district of Bihar.

696. Sinha, A. & Gupta, I.P. 2012. "Study of ethnomedicinal plants used against urinary diseases in Ranchi district". *Biospectra* 7(4): 153–156.

Abstract: This article represents traditional use of the plants in the treatment of urinary diseases, found among the people in Ranchi district of Jharkhand. It was found that all the plant parts or extracts used in urinary diseases were applied locally by local tribal and was found to possess good healing property. In this investigation the diversity of medicinal plants of Ranchi district was explored.

697. Sinha, G.N., Pandey, B.N. & Sharma. 1981. "Geographical distribution of ayurvedic medicinal plants in Bihar-I Haritakyedivarga". *Sachitra Ayurveda* 34(1): 30-33.

698. Sinha, R. & Jha, R.K. 2014. "Ethnobotanical investigations on anti-diabetic plants used by tribal inhabitants of Hazaribagh of Jharkhand, India". *Biospectra* 9(1): 243–248.

Abstract: An ethnobotanical study was conducted to collect information about medicinal plants used for the treatment of diabetics and associated complications by tribals in Bishnugarh, Hazaribagh district, Jharkhand. The indigenous knowledge of local traditional healers and tribal healers of Bishnugarh to use native plants for the treatment of diabetics

related health disorders were collected through questionnaire and personal interviews. The study describes the identification of plants and documentation of plants well-known for medicinal values by the virtue of tribal traditional practices. A total of 19 informants within the age group of 42 to 70 were interviewed, among them four were herbal practitioners. Our investigation revealed that, the local medico-botanical knowledge remains pretty specific in the area and the traditional healers, tribal inhabitants use 53 species of plants belonging to 38 families to treat diabetics and related complications. Anti-diabetic medicinal plants used by different tribes have been listed along with preparation of their medicine. This paper showed many medicinal plants from different families of which are purely anti-diabetic potential.

699. Sinha, R. & Lakra, V. 2007. "Edible weeds of tribals of Jharkhand, Orissa and West Bengal". *Indian J. Tradit. Knowl.* 6(1): 217–222.

Abstract: An extensive survey was carried out among ten ethnic groups in Jharkhand, Odisha and West Bengal of eastern India to document edible plants, which grow as weeds in their agricultural and non-agricultural fields. Data were collected through PRA exercises and interview schedules covering 8 districts, 10 community development blocks and 12 villages. The study identifies 43 species of weeds belonging to 36 genera and 26 families that are commonly consumed by the tribal population as per their availability. The habit, season as well as place of procurement and edible part of these plants have been discussed.

700. Sinha, R., Lakra, V. & Mahanta, P. 2007. "Traditional use of plants in curing stomach ailments by tribals of Jharkhand, Orissa and West Bengal". *J. Dairying, Foods & Home Sci.* 26(3&4): 223–225.

Abstract: Treatment of diseases with medicinal plants among tribals is widespread because of effectiveness, easy availability, lack of modern heath care alternatives, cultural preferences and century old association, emaciation with the plant and in this study, an attempt was made to document these indigenous knowledge of ten ethinic groups of Jharkhand, Odisha and West Bengal. Altogether 22 plant species have been reported to be used by the tribals of this region since long time for curing stomach aliments. Of 22 plant species, 12 are used for stomach pain, 8 for gastric trouble and 2 species are used for worms.

701. Sinha, R.K. & Nathwat, G.S. 1989. "Medicinal plants and plant products used by the street herbal vendors in the treatment of poliomyelitis in children". *J. Res. Educ. Indian Med.* 8: 23–26.

702. Sinha, R.K. & Nathwat, G.S. 1991. "Plants and plant products used in the treatment of some respiratory disorder by the street herbal vendors". *J. Sci. Res. Pl. Med.*10: 1–5.

703. Sinha, S.K. & Chandra, R. 2011. "Medico-ethnobotanical study of Madhubani district, Bihar. *Biospectra* 6(1):131–134.

Abstract: Ethno-medico-botany has greater role in modem period. This paper contains some ethno-medico plants of Madhubani district. Extensive ethno-medico explorations have been conducted in several remote areas of Madhubani district during the year of 2001–2002. Accumulated information on 20 medicinal plants species used to relieve various elements among people residing in the remote villages of Madhubani district has been obtained.

704. Srivastava, A.K. 2015. "Traditional knowledge of plants: Unconventional wisdom of an ethnobotanist of a Khunti village". *Int. J. Sci. Res.* 4(7): 421–424.

Abstract: The village Bichna is located in the Khunti district of Jharkhand state which lies in the north eastern part of the Deccan Plateau. This village is flush with flora and fauna at its diverse best. An octogenerian herbalist, Mr. James Kiro was a renowned for his magnanimous knowledge of plants and their unconventional potentials as herbal cures. For instance, use of *Moringa* plant parts in the treatment of twenties of diseases including eye sores, papaya in sprain, Mustard in the treatment of block in the nose due to cold, cold, feel heavy in the head, back pain, epilepsy, garlic in ulcer, banana stem juice in vomiting, mango in body pain, jackfruit in tuberculosis, etc. He had a similar list of about thirty common plants using which he cured about all the diseases of people in the locality. The idea behind this work is to keep the good work of Mr. Kiro and similar other traditional herbalist alive even after these wise men go away and to apprise the society and younger generations of this knowledge and give them the confidence to go for a traditional way to good health. The reasons for this study are manifold. One, the outside world is oblivious of their wisdom. Two, the extent of their knowledge on food and medicine supplementing plants would mean a lot to the outside world. Above all, since the knowledge is being passed on to the generations only orally, it is under threat. Thus eventually perhaps, they will be taken over by the spree of modernization of the outside world and lose all the knowledge or they would lose their existence fighting the outside world.

705. Srivastava, A.K., Kumari, S. & Kumari, B. 2007. "Identification and medicinal value of some potherbs sold in dry form in haats of Ranchi, Jharkhand, India". *Biospectra* 2(2): 293–296.

Abstract: Several biweekly and daily haats (small market with rural look) are a regular feature of Ranchi. Villagers, specially the tribals, from surrounding areas come here to sell agricultural and forest produces. One can easily notice that some potherbs are sold here in dry form. These dry plants serve as diet supplements for the poor who cannot afford the cost of fresh vegetables. The specific taste of these sag provide an off

season satisfaction to the palate of rural folks .They have immense medicinal value and serve also as diet supplement for the locals. In this study, such potherbs are identified and information about their medicinal value has been compiled.

706. Srivastava, D.K. & Varma, S.K. 1981. "An ethnobotanical study of Santhal Pargana, Bihar". *Indian Forester* 107: 30–41.

Abstract: In this paper, a total of 110 species of vascular plants of ethnobotanical interest are reported, of which 80 species are of with medicinal value, 18 of food value, and the rest of miscellaneous uses. It was observed that many of the uses and local names of the plants reported by the tribals are new or hitherto unrecorded.

707. Srivastava, J.G. 1958. Useful Plants of Bihar. State Gazetteer of Bihar. Government Press, Patna.

708. Suresh, G. & Kujur, S. 2009. "Therapeutic values of some important medicinal plants of Jamshedpur, Jharkhand, India". *Advances Pl. Sci.* 22(2): 579–581.

Abstract: This paper deals with 35 medicinal plants of Jamshedpur, a well-known steel city of India, located in East Singhbhum district of the state of Jharkhand. Therapeutic values of these plants have also been described in detail.

709. Suresh, G. & Kujur, S. 2011. "Biodiversity of certain medicinal plants of East Singhbhum, Jharkhand, India". *Biospectra* 6(2): (Special Issue): 215–222.

Abstract: Ayurveda means the science of life. Ayurvedic medicine is a system of traditional medicine native to the Indian subcontinent. In this system, different parts of various medicinal plants are used singly or in different combinations for the prevention as well as cure of various diseases. Due to systematic loss of biodiversity including that of precious medicinal plants in recent times, enlisting the existing medicinal plants location-wise and promoting their cultivation by the local populace has become all the more important today. This will lead to the upliftment of local communities through improving their health and enhancing their monetary and other benefits. It was with this motive that this work of enumerating the medicinal plants of East Singhbhum, Jharkhand was undertaken. Out of more than a hundred medicinal plants enumerated during the course of the study, names of 50 plants are being given in this paper, along with their actions, for creating awareness and for motivating people to cultivate them on a small scale in homes for personal use or on a large scale for commercial purposes.

710. Tarafder, C.R. 1983. "On two less known and unknown edible plants used by the tribals in Hazaribagh district of Bihar". *Folklore* 24: 88–89.

711. Tarafder, C.R. 1983. "Ethnobotanical observation on Nisinda". *Folklore* 24: 170–174.

712. Tarafder, C.R. 1983. "Ethnogynaecology in relation to plants. Part – I. Plants used for antifertility and conception". *J. Econ. Taxon. Bot.* 4(2): 483–489.

Abstract: In this paper 31 plant species distributed under 29 genera of 23 families have been discussed which are used for antifertility purposes. Another 10 plant species under 10 genera of 8 families have also been discussed in relation to conception. Most of the information have been collected from tribal areas of Hazaribagh and Ranchi districts and are indicated by mentioning field collection numbers after the prescription of each species and a little information have also been incorporated from published books and journals.

713. Tarafder, C.R. 1983. "Ethnogynaecology in relation to plants. Part – II. Plants used for abortion". *J. Econ. Taxon. Bot.* 4(2): 507–516.

Abstract: During ethnobotanical field studies among the Santhals, Oraons, Mundas, Birhore, Bedia Mohatos, Kurmi Mahatos, etc. of Hazaribagh and Ranchi districts of Bihar, the author has come across some plants which are used for abortion, not commonly known to others. A total of 74 indigenous plant species belonging to 61 genera under 38 families are used by the adhivasis for abortion. The botanical names, family name, tribal medicinal uses are incorporated. Two types of information are given in this paper, viz., tribal reporting in the filed and from published literature. The mode of uses is discussed in detail.

714. Tarafder, C.R. 1983. "Traditional medicinal plants used by the tribals of Ranchi and Hazaribagh districts, Bihar – Plants used in stomach troubles". *J. Econ. Taxon. Bot.* 4(3): 891–896.

Abstract: The paper deals with 40 plant species used in stomach trouble by tribals of Ranchi and Hazaribagh districts of Bihar state. Local name, locality and mode of uses of these plant species have been mentioned.

715. Tarafder, C.R. 1984. "Medicinal plants traditionally used by the tribals of Ranchi and Hazaribagh districts, Bihar: Skin diseases and sores". *Bull. Bot. Surv. India* 26(3 & 4): 149–153.

Abstract: The paper deals with about 45 species of medicinal plants belonging to 43 genera and 31 families. Species used in the treatment of skin diseases and sores are listed with their uses.

716. Tarafder, C.R. 1984. "Less known nine medicinal plants used by the tribals for curing gonorrhoea in Ranchi and Hazaribagh districts, Bihar". *Folklore* 25: 47–49.

717. Tarafder, C.R. 1984. "Ethnogynaecology in relation to plants. III. Plants used to accelerate delivery and pre and post natal care". *J. Econ. Taxon. Bot.* 5: 572–576.

Abstract: Ethnogynaecological uses of plants by the tribals of Ranchi and Hazaribagh districts in Bihar have been presented in this paper. Plants used in accelerating delivery, pre & post natal complaints and for safeguard against miscarriage have been discussed.

718. Tarafder, C.R. 1984. "Less known ten medicinal plants are used by the tribals of bringing taste to a sick person in Hazaribagh district, Bihar". *Vanyajati* 32: 9–11.

719. Tarafder, C.R. 1984. "Less known twenty three medicinal plants used by the tribals for curing boils in Ranchi and Hazaribagh districts, Bihar". *Vanyajati* 32: 14–19.

720. Tarafder, C.R. 1985. "*Acacia catechu* Willd. (Fabaceae) indigenous and less known uses of the plants". *Folklore* 26(8):158–159.

721. Tarafder, C.R. 1986. "Ethnobotany of Chhotanagpur. (Less known and unknown 38 medicinal plants used by the tribals)". *Folklore* 27: 119–125.

722. Tarafder, C.R. 1986. "Ethnobotany of Chotanagpur (Bihar): Less known and unknown 38 medicinal plants used by the tribals". *Folklore* 27: 119–124.

723. Tarafder, C.R. 1987. "Some traditional knowledge about tribal healths of Hazaribagh and Ranchi districts". *Folklore* 28(2): 37–42.

724. Tarafder, C.R. & Rai Chaudhari, H.N. 1981. Less known medicinal uses of plants among the tribals of Hazaribagh district, Bihar. In: Jain, S.K. (ed.), *Glimpses of Indian Ethnobotany*. Oxford & IBH Publishing Co., New Delhi. pp. 208–217.

Abstract: The chapter deals with 50 less-known medicinal uses of plants, which are neither recorded earlier in the published literature nor known to other. The mode of usage and the doses prescribed are discussed in detail.

725. Thakur, M.J., Mishra, I.N. & Chaudhary, B.K. 1992. "Ethno-botanical studies of some plants of Madhubani district (Bihar)". *J. Econ. Taxon. Bot.* 16(2): 383–390.

Abstract: In Bihar, Madhubani district is very rich in different medicinal flora, but relatively unexplored due to prevalence of allopathic as well as homeopathic medicines. But still in the different villages where the illiterates are more in number and proverty is of highest degree and where there is no facility of hospitals and doctors as well as road services to the nearby towns, the people are using different plants for their medicinal uses. In the first part of this paper, 32 medicinally important plants used by the people of different villages for ailments have been described.

726. Tirkey, S.S. & Kandir, K. 2016. "Ethnomedicinal plants used against mental disorder among children of Jharkhand". *Ranchi Univ. J. Sci. & Technol.* 4(1): 61–62.

Abstract: Plants and the plant parts are used traditionally among the tribal societies of India since time immemorial. The ethnomedicinal plants are used by the traditional

communities for curing various diseases namely cancer, diabetes, asthma, epilepsy, insomnia, etc. Nowadays mental diseases are very common in all age groups, including children. Neuropsychiatric diseases such as enuresis, encopresis, pica, tic and hyperkinetic disorder are very common among children. Some plants namely *Ocimum sanctum, Mirabilis jalapa, Bacopa monnieri, Centella asiatica*, etc. are very common and used against mental diseases among children. Mental diseases are completely curable from ethnomedicine.

727. Tiwary, M. 1992. *Ethnobotanical study of Aurangabad district*. Ph.D. Thesis, Magadh University, Bodh Gaya, Bihar (unpublished).

728. Topno, K.K. 1997. "Plants used by tribals of Chotanagpur against diabetes". *The Botanica* 47: 99–101.

Abstract: Chotanagpur plateau has been the reservoir of enormous natural resources including vegetational wealth. The population of the area has distinct traditions and taboos in their lives. Likewise, local people have certain traditions to cure prevailing human ailments. First hand information on 21 medicinal plants and their mode of therapeutic action has been gathered from tribal medicine-men and other experienced tribals. Some of the important medicinal plants widely used by the tribals for the treatment of diabetes are: *Annona squamosa, Catharanthus roseus, Emblica officinalis, Syzygium cumini, Diospyros melanoxylon* and *Ficus racemosa*.

729. Topno, S. & Ghosh, T.K. 1999. "Correlation of uses of medicinal plants by tribals of Chotanagpur with other tribals of India". *J. Econ. Taxon. Bot.* 23(1): 143–146.

Abstract: The ethnomedicinal uses of some plants by the Munda tribe of Chotanagpur have been studied. First hand information of medicinal uses of the plants has been gathered from various tribal medicine men. In this communication, five plant species namely *Cajanus scarabaeoides* (L.) du Petit, *Calotropis gigantea* (L.) R. Br., *Celastrus paniculata* Willd., *Helicteres isora* L. and *Plumbago zeylanica* L. are selected for the correlation of the medicinal uses in Chotanagpur with that of the other tribals of the various parts of the country. The study has revealed the fact that medicinal uses of these plants vary from place to place. This will help phytochemists and pharmacologists to determine their true therapeutic compounds.

730. Trebedi, G.N. 1986. "Ethnobotany of Chotanagpur (Bihar)". *Folklore* 27: 119–124.

731. Trebedi, G.N., Molla, H.A. & Pal, D.C. 1985. "Some use of plants from the tribal areas of Chotanagpur, Bihar". *Nagarjun* 29: 15–18.

732. Trebedi, G.N., Molla, H.A. & Pal, D.C. 1987. "Some traditional knowledge about tribal health (plants used by the tribals of Hazaribagh and Ranchi districts)". *Folklore* 28(20): 37–42.

733. Trebedi, G.N., Molla, H.A. & Pal, D.C. 1987. "Some traditional knowledge about tribal health (Plants used by the tribals of Hazaribagh and Ranchi districts)". *Folklore* 28: 37–42.

734. Tripathi, K.P., Rawat, A.K.S. & Mehrotra, S. 2008. "Exploration, distribution and ethnobotanical studies on some important medicinal plants used by the tribals of Ranchi district, Jharkhand". *J. Non-Timber Forest Prod.* 15(4): 271–274.

Abstract: An ethnobotanical field survey was carried out in Ranchi district of Jharkhand. It was observed that tribals are totally depending upon the forest and forest products for their day-to-day requirements such as food, fodder and medicine, etc. The areas surveyed are rich in biodiversity, particularly with medicinal plants. The paper deals with 36 plants species used very commonly as medicine among the tribals of Ranchi district.

735. Uniyal, M.R. 1995. *Bihar ke Adivasi evam Jari Bootiyan*. Sree Baidyanath Ayurveda Bhawan Pvt. Ltd. Publication, Patna.

736. Upadhyay, O.P., Kumar, K. & Tiwari, R.K. 1998. "Ethnobotanical study of skin treatment uses of medicinal plants of Bihar". *Pharmaceut. Biol.* 36: 162–172.

737. Varma, S.K. & Pandey, A.K. 1990. "Ethnobotanical notes on certain medicinal plants used by the tribals of Lohardaga district, Bihar". *J. Econ. Taxon. Bot.* 14(2): 329–333.

Abstract: An ethnobotanical survey of the tribals of the Maidanpat and adjoining areas of Lohardaga district, Bihar has been made. A total of 32 plant species have been recorded, which are used by the local people for the cure of various ailments. Information on local names, parts used, doses and method of administration for each species is given.

738. Varma, S.K., Srivastava, D.K. & Pandey, A.K. 1999. *Ethnobotany of Santhal Pargana*. Narendra Publishing House, New Delhi.

739. Verma, S.K. 1997. "Comparative studies on folk drugs of tribals of Chotanagpur and Santhal Pargana of Bihar, India". *Ethnobotany* 9: 70–76.

Abstract: Comparative studies have been made on folk drugs of Santhal, Paharia, Munda and Uraon for asthma, boils and ulcers, bone fracture, birth control, cholera, cough and cold, dysentery, eczema, epilepsy, fever, piles, snake bite and tuberculosis. The data gathered have been pooled and presented in tabular form. It is interesting to note that much of folk knowledge is endemic to a particular tribe, as the plants used by them vary in their identity, content and application for the same disease. This indicates that these tribes have retained their own traditions so far as treatment is concerned or possibly because different plants may possess the same ingredients. It is, therefore, suggested

that correct evaluation of the medicinal efficacy of these plants should be done and it should be ensured that their toxic ingredients, if any, arc eliminated or minimized. This will help in integration of tradition with modern system of medicine, thus making science out of folk medicine.

740. Vidhyarthy, A.K. & Gupta, H.S. 2004. "Ethno-medicinal study of some important plants of Jharkhand and their conservation". *Indian Forester* 130(2): 149–156.

Abstract: The increasing demand of medicinal plants has resulted in the rapid dwindling of these natural resources and there is a urgent need of systematics and conservation and sustainable production of medicinal plants involving local communities, university students and developmental field groups with stronger linkages for collaborative work to meet future demand on a suitable manner. There are some plants which are a panacea for most human ailments. Their documentation is the need of the hour. Also suitable propagation techniques are to be developed like tissue culture. In light of this, it is essential to have an interface between traditional trends and modern concept of production, marketing and technology of this important resource. Creating awareness and proper networking on the medicinal properties of these indigenous plants, which we very often encounter in our daily life, through dissemination of research data with extension activities will go a long way in conserving nature's priceless gift.

741. Yadav, D.K., Dayal, S., Prasad, S.N. & Shanker, U. 1997. "Medico-ethnobotanical study of Central Bihar". *J. Swamy Bot. Club* 14: 142–143.

ABBREVIATION OF TITLES OF PERIODICALS/ PROCEEDINGS

The titles of journals have been standarised following Botanico-Periodicum-Huntianum (Lawrence & al., 1968), B-P-H/Supplementum (Bridson & Smith, 1991) and BPH2: Periodicals with Botanical Content (Bridson, 2004). The journals which are not in BPH and its Supplements have been abbreviated as suggested in the journals, or as per the rules of B-P-H.

Advances Pl. Sci.	:	Advances in Plant Sciences
Ancient Sci. Life	:	Ancient Science Life
Ann. Pharm. & Pharmaceut. Sci.	:	Annals of Pharmacy and Pharmaceutical Sciences
Acta Bot.	:	Acta Botanica
Acta Bot. Indica	:	Acta Botanica Indica
Amer. J. PharmTech Res.	:	American Journal of PharmTech Resesearch
Aquatic Bot.	:	Aquatic Botany
Bangladesh J. Bot.	:	Bangladesh Journal of Botany
Biblioth. Phycol.	:	Bibliotheca Phycologica
Bioglobia	:	Bioglobia
Biojournal	:	Biojournal
Biosci. Disc.	:	Bioscience Discovery
Biospectra	:	Biospectra
Botanique	:	The Botanique
Bot. Reg.	:	The Botanical Register
Bull. Bihar Tribal Res. Inst.	:	Bulletin of Bihar Tribal Research Institute
Bull. Bot. Soc. Bengal	:	Bulletin of the Botanical Society of Bengal
Bull. Bot. Surv. India	:	Bulletin of the Botanical Survey of India (Vol. 1–50, 1959–2009. Superseded by: Nelumbo)
Bull. Med.-Ethno-Bot. Res.	:	Bulletin of Medico-Ethno-Botanical Research
Bull. Torrey Bot. Club	:	Bulletin of the Torrey Botanical Club
Check List	:	Check List
Chromosome Bot.	:	Chromosome Botany
Columb. J. Life Sci.	:	Columban Journal of Life Science
Cryptog. Algol.	:	Cryptogamie- Algologie
Curr. Sci.	:	Current Science
East. Anthropol.	:	The Eastern Anthropologist
Ecol. Food Nutr.	:	Ecology of Food and Nutrition
Econ. Bot.	:	Economic Botany
Environm. Ecol.	:	Environment and Ecology

ENVIS Newslett.	:	ENVIS Newsletter
Ethnobotany	:	Ethnobotany
Feddes Repert.	:	Feddes Repertorium
Folklore	:	Folklore
Geobios (Jodhpur)	:	Geobios; an international (bimonthly) journal of life sciences. Jodhpur
Geobios, New Rep.	:	Geobios, New Reports
Geophytology	:	Geophytology
Indian Fern J.	:	Indian Fern Journal
Indian Folklore	:	Indian Folklore
Indian Forest Rec., Bot.	:	Indian Forest Records. New Series, Botany
Indian Forest. Rec., Sylvic.	:	Indian Forest Records. New Series, Sylviculture
Indian Forester	:	The Indian Forester
Indian J. Forest.	:	Indian Journal of Forestry
Indian J. Forest., Addit. Ser.	:	Indian Journal of Forestry, Additional Series
Indian J. Pl. Sci.	:	Indian Journal of Plant Sciences
Indian J. Tradit. Knowl.	:	Indian Journal of Traditional Knowledge
Int. J. Advances Pharma. Biol. & Chem.	:	International Journal of Advances in Pharmacy, Biology & Chemistry
Int. J. Bioassays	:	International Journal of Bioassays
Int. J. Biol. Sci. & Eng.	:	International Journal of Biological Science and Engineering
Int. J. Crude Drug Res.	:	International Journal of Crude Drug Research
Int. J. Curr. Microbiol. Appl. Sci.	:	International Journal of Current Microbiology and Applied Sciences
Int. J. Curr. Res.	:	International Journal of Current Research
Int. J. Integr. Sci., Innov. & Technol.	:	International Journal of Integrative Sciences Innovation and Technology
Int. J. Life Sci. & Pharma Res.	:	International Journal of Life Science & Pharma Research
Int. J. Mendel	:	International Journal of Mendel
Int. J. Pharmacogn.	:	International Journal of pharmacognosy
Int. J. Recent Trends Sci. & Technol.	:	International Journal of Recent Trends in Science and Technology
Int. J. Sci. Res.	:	International Journal of Scientific Research
Int. J. Sci. Res. Publ.	:	International Journal of Scientific Research Publication
Int. J. Sci., Environm. & Technol.	:	International Journal of Science, Environment and Technology

Int. Res. J. Pharma.	:	International Research Journal of Pharmacy
J. Asiat. Soc. Bengal	:	Journal of Asiatic Society of Bengal
J. Bengal Nat. Hist. Soc.	:	Journal of Bengal Natural History Society
J. Bombay Nat. Hist. Soc.	:	Journal of the Bombay Natural History Society
J. Dairying, Foods & Home Sci.	:	Journal of Dairying, Foods & Home Sciences
J. Econ. Taxon. Bot.	:	Journal of Economic and Taxonomic Botany
J. Econ. Taxon. Bot., Addit. Ser.	:	Journal of Economic and Taxonomic Botany Additional Series
J. Ethnobiol. Tradit. Med. Photon	:	Journal of Ethnobiology Traditional Medicine Photon
J. Haematol. & Ecotoxicol.	:	Journal of Haematology & Ecotoxicology
J. Indian Bot. Soc.	:	The Journal of the Indian Botanical Society
J. Jap. Bot.	:	The Journal of Japanese Botany
J. Linn. Soc. London	:	Journal of the Linnean Society London
J. Mendel	:	Journal of Mendel
J. Natl. Bot. Soc.	:	Journal of the National Botanical Society
J. Non-Timber Forest Prod.	:	Journal of Non-Timber Forest Products
J. Pharmacogn. Phytochem.	:	Journal of Pharmacognosy and Phytochemistry
J. & Proc. Asiat. Soc. Bengal	:	Journal and Proceedings of the Asiatic Society of Bengal
J. Ranchi Univ.	:	Journal of Ranchi University
J. Res. Educ. Indian Med.	:	The Journal of Research and Education in Indian Medicine
J. Roy. Asiat. Soc. Bengal	:	Jounal of the Royal Asiatic Society of Bengal
J. Sci. Res. Pl. Med.	:	Journal of Science and Research of Plant and Medicine
J. Threat. Taxa	:	Journal of Threatened Taxa
J. Trop. Forest.	:	Journal of Tropical Forestry
J. Swamy Bot. Club	:	Journal of Swamy Botanical Club
Mem. Asiat. Soc. Bengal	:	Memories of Asiatic Society of Bengal
Nagarjun	:	Nagarjun
Nat. Environm. & Pollut. Technol.	:	Nature Environment and Pollution Technology
Nelumbo	:	Nelumbo (Vol. 51+, 2010+. Preceded by: Bulletin of the Botanical Survey of India)
New Botanist	:	New Botanist
Pharmaceut. Biol.	:	Pharmaceutical Biology
Phykos	:	Phykos
Phytodiversity	:	Phytodiversity
Phytotaxonomy	:	Phytotaxonomy

Planta	:	Planta
Proc. Asiat. Soc. Bengal	:	Proceedings of the Asiatic Society of Bengal
Proc. Bihar Acad. Agric. Sci.	:	Proceedings of Bihar Academy of Agricultural Science
Proc. Indian Sci. Congr.	:	Proceedings of Indian Science Congress
Proc. Natl. Acad. Sci. India	:	Proceedings of National Academy of Science, India
Quart. J. Crude Drug Res.	:	The Quarterly Journal of Crude Drug Research
Ranchi Univ. J.	:	Ranchi University Journal
Ranchi Univ. J. Sci. & Technol.	:	Ranchi University Journal of Science and Technology
Rec. Bot. Surv. India	:	Records of Botanical Survey of India
Rheedea	:	Rheedea
Sachitra Ayurveda	:	Sachitra Ayurveda
The Biobrio	:	The Biobrio
The Bioscan	:	The Bioscan
The Botanica	:	The Botanica
The Ecoscan	:	The Ecoscan
The Socioscan	:	The Socioscan
Trans. Mining & Geol. Inst. India	:	Transaction of the Mining and Geological Institute of India
Trop. Ecol.	:	Tropical Ecology
Vanyajati	:	Vanyajati
Videha	:	Videha
ZOO's Print	:	ZOO's Print

AUTHOR INDEX WITH ABSTRACT NUMBER IN PARENTHESIS

Vegetation around Telhar Kund, Kaimur Wlidlife Sanctuary, Bihar

View of Palkot Wildlife Sanctuary, Jharkhand

Gomphia obtusifolia

Sterculia foetida

Ceropegia hirsuta

Echinops echinatus

Lagerstroemia parviflora