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BIBLIOGRAPHY AND ABSTRACTS OF PAPERS ON FLORA OF WEST BENGAL – II

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BOTANICAL SURVEY OF INDIA

Botanical Survey of India
Ministry of Environment & Forests

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Compiled by

Soumen Gantait
Subir Bandyopadhyay
&
P. Lakshminarasimhan
of
ENVIS Centre on Floral Diversity
under ENVIS Programme

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- Statistical Advisor : Mr. Nilkanth Ghosh
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- Website : http://www.envis.nic.in

ENVIS CENTRE ON FLORAL DIVERSITY
Botanical Survey of India

- Eastablished : April, 1994
- Study area : Floral Diversity
- Director/ BSI : Dr. M. Sanjappa
- Contact Person : Dr. P. Lakshminarasimhan
  Scientist 'D', Central National Herbarium &
  In-charge, ENVIS Centre
- Address : Botanical Survey of India
  Central National Herbarium
  P.O. Botanic Garden
  Howrah 711 103
- Telephone : (033) 2668 0667, (033) 2668 7091
- Fax : (033) 2668 6226
- E-mail : envis@cal2.vsnl.net.in; bsi@envis.nic.in
- Website : http://www.bsienvis.nic.in

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FOREWORD

The ENVIS Centre on Floral Diversity has been publishing State wise Bibliography and Abstract series to facilitate researchers to have a glance on the scattered literature on the rich and diverse flora of India. It has so far brought out two such publications viz., Bibliography and related Abstracts on Flora of West Bengal (439 references) in 2008 and on Flora of North East India–I (564 references) in 2009.

The state of West Bengal with an area of ca 89 lakh sq. km is spread across varied altitudes from sea-coast to alpine Himalayas and the vegetation types vary accordingly from littoral forests of Sundarbans to luxuriant moist deciduous forests in the foot hills of Himalayas and upwards graduating to temperate and alpine types."Bengal Plants" by David Prain is a consolidated account on the State flora published in 1903. Population growth coupled with rapid urbanization and fast changing land use has its impact on floral components. Efforts have been initiated for revising the 'Flora of West Bengal' which is planned for 5 volumes; one of them has already been released. Also 5 volumes of "Paschim Banglar Udvid" have been published. Bibliography and Abstracts of Papers on Flora of West Bengal–II, which is a continuation of the earlier one, is a compilation of nearly 366 publications on various aspects of the floristic diversity. This compilation would serve the expected needs of the academic community. An electronic version of this publication will be made available in BSI, ENVIS website (www.bsienvis.nic.in).

Botanical Survey of India
Kolkata

(M. Sanjappa)
Director

1. **Acharjee, S.K., Ghosh, U., Biswas, A. & Murah, A.K. 2004.** "A study on the perceived benefits of farm forestry in terms of some socio-economic and motivational correlates in Cooch Behar district of West Bengal". *Indian Forester* 130(3): 333-339.

   Abst.- The propagation and sustenance of farm forestry in a given social context depends largely on the way the people of that social system perceive its total benefits- an accumulation of biotic, abiotic and social benefits. Thus, the present study in the district of Cooch Behar, West Bengal, envisaged to identify and assess some factors influencing and characterizing the perceived value of benefits of farm forestry. It was observed that the factors: operational holding, land under farm forestry, women's participation and information use index, substantially influenced the consequent variable, perceived benefits of farm forestry. The path analysis evinced that the variable land under farm forestry wielded the highest direct effect and the variable women's participation had channelled the highest number of largest indirect effects to influence the perceived benefits of farm forestry.

2. **Acharya, Jayashree, Banerjee, Dalia & Mukherjee, Ambarish. 2009.** "A contribution to the study of Commelinaceae R. Br. in Darjeeling- Sikkim Himalayas". *Pleione* 3(1): 18-27.

   Abst.- The present work records 21 species representing 11 genera of Commelinaceae R. Br. from Darjeeling-Sikkim region. *Commelina* L. is the most dominant genus with six species. Artificial keys to the identification of the genera and species have been provided along with brief phytogeography and flowering and fruiting periods, distribution and exsiccatae of the species.

3. **Acharya, Krishnendu & Acharya, Rupa. 2001.** "*Cyathus* and *Geastrum*- An addition to Darjeeling mycoflora". *Indian Forester* 127(8): 950-952.

   Abst.- *Cyathus* Haller ex Pers. (Gasteromycetes: Nidulariales) and *Geastrum* Pers. (Gasteromycetes: Lycoperdales) have been reported for the first time by the authors from the adjoining areas of Darjeeling town.

4. **Acharyya, Abhijit & Das, A.P.** (**1998) 2001.** "Seven new angiospermic hosts for *Orobanche aegyptiaca* Pers. (Orobanchaceae)". *Bull. Bot. Surv. India* 40(1-4): 99-101.

   Abst.- Seven new hosts of *Orobanche aegyptiaca* Pers. were recorded from the district of Malda, West Bengal, namely *Cicer arietinum* (cultivated), *Fumaria indica, Argemone mexicana, Leucas indica, Launaea aspleniifolia, Vernonia cinerea* and *Digitaria ciliaris* (all weeds). From the comparison of ten major morphological characters *Launaea aspleniifolia* appeared as most preferred host followed by *Cicer arietinum*, whereas *Argemone mexicana* is the weakest host.

5. **Adhikary, H.K. & Chatterjee, S.K. 1972.** "Vegetative and reproductive growth of eight commonly growing weeds in coal fields and industrial areas of Burdwan, West Bengal. II. Effect of competition". *Bull. Bot. Soc. Bengal* 26(1): 105-109.

   Abst.- Interspecific competition decreased the amount of root and shoot growth and increased the time requirement for flowering and fruiting as also of senscence in all the eight species. *Desmodium triflorum* DC. and *Tribulus terrestris* Linn. could not establish themselves in competition field. Abscission of leaves was remarkably delayed in interspecific competition plots. With the exception of *Malachra capitata* Linn., the inhibition of flowers and fruits formation has been prominently reflected in all other plant species. The phenomenon of disappearance of some particular weeds in competition plots is interesting in view of the fact that it might afford means to eliminate the weeds that are not wanted at all.

6. **Agrawala, D.K. & Chowdhery, H.J. 2008.** "On the taxonomy and occurrence of *Nephelaphyllum sikkimensis* (Hook. f.) Karthik. (Orchidaceae)". *J. Orchid Soc. India* 22(1&2): 1-4.

   Abst.- Nomenclatural status, morphology and distribution of *Nephelaphyllum sikkimensis*

(Hook. f.) Karthik. is discussed. The present report is from the type locality (Kalimpong to Lava, Darjeeling dist.) and is collected after a gap of more than 100 years.

7. **Ali, Md. H. & Banerjee, B.N. 2008.** "Some economic aspects of marketing of rose flower in West Bengal- A case study". *J. Interacad.* 12(3): 393-399.

Abst.- Rose flower is traditionally grown in Midnapur (East) district of West Bengal. Panskura-I and Panskura-II of Midnapur (East) is purposely selected. This flower is mainly marketed through Mullickghat Market of Kolkata. Highest price is noted in the month of December and the lowest in the months of January to March. Producer's share in consumer's rupee varies from 40 per cent to 60 per cent. Retail price levels, i.e. maximum and minimum have considerable effect on trader's profit as wide variation between two price levels are recorded.

8. **Ali, Md. H. & Banerjee, B.N. 2008.** "Marketing aspects of Chinese rose flower in West Bengal- A case study". *J. Interacad.* 12(4): 568-574.

Abst.- Chinese rose, a perennial flower, has more or less constant demand throughout the year as this flower is essential for worshipping Goddess *Kali*. The demand increases to its peak during the months of October/November and wholesale price also attains its maximum. Producer sellers have fetched higher profit at maximum price level than other that of traders which has compensated their loss incurred minimum price level. Wide difference in profit margins at and loss incurred by producer-sellers calls for development of post-harvest technology or processing technology.

9. **Ansari, A.A. (2008) 2009.** "*Lindera cercidifolia* Hemsl. (Lauraceae)- A new record for India". *Bull. Bot. Surv. India* 50(1-4): 156.

Abst.- *Lindera cercidifolia* Hemsl. has been recorded from India for the first time from Darjeeling district, West Bengal.

10. **Awasthi, Dharani Dhar & Agarwal, Manjoo Rani. 1970.** "An enumeration of lichens from the tropical and subtropical regions of Darjeeling district, India". *J. Indian Bot. Soc.* 49(1-4): 122-135.

Abst.- The paper outlines the distributional patterns of the lichens found in the subtropical-tropical parts of the district of Darjeeling. A total of 158 species have been found to occur in the area. Out of the enumerated species there are seven species which are being reported from the country for the first time.

11. **Bag, A.K., Singh, S.K. & Bhattacharya, S.G. 2007.** "*Riccia* of West Bengal". *Bull. Bot. Surv. India* 49(1-4): 173-186.

Abst.- Six species of the genus *Riccia*, from West Bengal have been studied critically from histomorphological point of view. Of them, *Riccia plana* Taylor is a new record for Gangetic Plains and two species viz., *Riccia crispatula* Mitt. and *Riccia cruciata* Kashyap are recorded for the first time from West Bengal. Relationship among the species have also been studied and discussed on the basis of computed Dendogram.

12. **Baksi, Sudhendu Kumar & Deb, Urmila. 1980.** "Palynostratigraphic zonation of the upper Cretaceous-Paleogene sequence of Bengal Basin". *Geophytology* 10(2): 199-224.

Abst.- Eight distinct palynological biostratigraphic zones in the subcrop Upper Cretaceous-Paleogene sequence of Bengal Basin have been recognized, all of which are assemblage zones. The main emphasis for the palynological breakdown has been laid on the data available from the deep test wells Jalangi-1, Bolpur-1 and Memari-1, which happen to occupy different basinal positions.

13. **Bal, A.R. & Dutt, S.K. 2008.** "Effect of salinity on different Brinjal (*Solanum melongena* L.) varieties under coastal saline soils on Sunderban". *J. Interacad.* 12(1): 1-7.

Abst.- Performance of Brinjal varieties under heavy textured coastal saline soils of Sunderban were studied. Experiment was carried out under varying levels of soil salinity to

find out suitable Brinjal varieties and to know their physiological behavior. Seven varieties of Brinjal were collected from IARI, Pusa, New Delhi and one variety (milky white long) was collected from Karnal, Haryana. Growth data revealed that plant height, total number of branch and root volume reduced with the increase in soil salinity, flowering was also delayed by 10-12 days due to salt stress. Leaf water potential of different varieties decreased with the increase in soil salinity. Sodium and potassium accumulation in leaves revealed that with the increase in salinity Na accumulation increased but the reverse trend was found in case of K accumulation. Yield data revealed that among the eight varieties *Pusa Ankur, Pusa hybrid* 5 and *Albinotype* (collected from Haryana) are at par and they were significantly superior over rest of the genotypes under control condition. But it was noticed that *Pusa Hybrid* 5, *Pusa Uttam* and *Pusa Bindu* could not survive from salinity levels ECe 5.61-8.20 dSm^{-1}. The experiment was designed in CRD. Statistical analysis revealed that *Pusa Hybrid* 6 and *Albino type* were the best variety under extreme salinity condition (ECe 8.20 dSm^{-1}) and they were at *par*.

14. Bala, Goutam & Mukherjee, Ambarish. 2007. "Useful plants of Wetlands in Nadia district, West Bengal". *Geobios (Jodhpur)* 34(4): 253-256.

Abst.- From the wetlands of Nadia district as many as 42 species of angiosperms belonging to 26 families and 2 species of Pteridophytes were observed which are locally used for various purposes. Of these plants, 30 species have excellent medicinal properties.

15. Bande, M.B. & Prakash, U. 1980. "Fossil woods from the Tertiary of West Bengal, India". *Geophytology* 10(2): 146-157.

Abst.- Seven fossil woods viz., *Shoreoxylon tipamense* Prakash & Awasthi, *Cassinium barooahii* (Prakash) Prakash, *Cynometroxylon holdeni* (Gupta) Prakash & Bande, *Koompassioxylon elegans* Kramer, *Millettioxylon pongamiensis* Prakash, *Ormosioxylon bengalensis* gen. et sp. nov. and *Peltophoroxylon ferrugineoides* sp. nov. have been described from the Tertiary of West Bengal. These resemble the modern woods of *Shorea assamica* of Dipterocarpaceae and *Cassia siamea, Cynometra ramiflora-C. polyandra, Koompassia malaccensis, Millettia prainii, Ormosia robusta-O. watsonii* and *Peltophorum ferrugineum* of Leguminosae, respectively. The assemblage indicates a Neogene age for these woods.

16. Bandyopadhyay, Anandamoy & Bera, Subir. 2005. "*Barringtonia acutangula* Gaertn.: An important Bee-forage plant". *J. Bot. Soc. Bengal* 59(1&2): 43-46.

Abst.- The present article deals with the pollen analysis of 8 honey samples of *Apis cerana indica* F. collected during March-April, 2003 from three localities of Bankura district, West Bengal. Five honey samples were found to be unifloral origin and the rest three were multifloral. Among the unifloral honey samples, *Barringtonia acutangula* Gaertn. of Lecythidaceae was found to be predominant pollen type in three samples while *Sesamum indicum* and *Brassica nigra* predominated in the other two samples. Other significant pollen types include *Ailanthus excelsa, Feronia elephantum, Croton bonplandianum, Eucalyptus globulus, Acacia nilotica, Terminalia arjuna, Coriandrum sativum, Borassus flabellifer, Ageratum conyzoides, Phoenix sylvestris, Ziziphus jujuba, Syzygium cumini, Mimosa pudica* and members of Poaceae. The present data explain the importance of *Barringtonia acutangula* as one of the major bee-forage plants for *Apis cerana indica* in Bankura district, West Bengal, India.

17. Bandyopadhyay, P.K., Khatun, S. & Chatterjee, N.C. 2009. "Isolation of gut fungi and feeding behavior of some selected soil microanthropods of wastelands of Burdwan district'. *Asian J. Expl. Sci.* 23(1): 253-259.

Abst.- Based on gut content analysis, *Alternaria humicola* and *Cladosporium cladosporioides* were found as the most prevalent fungi in the gut of Acarina and Collembola respectively. Altogether 21 fungal species were isolated and identified. Out of which 10 were common to both Acarina and Collembola. Among 21 isolates 18 obtained from Acarina and 13 from

Collembola. Acarines and Collembolan species showed different feeding habits and strategies. *Oppia yodai* was found to be truly fungivorous and *Gamasiphis benghalensis* was completely predatory in nature. Out of the 10 Collembolan species *Lepidocyrtus medius* is an obligatory fungivorous species and *Proisotoma* sp. showed facultative predatory habit. Despite preferences for certain fungal species most oribatid mites are best considered as 'choosy generalists' whereas Collembola may be conversely considered as 'selective' opportunistic feeder.

18. Bandyopadhyay, S., Bhattacharya, S.P., Poddar, P. & Chakraborty, T. 2000. "Survey on weed flora under different agro-ecological situations". *J. Interacad.* 4(2): 242-249.

Abst.- A survey on weed flora under different agro-ecological situations e.g. experimental field, farmers' field near manure pit and road side pasture land, was made in and around Sriniketan, in the Birbhum district of West Bengal, during the year 1993-94. Based on relative frequency (RF), relative density (RD) and abundance (A) of weeds, it was observed that, *Echinochloa colonum* was present in every situation and in all the seasons, though the intensity decreased in the *rabi* season. *Cyperus rotundus* and *Alternanthera sessilis* were present in all the situations only during the summer and *Kharif* seasons. Except in the pasture land, the weed *Chenopodium album* was observed in all the situations in the *rabi* season. In the pasture land situation, different type of weed flora was observed e.g., *Tephrosia purpurea, Evolvulus nummularius* in all the seasons.

19. Bandyopadhyay, S. & Mukherjee, S.K. 2005. "Diversity of aquatic and wetland vascular plants of Koch Bihar district, West Bengal". In: A.K. Pandey, Jun Wen & J.V.V. Dogra (eds.) "Plant Taxonomy: Advances and Relevance". Pp. 223-244.

Abst.- Koch Bihar- a feudatory state under the British Government was transferred and merged with the province of West Bengal on 1st January 1950 by an order of Government of India and since then Koch Bihar is being administered as a district of West Bengal. The district Koch Bihar lies between 26º32´46˝ to 25º57´57˝ North latitude and 89º52´00˝ to 88º45´02˝ East longitude. The total area of the district is 3,386 sq. km. The entire district is intersected by six river systems, which mainly originated in the Himalayas. Besides these rivers, the aquatic habitat of the district include a number of natural bils (lakes), ponds, canals and ephemeral water bodies which harbour a rich hydrophyllous flora. Extensive field study has been conducted in different seasons for four consecutive years to assess the plant wealth of the district. The study reveals that the aquatic and wetland plants of the district are represented by 172 species of vascular plants under 91 genera belonging to 42 families, of which 25 families with 43 genera and 79 species are included in the class Dicotyledons and 13 families with 44 genera and 89 species belong to the class Monocotyledons. The pteridophytic plants are presented by only 4 families with monotypic genus and species in each. Highest number of aquatic species have been recorded in the family Cyperaceae (39 spp.) followed by Poaceae and Scrophulariaceae (20 spp. each). According to classification system of hydrophytic plants by Cooke (1996), there are eight categories of growth forms found in this district viz., Epihydates, Helophytes, Hyperhydates, Plankton, Pleustophytes, Rosulate, Tenagophytes and Vittate, of which Helophytes are more prevalent than the other groups. In the present paper in addition to enumeration of species their vernacular names, growth forms, phenology, uses (if any) have been included.

20. Bandyopadhyay, S. & Mukherjee, S.K. 2005. "Ethnoveterinary medicine from Koch Bihar district, West Bengal". *Indian J. Traditional Knowledge* 4(4): 456-461.

Abst.- The ethnic communities like Kheria, Oraon, Rajbhansi, Rabha and Santal inhabit Koch Bihar, a district of northeastern part of West Bengal. Rearing of cattle, goat, fowl, etc. are common practice among the tribal societies. Treating the ailment of these domestic animals is done by the application of herbal drugs as the ethnic communities have their own system of herbal veterinary medicine practiced since time immemorial. The common veterinary diseases occurring in this district are swelling of abdomen, retention of urine and stool, loose motion, intestinal worm, swelling of neck due to cold, suppression of milk,

mastitis etc. During the field study, 25 ethnoveterinary prescriptions have been recorded in which 23 plants species belonging to 18 families have been used. In the present paper scientific and vernacular names of the plants, the mode of preparation of medicine have been given.

21. Bandyopadhyay, S. & Mukherjee, S.K. 2006. "Traditional medicine used by the ethnic communities of Koch Bihar district (W. Bengal- India)". *J. Trop. Med. Pl.* 7(2): 303-312.

Abst.- Koch Bihar, a district of north eastern part of the state of West Bengal (India) lies in between 26º32´46˝ to 25º57´57˝ North latitude and 89º52´00˝ to 88º45´02˝ East longitude covering an area of 3,386 sq. km. The major ethnic communities of the district are Kheria, Oraon, Rajbhansi, Rabha and Santhal. Most of them are village dwellers and depend on the plants and plant products to maintain their livelihood. Among the ethnic communities, the treatment of different ailments is done primarily by traditional practitioners. These practitioners have their own system of herbal medicine practiced since time immemorial.

To record this herbal heritage, ethnobotanical field studies were undertaken in different parts of the district for consecutive four years. The study reveals that the common female and post-natal diseases of this district include dysmenorrhoea, leucorrhoea, menometrorrhagia, mastitis, puerperal fever, etc. During the field survey, 28 herbal prescriptions were recorded which are used by the traditional practitioners for the treatment of different female and post-natal diseases. The medicines which are given for the treatment of patients are prepared either from a single plant or in combination with other plants. The doses and the period of treatment vary according to the nature of diseases.

In the present communication, scientific and vernacular names of the plants used along with the mode of preparation of medicine and doses are presented.

22. Banerjee, Archana. 1996. "Medicinal uses of some flowers by Santhals of West Bengal". *J. Econ. Taxon. Bot., Addit. Ser.* 12: 314-317.

Abst.- A list of twenty four flowering plant species belonging to seventeen families has been presented with their botanical and Santhali names, flowering time, frequency and medicinal use of the flowers.

23. Banerjee, A.K. 1972. "Trial of *Agave* species in lateritic areas of West Bengal". *Indian Forester* 98(7): 432-436.

Abst.- Two species of *Agave,* namely *Agave sisalana* (Keleghai of West Bengal and Sabalpur of Orissa provenances) and *Agave cantala* (Maharashtra province) were planted on an experimental scale in clear felled areas under the high tension grids in lateritic soils of West Bengal to determine their suitability. It was found that *Agave cantala* produced maximum dry fibre in the first three years among the tried varieties. Fertilizer and cleaning treatments indicated that none of the varieties can compete with Sal coppies crop. Further, 5.75 g of fertilizer of N: P: K (2: 2: 5) is better than the plots without any fertilization or with double the above dose. The additional fibre production due to application of the best fertilizer dose at an additional cost was found to be an economic proposition.

24. Banerjee, A.K. 1973. "Plantations of *Acacia auriculaeformis* (Benth.) A. Cunn. in West Bengal". *Indian Forester* 99(9): 533-540.

Abst.- *Acacia auriculaeformis*, a native of Australia, has been tried in West Bengal in semi-arid sites, and has been found to be successful. The nursery soil-working, spacing, fertilization techniques have been discussed. Also included in the paper are diameter, height, volume and yield of the species when raised in plantations in West Bengal.

25. Banerjee, A.K. 1975. "Red ferruginous soils of Midnapur uplands of West Bengal" *Indian Forester* 101(11): 635-651.

Abst.- The soil of Midnapore uplands developed on pleistocens alluvial are generally coloured in different shades of red, brown, yellow, etc. Reconnaissance study and

morphological, chemical and minerological, study indicated that these soils are made up of one or more number of type horizons. The horizons included red loamy soils, soils dominantly made up of ferric oxide nodules, firm indurated laterite and soft plinthites. The generalized sequence in a profile in a red loamy soil- nodule dominant brown soil- firm laterite- yellow and white variegated soil from top downward.

The horizons have variable characteristics but all of them are low in organic matter, total nitrogen and reserve fertility. It has been found that profile with about 1 metre of red loamy soil on the top is the best rooting medium for the forest growth.

26. Banerjee, A.K. 1976. "The morphogenesis of an umbraquult soil in forests of Kalimpong Himalayas, West Bengal". *Indian Forester* 102(9): 568-578.

Abst.- The present paper deals with a profile belonging to the order umbraquult, exposed at 2700 m elevation in the forest area of Kalimpong Forest Division, West Bengal. The soil has an organic matter enriched epipedon underlain by an argillic horizon. The base rock is granite-gneiss. The study of the texture and the graphs representing the size distribution of the non-clay fraction indicates that the profile is developed from a uniform parent material. Intensive weathering resulting in paucity of heavy minerals has taken place in the entire profile. The pH and texture and micromorphological studies showed that the soil had the maximum weathering and evacuation of ion in the B 22t layer while the clay accumulation by illuviation was maximum at B 3t layer. The lateral water movement due to steep gradient may be an important factor to bring about the clay profile of the soil.

27. Banerjee, Debdulal, Mahapatra, Subhadip, Manna, Subhendu, Mukherjee, Rashmi, Mukherjee, Sutapa & Pati, Bikas Rajan. 2006. "Occurrence of endophytic fungi in *Vitex negundo* L. (Verbenaceae)". *J. Bot. Soc. Bengal* 60(1): 28-31.

Abst.- Twelve species of endophytic fungi were isolated from segments of bark, petiole and leaf of *Vitex negundo* L. collected from different localities of Paschim Midnapur, West Bengal. Frequency of fungal endophytes is relatively higher in the leaves compared to the petiole and bark segments. Micro-morphological and reproductive characteristics of the isolated fungi were studied and identified as *Aspergillus* sp., *Alternaria* sp., *Aureobasidium* sp., *Cladosporium* sp., *Fusarium* sp., *Mycelia sterilia, Nigrospora* sp., *Penicillium* sp., *Phoma* sp., *Trichoderma* sp., *Trichophyton* sp. and some unidentified yeasts. Prevalance of *Alternaria* sp. and *Aureobasidium* sp. were higher than that of *Fusarium* sp. and *Penicillium* sp.

28. Banerjee, L.K. 1987. "Comparative study on mangroves of Sunderbans and that of the Mahanadi delta in Eastern India". *J. Econ. Taxon. Bot.* 9(1): 119-131.

Abst.- Tidal forests of the Gangetic Sunderbans delta in West Bengal and of the Mahanadi delta in Orissa constitute two distinct geographical zones with similar climate and edaphic conditions. Though these two deltas largely harbour mangals, there exists some similarities and differences in the species composition, structure and distribution of vegetation. Similarities and differences in species composition, distribution, some major interacting environmental factors like soil, salinity and tidal inundation and frequency and density of some common mangrove species of the two deltas have been studied here. Vegetation status and some important uses of mangroves of the two deltas have also been briefly discussed in this paper.

29. Banerjee, R.N. & Basu, S.K. 1992. "A systematic study on the Pteridophytes of West Dinajpur district, West Bengal". *J. Econ. Taxon. Bot.* 16(2): 425-431.

Abst.- The paper deals with taxonomic enumeration of the pteridophytic flora of West Dinajpur district in West Bengal. The account is based on the botanical exploration undertaken during the years 1983-84. In all 21 species of fern allies and ferns have been enumerated from the district. Latest nomenclature with citation, basionyms (if any) and few familiar synonyms have been given. In addition, fertile seasons, field numbers, locality,

ecological observations along with associated plants have also been provided. The arrangement of families is according to R.E.G. Pichi-Sermolli (1977) with modifications of R.C. Ching (1978 a & b) have been followed.

30. **Banerjee, R.N. & Ghora, Chhabi. 1996.** "On the domestic use of some unreported plants of West Dinajpur district (West Bengal)". *J. Econ. Taxon. Bot., Addit. Ser.* 12: 325-328.

Abst.- The paper presents 29 common wild plants so far not reported from the West Dinajpur district which are used as food and as vegetable-ingredients by the common people during drought, flood or even in daily life. The local or common names in Bengali (B), Hindi (H), English (E), the parts used and little hints of their preparation when cooked are also mentioned.

31. **Banerjee, Sachindranath. 1935.** "Thelephoraceae of Bengal- I". *J. Indian Bot. Soc.* 14: 13-48.

Abst.- In this paper detailed studies of 24 species of Thelephoraceae, a group of Hard Fungi belonging to 4 genera, viz., *Stereum, Hymenochaete, Craterellus* and *Asterostromella* have been made with special reference to their anatomy.

32. **Banerjee, Sachindranath. 1942.** "Importance of anatomical characters of the sporophores in the taxonomy- Study of Thelephoraceae of Bengal". *J. Indian Bot. Soc.* 21(1&2): 33-39.

Abst.- The present paper deals with a detailed comparative account of the anatomical characters of the sporophores of Bengal species of Thelephoraceae. A comparative statement of the microscopical characters is also given.

33. **Banerjee, Sachindranath & Bakshi, Bimal Kumar. 1945.** "Studies in the biology of wood-rooting fungi of Bengal". *J. Indian Bot. Soc.* 24(2): 73-93.

Abst.- Six species of Bengal Polyporaceae, namely, *Polyporus brumalis, P. friabilis, P. rubidus, P. ochroleucus, Polystictus steinheilianus* and *Merulius similis* have been studied. The technique of making different types of cultures, preparation of media and the conditions under which the fungi were grown have been described. The description of the fungi including their geographical distribution, occurrence, habit, colour, rate of growth, mycelium in culture, sporophore-production on various media have been given. General observations regarding the effects of light, temperature, substratum, humidity and aeration on vegetative growth and fruit-body formation have also been made.

34. **Banerjee, S.K., Nath, S., Singh, Balvinder, Das, P.K. & Gangopadhyay, S.K. 1989.** "Soil characteristics under Sal (*Shorea robusta*) in Tarai region of the north-eastern Himalayas". *Indian Forester* 115(9): 626-634.

Abst.- The nature and properties of some Sal (*Shorea robusta*) growing soils in the tarai region of north-eastern Himalayas were studied in order to evaluate the characteristic of the soils supporting the species. It was found that since sal is growing well in this area, the characteristics and the nature of the soils should be favourable for the growth and development of the species. Ranges of some of the soil attributes suitable for the optimum growth of the species under more or less similar climatic conditions were assessed.

35. **Banerjee, S.K., Singh, Balvinder, Nath, S., Nandi, A. & Gangopadhyay, S.K. 1989.** "Soil characteristics under coppice Sal (*Shorea robusta*) in the lateritic region of West Bengal". *Indian Forester* 115(10): 744-753.

Abst.- The nature and properties of some coppice Sal (*Shorea robusta*) growing soils in the lateritic region of West Bengal were studied in order to evaluate the characteristics of the soils supporting this species. Out of 31 sites, 23 sites had GBH greater than the table values suggesting that these sites were very much favourable for optimum growth of Sal (coppice). Ranges of some of the soil attributes suitable for the optimum growth of the species under more or less similar climatic conditions were assessed.

36. **Banerjee, S.N. 1947.** "Fungous flora of Calcutta and suburbs- I". *Bull. Bot. Soc. Bengal* 1: 37-54.

Abst.- In the present communication, about 180 species of Hymenomycetes have been enumerated along with their available synonyms (Thelephoraceae 26; Clavariaceae 6; Hydnaceae 4; Agaricaceae 41; Polyporaceae 91; Tremellaceae 4; Caloceraceae 2 and Auriculariaceae 6). Of these, the Polyporaceae is unquestionably represented by an overwhelming majority. However, very little is known about the species of Agaricaceae.

37. **Banerjee, S.P., Pande, P., Pant, R.C., Suri, R.K. & Bodala, K.C. 1981.** "Free iron oxide in relation to aggregation in lateritic soils of East Midnapur Forest Division, West Bengal". *Indian Forester* 107(1): 24-29.

Abst.- The lateritic soils of East Midnapur Forest Division, West Bengal are low in the physico-chemical agents responsible for soil aggregation except total and free iron oxide. The state of aggregation of the five depths studied considered along with the vertical distribution pattern of free iron oxides and of clay in these soil indicate that free iron oxides have participated rather actively in the formation of the nondispersible aggregation stable to water action. The trend of distribution and the relationships of the free iron oxides vis-à-vis aggregation has been discussed.

38. **Banik, Swapna, Chanda, Sunirmal, Chatterjee, Soma & Roy, Indrani. 2000.** "Results of clinical tests of some allergenically potent pollen grains from Calcutta, India". *J. Natl. Bot. Soc. India* 54(1&2): 75-78.

Abst.- Intradermal skin prick tests were performed at the Allergy Unit of the Institute of Child Health, Calcutta using sterile aqueous extracts of 22 pollen types of local respiratory allergic patients. Selection of specific types were mainly based on respective case histories, symptoms and data of patients' residential surroundings. Frequency of male patients were higher than the females. Age wise highest frequency were obtained from the age range of 21-40 years. Allergenically potent pollen types originated mainly from the grasses, followed by *Azadirachta indica, Parthenium hysterophorus, Cocos nucifera* and *Shorea robusta*.

39. **Basu, P.K., Ganguly, D.K. & Mandal, G.S. 1987.** "Introduction of exotics in south-West Bengal- *Acacia mangium* in coastal area (Digha-Midnapur)". *Indian Forester* 113(10): 675-680.

Abst.- A very few species have been successfully established artificially in the coastal areas. Considering the fact that the foliage of *Acacia mangium* are modified petioles (phyllodes) and would be tough enough to withstand the gust of the sea wind laden with sand and salt particles: it was experimentally tried in the coastal area of Digha during 1985. It has grown exceedingly well and expected to establish there. Other species are also being tried there. This species is also doing much better in producing biomass in comparison with its well known and established cousin the *Acacia auriculaeformis*, in lateritic tract of south-West Bengal, also in the chronically drought prone and lateritic area of Purulia district, result of which would be sent for publication in due course.

40. **Basu, P.K. & Gautam, B. 2002.** "Investigation of ethnic uses of *Dioscorea* spp. available in Darjeeling and Sikkim Himalayas and scientific evaluation of traditional practices" In: A.P. Das (ed.) Perspectives of Plant Biodiversity, pp. 697-711.

Abst.- During survey of ethnobotanical practices in Darjeeling and Sikkim Himalayas, the use of eight species of *Dioscorea* have been observed, which involve the elimination of water soluble part of boiled yam used for edible purpose but utlisation of the same for the cure of wound infection of human skin. Dioscin, a rhmnoglucoside of diosgenin has been isolated and identified as a toxic constituent in the water soluble part of the yam of *Dioscorea*. The toxicity of the natural product is being claimed to be due to its lytic property as observed during anti-fungal activity against *Aspergillus niger*.

41. **Basu, P.K. & Pradhan, D.K. 2000.** "A new report on the availability of two varieties of *Fagopyrum dibotrys* (D. Don) Hara in the Darjeeling and Sikkim Himalayas". *J. Hill Res.* 13(1): 24-27.

Abst.- *Fagopyrum dibotrys* (D. Don) Hara is a common plant of the Darjeeling and Sikkim Himalayas. Plants collected from Darjeeling are different from that of Gangtok in some morphological, anatomical and chemical characters. Two varieties viz. *Fagopyrum dibotrys* (D. Don) Hara var. *dibotrys* and *Fagopyrum dibotrys* (D. Don) Hara var. *alba* are now being proposed.

42. **Basu, Ram Sankar & Mukherjee, Prasanta Kumar. 1997.** "Ethnobotany of the oil extraction process by the 'Santhals' of Banduan in Purulia". *Ethnobotany* 9(1&2): 132-134.

Abst.- Banduan is one of the most backward rural areas in Purulia district of West Bengal. 'Santhals' constitute more than 60% of the total population. They live in hamlets in hilly jungles. They are familiar with the oil-yielding plants occurring in the forests. Oil seeds are collected from the jungle and squeezed manually in a wooden press made by them. The process of manufacturing of this manual grinder press, the oil extraction process, names of woods used and the oil-yielding plants and uses of oils are reported.

43. **Basu, Ram Sankar & Mukherjee, Prasanta Kumar. 1999.** "Plants used for lac culture by the tribals of Purulia in West Bengal". *Ethnobotany* 11(1&2): 119-121.

Abst.- Twelve types of ethnic groups and 17 plant species are met with in Jhalda and Balarampur police stations of Purulia district of West Bengal. These are intertwined with lac culture and production of shell-lac. Lac culture plays a major role in the economy of this district.

44. **Basu, S.K. (1984) 1986.** "Observation on two threatened arecoid palms of Nicobar Islands cultivated at the Indian Botanic Garden, Howrah". *Bull. Bot. Surv. India* 26(3-4): 207-210.

Abst.- Two threatened areciod palms viz., *Rhopaloblaste augusta* (Kurz) H.E. Moore and *Bentinckia nicobarica* (Kurz) Beccari, both native of Nicobar Islands, were observed and studied under cultivation in the Indian Botanic Garden. Brief description of the species and account on their culture are given to facilitate their identification and serve as a prerequisite for their further introduction and conservation.

45. **Bera, Subir & Ghorai, Narayan. 1997.** "On the occurrence of mite induced stem gall in *Odontosoria chinensis* (L.) J. Smith (Dennstaedtiaceae) from Darjeeling". *Indian Fern J.* 14(1-2): 103-105.

Abst.- The present study reports the occurrence of galls of different sizes on the stem of *Odontosoria chinensis* (Dennstaedtiaceae) from Darjeeling Himalayas for the first time. The galls are globular to lenticular in shape, lobed, brown to brownish-black in colour. The sections through the gall show 6-9 cavities, most of which crowded with *Eriophyes* sp. of Eriophyideae, a type of common gall inducing mite. Some of the gall activities are found infected with unknown fungal remains which are believed to be due to secondary infection.

46. **Bera, Subir & Ghorai, Narayan. 1997.** "Sedentary niche of *Parasaissetia nigra* (Nietner) on the fern *Drynaris quercifolia* (L.) J. Smith of Polypodiaceae (*s.l.*) from Darjeeling and Sikkim Himalayas". *Indian Fern J.* 14(1-2): 106-109.

Abst.- The fern *Drynaria quercifolia* (L.) J. Smith of Polypodiaceae possess a special leaflet surface with hard fibrils and hairs as an aversive physical device to common insects like defoliators and scrapers. This favours the sedentary sucking scale insect *Parasaissetia nigra* (Nietner) providing a safe resting and feeding niche. *P. nigra* also attaches itselt on the leaflet surface developing similar type of surface sculpture as an anchoring device.

47. **Bhaduri, Param Nath. 1933.** "Chromosome numbers of some Solanaceous plants of Bengal". *J. Indian Bot. Soc.* 12: 56-64.

Abst.- The chromosome numbers of some of the Solanaceous plants commonly occurring in Bengal have been determined. The chromosome numbers of the following plants have determined for the first time- *Solanum indicum* L. (n=12), *S. verbascifolium* L. (n=12), *S. trilobatum* L. (n=12), *S. torvum* Swartz (n=12), *Withania somnifera* Dun (n=24), *Physalis minima* L. (n=24), *Cestrum nocturnum* L. (n= *ca* 8) and *Brunfelsia americana* l. Sw. (n=11). Polyploidy within the species have been noted in *Solanum nigrum* L. (n=12, n=24 and n=36). The morphological characters of the polyploids have been given. The close resemblance of the tetraploid form of *S. nigrum* with *S. luteum* Mill. has been indicated.

48. **Bhakat, Ram Kumar & Pandit, P.K. 2003.** "An addition to the angiospermic flora of Chilkigarh sacred grove, West Bengal". *J. Bot. Soc. Bengal* 57(1&2): 55-58.

Abst.- The present paper is an account of new reports of angiospermic taxa of Chilkigarh sacred groove. The study records 70 new species, 51 new genera and 8 new families of angiosperms. It also mentions the socio-economic and cultural value, if any, of plants.

49. **Bhakat, R.K., Sen, U.K. & Pandit, P.K. 2008.** "Role of a sacred grove in conservation of plants". *Indian Forester* 134(7): 866-874.

Abst.- Many traditional conservation ethics of people directly or indirectly protect patches by dedicating them to local deities. Such forest pockets, referred to as sacred groves, are more or less small to large chunk of traditionally maintained near-virgin forests protected on socio-cultural grounds. Named differently in different states of India, these groves are mainly concentrated in tribal areas and are managed by local people for various purposes. Irrespective of their origin, size and management regimes, all sacred groves are islands of biodiversity protecting a host of plant and animal species including some rare and threatened taxa. With this background, this paper attempts to highlight the role played by a 4-acre sacred grove (popularly known as 'Sitabala than') of West Midnapore District in West Bengal towards conservation of plant diversity. The study records 80 species of angiosperms covering 42, 10, 16 and 12 species of herbs, shrubs, trees and climbers respectively. Moreover, the grove supports few locally useful medicinal plants. Owing to protection offered on socio-religious grounds, the sacred grove provides optimum conditions congenial for the growth of plants. As a result, some of the trees attain maximum dimensions in terms of size and growth patterns. Therefore, there is an urgent need not only to protect the sacred forest, but also to revive and reinvent such traditional way of nature conservation.

50. **Bhattacharjee, A. & Chatterjee, Soumyadip. 2007.** "Medicinal plants used in skin disease in Deganga, West Bengal". *Indian J. Traditional Knowledge* 6(2): 358-359.

Abst.- Ethnobotanical studies reveal some plant species used in skin disease by *Oraon* tribe of Chandanpur, Hadipur, Chupri village of Deganga, North twenty-four Parganas, West Bengal. Most of the plants were found to be unknown or less known from usage point of view. The village people migrated from the erstwhile East Pakistan (Bangladesh) also used the plants in skin disease. The plants are *Aloe vera* L., *Argemone mexicana* L., *Artocarpus gomezianus* Trecul subsp. *zeylanicus* Jorett, *Butea frondosa* Roxb., *Cassia alata* L., *Lawsonia inermis* L., *Ocimum sanctum* L., *Pongamia pinnata* (L.) Merr., *Solanum anguivi* Lam. and *Strychnos nux-vomica* L.

51. **Bhattacharya, Anirban & Bhattacharya, Sabita. 2008.** "A study on root rot disease of *Coleus forskohlii* Briq. occurring in Gangetic West Bengal". *J. Bot. Soc. Bengal* 62(1): 43-47.

Abst.- Severe loss of a medicinal crop viz., *Coleus forskohlii* by the attack of a dreadful root rot disease, found in the lower Gangetic West Bengal was investigated in three different locations. It was noticed that 70-85% plants were lost in the fields under survey during the month of May, 2006. Visible disease symptoms were yellowing and drooping of leaves, browning and blackening of stem, rotting of roots and lower stem. Anatomical study showed the presence of fungal mycelia in the internal stem tissue of diseased plant. A fungal pathogen was isolated from diseased plant parts and isolated pathogen fulfilled Koch's

postulates. Colony characters and spore morphology confirmed the identification of the pathogen to be *Fusarium solani*. This appears to be the first report of root rot of *Coleus forskohlii* caused by *Fusarium solani* from India.

52. Bhattacharya, C., Karmakar, K.S. & Bakshi, Asis. 2008. "Evaluation of *Cajanus cajan* L. germplasms for seven yield and yield attributing traits grown under rain fed condition of Red and Laterite zone of West Bengal". *J. Interacad.* 12(4): 420-426.

Abst.- Fifteen varieties of *Cajanus cajan* L. out of which nine varieties were collected from the farmer's field and the rest six varieties were standard varieties were tested under rainfed, upland, low fertile conditions of red and laterite zone of West Bengal for two successive years to evaluate suitable high yielding varieties for this zone. The results of this experiment revealed that V_7 which is locally and traditionally cultivated in the coastal saline soil of Purba Medinipur performed best, followed by V_3 and V_8 (both are locally cultivated in Bankura and Paschim Medinipur districts respectively). The result of this experiment indicate the necessity of intensive survey, collection, evaluation, identification and preservation of the local types traditionally cultivated in the districts for future breeding programmes. The varieties which have been identified as best performers may be selected for the cultivation for this agro-climatic zone of West Bengal.

53. Bhattacharya, C., Karmakar, K.S. & Bakshi, Asis. 2008. "Correlation coefficient studies on seven quantitative traits of *Cajanus cajan* L. grown for two years under red and laterite zone of West Bengal: A comparative study". *J. Interacad.* 12(4): 433-440.

Abst.- Fifteen varieties of arhar (*Cajanus cajan* L.) were grown for seed yield under rain fed, low fertile, upland conditions of red and laterite zone of West Bengal for two consecutive years in the same plot to evaluate the similarities and dissimilarities in correlation coefficient values at genotypic, phenotypic and environmental levels between different yield and yield attributing traits at three population levels which were genetically alike. Amongst these three population levels, A and B populations were composed of same group of varieties grown for first and second year respectively and C population was derived from first and second year pooled data. Keeping the ideas in view, the experiment was designed with the expectation that the genotypic correlation coefficient values estimated from the different population levels will be more or less similar. But, the phenotypic and environmental correlation coefficient values may vary due to differences in weather conditions of the two experimental years.

From the experimental results, it is observed, though the three populations were genetically alike, still the correlation coefficient values obtained at different population levels may be misleading to a breeder to judge the proper relationships between the characters under study. Though in the present experiment, varieties, fertilizers applied, date of sowing, soil (plot) of the experiments etc. were kept identical, but differences in weather conditions may affect the different developmental phases of the crop which ultimately reflected in the results. The differences in phenotypic, genotypic and environmental correlation coefficient values in the two experimental years may be stem from pleiotropy. So, the results obtained from the pooled data may help the breeder to minimize the chances of error in determining the component characters on which selection can relied upon the genetic improvement in the yield of this crop.

54. Bhattacharya, Debjyoti, Paria, N. & Mondal, M.S. (1996) 2001. "Pollen morphology of some herbaceous flora of Salt Lake City, West Bengal". *Bull. Bot. Surv. India* 38(1-4): 111-129.

Abst.- Pollen morphology of 30 plant species collected from Salt Lake City area has been examined for the present study. Most of these species are new entrants in term of plant succession after reclamation of saline swampy low land area of the present day Calcutta by dredged silt from Hooghly river. Pollen morphology shows a heterogeneous assemblage of morphoforms. Pollen dimorphism is also observed in some species. This study will be

very much helpful in correlation of sedimentary samples of the area towards better understanding of past and present vegetation.

55. Bhattacharya, Rama Prasad & Rai, Chandrakala. 2008. "Ethnobotanical studies of Srikola, Lepchajagat, Tonglu and Pankhabari areas of Darjeeling district, West Bengal". *J. Econ. Taxon. Bot.* 32 (Suppl.): 65-71.

Abst.- An account on the ethnobotanical uses of 36 plant species belonging to 26 families and 36 genera by the tribals (Lepcha, Bhutia, Nepali) of Darjeeling district have been discussed in this paper.

56. Bhattacharyya, Ananta P. & Roy, S.K. 1987. "Palynology of the lower Gondwana sediments in Saltora (Chakboga) area of Bankura district, West Bengal, India". *Geophytology* 17(1): 28-38.

Abst.- The present paper records 24 genera and 46 species of palynofossils from the carbonaceous shales and coal samples of Saltora (Chakboga) in Bankura district, West Bengal. The miospore assemblage shows close resemblance with the *Densipollenites* rich assemblage of Barren Measures Formations.

57. Bhattacharyya, N. & Halder, S. 2008. "Comparative biochemical studies on Thelypterioid ferns from Burdwan district of West Bengal". *Indian Fern J.* 25(1-2): 53-60.

Abst.- The present paper concerns the phytochemical levels of vegetation and reproductive plants of Thelypterioides ferns from Burdwan district of West Bengal. Soluble carbohydrates, insoluble carbohydrates, protein and phenolic compounds were studied in different plant parts. The contents of these macromolecules were more in *Ampelopteris prolifera* than *Christella dentata* and *Thelypteris interrrupta*. Hereas insoluble carbohydrate content was higher in rhizome of reproductive plants. Secondary metabolite like phenolic compound were studied in different parts of vegetative and reproductive plants and it was shown that maximum phenolic contains were obtained from rhizome of both vegetative and reproductive plants and fertile frond of *A. prolifera*. Antifungal activity of plant extracts were studied on *Trametes hirsuta* and *Curvularia* sp. It was observed that phenol extract from rhizome of vegetative and reproductive plants of *C. dentata* showed more inhibitory effect on *T. hirsuta* than on *Curvularia* sp.

58. Bhowmick, N., Pal, Ranjit K., Suresh, C.P., Paul, P.K. & Ghosh, S.K. 2009. "Status and prospects of litchi cultivation in Cooch Behar district of West Bengal". *Environm. Ecol.* 27(2A): 771-776.

Abst.- Litchi (*Litchi chinensis* Sonn.) is one of the important fruit crops of India. It is an essentially sub-tropical fruit crop and its exact climatic requirement limited its expansion under commercial cultivation. The agroclimatic condition of Cooch Behar district of West Bengal is quite suited for commercial cultivation of litchi and this area may be the potential area of expansion of litchi cultivation. In the present investigation attempts were made to assess the present status and prospects of litchi cultivation and performance of litchi in Cooch Behar district by dividing the litchi plants into five different age groups. Among the plants 62.50% were drooping in nature, rest were spreading or upright in nature. Date of starting of flowering observed from February third week to March first week and flowering continued upto March second week to fourth week. About 44% plants showed compact inflorescence, and others showed medium and loose inflorescence. Maximum trees showed mild biennial in bearing habit (62.5%), which might be due to the poor management practices and inferior planting materials and it decreased gradually with the advancement of the age of the litchi plants. Extent of fruit drop was high in 27.78% of trees and it was low in 20.83% of trees; rest plants showed medium extent of fruit drop. However, the extent of fruit cracking is lower in 62.5% of trees and rest showed medium (27.78%) and high (9.72%) extent of fruit cracking. Maximum (86%) trees gave red coloured fruit and rest gave greenish-red or greenish-yellow types of fruit. Aril juiciness varied from high (90.28%) to medium (9.72%). Average TSS, fruit weight and yield of the litchi plants were recorded as 17.71º Brix, 12.47

g and 44.06 kg/tree, respectively.

59. Bhujel, R.B. & Das, A.P. 2002. "Endemic status of the dicotyledonous flora of Darjeeling district" In: A.P. Das (ed.) Perspectives of Plant Biodiversity, pp. 593-609.

Abst.- Recent floristic study reveals the occurrence of more than 1900 dicotyledonous species in Darjeeling district including a significant number of endemic elements. The elements with restricted distribution provide reasons for categorical treatment according to their various stretch of geographical area of occurrence. For the elements occurring in the district alone, a consideration has been presented to treat them under four categories of confinement ranging from Eastern Nepal to Northern Myanmar. 23 dicotyledonous species are found to be confined within Darjeeling district while 397 species in total, show their distribution restricted within an area between E. Nepal to N. Myanmar, including other intermediate geographical distributions.

60. Bhujel, R.B. & Yonzone, G.S. 1994. "A new variety of *Baliospermum calycinum* Muell.-Arg. (Euphorbiaceae) from Darjeeling". *J. Econ. Taxon. Bot.* 18(3): 613-614.

Abst.- During a floristic exploration in Darjeeling district of West Bengal, the first author has collected a new variety of *Baliospermum calycinum* (*B. calycinum* Muell.-Arg. var. *racemiferum*. A detailed description, ecology and illustration have also been given for easy identification.

61. Bhunia, Debasis & Mondal, Amal Kumar. 2009. "Exploration to aquatic ethnomedicinal plants of Paschim Medinipur district, West Bengal". *Environm. Ecol.* 27(1): 64-70.

Abst.- The district Paschim Medinipur mostly covered with tribal people specially in Jhargram sub-division. The heavy rainfall, high humidity and moderate temperature, are collectively responsible for rich amalgamation of different aquatic medicinal plant types with vast stretches of water bodies existing in this district adding to rich aquatic plant diversity. About 75 medicinal plants which were collected and identified botanically, documented alphabetically along with their family names, tribal or local names, method of application of their parts and ethnomedicinal important particularly consulting with tribal people.

62. Biswas, Anjali. 2006. "Pteridophytes of Indian Botanic Garden, Howrah". *Bull. Bot. Surv. India* 48(1-4): 175-188.

Abst.- The present paper records 35 species of Pteridophytes from Indian Botanic Garden, belonging to 24 genera and 20 families. Keys for identification of all taxa (excluding ornamental) have been provided along with correct nomenclature, ecological notes and specimens collected.

63. Biswas, Anjali & Basu, S.K. (2008) 2009. "On the occurrence of three species of *Pseudocylosorus* Airy Shaw from West Bengal". *Bull. Bot. Surv. India* 50(1-4): 190-192.

Abst.- Three species of *Pseudocylosorus* have been reported from West Bengal for the first time. *P. esquirolli* (Christ) Ching also constitute a new record for India.

64. Brahma, Goutam, Debnath, H.S. & Mukherjee, Sobhan Kr. (2008) 2009. "Assessment of mangrove diversity in Sunderban Tiger Reserve, India". *Bull. Bot. Surv. India* 50(1-4): 167-170.

Abst.- A total of 5,804 mangrove and mangrove associate plants have been recorded from Sunderban Tiger Reserve in India. They belong to 16 families, 20 genera and 30 species.

65. Brahma, Goutam, Gantait, Soumen & Debnath, Himadri Sekhar. 2008. "A note on the invasion of exotic plants in Sunderban Biosphere Reserve". *J. Econ. Taxon. Bot.* 32(1): 174-177.

Abst.- Invasive species are a growing problem for the World, both ecologically and economically. The impact of invasive species on native species and ecosystem has been immense. During the field study, the authors found 4 invasive species distributed abundantly

in the Sunderban mangrove ecosystem, which is the largest contiguous mangrove patch on the globe. Emphasis has been given to the degree of invasion and probable deterious effects on the mangrove ecosystem of Sunderbans. The names of these plant invaders, with short botanical descriptions, site of occurrence and distribution status are provided in this paper.

66. Chakrabarti, Kalyan. 1984. "Dynamics of Flora-Fauna diversity in the mangroves of Sundarbans and laterite tracts of West Bengal, India- A bio-ecological study". *Indian J. Forest.* 7(3): 220-232.

Abst.- Sundarbans mangroves stand supreme in the forest map of the World. An incredible array of adaptations exist in the animal-vegetational complex in these mangrove swamps. A thorough synthetic analysis of animal-vegetational dynamics has been made for mangroves and laterite forests of West Bengal. Calculations of generic and specific diversities has been made in various types of micro-systems differentiated on the basis of tidal rhythms with respect of vegetation and different kinds of faunal organisms. Diversities were also computed for fish fauna, molluscs and crustaceans. Mangrove vegetational zone which is situated below the tide level was observed to be comparatively richer in generic and specific diversity over other zones which are frequently inundated or above the tide levels. Generic diversity of the tree vegetation of Sundarbans mangroves was observed to be lower than that of North Bengal and South Bengal. Again the generic diversity of Sundarbans molluscs were found to be more than that of tree vegetation, crustaceans, fish and other kinds of faunal organisms.

Sundarbans is perhaps a unique example which enables the wild denizens and particularly the tiger to choose the habitat having the least generic diversity of vegetation possibly for extraneous natural factors.

Sundarbans records significantly low generic and specific diversity for plant-animal complex and as such needs special treatment of protection from ecological considerations as it is held by naturalists that low generic and specific diversity indicate the high probability of extinction of the living organisms of the genera and species of the complex. This situation warrants a warning signal to guard against future ecological disasters. Low diversity of vegetation of the laterite forests of South Bengal also warrants special treatment as derived from the study.

67. Chakrabarti, Kalyan. 1987. "Sundarbans mangroves of India- A study on conservation status". *Indian Forester* 113(5): 352-358.

Abst.- In this paper, an analysis has been made of fauna-flora dynamics generic and species diversity of the animal vegetation complex for the Sundarbans mangroves. Calculations of generic and specific diversities have been made in various types of micro-ecosystems, differentiated on the basis of tidal rhythms with respect to the floral and faunal organisms. Diversities were also computed for fishes, molluscs and crustaceans. Mangrove zone, situated below the tidal level was observed to the comparatively rich in generic and specific diversity over other zones which are frequently inundated or above the tidal levels. Again the generic diversity of Sundarbans molluscs were found to be more than that of tree vegetation, crustaceans, fish and other kinds of faunal organisms.

68. Chakrabarti, Kalyan. 1987. "Sundarbans mangroves – Biomass productivity and resource utilization an indepth study". *Indian Forester* 113(9): 622-628.

Abst.- Sundarbans mangroves represent a dynamic wetland ecosystem having vast potentiality in biological resources. The paper describes the diversity of floral and faunal resources along with its utilization potential. It also stresses the need of optimum and balanced form of mangrove habitat uses for the cause of human welfare. The paper also gives an outline for potentiality of forest based industries with mangrove raw materials. The paper also gives a quantitative assessment of biomass productivity of mangrove forest formation. It was estimated to be 212 M.T./ha the highest, in *Avicennia-Sonneratia* forest

formation. The distribution of biomass among stem, root and branches, under various forest formation has also been discussed. Conservation of mangrove resources is the keywood of development of the region. Silviculture and ecology should form the basic tenets of conservation policy of the Sundarbans mangroves.

69. Chakrabarti, Kalyan. 1989. "Probe into wood-fuel balance- A case study in West Bengal". *Indian Forester* 115(6): 359-371.

Abst.- The study was designed to determine the present and projected positions of the supply, demand and consumption pattern of wood and wood products in the State so that the results may help the planners in formulating schemes on a more solid foundation of facts. Stratified random sampling was employed for the entire. State population and the results were derived from 18,758 respondents, in both family and institutions falling at random in 753 sample villages and 796 urban census blocks, drawn out of about 38,000 rural villages and 15,000 urban blocks. Some interesting facts of social ecology have also emerged from the study. Against the recorded fuel wood production of 0.7 million m^3 in West Bengal, the estimated annual consumption is 16.85 million m^3 which means the consumption is about 24 times the supply. Amongst the traditional renewable resources, fuel wood is the most widely used in rural areas (about 93.2%). Of all the non-commercial energy consumed, the relative share in million tons of coal replacement (MTCR), fuel wood provides 77.1% compared to 14.97% of agricultural wastes, 7.48% of dung-cake and 0.45% of biogas. In the total energy consumption in this state including commercial and non-commercial energy, fuel wood also constitutes about a significant 42%. Out of the total 16.85 million m^3 of fuel wood consumed annually, family, institutional and cremational sectors constitute 94.10%, 5.19% & 9.71% respectively. Annual average capita consumption is about 0.288 m^3 varying from 0.368 m^3 in rural areas to 0.072m^3 in urban areas. The study also reveals that the proximity of forest areas bears a positive correlation to the per capita fuel wood consumption pattern, which is found to be the highest in Darjeeling district (1.103 m^3) and lowest in Calcutta (0.017 m^3). A negative correlation has been established between the monthly income of a family and the per capita consumption of fuel wood both in respect of urban and rural sectors.

70. Chakrabarti, Kalyan. 1993. "Biological productivity in laterite areas of Southern Bengal". *Indian Forester* 119(3): 180-204.

Abst.- The analysis of the designed experiment tends to indicate that there is a significant effect of spacing on biological productivity in the laterite areas of West Bengal. The closer is the spacing, more is the biomass productivity for the plots in both the locations of Southern Bengal. Regarding intra-species productivity, *Eucalyptus* was observed to produce more biomass productivity than species like *Acacia auriculiformis, Cassia siamea, Gmelina arborea, Dalbergia sissoo* and *Leucaena leucocephala* and this order of productivity is markedly visible in both the locations of Southern Bengal. A descending order of productivity was noticed in these six species for different kinds of spacing treatments. This study brings out a code of treatment ethics and procedural disciplines in spacing treatments for lateritic areas of West Bengal and the results of this study may be compared with other similar sites to comprehend the *in-vivo* biological properties.

71. Chakrabarti, Kalyan. 1993. "Biodiversity of the mangrove ecosystem of Sundarbans". *Indian Forester* 119(11): 891-898.

Abst.- Observations of the plant-animal relations and adaptations of different forms of living organisms of the mangrove swamps are presented. Principal forest formations inhabited by Sundarbans tigers have been described with vegetation types. Ecological dynamics of the plant-animal complex indicate strict protection of the habitat. The mangrove zone situated below the tide level was observed to be comparatively rich in generic and specific diversity over other zones which are frequently inundated. Salinity and tidal fluctuations in the mangrove swamps are the critical factors that regulate the physical and chemical environment of the entire biota. All other biotic and abiotic factors that exert

considerable force on the environment have also been identified.

Habitat formations like pure *Ceriops, Excoecaria-Ceriops* which record high soil salinity also exhibit significantly higher human casualities from tiger. Soil salinity has been correlated with human casualities from tiger in different habitat formations types.

72. Chakrabarti, Kalyan. 1999. "Man, nature and ocean- An ecology prespective of coastal ecosystem of Sundarbans forests". *Indian Forester* 125(8): 753-759.

Abst.- In this paper, various intricate environmental imperatives have been stated for the coastal ecosystem of Sundarbans. The development of the area lies in maintenance of ecological balance in the fragile ecosystem. The low plant-animal diversity for Sundarbans is clearly a warning signal for ensuring strict protection of this biotope from the future impending disasters. This conservational exercise will be of considerable help to consider and reorient the broad conservation strategy of Sundarbans mangroves. Sundarbans mangroves inhabit higher caloric concentrations and significantly high biomass productivity with low generic and specific diversity generally for both flora and fauna. Because of locational advantages of mangroves of Indian Sundarbans, biotic interference is least in Sundarbans in comparison to other forest types of West Bengal. The balance of poor floral and faunal diversity in Sundarbans mangroves is practically recompensed by lesser biotic interference. So with proper balanced forest management, Sundarbans hold bright potentiality in natural ecosystems. This unique conservational exercise is likely to open up new dimension into unknown properties of Sundarbans mangrove ecosystem of West Bengal.

73. Chakrabarti, Kalyan & Zaidi, Azam. 1997. "Silvicultural management of *Cryptomeria japonica* in Darjeeling Hills". *Indian Forester* 123(1): 3-10.

Abst.- In this paper, an attempt had been made to review the history of plantation of *Cryptomeria japonica* a fast growing species in Darjeeling hills, its good and ill effects overtime. A detailed cultural and silvicultural practices had been described in details to improve the quality of plant, upgrade the ecology and as to how this practice may be a handy tool for rural development through joint forest management.

74. Chakraborty, Indradeep & Chattopadhyaya, N.R. 2004. "Planktonic components of an unmanaged ox-bow lake in West Bengal". *J. Interacad.* 8(1): 74-79.

Abst.- The study was made to evaluate the plankton populations of Mathura *beel*, West Bengal. A total of 12 planktonic taxa were recorded during February 2002 to May 2002. Out of 12 planktonic taxa, 6 were phytoplanktons and 6 zooplanktons. The phytoplankton communities of the *beel* were represented by Cyanophyceae, Chlorophyceae, Bacillariophyceae and Euglenophyceae whereas the zooplanktons were represented by Rotifers, Cladocera and Copepod.

75. Chakraborty, Manas Kumar & Bhattacharjee, Aloke. 2003. "Plants used for thatching purpose by the tribals of Purulia district, West Bengal, India". *J. Econ. Taxon. Bot.* 27(3): 571-572.

Abst.- This paper deals with 16 species of plants belonging to 16 genera and 7 families used by the tribals of Purulia district of West Bengal for thatching purpose. The information given in this paper has been collected by personal contact with the tribals. The plants are arranged alphabetically under botanical name followed by name of the family, local name, parts used and mode of use.

76. Chakraborty, Manas Kumar & Bhattacharya, Aloke. 2004. "Magico religious beliefs among the tribal of Purulia district, West Bengal". *J. Econ. Taxon. Bot.* 28(2): 510-512.

Abst.- This paper deals an enumeration of 15 plants species belonging to 15 genera and 13 families used by the tribal of Purulia district of West Bengal as magico-religious beliefs. The information given in this paper has been collected by personal contact with the tribal.

The plants are arranged alphabetically on their botanical names. Local name and uses have been provided in the paper.

77. **Chakraborty, Manas Kumar & Bhattacharjee, A. 2006.** "Some common ethnomedicinal uses for various diseases in Purulia district, West Bengal". *Indian J. Traditional Knowledge* 5(4): 554-558.

Abst.- Purulia, the western most district of West Bengal, covering land area of 6259 sq. km. is the natural treasure of vast number of plants having ethnobotanical importance. The present study enumerates some common and extensively used ethnomedicinal plants. During the ethnobotanical survey in the district, 57 plant species belonging to 57 genera and 40 families have been enumerated. The medicinal information have been collected by personal contact with the aborigines such as *Bhumijs, Birhores, Kherias, Mundas, Oraons* and *Santhals*. Plants with botanical name, family, local names, parts used, mode of preparation and administration are given. These plants may be useful under rural healthcare system and for herbal drug-industry.

78. **Chanda, Soma & Palit, Debnath. 2009.** "Plant diversity indices and pedological characteristics of Ragiroom Beat, Senchal West Zone Forest Range, Darjeeling, West Bengal, India". *Pleione* 3(1): 50-58.

Abst.- The present investigation concerns the plant diversity and pedological characteristics in Ragiroom Beat under Senchal West Forest Zone, Darjeeling. Diversity indices of 50 plant species and the regulatory effects of the pedological factors on the plant diversity were assessed.

79. **Chatterjee, Probir. 1975.** "Some additions to the Charophytes of West Bengal". *Bull. Bot. Soc. Bengal* 29(2): 105-109.

Abst.- The present paper deals with the taxonomy of Charophyta collected from various parts of West Bengal together with detailed bio-ecological data for each taxon. Altogether eight taxa are described, all of which are recorded for the first time from West Bengal. Chromosome numbers determined from mitotic cell divisions in the antheridial filaments of all the taxa studied are also presented.

80. **Chattopadhyay, Partha & Pal, Ruma. 1995.** "A procedure for low cost outdoor mass production of *Spirulina platensis* using industrial waste at rural West Bengal". *J. Natl. Bot. Soc. India* 49(1&2): 35-41.

Abst.- Outdoor biomass production of *Spirulina platensis* using altered media with industrial waste have been standardized at rural areas of Howrah district. The major salt replacement of the conventional Zarrouk's medium for *Spirulina* growth, was done with cowdung extract and industrial waste water. Industrial waste included chemical manufacturing factory waste, electroplating factory waste and tannery waste. The growth potential of the alga was monitored on the basis of algal biomass and the total protein content of 7, 14, 21 and 28 days of culture, both qualitatively and quantitatively. The technology of biomass production has been transferred among the villagers.

81. **Chattopadhyay, S.B. & Das, C.R. 1955.** "The occurrence of some virus diseases of Agricultural crop plants in West Bengal". *Bull. Bot. Soc. Bengal* 9(1): 42-45.

Abst.- During the past four years a survey was made with a view to record the occurrence of virus diseases of different crop plants under field condition. In the present note an account of virus diseases affecting 16 agricultural crop plants is given.

82. **Chattopadhyay, S.B. & Mustafee, T. 1967.** "Diseases of a few common vegetables in transit and marketing in West Bengal". *Bull. Bot. Soc. Bengal* 21(2): 103-106.

Abst.- Deterioration due to attack of fungi during transit and marketing of some vegetables namely green papaya, tomato, sugarbeet, palwal, bittergourd and banana were studied.

The green papayas were affected by *Fusarium solani* and *Rhizopus nigricans*, tomato by *Fusarium oxysporum* f. *lycopersici*, sugarbeet by *Sclerotium rolfsii,* palwal by *Fusarium oxysporum* and *Rhizopus nigricans*, bittergourd by *Fusarium solani* f. *cucurbitarum* and banana by *Gloeosporium musarum*. The organisms were isolated and their pathogenicity was tested in each case. Casual organisms and the symptoms of these diseases are described.

83. Chaudhuri, Ila & Bhattacharyya, U.C. 2005. "Medicinal plant diversity of Atghara village (West Bengal) and its surrounding areas and prospect of their utilization by local people". *J. Bot. Soc. Bengal* 59(1&2): 55-58.

Abst.- A floristic survey, with the active participation of SEVA (NGO), at Baduria and Deganga blocks (North 24-Parganas) of West Bengal revealed 297 plant species belonging to 98 families. Over three years, 450 collections were made from the area, identified, catalogued, and preserved as herbaria at Vikas Kendra of Atghara village of Baduria block. The area is rich in mesophytic herbaceous plants intermixed with shrubs, trees and crop plants like jute and rice. Of the 297 angiosperm species, 221 had medicinal properties. This is significant for a small locality comprising of a few villages.

84. Chaudhuri, Saurabh & Chowdhury, M.K. 2006. "Rehabilitation of coastal mudflats in Contai-Junput coast of West Bengal, India with mangroves and other halophytes- A new approach for coastal afforestation". *J. Bot. Soc. Bengal* 60(2): 105-113.

Abst.- Digha-Junput coastline of Bay of Bengal, India, is unique in its own peculiar features obtained through geomorphic changes. Here, sand dunes in some areas are gradually replaced by progressing mudflat and the tidal zones are tansforming into intertidal zones with high salinity leading to an impact in local ecosystem. Physiologically, dry soil of Digha-Junput coastline does not allow the traditional coastal shelterbelt species *Casuarina* to grow well. Natural colonization of certain mangrove and halophytes on mudflat could be noticed on this coastline. Taking cognizance of this natural phenomenon, a new approach has been made in afforesting the coastal mudflats by reboisement of the area with serially appropriate mangroves and halophytes as well as fostering the naturally occurring colonizing mangrove species in the area by nurturing the advance growth and by creating conducive conditions for future colonizers as well.

85. Chhetri, D.R. 2007. "Medicinal plants scenario in Darjeeling Himalayas: Conservation and cultivation as alternative crop". *Indian Forester* 133(5): 665-678.

Abst.- The traditional agricultural practice in Darjeeling Himalayan region is characterized by low input, low risk and low yield. Lack of irrigation, small land holdings, difficult terrain and nutrition depletion etc., limit the area of operation for agriculture. Therefore, for the farmers here, a high economic return from limited land holding, maintenance of sustainable conditions and preservation of biodiversity are the challenges. Considering the special condition in Darjeeling Himalayas, the best way of sustenance is to go for high-value, low-volume cash crops. Cultivation of medicinal plants is such an alternative. Darjeeling Himalayan region is very rich in medicinal plant flora, but so far, it has not been able to exploit the full potential of this sector. Some Government agencies are doing some work and they have already identified certain plants for commercial cultivation and conservation, for which financial support is provided. Local NGO's are also doing some work towards cultivation of medicinal plants. This type of alternative cropping system is being proved to be a suitable livelihood strategy for this region.

86. Chhetri, D.R., Gurung, T. & Gurung, R. 2005. "Physiological and biochemical variations among the natural populations of two medicinal plants, *Plantago major* L. and *Astilbe rivularis* D. Don from Darjeeling Himalayas". *J. Hill Res.* 18(1): 1-8.

Abst.- Studies on different populations of *Plantago major* and *Astilbe rivularis* were found to have considerable differences in the length and diameter of different morphological parts. The content of biochemical constituents viz. free amino acids, soluble proteins, soluble

and insoluble carbohydrates, DNA & RNA and photosynthetic pigments revealed considerable differences. The activity of peroxidase and catalase was more pronounced in the specimens from colder regions and the physiological growth was higher in specimens collected from warmer regions.

87. Chhetri, D.R. & Roy, S.C. 2007. "Biochemical diversity in some *Rhododendron* species from the Darjeeling and Sikkim Himalayas". *J. Hill Res.* 20(2): 46-52.

Abst.- Biochemical analysis of eight *Rhododendron* species occurring in Darjeeling and Sikkim Himalayas showed a high level of soluble protein content in the species distributed over a wide range of altitudinal gradient (*Rhododendron arboretum, R. cinnabarium* etc.), while the amino acid content was high in the species growing in the highest region (*R. maddenii*) in this study. The proline content was more pronounced in the species growing under water stress conditions. A high level of carbohydrate content as well as catalase and peroxidase activities seemed to be an adaptive feature in some of the species.

88. Chettri, Rabindra, Rai, Bharat & Khawas, D.B. 1992. "Certain medicinal plants in the folklore and folk life of Darjeeling and Sikkim Hills, India. 1. Used for the treatment of ailments in domestic animals". *J. Econ. Taxon. Bot.*, *Addit. Ser.* 10: 393-398.

Abst.- The indigenous plants used by the inhabitants of Darjeeling-Sikkim Hills for the treatment of various ailments in domestic animals are particularly studied. The present paper deals with 29 species (23 families) having medicinal properties. The botanical name, local name, habit and plant parts used etc., reported here, have been found new and thus the present study may form a significant contribution for the preservation and perpetuation of this knowledge of the local plants for the benefit and further scientific analysis.

89. Chowdhery, H.J. 2004. "A new species of *Coelogyne* Lindl. (Orchidaceae) from India". *Indian J. Forest.* 27(1): 121-124.

Abst.- A new species of *Coelogyne* viz. *C. pempahisheyana* has been described from Kalimpong sub-division of Darjeeling district, West Bengal.

90. Chowdhury, Monoranjan & Das, A.P. 2007. "Folk medicine used by the *Rabha* tribe in Coochbehar district of West Bengal: A preliminary report" In: A.P. Das & A.K. Pandey (ed.) Advances in Ethnobotany, pp. 289-296.

Abst.- *Rabha* is a very ancient tribe living mainly in Jalpaiguri and Coochbehar districts of West Bengal. They generally live in forest villages and use numerous plants in their daily life for sustenance. Recent studies explored their knowledge regarding the treatment of various diseases they suffer and for which mostly local plants are the sources of medicine. This study listed the use of 51 species of angiospermic plants as sources of medicine. It includes 16 major diseases like abdominal pain, diarrhoea, jaundice, irregular menstruation, etc. Some commonly cultivated and some well known medicinal plants are also used for this purpose.

91. Chowdhury, Monoranjan & Das, A.P. 2009. "Inventory of some ethno-medicinal plants in wetlands areas in Maldah district of West Bengal". *Pleione* 3(1): 83-88.

Abst.- The wetlands of Maldah districts are very old and fresh water natural habitat for several herbaceous flora. Present study focused on the wild wetland plants used by the tribal communities like *Santal, Malpaharia* and *Oraon* to cure many of the diseases they suffer. The record of 33 species of angiosperms belonging to 22 families includes some common medicinal plants and some other need proper evaluation.

92. Dan, S.S., Mondal, N.R. & Dan, Sipra. (1978) 1979. "Phyto-chemical screening of some plants of Indian Botanic Garden". *Bull. Bot. Surv. India* 20(1-4): 117-123.

Abst.- This a report of preliminary screening of 120 samples representing 103 different species, wherein 27, 14, 85, 30 and 45 samples gave positive tests for alkaloids, saponins, steroids/triterpenoids, coumarins and flavonoids respectively. Only *Solidaga canadensis*

L. responded to Legal test and *Cassia fistula* L. contain anthraquinone derivative.

93. **Das, A. & Basu, D. 2008.** "Factors affecting sunflower productivity in West Bengal". *J. Interacad.* 12(4): 541-547.

Abst.- A study was undertaken in South 24-Parganas of West Bengal to find out the factors affecting the sunflower productivity with some selected variables in three groups of sunflower growers- Resource Rich (RR), Resource Moderate (RM) and Resource Poor (RP). The study revealed significant difference in respect of 'area under kharif' and 'Rabi cultivation', 'land holding status', utilization of mass media' among all categories of farmers. There were significant differences among RM and RP and RR and RP farmers in respect of 'agricultural implements possession' and 'livestock possession', 'irrigation index', 'experience of the respondent as sunflower cultivation', 'area under sunflower cultivation', 'cost of cultivation of sunflower', 'utilization of personal cosmopolite', 'risk preference', 'scientific orientation' and 'economic motivation'. Significance difference existed between RR and RM farmers in respect of 'educational qualification'. The study revealed positive and significant association of 'agricultural implements possession', 'utilization of mass media' and 'risk preference' in RR and RP farmers with sunflower productivity. Negative and significant association in RR farmers with sunflower productivity was observed in respect of 'educational qualification', 'livestock possession', 'area under *rabi* and *kharif* crops' and 'land holding status'. The findings of the study implies for targeting of extension for production of sunflower in particular and other crops in general.

94. **Das, A.P., Ghosh, Chandra & Paul, T.K. 2008.** "*Geissaspis cristata* Wight ex Arnott- An addition to the state flora of West Bengal". *Pleione* 2(1): 55-57.

Abst.- *Geissaspis cristata* Wight ex Arnott has been reported as an addition to the flora for the Indian state of West Bengal.

95. **Das, A.P. & Lahiri, A.K. 1990.** "Angiospermic flora of Bethuadahari Reserve Forest, Nadia (India)". *Indian Forester* 116(11): 871-882.

Abst.- Bethuadahari reserve is a 121 hectare man-made deer sanctuary. A recent floristic survey in this forest recorded 193 species of angiosperms covering 51 dicotyledonous and 11 monocotyledonous families of which 49.2% are herbs, 11.9% climbers, 12.4% shrubs and 26.4% are trees. 23 species of plants were found to grow only within the grazing free fenced area. Out of 52 species of trees at least 24 are basically introduced. *Polyalthia suberosa* Benth. is the dominant shrub in the under-storey and in open areas *Vitex negundo* L., *Lantana camara* L., *Chromolaena odorata* (L.) King et Robin and *Glycosmis arborea* (L.) DC. are common. The poor representation of chamaephytes, hemicryptophytes and cryptophytes are due to the excessive pressure of grazing. Altogether 90 species were seen to be eaten by deer of which 35 species are of very good fodder value. Necessary measures to improve the structure of its vegetation, fodder content and beauty has been suggested.

96. **Das, A.P., Panda, Sauris, Bhujel, R.B. & Minda, Renu. 2002.** "Rubiaceae of Darjeeling Himalaya: Recent observation" In: A.P. Das (ed.) Perspectives of Plant Biodiversity, pp. 231-273.

Abst.- Rubiaceae occupies 4th position in *Flora of British India* (Hooker, 1880-1881), and 7th in *Bengal Plants* (Prain, 1903). Floristic survey in Darjeeling Himalaya recorded 83 species covering 36 genera of Rubiaceae growing naturally in its much varied climatic and topographic biozone. Red Data Book of Indian Plants listed 50 Rubiaceous species with different kinds of threat. The present article enumerates the Rubiaceous plants of Darjeeling along with identification keys, synonyms, local names, exsiccata, phenology, frequency, distribution, annotations with use, etc. Appropriate conservational measures also have been discussed.

97. **Das, Debabrata. (2002) 2003.** "*Pedalium murex* L. (Pedaliaceae)- A new report from

Midnapore to the state of West Bengal". *Bull. Bot. Surv. India* 44(1-4): 151-152.

Abst.- *Pedalium murex* L. (Pedaliaceae) has been collected from Kansai Halt which is a new record for the Midnapore district of West Bengal. A complete description along with correct citation, vernacular names, figures, flowering and fruiting, distribution and uses have also given.

98. Das, Debabrata & Mishra, Tapan Kumar. 2004. "Host range diversity of *Cuscuta reflexa* Roxb. in Burdwan district of West Bengal". *J. Econ. Taxon. Bot.* 28(4): 922-926.

Abst.- The district Burdwan, lies between 22º56´ -23º53´ N latitude and 86º48´ -88º25´ E longitude. The district has a magnificent floral diversity embedded by Ajoy, Bhagirathi and Damodar. Dodder (*Cuscuta* sp.) is a species which parasitize a broad range of hosts. The paper is a description of the hosts of *C. reflexa*. In total 44 host species belonging to monocots (4) and dicots (40) have been found to be the host of *C. reflexa*. The hosts include xerophytes (9 species), hydrophytes (2) and mesophytes (3). Among these the hosts of 4 species of monocots are new reports. The new records regarding the parasite and its host will be helpful in enriching our knowledge in biology.

99. Das, J., Pal, P.K. & Sarker, S.C. 2008. "Farmers' cultivation status and technology gap of some selected spice crops- A study in Cooch Behar district of West Bengal". *J. Interacad.* 12(2): 241-246.

Abst.- Most of the time it is observed that the technologies which are being practiced by the farmer is not up-to-date rather latest technologies are not diffused or transferred to the farmer at right time. Farmers are bound to follow the same without getting any up-date version of package. The study is an endeavourer to observe the gaps between the farmers package and the recommended package on spice production technology. In most of the cases it is observed that 'seed' is also follow the same trend, but in case of black pepper the gaps is so wide that no other spices have such deficiencies. The reasons of gaps have also been identified and needs to be addressed the issues with utmost care to popularize the spices in the area.

100. Das, K.K., Ray, J. & Roy, T.N. 2008. "Changing crop dynamics in old alluvial zone of North Bengal- An overview". *J. Interacad.* 12(2): 247-260.

Abst.- North Bengal, the northern segment of West Bengal, comprises of three distinctly characterized agri-climatic zones, namely, Hill, Terai and Old Alluvial. Old Alluvial Zone covers about 42 per cent of the total geographical area of the whole North Bengal to sustain about 49 per cent of its total population. The zone comprises of districts like Dinajpur (South & North) and Malda. Agriculture that provides daily livelihood to more than 61 per cent of the total population has paramount importance in the zone's social, cultural and economic development. The year around agricultural cropping pivots around paddy cultivation. Jute, Maize and Sugarcane (both the crops in Malda district only), *aman* paddy, Potato, Rape and Mustard & Chili, *boro* paddy and *aus* paddy are the major crops cultivated in this zone. But today's cropping practices in this Old Alluvial Zone has undergone a silent but dynamic change over the years; there remains a spatial and temporal variation in growth performance in these crops of the zone too. Therefore, an attempt (with the help of time series data) has been made to investigate growth performance of major agricultural crops in terms of area, production and productivity in two districts of Old Alluvial Zone (as well as in North Bengal as a whole) for the period 1977-78 to 2004-05. The study reveals an encouraging and significant growth trend in area, production and productivity in crops like *boro* paddy, potato, mustard, chili and wheat (in Malda only) in whole North Bengal and the Old Alluvial Zone as well. While there is significant reduction in area coverage under *aus* paddy, area under *aman* paddy and jute remains almost static. Recently, area under maize is on the increasing trend too. The study suggests an urgent need for suitable infra-structural development to facilitate the important crop diversification which has taken place in the region in the last 30 years to boost up the economy.

101. Das, Nilanjana & Chattopadhyay, R.N. 2001. "Nutritional evaluation of edible non-timber forest produces- A case study in south-west Bengal". *Indian Forester* 127(11): 1232-1238.

Abst.- Non-Timber Forest Products (NTFP) constitute an important source of food for economically backward communities living in the forests of the Nayagram Range of West Midnapore Forest Division, south-west Bengal. Items collected for household consumption include leaves and young shoots, flowers, fruits, tubers, mushrooms, etc. The average annual collection was found to be highest for Mahua flowers followed by tubers, leafy vegetables, mushrooms and fruits. The consumption pattern of forest edibles varied widely over the FPCs studied. The present study on nutritional aspect confirms the presence of major nutritive elements in forest edibles in appreciable amount. Therefore, NTFPs have immense prospects to provide solution to the problems of hunger, malnutrition and poverty of the rural poor in the world.

102. Das, Nilanjana & Chattopadhyay, R.N. 2003. "Inventory of forest-based medicinal plants- A case study in South West Bengal". *Indian Forester* 129(1): 69-79.

Abst.- An exploration was undertaken for identification of medicinal plants frequenly used by the forest fringe people of Nayagram Range under Midnapore West Forest Division of South West Bengal. A total of 75 species having medicinal value could be identified and presented along with their identifying characters like botanical name, local name, family, plant type, etc. and uses of the plant components against different diseases. The species diversity in medicinal plants belongs to 34 dicotyledonous plant families and 4 monocotyledonous families. In dicotyledons, the maximum number of genera belong to the family Fabaceae and the maximum number of species belong to the genus *Terminalia*. In monocotyledons, the family Liliaceae is represented by a maximum number of genera. The medicinal utility of the plant species has also been highlighted.

103. Das, Piyush Kanti & Mondal, Amal Kumar. 2008. "Some natural dye yielding plants of Paschim Medinipur district, West Bengal, India". *Environm. Ecol.* 26(4C): 2304-2307.

Abst.- A preliminary ethnobotanical survey among the tribal people of Paschim Medinipur district, West Bengal was done to record the natural dye yielding plants used by the tribal people. *Acacia catechu, Bixa orellana, Curcuma longa, Indigofera tinctoria, Tectona grandis, Morinda citrifolia, Wedelia chinensis, Melastoma malabathricum, Ehretia laevis, Terminalia chebula* and *Carthamus tinctorius* were found to be some of the important species, the dye of which are used by the people of different purpose in local festival and domestic purposes.

104. Das, Piyush Kanti & Mondal, Amal Kumar. 2009. "A contribution to the medicinal plants of West Midnapore district, West Bengal, India". *J. Econ. Taxon. Bot.* 33(Suppl.): 128-138.

Abst.- Herbal medicines have been very helpful in providing excellent lead for synthesizing better drugs for the treatment of different human ailments. In ancient Indian literature, mention regarding the process for utilization of plants in treatment of various human diseases are abundant. The present paper carries about preliminary contribution to the uses of medicinal plants by the tribal and rural people of West Midnapore district. It has been estimated that eighty per cent of the world's population still rely upon the traditional medicinal system for their primary health care. The demand for herbal products is again gradually increasing due to their safer use. In all, 72 medicinal plants were collected and documented. The plants were identified botanically, arranged alphabetically along with their family names, local names, method of application of their parts and medicinal importance.

105. Das, P.K., Nath, S., Sahai, R.M.N. & Banerjee, S.K. 1992. "Characteristics of soils under different aged plantations of *Pinus patula* and *Cryptomeria japonica* in Eastern Himalayas". *Indian J. Forest.* 15(2): 111-115.

Abst.- Soil properties under two different types of coniferous species viz., *Cryptomeria japonica* and *Pinus patula* of different ages in a contiguous area of Takdah range, Darjeeling Forest Division were compared. All the soils were acidic. Surface minerals soils under old

plantation had a lower pH than those under young ones. In soils under both the species, age facilitated the higher organic carbon accumulation. It was noted that cation exchange capacity, exchangeable cations, organic matter content of surface soils under young *P. patula* were higher to those under young *C. japonica*. The age factor along with the soil nutritional status at a particular time affected the nutritional uptake of the plant.

106. Das, S.N., Janardhanan, K.P. & Roy, S.C. 1983. "Some observations on the ethnobotany of the tribes of Totopara and adjoining areas in Jalpaiguri district, West Bengal". *J. Econ. Taxon. Bot.* 4(2): 453-474.

Abst.- The paper deals with 84 species of angiosperms predominantly used by the tribes inhabiting the area like Totos, Mech, Modesia, Nepalese, etc. for food, for poisoning fish, as medicine, fodder for cattle, etc. In the enumeration, the various species have been listed in alphabetical order according to their botanical names. Under each botanical name details such as local names, short description, data on abundance and distribution in the area, phenology, uses, etc. have been given. Details of herbarium specimens to authenticate the report of the species in the area have also been provided under each species.

107. Das, S.R. 1982. "Observations on the elements of the Bankura Forest Division, West Bengal". *Indian Forester* 108(9): 623-625.

Abst.- Observations on the vegetation of the Bankura Forest Division are presented. Physiographically, the Bankura district may be divided into two parts, east and west. The floristic pattern is not uniform in both the parts. Trees, shrubs and woody climbers occurring in general all over the division are enumerated. Differences in the distribution of some trees and elements of shrubby undergrowth are discussed.

108. Dasgupta, M. & Datta, S. 2006. "Plankton composition of four newly excavated ponds of Mohanpur, Nadia, West Bengal". *J. Interacad.* 10(4): 617-620.

Abst.- Plankton composition of four newly excavated ponds located at Mohanpur, Nadia (W.B.) which lies between 21.5-24.5 degree north and 86.0-89.0 degree east was studied. Although the ponds are located in the same area a wide variation in their plankton composition was observed.

109. Das Gupta, J.M. & Mehra, B.P. 1967. "Recorded and unrecorded lac-hosts from West Bengal". *Indian Forester* 93(5): 332-340.

Abst.- The authors record 28 lac-hosts from West Bengal including 15 hosts recorded by previous authors, 4 of which have also been observed by the present authors. The remaining 13 hosts have been recorded by the present authors, 2 of which are new and 11 first records from this state.

110. Datta, P.C. & Maiti, R.K. 1968. "Stereome disposition of paddy field weeds of West Bengal". *Bull. Bot. Soc. Bengal* 22(2): 221-236.

Abst.- Stereome disposition in sixty five species of paddy-field weeds of West Bengal has been studied. The stereome systems encountered in the investigation have been classified. A key to the stereome types for all the species of dicotyledons and monocotyledons growing as weeds of paddy fields of West Bengal has been prepared. A relation between the stereome system and the response to weedicides has been surmised.

111. Datta, P.C. & Saha, Amitava. 1970. "A key to the microscopy of common vegetable fibres of West Bengal". *Bull. Bot. Soc. Bengal* 24(1&2): 61-73.

Abst.- Fibres of 20 common species have been examined under microscope. Their cross section, surface views, colour reactions to different chemical reagents have been studied. Based on these characters a key for identification of fibres has been prepared.

112. Datta, S.C. & Biswas, K.K. 1977. "Autecological studies of weeds of West Bengal. VII. *Nymphaea nouchali* Burm. *f.*". *Bull. Bot. Soc. Bengal* 31(1&2): 129-140.

Abst.- *Nymphaea nouchali*, belonging to the Nymphaeaceae, is characterized by the nymphaeid type of growth-form. Depending upon the manifestation of aerial and edaphic conditions, the species can be variously termed a benthos, floating leaved hydrophyte or hemicryptophyte. Certain factors are responsible for its limited distribution, but it can grow under a variety of conditions. The seeds need mud-processing for germination. The morphological and anatomical features of the plants are such as to resist wetting and tearing as well as to adjust to the depth of water.

113. De, A.B. 1996. "*Diachanthodes novo-guineensis* (Henn.) Fidalgo- A new record from India". *Indian Forester* 122(1): 92-93.

Abst.- A poroid fungus of Aphyllophorales viz., *Diachanthodes novo-guineensis* (Henn.) Fidalgo was collected by the author from Asansol, West Bengal. Scrutiny of literature reveals that it is a new record for India. Morphological and anatomical features of the species based on the author's collection have been provided.

114. De, D.K. 2009. "Ethnobotanical uses of wetland grasses of Purba and Paschim Medinipur district". *J. Econ. Taxon. Bot.* 33(4): 973-977.

Abst.- During the course of ethnobotanical studies, the author came across 32 wetland grasses which have influenced the culture of ethnic communities and have played an important roles in soil binding, supply of fodder and food during scarcity and wild genetic resources for cultivated grain crops. These taxa are enumerated in this paper alphabetically along with local name, flowering and fruiting period, conservation status in the area and uses.

115. Debnath, Manojit, Mandal, Narayan Chandra & Ray, Samit. 2007. "Survey of Cyanobacterial flora of Sagar Island, West Bengal". *J. Bot. Soc. Bengal* 61(2): 83-89.

Abst.- A systematic study of cyanobacterial flora of the estuarine habitats of Sagar Islands was undertaken for the first time. A total 32 cyanobacterial taxa including 2 unicellular (belonging to 2 genera), 22 non-heterocystous filamentous (belonging to 6 genera) and 8 heterocystous filaments (belonging to 6 genera) forms were found from estuarine habitats of Sagar islands. The taxa were identified on the basis of morphological and morphometric characters. All planktonic cyanobacteria found were non-heterocystous and the genus *Oscillatoria* showed maximum species diversity. *Microcoleus chthonoplastes* was the main constituent of cyanobacterial mats and mud flats inundated by tidal water. Of the various physico-chemical parameters studied pH 7.92-8.1, salinity 3.4-6.1 ppt, inorganic phosphate 0.8-0.92mg/L and dissolved inorganic nitrogen 1.2-1.34 mg/L (DIN) were of much higher values as compared to fresh water habitat (pH 6.7-7.2, phosphate up to 0.4 mg/L, DIN 0.3-0.51 mg/L). However, these increased values do not seem to have any effect on the morphology of the various physico-chemical parameters.

116. Debta, M.R. (2008) 2009. "Some new reports for the flora of West Bengal". *Bull. Bot. Surv. India* 50(1-4): 147-149.

Abst.- *Dichrocephala integrifolia* subsp. *gracilis* (DC.) Fayed, *Prenanthes violifolia* Decne., *Saussurea gossypiphora* D. Don, *S. leontodontoides* (DC.) Sch.-Bip., *S. sughoo* C.B. Clarke belonging to the family Asteraceae are reported here for the first time from West Bengal.

117. Debta, M.R. & Chowdhery, H.J. 2009. "Botany of the Singalila National Park, West Bengal". *J. Econ. Taxon. Bot.* 33(4): 778-785.

Abst.- The present paper provides a glimpse on the botanical aspect and the floristic diversity of the Singalila National Park, Darjeeling district, West Bengal along with the existing threats to its flora. Dominant families and genera are listed in Table 1 to 2 for dicotyledonous and monocotyledonous flora.

118. Dey, D.K. & Pati, B.R. 2004. "Exotic grass of Midnapore district, West Bengal". *J. Econ. Taxon. Bot.* 28(4): 976.

Abst.- An exotic grass species *Phalaris minor* has been reported from Midnapore district, West Bengal.

119. Dey, Monalisa & Singh, Devendra Kumar. 2008. "*Frullania pran-nathii*- A new epiphyllous liverwort from Darjeeling, India". *J. Jap. Bot.* 83(5): 280-283.

Abst.- A new species of genus *Frullania* Raddi, *F. pran-nathii* M. Dey & D.K. Singh is described from Darjeeling in the Eastern Himalaya, India. It is characterized by greenish-brown plants with small, thick-walled cortical cells arranged in a single layer and thin-walled medullary cells with minute tri-radiate trigones; widely spreading, contiguous to distant, suborbicular to elliptical leaves with plane lobe, a large auriculate appendage at base and flat apex; median leaf cells with small trigones and nodular intermediate thickenings; basal leaf cells with trabeculately thickened trigones and intermediate thickenings; stylus multicellular at base with 1-3 teeth lateral tooth and 5-7 cells uniseriate towards apex terminating into an elongated hyaline cell, and 1/8-1/5 bilobed, distant underleaves with auriculate base. The species has been compared with *F. nepalensis* (Spreng.) Lehm. & Lindenb., from which it differs in the shape and arrangement of leaves, and size and structure of stylus.

120. Dey, Monalisa & Singh, D.K. (2008) 2009. "*Cololejeunea longiana* Grolle & Mizut.- An addition to Indian bryoflora from Darjeeling, West Bengal". *Bull. Bot. Surv. India* 50(1-4): 209-211.

Abst.- The record of *Cololejeunea longiana* Grolle & Mizut. from Darjeeling district, West Bengal also constitute a new record for India.

121. Dey, N. (2008) 2009. "*Sirocladium kumaoense* Randhawa (Zygnemaceae)- A rare terrestrial alga from Darjeeling Himalayas". *Bull. Bot. Surv. India* 50(1-4): 175-178.

Abst.- *Sirocladium kumaoense* Randhawa, a rare terrestrial alga has been recorded from the Darjeeling district for the first time.

122. Dey, N., Banerjee, B. & Ghatak, A. 2009. "Three efficient heterocyst bearing nitrogen fixing Blue-green algae from rice field of Bankura district, the Rarh Bengal". *J. Econ. Taxon. Bot.* 33(3): 677-681.

Abst.- The purpose of this study was to identify the heterocyst bearing nitrogen fixing Blue-green algae from a rice field in a locality of Bankura district, West Bengal. Three such Blue-green algal species (*Cylindrospermum majus* Kutz. ex Born. & Flah., *Ananaena oryzae* Fritsch., *Nostoc commune* Vaucher ex Born. & Flah.) were identified and morpho-taxonomically characterized.

123. Dey, N., Ghatak, A. & Banerjee, B. 2008. "*Trentepohlia aurea* (L.) Martius- The most abundant epiphytic chaetophoralean alga from Darjeeling Himalayas". *J. Swamy Bot. Club* 25(1-4): 51-53.

Abst.- Species of *Trentepohlia* belonging to the order Chaetophorales, class Chlorophyceae has been reported from hilly region of Darjeeling in the provinces of North East Himalayas. Morpho-taxonomic description of the specimen is provided.

124. Dey, Sangita, Debnath, H.S. & Sikdar, P.K. 2006. "A review of the legal tools for management of Sunderban Biosphere Reserve, West Bengal, India". *Indian Forester* 132(10): 1343-1356.

Abst.- The Sunderbans Biosphere Resrve (SBR) is the largest marine biosphere reserve in India to conserve the coastal and threatened mangrove ecosystem. The importance of mangrove forests of Sunderbans in terms of international, national and local level as well as to the total economy of the country is immense. However it has been reported that for the last two decades this rich and diverse mangrove ecosystem is under continuous threat due to various natural and anthropogenic activities. To conserve this ecologically fragile environment various rules, regulations and legislations were enacted from time to time.

The Indian Forest Act, 1927, is responsible for declaration of 9,630 km^2 areas as Reserved Forest within the Sunderbans. The Forest (Conservation) Act, 1980, actually forms the basis of protection of forestland because it restricts use of forestland for non-forest purposes. The Wildlife (Protection) Act, 1972, provides the basis for declaration of National Parks and sanctuaries within the reserve. It also prohibits hunting and poaching of wild animals. The Environment (Protection) Act, 1986, is an umbrella act and provides protection from all the different types of pollutants. The Coastal Regulation Zone Notification (CRZ), 1991, The West Bengal Marine Fishing Regulation Act, 1983, regulates shrimp culture and marine fishing respectively. But in spite of all these legal tools and machinery the illegal trespassing, hunting, discharge of various types of pollutants and unsustainable fishing are still continuing. So more stringent legal action against the defaulters by increase in penalty and imprisonment years as well as closing of polluting units in some cases are recommended. The Coastal Regulation Zone Notification (CRZ), 1991, is required to be reviewed for formulation of the Shoreline Management Plan. Also to make the legal tool stronger the identified provisions of various International Conventions should be incorporated in the legal framework on a priority basis.

125. Dharne, C.G. & Roychoudhury, K.N. 1968. "New or noteworthy species of *Graphina* from Darjeeling Himalayas – I". *Bull. Bot. Surv. India* 10(3&4): 267-269.

Abst.- This paper deals with two new species (*Graphina darjeelingensis* and *G. awasthii*) and two new records (*G. carbocarpa* and *G. bipartita*) of the genus *Graphina* collected from Darjeeling Himalayas.

126. Dixit, R.D. & Das, Anjali. (1975) 1978. "*Coniogramme subcordata* Copel.- a new record of fern for India". *Bull. Bot. Surv. India* 17(1-4): 184-186.

Abst.- *Coniogramme subcordata* Copel. has been reported for the first time from India based on collections from Tonglu and Rambi, West Bengal.

127. Dixit, R.D., Hazra, Dipali & Kar, B.D. (1976) 1979. "*Loxogramme remote-frondigera* (Hayata) C. Chr. – A new record for India and China". *Bull. Bot. Surv. India* 18(1-4): 222-223.

Abst.- *Loxogramme remote-frondigera* (Hayata) C. Chr. is reported here as a new record for India and China. Indian specimens were collected from Maneybhanjang and Senchal Reserve Forest, Darjeeling, West Bengal.

128. Dolui, A.K., Boxi, R.N. & Banerjee, S.K. 1985. "Physicochemical studies of some forest soils occurring in Topo sequence of West Bengal". *Indian Forester* 111(1): 36-46.

Abst.- The physicochemical characteristics of some lateritic soils under forest floor in topo sequence of West Bengal were studied. The soils were then classified according to modern system of classification. The chemical composition of these soils has been influenced to a great extent by drainage condition, differential transport or eroded material, leaching, translocation and redeposition of mobile soil constituents. Chemical composition of the soils indicates trend in laterisation process. Appreciable base status of the soils, however, goes to prove that weathering has not progressed very far.

129. Dolui, A.K. & Dey, S. 1993. "The Zero Point of Charge (ZPC) of some forest soils in Terai and Teesta alluvial regions of West Bengal". *Indian Forester* 119(4): 334-339.

Abst.- The Zero point of charge of some Terai and Teesta alluvial soils under forest floor in West Bengal was studied. The electrochemical behavior of these soils was found to be similar to that of the constant potential systems in which the surface potential is determined by H^+ and OH^- ions in the equilibrium solution, hence charge distributed varied substantially with pH and electrolyte concentration. The point of zero charge of the soils ranged from $_pH$ 2.30 to 2.90 with the Karnajora soils series having the lowest values and the Haihaipathar soil series the highest. The (pH_{KCl}-ZPC) values of Haihaipathar soils series (varying from 0.90 to 1.30) are less than that of Karanjora series (varying from 2.30 to 2.45) indicating

that Haihaipathar soil series is more developed than Karanjora soil series.

130. Dutta, G., Dutta, A., Das, N.D. & Ghosal, K.K. 2004. "Studies on the floral biology of Isabgul (*Plantago ovata* F.) in new alluvial zone of West Bengal". *J. Interacad.* 8(4): 630-633.

Abst.- Floral biology of Isabgul (variety- Gujarat Usabgul-I) is studied in new alluvial zone. The flower is regular, bisexual, tetramerous and actinophormic in nature. The anthesis is largely (84.61%) confined to early morning hours (5.30 AM to 7.00 PM). The stigma emerges about one day earlier than anther dehiscence. It reveals that the flower is protogynous in nature. More than 90% pollen grains remain viable throughout the day. The number of flowers borne per spike (panicle) are on average 44.35 ranging from 38-52, while the average number of days required is 12.2 days in a range of 8-15 days for completion of flowering.

131. Dutta, Suchandra, Naik-Desai, Abhijit, Almeida, S.M. & Das, A. P. 2002. "Aquatic macrophytes of Apalchand Reserve in the Jalpaiguri District of West Bengal" In: A.P. Das (ed.) Perspectives of Plant Biodiversity, pp. 53-65.

Abst.- Hydrophytes and helophytes of Apalchand Reserve in Jalpaiguri District of West Bengal have been surveyed during 1994 to 1999. Habit, habitat, local name and uses (if any) of recorded plants are discussed. A total of 75 species, representing 61 genera and 38 families have been enumerated.

132. Dutta, Suchandra R. 2007. "Ethnobotany of *Rajbanshies* of Apalchand Reserve, Jalpaiguri district, West Bengal, India" In: A.P. Das & A.K. Pandey (ed.) Advances in Ethnobotany, pp. 233-238.

Abst.- Present paper deals with the ethnobotanical uses of 63 plants which were reported by Rajbanshies of Apalchand Reserve Forest. The information is first hand and useful for further studies.

133. Dutta, Sutapa, Kole, Ramen K., Ghosh, Santanu, Vass, Kuldip K. & Nath, D. 2005. "Evaluation of water quality index of the river Ganga in West Bengal". *J. Interacad.* 9(4): 559-568.

Abst.- Water quality parameters (DO, BOD, pH, chloride, total hardness, alkalinity, nitrate nitrogen and coliform bacteria) of the river Ganga were monitored once in a month for a period of two years at four stations in West Bengal. Harkins water quality index values for the monthly observations were found to be in the range of 3-49, the higher values indicating more pollution load. Weighted arithmetic and multiplicative indices for the average seasonal values of the parameters were observed in the range of 99-140 and 89-76 for drinking and general use purpose respectively. The weighted indices indicated least pollution at the upper most station in the winter season which increased significantly to other stations in the downstream. Seasonal effect on the pollution load was revealed in the order of summer>monsoon>winter. Water pollution in the river was chiefly attributed to the occurrence of coliform bacteria.

134. Gangopadhyay, S.K., Nath, S. & Banerjee, S.K. 1987. "Nature and properties of some introduced Teak (*Tectona grandis*) growing soild of North-West Bengal". *Indian Forester* 113(1): 65-72.

Abst.- Nature and properties of some introduced teak (*Tectona grandis*) growing soils of North-West Bengal were studied in order to evaluate the characteristics of the soils supporting the species. It was found that since teak was growing well in the area, the characteristics and nature of the soils must be favourable for the growth and development of the species. Information from other good teak growing areas will help to generalize the range of the characteristics of the soil suitable for the species.

135. Ganguly, Pabitrananda & Kumar, Nirmal Chandra. 1976. "Topographical distribution of

the phanerogamic parasites in Sukna Forest, Darjeeling district, West Bengal". *Indian Forester* 102(7): 459-462.

Abst.- A survey of the Phanerogamic parasites was made on 607.27 hectares of commercial forest in Sukna, West Bengal primarily to determine the effect of topographical elevations in the distribution of certain parasites. The data shows that the frequency of the parasites is highest on ridges, less on the slopes and least on the plains. The causes for such varied distribution in relation to topography are discussed.

136. Garg, Arti. 2007. "New records of Asteraceae for West Bengal". *Phytotaxonomy* 7: 38-43.

Abst.- *Carpesium scapiforme* Chen & Hu, *C. cernuum* L. var. *cernuum* and *C. cernuum* L. var. *pedenculosum* Wall. ex C.B. Clarke are reported for the first time from Darjeeling district of West Bengal.

137. Garg, Arti. (2008) 2009. "New records of Asteraceae from West Bengal". *Bull. Bot. Surv. India* 50(1-4): 101-104.

Abst.- The present work elucidates eleven taxa belonging to ten species of Asteraceae as new records for the state of West Bengal.

138. Garg, Arti. 2009. "*Blumea lanceolaria* (Roxb.) Druce var. *spectabilis* (DC.) Randeria (Asteraceae): A new record for West Bengal with taxonomic notes". *J. Econ. Taxon. Bot.* 33(4): 811-813.

Abst.- *Blumea lanceolaria* (Roxb.) Druce var. *spectabilis* (DC.) Randeria of family Asteraceae is reported as a new record from Darjeeling district of West Bengal.

139. Garg, K.L. 1981. "Rhizosphere and rhizoplane mycoflora of some Indian mangrove plants". *Geophytology* 11(2): 148-153.

Abst.- Rhizosphere and rhizoplane mycoflora of three mangrove plants, viz., *Rhizophora mucronata, Avicennia officinalis* and *Heritiera minor* from Sunderban (West Bengal) area, has been studied. The pH and salinity of rhizosphere mud was lower than the non-rhizosphere mud, whereas the organic matter was high in rhizosphere of all the three plants. In all, 77 fungal species were isolated from rhizosphere, non-rhizosphere mud and rhizoplane. Phycomycetes were absent in non-rhizosphere mud but were isolated from rhizosphere mud and rhizoplane. All the phycomycetes fungi belong to the order Mucorales. Ascomycetes were more in rhizoplane. Basidiomycetes were not encountered at all in the present study. Fungi Imperfecti isolated frequently and in abundance formed the dominant mycoflora of rhizosphere and rhizoplane.

140. Ghatak, Avijit, Banerjee, Banani & Dey, Narottam. 2008. "*Nostoc muscorum* a mucilaginous ball forming blue-green algae from Darjeeling Hills". *J. Hill Res.* 21(2): 70-72.

Abst.- *Nostoc muscorum* has been collected from Padmaja Naidu Himalayan Zoological Park, Darjeeling. This is the only and first report of this species growing as wall flora in association with the Bryophytic members from the Eastern Himalayas.

141. Ghatak, P.N. 1939. "Studies in the soil fungi of the paddy-fields of Bengal". *J. Indian Bot. Soc.* 18: 113-127.

Abst.- The present work deals mainly with the systematic study of fungi of an unmanured paddy filed at Chinsurah Agricultural Farm near Calcutta.

142. Ghosal, P.P. & Srivastava, S.C. 2006. "Rediscovery of *Hemiorchis rhodorrhachis* K. Schum. (Zingiberaceae)- After gap of a century with extended distribution". *Bull. Bot. Surv. India* 48(1-4): 197-200.

Abst.- During a collection trip to Buxa Tiger Reserve, Jalpaiguri district, West Bengal, the first author collected *Hemiorchis rhodorrhachis* K. Schum. (Zingiberaceae). Scrutiny of literature reveals that it has been collected from India after a gap of more than a century.

Previously this species was recorded from Assam, Meghalaya and Mizoram. Thus the present collection of the species from West Bengal extends the range of its distribution.

143. **Ghosh, Ashis. 1999.** "Herbal veterinary medicine from the tribal areas of Bankura district, West Bengal". *J. Econ. Taxon. Bot.* 23(2): 557-560.

Abst.- Ethnobotanical uses of plants in veterinary medicine by the tribals of Bankura district have been reported.

144. **Ghosh, Ashis. 2003.** "Herbal folk remedies of Bankura and Medinipur districts, West Bengal". *Indian J. Traditional Knowledge* 2(4): 393-396.

Abst.- Twenty two medicinal plants belonging to nineteen families used by the tribals/ local communities of Bankura and Medinipur districts, West Bengal have been reported as the potential drugs against twenty common ailments of the people.

145. **Ghosh, Ashis. 2008.** "Ethnobotanical biocides of West Rardh in West Bengal". *J. Econ. Taxon. Bot.* 32(3): 742-744.

Abst.- The paper deals with the first-hand informations gathered during ethnobotanical surveys in South Bengal. Traditional uses by aborigines and rural folk for the treatment in plants, human and veterinary. The ethnobiocidal-lore of the tribes such as Bhumij, Chakma, Chero, Kharwar, Lodha, Mahali, Metch, Munda, Oraon, Rabha, Santal, Savar are presented in the table.

146. **Ghosh, Ashis. 2009.** "Ethnobotanical survey of West Rardh (Murshidabad, Birbhum, Bankura, Purulia, Pura and Paschim Medinipur districts) for natural health care and green belt movement". *J. Econ. Taxon. Bot.* 33(Suppl.): 24-29.

Abst.- In the present paper the author has tried to unveil the potential value of different plants of six districts and their surroundings. Many of the residents have knowledge of plants or plant parts used as medicine, but only local folk-doctors have the knowledge of their growth season, place and mode of harvest, post harvest treatment, storage and usage, doses etc. Commercial pressure has reached the areas during the last decade and illegal export of a large number of plants is reported. 38 folk recipes explored on 48 plant species belonging to 44 genera and 31 families are presented herewith.

147. **Ghosh, Ashis. 2009.** "Folk potential herbal drugs of Bankura, Purulia and Midnapore districts in West Bengal". *J. Econ. Taxon. Bot.* 33(Suppl.): 213-216.

Abst.- The Bankura, Purulia and Midnapore districts are mostly inhabited by the tribals. About 25 plant species are used by the tribals and locals as medicine for different ailments, such as habitual abortion, ashma, diabetes, migraine, dyspepsia, gout, dysentery, snake bite, filaria etc. Commercial pressure has reached these areas during the past decade and illegal export of valuable species is reported for the folk potentiality. Over 32 medicinal uses relating to 24 general among the native folk seem new. Hence, an attempt has been made to explore all these medicinal uses.

148. **Ghosh, Ashish. 2003.** "Traditional vegetable dyes from central West Bengal". *J. Econ. Taxon. Bot.* 27(4): 825-826.

Abst.- In the present paper the author has tried to unveil the potential value of vegetable dyes collected from the inhabitants of central West Bengal.

149. **Ghosh, Barin & Maity, G.G. 1987.** "Notes on distribution of a few plants in India". *J. Econ. Taxon. Bot.* 10(1): 195-198.

Abst.- The present paper reports on some new distributional records of *Vigna aconitifolia* (Jacq.) Marechal, *Hedyotis pinifolia* Wall. ex G. Don, *Spermacoce pusilla* Wall., *Andrographis echioides* (L.) Nees and *Melastoma malabathricum* L. in West Bengal and also deals with some problems regarding the distributional records of *Ludwigia octovalvis* (L.) Raven, *Lepidium virginicum* Linn. and *Tragia hispida* Willd. which were made due to misidentification

of the specimens by the previous authors.

150. Ghosh, Chandra & Das, A.P. 2004. "Preparation of rice beer by the tribal inhabitants of tea gardens in Terai of West Bengal". *Indian J. Traditional Knowledge* 3(4): 373-382.

Abst.- The ingredients and the method of preparing starter mixture (*Rânu Dâbâi*) and the fermentation of boiled rice for production of rice beer (*Jhârâ* or *Hârhiâ*) have been recorded as it is practiced by the Oraon and Santhal workers in Terai Tea Gardens. In addition to the use of five core plants (*Oryza sativa, Coccinia grandis, Plumbago zeylanica, Vernonia cinerea* and *Clerodendrum viscosum*) tribals use quite a few more plants to modify the taste and/or colour of *Jhârâ*.

151. Ghosh, Chandra & Das, A.P. 2007. "Plants of ethnobotanical significance for the tea garden workers in Terai and Duars of Darjeeling in West Bengal, India" In: A.P. Das & A.K. Pandey (ed.) Advances in Ethnobotany, pp. 133-147.

Abst.- Present paper recorded 133 dicotyledonous, 33 monocotyledonous and four pteridophytic plants of ethnobotanical significance for the tea garden workers of Terai-Duars of Darjeeling in West Bengal. A good number of these useful plants are available inside the tea gardens. Most of the information like local names, uses, parts and mode of applications has been obtained from village medicine men and other elderly and experienced members of their communities through discussion and demonstration. All these plants fulfill a wide array of requirements in their daily life.

152. Ghosh, J.P. 2006. "A preliminary check-list of Hepatics of West Bengal". *Bull. Bot. Surv. India* 48(1-4): 73-102.

Abst.- A check-list of Hepatics of West Bengal has been provided. The list is based mainly on published records and hepatics housed in Central National Herbarium (CAL) along with some new collections made by the authors. The Hepatics of West Bengal are represented by 35 families, 73 genera and 221 species. It is expected that the number of hepatic species may increase with further hepatics investigation in different districts of West Bengal. According to literature information, 5 species listed here are rare and 20 species are endemic to Darjeeling Himalayas.

153. Ghosh, R.C. 1968. "*Cryptomeria japonica* plantations in West Bengal". *Indian Forester* 94(1): 104-111.

Abst.- Conifers are practically absent in the Himalayan range in the northern region of West Bengal. The bulk of the forest is a broad-leaved complex, chiefly of oaks (*Quercus* species), maples (*Acer* species), laurels (*Machilus* species) and magnolias (*Magnolia* species). There is a small patch of *Pinus longifolia* barely 30 hectares in extent, lying isolated on the bank of the Great Rangit river. Hemlock (*Tsuga brunoniana*) and silver fir (*Abies densa*) are the only species which individually occur as significant communities over about 70 sq km of forest approximately between the altitudes of 2,700 m and 4,000 m.

154. Ghosh, Ruby, Bera, Subir, Chakraborty, Supriyo, Chattopadhyay, Rupendra Kumar & Banerjee, Manju. 2005. "Significance of study of phytoliths in understanding vegetational pattern in an archaeological site of West Bengal, India". *Phytomorphology* 55(3&4): 221-232.

Abst.- Phytoliths of poaceous origin with diverse shapes and sizes are recovered from C^{14} dated sedimentary layers of an archaeological site at Pakhanna, district Bankura, West Bengal, India. The data accumulated on phytoliths assigned to subfamilies and genera are utilized to explore human-plant relationship in the contemporary time. Among the phytoliths of panicoid, chloridoid, festucoid types, panicoid type of phytoliths are frequent in the assemblages recorded from sediments of 3320±400-2110±340 years BP (Before Present). Phytoliths similar to that of that of the leaf phytoliths of modern maize plant occur in highest frequency in the assemblages. Considering the global data, particularly records on earliest

cultivation of *Zea mays* L. in India not until 1500 AD, the phytoliths of the present collection are tentatively identified ef. *Zea* sp. till confirmed with the data of cob phytolith. From the data obtained, it appears that the area had a cover of rich vegetation of a tropical humid grassy land. The grassy land was primarily dominated by the panicoid grasses in association with chloridoid and festucoid grasses. The climate and ecology of the area have remained almost unchanged during last *ca* 3500 years.

155. Ghosh, Subir, K. 2002. "Scope of Makhana (*Euryale ferox* Salisbury) cultivation in less remunerable wetlands: A case study from West Bengal" In: A.P. Das (ed.) Perspectives of Plant Biodiversity, pp. 757-768.

Abst.- *Euryale ferox* Salisbury (Nymphaeaceae) is wetland cash crop of North Bihar. Due to lack of awareness regarding the potentiality of 'makhana' seed as food and medicine as well as due to anthropogenic pressure and wetland encroachment from middle part of the twentieth century this plant became rare in West Bengal. In Bihar, more than 86,000 ha wetland area are utilized for its cultivation and the rate of production is about 21 quintals/ ha. Very recently, the plant has been reintroduced into the district of Malda, West Bengal for commercial cultivation. More than 900 ha wetland area in this district is now under its cultivation employing about 5000 people. Considering the plant's tremendous potentiality in both the national and the international market, it can be successfully cultured in those wetlands where pisciculture is less remunerable. Makhana grows well in wetlands with six 15 cm to 1 m deep water, nearly neutral pH and sediments with high organic content.

156. Ghosh, Sutapa & Sensarma, Priyadarshan. 1997. "Ethnomedicine to modern medicine: An observational study in some villages of West Bengal". *Ethnobotany* 9(1&2): 80-84.

Abst.- A survey on transition from ethnomedicine to modern medicine has been carried out in three villages- Nikiripara, Merudandi and Bagdipara- in Basirhat subdivision of 24-Parganas (North) district, West Bengal. The survey reveals that despite extension of infrastructure of the modern medicine system, the people of these villages, irrespective of their religion, level of literacy, financial capability and proximity to the health centres, depends on the traditional folk-medicines at the primary state of a disease and take the help of modern medicines only when the traditional medicines fail. The folk of these villages use 24 locally available angiospermatic plants, singly or in combination, for the treatment of 23 common diseases. These plants are recognized as medicinal plants by modern scientists too, but their use is not identical in modern medicines in which these are considered as health remedies, not drugs.

157. Giri, G.S. & Nayar, M.P. (1983) 1985. "New taxa of *Osbeckia* L. with a note on *O. lineolata* Gamble". *Bull. Bot. Surv. India* 25(1-4): 241-245.

Abst.- In this paper a new species of *Osbeckia* viz., *O. darjeelingensis* has been described. A note on the systematic position of *O. lineolata* Gamble is given. A new variety under this species viz. *O. lineolata* Gamble *var. anamalayana* has also been described.

158. Goswami, A., Panja, B.N. & Chaudhuri, S. 2007. "Weed flora mediated mycorrhizal infective potential preservation benefit for succeeding crops in fly ash". *J. Interacad.* 11(2): 244-246.

Abst.- Roots and rhizosphere fly ash of five weed species viz., *Cyanodon dactylon* Pers., *Brachiaria mutica* (Forsk.) Stapf, *Eleusine indica* (L.) Gaertn., *Colocasia esculenta* (L.) Schott and *Borreria hispida* (L.) K. Schum. with 60-77% intensity of mycorrhizal colonization, collected from 0-2 m border of fly ash pond of Bandel Thermal Power Station, Hooghly, West Bengal, India, were used as inoculums source for the experiment. Results showed that these were very good source of mycorrhizal inoculums, played a significant role in mycorrhizal infective potential preservation and extended mycorrhizal benefit in terms of higher plant height (52.6-84.7%) and dry matter accumulation (40.2-73.3%) for the succeeding crops like cowpea, maize and jowar. Present increment of plant height and total dry matter accumulation of mycorrhizal over non-mycorrhizal one was higher in maize

and jowar than others.

159. Guha, B.P. 1968. "An account of the floristic survey of Birbhum district (West Bengal)- I (Ranunculaceae- Moringaceae)". *Bull. Bot. Soc. Bengal* 22(1): 109-121.

Abst.- One hundred and sixty one species of plants belonging to 40 families (Ranunculaceae to Moringaceae) of the angiospermic flora of the Birbhum district of West Bengal are listed. Data on flowering and fruiting times, degree of abundance, synonyms of plants and notes on topography, geology, soil, climate and vegetation, etc. of the district are included. The meteorological data based on last 5 years reports are also given.

160. Guha, S.R.D., Gupta, R.K., Mathur, G.M. & Sharma, Y.K. 1970. "Production of writing and printing papers from *Prosopis juliflora*". *Indian Forester* 96(6): 426-428.

Abst.- Proximate chemical analysis and fibre dimensions of *Prosopis juliflora*, have been recorded. Bleached sulphate pulps have been prepared on the laboratory scale. Laboratory scale experiments were confirmed on pilot plant scale. Laboratory as well as pilot plant scale experiments have shown that writing and printing papers can be produced by *Prosopis juliflora*. As the wood was very crooked difficulties were observed in chipping.

161. Guha Bakshi, D.N. 1982. "Grasses of Murshidabad district in West Bengal". *J. Econ. Taxon. Bot.* 3(1): 77-91.

Abst.- A list of 28 genera and 55 species of grasses of the district of Murshidabad have been given here with synonyms, degree of abundance, nature of habit, habitat, phenology and field notes.

162. Gupta, Dilip. 1965. "Some new records of Blue-green algae from West Bengal". *Bull. Bot. Soc. Bengal* 19(1): 1-2.

Abst.- 4 species of Blue-green algae under 3 genera were found to be new records for West Bengal. Among these 4 species, two have been previously reported from South India only and one from North India.

163. Gupta, R.K. (2008) 2009. "Bark algae of Indian Botanic Garden, Howrah". *Bull. Bot. Surv. India* 50(1-4): 119-128.

Abst.- Studies on the epiphytic algae on the bark of different trees in Indian Botanic Garden, Howrah were conducted between 2006-2007. Of these 33 species belong to Cyanophyceae. The members of 53 algal species revealed that members of Chroococcaceae, Oscillatoriaceae, Scytonemataceae, Nostocaceae, Rivulariaceae (Cyanophyceae), Trentepohliaceae and Pleurococcaceae (Chlorophyceae) exhibit a luxuriant growth. But certain members of Chlorophyceae, Xanthophyceae and Bacillariophyceae, exhibit scarce growth. The correct names of the woody species that support the growth of the algae are also listed.

164. Gupta Bhattacharya, S., Bhattacharya, K., Chakraborty, P., Bishayee, G.C., Choudhury, I. & Chanda, S. 2002. "A contribution to the pollen-flora of tropical West Bengal as an aid to vegetational history and aerobiology" In: A.P. Das (ed.) Perspectives of Plant Biodiversity, pp. 437-450.

Abst.- Pollen morphological survey in the tropical West Bengal with both naturally occurring and cultivated plants revealed the presence of all apertural types of pollen grains namely inaperturate, 1-porate/sulcate, 3-colpate/porate/pororate/colporate, pantoporate, etc. The major pollen shapes varied from prolate to oblate and spheroidal with various types of surface ornamentation. Subsurface pollen analysis to reconstruct the vegetational history of Birbhum district and dispersed pollen survey to identify the potential allergenic pollens present in the atmosphere of Madhyamgram (suburban area of Calcutta metropolis) yielded useful data. The clinical tests have confirmed the allergenicity of suspected pollen taxa. The study also helped in identifying the pollen types of recent-past recorded from young deposits in Birbhum district.

165. Hotwani, Gita & Mukherjee, Ambarish. 2008. "Studies on medicinal plants of Burdwan-III". *J. Econ. Taxon. Bot.* 32 (Suppl.): 425-436.

Abst.- The present paper deals with the inventorization of 132 species of medicinal plants belonging to 58 families and 108 genera growing in different parts of the Burdwan district. The work is in conformity with the first and second phase wherein 230 such species along with their family and local name, plant part(s) and/or material used and medicinal property/ uses have been brought into light. The work is still in progress.

166. Jagadeesh Ram, T.A.M. & Sinha, G.P. 2003. "Four new records of lichens for India from West Bengal". *Phytotaxonomy* 3: 97-98.

Abst.- The paper deals with four species of lichens viz., *Arthonia dispersula* Nyl., *A. obese* (Mull.-Arg.) R. Sant., *Dirinaria leopoldii* (Stein) Awasthi and *Parmotrema overeemii* (Zahlbr.) Elix from Sundarbans Biosphere Reserve, West Bengal as new records for Indian lichen flora.

167. Jagadeesh Ram, T.A.M., Sinha, G.P., Singh, K.P. & Borthakur, S.K. 2005. "New records of *Bactrospora* and *Coccocarpia* species for Indian lichen flora". *Phytotaxonomy* 5: 94-95.

Abst.- The paper deals with three species viz., *Bactrospora jenikii* (Vzda) Egea & Torrente, *Coccocarpia glaucina* Krempelh. and *C. rottleri* (Ach.) L. Arvidsson, from Sunderban Biosphere Reserve as new records for Indian lichen flora.

168. Jagadeesh Ram, T.A.M., Sinha, G.P., Singh, K.P. & Borthakur, S.K. 2007. "Fours species of lichens new to Indian lichen flora". *Indian J. Forest.* 30(4): 535-538.

Abst.- The paper deals with 4 species of lichens viz., *Fissurina agena* (Nyl.) Nyl., *Graphis pulacana* Vain., *G. dendrogramma* Nyl., *Myriotrema minutum* (Hale) Hale and *Phaeographis epruinosa* (Redinger) Staiger recorded for the first time from India in Sundarban Biosphere Reserve, West Bengal.

169. Jana, Debasis & Bera, Subir. 2004. "*Sonneratia apetala* Buch.-Ham. as major nectar source for honey bees during mid-summer days in Sunderbans, West Bengal, India". *Phytomorphology* 54(1&2): 51-57.

Abst.- Pollen analytical data of nine honey samples collected during April 1999-May 2000 from different places of Sunderbans, West Bengal is presented here. *Sonneratia apetala* was the predominant pollen type in seven samples, while *Ceriops decandra* in one sample. Other significant pollen types recorded are *Aegiceras corniculatum, Phoenix paludosa, Excoecaria agallocha, Avicennia* sp., *Bruguiera gymnorrhiza* and *Acanthus ilicifolius.* The present data suggests the importance of *Sonneratia apetala* as major nectar source for honey bees viz., *Apies dorsata, Apis cerana indica* and *Apis mellifera* during mid summer days in Sunderbans, West Bengal, India.

170. Jana, T.K. & Ghosh, S.N. 2008. "A new variety of *Meliola mammeae* Hansf. from Darjeeling district of West Bengal". *J. Bot. Soc. Bengal* 62(2): 43-44.

Abst.- One new variety of *Meliola mammeae* Hansf. collected from Darjeeling district of West Bengal (India) viz., *M. mammeae* Hansf. var. *macrosporae* var. nov. causing leaf spot on *Garcinia xanthochymus* Hook. f. is described and illustrated in this paper. The type specimen has been deposited in the herbarium, CAB, International Mycological Institute (IMI 215567), U.K.

171. Jayaraman, Uma. (1992) 1997. "A note on the distribution of some species of *Diospyros*". *Bull. Bot. Surv. India* 34(1-4): 230-232.

Abst.- In course of the revisionary study on the family Ebenaceae the author reported some plants as new records for West Bengal, Andaman and Burma in which *Diospyros paniculata* Dalz. is a new record for West Bengal.

172. Kabir, S.E. & Ghosh Hajra, N. 1993. "Chemical weed control in Kurseong tea plantation".

J. Hill Res. 6(1): 37-40.

Abst.- The study on the effectivity of different herbicides in singular as well as combination on the weed flora of Kurseong revealed that Glyphosate @ 0.92 Kg a.i. ha^{-1} has the capacity to control almost all types of weeds. Glyphosate and 2,4-D @ 1.2Kg a.i. ha^{-1} in alternate rounds are also useful. Paraquat enhances the population of *Polygonum* weeds. Praquat and 2,4-D in alternate rounds are unable to control *Polygonum, Oplismenus, Ageratum* and *Borreria* spp. 2,4-D and Dalapon are less effective. Yield of tea was significantly higher in Glyphosate treated plots.

173. Kachroo, P. 1959. "Hepaticae of Bengal". *J. Indian Bot. Soc.* 38(2): 213-220.

Abst.- The formation of germ disc in sporelings of *Riccia pimodii* and a tetrad-spored *Riccia* follow nearly the *Stephensoniella*-plan. Observations on sporelings and cytology lend support to the view that *Riccia* is a polymorphic genus. *R. pimodii* with apical tubers is described as a new species from Burdwan, West Bengal.

174. Kamilya, Parasuram. 2008. "Survey of weed flora of Atrai river bed in Dakshin-Dinajpur in district of West Bengal, India". *Pleione* 2(1): 77-86.

Abst.- About 96 species of angiosperms under 63 genera of 31 families are studied from the river bed of Atrai. Major attention is given to migratory nature of weed taxa linking subhimalayan tract to Bangladesh and West Bengal. The silty-sandy riverbed is helpful for the perennation of these weeds by their seeds or other propagules. Indented keys have been made for genera and species under many families for their easy identification.

175. Kargupta, Amarendra Nath. 1994. "Monotypic genus *Arnoldiella* (Cladophorales: Chlorophyceae)- A new record from Indian subcontinent". *J. Econ. Taxon. Bot.* 18(2): 439-441.

Abst.- The present paper deals with the description of a rare genus *Arnoldiella* (*A. conchophila* Miller) for the first time from Indian subcontinent. The author collected this species from a pond of Suri, Birbhum district, West Bengal. Probably this is the only record of the genus after its establishment.

176. Kargupta, A.N., Sarma, P. & Mukherjee, D.D. 1997. "On two new taxa of *Bulbochaete* (Chlorophyceae: Oedogoniales) from West Bengal, India". *Phytomorphology* 47(2): 135-139.

Abst.- Present communication describes two new varieties belonging to genus *Bulbochaete*. These have been named as *B. insignis* Pringsh. var. *bengalensis* var. nov. and *B. pygmaea* Pringsh. var. *stipitata* var. nov. The specimens were collected from freshwater bodies of Birbhum and Murshidabad districts of West Bengal, India during 1979-1982.

177. Krishna, Bijoy & Dutta, Ratna. (1979) 1981. "New plants records for West Bengal". *Bull. Bot. Surv. India* 21(1-4): 211.

Abst.- *Ixora nigricans* R. Br. ex Wt. & Arn. (Rubiaceae) and *Argyreia imbricata* (Roth) Sant. & Patel (Convolvulaceae) collected during the botanical exploration in Jalpaiguri and Darjeeling districts of West Bengal constitute new records for the state.

178. Kumar, Anant, Ghosh, Chandra & Paul, T.K. 2009. "*Hypoestes phyllostachya* Baker (Acanthaceae): a new record for West Bengal, India". *Pleione* 3(2): 227-228.

Abst.- The occurrence of *Hypoestes phyllostachya* Baker (Acanthaceae) has been recorded for the first time from West Bengal state. Detailed description along with a photograph is provided.

179. Kumar, Anant & Paul, T.K. 2009. "*Hypoestes phyllostachya* Baker (Acanthaceae)- A new record for West Bengal state, India". *J. Econ. Taxon. Bot.* 33(2): 385-386.

Abst.- *Hypoestes phyllostachya* Baker (Acanthaceae) is described here as an addition to

the flora of West Bengal from Darjeeling district.

180. Kumar, Dinesh. 1987. "*Pseudolepicolea trollii* subsp. *andoi* (Scuhust.) Hatt. et Mizut. from India". *J. Indian Bot. Soc.* 66(1&2): 173-175.

Abst.- *Pseudolepicolea trollii* subsp. *andoi* (Scuhust.) Hatt. et Mizut., was discovered in Darjeeling, Eastern Himalayas. Complete details, including sporophytic features have been provided.

181. Kumar, Dinesh & Udar, Ram. 1976. "*Calobryum dentatum* Kumar et Udar sp. nov.: A new species of *Calobryum* from India". *J. Indian Bot. Soc.* 55(1): 23-30.

Abst.- A new *Calobryum, C. dentatum* Kumar et Udar sp. nov., has been described from Darjeeling, India. This species is strictly acrogynous while the antheridia are borne terminally as well as in the axil of bracts. The most striking feature in this species is the presence of dentate leaves, male bracts and female bracts which are always longer than broad. The spores are smallest in size in the *Calobryum*- complex.

182. Kumar, Dinesh & Udar, Ram. 1977. "A new species of *Haplomitrium*, *H. grollei* Kumar et Udar, from Darjeeling, Eastern Himalayas, India". *Geophytology* 7(2): 260-263.

Abst.- *Haplomitrium grollei* sp. nov. has been described from Darjeeling, Eastern Himalayas, India. This species is characterized by large plants with leaves distant on axis and crowded at apex, clearly anisophyllous, and 3-4 stratose at base. The gynoecial disc shows various degrees of elaboration, being normally anacrogynous with apical proliferation resulting in an innovation which is again fertile, or with archegonia in terminal receptacle apparently acrogynous and intermixed with narrow, irregular, lingulate bractlets.

183. Kundu, Subir Ranjan & Pal, Mahua. 1998. "An autecological investigation of *Pyrrosia adnascens* (Sw.) Ching (Polypodiaceae) in Indian Botanic Garden, Howrah". *J. Econ. Taxon. Bot.* 22(1): 241-245.

Abst.- The investigative studies of *Pyrrosia adnascens* (Sw.) Ching (Polypodiaceae), an epiphytic fern of Indian Botanic Garden, Howrah, happened to be the latest addition to the previously listed 34 vascular epiphytes (Ghosh, R.B. 1971). The present paper reveals systematic account, salient features, distribution, economic potentiality, extent of epiphytism regarding host species of *P. adnascens* (Sw.) Ching.

184. Lahiri, A.K. 1972. "Intercropping trials with turmeric in North Bengal". *Indian Forester* 98(2): 109-115.

Abst.- Interesting results have been obtained from trials of intercropping with turmeric in North Bengal. Turmeric is a very successful intercrop which can be grown in two year and older plantations. As a result of this cultivation substantial income is obtained and growth of the forest crop improves considerably.

Detailed studies about turmeric and other intercrops are in progress.

185. Lahiri, A.K. 1984. "Prospects of Hollong (*Dipterocarpus macrocarpus* Vesque) in North Bengal". *Indian J. Forest.* 7(1): 1-3.

Abst.- *Dipterocarpus macrocarpus* Vesque, a well known plywood species of North East India has been tried in North Bengal. The growth of the species is comparable to *Michelia champaca*- a native of West Bengal. Besides, the species is capable of natural regeneration in its new home. The species is extremely susceptible to fire. It puts best growth in loamy soil of the Terai area which retains adequate moisture throughout the year.

186. Lahiri, A.K. 1989. "Taungya based agro-forestry trials in West Bengal". *Indian Forester* 115(3): 127-132.

Abst.- Agro-forestry in the form of Taungya is practiced in West Bengal since sixties of last century. With the changing situation, the practice once developed to raise the plantation

economically in the forest areas has became one of the important tool for rural development. Some research works have been carried out to evolve optimum spacing, crop combination, three tier cropping system, sequential cropping, mechanization, etc. An account of the same is given in the present paper. Presently large scale inter-cultivation is being carried out in forest areas to generate employment and production. In non-forest areas, where there is no tradition of agro-forestry people are being motivated to grow trees in their non-irrigated land in combination with intercrops.

187. Lahiri, A.K. 1992. "Silvo-pasture practices of lateritic tract of South West Bengal". *Indian Forester* 118(12): 887-892.

Abst.- Silvo-pasture practice is carried out in lateritic tracts of South West Bengal. Adoption of this practice helps in increasing yield of fodder in the pinch period of the year as well and in soil and water conservation. Among the various fodder species tried *Stylogenthus guinansis* CV *schofield* has shown promise to its maximum extent. Though practice is showing promise but the farmers in most of the areas are not interested for cut and carry method of feeding in view of maintenance of low productive cows. So, the reduction of unproductive cows and maintenance of high yielding cattle will facilitate the adoption of stall feeding and the practice of silvo-pasture will be popular.

188. Lal, Jagdish. 1979. "Observations on *Cyathodium denticulatum* Udar et Srivastava". *J. Indian Bot. Soc.* 58: 175-177.

Abst.- The mature sporophyte of *Cyathodium denticulatum* Udar et Srivastava has been described. The spores are dark black, spheroidal with verrucose exine ornamentation. The verrucae are ramified and form incomplete reticulations, a character previously not known in the genus *Cyathodium*. The genus *Cyathodium* exhibits different exine morphological characters of spores, and the segregation of family Cyathodiaceae from Targioniaceae is supported.

189. Mahanta, A.K., Chakraborty, Manas & Pal, D.C. 2008. "Plant species growing on Midnapore and Kharagpur Municipal soild waste dumps and their ethnic uses in Paschim Medinipur (WB), India". *Environm. Ecol.* 26(4A): 1713-1717.

Abst.: Midnapore and Kharagpur are the two main municipalities of Paschim Medinipur district. A large number of plants naturally grow on the solid dumping waste. 73 species belonging to 56 genera and 28 families were collected and are presented in this paper. They grow on the solid waste in different seasons by quick absorbing waste decaying organic matters. Fixing the botanical identity and their uses for solid waste management and controlling environmental pollution may be taken into consideration. The most promising and dominant species are *Solanum sisymbrifolium*, *Amaranthus spinosus*, *A. viridis*, *Colocasia esculenta*, *Argemone mexicana*, *Alternanthera sessilis*, *Parthenium hysterophorus*, *Ricinus communis* and *Mukia maderaspatana*. Many of this species are exotics but naturalized. Practically there is no inventory data and phytodiversity register of the species grown on the solid waste. These plants may be useful for pollution control purpose and waste management.

190. Mahanta, A.K., Pal, D.C. & Pati, B.R. 2009. "Some forest weeds in lateritic Paschim Medinipur district and their therapeutic values". *J. Econ. Taxon. Bot.* 33(Suppl.): 68-72.

Abst.- The weeds are particularly unwanted plant species of an area where they are not desired, but some of them play an important role in therapeutic uses. Most of the area of Paschim Medinipur district contains lateritic soil and have about 18.54% forest cover. About 30 medicinal weed plant species are reported from the district, including their local name, family, used parts and their therapeutic values for human beings.

191. Mahanta, A.K., Pal, D.C. & Pati, B.R. 2009. "Some plants used in veterinary medicine, Paschim Medinipur, West Bengal, India". *J. Econ. Taxon. Bot.* 33(Suppl.): 139-142.

Abst.- In veterinary medicine, tribal and ethnic communities use a good number of plant

species, of which 26 species have been dealt in this paper for various ailments like fever, dysentery, digestive disorders, wound, intestinal parasites, body parasites, etc. Most of the uses are found unknown or less known to the outside world.

192. **Maiti, A. & Manna, C.K. 2000.** "Some ethnomedicines used by the Santal of Baghmundi-Ajodhya hill region of Puruliya district, West Bengal, in controlling fertility". *Ethnobotany* 12(1&2): 72-76.

Abst.- The present study deals with some medicines used by the Santal of Baghmundi Ajodhya hill area of district Puruliya, West Bengal, India. To get authentic information, medicine men (ojhas) of Santal community in this region were interrogated from time to time. At least 10 reports on interviews conducted with different medicine men were recorded. Parts of various medicinal plants were observed personally, collected and preserved as herbarium specimens for proper identification. The reports indicated the various indigenous methods of contraception and may help in searching potent contraceptives.

193. **Maiti, R.K. 1968.** "Medicinal plants of Ayurvedic value in the paddy-fields of Bengal". *Bull. Bot. Soc. Bengal* 22(1): 69-77.

Abst.- In a survey of paddy fields of West Bengal, the author has come across 48 medicinal plants used in indigenous systems of treatment. The uses, distribution and a short description have been given, which may help the local sellers of raw drug plants and the Ayurvedic physicians.

194. **Maiti, S. & Mishra, T.K. 2000.** "Anti-venom drugs of Santals, Savars and Mahatos of Midnapore district of West Bengal, India". *Ethnobotany* 12(1&2): 77-80.

Abst.- The paper provides a brief account of 13 plant species reported to have anti-venom property. Various tribal communicates like Munda, Savar, Santal, Lodha and a non-tribal community (Mahato) have been using these plants since long. These species have also been reported earlier by various authors. The frequency of availability of all these species found to be used for snake bite has also been studied. Of the 13 species dealt with, three are abundant, seven are common and the rest three are rare in the district.

195. **Maiti, Sudipta Kumar, Mishra, T.K. & Mishra, Moumita. 2007.** "Ethnobotany of *Kheria, Lodha* and *Munda* tribes in the lateritic West Bengal: Changing perspective" In: A.P. Das & A.K. Pandey (ed.) Advances in Ethnobotany, pp. 123-131.

Abst.- The lateritic belt of the Indian state of West Bengal is stretched over the districts of West Medinipur, Bankura, Purulia, Bardhaman and Birbhum. A large number of ethnic or tribal group of people live in this area including *Bhimijs, Gonds, Kherias, Kharwars, Kols, Puraons, Sabars, Santhals* and *Dhagars* or *Oraons*. Present study records ethnobotanical information from tribals of lateritic West Bengal.

196. **Maji, S. & Sikdar, J.K. 1982.** "A taxonomic survey and systematic census of the edible wild plants of Midnapore district, West Bengal". *J. Econ. Taxon. Bot.* 3(3): 717-737.

Abst.- The paper presents an enumeration of 115 edible wild taxa of angiosperms (Dicotyledons 102, Monocotyledons 13) which were collected and recorded during senior author's floristic survey in Midnapore district of West Bengal for six years. The correct nomenclature together with flowering and fruiting seasons, local names, edible parts and precise localities have been provided against each species.

197. **Malakar, S., Bhattacharya, T., Das, D.K. & Bhaumik, A.K. 2008.** "Heavy metal concentration in the leaves of *Oryza sativa, Piper betle* and *Rosa* sp. in vicinity of Kolaghat Thermal Power Plant". *J. Interacad.* 12(4): 449-458.

Abst.- The present study deals with the concentration of four heavy metals Zn, Cu, Mn and Fe in the leaves of *Oryza sativa, Piper betle* and *Rosa* sp. in the vicinity of Kolaghat Thermal Power Plant (K.T.P.P.). Leaves of these three plant species were found to be adversely affected by the fly ash. Concentration of Zn, Cu, Mn and Fe in leaves of these three plant

species studied increased significantly between 1996-2002 but decreased with distance from K.T.P.P. The amount of Zn in leaves were found to be within the sufficiency level. The amount of Cu in leaves of rose and paddy generally deficient in 1996 but sufficient in 2002. Leaves of betel had sufficient level of Cu in 1996 but the concentration increased to toxic level in 2002. The amount of Mn and Fe in the leaves of plant studied were below the toxic level.

198. Mallik, Nityananda & Chaudhuri, Salil Kumar. 1968. "Palynological studies of the Sunderban flora for identification of peat pollen". *Bull. Bot. Soc. Bengal* 22(1): 105-108.

Abst.- Pollen morphology of some of the members of mangrove vegetation of the Sunderbans is described with a view to collecting information which may be helpful in identifying the pollen grains and spores occurring in the peat horizon below Calcutta and its neighbourhood.

199. Mandal, Asim & Mondal, Amal Kumar. 2008. "Pteridophytes of ethnomedicinal importance from Chilkigarh forest, Paschim Medinipur, West Bengal, India". *Environm. Ecol.* 26(4C): 2323-2325.

Abst.- The paper deals with the use of medicinally important pteridophytes by the tribal and rural peoples of Paschim Medinipur district. Six medicinally important pteridophytes were collected from Chilkigarh forest. The specimens were further prepared for herbarium. The plants were identified, arranged along with their family names and their medicinal uses. Several plant parts like total plants, leaves, rhizomes and used by the people for different purposes.

200. Mandal, Dhananjoy, Baral, K. & Dasgupta, M.K. 2008. "Role of biotic pests in natural control of weeds". *J. Interacad.* 12(1): 49-53.

Abst.- An experiment was conducted at Palli Siksha Bhavana (Institute of Agriculture) farm, Visva-Bharati, Sriniketan, West Bengal in non-cultivated areas from 15th June 2001 to 20th July 2001 to study the insect disease association with weeds and its potentiality in controlling the weeds. There were four types of vegetative profiles as pasture, road side, field bund and main field channel as treatments with five replications. The weeds viz., *Croton sperciflorous, Physalis minima* and *Tephrosia purpurea* harboured number of insect species while *Cercospora* leaf spots were observed with the weeds viz., *Cyperus rotundus*, *C. iria* and *Ludwigia parviflora*. Insect population as well as total disease index and leaf spots were highest on pasture/fallow land suggesting pasture as the best reservoir of insect pests and diseases while field bund recorded lesser number insect pests and diseases.

201. Mandal, D. & De, G.C. 2004. "Studies on herbal herbicides in controlling weeds in rapeseed and mustard". *J. Interacad.* 9(2): 292-295.

Abst.- In reducing population and biomass of weeds in rapeseed (cv. B-9) pre-emergence application pretilachlor at 1.25 kg a.i. ha^{-1} was the best. Mechanical weeding (scheduled at 20 and 40 DAS) was the next efficient treatment. This was ensued by pre-emergence application of extracts of 200 kg ha^{-1} of green leaves of *Tabernaemontana coronaria*, a herbal herbicide. Weed Control Efficiency (WCE) was the highest in weed-free check and pretilachlor and these were equivalent in seed yield production with 52% more seed yield than a control. The highest net return (Rs. 13,104/ha) was in pretilachlor while the third top net return (Rs. 10,225/ha) was in weed-free check. Among the herbal substances *Tabernae* was the best with 34.07% yield advantage and ranked overall second top in net return (Rs. 10,544/ha). *Holarrhena* and *Antigonon* both the herbal herbicides provided net returns exceeding mechanical control. Therefore, herbal materials like *Tabernae, Holarrhena* and *Antigonon* may replace traditional method of mechanical weed management in rapeseed.

202. Mandal, D., Panja, B.N., Sengupta, A., Saha, J. & Chaudhuri, S. 2007. "Abuscular mycorrhizal status of plants grown on Kolkata Municipal waste and sewage amended

agricultural soil". *J. Interacad.* 11(4): 432-439.

Abst.- The rhizosphere soil and root samples of 12 crops and 35 weed species as well as the non-rhizosphere soil samples were collected from Kolkata Municipal solid waste and sewage amended Dhapa agricultural soil for physico-chemical and mycorrhizal analysis. Results of the physico-chemical analysis of the non-rhizosphere soil samples revealed that sand–, silt– content, bulk density, organic matter content, electrical conductivity, cation exchange capacity, total and available N, P and K content, heavy metal contents (Pb, Cd, Ni, Hg, As) were higher and clay content, water holding capacity and soil pH were lower in MSW amended soil as compare to the unamended normal alluvial soil. Mycorrhizal analysis of thirty seven plant species showed that twenty seven plant species were found mycorrhizal and their root intensities and spore densities varied from 3.2-70.2% and 34-408 during summer and 42-80% and 33-320 during winter, respectively. Eleven AMF spore types were recovered from three crops namely *Zea mays, Allium cepa* and *Amaranthus viridis* and three weed species viz., *Cynodon dactylon, Commelina benghalensis* and *Euphorbia hirta* rhizospheres. Among the eleven, six species belonged to *Glomus*, three to *Gigaspora* and two remained unidentified. Five among eleven AMF species were present consistently in the rhizosphere of six plants. Among the identified species, *Glomus epigaeum* was dominant in the rhizospheres of *Allium cepa, Commelina benghalensis* and *Amaranthus viridis* whereas *Glomus aggregatum* in *Cynodon dactylon* and *Glomus postulatum* in *Euphorbia hirta*. Frequencies of other AMF fungal species were low and also inconsistent in the rhizosphere.

203. Mandal, Manasi, Maiti, G.G. & Sharma, P. 2009. "Algal flora of Kalyani-I". *J. Interacad.* 13(1): 1-5.

Abst.- A preliminary report on the algal flora of Kalyani, Nadia, West Bengal is presented based on the survey works from 2006-2008. A total 30 taxa has been collected among which 3 belongs to Bascillariophyceae, 11 to Chlorophyceae and rest are the Cyanophycean members. It is provided as a first phase of the survey work of algal flora of Kalyani and the name of these taxa along with their respective orders and classes are provided. The time of collections as well as collection numbers are also provided.

204. Mandal, P.K. & Das, P.K. 2000. "Phenology, floral biology and reproductive profile of *Acacia auriculiformis* A. Cunn. ex Benth." *J. Natl. Bot. Soc.* 54(1&2): 79-85.

Abst.- *Acacia auriculiformis* A. Cunn. ex Benth., commonly known as 'Akashmoni', an evergreen multipurpose tree of Australian origin, now extensively grown in West Bengal was studied to record its phenology under altogether different ecological niche. The inflorescence stalk, appeared in the month of July, flowered in four consecutive flushes from bottom to top at regular iintervals of around two weeks and the new twig appeared by mid November with new flower flush overlapping the old. Simultaneously, new foliage appeared with onset of winter. Pod formation and flowering continued concurrently.

The tree displayed indefinite inflorescence with axillary spikes bearing sessile flowers. Larger inflorescence stalk having more number of spikes where reproductive parts (stamens and carpel) with increased sizes were recorded in early stage of reproductive growth during July-August as compared to those of late stage in November. However, flower production remained almost constant per unit length of spike irrespective of seasonal variation. Flowers of different seasons also displayed more or less similar size.

Highly sculptured heteromorphic sixteen-celled multipore pollen with polyads were observed. Different flower flushes produced different sized pollen. Majority of these were of 30-35 µm. Timing of pollen formation and pollen size appeared to register a profound influence on pollen fertility. In general higher pollen fertility was recorded in pollen of October-November flushes. Well developed pods and seeds were also recovered from these October-November flower flushes. Dry weight of matured seed was around 22 mg with moisture content of 27%. Funicle was conspicuously larger, appeared to be the unique

character of *Acacia*. Pods recovered were not in parallel with flower production. A relaxed reproductive economy became apparent.

205. Matthew, K.M. 1971. "Pteridophytes from the Darjeeling district". *Bull. Bot. Soc. Bengal* 25(1&2): 97-102.

Abst.- An enumeration of 90 pteridophytic species mainly from the Kurseong subdivision of the Darjeeling district are given here. The precise localities from where the collections have been made are also given.

206. Mehrotra, R.K. & Jaitly, Y.C. 1983. "*Tribonema elegans* – A new addition to the algal flora of India". *J. Indian Bot. Soc.* 62(3): 204-205.

Abst.- *Tribonema elegans* Pascher has been reported for the first time for India from Darjeeling district of West Bengal.

207. Mishra, T.K., Bhunia, A., Sahoo, T.K. & Roy, S.B. 1997. "Ethnobotany *vis-à-vis* Joint Forest Management of Midnapore (West Bengal), India". *Ethnobotany* 9(1&2): 52-55.

Abst.- The success of Joint Forest Management (JFM) involving a vast majority of tribals and non-tribals has brought certain ethno-ecological question into sharp focus. This study involves a limited area of ethnoecology where folk knowledge of using plant resources and scientific knowledge of productivity of these resources have been analyzed. The ethnobotanical inventory reveals the use of 36 plant species in three major ailments like rheumatic pain, chronic acidity and tuberculosis. A quantitative study of productivity and level of extraction of four commonly available plants of ethnobotanical importance has been done under JFM-managed forests. It is suggested that commercial propagation of these plants would be useful in generating additional employment.

208. Misra, T.K., Saha, A., Nanda, A.K., Biswas, Rajib & Mandal, P. 2009. "Shade trees in tea plantations in different soil conditions of North Bengal". *Pleione* 3(2): 219-223.

Abst.- The paper reported the occurrence of 24 species of shade trees in tea plantations on various soil conditions in North Bengal region. The prevailing soil types and different soil characteristics have been recognized in the area. Suggestions related to the proper selection of shade trees also have been provided.

209. Mitra, A., Dutta, S. & Roy, Anjali. 1985. "New records of two wood-rooting fungi from India". *Indian Forester* 111(2): 78-81.

Abst.- Two new wood-rooting fungi viz., *Trametes trogii* Berk. & *Irpex lacteus* (Fr.) Elench. are recorded here for the first for India from West Bengal.

210. Mitra, Samik & Banerjee, Manju. 2004. "Fossil fruit *Derrisocarpon miocenicum* gen *et* sp. nov. and leaflet *Derrisophyllum siwalicum* gen *et* sp. nov. CF. *Derris trifoliata* Lour. of Fabaceae from Siwalik sediments of Darjeeling foothills, Eastern Himalaya, India with remarks on site of origin and distribution of the Genus". *Phytomorphology* 54(3&4): 253-263.

Abst.- Fabaceous fruit *Derrisocarpon miocenicum* gen *et* sp. nov. and leaflet *Derrisophyllum siwalicum* gen *et* sp. nov. comparable to modern *Derris trifoliata* Lour., are recorded from the sub-Himalayan Lower Siwalik deposits (Middle Miocene) of Darjeeling foothills, West Bengal, India. *Derris trifoliata* and all other extant species of the genus are distributed in the tropical, humid areas of the Indian subcontinent, eastern part of Africa, Madagascar, South East Asia and northern Australia. Fossil remains of *Derris* species till date are reported from the Eocene to Holocene sediments exposed in the eastern part of India only. Site of origin of the *Derris* species in the eastern part of India may be suggested considering the restricted occurrence of the fossil remains. *Derrisocarpon miocenicum* and *Derrisophyllum siwalicum* are recorded from Siwalik sediments that has records of a large numbers of fossil Fabaceous taxa of tropical, humid environment. *Derris trifoliata*, to which *Derrisocarpon miocenicum* and *Derrisophyllum siwalicum* resemble closely, is a frequent component of

the modern back mangrove swamps. All these evidences suggest a tropical, humid environment of deposition of the sediments recovering the fossil *Derris* fruit and foliage viz., *Derrisocarpon miocenicum* and *Derrisophyllum siwalicum*.

211. **Mitra, Samik, Bera, Subir & Banerjee, Manju.** 2002. "On a new fossil epiphyllous fungus *Palaeoasterina siwalika* gen. et sp. nov. from the Siwalik (Middle Miocene) sediments of Darjeeling foothills, India with remarks on environment". *Phytomorphology* 52(4): 285-292.

Abst.- Foliicolous microthyriaceous fossil fungus *Palaeoasterina siwalika* gen. et sp. nov. is described from Siwalik sediments (Middle Miocene) of Darjeeling foothills, eastern Himalaya. Both vegetative and reproductive phases of the fossil fungus are preserved. The characteristics of septate, hyphopodiate, superficial mycelial reticulation, simultaneous bipolar germination of ascospores and dimension of vegetative and reproductive structures of the fossil form are closely comparable with the extant fungus *Asterina* viz., *A. aporosae* Hansf. var. *cylindrica* Kar and Ghosh growing in tropical humid climate. The occurrence of *Palaeoasterina* in the Siwalik foothills suggests tropical humid climate with high rate of precipitation in the area during Neogene Period.

212. **Mitra, Sunit, Bandyopadhyay, Subhajit & Mudgal, V. (1995) 2000.** "*Spermacoce mauritiana* Osea Gideon (Rubiaceae) – from West Bengal". *Bull. Bot. Surv. India* 37(1-4): 130-132.

Abst.- *Spermacoce mauritiana* Osea Gideon has been collected from different parts of Dakshin Dinajpur and Coochbehar districts which is a new record for West Bengal. A complete description along with correct nomenclature, flowering and fruiting, ecology, ethnobotany and specimens examined have also been given.

213. **Mitra, Sunit & Mukherjee, Sobhan Kumar. 2007.** "Plants used as ethnoveterinary medicine in Uttar and Dakshin Dinajpur districts of West Bengal, India" In: A.P. Das & A.K. Pandey (ed.) Advances in Ethnobotany, pp. 117-122.

Abst.- Domestic animals play a very significant role in the human civilization. The present paper enumerated 23 ethnoveterinary medicinal plants used by the four major tribal communities of the Uttar and Dakshin Dinajpur districts to treat the ailments of cattle, to promote better location and also to improve the quality of meat, egg, etc. which are being traditionally used till date.

214. **Mohanty, Lopamudra. 2008.** "Some medicinal plants of Gorumara National Park, Jalpaiguri district, West Bengal". *J. Econ. Taxon. Bot.* 32 (Suppl.): 223-231.

Abst.- During botanical survey of Gorumara National Park, situated in Jalpaiguri district of West Bengal, about 70 species belonging to 38 families were collected which have medicinal value. The medicinal importance of these plants are described in this paper.

215. **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.

Abst.- Observation on the habit, habitat and uses of *Eulaliopsis binata* (Retz.) C.E. Hubb. grass based on the material collected in the forests of Bihar, Orissa and West Bengal and those lodged in the Central National Herbarium (CAL) are given. Certain uses attributed to this plant by the tribal people of Bihar, Orissa and West Bengal do not seem to be so far well known.

216. **Molla, H.A., Pal, D.C. & Rai Chaudhuri, Enakshi. 2001.** "Observation on a mangrove palm". *J. Econ. Taxon. Bot.* 25(3): 740-741.

Abst.- Observation on the habit, habitat and uses of a mangrove palm (*Phoenix paludosa* Roxb.) based on the materials collected from the Sundarban area of West Bengal.

217. **Molla, H.A. & Roy, B. 1985.** "Traditional uses of some medicinal plants by the Rabha tribes in Jalpaiguri district, West Bengal". *J. Econ. Taxon. Bot.* 7(3): 578-580.

Abst.- The paper deals with some selected species of plants viz., *Helminthostachys zeylanica* (Linn.) Hk., *Lepidagathis incurva* D. Don, *Nelsonia canescens* (Lam.) Spreng., *Toona ciliata* Roemer, *Pogostemon parviflorus* Benth. etc. which are used by the Rabha tribals of Jalpaiguri district, West Bengal in various ailments and diseases like jaundice, gastric ulcer, bronchitis, hernia, rheumatism, etc. and in birth control. These uses are not reported in any important published literature on medicinal plants.

218. Molla, H.A. & Roy, B. 1996. "Some ethnobotanical claims from the Jalpaiguri district of West Bengal". *J. Econ. Taxon. Bot., Addit. Ser.* 12: 322-324.

Abst.- During the course of ethnobotanical studies in Jalpaiguri district, the authors came across a number of plant species, out of which 25 plants namely *Anthocephalus cadamba* Miq., *Callicarpa arborea* Roxb., *Drymaria cordata* (L.) Roemer ex Schultes, *Mezoneuron cucullatum* (Roxb.) W. & A., *Phlogacanthus thyrsiflorus* (Roxb.) Nees, *Scoparia dulcis* L. etc. belonging to 20 families are found useful in traditional medicine of Oraon, Rabha and Nepalese of this district. Some of the uses are interesting from medicinal point of view.

219. Mondal, Amal Kumar. 2004. "*Utricularia pubescens*- A report from the Eastern Himalayas". *J. Bot. Soc. Bengal* 58(1&2): 51-54.

Abst.- The present paper reports the findings of a species of *Utricularia* [*U. pubescens, U. peltata, U. deightonii*] for the first time from (Saberi Park above V.I.P. Road, Darjeeling district, West Bengal) Eastern Himalayas.

220. Mondal, M.S. 1978. "Spore morphology of *Isoetes coromandelina* L. from Kalyani". *Bull. Bot. Soc. Bengal* 32(1&2): 9-12.

Abst.- *Isoetes* is an interesting material as it shows the occurrence of microspore and megaspore within the same sporangia. The occurrence of mixed spores in the same sporangia has been reported formerly in *I. pantii*. Present study reveals similarly in *I. coromandelina* L. from Kalyani, West Bengal, the presence of joint spores in the same sporangia.

221. Mondal, M.S. & Mitra, Krishna. 1980. "Pollen analysis of honey from Sunderbans (W. Bengal)". *Geophytology* 10(2): 137-139.

Abst.- Present paper deals with the qualitative and quantitative pollen analysis of six honey samples from Sunderbans, W. Bengal. This gives a picture of pollen of different species present in honey and their frequency. Pollen of Rhizophoraceae are dominant in the samples, but *Bruguiera* and *Phoenix* are dominant genera as far as percentage is concerned.

Sunderbans, comprising of small islands, is situated at the estuary of river Hooghly, in W. Bengal. Floristically it is very rich and well known for its mangrove vegetation. Melittopalynology or the pollen analysis of honey and sugar content estimation can evaluate the quality of honey produced in different plant communities and in different seasons. It also provides an idea of relative floristic composition of the area.

222. Mondal, Sadhana & Roy, S.K. 1984. "Pollen production in weeds associated with some rice cultivars in Burdwan district, West Bengal, India". *Geophytology* 14(1): 74-81.

Abst.- The paper evaluates the production of pollen grains per anther/ per flower in 73 species of weeds of rice fields in the district which are referable to Gramineae (22 species), Cyperaceae (11 species), Compositae (9 species), Pontederiaceae, Commelinaceae, Acanthaceae, Scrophulariaceae (3 species each), Nymphaeaceae, Onagraceae, Leguminosae, Rubiaceae, Amaranthaceae, Polygonaceae (2 species each) and one species each of Alismaceae, Campanulaceae, Convolvulaceae, Hydrophyllaceae, Lentibulariaceae, Lythraceae and Euphorbiaceae.

Among these, *Nymphaea stellata* Willd. produces the highest number of pollen (15,484) per anther. The production of pollen grains per flower in *N. stellata* and *N. lotus* Linn. is more than one hundred thousand. These are followed by *Aeschynomene indica*

Linn. (56,640), *Eichhornia crassipes* Solms. (37,320), *Monochoria hastaefolia* Presl. (28,920), *Oryza coarctata* Roxb. (28,296) and *Hydrolea zeylanica* Vahl (22,240) in production of pollen grains per flower. On the other hand *Cyperus iria* Linn. produces only 64 pollen grains on an average per flower.

223. Mondal, Tarun Kumar. 2008. "Cropping intensity and irrigation intensity in Nadia district, West Bengal". *J. Interacad.* 12(3): 308-315.

Abst.- The present paper is an attempt to analyze the spatio-temporal variations of cropping intensity and irrigation intensity in Nadia district during 1990-91 and 1999-2000. The study also highlights the interrelationship between the cropping intensity and irrigation intensity in this district. The study shows that there is a close relationship between irrigation intensity and cropping intensity during the study period.

224. Mondal, Tarun Kumar & Mitra, Champa. 2005. "Spatio-temporal variations in agricultural productivity of Nadia district (West Bengal)". *J. Interacad.* 9(4): 550-558.

Abst.- The object of the paper is to assess the spatio-temporal variations in the level of agricultural productivity of Nadia district, West Bengal. The study has been carried on for a period of 10 years, from 1990-91 to 1999-2000. For this purpose an attempt has been made to delineate agricultural productivity regions on the basis of six crops, *aus* paddy, *aman* paddy, *boro* paddy, jute, wheat and mustard. Shafi's method (1972) has been adopted which considers the overall yield index for each agricultural block. Overall yield index has been found to vary from 85.78 per cent to 114.41 per cent in 1990-91 and 80.03 per cent to 126.62 per cent in 1999-2000. Thus the overall spatial distribution of yield index for the considered time period reflects variation pattern of the district.

225. Mukherjee, Ambarish, Banerjee, Dalia & Acharya, Jayashree. 2008. "A contribution to the study of Gesneriaceae Dum. in the Eastern Himalaya". *Pleione* 2(2): 151-161.

Abst.- The present work records 10 genera and 25 species of the Gesneriaceae from Darjeeling, Sikkim and other regions of Eastern Himalaya, the principal abode of the taxon in India. *Didymocarpus* and *Aeschynanthus* are the most dominant genera with eight and six species respectively.

226. Mukherjee, A.K. 1985. "Environmental problems of Indian Botanic Garden, Calcutta and their control". *J. Econ. Taxon. Bot.* 7(3): 715-721.

Abst.- Environmental pollution and other problems namely age of plants, nursery practices, biotic interferences, etc. responsible for the deterioration of the plants of the Indian Botanic Garden, as observed during the last few years, have been presented in this paper. The control measures, both short term and long term, have been suggested for improvement and proper maintenance of the garden which was regarded as one of the most important contributor to both science and economy of India.

227. Mukherjee, A.K. 1986. "Adaptations in mangroves of Sunderbans". *J. Econ. Taxon. Bot.* 8(1): 185-190.

Abst.- Mangrove adaptations in different organs of plants as observed in the Sunderbans, are: (1) Succulency of leaves with a distinct hypodermal aqueous tissue in general; salt secreting glands or glandular hairs in a few species; high osmotic value in the cells of leaf. (2) Vivipary in some species; light fruits and seeds in oviperous species with prolonged viability. (3) Viviparous seedlings with long, stout, green hypocotyle, in general, established by producing radical roots instead of a tap root; hypocotyls store oxygen in their aerenchyma and also synthesize food; an aerobiosis takes place in the seedlings of Avicennias. (4) Aerophores (pneumatophores) are produced from the cable roots, nutrition roots are produced from the aerophores just below the soil surface horizontally and anchor roots from the base vertically downwards. (5) There is an evolutionary trend in the production of aerophores, relatively primitive families produce stouter and advanced ones flexible aerophores. (6) A few species produce stilt roots instead of aerophores but their function is

the same to give support and help in arresting the silt and mud around the base of the plants. (7) Aerophores production in *Phoenix paludosa* is a facultative habitat adaptation. (8) *Porteresia coarctata* produce a false tap-root in thick muds.

228. Mukherjee, A.K. & Sinha, A. (1978) 1979. "*Ranunculus sardous* Crantz.- A new introduction in India". *Bull. Bot. Surv. India* 20(1-4): 158-159.

Abst.- *Ranunculus sardous* Crantz. collected from Shibpur, Howrah district, West Bengal, is a new introduction in India from Europe. A complete description of the species and the photograph of the relevant herbarium sheet is given here.

229. Mukherjee, Dhiman. 2008. "Association of Medicinal plants with important tree species in hills of Darjeeling". *Environm. Ecol.* 26(4A): 1697-1699.

Abst.- The experiment was conducted to ascertain the tree under which valuable medicinal plants grew well in the Darjeeling hill. Result revealed that soil in these hilly zones is mostly categorized as brown forest soil due to their characteristic reddish brown or brownish colour. In lower altitude *Alnus nepalensis* was found to be the most abundant and preferred tree, which is non-leguminous nitrogen fixing tree and help to grow *Colocasia*, ginger and turmeric. In steep higher slope, where drain condition was good *Cryptomeria japonica* was common and usually *Kaempferia rotunda*, *Hippophae salicifolia* and *Heracleum wallichii* prefer to grow beneath this tree. Further, medicinal plants viz., *Panax pseudo-ginseng*, *Picrorhiza kurrooa*, *Podophylum hexandrum* prefer to grow under *Acer oblongum*, *Pinus wallichiana*, *Betula alnoides*, *Mahonia acanthifolia* and *Swertia chirayita*, *Valeriana hardwickii* prefer to grow with *Betula utilis*, *Pyrus pashia*, *Mahonia acanthifolia* and *Dichroa febrifuga* in high hill. Observation on distribution pattern of tree species revealed that in the Darjeeling hill priority for different trees was in the order of *Pinus kesiya*, *Alnus nepalensis*, *Tectona grandis*, *Michelia champaca*, *Lecaena leucocephala* and *Gmelina arborea*.

230. Mukherjee, K.D. & Ghosh, R.B. 1968. "Trees and shrubs of the Indian Botanic Garden (Calcutta) producing edible fruits- A preliminary list". *Bull. Bot. Soc. Bengal* 22(1): 89-100.

Abst.- The present investigation is a preliminary attempt to bring out a census of edible fruit bearing trees and shrubs of the Indian Botanic Garden. The object of presenting such a paper is to enable several enthusiasts, gardeners and biologists to have important details about edible fruit yielding plants. The paper covers a list of 100 trees and shrubs of the garden which belong to 77 genera and 41 families of angiosperms. The plants have been enumerated in alphabetical sequence along with their families, country of origin, common names, and some relevant informations concerning biological, phenological and horticultural aspects.

231. Mukherjee, Neela. 1997. "Why Joint Forest Management (JFM) failed to deliver? A case study of Arjuni Mouza, Midnapore (West Bengal, India)". *Indian Forester* 123(6): 546-555.

Abst.- The study discusses the issue from different perspective and arrives at approximate cause of failure of Joint Forest Management in Arjuni Mouza in Midnapore of West Bengal.

232. Mukherjee, S.K., Bhujel, R.B., Pradhan, J.P. & Rai, S. 2000. "Ethno-medicinal plants of tribals of Bankura district, West Bengal". *J. Econ. Taxon. Bot.* 24(2): 385-394.

Abst.- More than ten ethnic tribes are found to inhabit the district of Bankura. Many of these races are living in other states of India too. Forty-four plants used for twenty-three common diseases have been studied and presented along with their tribal names, locality, ethno-pharmacognistic preparation and dosage. Diseases like dysentery, fever, lumbago, stomachache, rheumatism, snake bite, gastritis are always treated ethno-medicinally. The plants such as *Vernonia anthelmintica, Hedyotis corymbosa, Mimosa pudica, Ocimum sanctum* and *Jatropha gossypifolia* are considered to be of high medicinal value even by cultured tribes and are regularly prescribed by tribal herbalists.

233. Mukherjee, S.K., Das, A.P. & Bera, Subir. 2007. "Ethnic uses of honey in Sikkim and sub-

Himalayan West Bengal, India" In: A.P. Das & A.K. Pandey (ed.) Advances in Ethnobotany, pp. 189-197.

Abst.- A total of 69 subcastes under six scheduled tribe communities like *Lepcha, Sherpa, Bhutia, Dukpa, Kagatang* and *Yolmo* and 78 subcastes of scheduled caste communities like *Damai, Kami* and *Sarki* are living in Sikkim and sub-Himalayan West Bengal. Other backward classes like *Tamang, Limbu* and *Rai* are also having six subcastes. Survey among the tribal people of this area has reported the use of honey either directly or indirectly as medicinal ingredient and in cultural fields for thirty ailments cases. The diseases like fever, stomach problems, common cold and cough, bone fracture, snakebite, etc. are always treated ethno-medicinally. Plants like *Tinospora cordifolia, Gymnocardia odorata, Justicia adhatoda, Swertia chirayita, Bergenia ciliate, Thysanolaena maxima, Holarrhena pubescens, Astilbe rivularis, Viscum nepalense,* etc. are found to have high medicinal value to be used along with honey even by cultured tribes. Other uses of honey and bee hive products in different cultural practices by the tribal people cannot be ignored.

234. Mukherjee, Subhra, Gupta, Debsankar & Bhowmik, Niladri. 2008. "Estimation of genetic variability of wheat (*Triticum aestivum* L.) grown in Terai region of West Bengal". *J. Interacad.* 12(2): 145-149.

Abst.- The present investigation was undertaken to estimate the genetic parameters for seven quantitative characters in wheat grown under boron (B)-deficient (B_0) and B-supplemented (B_1) conditions in Terai region of West Bengal. The range, mean, phenotypic and genotypic coefficient of variation, heritability (broad sense) and expected genetic advance were estimated for each of the studied traits. The values of phenotypic coefficient of variation were higher compared to those of genotypic coefficient of variation for all the traits studied indicating the influence of environment. Number of tillers, number of grains/ear, thousand grain weight and grain yield exhibited high genetic advance as per cent of mean coupled with high heritability under B- deficient condition. The association indicated the role of additive genes for the inheritance of these characters. Hence, selection for these characters in early segregating generations would be highly effective under B-deficient condition.

235. Mukhopadhyay, C.R. 1987. "Aquatic and semi-aquatic plants of Birbhum district, West Bengal". *J. Econ. Taxon. Bot.* 9(1): 230-238.

Abst.- The paper presents a general account of the aquatic and semi-aquatic plants of Birbhum district with a list of 75 species under 47 genera. Of these, 15 species belong to dicotyledons and 57 species belong to monocotyledons.

236. Mukhopadhyay, C.R. & Ghosh, R.B. 1992. Useful plants of Birbhum district, West Bengal". *J. Econ. Taxon. Bot*., *Addit. Ser.* 10: 83-95.

Abst.- The paper presents a brief account of useful plants of Birbhum district, West Bengal, with a list of 132 species under 113 genera. Of these, 115 species belong to Dicotyledons and 17 species to Monocotyledons both of which comprise a total of 64 families of Angiosperms.

237. Mukhopadhyay, Samir Kumar, Das, A.P. & Bera, Subir. 2002. "Physico-chemical composition of some unifloral natural honey originated from Sikkim and sub-Himalayan West Bengal". *J. Natl. Bot. Soc. India* 56(1&2): 85-90.

Abst.- From the physico-chemical composition point of view, qualitative and quantitative analysis of ten squeezed honey samples (collected during the period 1996-1997) from Sikkim and two sub-Himalayan districts (Darjeeling and Jalpaiguri) of West Bengal, have been worked out and discussed. Moisture content (17.5% to 30.0%) (Agmark specification: 22%, 1959), specific gravity (1.41 to 1.49) (Agmark specification: 1.4, 1959), colour (creamy white to dark amber due to different degree of pigmentation), total sugar content (33.00% to 76.25%), protein content (1.29% to 10.25%), total amino acids (0.45% to 1.4%), phenol

content (0.069%-0.251%), ash content (0.115% - 0.483%), pH value (4.09 to 5.13) and absolute pollen count (2012 to 350809), all indicating the group I to group II nature of honey samples. The result of physico-chemical analysis of the honey samples suggest the possibility of utilizing the rich flora of Sikkim and Darjeeling Himalayas for the development of a sustainable apiary industry in this region.

238. Munshi, Mrinmoy, Santra, S.C. & Lahiri, S. 2000. "Biochemical monitoring of air pollution- A case study in Calcutta city". *J. Natl. Bot. Soc. India* 54(1&2): 63-70.

Abst.- Calcutta is known to be one of the world's most polluted cities. Pollution injury to plant has been studied for the past few decades. Plants can act as indicators by accumulating gaseous pollutants or some metabolic products of plant-pollution interaction in their tissues. The sensitive indicator plants could be used as a chemical sensor which can detect the presence of pollutant in the air. A case study was undertaken in Calcutta city to evaluate the importance of plant biochemical responses to environmental pollution. The effect of pollution on some plants with respect to their biochemical parameters viz., chlorophylls, catalase activity and metal content were studied taking plant samples from polluted and non-polluted sites. The catalase activity was higher in most of the plant samples of polluted site showing the rise of degradative metabolism.

The total chlorophyll content of *Alstonia scholaris* in polluted sites in summer as (0.516, 0.498 and 0.504 mg g^{-1} fresh wt.) whereas in non-polluted site it was 0.925 mg g^{-1} fresh wt. Gaseous pollutants and particulate matters decrease the chlorophyll content during the growth of the plants. The total cholophyll content of other plants in polluted sites were lower than that of the non-polluted site. The metal contents (Cu, Pb, Zn, Cr and Cd) in the species of polluted sites were also higher than that of the non-polluted samples and thereby indicates the plant accumulation of "SPM-pollutant".

239. Nair, K.K.N. 1981. "On the occurrence of *Indigofera aspalathoides* Vahl ex DC. (Fabaceae) in West Bengal". *J. Indian Bot. Soc.* 60(2): 182-183.

Abst.- The new record of *Indigofera aspalathoides* Vahl ex DC. from West Bengal extends its range of distribution. Earlier it was known to occur in Andhra Pradesh, Karnataka, Kerala and Tamil Nadu.

240. Namhata, Debashis & Mukherjee, Ambarish. 1989. "Some common practices of herbal medicines in Bankura district, West Bengal". *Indian J. Forest.* 12(4): 318-321.

Abst.- The present communication, based on information gathered from the tribals of Bankura district, West Bengal, reveals the unique practice of herbal medicines for some twelve common ailments. This information, if proved therapeutically, could certainly be a potential source of many commercial medicines.

241. Namhata, Debashis & Mukherjee, Ambarish. 1992. "Some folklore medicines of Bankura district, West Bengal". *J. Econ. Taxon. Bot., Addit. Ser.* 10: 265-266.

Abst.- The present communication unearths the so far unknown remedies for ten common ailments from a medico-ethnobotanical exploration of various localities of Bankura district, West Bengal. This information if proved therapeutically would give a new source of drugs.

242. Nandi, Aparajita & Barari, S. 1997. "Soil management- A new hope for lateritic forests of West Bengal". *Indian Forester* 123(4): 280-284.

Abst.- Liming is important for the management of lateritic acid soils, for it has considerable influence on growth of plants and soil environment, besides neutralizing soil acidity. In acidic soil the availability of Ca^{+2}, Mg^{+2} and P decreases, where as that of Al^{+3}, Fe^{+2} and Mn^{+2} increases. Thus the nutrient availability is closely related to the soil pH. A glass house experiment was carried out to find out the effect of liming with inorganic fertilizer and organic manure on two forest plant types viz., *Eucalyptus tereticornis* and *Shorea robusta*. As per the preliminary analysis in glass house condition, the growth of two plant types was

found significant in limed soil with organic manure and inorganic fertilizer. The initial start i.e. both root and shoot development may help for better establishment of forest spp.

243. Naskar, N.M. & Naskar, K.R. 2008. "On *Anabaena* Bory from bheries of North 24-Parganas district, West Bengal". *Geobios (Jodhpur)* 35(4): 263-273.

Abst.- Description of nine taxa of *Anabaena* Bory, collected from bheries of North 24-Parganas district, West Bengal is dealt herewith. A great diversity was observed in bheries, which dominated all other groups of algae belonging to Chlorophyceae, Xanthophyceae, Chrysophyceae, Bacillariophyceae, Dinophyceae and Rhodophyceae. These 9 taxa are being reported for the first time.

244. Naskar, N.M., Naskar, K.R. & Sen, C.R. 2007. "Systematic account and ecology of Chlorococcales from brackish water bheries (wetlands) of North 24-Parganas district of West Bengal". *Geobios (Jodhpur)* 34(1): 17-20.

Abst.- The present paper deals with taxonomic enumeration along with ecological observations of Chlorococcalean algae from brackish water bheries of North 24-Parganas district from January 2002 to December 2005. These algae show morphological variations which could be attributed to variation in ecological parameters. These taxa are reported for the first time from brackish water here.

245. Nath, S., Das, P.K., Gangopadhyay, S.K., Kapoor, K.S., Singh, Balvinder & Banerjee, S.K. 1989. "Suitability of different forest species for social forestry programme under different soil conditions Part I- Alluvial soil". *Indian Forester* 115(8): 536-547.

Abst.- The growth of forest tree species planted along road sides, canal banks and railway tracts has been correlated with the soil attributes in Alluvial soil zone of Midnapore district, West Bengal. Some of the sites having better nutritional status accelerate the growth of some selected species. On the basis of the results some quick growing species for Social Forestry programme and range of soil characteristics most suitable for optimum growth of plants in a given climatic condition have been recommended.

246. Pal, A., Mondal, M.S. & Pal, P.K. (**2000) 2001.** "Pollen morphology of some species of Rhamnaceae from West Bengal". *Bull. Bot. Surv. India* 42(1-4): 65-72.

Abst.- Pollen morphology of 10 species and 2 varieties of Rhamnaceous taxa belonging to all the four tribes have been worked out. Pollen morphology of the family shows a tendency of evolution from basic morphoforms to the derived ones. Pollen grains of all the taxa investigated have been found to possess triangular to sub-trianular amb with three equatorial apertures situated at the angles (angulo aperturate). In *Ziziphus xylopyrus* the pollen grains are pororate and in the rest nine species those are colporate with circular or lalongate-endoaperturates. Exine ornamentation shows a gradual tendency from granulose to rugulo-reticulate or reticulate pattern. Palynological features have been evaluated in understanding the taxonomy of the family.

247. Pal, Aparna, Paria, N. & Chanda, Sunirmal. 1985. "On the pollen morphology of common ground vegetation of Lava, Rechi La and Lulagaoun, Darjeeling district". *Geophytology* 15(1): 67-75.

Abst.- Pollen grains of 25 taxa from the part of a disappearing ground vegetation of Lava, Rechi La and Lulagaoun have been investigated covering the entire range of morphological parameters. The implication of the result of this investigation has been discussed with a reference to the endangered plant community of these places.

248. Pal, B.C. & Das, K.K. 2008. "Usage of Mango (*Mangifera indica*) tree-parts as traditional folk medicine in rural Malda, West Bengal, India". *Environm. Ecol.* 26(2): 719-721.

Abst.- Malda district of West Bengal is renowned for mango production. A significant portion of the people of this district depend on this crop for their livelihood. Besides making a living from this crop, the rural folks often depend on this plant for cure of a host of ailments. In the

process various parts of the mango tree and fruit are used singly or in combination with other plants as medicine for different illness. The preparation of the medicine, amount and frequency of dosage are also discussed.

249. Pal, D.C. 1992. "Observation on folklore plants used in veterinary medicine in Bengal, Bihar & Orissa-II". *J. Econ. Taxon. Bot., Addit. Ser.* 10: 137-141.

Abst.- During ethnobotanical exploration of Bihar, Orissa and West Bengal, and consultation of old literature (*Puranas*) and herbaria informations on plants used in veterinary medicine have been collected. It is found that additional 24 species under 24 genera and 22 families are used in veterinary medicine. Almost all the information are new to present day knowledge.

250. Pal, D.K., Nath, S., Singh, S.B. & Banerjee, S.K. 1985. "Genesis of red and lateritic forest soils of West Bengal on Catenary basis: Part II. Physicochemical properties". *Indian Forester* 111(4): 195-207.

Abst.- Three catenas comprising of ten soil profiles on different physiographic positions were investigated. The paper deals with the physical and chemical characteristics of the soils. It is observed that in the foot slope of the catena, the soils are dominated by the illuvial materials transported from the higher one. Down the slopes the soils are deeper, heavy in texture with more developed pedogenic process. All the soils have been classified upto subgroup level according to the Taxonomic system of classification.

251. Pal, U.C. & Santra, S.C. 1987. "Some new additions to the algal flora of West Bengal". *J. Indian Bot. Soc.* 66: 365-369.

Abst.- Twelve members of Cyanophyceae and 12 members of Chlorophyceae are described which are new records for West Bengal. The taxa (*Arthrospira jenneri, Bulbochaete reticulostratum, Ulothrix flacca* and *U. moniliformis*) are reported for the first time from India.

252. Pal Choudhury, J. & Chakraborty, Kalyan. 2008. "Prediction of rainfall in West Bengal for the next two years". *J. Interacad.* 12(3): 326-335.

Abst.- The rainfall plays a major role in agricultural field that generates various agricultural products resulting in revenue through marketing not only in Indian market, but also through export in foreign markets. It also affects the economic and financial condition of the state and the country. If the information related to rainfall is available before time, the planners of the state in various fields find it easy to perform their work in various fields related to them. In this paper, an effort has been made to predict the rainfall in the state of West Bengal in the next two years. Prediction is made based on previous years available data. The method of least square using linear, exponential, curvilinear (parabolic) equation, using orthogonal polynomial and using neural network have been used.

253. Palit, Debnath & Gurung, Sulochana. 2008. "Some phytoremedies used traditionally by Gurungs in Darjeeling, West Bengal, India". *Pleione* 2(2): 171-174.

Abst.- Gurungs are the tribal people having profound knowledge in ethnomedicines and known for their age-long traditions and customs reflecting a heritage of reputation and esteem. From an ethnobotanical survey among the Gurung community in Darjeeling, India the present work brings into light 24 plant species which are used for medicinal purposes. The areas of utilization include their common ailments.

254. Palit, S. 1981. "*Mikania*- A growing menace in plantation forestry in West Bengal". *Indian Forester* 107(2): 96-101.

Abst.- *Mikania cordata*, has been recognized as a serious pest in the forests of North Bengal. It has been steadily ruining the otherwise successful plantations. The high forests also have not been spared. The situation has been further aggravated by the virtual steppage of the taungya cultivation. This has necessitated experimentation with weedicides for

controlling this notorious climber. The lay out, results and economics of the experiment have been discussed in this paper.

255. Palit, S. 1982. "Species and provenance trials of pines in North Bengal". *Indian Forester* 108(2): 144-162.

Abst.- Trials with fast growing tropical pines, in North Bengal began more than a decade ago. Beginning with many, the number gradually narrowed down to seventeen through a process of elimination. Provenance trials were also taken up with species showing promise initially. *Pinus patula* has been found to be a suitable species for both upper and middle hills. Of the different provenances tested, Keyna has been found to be superior to other in most of the sites. The other species found promising include, *P. kesiya* of Philippine origin, *P. greggii, P. taeda, P. caribaea* (var. *bahamensis* and *hondurensis*) and *P. elliottii*.

Seed bases for species like *P. patula, P. kesiya, P. greggii* and *P. taeda* have already been established. Nursery methods have more or less been perfected. The constraints regarding supply of seeds for provenance trials still remain. *Pinus patula* can replace *Cryptomeria japonica* in various zones.

256. Panchanan, Bhaswati & Mondal, M.S. (1998) 2001. "Notes on distribution and biology of *Ceratopteris thalictroides* (L.) Brongn. (Parkeriaceae) with special reference to spore production and fertility under pollution stress". *Bull. Bot. Surv. India* 40(1-4): 58-61.

Abst.- Present paper deals with 8 samples of water fern- *Ceratopteris thalictroides* (L.) Brongn. growing in the fresh water lakes of Indian Botanic Garden, Shibpur, Howrah and in nearby areas inundated by different factory wastes containing hydrocarbons, saponins, mercury residues and various heavy metals in addition to acidic and alkaline residues.

Biology of the water fern including spore production, fertility, germination, etc. have been studied under control (IBG lakes) and fields stress conditions. It is observed that environmental and pollution stress causes severe alteration in the life cycle of this aquatic fern affecting spore production rate, fertility percentage and germination. It is also observed that presence of humus in the soil, salinity and pH of the water also affect the biology and phenotypic plasticity of this water fern. Present observation will be very much helpful in the further studies on the biology of the aquatic plants.

257. Panda, S. 2009. "Notes on rare and locally threatened ethnomedicinal plants of Bankura district, West Bengal and their *ex-situ* conservation". *J. Econ. Taxon. Bot.* 33(Suppl.): 288-292.

Abst.- This work includes collection and conservation of 35 rare and locally threatened medicinal plants collected from different parts of Bankura district in West Bengal and their *ex-situ* conservation in the Medicinal Plant Garden of Bankura Christian College Campus. These plants are extensively used by Santal, Lodha, Sabar, Bauri, Behula and Tili communities for their ethnomedicinal properties. Due to over exploitation these plants are facing a serious threat to their existence in the district.

258. Panda, Sauris. 2009. "Uses of some medicinal plants in the Kalimpong Himalaya (India): Conservation, potential and prospects". *J. Econ. Taxon. Bot.* 33(Suppl.): 205-212.

Abst.- Ethnobotanical survey covering Kalimpong hill subdivision (altitude to 3660 m) in the eastern Himalayan region of India was carried out by the present author during 2004-2006, following standard methods. The herbarium specimens were identified at CAL. Twelve species of flowering plants, widely used in the folk-medicine of this region, are highlighted in this paper. They have a broad spectrum of medicinal uses. New or less known healing applications of these plants were recorded. Such plants are mostly utilized by the Bhutias, Lepchas and Nepalis, the major ethnic communities of Kalimpong hills, bonded together by Nepali language. For each species, family, local names, life-form, altitude range and distribution, flowering and fruiting months, detailed uses, threat status of IUCN and annotations etc. are given. Owing to over-exploitation, a number of medicinal and/or

economically lucrative species are already under different categories of threat. *Rauvolfia serpentina* (L.) Benth. ex Kurz has almost disappeared from this area as a result of ruthless exploitation during last twenty years. *Abutilon indicum* (L.) Sweet ssp. *indicum*, a potent diuretic plant, is now "extinct" in the wild in Kalimpong and adjoining Darjeeling hills, albeit it was abundant there about two decades ago. Several other medicinally important species heavily exploited in the past are *Aconitum bisma* (Buch.-Ham.) Rap., *Arisaema consanguinatum* Schott, *Hedychium spicatum* Sm., *Panax pseudoginseng* Wall., *Piper longum* L., *Stephania glabra* (Roxb.) Miers, etc. and consequently they are now threatened. Biopiracy of such important medicinal plants often takes place from this region which must be strictly prohibited. In general, the underground plant parts eg. root/stem tuber, rhizome, root, etc. have remarkably high medicinal value. Such plants of Zingiberaceae, Costaceae, Araceae, Araliaceae, Menispermaceae, Ranunculaceae and many other families provide the real medical support in everyday life in the mountainous remote villages where the qualified doctor to people ratio is 1:4892. It is fascinating to see that when the era of "telemedicine" is coming up and probably arrived at the most modern doors, the people living in far-flung Himalayan villages are still healed at nature's own dispensary. The information given in this paper will be useful for backing conservation strategies and facilitate better understanding of phytotherapy research.

259. Panda, Sauris, Bhattacharyya, D. & Mukherjee, P.K. 2009. "Macrophytic vegetation of wetlands of West Bengal- Some case studies: Perspectives of conservation". *J. Econ. Taxon. Bot.* 33(3): 643-656.

Abst.- As many as 476 wetlands of different kinds each exceeding a total area of 10 ha have been identified in West Bengal state (India). Of these, 12 which includes man-made and cut-off meanders of fresh-water type as well as a few salt marshes have been explored for their macrophytic vegetation. A total of 123 species of angiosperms comprising 67 dicotyledonous and 56 monocotyledonous species were collected and their growth-forms were determined. The physic-chemical parameters studied were shoreline morphology, water regime, pH and salinity of water, and perceived threats. Characteristics of each wetland, analysis of the relevant aquatic flora, distribution, frequency, flower-fruit time, habit and habitat types, and their conservation scenario have been discussed. Best growth of these macrophytes is observed in neutral to slightly alkaline pH (7.50-8.31). The distribution and abundance of various growth-forms depend on shoreline morphology, sediment/soil characteristics, annual flood levels, etc. Threats to these wetlands chiely include the practice of pisciculture and reclamation for cultivation apart from infestation of *Eichhornia crassipes* (Mart.) Solms. and siltation from run-offs. *Aldrovanda vesiculosa* L. and the bladderworts in general are threatened in this state.

260. Panda, Sauris & Das, A.P. 2007. "Uses of corolla in tribal medicine in West Medinipur district of West Bengal, India" In: A.P. Das & A.K. Pandey (ed.) Advances in Ethnobotany, pp. 229-232.

Abst.- Use of corolla as medicine among the Kharias and Santhals of Medinipur (West) district of West Bengal recorded for 16 species of dicotyledonous plants. Apart from common diseases like headache, dysentery, fever, cough, cold, etc. three species have been reported to be used as contraceptive and one to control miscarriage.

261. Pande, M.C., Tandon, V.N. & Rawat, H.S. 1989. "Forest productivity research- Case study of Eastern part of the country". *Indian Forester* 115(12): 860-868.

Abst.- This paper presents the case study on work done on biomass production of some mono-culture raised in eastern part of the country. Comparative total biomass and the timber production of *Eucalyptus* hybrid, *Pinus patula, Pinus kesiya* and *Cryptomeria japonica* have been discussed. Further studies to obtain more reliable and authenticated data on productivity has also been suggested.

262. Pandit, P.K., Ghosh, Chandra & Das, A.P. 2004. "Non-timber forest products of Jaldapara

Wildlife Sanctuary: An assessment". *Indian Forester* 130(10): 1169-1185.

Abst.- Jaldapara Wildlife Sanctuary has been surveyed for the availability of type and amount of Non-timber Forest Produces. A total of 132 species has been recognized as NTFP producers which include plants of different habit groups, occupying different strata and types of vegetation. While the existence of an established market for only 22 of these articles are there, a list of another 27 articles have been provided for which proper markets need to be developed immediately. Prices for at least 33 articles could not be ascertained. Stress has provided for the proper survey of NTFPs in North Bengal vegetation and to develop strategies for their proper sustainable extraction and utilization.

263. Paria, N., Bhattacharyya, B. & Ghosh, M. 1990. "Seedling morphology of some members of Malvales with a note on their cytology". *Bull. Bot. Soc. Bengal* 44(1&2): 1-11.

Abst.- Seedling morphology of 14 species under 13 genera from four families of Malvales has been described and utilized in the construction of artificial keys to the identification of the taxa. An apparent cytological relationship is mentioned and emphasis has been given on the implication of vegetative juvenile characters in taxonomic research.

264. Paria, N., Kamilya, P. & Bhattacharyya, B. 1995. "Seedling morphology in taxonomic study of some members of the Bignoniaceae". *J. Natl. Bot. Soc. India* 49(1&2): 75-81.

Abst.- Seedling morphology of eleven species under six genera of the Bignoniaceae occurring in and around Calcutta has been studied for the first time. The application of this character state appears useful in systematic consideration of these taxa. Seven species under the genera *Ehretia, Heliotropium* and *Trichodesma* form one group and manifest opposite phyllotaxy in the display of first two leaves in the seedlings. Conversely, four species belonging to the genera- *Coldenia, Cordia* and *Cynoglossum* represent another group and reveal alternate phyllotaxy. Comparative screening of seedling morphological characters like shape, base, margin, number of primary veins of cotyledons and their venation pattern; shape, base, apex, margin and surface of eophylls provide important information. This information may serve as taxonomic characters to distinguish the taxa at the levels of genera and species within each group which have been evidenced in the construction of artificial keys. The present work offers a possibility for the further study of seedling morphology with the circumscription in the context of taxonomy and affinity.

265. Parui, Sanjukta, Mondal, Amal Kumar & Mandal, Sudhendu. 1996. "Protein and free amino acid composition of pollen of four species of Solanaceae". *J. Natl. Bot. Soc. India* 50(1&2): 89-92.

Abst.- The present paper reports the protein and free amino acid composition of four species of Solanaceae (*Datura metal* Linn., *Solanum indicum* Linn., *S. nigrum* Linn. and *S. surrattenmse* N. Burman). *D. metal* showed a high level of protein content i.e. 22%, while *S. nigrum* showed the highest level of free amino acids i.e. 6.85%. Among the various amino acids, amino-n-butyric acid, arginine, glutamic acid, methionine and proline were found to be common in all four species investigated.

266. Patra, N.K., Majhi, K., Basu, D. & Mazumder, G. 2003. "Identification and documentation of traditional knowledge based medicine of tribal people". *J. Interacad.* 7(2): 202-205.

Abst.- In recent era, scientists' view is that Indigenous knowledge/traditional knowledge is unique, due to its acceptance and reality for solving problem. Consequently these knowledge are highly localized and domain specific and evolved by traditional people. So identification and documentation of these practices or knowledge are crying need. Otherwise it must be passed away from our society. Tribal people have the rich sources of Indigenous Technical Knowledge on medicine because they have been procuring these from their ancestors over generation.

This study emphasized the traditional knowledge based medicine of tribal population. For this purpose Purulia and Midnapore districts of West Bengal in India were

selected purposively as study area. The intended coverage was on the components of traditional knowledge based medicinal practices among tribal population of the selected areas. The information on this topic were collected and documented.

267. Patra, P.K. & Bhattacharyya, C. 2008. "Relative performance of 24 rice genotypes (*Oryza sativa* L.) under two levels of nitrogen supply in the rainfed medium low land ecosystem of Red and Laterite zone of West Bengal". *J. Interacad.* 12(3): 283-291.

Abst.- A field experiment was conducted for two consecutive years in the Red and Laterite zone of West Bengal to evaluate the performance of 24 rice genotypes with and without application of recommended doses of fertilizer nitrogen. The genotype CN-907-6-2 performed best under both, intensive as well as under subsistence farming situations without application of fertilizer N. Two other genotypes viz., IET-8682 and UPR-103-80-1-2 also out yielded IR-36 which is considered the most widely adopted variety of the zone. Apart from these genotypes, IET-8682, IR-36, IET-12703, Khitish, IET-10384 and UPR-103-80-1-2 also performed well under no nitrogen situation. This study revealed superiority of the genotype CN-907-6-2 under both traditional (applying no fertilizer N) as well as intensive method of cultivation and may be recommended for cultivation under rainfed medium lowland ecosystem of the Red and Laterite zone of West Bengal particularly under Jhargran situation. Other varieties that may be recommended for cultivation by the farmers are: IR-36, Khitish, UPLRi-7, Pusa 312 and IET-12703.

268. Paul, C.R. & Pal, D.C. 2003. "Some non-conventional oil sources of Bankura district, West Bengal". *J. Econ. Taxon. Bot.* 27(3): 564-567.

Abst.- During the ethnobotanical field studies at Bankura district a good number of Angiospermic plants have been identified as source of non-conventional oil both edible and non-edible. In this paper eleven such plants like *Aphanamixis polystachya, Argemone mexicana, Azadirachta indica, Butea monosperma, Ceiba pentandra, Celastrus paniculatus, Hibiscus sabdariffa, Holoptelea integrifolia, Schleichera oleosa, Shorea robusta* and *Xanthium strumarium* have been discussed.

269. Paul, S.C. & Ghosh, A.K. 2005. "Forms of A1 in some acidic soils of Terai region of West Bengal". *J. Interacad.* 9(4): 533-537.

Abst.- Soil samples collected from different land uses (cultivated, barren, forest and tea gardens) of *terai* region of West Bengal were analyzed for exchangeable, extractable, non-exchangeable, amorphous bound and crystalline aluminium phases. Exchangeable, extractable, non-exchangeable, amorphous bound and crystalline aluminium phases were more in tea soils, followed by forest, cultivated and barren soils. A dynamic relationship existed between all forms of A1 studied. Non-exchangeable A1 was dominant in forest soils and was complexed with organic matter. Soil pH was negatively and significantly correlated to exchangeable, extractable and per cent aluminium saturation.

270. Paul, T.K. 2001. "*Croton bhasanthii*, a new species from India". *J. Econ. Taxon. Bot.* 25(3): 594-596.

Abst.- A new species *Croton bhasanthii* T.K. Paul (Euphorbiaceae) from Kalijhora, Darjeeling district, West Bengal state, India is described.

271. Paul, T.K. 2008. "A new species of *Premna* L. (Verbenaceae) from West Bengal, India". *Pleione* 2(2): 239-240.

Abst.- *Premna jalpaiguriana* T.K. Paul, a new species is described from Judang, Jalpaiguri district, West Bengal, India.

272. Paul, T.K. & Bhattacharya, J. 1993. "*Cissus heyneana* Planch.- A new record for Eastern India". *J. Econ. Taxon. Bot.* 17(1): 239.

Abst.- *Cissus heyneana* Planch. has been collected from South Buxarah, Howrah (West Bengal) and is reported here as new record for Eastern India. A detailed description is

provided for facilitate further exploration.

273. Pradhan, Sanjeeta, Chatterjee, Ranabir & Thapa, Umesh. 2008. "Studies on the year round cauliflower production in open and under cover conditions in the hill of Darjeeling District". *J. Interacad.* 12(1): 16-26.

Abst.- A study was conducted on the year around Cauliflower cv. Dania production in hilly area of Darjeeling District (Kalimpong) of West Bengal, India in order to standardize the technique in open and under cover condition. The experiment was laid out in a Randomised Block Design during 1997-1998 in three situations namely under high cost polyhouse, under low cost polyhouse and open conditions; and also in three growing seasons like summer, rainy and winter. The parameters like the plant height, number of leaves, length and breadth of leaf, curd initiation and formation, net and gross weight of curd, yield of cauliflower per hectare, cost of cultivation, cost benefit ratio, etc. were recorded properly. Cultivation under high cost polyhouse during winter caused the maximum plant height (69.5 cm) and the minimum was recorded in open condition during summer season. Minimum number of leaves per plant at curd initiation stage (15.5) was recorded during winter in open field. The highest average length of leaf of 57.0 cm and highest breadth of leaf (21.3 cm) were recorded during summer inside high cost polyhouse. Minimum days required for curd initiation under high cost polyhouse was recorded as 60.3 during winter. The per hectare yield was highest (54.79 ton) under high cost polyhouse in winter. It appears that cultivation inside high cost polyhouse is not feasible in Kalimpong because of high erection cost and very low wholesale price. The cost benefit ratio in winter and summer were higher under open condition.

274. Prasad, B.N., Srivastava, M.N. & Khanna, P. 1988. "Diatoms of Kalimpong, West Bengal (India)". *Geophytology* 18(1): 78-86.

Abst.- This paper deals with 25 taxa of diatoms reported for the first time from Kalimpong, West Bengal, India. The following genera of diatoms have been represented (the number within brackets indicates the number of taxa of each genera): *Diatoma* (1), *Ceratoneis* (1), *Synedra* (1), *Eunotia* (1), *Achnanthes* (2), *Navicula* (1), *Pinnularia* (2), *Frustulia* (1), *Gyrosigma* (1), *Gomphonema* (4), *Cymbella* (4), *Nitzschia* (4), and *Hantzschia* (1).

275. Prasad, Mahesh. 2008. "Fossil wood of the genus *Cynometra* L. from the Siwalik sediments of Darjeeling district, West Bengal and its phytogeographical significance". *Phytomorphology* 58(3&4): 181-186.

Abst.- A fabaceous fossil wood showing affinity with modern taxon, *Cynometra ramiflora* L. has been recorded from the Middle Siwalik sediments of Ramthi River Section in Darjeeling district, West Bengal. This taxon is a typical evergreen tree occurring in the sea coast tidal forests of India, Myanmar and Sri Lanka. Phytogeographically, it is very significant as it indicates that the sea shore was not very far from its existence during Miocene-Pliocene times.

276. Purkayastha, R.P. & Pal, A.K. (1993) 1997. "Two new species of *Pestalotiopsis* on mangrove trees in the Sunderbans, India". *Bull. Bot. Surv. India* 35(1-4): 94-98.

Abst.- Two new species of fungi, namely *Pestalotiopsis caseolaris* and *P. apetalae* were isolated from the leaves of two mangrove trees, *Sonneratia caseolaris* (L.) Engl. and *S. apetala* Ham. respectively. These fungi are described with illustration.

277. Rahaman, Chowdhury Habibur, Ghosh, Avijit & Mandal, Sudhendu. 2009. "Studies on the ethno-veterinary medicinal plants used by the tribals of Birbhum district, West Bengal". *J. Econ. Taxon. Bot.* 33(Suppl.): 333-338.

Abst.- The present paper reveals the valuable information on some ethno-veterinary plants, commonly used for treatment of diseases of domestic animals by the tribal people of Birbhum district, West Bengal. Altogether 25 plants were recorded which are used by the tribals in formulation of 17 different ethno-medicinal preparations for curing 14 different types of

diseases. Many of these ethnoveterinary medicinal preparations are new, as they have not been recorded earlier in the standard literature. Among the 17 ethno-medicinal uses, 11 are administered in the form of single drug curing indigestion, reduced lactation, colic pain, cold, fever, mouth disease, ear sore, eye problem, etc. In six cases, compound drug preparations are used in urinary troubles, diarrhoea, boils in nose, etc. Lastly, the investigated taxa have been enumerated alphabetically with their botanical names and families, followed by tribal and local names, parts used, diseases and mode of administration.

278. Rai, J.N. & Chowdhery, H.J. 1978. "Microfungi from mangrove swamps of West Bengal, India". *Geophytology* 8(1): 103-110.

Abst.- A total of 181 species of fungi have been isolated from mangrove swamps of West Bengal using soil plate, dilution plate and baiting technique methods. Of these, 7 species belonged to Oomycetes, 10 to Zygomycetes, 43 to Ascomycetes and remaining to Fungi Imperfecti. Species of the genus *Aspergillus* out number those of any other in the mangrove swamps. Next in abundance ranks the genus *Penicillium* followed by *Fusarium*. In the mangrove swamps which offer high salt concentration, high moisture and anaerobic conditions, the occurrence of such a large number of terrestrial fungi may be attributed to the fact that a prolonged and continuous impact of these ecological conditions has developed certain degree of ecological specialization among these micro-organisms. The amount of available organic matter present in the swamp appears to be mainly responsible for the activity of these fungi despite high salinity and anaerobic conditions.

279. Rai, P.C. & Das, A.P. 2002. "Analysis of the flora of Neora Valley National Park in Darjeeling district of West Bengal, India" In: A.P. Das (ed.) Perspectives of Plant Biodiversity, pp. 135-150.

Abst.- Survey of the angiospermic flora of Neora Valley National Park, covering an altitudinal range of 300 to 3100 m has revealed a high diversity of floristic elements with the record of 812 species and varieties of angiosperms distributed over 138 families. A little over 14% of the recorded taxa are ascertained to be endemic which keeps a great meaning as regards to the biodiversity richness of a small geographic area (8800 hectares), and the essence of endemic species in terms of species composition. Survey recorded 19.7% trees, 15.02% shrubs, 3.07% undershrubs, 11.94% climbers, 27.09% annuals, 13.17% perennial herbs, 4.92% geophytes, 0.49% saprophytes, 0.86% parasites, 3.32% epiphytes and 0.36% hydrophytes from different types of vegetation in Neora Valley National Park. The analysis also revealed that many exotic plants have also made their presence in the park through various processes of migration. While the valley is found to be an ideal home to a number of rare and threatened species of plants, it is also a storehouse for a large number of economically important species. Members of the families like Compositae, Rosaceae, Rubiaceae, Cyperaceae, Gramineae, Urticaceae, Ericaceae, Leguminosae, Scrophulariaceae, Polygonaceae, Lauraceae, etc. are dominants in the flora. In addition, some new taxa have also been established. The evolutionary process is active in the virgin habitats of Neora as seen from the sharp-infra-specific variations. Thus, an important aspects of species delimitation of many taxa has been directly perceived as the immediate due work. Some urgent recommendations for the conservation of park's biodiversity has also been suggested.

280. Rai, S.K. & Bhujel, R.B. 2002. "Ethnic uses of some monocotyledonous plants in the Darjeeling Himalayan region" In: A.P. Das (ed.) Perspectives of Plant Biodiversity, pp. 635-644.

Abst.- Ethnobotany of Darjeeling Himalayan region has its bearing to the richness and diversity of the vegetation. The folk use of monocotyledonous plants alone find their significance in the recent ethnobotanical study. Their traditional use in socio-cultural and economic aspects among different ethnic communities living in villages and fringe areas in Darjeeling have been studied. Information on various uses of 30 monocotyledonous plants is presented below along with their ecological status.

281. Rai, Santosh Kumar & Bhujel, R.B. 2007. "Dye and gum yielding plants of Darjeeling Himalaya, India" In: A.P. Das & A.K. Pandey (ed.) Advances in Ethnobotany, pp. 219-228.

Abst.- The dye and gum yielding plants have found a significant place in trade in the Himalayas. In a recent study, 20 species of plants have been reported to be used by the ethnic people of Darjeeling Himalaya as source of dye and gum. The present article deals with the distribution and method of these plants. It is recommended that these plants should be brought to cultivation for better economic benefit.

282. Rai, Santosh Kumar, Bhujel, R.B. & Das, A.P. 2007. "Ethnobotanical studies in Darjeeling Himalaya in relation to birth, marriage and death" In: A.P. Das & A.K. Pandey (ed.) Advances in Ethnobotany, pp. 51-59.

Abst.- Darjeeling, part of the Eastern Himalaya, is rich in ethnobotanical heritage. The numerous races of Gorkhas are the most dominant inhabitants among the aborigines in the region. Ethnobotanical studies related to the three important stages of their life, the birth, marriage and death have been carried out on this multi-ethnic group. The uses of plants have their own importance and philosophy in their life. Five plants are associated with rituals in birth, nine in marriage and six in death.

283. Rai, Upakar, Das, A.P. & Singh, Sarnam. 2008. "Inventory of medicinal trees in lower hills of Darjeeling, West Bengal, India". *Pleione* 2(1): 137-146.

Abst.- Seven forest types recognized from the tropical and sub-tropical lower hills of Darjeeling district in West Bengal houses a myriad of tree species. Many of these species have potential therapeutic value. Out of the 210 species encountered in the area, 62 species (i.e. 30%) are known to have medicinal values. The numerical strength, distribution, economic potential, use pattern and uses in treating 83 ailments have been highlighted. The potentiality of the study for prioritizing species and habitat for conservation, management along with possibility for carrying out economic activity to benefit the forest dependent communities have been discussed.

284. Raju, D.C.S. & Murthy, G.V.S. (1994) 1997. '*Sesbania roxburghii* Merr.– A less known fodder plant". *Bull. Bot. Surv. India* 36(1-4): 223-224.

Abst.- *Sesbania roxburghii* Merr. (syn. *S. paludosa* Prain) is a native rattle pod in rice-fields of Bengal. It is a fast growing species and potential source of fodder and green manure. Taxonomy and distribution of the plant are furnished in this note.

285. Rana, Vijaya & Tiwari, R.S. 1980. "Palynological succession in Permian-Triassic sediments in Bore-hole RNM-3, East Raniganj coalfield, W. Bengal". *Geophytology* 10(1): 108-124.

Abst.- Palynological succession through Barren Measures, Raniganj and Lower Triassic sediments cutting 930 m in Bore-hole RNM-3, which is located beyond the eastern limits of East Raniganj Coalfield, W. Bengal, has been analysed. The conclusions corroborate the earlier results of investigations in the subsurface strata in this area. The Upper Barren Measures mioflora is characterized by the prominence of striate-disaccate miospore genera and the genus *Densipollenites*. The main coal-bearing Raniganj sediments show- except at certain level of distinction- a continuity of striate-disaccate dominant miofloral spectrum; the closing phase of Raniganj Formation, once again indicates the *Densipollenites*-rich assemblage but the incoming Triassic elements determine the difference from Barren Measures. The yielding Triassic sample contains pollen-spore complex of typical Upper Panchet Formation (late Lower Triassic). The general paucity of trilete spores in the Raniganj strata is an indicator of ecological variation with respect to the main, central part of the Raniganj Basin where they are abundant. The precise Raniganj/Panchet boundary could not be determined due to non-availability of assemblage for a considerably thick sediments near the boundary region, yet a non-representation of lower part of a Panchet sediment is suspected in this area.

286. Ray, Mukul P. 1970. "Preliminary observations on stem-flow, etc. in *Alstonia scholaris* and *Shorea robusta* plantations at Arabari, West Bengal". *Indian Forester* 96(7): 482-493.

Abst.- The paper presents the results of preliminary studies mainly on stem-flow and also on through-fall and interception in plantations of *Alstonia scholaris* and *Shorea robusta* at Arabari in the East Midnapore Division of West Bengal. One plot each was laid out in the two species. Stem-flow, Through-fall and Interception were measured in each plot as a whole. Also stem-flow per tree (in litres) was measured for each girth class for the two species.

The stem-flow in the lowest rainfall group, viz., 1-10 mm is greater in *A. scholaris* (20.4%) than in *S. robusta* (5.0%). The maximum stem-flow for the two species are 20.4% and 10.4% respectively. For both the species, the gross stem-flow per tree increases with rainfall till saturation. For the same rainfall, stem-flow per tree increases as the girth class goes up, but it is greater in *A. scholaris* than in *S. robusta*. Through-fall for *A. scholaris* is 48.7% and that of *S. robusta* is 61.3% in the rainfall class 1-10 mm. With increase in rainfall, through-fall increases in both the species but the difference decreases. For both the species, the Interception (%) figures are very close to each other. For the rainfall group 1-10 mm, the values are 30.9% and 33.7% for the two species and decrease with increase in rainfall.

287. Ray, Samit. 1984. "Cytomorphological investigation of three populations of *Chara corallina* var. & f. *corallina* in West Bengal". *J. Indian Bot. Soc.* 63(Suppl.): 4.

Abst.- A detailed cytomorphological investigation of three different populations of *Chara corallina* var. & f. *corallina* from West Bengal was carried out following a new pretreatment schedule. All the populations showed n=42 chromosomes but differed in karyomorphological details like karyotype, length of chromosome, number of chromosomes with secondary constriction confirming that minute structural alterations have taken place in course of evolution.

288. Ray, Samit & Mukhopadhyay, Arpita. 2003. "Chromosomal variation in two populations of *Chara setosa* Klein ex Willd., em f. *setosa* from West Bengal". *Phytomorphology* 53(3&4): 215-219.

Abst- The chromosome morphology of two populations of *Chara setosa* f. *setosa* from Murshidabad and Purulia districts of West Bengal were studied from mitotically dividing cells of antheridial filament. A comparative study of karyograms of these two populations has been made to establish a correlation between morphological variability including oospore wall ornamentation and variation in chromosome morphology at population level, for the first time.

289. Roy, Anjali. 1991. "*Oxyporus latemarginata* (Dur. & Mont.) Donk and *Ceriporia xylostromatoides* (Berk.) Ryv. from India". *Bull. Bot. Soc. Bengal* 45(1&2): 63-64.

Abst.- Two wood-decay fungi namely *Oxyporus latemarginata* (Dur. & Mont.) Donk and *Ceriporia xylostromatoides* (Berk.) Ryv. were collected from West Bengal and described in detail.

290. Roy, S.C. & Chakraborty, B.N. 2007. "Evaluation of genetic diversity in tea of the Darjeeling foot-hills using RAPD and ISSR markers". *J. Hill Res.* 20(1): 13-19.

Abst.- The genetic relationships of ten tea cultivars were assayed using RAPD and ISSR markers. A high level of polymorphism was found with both RAPD and ISSR markers. A total of 26 polymorphic bands in RAPD and 14 polymorphic bands in ISSR were scored. The mean polymorphism was 60.66% in RAPD and 64.28% in ISSR markers. The scored binary data were used in cluster analysis to construct a dendrogram using UPGMA method in NTSYSpc software. Cluster analyses suggesting that 10 tea cultivars could be discriminated from one another using these markers, which also revealed their genetic relationships.

291. **Roy, S.K. & Ghosh, Pradip. 1976.** "On the occurrence of fossil woods of *Gluta* and *Anogeissus* in the tertiary of Birbhum district, West Bengal, India". *Geophytology* 9(1): 16-21.

Abst.- In the present paper two species of fossil woods belonging to the families Anacardiaceae and Combretaceae have been described from the bank of Mayurakshi Canal near Santiniketan (23^{0}42´N:87^{0}42´E) of Birbhum district in West Bengal. One of them shows closest resemblance with the wood structure of *Gluta* L. of Anacardiaceae and is identical with *G. burmense* (Holden) Chowdhury (1952). The other resembles the wood structure of *Anogeissus* Wall. ex Guillem. & Perr. of the Combretaceae. It has been referred to *Anogeissusoylon* Navale (1962) and described as *Anogeissusoxylon bengalensis* sp. nov.

292. **Roy, S.K. & Mukhopadhyay, Shampa. 1996.** "Fossil woods resembling *Saraca indica* L. and *Ougenia dalbergioides* Benth. from the Mio-Pliocene of West Bengal, India". *Rheedea* 6(1): 93-101.

Abst.- Two permineralized fossil woods viz., *Saracoxylon indicum* gen. et sp. nov. and *Ougenioxylon bengalensis* sp. nov. are described for the first time from Mio-Pliocene formations of Burdwan and Birbhum districts of West Bengal, India. The fossil wood resembling *Ougenia* was reported from the Tertiary of Assam; the occurrence of fossil wood resembling *Saraca indica* from the Indian Tertiary is a new record.

293. **Roy, T.C. 1948.** "Fungi of Bengal". *Bull. Bot. Soc. Bengal* 2(2): 134-177.

Abst.- A comprehensive list of 770 species of fungi and bacteria belonging to over 248 genera has been given for pre-partitioned Bengal.

294. **Roy Choudhuri, P.K. 1990.** "Artificial regeneration of *Sonneratia apetala* Buch.-Ham. in Sundarbans, West Bengal". *Indian Forester* 116(10): 773-779.

Abst.- This paper deals with the propagation, protection and prospects of raising *Sonneratia apetala* Buch.-Ham. on the foreshore areas of Sundarbans (outside reserved forest). The plantation works started during the year 1982 by Social Forestry Division of the Sundarban Development Project financed by International Fund for Agricultural Development. Pretreatment of *Sonneratia apetala* seeds are necessary prior to sowing the nursery beds or in the field. The different methods of treatment were discussed. Soaking in saline water and thereafter sowing after drying has shown the best performance. The author concludes that it is possible to implement *Sonneratia apetala* plantation artificially in Sundarban belt and thereby enhancing the prospect of afforestation work in this region. The benefits from afforestation of such unused land could be significant and has shown high potential for further extension.

295. **Roy Chowdhury, K.N. (1971) 1974.** "Six noteworthy corticolous lichens from India". *Bull. Bot. Surv. India* 13(3&4): 341-343.

Abst.- During the study of the lichens of 24-Parganas, Indian Botanic Garden, Shibpur and Eastern Himalayas six noteworthy lichens have been discovered which show new distribution records. Two of these are new records for Indian subcontinent and others are reported for the first time from West Bengal and Assam.

296. **Roy Chowdhury, K.N. (1972) 1975.** "Three noteworthy lichens from Darjeeling district". *Bull. Bot. Surv. India* 14(1-4): 153-155.

Abst.- *Phaeographina exertissima* and *Phaeographis dendritica* has been reported for the first time from India based on collections from Lloyd's Botanic Garden and Sukna forest, Darjeeling, respectively. *Phaeographina caesiopruinosa* which was earlier known to occur in Manipur, constitutes a new record for West Bengal.

297. **Rudra, B.C. & Mukhopadhyay, P. 2005.** "Impact analysis in transfer of technology: A case study in the northern district of West Bengal". *J. Interacad.* 9(4): 623-630.

Abst.- The study was conducted in four villages of Cooch Behar district of West Bengal during 1999-02 based on primary data collected through suitably designed sets of schedule and questionnaire in order to assess the impact in transfer of technology in terms of adoption of recommended practices by farmers in wheat and mustard cultivation. A sample of 120 farmers was drawn by SRSWOR from the farmers' group formed by the KVK in four villages. The extent of adoption of any individual component of the recommended package has been achieved in terms of percentage method. To ascertain the statistical significance of components, student's 't' test, discriminant analysis (Mahalanobis D^2 test) and also test for additional discrimination have been employed. The paper concluded that component-wise technology adoption is statistically significant for both the crops of wheat and mustard. Top dressing of nitrogen is the only component where highest adoption has been found for wheat and mustard also. It can also be highlighted that farmers in the adaptive villages are in the way of improvement both technically and technologically through physical, technological and economic constraints are there. Technology undomination resulting from poor awareness of the farmers leads to poor technology adoption only in few components in the study area.

298. Sabata, B.C. & Nayar, M.P. (1992) 1997. "Taxonomy of algae of river Hooghly'. *Bull. Bot. Surv. India* 34(1-4): 194-204.

Abst.- The present paper deals with fifty one taxa of algae from various sites of river Hooghly near Calcutta. Members of Bacillariophyceae are found to be dominant followed by Chlorophyceae, Cyanophyceae, Euglenophyceae and Dinophyceae at all the sites.

299. Saha, Dulal K. & Pan, Sitansu. 1996. "*In vitro* antagonistic potential of different isolates of *Gliocladium virens* of West Bengal". *J. Natl. Bot. Soc. India* 50(1&2): 13-18.

Abst.- *In vitro* antagonistic potential of thirty-two isolates of *Gliocladium virens* collected from different agro-ecosystem of West Bengal was tested against nine fungal plant pathogens like *Macrophomina phaseolina, Sclerotium rolfsii, Rhizoctonia solani, Fusarium oxysporum* f. *ceceri, F. oxysporum* f. *udum, F. oxysporum* f. *lycopersici, Phytophthora nocotianae* var. *nicotianae, Pythium debaryanum* and *Helminthosporum sativum* on PDA following modified dual culture plate method. Each pathogen was antagonized by one or more isolates of *G. virens*. The antagonistic potential of different isolates of *G. virens* varied widely among fungus to fungus and was not identical to all host fungi screened. Among the antagonistic isolates of *G. virens* $15GV_1$, $26GV_1$, $27GV_1$, $5GV_1$, 1 AGV_2 and $1AGV_6$ were of promise with high hyperparasitic activities against most of pathogen tested.

300. Saha, Santanu. 2007. "Study of leafing, flowering and fruiting activities in three species of temperate forest at the Singalila range, Darjeeling". *Indian J. Ecol.* 34(1): 15-18.

Abst.- Phenophase pattens of two trees and a shrub species common at both 1900 m (stand 1) and 2600 m (stand 2) altitudes were studied. The trees were evergreen type where leaf drop and new flush happened simultaneously for more than once a year. The shrub was winter deciduous and the new leaf flushed in spring. All the species flowered during spring summer seasons, while the fruit matured within monsoon. One tree, *Lithocarpus* sp. had long fruit retention. Except for leaf drop all the other phenophases always occurred earlier in stand 1.

301. Saha, Santanu. 2007. "Biological Spectrum- A reflection of climate condition: A case study in the hills of Darjeeling". *J. Econ. Taxon. Bot.* 31(2): 277-282.

Abst.- In the east Himalayan moist temperate forests of Darjeeling (1800-3200 m), life form studies are made as because it is believed that adaptation of plants to the climate are reflected in the biological spectrum. The recorded 176 species are in the following proportions: phanerophytes (P)-22.15%; chamaephyte (Ch)- 8.54%; hemicryptophyte (H)-24.99%; geophyte (G)- 5.68% and therophyte (Th)- 38.64%. The flora is, therefore, 'therophytic', even though the climate has always been identified as 'temperate'. This result is, therefore, unlike of typical temperate vegetation where hemicryptophytes are supposed

to be in preponderance. It is argued here that the region is located in the subtropical belt and the 'apparent temperate' climate is actually due to high elevations. The distinctly seasonal climate is strongly influenced by monsoon and differ from the characteristic conditions of temperate Europe and America. It should more appropriately be termed as 'Himalayan temperate' climate. Further discussions are also made with respect to the biological spectra of other regions of the Himalayan range.

302. Saha, Santanu. 2008. "Determination of life from patterns in the Singalila range of Darjeeling". *Environm. Ecol.* 26(2): 588-590.

Abst.- Life form study was carried out in the temperate forests of Darjeeling hills between 1,800 m and 3200 m elevations. The flora was found to be therophytic which was unlike of a true temperate region where hemicryptophytes should be in preponderance. It is argued here that the study area being located in a subtropical belt does not have the characteristic temperate conditions of the northern latitudes. The apparent temperate conditions were simply due to high elevations. It should more appropriately be termed Himalayan temperate. Further discussion has also been made with respect to the biological spectra of other Himalayan regions.

303. Saha, Santanu. 2009. "Composition and structure of trees and saplings in the broadleaved forests of Singalila Range, Darjeeling". *Indian J. Forest.* 32(1): 55-64.

Abst.- The present study was carried out in three forest stands- S1, S2 and S3, located at 1900 m, 2600 m and 2800 m elevations, in Darjeeling. The stands harboured the typical broadleaved species of the East Himalayan Moist Temperate forests. Vegetation analysis for trees and saplings was carried out by quadrat method and the density (D), basal area (BA) and diversity were evaluated. A total of 24 tree species were recorded, of which S1 had 13 species (D-740 ha^{-1}, BA-48.23 m^2ha^{-1}) and was dominated by *Castanopsis purpurella*. At S2, there were 12 species (D-840 ha^{-1}, BA-63.04 m^2ha^{-1}) with dominance of *Lithocarpus pachyphylla* and *Rhododendron* spp. At S3, there were 9 species (D- 620 ha^{-1}, BA-30.33 m^2ha^{-1}) with *Cryptomeria japonica* and *Rhododendron* spp. dominating. The sapling layer was poorer in comparison with a total of 16 species. There were only 8, 9 and 5 species at S1, S2 and S3, respectively and the density ranged between 480 ha^{-1} and 900 ha^{-1}. Both the trees and sapling showed low similarity values between the stands and a predominantly random distribution pattern. The tree and sapling diversity ranged between 2.917-3.385 and 2.305-3.026, respectively.

304. Saha, S. & Santra, S.C. 2001. "Variation in litter fall activity of two species in the temperate forests of Singalila range of Darjeeling". *J. Hill Res.* 14(1): 16-20.

Abst.- In the forests located at 1900 m and 2600 m of Singalila range of the Darjeeling hills, two tree species- *Lithocarpus pachyphylla* and *Symplocos lucida*, commonly found at both altitudes were selected for the study of litter fall and leaf drop. The pattern of litter fall was similar for each species at both sites, but always lagged by 1-2 weeks at 2600 m. *Lithocarpus pachyphylla* and *Symplocos lucida* had three and two concentrated leaf drops in a year, respectively. These also matched with the litter fall peaks, indicating that leaf contributed mostly to the total litter fall (>90%). At 1900 m, the quantities of litter fall were 295.4 $gm/m^2/yr$ and 218.1 $gm/m^2/yr$ for *Lithocarpus* and *Symplocos* respectively, while at 2600 m, they were 186.4 $gm/m^2/yr$ and 126.9 $gm/m^2/yr$ respectively. These values were among the highest for the Himalayan forests and some temperate forests of the world. The dry spring season accounted for 25% to 47.5% of the annual fall. So there appeared to be an inverse relationship with rainfall.

305. Sahu, A.K. & Panda, S. 2001. "Studies on pollutant sink function of trees of Calcutta metropolis with emphasis on urban forestry". *J. Econ. Taxon. Bot.* 25(3): 635-644.

Abst.- Morphological traits of trees of Calcutta metropolis, related to pollutant sink function, were investigated. The traits of leaf, tree canopy and bark surface were studied. The leaves were mostly mesophyllous, simple and ovate with entire margin. The leaf area was large

with higher circumference-area ratio. The leaf texture and degree of hairiness were moderate. Tree canopy shape was round with dense leaves and larger surface area. Most of the plants showed rough bark surfaces. Judging these traits of the leaves, bark surface and tree canopy, sink function efficiency was evaluated and their suitability for pollution abatement and designing of urban forestry were emphasized.

306. Samanta, A.K. & Biswas, K.K. 2009. "Climbing plants with special reference to their medicinal importance from Midnapore town and its adjoining areas". *J. Econ. Taxon. Bot.* 33(Suppl.): 180-188.

Abst.- Present investigation reports 51 species of climbers, of which 45 dicot and 6 monocot species fall under 18 dicot and 5 monocot families respectively. Medicinal importance of these species in addition to common uses, if any, have been discussed in this paper.

307. Samanta, A.K. & Das, A.P. 2002. "Pollen diversity among the angiospermic climbers in the flora of Darjeeling and Sikkim Himalayas" In: A.P. Das (ed.) Perspectives of Plant Biodiversity, pp. 355-376.

Abst.- Pollen grains of 77 species (73 dicotyledonous and 4 monocotyledonous) of angiospermic climbers, representing 39 dicotyledonous and 3 monocotyledonous (total 42) families from Darjeeling and Sikkim parts of eastern Himalaya have been studied for morphological characters. Detailed description and a discussion on their evolutionary status and assemblage pattern are also provided in the paper.

308. Sannigrahi, Arabinda & Pal, Pankaj K. (1997) 2001. "Megaspore succession through the Raniganj- Panchet transition in the Raniganj Coalfield, India". *Bull. Bot. Surv. India* 39(1-4): 157-178.

Abst.- Megaspores from the uppermost horizon of Raniganj Formation and the lower most strata of Panchet Formation exposed in the Raniganj Coalfield, West Bengal, have been analysed both qualitatively and quantitatively. The assemblage recovered from the Ranigang Formation qualitatively comprises *Banksisporites psilatus* (Bharadwaj & Tiwari) *comb. nov., B. panchetensis* (Maheshwari & Banerji) Banerji *et al., Biharisporites maiturensis* Maheshwari & Banerji, *B. raniganjensis sp. nov.* and *Maiturisporites indicus* Maheshwari & Banerji. The genus *Biharisporites* is the most commonly occurring form in this assemblage. The Maitur Member of Panchet Formation yields *Banksisporites panchetensis* (Maheshwari & Banerji) Banerjee *at al*., *B. gondwanensis* Maheshwari & Banerji, *B. granulosus* Maheshwari & Banerji, *Biharisporites maiturensis* Maheshwari & Banerji, *B. luguensis* Pal *et al., Verrutriletes obscurus* (Mahashwari & Banerji) Banerji *et al., V. distinctus* (Maheshwari & Banerji) Banerji *et al., Talchirella sinuata* Maheshwari & Banerji, *T. dubia* Maheshwari & Banerji, *T. flavata* (Kar) Bharadwaj & Tiwari, *Pantiella bosei* Maheshwari & Banerji, *P. bharadwajii* Maheshwari & Banerji, *P. maheshwarii sp. nov., Maiturisporites indicus* Maheshwari & Banerji, *M. distinctus* Maheshwari & Banerji, *M. spinotriletus* Maheshwari & 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.*

309. Santra, S.C. & Adhya, T.K. 1976. "Zygnemaceae of Eastern Himalayas-II: *Spirogyra* Link". *Bull. Bot. Soc. Bengal* 30(1&2): 47-49.

Abst.- A systematic account has been presented of five species of *Spirogyra* Link collected for the first time in West Bengal.

310. Sanyal, P. 1975. "Rehabilitation of 'Degraded coppice Sal' forests vis-à-vis conversion to *Eucalyptus* plantations in South Bengal- A Financial study". *Indian Forester* 101(1): 103-108.

Abst.- Bulk supply of mining pit props and constructional poles come from the coppice sal forests of dry lateritic tracts. Owing to pressure of population at fringes such forests are often found in a state of degradation, being gradually replaced by miscellaneous scrubs.

While tackling such areas by complete conversion to pulpwood plantation (*Eucalyptus*), it has become expedient to determine the stage of degradation in order to justify the same on economic grounds. A rough financial index for field foresters has been derived by comparing the profitability of *Eucalyptus* plantations vis-à-vis rehabilitation the degraded sal coppice forests. Thus for allocating areas to Pulp-wood Working Circle in Quality I, II and III sites of *Eucalyptus*, the existing coppice forests should contain less than 328, 215 and 162 numbers of viable sal tools per ha, respectively. If the density is more the sal coppice crop will give a better return.

311. Sanyal, P., Hazra, S., Das, I., Das, A.K. & Amin, Sk. R. 2007. "Survey of algal resources-Digha Shankarpur coast (Midnapore District), West Bengal". *J. Interacad.* 11(2): 152-156.

Abst.- A survey of algal resources from this open coastal region has been attempted within Digha-Sankarpur Development Authority of Midnapore District. Luxuriant growth of the edible algae *Enteromorpha* had been observed at many spots. Occurrence of the sea lettuce *Ulva* has also been documented *in situ*. Drift fragments of important brown algae *Laminaria*, the agar yielding red algae *Gracillaria* and economically important *Catenella* were recorded. On the whole, Cyanophyceae and Bacillariophyceae dominate these intertidal and subtidal zones of the open coast.

312. Sarbajna, K.K. 1990. "New Foliicolous Hyphomycetes from India". *J. Econ. Taxon. Bot.* 14(2): 487-492.

Abst.- In the present paper, two new species of the genus *Stenella* Syd. are described and illustrated. These are *Stenella lygodii sp. nov.* and *S. tiliacori sp. nov.* collected on *Lygodium* sp. and *Tiliacora racemosa* Colebr. respectively from Jalpaiguri and Baruipur (West Bengal).

313. Saren, A.M., Halder, A.C. & Sur, P.R. 2008. "Observation on ethnobotany of Darjeeling district, West Bengal". *J. Econ. Taxon. Bot.* 32 (Suppl.): 345-352.

Abst.- The present paper deals with 71 species of vascular plants belonging to 69 genera used traditionally by the tribals of Darjeeling district of West Bengal for curing various ailments of man and cattle.

314. Saren, A.M., Sen, R. & Pal, D.C. 1999. "A contribution to the ethnobotany of Bankura district, West Bengal". *J. Econ. Taxon. Bot.* 23(2): 545-555.

Abst.- Paper presents ethnobotanical uses of 78 species of plants in the Bankura district of West Bengal.

315. Sarkar, Kalyan. 2009. "Studies on chemical properties and nature of acidity of coastal acid soils of West Bengal". *J. Interacad.* 13(1): 23-27.

Abst.- Crop growth in acid soil is limited by toxicity of iron and aluminium and also because of deficiency of other nutrients like calcium, magnesium, etc. In view of that present investigation was taken to study the chemical properties and nature of acidity of six coastal acid soils of Sunderbans of West Bengal which is also referred as "acid sulphate soil" (Bandyopadhyay, 1988) and different from other acid soils of West Bengal. The pH (water) of the six experimental soils were varied from 4.10 to 4.80 with a mean value of 4.37. The value of pH with 1N KCl was lower than water suspension but differences were not so high. The electrical conductivity was expectively high and varied from 1.9 to 3.9 dSm^{-1}. Except the soil of Agarhati, the organic carbon content of the soils was very high. So also was in the case of total nitrogen. The sulphate content was varied from 1.08 to 2.49 meq/ 100 mg. Among the exchangeable cations sodium was most dominant followed by calcium. The percent base saturation of the soils varied from 19.22 to 31.07 with mean value of 24.82. The extractable iron content of the soils showed variable results but high content of extractable aluminum confirm the low pH of the soils. The total acidity of the soils varied from 15.760 to 20.576 $cmol(p^+)kg^{-1}$. The percent contribution of exchangeable acidity was less than that of non-exchangeable acidity in every case.

316. Sarkar, M.K., Saha, S., Nayak, D.K., Naskar, I. & Singh, S.S. 2005. "Disease incidence of Indian arrowroot in West Bengal". *J. Interacad.* 9(4): 631-632.

Abst.- Indian arrowroot has been infected by rhizome rot disease and two pathogens *Pythium* sp. and *Fusarium* sp. are associated with the disease. Cultural control measures are mainly adopted to manage the disease.

317. Sarkar, P.K. 2002. "Foundation of the then Company's Garden at Calcutta and implementation of economic and rare plant species". *J. Econ. Taxon. Bot.* 26(1): 245-247.

Abst.- Transfer of plants and raising plantation of them for trade of the East India Company was among the primary reason of origin of Indian Botanic Garden. Its activities on the development and conservation of certain other useful plants are also briefly discussed in the paper.

318. Sarkar, P.K. 2002. "Great Banyan Tree, Large Palm House and Giant Water Lily- A visitor's bonanza in Indian Botanic Garden". *J. Econ. Taxon. Bot.* 26(1): 248-250.

Abst.- The plant wealth of Indian Botanic Garden holds endless amusement to the visitors. Among many viewing items only a few are mentioned in the paper for interested public.

319. Sarkar, P.K., Majumder, S.C. & Dutta, S. 2003. "Jurassic plants in Indian Botanic Garden". *J. Econ. Taxon. Bot.* 27(Suppl.): 1114-1115.

Abst.- Cycads, the Jurassic plants are among the most primitive of surviving seed plants of the world and are often called living fossils. They originated in Triassic period, flourished most in Jurassic after which they declined slowly. A sizeable collection of such plants in Indian Botanic Garden has been specially mentioned in the paper.

320. Sarkar, P.K., Majumder, S.C. & Mandal, C.R. 2003. "Curious plants of Indian Botanic Garden". *J. Econ. Taxon. Bot.* 27(Suppl.): 1121-1123.

Abst.- Indian Botanic Garden is a treasure-house of plants. One may see there various types of curious and interesting plants brought from different parts of the world. These collections enrich the knowledge of the plant lovers in many ways. Few kinds of such plants are mentioned in the paper.

321. Sarkar, P.K., Majumder, S.C. & Sarkar, G. 2003. "The spectacular palms of Indian Botanic Garden". *J. Econ. Taxon. Bot.* 27(Suppl.): 1112-1113.

Abst.- Palms play a very important role in human livelihood. They are unique ornamental plants of nature. Indian Botanic Garden is well known for its rich collection of palms. Some of the interesting palms that attract attention of visitors are mentioned in the paper.

322. Sarkar, P.K., Majumder, S.C. & Sarkar, S.K. 2003. "The interesting cacti and succulents of Indian Botanic Garden". *J. Econ. Taxon. Bot.* 27(Suppl.): 1116-1117.

Abst.- Cacti and succulents are fascinating groups of plants. The infinite and unique variations in shape and size and colour of these groups of plants make them look curious and interesting to plant lovers. Some of them are mentioned in the paper.

323. Sarkar, P.K., Majumder, S.C. & Singh, B. 2003. "Indian Botanic Garden- A premier visitor attractor in Eastern India". *J. Econ. Taxon. Bot.* 27(Suppl.): 1118-1120.

Abst.- Indian Botanic Garden is an unavoidable point of itinerary for native and foreign visitors. It is not only a place of aesthetic beauty to nature lovers but its plant wealth and expertise draws general public, students and researchers all the time alike. Some of its interesting visiting items have been mentioned in the paper.

324. Sarkar, S.K. 1999. "Occurrence and management of canes in West Bengal". *Indian Forester* 125(9): 845-854.

Abst.- In West Bengal canes occur naturally within the agro-climatic zones of Sun-Himalayan

Bhabar and Tarai. With the exception of two high altitude canes, other eight species appear in wet mixed plain forests in the swampy pockets. In the recent past, canes were extracted on a cutting cycle of 3 to 5 years. But over-exploitation surreptitiously, extraction of immature plants and clear felling of natural forests depleted these valuable resources, which were much in demand in local rattan industries. At present, discontinuing clear felling in natural forests under the provision of Forest Conservation Act, ban on extraction of cane in Working Plan prescription and resorting to artificial regeneration in suitable habitat help rehabilitation of cane in this state.

325. Sarkar, S.K. 2006. "Present status and future prospects of Joint Forest Management in West Bengal". *Indian Forester* 132(1): 11-18.

Abst.- JFM is a recent concept adopted by various states of India, which is an institution building process (not a silvicultural management system) by which it is easier to manage the forests through active participation of the fringe people. But the viability and continuity of these institutions rest on certain factors. The most important is the sustainability of the development process by which the benefits received by the FPC members should be commensurate, at least to some extent, with the services rendered by them in managing the forests effectively. Attempts are made in this article to examine this from institutional, economic and ecological point of view of this programme and suggest improvements. Income of the beneficiaries may not be complementary, but definitely it can be supplemented to great extent, if certain technical and technological measures can be taken. Above everything, motivation and interaction with the FPCs are vital and imparting training for value addition of natural resources is an important factor to augment the income.

326. Sarkar, S.K. & Chattopadhyay, R.N. 1999. "An introspect into management aspects of the institutions- Case study of the selected FPCs in the forest divisions of Midnapore district, West Bengal". *Indian Forester* 125(1): 93-104.

Abst.- This article is based on field survey to assess the performance of the Forest Protection Committees through participatory monitoring in four Forest Divisions of Midnapore District with their success and drawbacks.

327. Sarkar, S.K. & Chattopadhyay, R.N. 2002. "The extent of economic viability of institutions formed for JFM- Case study from Midnapore district of West Bengal". *Indian Forester* 128(1): 3-18.

Abst.- In the lateritic tract of South-West Bengal Sal coppice forests, JFM programme had started in late 1990s and is apparently successful. But the major factor for the continuity of the programme depends on the viability and buoyancy of the institutions i.e. Forest Protection Committees (FPCs) formed for this purpose. In this study attempts were made to assess the income of the FPC members from different sources and resources in Midnapore District of West Bengal, selecting sample FPCs all over the district. How far such income is encouraging to keep them involved in the programme and the ways and means to enhance income have also been indicated and suggested.

328. Sarma, Pranjit. 1971. "On the occurrence of the genus *Dichotomosiphon* Ernst in West Bengal and Dehra Dun". *Bull. Bot. Soc. Bengal* 25(1&2): 53-54.

Abst.- The monotypic genus *Dichotomosiphon* Ernst [*D. tuberosus* (A. Br.) Ernst] has been recorded for the first time from Amodar river, near Garmandaran, Hooghly district, West Bengal and from Dehra Dun. It was found to grow as a benthic alga forming extensive felt-like mats in a small river. Dehra Dun specimen was collected from Sahasra Dhara sulpher spring where it formed a black cushion like mats on the soil over which spring water is slowly passing. The distribution of the genus in India is now being extended to further north and to the east. Available distribution records throughout the world show that the genus is restricted within a small belt between 15^0 and 55^0 N latitude.

329. Sarma, Pranjit & Mukherjee, Durgadas. 1984. "On the occurrence of a new species of

Nannandrous *Bulbochaete* (*Bulbochaete jaoii* sp. nov.) from West Bengal, India". *J. Indian Bot. Soc.* 63(Suppl.): 1.

Abst.- During a systematic survey of the Oedogoniales from several districts of West Bengal, the authors have encountered many interesting taxa of *Bulbochaete*. In the present paper, one new species *B. jaoii* sp. nov. is described. *B. jaoii* differs from all other species so far known in having (1) swollen holdfast with two lateral sides often straight or parallel (2) outer layer of the oospore wall ornamented with highly irregular and anastomosing longitudinal costae sometimes connected by a few curved transverse lines.

330. Sarma, T.K. & Sarkar, A.K. 1987. "Two new records for flora of India". *J. Econ. Taxon. Bot.* 11(1): 189-192.

Abst.- Two leguminous plants, namely *Aeschynomene americana* Linn. and *Stylosanthes guianensis* (Aubl.) Sw., are new records for India.

331. Sasmal, Babulal, Biswas, Kamala Kanta & Mondal, Amal Kumar. 2009. "Aquatic angiospermic plants of Purba Medinipur district, West Bengal with reference to their sustainable use". *Environm. Ecol.* 27(2A): 733-737.

Abst. The paper described medicinal aquatic angiosperms of Purba Medinipur district, West Bengal. The study was carried out in this area to investigate the medicinal importance of the plants. It gives 37 species under 26 families with their botanical names, local names, flowering and fruiting period and medicinal uses.

332. Sasmal, S.K. & Choudhury, A. 2009. "Seasonal variations of limnological parameters in the coastal West Bengal, India". *Environm. Ecol.* 27(3A): 1253-1257.

Abst.- Investigations on the limnological factors were done at three different sampling stations viz. light house (Station1), Kachuberia (Station1) and Haldia (Station 3) during 1998 to 2000. All limnological data showed spatial and temporal variation in every year. Highest COD and lowest DO values were observed in Station 3 while highest DO and lowest COD values were recorded in Station 1. Average salinity was 17.92, 9.63 and 3.14 ppt in respective stations. The pH did not very much among the sampling stations. Average pH was 8.21, 8.08 and 8.09 in station 1, station 2 and station 3 respectively. Concentrations of different nutrients such as nitrate, phosphate and silicate were found to be high station 3 compared to station 1 and station 2.

333. Sau, Ankhi & Gupta, R.K. 2008. "A contribution to some fresh water Chlorococcales of Howrah district, West Bengal, India". *J. Econ. Taxon. Bot.* 32(1): 186-191.

Abst.- The present communication deals with the morphotaxonomic enumeration of 7 taxa under 21 genera of the order Chlorococcales from Howrah district of West Bengal, India. Out of these, nine taxa are of rare occurrence in Howrah district viz., *Chlorococcum infusionum* (Schrank) Meneghini, *Trebouxia humicola* (Treboux) West & Fritsch, *Characium acuminatum* A. Braun & Kuetzing, *Characium angustatum* A. Braun, *Closteridium siamensis* (West & West) G.M. Smith, *Gloeotaenium loitlesbergerianum* Hansgirg, *Tetraedron trigonum* (Naegeli) Hansgirg, *Oocystis lacustris* Chodat and *Actinastrum hantzschii* Lagerheim.

334. Sau, Ankhi, Pal, D.C. & Verma, N.K. 2008. "Studies on ethnobotany of Sunderbans with special reference to tribal and rural women health care". *J. Econ. Taxon. Bot.* 32 (Suppl.): 232-235.

Abst.- The paper deals with 17 angiospermic plant species used as medicinal plants by the women of the area. The botanical names, local names, families and the plant parts used as home remedies and other details e.g. ingredients, methods of preparations, doses, mode of administration and duration, etc. have been provided.

335. Sekhar, A.C. & Gaharwar, K.S. 1977. "A note on physical and mechanical properties on *Exbucklandia populnea* (Pipli) from Kalimpong Division, West Bengal". *Indian Forester* 103(10): 661-668.

Abst.- Physical and mechanical properties of *Exbucklandia populnea* (from Kalimpong Division, West Bengal) evaluated in green and kiln dry condition have been reported and compared with corresponding properties of "Standard Teak". Estimated values based on strength specific gravity formulae have also been reported and compared with the observed values in green condition. Safe working stresses and suitability indices of this species have also been calculated and reported.

336. Sen, Neera & Naskar, K.R. 2002. "Algal communities in the intertidal mangrove niches of Sunderbans". *J. Interacad.* 6(4): 420-433.

Abst.- The algal flora of Sundarbans, West Bengal are found to inhabit varied habitats in different ranges of conditions related to soil and water physico-chemical parameters and inherent soil and water conditions viz., texture and various levels of consolidation and lotic/ lentic condition of the water bodies. The algal flora are found to form specific communities or associations in the estuarine and brackish water environments of the Indian Sundarbans. There have been some sporadic reports on the algal communities or associations and their preferred habitat ecology, but a comprehensive and elaborate account of the algal associations occurring in the Indian Sundarbans mangals is lacking altogether. During the present investigation, 10 different types of algal associations or communities were identified from various habitats. The paper attempts to give an account of the specific algal associations commonly encountered in Indian Sundarbans mangals with an account of the habitat ecology of the communities in particular and the algae in general.

337. Sen, Neera, Naskar, Saikat & Naskar, K.R. 2002. "Taxonomy of the diatom flora of Sundarbans mangals in West Bengal, India". *J. Interacad.* 6(2): 118-137.

Abst.- Taxonomic enumeration of 42 species of diatoms belonging to 27 genera has been made from the Sundarbans mangals in India. Distribution and notes on their habit and habitat have also been studied and indicated. The following genera are represented along with the species number indicated in parenthesis.

Melosira (2), *Stephanopyxis* (1), *Cyclotella* (1), *Coscinodiscus* (3), *Hemidiscus* (1), *Corethron* (1), *Rhizosolenia* (2), *Climacodium* (1), *Chaetoceros* (5), *Bacteriastrum* (3), *Biddulphia* (2), *Asterionella* (1), *Fragilaria* (1), *Synedra* (1), *Diatoma* (1), *Achnanthes* (2), *Cocconeis* (1), *Navicula* (2), *Stauroneis* (1), *Pinnularia* (1), *Pleurosigma* (1), *Gyrosigma* (1), *Gomphonema* (1), *Anomoeoneis* (1), *Cymbella* (1), *Amphora* (1) and *Nitzschia* (3).

338. Sengupta, Anjan & Chaudhuri, Subhendu. 1993. "Studies on the physico-chemical properties of soils of the eco-successional stages of mangrove sediments in the Sundarban". *Indian J. Forest.* 16(3): 250-254.

Abst.- Physical and chemical properties of the soils of the eco-successional stages of mangrove sediments of Sundarbans have been investigated. The parameters studied pH, electrical conductivity and the exchangeable anions and cations indicated that the soils are characteristically saline. There was a direct relationship of soil salinity with the stages of soil formation and saline water inundation, being the highest in stage I, i.e. formative mangrove swamps and the lowest in stage IV of the degraded mangroves on embankment protected highlands.

339. Sharma, J.R. 1993. "New records of Polypores from India". *Indian J. Forest.* 16(2): 186-187.

Abst.- While collecting in Eastern Himalayas and West Bengal, the author collected two species of polypores i.e. *Phellinus ferruginea-velutinus* (Henn.) Ryv. and *P. purpureogilvus* (Petch.) Ryv. of the family Hymenochastaceae which are the new records for India.

340. Sharma, J.R. & Ghosh, P.K. (1989) 1992. "Polypores that decay trees of Indian Botanic Garden". *Bull. Bot. Surv. India* 31(1-4): 95-102.

Abst.- Fifty two species of wood-rotting polyporoid hymenomycetes were found associated

with decay of trees of Indian Botanic Garden. Most of them caused white rots. *Oxyporus latemarginata* (Dur. & Mont.) Donk, *Phellinus glaucescens* (Petch) Ryv. and *Rigidoporus vitreus* (Fr.) Donk have not been reported earlier from India. *Coriolopsis luzonensis* (Murr.) Sharma is a new combination proposed. *Casuarina equisetifolia* Forst. is the most frequent host.

341. Sikdar, J.K. & Ghosh, R.B. 1981. "A taxonomic survey and systematic census of tree legumes of North Bengal". *Indian J. Forest.* 4(3): 224-229.

Abst.- The paper presents an account of flowering tree legumes of North Bengal. Fifty-eight species under twenty-six genera are recorded. Correct nomenclature with basionyms and synonyms, short diagnostic characters, flowering and fruiting and brief notes are attached against each taxon.

342. Sikdar, J.K. & Maiti, G.G. (1979) 1981. "Two new records of Compositae from West Bengal". *Bull. Bot. Surv. India* 21(1-4): 218-220.

Abst.- In course of studies on the flora of Jalpaiguri district, the senior author collected two species of the family Compositae viz., *Thespis divaricata* DC. and *Senecio vulgaris* L. which constitute new records for West Bengal.

343. Singh, Balvinder, Nath, S., Das, S.K., Singh, S.B. & Banerjee, S.K. 1987. "Soil characteristics under introduced *Cryptomeria japonica* (Dhupi) in Darjeeling Himalayan region". *Indian Forester* 113(3): 191-201.

Abst.- The nature and properties of the soils supporting *Cryptomeria japonica* in Darjeeling Himalayan region were studied. The soils are acidic and contain high organic matter. The growth parameters are inversely related to the pH and organic matter of the soils while height of plants and basal area of the species are positively correlated with C.E.C., exch. Ca^{+2}, Mg^{+2}, K^{+} and available phosphorus. Total nitrogen contents of the soils are correlated positively with G.B.H. and basal area but negatively with the heights of the plants. Ranges of some of the attributes for the growth of the species under more or less similar climatic conditions are assessed.

344. Singh, J.N. (1996) 2001. "Overview of ecological studies on conservation and management of plant diversity in Indian Botanic Garden". *Bull. Bot. Surv. India* 38(1-4): 102-110.

Abst.- Ecological factors of edapho-microbial nature, bio-aquatic nature, chemical nature of Hooghly river waters and their impact on the eco-pedon system of IBG have been analysed and are presented here with the objective to aid in scientific management of this unique Botanic Garden. Emphasis is laid on the seasonal variations in the factors governing the ecology of the garden. The paper is concluded with some suggestions for upkeep of the balanced ecology of Indian Botanic Garden (IBG).

345. Singh, Jagdish Narain & Ghosh, Madhav Krishna. (1991) 1994. "Herbage layer biomass and edaphic status of the Botanic Garden at Shibpur, Howrah". *Bull. Bot. Surv. India* 33(1-4): 288-295.

Abst.- The biomass comprising the shoot and root of the distributed herbage layer of Indian Botanic Garden at Shibpur was studied. Among the constituent populations of the herbage layer, *Imperata cylindrical* (L.) P. Beauv. was noted to be most dominant of the species. It was observed that the root biomass ratio of the layer was higher than the shoot biomass. The total biomass production was found to be as its Zenith during the months of October and November. For the maximum production of total biomass 16-20% field moisture was observed to be optimal. The constant removal of phytomass (energy materials) from the herbage layer an account of anthropogenic activity created positive imbalances on the corresponding edaphic characteristics. For an ideal ecological management the reinput of the phytomass in the soil system of the garden was favoured.

346. Singh, Jagdish Narain, Ghosh, Madhab Krishna & Sen, Ratna. (1990) 1992. "Observations on the edapho-microbial nature of Indian Botanic Garden, Howrah". *Bull. Bot. Surv. India* 32(1-4): 94-102.

Abst.- The edapho-microbial nature of Indian Botanic Garden was assessed. The activities of Azotobacter were used as an indicator to determine the suitability of edaphic conditions for plants introduction. It was observed that the Hooghly river (Ganga) front had comparatively higher clay content and organic carbon. The water holding capacity, cation exchange ability, pH, porosity and available nutrients such as nitrogen and phosphorus and azotobacter activities of the river site were comparatively superior to the other sites. The middle stretch of the garden area was observed to be more saline than other two stretches. The area towards human settlements was exposed to severe anthropogenic interference. Consequently, the microbial population was diminutive here with relatively inferior edaphic characteristics.

347. Singh, Nicky, Samajpati, N. & Paul, A.K. 2008. "Development of salt tolerant Rhizobia for *Lathyrus sativus* L. cultivation in coastal West Bengal". *J. Bot. Soc. Bengal* 62(2): 63-66.

Abst.- Survey of Rhizobia from root nodules of five different cultivars of *Lathyrus sativus* L. growing in coastal saline areas of West Bengal has resulted in the isolation of 45 isolates. These isolates showed different degrees of tolerance to NaCl in yeast-extract mannital medium and only 8 of them were able to tolerate 2% (w/v) NaCl. When tested for streptomycin resistance, 50% of them tolerated up to 400 mg/ml. Streptomycin resistant isolates showed 75-76% root infection comparable to wild type strains. One of the isolates, CON 35 showed high degree of survivality and recovery in both sterile and non-sterile soils and appeared to be an ideal candidate for field application in cultivating *L. sativus* L. in saline soils of West Bengal.

348. Singh, S.B., Nath, S., Pal, D.K. & Banerjee, S.K. 1985. "Changes in soil properties under different plantations of the Darjeeling Forest Division". *Indian Forester* 111(2): 90-98.

Abst.- Investigation on soil properties of the Darjeeling Forest Division (W.B.) was carried out to see the changes due to different forest vegetations (*Pinus patula, Cryptomeria japonica, Tectona grandis, Shorea robusta* and mixed broad leaf species). Highest content of organic matter and lowest soil pH were noticed in site of *C. japonica* plantation; calcium content was maximum in teak (*Tectona grandis*) area. The soils under *C. japonica* had minimum total bases and teak the maximum, and more than half of the total bases in teak area was contributed by calcium. Mixed vegetation reflected best performance on soil properties among the plantations undertaken in the present investigation. Results showed that vegetational cover affects the soil properties and it is suggested that in order to maintain natural ecological balance and avoid drastic changes in soil properties, mixed plantation should be preferred to pure plantation.

349. Singh, S.K. & Ghosh, J.P. 2007. "Bryo-diversity in Indian Botanic Garden, Howrah, West Bengal". *Bull. Bot. Surv. India* 49(1-4): 155-164.

Abst.- Twenty-five species of bryophytes, comprising 16 mosses, 7 liverworts and 2 hornworts have been recorded from various habitats in Indian Botanic Garden, Howrah. These include 5 new records for the Gangetic Plains and 2 new records for the state of West Bengal.

350. Singh, Sanjay, Agrawala, D.K. & Chowdhery, H.J. 2007. "Further contribution to the flora of Buxa National Park, Jalpaiguri district, West Bengal". *J. Econ. Taxon. Bot.* 31(2): 380-386.

Abst.- Present communication deals with 80 species belonging to 62 genera representing 26 families of angiosperm plants and 8 species of pteridophytes for the first time from the Buxa National Park in Jalpaiguri district, West Bengal. Of these, *Psychotria nigra* (Gaertn.) Alston, *Zanthoxylum tetraspermum* Wight & Arn., *Piper argyrophyllum* Miq. and *Juncellus*

laevigatus (L.) Cl. are being recorded for the first time from the state of West Bengal.

351. Singh, S.P. 1981. "Tree model for Kadam (*Anthocephalus chinensis*) plantations of West Bengal". *Indian Forester* 107(3): 158-165.

Abst.- Tree model to simulate growth and yield of Kadam has been developed. With its help, it is feasible to predict yields obtainable under different site conditions and different predefined intensiby of low (ordinary) thinning. It thus can provide information to decide initial spacing for planting so as to obtain maximum volume output from the site.

352. Singhal, N. & Sen Gupta, S. 1999. "Garumara National Park, West Bengal: Problem, prospects and management". *Indian Forester* 125(10): 963-974.

Abst.- Garumara National Park, situated in West Bengal is important for being one of the last gene pool reserves of Great Indian One Horned Rhinoceros. It is very rich in flora and fauna besides containing at least 12 species of vertebrates belonging to the Schedule-I of Wildlife (Protection) Act, 1972. The habitat types of Garumara National Park, the basic objectives (Prospects) of Management, problems faced and the Management strategies detailing how the objectives are to be achieved, have been dealt with.

353. Srivastava, S.C. & Srivastava, Abha. 1986. "A new *Heteroscyphus* from Eastern Himalaya". *Geophytology* 16(1): 129-132.

Abst.- A new species of *Heteroscyphus* Schiffn., *H. udarii*, has been described from Darjeeling, Eastern Himalaya, India. The taxon is characterized by laterally compressed plants having bifid leaves and underleaves with smooth margins. The underleaves are orbicular and connate at their basal margins by the adjoining lateral leaves. Besides, the lateral leaves are also connate dorsally at their antical end.

354. Srivastava, S.C., Srivastava, Anshu & Dixit, Renu. 1994. "Epiphytic liverworts on tea-plantations in Darjeeling". *Geophytology* 24(1): 63-72.

Abst.- Half a dozen species of corticolous epiphytes belonging to five genera of leafy liverworts (Jungermanniales) growing on tea plants [*Camellia sinensis* (L.) Kuntze] in Darjeeling (Eastern Himalaya), India are described with relevant illustrated details. These are *Plagiochila luthiana* St., *P. forficata* Schiffn., *Porella campylophylla* (Lehm. & Lindenb.) Trev., *Frullania neurota* Tayl., *Lejeunea flava* (Sw.) Nees and *Microlejeunea punctiformis* (Tayl.) Spr. *Plagiochila luthiana*, earlier known from south India, is being reported from Eastern Himalaya thus suggesting its wide range of distribution.

355. Subhalakshmi, T. & Chowdhury, A.K. 2008. "Prevalence of some groundnut (*Arachis hypogaea*) fungal and viral diseases in the plains of West Bengal". *J. Interacad.* 12(4): 427-432.

Abst.- Groundnut viruses have been detected in almost all the groundnut growing states of India along with other diseases and causes considerable crop losses. In West Bengal also, some of the groundnut viruses have been frequently observed namely stripe, mottle, bud necrosis, etc. In this experiment, field incidence of two most serious fungal diseases of groundnut namely tikka disease and rust and two viral diseases-stripe and mottle were taken during 2004-2005 in all the three cropping seasons viz., *pre-kharif, kharif* and *rabi*. The results showed the prevalence of all the four diseases with higher incidence of fungal diseases during the *kharis* season and that of viral diseases during the *rabi* season. It was further observed that incidence of both fungal and viral diseases increased with age of the plants.

356. Subramanyam, K. & Sharma, V.S. 1968. "The genus *Dentella* J.R. & G. Forst. (Rubiaceae) in India". *Bull. Bot. Surv. India* 10(3&4): 386-390.

Abst.- During studies on the weed-flora of the Indian Botanic Garden, Shibpur, Howrah, two forms of "*Dentella repens*", were met with; they were identified as two distinct species- *D. repens* (Linn.) J.R. & G. Forst. and *D. serpyllifolia* Wall. ex Airy-Shaw. Detailed description

and illustrations of both the species, hitherto not available in Indian floras, are given to facilitate easy identification. Specimens of *Dentella* present in various herbaria in India were studied in order to establish their correct identity.

357. Sur, P.R., Sen, R. & Halder, A.C. 1992. "Ethnobotanical study of Purulia district, West Bengal, India". *J. Econ. Taxon. Bot., Addit. Ser.* 10: 259-264.

Abst.- This paper deals with the study of ethno-economic importance of 70 plant species under 67 genera of Purulia district, West Bengal, India. Various plants available in the locality used by the tribals like Birhor, Santals and Mahato are summarized. The valid scientific names, vernacular names, plant parts used and their economic uses are also given.

358. Sur, P.R., Sen, Ratna, Halder, A.C. & Bandyopadhyay, S. 1987. "Observation on the ethnobotany of Malda-West Dinajpur districts, West Bengal-I". *J. Econ. Taxon. Bot.* 10(2): 395-401.

Abst.- The present article deals with the study of ethno-economic importance of 73 plant species under 67 genera of Malda-West Dinajpur districts of West Bengal. Details about vernacular name, method of application in the treatment of certain diseases and their distribution have been noted.

359. Sur, P.R., Sen, Ratna, Halder, A.C. & Bandyopadhyay, S. 1990. "Observation on the ethnobotany of Malda-West Dinajpur districts, West Bengal-II". *J. Econ. Taxon. Bot.* 14(2): 453-459.

Abst.- This paper deals with the study of ethno-economic importance of 52 plant species under 48 genera of Malda-West Dinajpur districts of West Bengal. Details of vernacular names, method of application in the treatment of certain diseases and their distribution have been noted.

360. Sur, P.R., Sen, R., Halder, A.C. & Bandyopadhyay, S. 1992. "Ethnomedicine in the Ajodhya hills region of the Purulia district, West Bengal, India". *J. Econ. Taxon. Bot., Addit. Ser.* 10: 333-337.

Abst.- This paper presents the medicinal use of 38 plants collected in Ajodhya hills of the Purulia district, West Bengal, India. The plants were taxonomically identified and their medicinal use as described to us by herbalists are discussed.

361. Tarai, Ranjan Kumar & Kundu, S. 2008. "Flowering behavior of eight minor fruit crops in the new alluvial zone of West Bengal". *J. Interacad.* 12(3): 292-296.

Abst.- The flowering behavior of eight minor fruit crops viz., bael (*Aegle marmelos* Corr.), carambola (*Averrhoa carambola* L.), jamun (*Syzygium cumini* (L.) Skeels), loquat (*Eriobotrya japonica* Lindl.), pummel (*Citrus grandis* (L.) Osbeck), rose apple (*Syzygium jambos* Alston), sapota (*Achras zapota* L.) and water apple (*Syzygium aqueum* Alst.) were studied in the new alluvial zone of West Bengal during 2001-02. Carambola, loquat and sapota flowered thrice but water apple flowered twice in a year. Jamun and pummel flowered once in the spring season; bael flowered once in the summer season while rose apple had a long continuous flowering period from autumn to spring. The period for flower bud development was less in carambola (18 days), bael (22.3 days), and pummel (23.3 days) whereas flower buds of jamun (50 days), loquat (30.3 days), rose apple (44.6 days), sapota (35.5 days) and water apple (41.0 days) required longer time to develop into flower. Panicle type of inflorescence was observed in carambola, jamun and loquat. The flowers of the rest of the minor fruit crops were borne in clusters.

362. Tribedi, G.N., Mudgal, V. & Pal, D.C. (1993) 1997. "Some less known ethnomedicinal uses of plants in Sunderbans, India". *Bull. Bot. Surv. India* 35(1-4): 6-10.

Abst.- More than 100 medicinal plants belonging to 63 genera and 42 families are found in the mangrove vegetation of Sunderbans, West Bengal, India. Several of these plant species,

e.g. *Avicennia marina, Bruguiera gymnorrhiza, B. parviflora, Ceriops decandra, Nypa fruticans,* etc. are restricted to the marshy deltaic estuary only. After prolonged field work, and comparison with the available published literature it is seen that medicinal uses of 43 species, and one variety such as *Aegialitis rotundifolia, Blumea wightiana, Ceriops decandra, Heliotropium curassavicum*, are practically unknown or less known.

The specimens of these species have been exhibited in Crude Drug Museum of Pharmacognosy Section, Botanical Survey of India, Howrah.

363. Udar, Ram & Kumar, Dinesh. 1982. "A new *Haplomitrium* from India". *J. Indian Bot. Soc.* 61(1): 73-79.

Abst.- A new species of *Haplomitrium*, *H. kashyapii* Udar et Kumar, has been described from Darjeeling. This species is characterized by large and robust plants, with male and female gametophytes of almost equal size. The antheridia occur in groups towards the apex of the male gametophyte intermixed with intra-androecial bracts. The ape proliferates producing antheridial group subsequently. The archegonia are scattered on the surface of the aerial axis, often seemingly terminal as well. The vegetative leaves spread at right angles to the main axis and are broader than long, but the leaves in association with archegonia are erect to patent, longer than broad and characteristically conspicuous. Both types of leaves are multistratose at the base. The shoot calyptra has foliar outgrowth and unfertilized archegonia over its surface.

364. Udar, Ram & Singh, Devendra Kumar. 1977. "Studies in East Himalayan Hepaticae 1. The genus *Trichocolea* Dumort". *Geophytology* 7(1): 65-72.

Abst.- The paper deals with two new species of the genus *Trichocolea* Dumort, *T. indica* sp. nov. and *T. tenera* sp. nov., revealed during an investigation of the collections of liverworts from Darjeeling (Eastern Himalayas) and its neighbourhood. The former species is characterized by larger plants, irregular bi-tripinnate branching, presence of 21-23 cells across the stem diameter, very rare occurrence of paraphyllia, 8-12 series of antheridial bracts, each subtending 1-3 antheridia, complete absence of paraphyllia from the surface of coelocaule and 60-240 µm long stumpy-elongated bispiral elaters, whereas the latter is characterized by small delicate plants, regular bipinnate branching, presence of rhizoids, presence of 8-12 cells across the stem diameter, 4-8 series of antheridial bracts and presence of one antheridium per bract.

365. Udar, R. & Srivastava, S.C. 1971. "A new species of *Cyathodium* Kunze, *C. denticulatum* Udar et Srivastava sp. nov. from Darjeeling (Eastern Himalayas), India". *Geophytology* 1(2): 165-169.

Abst.- In the present paper a new species of *Cyathodium*, *C. denticulatum*, is described from Darjeeling (Eastern Himalaya), India. The species is characterized by thallus with distinct assimilatory and storage zones, air chambers in 2-3 layers and free margins of the involucres distinctly denticulate.

366. Vohra, J.N. (1978) 1979. "*Lescuraea darjeelingensis* Vohra and *Haplocladium microphyllum* (Hedw.) Broth. ssp. *capillatum* (Mitt.) Reim. var *bhutanicum* Vohra- Two new taxa of mosses from the Eastern Himalayas". *Bull. Bot. Surv. India* 20(1-4): 150-153.

Abst.- In a detailed study of the mosses belonging to the order Hypnobryales (Musci) in the Himalayas, several hitherto undescribed taxa have been discovered. Two of them viz., *Lescuraea darjeelingensis* Vohra and *Haplocladium microphyllum* (Hedw.) Broth. ssp. *capillatum* (Mitt.) Reim. *bhutanicum* are described here from Darjeeling, West Bengal and Bhutan, respectively.

ABBREVIATION OF JOURNALS

Asian J. Expl. Sci.	:	Asian Journal of Experimental Science
Bull. Bot. Soc. Bengal	:	Bulletin of the Botanical Society of Bengal. Calcutta. [Vol. 1-43. 1947-1989. Superseded by: Journal of the National Botanical Society (India), Calcutta]
Bull. Bot. Surv. India	:	Bulletin of the Botanical Survey of India
Environm. Ecol.	:	Environment and Ecology
Ethnobotany	:	Ethnobotany
Geobios (Jodhpur)	:	Geobios
Geophytology	:	Geophytology
Indian Fern J.	:	Indian Fern Journal
Indian Forester	:	The Indian Forester
Indian J. Ecol.	:	Indian Journal of Ecology
Indian J. Forest.	:	Indian Journal of Forestry
Indian J. Traditional Knowledge	:	Indian Journal of Traditional Knowledge
J. Bot. Soc. Bengal	:	Journal of the Botanical Society of Bengal, Calcutta. [Vol. 57+, 2003+. Preceded by: Bull. Bot. Soc. Bengal & J. Natl. Bot. Soc. India]
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. Hill Res.	:	Journal of Hill Research
J. Indian Bot. Soc.	:	The Journal of the Indian Botanical Society
J. Interacad.	:	Journal of Interacademicia
J. Jap. Bot.	:	The Journal of Japanese Botany
J. Natl. Bot. Soc. India	:	Journal of the National Botanical Society (India). Calcutta. [Vol. 44-56. 1990-2002. Superseded by: Journal of the Botanical Society of Bengal, Calcutta].
J. Orchid Soc. India	:	The Journal of the Orchid Society of India
J. Swamy Bot. Club	:	Journal of the Swamy Botanical Club
J. Trop. Med. Pl.	:	Journal of Tropical Medicinal Plants
Phytomorphology	:	Phytomorphology
Phytotaxonomy	:	Phytotaxonomy
Pleione	:	Pleione
Rheedea	:	Rheedea

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Arundina graminifolia (D. Don) Hochr.

Cheriostylis yunnanensis Rolfe

Crawfurdia speciosa Wall.

Inula eupatorioides Wall. ex DC.

Mahonia napaulensis DC.

Swertia bimaculata Hook.f. & Thomson ex C.B. Clarke

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