CHAPTER-II

REVIEW OF LITERATURE

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2.1 EXPLORATION IN INDIA WITH SPECIAL REFERENCE TO ASSAM

According to Hooker (1855), there are the five principal elements in the flora of India. They are (i) The Malaysian element, (ii) The European Oriental element, (iii) The African element, (iv) The Tibeto Siberian element, and (v) The Chino-Japanese elements. The work on flora or floristic study has been pioneered by Linnaeus in his classic book *Genera Plantarum* (1737). In India, the floristic explorations had been initiated by Roxburgh (1820-1824) who published *Flora Indica* and the progress of Botany in India is associated with the names of J.G. Koeing, Robert Kyd., Nathanial Wallich, F. Buchanan-Hamilton, I.F. Royale, Transqueber Brethen, Robert Weight and J.D. Hooker, Robert Kyd established the first Botanical Garden of India at Calcutta in 1787 which has been an active centre of Taxonomic study since its inception. In the latter half of the 19th century, *Flora of British India* was published by Hooker and describe 15,900 species of flowering plants in seven different volumes (1872-1897). This monumental work is serving as the basis of many principal floras for subsequent publications. During the first three decades of the 20th century intensive exploration was done all over the Country, mostly by the Botanical Survey of India. This results in the publication of numbers of regional floras, such as *Flora of Presidency Bombay* (Cooke, 1901-1908); *Bengal Plants* (Prains, 1903); The *Flora of Upper Gangetic Plains and the adjacent Siwalik and Sub-Himalayan Tracts*, Calcutta (Duthie, 1903-1929); *Flora of the Presidency of Madras* (Gamble and Fisher, 1935). Later, a supplement to Duthies *Flora of Upper Gangetic Plain and the adjacent Siwalik and Sub-Himalayan Tracts* (Raizada, 1954). A number of floras of small areas have been published from 1900 century onwards. A few of them are stimulating significantly on taxonomic research and development activities in India. Mention may be made in this regards are *Flora of Khandla*, (Santapau, 1953); *The Flora of Surusthra*, (Santapau, 1988); *Flora of Delhi*, (Maheswari, 1916, 1963); *Herbaceous flora of Dehradun*, (Babu, 1977).

The earliest recorded information and history of the floristic explorations and botanical collections seems to have started in erstwhile Assam or North Eastern Region in the later part of the 18th century under the guidance of Jenkins (1793-1855) was the Governor General of Gauhati, who himself, collected all the plant materials along the Brahmaputra Valley and all around Gauhati. He deposited all those collected plant materials in the Sibpur Herbarium, now called as Central National Herbarium, Calcutta. Buchanan-Hamilton collected some specimens from Assam mainly from Guwahati area in 1808 for his floristic survey work of Bengal and later he introduced in the Botanical Garden, Sibpur, Howrah (Chowdhury, 2005). He mainly collected the ornamental plants from 'Sylhet Mountain' which in fact were from the Khasi hills of old Assam and earliest to write and described about the plants of this region. An account of Assam with some notes concerning neighbouring countries, London (Buchanan-Hamilton, 1820). In the middle of 19th century, Hooker and Thomson (1855) collected approximately 3000 plants collected mainly from Khasi and Jaintia Hills of Old Assam (now Meghalaya) and from Sylhet, now in Bangladesh (Shukla, 1996). Based on the explorations and collections, Hooker published the largest systematic outcome the *Flora of British India* (1872-1897) in seven volumes incorporated and mentioned areas of collections of Assam as Upper Assam, Lower Assam, Assam or Assam Plains, Brahmaputra Valley and Surma Valley (the major portion of Sylhet district is now in Bangladesh) for the plains areas and on the other hand the hilly regions are termed as Mikir Hills and so on (Das *et al,* 2013). However, the conceivable of publishing a extensive flora of the region was first given by Sir Archdale Earle who was the chief commissioner, under whose encouragement, U.N. Kanjilal joined the forest service of Assam. During Kanjilal's service (1906-1928), he enterestingly made extensive and intensive collections from the most parts of old Assam. All the collections of flora were kept in a separate room in Assam Secretariate which was also known as Assam Forest Herbarium. Even after his retirement, he worked onthe manuscript, on the first volume of the *Flora of Assam* but he died on 25th October 1928 much before its publication (Chowdhury, 2005). This huge collections and drafts were remained as resource for his successor, P.C. Kanjilal to

complete his father works, who also made an exhaustive additional collection from the various parts of Assam that enriched the collections to about 40,000 specimens with the active support of Deka, Sharma, Paul, De, Kalita, Shyam and several others (Shukla, 1996; Chowdhury, 2005). A. Das the Silviculturists and Forest Officer took over the responsibility of publication of the *Flora of Assam* in 1931 which was published in 4 volumes, 1934-1940 (Shukla, 1996; Chowdhury, 2005). During 1936, N.L. Bor had been to Naga hills and Aka Hills as Political Officer, made an extensive collection on grasses in several parts of erstwhile Assam and published the 5th volume of the *Flora of Assam* (1940) containing an account of grasses or Gramineae. Thus, the *Flora of Assam* stands out as the last Regional flora of India authored by Indians before independence. The Botanical Survey of India, Eastern Circle Station, now recognised as Eastern Regional Circle (ERC) was established in Shillong in 9thAugust, 1956 (Chowdhury, 2005). Thereafter, periodical explorations are being organised by various workers of the organisation to explore the several unexplored areas of the region with the aim of completing the *Flora of Assam.* Notable among them are R.R. Rao and G. Panigrahi (1961) who have surveyed principally the Himalayan range. Panigrahi (1963) studied the family Compositae in Assam.Naik and Panigrahi (1962) described collection from Subansiri. Josephand Chowdhury (1966) have enumerated the plants of Tirap Frontier Division, NEFA (Shukla, 1996). Some other plant collectors associated with Botanical Survey of India who have enriched the Assam Forest Herbarium now called "Kanjilal Herbarium" (Assam) and with a view to study of *Monocotyledonous flora* of this region, D.M. Verma completed, *Cyperaceae of Assam* (1982), Kataki (1986) worked on *Orchids Flora of Meghalaya* and Raoand Verma (1970-1982) worked on several others families and brought out series of publications in their account in various reputed journals. During the period of S.K. Jain, the Deputy Director, Eastern Circle, Shillong and the Director of Botanical Survey of India have made thorough explorations in Arunachal Pradesh, Manipur, Meghalaya and Mizoram during that periods and published the *Grasses of North Eastern India* in 1996. Raoand Verma (1972-1976, 1982) have brought a series of publication to complete the Monocot flora of Assam (old region) but could not do so

and made the complete studies only on some famlies of Monocotyledones (Chowdhury, 2005). Thus, as such the complete study of Monocot flora of Assam still remains incomplete.

The valuable contributions of the region published by the various officers of Botanical survey of India, Eastern Regional Circle are *Flora of Jowai and its vicinity* by Balakrishnan (1982-83), *Flora of Nongpoh and its surroundings* by Joseph (1982), *Flora of Tripura* by Deb (1981 and 1983), *Aquatic Plant Book* by Cook (1990), *Aquatic and Wetland Plants of India* by Cook (1996) and *Orchids of Nagaland* was published by Hynniewta *et al*. (2000). Dr. S. Chowdhury (Rtd. Prof. and Head of the Department of Botany, Gauhati University, Guwahati), one who is active and interested taxonomist had made a notable been contribution on highlighting the plant resources of Assam. He made extensive and intensive collections covering all the seasons of the year almost all the district of Assam mainly in the districts Lakhimpur, Dhemaji, Kamrup, Sonitpur, Golaghat, Karbi-anglong, Tinsukia, Dibrugarh, Cacher and some part of the districts of N.C. Hills, Hailakandi, Karimganj, Jorhat, Sibsagar, Dhubri, Nagaon, Morigaon and Darrang (Chowdhury, 2005) and they have contributed much knowledge of the floristic elements and vegetations of Assam. He discovered several species of plants New to science and recorded a number of plants previously unknown from areas within Assam and published in reputed National and International Journels of Chowdhury (1970, 1982); Chowdhury, Baruah and Mazumder (1967); Chowdhury, Baruah and Baruah (1971); Chowdhury and Barua (1976); Chowdhury and Singh (1991, 1992); Chowdhury, Kataki and Baruah (1994). Chowdhury also discovered 3 new species of Orchids from the Assam viz. *Dendrobium assamicum* Chowdhury (1988), *Eulophia Kamrupa* Chowdhury (1993), and *Zeuxine debrajiana* Chowdhury (1996). Chowdhury has published the most valuable contribution of floristic account on the flora of Assam i.e. *Assam's Flora*: Present Status of Vascular Plants (2005), which was based on thorough survey literature, his own collections since 1967 and consultation of Herbaria where plants of Assam are found preserved.

Rtd. Prof. S.K. Borthakur, another active worker of Plant Taxonomy of Gauhati University, Assam, has also contributed a lot in the field of floristic collections and discovered a few new species to Assam (Borthakur and Hajra, 1976; Borthakur, Deka and Nath, 2001; Saikia, Borthakur and Saikia, 2010). During the preceding decades, conciderable works on floristic studies were carried out which have resulted into several publications on flora. Following are the some of the published and unpublished study and floristic works of the regions of Assam and India. Rao and Rabha (1966) Contribution to the Botany Kamrup District; Hajra (1978) Floristic composition of Manas and Kaziranga Game Sancturies of Assam; Gogoi (1978) A detailed study of flora of Golaghat sub division and its Neighbouring area; Myrthong (1980) Studied monocot flora of Meghalaya; Sarmah (1989) A detailed Study of the Flora of Sibsagar district; Islam (1990) The flora of Majuli; Pathak (1990) Hydrophytic Flora of Guwahati and its Vicinity; Biswas *et al* (1991) Studied forest flora of lower Assam; Baruah (1992) Systematic study of Angiosperm of Kamrup district; Brahma (1992) Studied Ethnibotany of Bodos of Kokrajhar District; Sarkar (1993) Studied herbaceous plants of Karbi Anglong district of Assam with reference to their taxonomy and economic utilization; Nath and Chowdhury (1994) Studied vegetation and flora of Rajib Gandhi Wildlife Sanctuary; Malakar (1995) Aquatic Angiosperm of Cachar district; Gogoi (1997) Floristic composition of Tinsukia district; Devi (1998) Herbaceous Angiosperms of Tezpur sub divisions of Sonitpur District, Assam with reference to their Taxonomy and Scope of utilization; Bora (1999) Studied Flora and Biodiversity of Pabitora Wild Sanctuary of Assam Wildlife Sanctuary; Nath (1999) A comprehensive studied on floristic composition of Orang Wildlife Sanctuary; Baishya (1999) Studied the flora of Assam; Barua (2000) Studied Orchid flora of Kamrup District; Baruah and Baruah (2000) Studied hydrophytic flora of Kaziranga National Park; Bora and Kumar (2001) Vegetation and Wildlife of Pabitora Wildlife Sanctuary; Baruah *et al* (2001) Studied floral diversity and community characteristics of Manas Biosphere Reseve; Baishya *et al* (2001) Studied Dibru Saikhowa Biosphere Reserve; Deori (2003) Distribution pattern of the Genus *Dendrobium* Swtz. (Orchidaceae) in Kaziranga National Park and Manas

Biosphere Reserve; Bora *et al* (2003) Floristic Diversity of Pabitora Wildlife Sanctuary; Bujarbarua (2003) An ecological study of Gibbon Wildlife Sanctuary, Jorhat; Barooah *et al* (2003) Studied diversity and distribution of Bamboos in Assam; Nath (2008) Floristic diversity of Laokhowa Wildlife Sanctuary; Bora (2008) Studied flora of Bongaigaon District; Dutta *et al* (2008) Studied Grasses of West Tripura District; Saikia *et al* (2008) Diversity of edible species *Dioscorea* Plum. *ex*. L. (Dioscoreaceae) from Arunachal Pradesh; Das (2009) Herbaceous Flora of Karimganj dictrict of Assam withreference to economic utilization; Saikia *et al* (2010) Studied Medico-ethnobotany of Bodo tribals in Gohpur, Sonitpur district; Begum (2010) Floristic Biodiversity of Nameri National Park; Daimary (2011) Studied on Floristic Diversity of Kokrajhar District of Assam with special reference to Chakrasila Wildlife Sanctuary; Das (2013) Diversity of aquatic and wetland angiospermic macrophytes in the Kamrup District; Handique (2013) Studied Monocot Flora of erstwhile Kamrup District; Pathak and Singh (2013) A less known grass from North Eastern India; Barooah and Ahmed (2014) Studied plant diversity of Assam; Saharia and Yasmin (2014) Ethnobotanical studies of some indigenous plants used by the Bodo tribes of Udalguri District; Bhargav (2014) Ethnobotanical aspects of some medicinally important plant of Jhabua District, M.P.; Deka (2015) Systematic studies of aquatic Angiosperms of Bodoland Territorial Council (BTC) Area; Jiji (2015) Endangered plants and their uses of Sivasagar District; Deka and Devi (2015) Wild edible aquatic and marshland angiosperms of Baksa district; Neog *et al* (2016) Credibility of medico-ethnobotanical uses of members of Aroid family in Assam; Boro (2016) Floristic study of Udalguri district; Hareesh and Sabu (2018) *Amomum riwatchii* (Zingiberaceae): a new species from north eastern India; Ghosh and Bhattacharyya (2018) Five new addition to the grass flora of Tripura State; Sinha, Garg and Gautam (2016-2018) Flora of Chhattisgarh; Baruah *et al* (2018) *Smilax sailenii* (Smilacaceae) a new species from Assam, North East India; Ghosh (2018) Studied five new addition to the grass flora of Tripura State, India.

The publication on the floristic composition of Assam is *Assam's Flora*: *Present Status of Vascular Plants*, a book published by the Assam Science

Technology and Environment Council (ASTEC), compiled and edited by Chowdhury (2005). The book enumerates 4273 species of vascular plants of Assam in its present circumscription. These include 40 species of fern allies, 315 species of ferns, 23 species of Gymnosperms and among Angiosperms 2823 species of Dicotyledones and 1072 species of Monocotyledons.

We have little knowledge about the Monocot flora of Assam. Rao andVerma (1972 and 1982) have attempted to complete the Monocot families but could not completed the work. No doubt, it has been provided a clear knowledge for taxonomists, ecologists, agriculturist and also for layman for easy identification of species and also provide a knowledge for the unknown economic plant used by the primitive people of our society, particularly for ethnobotanical important point of us. The densely forest areas are now found to be transformed into scrub jungles. As a result, gradually rare and threatened in their survival of existence. So, protection of natural habitats, preservation and *ex-situ* (off-site) conservation of these species be taken up immediately for their perpetual existence and has been the first systematic study of Monocot flora from Udalguri district with detailed taxonomic description of the species including citation, nomenclature, phenological data, distribution even ethnobotanical importance of eco-degradation as there was no mention of the *Monocot flora of Assam* by Kanjilal *et al* (1934-40) except Poaceae.

Keeping all these aspects in view, the present investigation has been undertaken with the aim to collect all Monocot flora of Udalguri district by making intensive field studies all the seasons of the year. The period of the study has been extended from the year 2014-2017 for the collection of plant materials. There must be a thorough floristic study which is needed perfectly knowing what are flora existing there? Therefore, the present work, **"**Studies on Monocot Flora of Udalguri district, BTAD, Assam, with special reference to ethnobotany of Bodo and Rabha", is attempted to fill in such a gap in the knowledge of Monocot flora as well as their ethnobotanical usage in the Udalguri district, BTAD, Assam.