CHAPTER - I

INTRODUCTION

The family Juncaceae was established by A.L. Jussieu in 1789 in Genera Plantarum based on the type genus Juncus L. The family, commonly known as ‘Rush Family’, is Grass-like in appearance being superficially resemble grasses (Poaceae) and Sedges (Cyperaceae). The family is represented by ca 10 genera and more than 325 species in the world (Shukla et al. 2000). Of these, 2 genera viz., Juncus L. and Luzula DC. have been reported from India.

Etymologically, the generic name Juncus L. originated from the latin word ‘jungo’ which means to tie, referring to the use made of the stems and leaves for tying purposes. The genus ‘Juncus’ was established by Linneaus in Genera Plantarum Vol. 1 in 1737. Another genus under the family occurring in India is Luzula and etymologically originated from the Italian word ‘lucciola’ meaning a glow-worm, referring to the shiny flower-clusters because long-ciliate white hairs present on their inflorescence and leaves have shiny appearance when covered with dew. Luzula was established by A.P. De Candolle in Lamark & De Candolle’s ‘Flore Francaisne, on descriptions succinctes de toutes les plantes’ Vol. 1 & 3 in 1805.

Most of the species of the family Juncaceae are perennial herbs and few are annuals, One genus viz. Prionium E. Mey. is woody shrub, but this genus is not reported from India.

Species of Juncaceae grow mostly on wet or damp soils of temperate, subalpine and alpine regions and often in semi aquatic habitats like marshes, swamps, wet grasslands, shallow mossy pools and flushes, moist meadows, stagnant water, wet damp slopes along lakes, besides running water such as river and stream banks, etc. Many alpine species grow on moist mossy rocks, snow covered areas, mossy floor of Rhododendron forests, Yak pastures and sometimes on mossy Rhododendron trees. Mention may be made of the species growing on trees are Juncus chrysocarpus Buchenau and J. clarkei Buchenau. Some of the species of Juncaceae are found growing in between boulders on hilly slopes. J. benghalensis Kunth, J. minimus Buchenau, J. wallichianus Laharpe, etc.
Subtropical or temperate species like *J. bufonius* L., *J. inflexus* L., *J. ochraceus* Buchenau, etc. are found to occur on wet places as well as on dry sandy soils, often along roadsides. (Pl.1a – 1f)

Juncaceae, though a small monocot family, is one of the inadequately studied families, but possesses various potentialities:

1. **Conservation of Wildlife**: Members of the family provide food and nesting materials to birds and other wildlife where other plants hardly grow; dried plants are also used as fodder in the form of hay in scarcity.

2. **Medicinal use**: In China, pith of one of the species *viz.*, *Juncus effusus* L. is used as diuretic and depurative and is employed for keeping fistulous sores open. The root is diuretic (Anonymous 1957).

3. **Dye making**: It is reported that the flowers of *Juncus* species have been used traditionally for dyeing fabric. It is also used in dyeing wool.

4. **Handicraft**: Some species *i.e.* *Juncus effusus* L., *J. inflexus* L., *J. prismatocarpus* R. Br., *J. wallichianus* Laharpe, etc. are used for making baskets, chair bottoms, hats, etc. Also used for tying parcels in olden days. A fine straw is prepared from *J. effusus* in Philippines. The pith of the stem is used as wick for lamps and candles and entire plants are used for making indigenous lamps.

5. **Ornamentals**: A few species are grown as ornamental plants in locations adjoining aquatic habitats like edges of ponds or water gardens, etc.

6. **Paper making**: Fibre obtained from the stem of *J. effusus* L. is also used for making paper. The stems are harvested in the late summer or autumn, splitted and cut into usable pieces and then cooked for 2 hrs. with lye and beaten in a blender. The fibre makes an off-white paper. With mulberry fibre it is used for making stencil paper.

2
7. **Soil binder:** Members of the family are used as groundcover to help control soil erosion. Also grown on wet banks of ponds or streams to help control soil erosion as they are good soil binders.

Eastern Himalaya is one of the botanically richest areas of the World significance and it is also the richest of the phytogeographic regions of India harbouring the highest floral and faunal diversity. High rainfall, moist and cold climate coupled with variable altitude and other physiographic conditions have added to the multiplicity of habitats which supports an exceptionally rich vegetation, both in luxuriance and species diversity. Here in Eastern Himalaya, the family Juncaceae exhibiting its largest species diversity with 44 species out of 53 species occurring in India. The region supports varying vegetational types ranging from grasslands to meadows, marshes, swamps, etc. where the Juncaceae can grow luxuriantly. Eastern Himalaya harbours both the genera *Juncus* and *Luzula* with 44 species which accounts for 83.02% of total Indian species of the family Juncaceae. Hence the region with its favourable climatic condition is congenial for the luxuriant growth of Juncaceae species and therefore it is the richest Juncaceae belt in India. The family is playing a vital role in supporting wildlife conservation by providing fodder, nesting materials, etc. Some are with medicinal values and some are used as materials for handicrafts as well as household materials and most importantly they add greenery to the high altitude areas where other plants hardly grow. Inspite of all its potentiality the family has been inadequately studied in India including the Juncaceae rich belt *i.e.* Eastern Himalaya as evidenced by very scanty information on the family. So far no attempt has been made for taxonomic studies of this family in the region. In many herbaria in India though some old collections of the family Juncaceae are available yet most of them are either unidentified or misidentified. This reveals that this family is inadequately studied. Therefore, it is imperative to undertake revisionary studies of the family Juncaceae in India. As a part of “Flora of India Project” of Botanical Survey of India under Ministry of Environment and Forests, Govt. of India, the present work on Taxonomic studies of the Family Juncaceae of Eastern Himalaya has been taken up.

In the present work, an attempt has been made to study all the species of
family Juncaceae occurring in Eastern Himalayan region of India in its natural habitats in relation to environmental factors and altitude governing their growth and development along with their associated plant species. The study covers the following aspects:

1. For taxonomic study correct identification is of prime importance. Scrutiny of published literature and herbarium study at various Indian herbaria revealed that the family Juncaceae is one of the taxonomically inadequately studied families in India. In addition, taxonomic synonymy for the species are numerous and consolidated descriptions drawn from scanty and in many instances fragile old materials proved insufficient. Hence correct identification of each species with fresh collections is imperative for the family. The present investigation is aimed to collect all the available species of Juncaceae in Eastern Himalayan region of India for proper analytical study. Therefore, in the present investigation an attempt has been made to study and analyse the floral structures of all the available species of Eastern Himalayan region and to provide detailed taxonomic descriptions on the morphological and reproductive characters along with correct nomenclature, illustrations, type locality, flowering and fruiting periods, distribution, habitat and etymology where possible, notes and specimens examined for easy and clear identification of each species.

2. The family being less known and draws little attention of naturalists no proper steps have been taken up so far for its conservation. Various anthropogenic activities and natural calamities constantly putting pressure on their habitats and as a result, many of the species are threatened and are in the verge of extinction. Therefore, in the present investigation an attempt has also been made to analyse the current status of different species of Juncaceae in Eastern Himalaya and to suggest appropriate measures for its conservation and propagation.

3. Eastern Himalayan Region of India with its favourable climatic condition provide suitable habitats for Juncaceae. The region shares borders with Bangladesh, Bhutan, China, Myanmar, Nepal and Tibet. It is natural that through transmigration and
Different habitats of Juncaceae.


*J. himalensis* Klotzsch in snow covered area beside Chhangu Lake, E. Sikkim.

Population of *Juncus allioides* Franch. at the vicinity of Memeinchu Lake, E. Sikkim.

*Mixed population of J. allioides* Franch. & *J. himalensis* Klotzsch near Chhangu lake in E. Sikkim.

*J. chrysocarpus* Buchenau growing in mossy rock in shade, N. Sikkim.

*J. wallichianus* Laharpe growing among the boulders near Chungthang, North Sikkim.
Plate – 1b

*J. benghalensis* Kunth growing at the edge of Memeinchu Lake, E. Sikkim.

*J. grisebachii* Buchenau along roadside in Arunachal Pradesh.

*J. benghalensis* Kunth in rocky & barren roadside of N. Sikkim.

*J. ochraceus* Buchanau in Sandy & rocky place along roadside in E. Sikkim.
Plate – 1c

*J. triglumis* L. near running water of a stream in E. Sikkim.

*J. allioides* Franch. & *J. sphacelatus* covered area during peak winter season in E. Sikkim.

*J. grisebachii* Buchenau in snow covered area during peak winter season in Sikkim.

*J. allioides* Franch. & *J. sphacelatus* Decne. on either sides of a stream in E. Sikkim.
J. benghalensis Kunth in moist mossy rock along Roadside in Arunachal Pradesh.

J. chrysocarpus Buchenau in mossy rock of Rhododendron Sanctuary in North Sikkim.

J. wallichianus Laharpe in wet sandy place in Darjeeling.

J. grisebachii Buchenau on wet & rocky slope in Bomdila, Arunachal Pradesh.

Mixed population of J. effusus L., J. inflexus L. & J. wallichianus Laharpe in a marshy place on way to Tawang Arunachal Pradesh.

J. brachystigma Sam. growing on rock crevice of E. Sikkim.
Plate – 1e

*Juncus* sp. sprouting in an open pasture of alpine Sikkim.

*J. ochraceus* Buchenau growing on rocky surface in South Sikkim.

*J. inflexus* L. in wet rocky place in N. Sikkim.

*Luzula oligantha* Sam. growing in a stream on rotten log in N. Sikkim.
Mixed population of *Juncus* spp. in a stagnant water body at Kupup, E. Sikkim.

*J. cephalostigma* Sam. on moist mossy rock surface of E. Sikkim.

Common habitat of *Juncaceae* spp. at the vicinity of Bedang Chu Lake in E. Sikkim.

Common habitat of *Juncaceae* spp. at the vicinity of a Lake in Singalila, Darjeeling.

Population of *J. allioides* Franch. growing in marshy land, E. Sikkim.

*J. clarkei* Buchenau growing horizontally on mossy rock surface along roadside near Kyongnosla, E. Sikkim.
intermingling of floral elements have resulted in occurrence of plant species from these neighbouring countries in this region and *vice versa*. For example, in India there are some species which are occurring in Sikkim only are also reported from neighbouring countries surrounding the state, *viz.*, *J. glaucoturgidus* Noltie reported from Sikkim and Bhutan, *J. harae* Miyam. & H. Ohba from Sikkim, Bhutan and China, *J. hydrophilus* Noltie from Sikkim and Bhutan, *J. kingii* Rendle from Sikkim, Bhutan, China and Nepal, etc. Therefore, in the present study an attempt has also been made to work out the diversity of Juncaceae and affinity of the members of the family in all the states of study area, rest of India and neighbouring countries. On the basis of this, rediscovery of taxa, if any, new taxa and new addition of taxa to each state of study area and India as a whole have been worked out.

4. Due to its less insignificant economic importance, members of Juncaceae are always neglected and keeping this in view the present study is also aimed to gather all the available informations on their various uses in India and other parts of the world through scrutiny of published literature, electronic media (web site) etc. in order to bring out a consolidated account on economic importance of the family for the benefit of general people, students, researchers, scientists, etc. for its proper conservation in time through concerted and united efforts. Tomorrow it might be too late to save this most precious component of the phytodiversity of the country particularly of Eastern Himalayan Region of India.