

ABSTRACT

The family Polygonaceae comprises a group of flowering plants integrated in the order Polygonales in the Magnoliophyta of the kingdom Plantae. The Angiosperm Phylogeny Group classification (APG IV) placed Polygonaceae in Caryophyllales under the clade Superasterids, one of the major clades of Core Eudicot.

Polygonaceae is prevalent in temperate regions throughout the world. They have an extensive array of distribution in India stretching from the coastal plains to the subtropical temperate regions and almost to the sub alpine regions. Very little floristics and systematics works were reported on various members of this family from West Bengal that shares significant areas under 'The Himalaya' biodiversity hotspot. Through literature survey even comprehensive floristic database of Polygonaceae of this region was not obtained. Since the study on Polygonaceae has not yet completed in this highly diverse region, so there were still some confusions about taxonomic revision of this family, hence, this study will sustain the taxonomic illumination of this family.

Some members of Polygonaceae are economically important mainly because of medicinal resources. Most of the species are utilised in various purposes like aromatic, edible, spice and many being used in a range of household and as well as industrial uses. These economically important species of Polygonaceae remains inadequately predictable and quite complicated to identify as morphologically the taxa are more or less similar. Therefore different parameters like, leaf architecture, palynology and molecular documentation have been use to resolve the problem.

The thorough taxonomic study of the complex family Polygonaceae A. Jussieu has been carried during 2014-2019. Materials for morphological, palynological and molecular studies were obtained through random sampling in three pre-dominant seasons for five successive years, 2014 to 2019. Thirty five taxa belonging to nine genera, Antigonon Endl., Bistorta (L.) Scopoli, Homalocladium (F. Mueller) L .H. Bailey, Fagopyrum Mill., Fallopia Adans., Persicaria Mill., Polygonum L. Rheum L. and Rumex L. were morphologically reviewed in detail, original observations being supplemented by and compared with formerly published literature. One variety of Persicaria chinensis was reported first time in this account from the boundary of West Bengal.

Leaf architecture studies have been conducted for all the collected taxa of the family and observations were prepared through conventional light microscopy. It is a fresh work which has covenant with comprehensive qualitative and quantitative foliar macro & micro

morphological investigations in the taxa of Polygonaceae from West Bengal. The study uncovered some distinctive and unique features on both the surface of lamina such as epidermal cells outline, type of stomata and presence or absence of trichomes. The shapes of the epidermal cells are found to be variable; six different stomatal patterns have been examined, variations among gland of trichomes were also observed. Glandular trichomes were of peltate, capitate spheroidal and stellate types. The analyzed characteristics attributes have great systematic value but they were probably to be constant at specific and/or below rank level therefore not much helpful in generic delimitation.

Pollen morphological characters have been investigated by both light microscope (LM) and scanning electron microscope (SEM). Both qualitative and quantitative attributes including aperture number, pollen shape, size in polar and equatorial view, colpi length, exine thickness have been observed. The studied characters have been proved to be beneficial in classification of the cosmopolitan family Polygonaceae into different genera. On the basis of aperture type and exine sculpturing pattern in SEM, 3 main pollen types and 12 subtypes have been identified. These different pollen types are useful to establish the evolutionary and phylogenetic relationship among the different taxa of the family Polygonaceae.

To scrutinize the inter and intra relationship and high resolution phylogeny among taxa of all the seven recorded genera, based on three chloroplast DNA region viz., rbcL, matK and trnL-F were made. Moreover, phylogenetic analysis of many less known members of Himalayan Polygonaceae, including Persicaria strigosa, P. glabra, P. tenella, P. lanigera and P. lapathifolia var. lanata had been made for the first time. The present study focused on new findings based on extended taxon sampling and ML and BI analyses of three chloroplast markers, which can be useful for the systematic positioning of different taxa of Polygonaceae. Molecular differences were detected among the species although these were not differentiated at the morphological level. The current study shows that uniting Persicaria with Polygonum sensu stricto is unnatural. Their apparent resemblance can only be linked by their more distant affinities within the family Polygonaceae. From the phylogenetic study it was also observed that most of the members of the family are monophyletic in origin whereas the origin of genus Polygonum is found polyphylic.