

**Chapter 2**  
*REVIEW*  
*of*  
*LITERATURE*

## 2. Review of literature

### Nodal anatomy

The application of the systematic anatomy in solving practical problem has often been stressed in the treatment of taxonomic investigations (Soleredor, 1908; Metcalfe and Chalk, 1950). The attempt of investigation started from the time of Soleredor (1908) and then from the contributions made by Metcalfe and Chalk (1950, 1983), Metcalfe (1954,) and Chalk (1937). Sinott (1914) has concluded that 3-traced trilacunar node is primitive based on the study of 164 families of Dicotyledons. The unilacunar and multilacunar types were derived from the trilacunar type. The nodal anatomy of angiosperms and its taxonomic significance have been much discussed (Esau 1960, 1965, 1979; Chowdhury, 1961).

The family Sterculiaceae Vent. is now included in Malvales clade (APG IV, 2016). Generalized studies on different anatomical and foliar architectural aspects of Malvaceae (*s.s*) have been done (Mandal, 2010; Mandal *et al.*, 2010). Monumental works of Sinnott (1914) and Metcalfe and Chalk (1950) are with little Indian representatives. Detailed study for Sterculiaceae is lacking until now.

### Petiolar anatomy

Grew (1675) was the first botanist to recognize that a cross section of a petiole can play an important role in plant systematics. Petit (1886) recognized differences of vasculature along the length of petioles. Hare (1943) had proposed a classification of petiolar anatomy i.e., i-shaped, o-shaped and u-shaped based on the configuration of the vascular pattern. Howard (1959, 1962, 1974 and 1979) advocated that petiolar anatomy along with combination of nodal vasculature and other associated characters can play an important role in systematic study.

The petiolar vascular structure of the Malvaceae and its systematic significance had been done by Dehay (1941, 1942). Metcalfe and Chalk (1950) had also studied the petiolar anatomy of the families Malvaceae and Sterculiaceae and evaluated some important evolutionary aspects. The petiolar anatomy of Indian members of Malvaceae has been studied by Mandal (2010) and Mandal *et al.* (2010). Studies on *Pterygota alata* and some species of *Sterculia* in relation to the systematic study had done by Hussin and Sani (1996, 1998). Hussin *et al.* (1997) had studied the petiolar anatomical aspects in some member of *Heritiera*. Although

the family Sterculiaceae has been described morpho–anatomically, yet there exists a gap to be filled in for the same from Indian context as none of the workers have emphasized on Indian representatives of the family.

### **Foliar venation**

The founder of venation study of angiosperms was laid down by Von Ettinghausen (1854). It was Foster (1950a, 1950b, 1951) and associates who had focused a new light on venation pattern of angiosperms. Foster (1952), Pray (1954) and Slade (1957) had considered foliar venation pattern from ontogenetic point of view. The pattern of overall venation, vein sheathing, areolation and the nature of free vein endings are taken into consideration by Dickison (1969, 1973 and 1975a) for the families Dilleniaceae, Connaraceae and Cunoniaceae respectively and which again strengthened the importance of venation as a taxonomic tool.

Hickey and Doyle (1972), Hickey (1973, 1979), Hickey and Wolfe (1975) had presented the leaf architectural patterns of woody dicotyledons and their evolutionary significance. Dilcher (1974) also provided an important view regarding the same. Melville (1976) had studied the comparative leaf architecture of the angiosperms and recognized six classes of venation pattern while according to Hickey (1973 and 1979) these are of 6 types as also recognized later by Dilcher (1974).

Hussin and Sani (1996, 1998) and Hussin *et al.* (1997) evaluate the taxonomic significance of leaf architecture for some members of this family. The clear picture is thus obtained where it is seen that though the family is studied and described well yet it is better to say that as a whole Indian Sterculiaceous members are lagging behind in this aspect. A thorough investigation of the whole Indian Sterculiaceae is thus very essential.

### **Micromorphological study of foliar epidermis**

Foliar epidermis particularly their micromorphology provide features of taxonomic and phylogenetic importance. The taxonomic value of these epidermal features greatly emphasized by Stebbins and Khush (1961), Metcalfe and Chalk (1959) and Stace (1965). A glossary of plant hair terminology along with their systematic implication was provided by Payne (1978).

The leaf anatomical study along with micromorphology of some members of Sterculiaceae had been studied by Hussin and Sani (1996, 1998) and Hussin *et al.* (1997).

### **Secretory structures and crystals**

Secretory structures and secretory materials are very important taxonomic tool due to their restricted distribution within a particular group. The foliar inclusions of the family Malvaceae by Mandal (2010) and Mandal *et al.* (2010) and that of Sterculiaceae had been studied by Metcalfe and Chalk (1950). Metcalfe and Chalk (1983) had indicated that the secretory cells, cavity and canals show systematic importance, particularly at the generic level.

Although the study on nodal perspective have been done in case of Malvaceae (Mandal, 2010; Mandal *et al.*, 2010), the thorough investigation regarding Indian Sterculiaceae is lacking except for the efforts of Metcalfe and Chalk (1950) though he described only few Indian members.

The petiolar anatomy of Indian members of Malvaceae has been studied thoroughly by Mandal (2010) and Mandal *et al.* (2010), whereas this aspect in case of Indian Sterculiaceae is not fulfilled. However, with the present study an endeavor has been thereby taken in order to fill up the prevailing gaps in the anatomical field.

The foliar anatomical study of Malvaceae and Sterculiaceae as a whole had been done long back by Metcalfe and Chalk (1950). Since then after a long gap, Mandal (2010), Mandal *et al.* (2010) investigated the foliar anatomical study of Malvaceae but for Sterculiaceae attempts have been taken with the present study which included almost all Indian members of the family (Mitra and Maity, 2013, 2014) and Maity and Mitra (2014).

The foliar micromorphology of the family Sterculiaceae had been studied by Metcalfe and Chalk (1950) and that of Malvaceae by Mandal (2010), Mandal *et al.* (2010). Inamdar *et al.* (1983) had studied the structure, ontogeny, classification and taxonomic significance of trichomes of Malvales including Sterculiaceae. The structure, distribution and classification of trichomes of the members of this family had been studied by Shanmukha Rao (1987). The leaf anatomical study along with micromorphology of some members of Sterculiaceae had been studied by Hussin and Sani (1996, 1998) and Hussin *et al.* (1997); Maity and Mitra (2014).

The revisionary work of Indian Sterculiaceae had been provided by Malick (1993). The anatomical study of some Indian members of Malvaceae had been done by Mandal (2010); Mandal *et al.* (2010); and that of Sterculiaceae had been done by Metcalfe and Chalk (1950), mostly on non-Indian members; Mitra and Maity (2013, 2014); Maity and Mitra (2014) and Mitra *et al.* (2015).