REVIEW OF LITERATURE
CHAPTER II
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The broader aspects of Palynology cover the studies related to pollination ecology and floral biology. The spectacular advances during last few decades initiated indepth studies in the fields like pollen morphology, pollen physiology, pollen development, melissopalynology, palaeopalynology and aeropalynology, under the science of Palynology. However, scanty work has been carried out in the field of pollination ecology and floral biology. The pioneer work in this field was started with the first discoveries of cross-pollination by A. Dobbs and H. Muller, who also discovered the role of insects in pollination (Faegri and Pijl, 1971).

The foundation work on pollination ecology have been reviewed by Faegri and Pijl (1971) and stated that Dobbs and Muller; and Koelreuter and Sprengel are generally accepted as the fathers of this branch of science. Koelreuters work on pollination was published in 1761, and another valuable publication was by Sprengel in 1793. They describe the pollen grain and its function in some detailed and recognized, autogamous, anemophilous and entemophilous pollination. While working on pollination ecology, Thomas Andrew Knight in 1799, formulated the principle that no plant can without detrimental effects, pollinate itself for a sequence of generations. During the first half of Nineteenth century, the contribution to the field of pollination ecology was worthless (Faegri and Pijl, 1971).

Knuth's great work was completed by Loew (1895) contains all data on pollination known till then. The behavioural studies of different pollinating insects had important repercussions on pollination ecology. Such an important aspect of pollination ecology was studied by Frisch (1914, 1923, 1950), Knoll (1921, 1956) and Free (1966).

Anecdotal evidences suggest that ancient Indians had the knowledge of sexes, and the different events of pollination and fertilization, in plants (Belavadi, 1993). From the cited literature, it is also known that ancient Indian literature is replete with scientific information (Besant, 1897; Ranade, 1926). Uma Shaanker and Ganeshhaiah (1993) has taken review of the work on pollination biology in India through ancient to post-independent period.

Floral biology includes all manifestations of life within the flower or, rather, it is the science of flower life. Percival (1965) has stated that floral biology dates from 1793 with the investigations of Christian Conrad Sprengel. It is known from the literature that the major contributors in the field of floral biology are Muller (1873), Knuth (1895-1905), Vogel (1954), Kugler (1955).

From the literature cited, it is known that Papilionaceae is largest family under order Leguminosae (Hooker, 1961). However, very few genera belonging to Papilionaceae have been studied for pollination ecology and floral biology (Robertson, 1923; Dnyansagar, 1949; Subramanyam, 1950; Valle, 1959; Vieira 1960; Sheshadri, 1961; Nair and Sharma, 1962; Free, 1966; Akerberg, 1967; Chau, 1972; Stainier, 1974; Oomman, 1975; Rao and Bahadur, 1985; Rahman and Patil, 1986; Patil and Rathi, 1987; Karoly, 1992; McGuire, 1993; Westerkamp and Paul, 1993; and Rozzi et al., 1997).

Pollinators are attracted towards flowers because of some attractants and they establish relations with a particular type of floral form. Vasudeva and Lokesh (1993) review studies by Indian workers on plant - pollinators interactions and discuss the evolution of floral traits in relation to pollination and the foraging behaviour of pollinators. Pollen and nectar are important attractants for a variety of insects. Pollen and their related ecological aspects during pollination, have been worked out by Pereival (1965), Willson and Burley (1983), Stanton and Preston (1986), Lan and Stephenson (1993). On the basis of pollen-ovule ratio, Cruden (1977) has defined the mode of pollination and breeding systems.

In a number of research papers, data on pollen production (Erdtman, 1938, 1940; Nair and Sharma, 1970; Vaish, 1973; and Agnihotri and Singh, 1975), and viability (Laken, 1942; Smith, 1951; Vieitz, 1952; and Johri et al., 1977;) have been accounted, which can serve a good tool for plant breeders of new generation (Nair and Rastogi, 1963; Stanton and Preston, 1986; Ganeshiah and Uma Shankar, 1992).
Schmid (1988) has described the terms and definitions applied to the nectary and the nectar. In angiosperm nectar, the secretion of nectar and the compositions of nectar have been studied by a number of scientists and their names are abound. Floral nectar production has been studied for different ecological parameters such as season (Lack, 1982; Pleasants, 1983; Zimmerman and Pyke, 1986), time of the day (Cruden et al., 1979; Feinsinger et al., 1979; Pleasants, 1983), flower age (Carpenter, 1976; Lack, 1982), flower size (Harder, 1985), weather conditions (Walker et al., 1974; Southwick et al., 1981; Pleasants, 1983) etc. Valuable work on nectar and nectar production has been carried out by Fahn (1952, 1979), Percival (1961), Harborne (1973), Waddle and Lersten (1973), Baker and Baker (1975, 1983c, 1987), Teuber et al. (1980); and Zimmerman (1988).

During the last few decades, the Palynologist has very well understood the morphological details of angiosperm pollen. With the advancement of light and scanning electron microscopic techniques, more details of pollen wall structure have been studied. The morphology of different angiospermic families and taxa have been investigated by Wodehouse (1935), Erdtman (1952), Nair (1960), Faegri and Iversen (1964), Moore and Webb (1978). Some of the genera of Papilionaceae have been worked out by Elfving (1879), Nair and Sharma (1962), Ramcharan et al. (1973), Thuan (1973), Stainier (1974), Oomman (1975), Patil (1987), Nayar (1990), and Pena et al. (1993).