I. PREFACE

The mulberry is primarily a plant of the temperate region but some species do fairly well in sub-tropical or in mild tropical zones (Sham Singh et al., 1967; Hayes, 1970). It is believed to be a native of India or China, on the lower slopes of the Himalayas (Rangaswami et al., 1992). The said authors mentioned that towards the year 2800 B.C., Chin-Nong, one of the successors of Emperas Fo-Hi taught cultivation of mulberry in China.

All species of mulberry belong to the genus, Morus. The number of species however, varies according to the authors as the species which are classified by some taxonomists are recognized by others as varieties of the same species. In any case, the number of species falling under the genus, Morus have been considered to be more than twenty (Jolly, 1987; Rangaswami et al., 1992).

There is in fact, considerable amount of confusion in regards taxonomy of the genus, which is perhaps due to its high degree of cross-pollination in nature, resulting wide variations in morphological characters. The taxonomists in different countries have adopted different systems to classify the species of mulberry (Bureau, 1873; Ladebour, 1951; Hotta, 1954; Brandis, 1966; Katsumata, 1971). Some of

The species of *Morus* grown in India are *M. alba*, *M. serrata*, *M. nigra*, *M. indica*, *M. multicaulis*, *M. sinensis* and *M. laevigata*. However, confusion also exists among taxonomists on the Indian species (Mukherjee, 1899; Hooker, 1885; Brandis, 1966; Kadambi, 1949).

All the species of *Morus* are perennial, deciduous trees or shrubs and depending on cultivation, the plant is grown as a bush, tree or middling. The plants when allowed to grow unpruned attain a height of 20-25 m. Generally one bud is present in the leaf-axil, although sometimes two more independent buds on either side of the main bud are noticeable, which are known as accessory buds. The buds have dormancy, which is mainly due to the presence of auxin in them and the terminal buds are known to be more dormant. The bud dormancy may however, be overcome by chilling exposure (Gururajan, 1962) or chemical treatment (Iwata, 1970). The species are highly cross-pollinated in nature and are of anemophilous in pollination.
The total area under the mulberry crop in the world has been estimated to be 2219061 hectares (Anon., 1997) and a global survey brings it to light that at least 29 countries are known to grow this crop, notable among which are Japan, China, Korea, Russia, India, Brazil, Mediterranean countries, Iran, Lebanon, Thailand, Burma, South Vietnam, Indonesia, Cambodia, Bangladesh, Afghanistan etc. (Rangaswami et al., 1992). With possible exception of Brazil (14°-23°S), most of the mulberry growing countries are located north of the equator (Jolly, 1987).

Beyond doubt, India, is an important country in growing mulberry, where the area under this crop comes to 1,20,569 hectares and the production of raw silk in this country has been estimated to be 2445 tonnes (Anon., 1997).

The State of West Bengal has evidently a noticeable position in the moricultural and sericultural scenario in India. In this State, the mulberry crop has been estimated to have a coverage of 15582 hectares and is destined for a contribution of 316 tonnes of raw silk (Anon., 1997). It is considered that West Bengal is one of four important States for moriculture and sericulture in the land of India.

In this State, sericulture by growing mulberry crop has been in practice since long past. This avocation was
predominant in the district of Murshidabad which was the erstwhile capital of the Bengal province. It needs mentioning that sericulture received a royal patronage in this State in ancient time. Sericulture had also flourished in the Bishnupur area of the Bankura district and elsewhere in this State.

At the present time, exploration of sericulture in the western hilly region in this State, i.e., where the present study had been carried out has also been made by the Govt. of West Bengal. In this part of the State, moriculture has been an age-old practice among the tribal people, who consume the fruits of mulberry and prepare some home-made products with those. Some quantity of crude silk is also produced by them. To gather technical information on moriculture and sericulture in this area for fruits and silk, the Govt. of West Bengal has set up a Research Station, which is apart from that in the Murshidabad district.

In regards, edapho-climatic requirements for cropping of mulberry, most suitable range of temperatures for better growth could be regarded to lie from 20°-30°C as at above 40°C, plant suffers due to high evaporation rate. On an average, mulberry is grown with a rainfall ranging from 600 mm to 2500 mm and with a relative humidity of 65 to 80 percent. An elevation of upto 700 m above m.s.l. is
considered suitable for growth of the crop. The soil is though not an important factor for mulberry but deep soil is preferred as the plant is deep rooted and it should be of clayey loam or loamy in texture.

Propagation of mulberry is possible both from seeds or vegetative parts and the latter method is undoubtedly preferred to secure true-to-type plants. The common methods of vegetative propagation are stem cuttings, budtings and inarching. In fact, depending upon soil and climatic conditions, vegetative propagation methods are found to differ in countries (Hamada, 1958; Lombardi, 1960; Taguchi, 1971). In India, the most common method of propagation is through cuttings in multivoltine regions like Karnataka and West Bengal while in univoltine areas like Kashmir, propagation is done by seeds. Exotic species when attempted to grow in this country are propagated by root grafting as they are difficult to produce adventitious roots.

Planting season of mulberry cuttings varies in different parts in India and in West Bengal, cuttings are planted during November, i.e., late autumn after the monsoon. The spacing for mulberry planting in India varies from 0.3-0.9 m between rows and 0.15 to 0.9 m between plants depending upon whether it is cropped as rainfed or irrigated. The amount of manures and fertilizers needed to the crop
depend upon soil type, removal of plantation, rainfall distribution, spacing, pruning, harvesting methods. However, organic manure is of great benefit and nitrogenous fertilizer greatly heightens the yield and quality of the leaves.

An important cultural practice in mulberry is pruning, which is practised to improve the yield of leaves and fruits and to maintain the shape of the trees. Both the season of pruning and the height of the trees at which pruning be done differ widely in various mulberry growing regions in India and these have a great influence on productiveness of the crop, in respect of both foliage parts or the berries.

ECONOMIC IMPORTANCE:

The mulberry crop is economically important to the human beings in two ways, which are for (a) rearing silkworms and (b) production of edible fruits.

(a) Rearing silkworm

The silk of commerce has played an important role in economic life of man ever since its discovery more than 4000 years ago. This is biologically produced by four species of silkworms. These are mulberry silkworm (Bombyx mori, believed to be derived from B. mandarina), eri silkworm
(Philosamia ricini and P. cynthia), tasar silkworm (Antheraea pernyi, A. mylitta and A. yamamai) and muga silkworm (A. assama).

Among these, the silk produced by mulberry silkworms on foraging mulberry leaves is most important in commerce and this silk contributes 95 percent of total global production of silk. Therefore, by the term, silk, mulberry silk is referred to.

The leaves of mulberry (Morus species) are the exclusive food by the mulberry silkworms. The larvae of this worm actually feed on the leaves of mulberry. For this purpose the leaves or twigs containing leaves of mulberry are plucked and placed in suitable containers under proper environmental conditions for forage by the worms. The production of leaves by the trees is therefore, a pre-requisite for production of silk. However, quality of the leaves of mulberry is also a very important factor. This is because, acceptance of the leaves by the silkworms depends much upon quality of the leaves, i.e., palatability by the worms.

(b) Edible fruits

Apart from leaves, mulberry trees have their importance to man in giving edible fruits also. The fruits
have a good appeal in having a blend of sweetness and acerbity (Sham Singh, et al., 1967; Singh, R., 1969; Hayes, 1970; Rangaswami and Jolly, 1992) and are consumed as fresh or are processed to make various products. In containing good amount of pectin of high jelly-grade, the fruits are utilised in making jam or jelly (Singh, J., 1952; Sham Singh et al., 1967). In Europe, it is also used for wine (Hayes, 1970). The berries of the species, *M. nigra* L. with black coloured berries seem to serve as better materials as fruits. However, it needs mentioning that in the locality where the experiment had been done, the species, *M. nigra* L. is not grown and berries for consumption as fruits are obtained from *M. alba* or from some other types evolved from different species under open-pollinated conditions. It is added that the locality is primarily a tribal inhabited area and these berries comprise as one of the few principal fruits to those people.

In addition to giving fruits and leaves to man, some species of mulberry and especially, *M. rubra* L. have importance as timber as well.