REVIEW OF LITERATURE
Sustained forest management requires a knowledge of not only the existing stock of a forest but also of the forest regeneration to be expected in future. During the British regime, Dr. Districh Brandis, the first Inspector General of Indian forests inspected and surveyed the available forests in 1864 and submitted a report to the Government of India, which suggested the ways and means of forest management. In Andaman Islands, experiments to find out a proper natural regeneration technique for the **Dipterocarpus** were carried out between 1933 and 1936 by Changappa and based on those studies the present 'Andaman Canopy Lifting Shelter Wood System' was evolved. Iyppu (1960) mentioned about the various attempts that were made to manipulate the overhead canopies to achieve regeneration of various species. Ward (1961) studied the regeneration behaviour of the American beech. Hosner & Minckler (1963) followed the pattern of regeneration and succession of bottomland hardwood forests of southern Illinois. Sutton (1969) made a silvicultural study on white and engelmann spruce, and Dobbs (1972) on the regeneration of these plant species in north east of British Columbia. Griffin (1976) studied the regeneration of **Quercus lobata** in savanna of California. Regeneration behaviour of fir and beech in Japanese forests was investigated by Kohyama (1980, 1982, 1983, 1984), Kohyama & Fujita (1981) and Hara (1983). Many studies were undertaken to understand the regeneration potential of **Pinus** spp. (McMinn 1981, Hu & Linnartz 1981, Miller & Cummins 1982, Lea 1984, White 1985). In arid zone of south-eastern

structures characterised by the presence of sufficient number of seedlings, saplings and young trees, indicate successful regeneration.

Yeaton (1984) studied the population structure of sugar pine at three elevations and reported that number and growth rates of seedlings and saplings increased with increasing elevation. Pinero et al. (1984) proposed a population model of *Astrocarpus maxicanum* and emphasised the factors which regulate the population and its regeneration. The role of disturbances in regulating the age structure of population has also been emphasised (Bazzaz 1983). Fire frequency in the boreal forests of Jasper Park in the Canadian Rockies has determined the age structure of lodgepole pine communities (Tande 1979). Disturbance caused by man and by oak wilt disease has structured the age class distribution of *Prunus serotina* in southern Wisconsin (Auclair & Cottam 1971). Age structure of several species in northern hardwood forests in New Hampshire, U.S.A. has been used by Henry & Swan (1974) to reconstruct disturbance history of the area with regard to the timing of occurrence, frequency, kind and intensity of the disturbances.

Mann (1984) and Harrington et al. (1984) reported that the percentage of sprouting increased with increasing parent-tree diameter up to a certain size, and then it decreased. Solomon & Blum (1967) found that height achieved by the sprouts decreased with increasing parent-tree diameter up to a certain size and then it increased. Harrington (1984) studied the effects of stump height and aspects of cut (i.e., angle and slope), tree age and season on sprouting and growth of sprouts in red alder. He found that the number and length of sprouts increased with the increasing stump height. Similar trend was also observed by Hook & DeBell (1970), DeBell (1971), Bellanger (1976), El Houri Ahmed (1977), Blake & Raitanen (1981) and Mroz et al. (1985) in other tree species. El Houri Ahmed (1977) and Harrington (1984) suggested that low-cut stumps decay rapidly, resulting in low sprouting. Crowther & Patch (1980) and Harrington (1984) in their discussion of coppicing in chestnut, hazel, willow and red alder, recommended a sloped or angled cut for better sprouting. Many authors (Mattoon 1909, Brown 1930, Buell 1940, Roth & Hepting 1943, Wenger 1953, Wilson 1968, DeBell & Alford 1972, Bellanger 1976, Strong & Zavitkovski 1982, Harrington 1984, MacDonald & Powell 1985) found that dormant period cuts produce more and taller sprouts than growing period cuts. Stoeckler (1947), Neal (1967), Borchert (1976) and Beck (1977) emphasized the importance of site quality on sprouting and growth of sprouts of Sequoia sempervirens, Populus tremuloides, Liriodendron tulipifera and found a more rapid sprouting and height growth of the sprouts on the sites rich in nutrient and moisture. Recently, Mroz et al. (1985) reported more sprouting and better growth of sprouts in some northern hardwood tree stumps at fertilized sites. In India, Sharma (1979) and Neelay et al.
(1984) studied the growth and coppicing capacity of *Eucalyptus* spp.

Seed is an important means of tree regeneration. Studies on flowering and seed production in some tree species were made by Downs & William (1944), Wright (1953), Sharp (1958), Sharp & Henry (1961), Sharp & Vance (1967), Grisez (1975), Verma & Sharma (1978), Palits (1980), Sharma (1981) and Rust & Roth (1981). The influence of climate on flowering and seed production in European beech was investigated by Holmsgaard (1972). Mathews (1963) stressed on the production of seeds in relation to biotic and abiotic factors. Singh & Singh (1984a) studied the dispersal pattern of seeds of silver fir and spruce. Singh & Singh (1981) emphasised the importance of seed source of spruce and silver fir in seed germination. Dabral (1976) developed the techniques for the extraction of teak seeds from fruits. Ecological studies on seed germination of some forest trees have been conducted by Athaya (1985a, b). Tang & Tomari (1973) emphasized the role of seed viability. Dunlop & Barnett (1983) reported that small and light seeds of loblolly pine lose their viability faster than the heavier seeds. Janzen (1978), Auld (1983), O'Dowd & Gill (1984) and Mittelback & Gross (1985) argued that predation is the major selective force affecting synchrony in reproduction and sizes of individual seed crops.


et al. (1976) found that increase in sowing depth resulted in a corresponding delay in commencement of germination in *Pinus patula*, *Pinus caribaea* and *Pinus elliottii*. Besides, Ahlgren & Ahlgren (1981) emphasized the role of forest litters in seed germination.

seedling of smaller diameter was poor. Growth of several tree species has been studied in relation to various environmental factors by many workers in India (Singh 1980, 1982, Singh 1982, Singh 1982, Singh et al. 1982, Suri 1984). Kaul & Sharma (1982) emphasized the importance of initial spacing on growth of *Pinus caribaea*. Growth increment in saplings of *Eucalyptus tereticornis* Sm. in relation to age has been studied by Krishnaswami et al. (1982b).

Some fragmentary studies on seed germination of *Alnus nepalensis* and seedling establishment, growth pattern and phenology of *Schima khasiana* have been made by Boojh & Ramakrishnan (1981a, b, c, 1982a, b, c, d, 1983). However, extensive studies on natural regeneration of forest trees of India in general and of North-East region in particular, are lacking. In view of the fact that such studies could have significant implications for forest management, the present study on the ecology of regeneration of some important tree species of Meghalaya was undertaken.