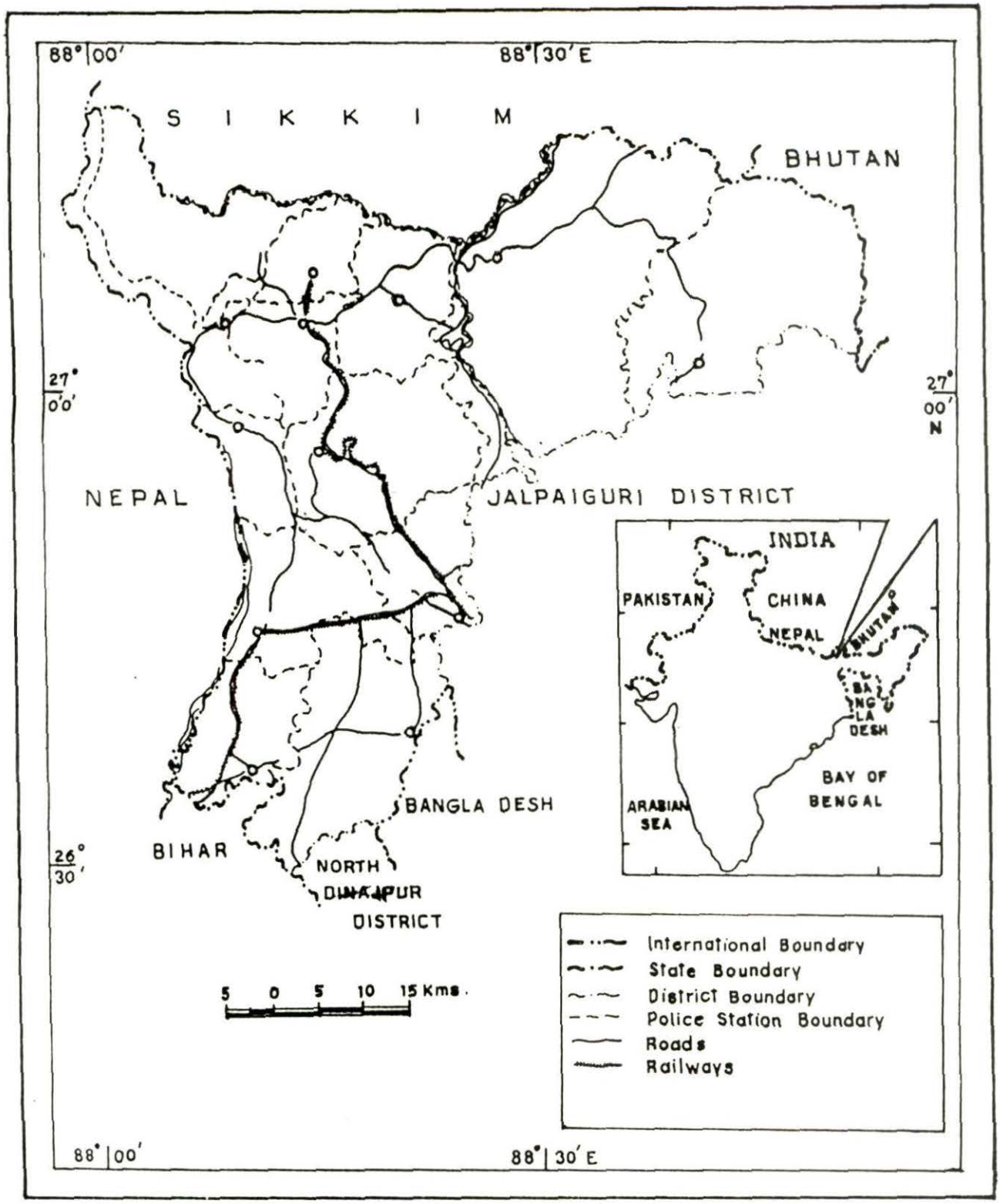

Fig.1. Map showing location of district Darjeeling

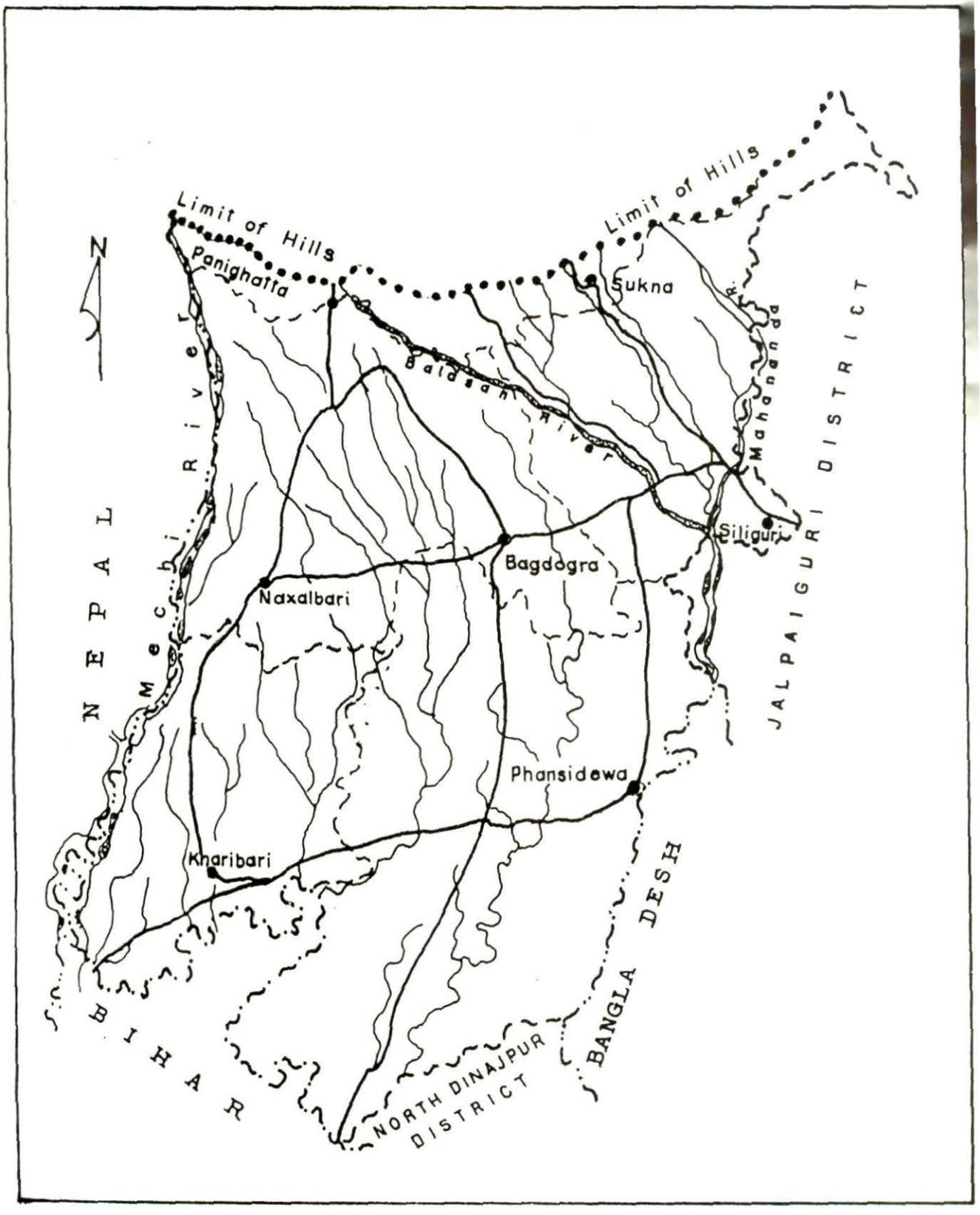

Fig. 2. Map showing Darjeeling plain with roads police stations and rivers.

Fig. 3. Foothill (Terai) showing culturable waste land.

Fig. 4. Terrestrial fern vegetation of waste land.

Fig. 3.

Fig. 4.

1 : INTRODUCTION

Ferns are primitive plants, the simplest of which made their advent on earth during the Carboniferous period. By end of this period, the ferns were a major component of earth's flora with appearance of the ancestors of the hemipteroid, orthopteroid and lepidopteran orders (Ross, 1956). Ferns are generally considered as difficult plants for herbivores to exploit, and a relative paucity of insects have been reported by many investigators (Hendrix, 1977,1980; Cooper-Driver, 1978; Weiczorek, 1973). However, such an assumption that ferns are underutilized by insects may not be well_founded (Ottosson and Anderson, 1983). The number of insect species associated with a given plant is positively correlated with the geographical range of a host plant and some factors like habitat type, local plant density (Strong, 1974; Strong and Levin, 1979), plant morphology (Rigby and Lawton, 1981), as well as secondary defence compounds (Swain, 1977). A thoroughly sampled fern, Pteridium aquilinum (L.) is known to support a fair population of insect fauna and similarly three Mexican ferns are also known to be extensively exploited by insects (Lawton, 1976; Strong and Levin, 1979; Balick et al. 1978).

In the Indian subcontinent, the Himalayan mountain constitutes a very significant and phyto-geographically important region in the world's pteridophytic flora (Bir, 1987). Of a total of 480 species of ferns in the Himalaya , about 12% are endemic to the eastern Himalaya (Dhir and Saiki, 1984).

The Darjeeling district of West Bengal (Fig.1) is located between $26^{o}31'$ and $27^{o}13'$ north latitude and between $87^{o}59'$ and $88^{o}53'$ east longitude covering an area of 3149 sq.Km. Northern part of the district has the distribution of eastern Himalayan ranges and the southern part has a stretch of alluvial plain at the base of the hills which is known as Terai (Fig.2). It is situated 91 m above sea level having an average annual rainfall of 350 cm. minimum temperature of 12^{o}c and maximum temperature of 30^{o}C. The soil in this region is known as 'Terai soil' which is acidic, rich in organic material and is admirably suited for certain kinds of crops. However, there are also poor savely tracts that cannot be brought under the plough (Ghosh, 1981). The non-cultivable land and the culturable waste (Fig.3) in the Terai show a fair distribution of fern flora (Fig.4). The terrestrial ferns, in particular the thicket forming species and the ravine ferns (Punetha, 1989) are found to be dispersed

surrounding forest patches, tea gardens, crop lands and sides of water bodies. Some of these species also form undergrowth of forests. Interestingly enough there are some terrestrial fern species that occur frequently and constitute the apparent life-forms of the fern community (patches) in Darjeeling plain ; and of these, a few show greater abundance of insects attack with some definite pattern of occurrence in different seasons.

Weeds are an important part of the terrestrial ecosystem. The fact that many pest species colonize on weeds and breed successfully on them reveal that they have the potentiality to harbour crop pests which may inflict severe damage to crop at any time (Anantha-krishnan et al., 1985). This is more so when the growing period of crop plants synchronizes with that of weeds Further, the ability of weeds to harbour pests is well known, especially in situations when the cropping season is short and is followed by different cropping system. Uncultivated land and its vegetation may provide an alternate food for insect pests before and after the availability of crops (Van Emden, 1965). The nature and extent of growth and reproduction of insect on crops and weed hosts depend on the suitability of the host for colonizing species. There exists a great variety of

insect species on grasses and weeds which enables their inflow into the cultivated field where the fallow undergrowth act as an original source/ alternate hosts of some pests (Uvarov, 1964). Strong et al.(1977) and Strong (1979) suggest that host plant switching rather than slow autochthonus evolutionary proliferation of plant-insect associations account for the majority of insects utilizing a plant species. Thus to have a better understanding of the above conjectures, a study on diversity and variability of insect-plant relationship would comprise :

a. the study of feeding behaviour of the plant eating insects in response to primary and secondary substances present in the host plants,

b. the influence of crop and weed hosts in the race of colonization and population dynamics of the phytophagous insects and

c. the impact of quality of the host plant on growth and fecundity of insects.

.....Ananthakrishnan (1992)

In light of the above suggestions some aspects of the bioecology have been studied using fern species as weed and angiosperm as crop. Besides an account of the fern entomofauna, three representative insects have been chosen for the purpose of investigation. These are reported as polyphagous pests belonging to two distinct

orders, Orthoptera, i.e. Atractomorpha crenulata (Fabr.), and Lepidoptera i.e. Spilarctia obliqua (Walker) and Spilarctia casigneta(Kollar). Study of these taxonomically distant or close species also gives an opportunity to analyse their bioecological similarity and dissimilarity during the utilization of a fern or an angiosperm host. Further, bioecological study when coupled with the faunistic study would help scientists and researchers to formulate some pest management strategies. Such studies also hold promise in future for control of these local pests by developing resistant varieties of host plants and through better management of the ecosystem.

Fig.5a. Standing jute (Corchorus capsularis) crop.

Fig.5b. Mulberry (Morus indica) plant.

Fig.5a.

Fig.5b.