ABSTRACT

Title of the thesis: "**Studies on the Phylloplane mycoflora of Oak** (***Quercus serrata*** **Thunb.**) **with special reference to the rearing performance of Oak Tasar Silk Worm** (***Antheraea proylei*** **Jolly.**) **in Dima Hasao**, **District**, **Assam".**

Oak (*Quercus serrata* **Thunb.**) is belong to family Fagaceae and one of the important forest forming trees in temperate Himalayas. A total 35 Oak species are reported in India, Nepal and Bhutan. 7 Oak species are used as host plant of oak tasar (temperate tasar) silkworm distributed in North Eastern to North Western Himalayan. They are *Quercus serrata, Q. griffithii, Q. acutissima* and *Lithocarpus dealbata* in North-East Himalayan and *Q.leucotrichophora, Q. floribunda* and *Q. semecarpifolia* in North-West Himalayan. Leaf of *Q.serrata* is used for Oak tasar silkworm rearing and is considered to be the primary host plant of Oak tasar silk producing silkworm *Antheraea proylei* (**Jolly.**) in the North Eastern India. In Assam 24000 hectares area are under Oak flora among them 2000 hectare area are exploitable in Karbi-Along and Dima Hasao district. There are two crops of Oak tasar silkworm i.e. Spring and Autumn crop. In the present study it has been found that a numbers of micro organism are present in the rhizoplane and phylloplane and in other habitants in the studied host or in close proximity of the host. The root exudates of the host plants were found to have stimulatory effects on the growth and sporulation of different types of micro-organisms, which is helpful in the development of the phylloplane of the host plant by providing special type of nutrition, and development of the different varieties of leaf surface micro organisms. These micro floras may be playing a very important role in supplying different types of nutrients to the growth of the plants as well as the silkworms which will be helpful for heartening the growth and development of the plant and ultimately has a great impact on the raw silk production *i.e.* Oak tasar silk. By adaption of Oak tasar culture in hilly region may also help prevention of jhum cultivation and also save the environment and encouraging economic upliftment of poor rural people residing in hilly region.

The nature and type of microbial population in the rhizoplane and phylloplane, of Oak plants particularly of economic/cash crops have received

considerable attention during last few years. Till date no serious attempt has been made to work out the microbial complexes of rhizosphere and phylloplane of Oak plants (*Q.serrata*) at Umrangso Research Extension Centre Farm, and their effect/impact on the growth and development of Oak tasar silkworm, which was not carried out till date.

Average Leaf yields of per plant and per hectare of *Q.serrata* in different treatments *i.e.* (a) Control (Without application of Farm Yard Manure and Nitrogen. Phosphate and Potash.), (b) Application of FYM and N.P.K., (c) Application of FYM during Spring and Autumn crop during 2013 and 2014 and Rearing performance of *Antheraea proylei* **Jolly.** The leaf yield per plant /per hectare of *Q.serrata* 1.53 Kg/10355.00Kg in Spring and 0.630Kg/4236.00 kg in Autumn crop when FYM and NPK. The rearing performance recorded ERR 64.5% ,SR 10.15% in Spring crop and ERR 31.6% ,SR 9.54% in Autumn crop .The Statistical analysis had been done for leaf yield per plant and effective rate rearing in the seasons during the investigation.

Different fungal species were found in the soil and rhizosphere of Oak plants at Umrangso REC Farm. They are *Alternaria alternata, Aspergillus flavus, Aspergillus niger, Aspergillus fumigatus, Curvularia* sp, *Cladosporium clodosporides, Cladosporium herbarum, Colletotrichum gloeoporiodes, Fusarium solani, Fusarium oxysporium Mucor* sp, *Penicillum* sp, *Trichoderrma harizanum,* and Sterile mycelia were isolated during the period of investigation. The increasing trend of microbial population was observed from rhizosphere of Oak seedling to mature Oak plant and also phylloplane of different status of leaves in Spring and Autumn season. The Rhizosphere microbial population was higher than rhizoplane and non-rhizosphere soil it was also observed that the fungal population was higher on mature leaves on lower surface than semi- mature and tender leaf upper surface in Autumn season. Seasonal variation of microbial population was observed in the study *i.e.* higher in Autumn season than Spring season. *Penicillum* sp was observed in Autumn season only.

Eleven fungal species were isolated and identified in the phylloplane of Oak plant (*Q.serrata)* in different ages of leaves namely tender, semi-mature and mature. *Alternaria alternata Aspergillus niger, Aspergillus fumigatus, Aspergillus flavus,*

Curvularia sp., *Mucor* sp, *Penicillum* sp, *Verticilium, Fusarium* sp, *Colletotrichum* sp, *Cladosporium* sp, during the two rearing season Spring and Autumn. Tender leaves shown lowest population on the upper surface and showed higher population on the lower surface and nos of fungal population increasing like tender < semi-mature < mature leaves. The seasonal variation chemical constitution of *Quercus serrata* leaves where plants were applied with (NPK+FYM),in Spring season moisture, crude protein, crude fibre, crude fat, ash, carbohydrates and ERR% were recorded as 68.98%, 10.28%, 6.78%, 2.34%, 1.88%, 10.80% and 64.50% respectively and during the Autumn season leaf moisture 57.23%,crude protein 5.13%, crude fibre 7.09% crude fat 1.94%, ash 1.90% carbohydrates 21.33% and ERR 31.60% were recorded. Higher leaf moisture, crude protein and ERR% has been recorded in Spring season; while in Autumn season less % of moisture and ERR% but higher % of carbohydrates were recorded in leaves in Autumn season may be impact on higher population fungal on mature leaves of *Quercus serrata*.

The studied height of the *Quercus serrata* plants were 1.50 m which will be more conducive for rearing in the both seasons (*i.e.* Spring and Autumn). Fungal species were isolated from air over *Quercus serrata* plantation during Spring and Autumn season in 2013 and 2014, at height 0.75 m and 1.50 m at Umrangso REC farm; so air samples were collected from at height of 0.75 m and 1.50 m two different heights.

In the study a total eleven fungal species were isolated and they were *Alternaria alternata. Aspergillus flavus, Aspergillus fumigatus, Aspergillus niger, Cladosporium* sp , *Colletotrichum* sp, *Curvularia* sp, *Fusarium* sp, *Mucor* sp, *Penicillum* sp and *Sterile mycelia*. But no different species were isolated from air during different seasons (Spring and Autumn) at the two status of height, climatic condition prevailing over the season influence the fungal population.

Physcio-chemical character of soil under *Quercus serrata* plantation at R.E.C. Umrangso Farm were done. In fertilized soil pH 4.51, Organic Carbon 2.23%, average Nitrogen 331.90 ppm, Phosphate 32.00 ppm and potash 75.00 ppm. But in non fertilized soil pH 4.61, was little higher than fertilized soil Organic Carbon 1.56%, which was laser then fertilized soil availability of Nitrogen 231.14 ppm which was very much less than fertilized soil. Availability of Phosphous was

observed slightly more *i.e.* 36.00 ppm but availability of Potash was observed 150.00 ppm which was almost double than fertilized soil.

Reeling parameter of *Antheraea proylei* **Jolly.** Cocoons.

1. Filament length –Length of reeled silk filament per cocoon in meters.
2. Denier filament -Weight in gm of 9000 meter of reeled filament length.
3. Recovery%-Filament (weight length/cocoon shell weight) x100.
4. Reelability-1/(Number of ends feeding /cocoon) x 100.
5. NBFL-(Filament length (Meter) x Reelability %) /100.

The reeling parameter of *A.proylei* **J.** cocoons were taken from three different treatments

A. Cocoons, harvested from the rearing where FYM and NPK not applied in Oak plants.
B. Cocoons, harvested from the rearing where applied FYM and NPK in Oak plants.
C. Cocoons harvested from the rearing where Oak plants were applied FYM only.

Average Filament length 588.92 m, Denier 6.288, Non Breakable Filament Length (NBFL) 298.60 m, Silk recovery 62.20% and Reelability 41.14% were observed from the treatment (A) cocoons. Similarly, cocoons from treatment (B) average Filament length were 662.030 m, Denier 6.148, NBFL 330.40 m, Silk recovery 70.15% and Reelability 46.27%. From cocoons treatment(C) average filament length 627.14 m, Denier 6.225, NBFL 314.30m,Silk recovery 65.130% and Reelability 43.20%. Hence reeling parameter comparative better from the treatments like this B>C>A.

The fungal population isolated from leaf, soil and air were found in the present investigation and it is indicates mycoflora present in the cyclic pattern of appearance in air, phylloplane and soil. The mycoflora population density observed was the highest in rhizosphere soil and lowest in air of *Quercus serrata* plantation.

The present investigation deal with the fungal population of rhizosphere and phylloplane of (*Quercus serrata*) Oak host of temperate tasar and their effect on the growth and development of Oak tasar silk worm (*Antheraea proylei* **Jolly.**) at Umrangso, District Dima Hasao, Assam.