ABSTRACT
STUDIES ON THE EFFECTS OF CERTAIN HOST PLANTS AND THEIR PHYLLOPLANE MICROFUNGI ON THE GROWTH AND DEVELOPMENT OF MUGA SILK WORM

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India has an ancient silk culture. Himalayan belt, particularly, the Eastern Himalayan region is believed to be the homeland of silk. Silk culture gradually spread to other Asian countries and many silk roads were established later in Asian countries which ultimately lead to Middle East countries and Europe for the purpose of export of silk.

India is unique, in that, all the four varieties of silk are produced in India. Assam in general and the northeastern region in particular is famous for production of excellent variety of muga silk. The muga silk worm *Antheraea assama* is endemic to the northeastern India.

There are several types of host plants, on the leaves of which the muga silk worm feed. Of these, Som (*Machilus bombycina*) Soalu (*Litsaea polyantha*) and Mejankari (*Litsaea citrata*) are very popular among silk growers. Each of these types of plants has several morphotypes. Muga silkworms, depending upon climate and others factors often show preference to some of the morphotypes.
These morphotypes are easily recognised by the local people for rearing of silkworms. The types of plants are considered to be crucial for production of quality silk. The nutrient contents of leaves also play important role in silk production.

The climate of Assam is most suitable for growth of host plants of the muga silkworm. These host plants are found to grow in wild condition. But for the purpose of rearing of muga silkworm these plants are now cultivated commercially by the Government as well as by private farms. Although hill slopes are most suitable for the growth of such host plants, these can be grown in the plain area also. Morphology of the leaves, their longevity and inclination, apart from physiology has profound bearing on the preference of the host plants by the silkworms. Duration of the year, rainfall, temperature, etc also influence the host plants and so also the activities of the silkworms.

Microbiology of aerial plant surface particularly the leaves have received wide attention in recent years. The leaf surface area where microorganisms are found to be very active is called phylloplane. The phylloplane microfloras of many economically important plants have been already worked out. The phylloplane microflora is known to have great influence not only on the physiology of the plant but also on others which use the leaves. No serious attempt has been made to work out the microbial complexes of the phylloplane of muga host plants. The leaves of such host plants are important because of the fact that the growth and development of silkworms depend upon the quality of the leaves. Screening of the leaves for detecting the presence of pathogenic and non-pathogenic or commensal flora
is important as because along with the leaves the silkworms also consume these microflora. We are not aware how these microflora affect their health and in turn their capacity to produce silk.

The present research scheme is intended to study the role of certain host plants on the growth and development of silkworm and their ability to produce silk. The morphology and the chemical constituents of the leaves of three host plants were studied. The phylloplane microfungi have also been screened to know whether there is any specificity of fungi with regards to choice of host plants, choice of season or choice of age and surface of the leaves. Study has also been carried out to detect whether the leaf surface microfungi have any impact on the growth and development of the silkworms and finally on the production of silk. It was presumed that as the silkworms feed on the leaves loaded with fungal mycelia and spores, these may have some impact on the growth and development of the silkworms as mycelia and spores are a good source of protein and vitamins. This in turn may influence the silk production too.

The present study shows that the rearing performance and the production of silk differ in three host plants used in the experiment, although there exist not much difference in chemical constituents of the leaves of the host plants. The yield of cocoons and their quality has been found to be a little better in Som plants than in other two-host plants (Soalu and Mejankari). Silk ratio in Som plants is also higher than in two other plants. There is also distinct difference between the broods with respect to yield of cocoons. The Disease free laying: Cocoons (Dfl: Cocoons) ratio also
differs among different broods. “Bhodia” and “Kotia” broods show higher performance. This is found to be season related.

The present study is the first of its kind regarding phylloplane fungi of host plants of silkworms. It has been found in that the types of fungi that colonise on the leaf surface are of very limited types and of the few that have been detected are dominated by *Aspergillus fumigatus* (about 50-60%). There is no specificity with regards to choice of host plants. They of course show some preference for age of the leaf and its surfaces. Mature leaves, particularly their lower surface harbour more fungi. These fungi are carried on to the leaf surface by air. These fungi were not found to be associated with any disease of the leaves. Autumn and spring periods are found to be favourable for the fungi to grow on leaf surface as at that period the spores can easily settle down on the leaves. Excudates of the leaves can mix up with the leaf surface moisture provided by night precipitation and that there is no rain to wash them down. Fungi seem to prefer the lower surface probably because they want to avoid direct heat of the sun. The same type of fungi and the same pattern of colonization on the leaf surface have been found in all types of host plants and in all the places where study was carried out.

Studies relating to the role of leaf surface fungal spores on the rearing performance and the production of silk have not been taken up earlier. It is encouraging to note that feeding of spores of certain fungi like *Aspergillus fumigatus, Aspergillus candidus, Aspergillus flavus, Mucor* sp, *Torula* sp, *Curvularia* sp, *Rhizopus* sp, *Alternaria* sp, *Aspergillus niger, Fusarium* sp, *Cladosporium* sp, *Aspergillus terreus* to the Muga silkworms
along with the leaves of the host plants showed statistically significant improvement in the weight of the cocoon and their performance as revealed by the improvement in silk ratio over the control. Not all species of fungi influence the performance of silkworms equally. Species belonging to *Aspergillus* has been found to influence the silkworms more than the other fungi. This piece of research work has tried to focus attention primarily on the quality of phylloplane microfungi of the three host plants surveyed and the effect of such phylloplane microfungi on the growth and development of silkworm and consequently on the quality and quantity of the silk they produced. Effect of host plants on the performance of the silkworm has also been studied. Although the work is a preliminary one it shows that there is wide scope of research in the area and that the phylloplane microfungus is an important factor in the growth and development of silkworms which may be investigated in considerable depth.

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