CHAPTER - 7

SUMMERY
SUMMARY

The present research work include the study of mycoflora of air, phyllosphere and soil of the tea bush/tea field, their seasonal variation, aflatoxin production potential and antagonistic activities for the biological control of Black rot disease of tea caused by *Corticium invisum*.

The population of air and leaf surface propagules are gaining considerable attention as they can play significant role in the resistant mechanism of plants from air-borne plant pathogens. Studies on aerobiology can help to understand the sources, take off, passive transport, deposition and implication of these microorganisms on the plant leaf surface. So far no works has been reported on the air spora of tea plantation areas of Barak Valley, Assam.

Therefore, in the present work mycoflora of air, phyllosphere and soil of tea field areas were recorded for one year at monthly intervals. Seasonal variation of the aero mycoflora was observed by exposing perti-plates containing Czapek Dox agar medium. For phyllosphere studies ten tea varieties were taken into consideration (i.e. TV1, TV 7, TV 20, TV 23, TV 25, TV 27, TV 28, TV 29 and TV 30).

A total of 34 fungal species were identified from the air, phyllosphere and soil of the tea plantation area. Among them *Penicillium* sp, *Aspergillus* sp,
Fusarium sp. and Curvularia sp dominated in all the cases, i.e. air, phyllosphere and soil. Some air-borne species such as Aspergillus candidus, A. niger, P. citrinum, P. islandicum, Cladosporium herbarum, Alternaria sp., Saccharomyces cerevisiae, Candida sp. etc. were found to be present on the tea leaf surface and tea soil as well, indicating that the air spora originated either from the vegetation including tea plants as well as from the soil. The results were compared and correlated with the meteorological conditions of the area.

The present study concerns with the air mycoflora of tea plantation environment and factory with special reference to the mycotoxin producing ability of these mycoflora. It was also includes the biological control efficiencies of the tea field and phyllosphere mycoflora. Their aflatoxin production potential in the in the black tea has also been studied in the present work.

Initial screening of the isolated tea phyllosphere / soil mycoflora suggests that some of the fungal organisms have potential for the production of aflatoxin in black tea in vitro.

It has been observed that the fungal isolates showing aflatoxin production potential include A. flavus 61/S, A. flavus 102/S, A. flavus 102/A, A flavus 30/P, A. flavus 30/A, A. flavus 61/A, A. parasiticus 102/P, and A. parasiticus 61/S. Among the ten aflatoxin producing strains isolated from air, phyllosphere and soil, the strain A. flavus 102 (Phyllosphere) shows the highest percentage in terms of occurrence, the value being 12%. The minimum
percentage occurrence was shown by *A. flavus* 102(soil), the value being 7%.

The observation shows that the two species of aflatoxin producing strains of *Aspergillus* viz. *A. flavus* and *A. parasiticus* have been detected from the tea field (i.e. air, phyllosphere and soil).

Among the ten tea factories visited in the present investigation it was found that a few factories were very poorly maintained (i.e. unhygienic in terms of mycoflora). Such poorly maintained tea factories include Cossipore, Urrunabund, Doyapur etc. However, some factories were found to be very well maintained from hygienic point of view; these factories include Dewan, Burtoll, Koomer etc. The poorly maintained factory atmosphere were found to be having larger population of mycoflora compared to the well maintained factories as mentioned above.

There is a uniformity in the pattern of occurrence of mycoflora in the site of observation i.e., fermentation, drying and sorting rooms. However, in case of fermentation room, there is a sudden fall of the total population in the month of December. Such decline in the occurrence seemed to be due to the low temperature during the winter. Moreover, drying and sorting rooms didnot show any decrease of the fungal population, rather a slight increase in the trend of total population was observed in the month of December. This may be due to the prevailing temperature in the drying and sorting room.
Analysis with simple linear correlation shows that there is a highly negative correlation ($r = -0.0940816$) between the occurrence of total population of mycoflora in the fermentation and drying room, throughout, the year. Again a low negative correlation ($r = -0.1299748$) exists between the total population in the fermentation and sorting room. On the other hand a negligible negative correlation ($r = -0.0246628$) was observed between the drying and sorting room in terms of relative frequency of the total population in various seasons.

It has been seen that the maximum aflatoxin production was shown by the sample kept at 30 °C. Statistical analysis shows that significant difference exists among the various strains of aflatoxin producers. The temperature / moisture variation in terms of aflatoxin production was found to be highly significant. Aflatoxin production in terms of time span was also found to be highly significant. It has been observed that the production of aflatoxin started from the 5th day of inoculation.

Integrated pest management (IPM) is being practised now-a-days in order to avoid the pollutive and hazardous effect on the environment caused by the inorganic chemical pesticides. It is an achievement of Biotechnology and has been the appreciated by the environmentalists and public health authorities. The study of antagonistic pathogens may lead to the proper understanding and application of them in the field condition so that the ultimate goal of biological control can be achieved.
"Black rot" is a devastating disease of tea which is predominantly known to occur in the Cachar District of Assam. It is responsible for the heavy loss of these cash crop. An attempt has been made in the present study to understand the possibility of using some of the antagonistic fungal species for the control of Black rot disease of tea caused by *Corticium invisum*.

Initial screening of the phyllosphere microorganisms suggests that some of them have potential to control the Black rot disease of tea caused by *Corticium invisum*. Such potential organisms include species of *Trichoderma*, *Aspergillus*, *Penicillium*, *Taloromyces* etc. The potential of the leaf surface organisms as antagonists to control the leaf / stem diseases also should be explored so that they can be included in the IPM strategy for better management of the tea diseases at large.

In the subsequent field experiment, some of the antagonistic fungal organisms in aqueous solution, applied as spray, controlled the disease effectively. The most promising organisms are found to be *T. viride*, *T. harzianum*, *A. niger* and *P. sclerotium* respectively (Table 35, Plate 26-29). All of them achieved varied degree of control over a period of 4-12 months (between the range of 90% to 100%). Other test organisms i.e. *Penicillium purporogenum*, *P. rubrum*, *Taloromyces flavus*, *Aspergillus ochraceous*, *A. flavus*, *Fusarium oxysporum* achieved comparatively less degree of control (between 50-70%) over the entire time span of the experimentation.