Chapter 6
CONCLUSION

- *Pleurotus* species is one of the most popular mushrooms cultivated in North Bengal. Four species namely *Pleurotus ostreatus, P sajor-caju, P. djamor* and *P. florida* were selected for cultivation in this environmental condition.
- Morphological and histopathological characteristics were studied with special reference to their fruiting body structure, structure of gill and also the spore characters. Mycelial growth pattern of *Pleurotus* species were also studied using various medium and it was found that the growth rate varies in different medium.
- Molecular detection of the four fungal isolates IPL/MC/PO-1, IPL/MC/PS-01, IPL/MC/PD-01 and IPL/MC/PF-01 were carried out using 18S rDNA sequencing using ITS1 and ITS 4 primers. BLAST query of 18S rDNA sequence were analysed and identified as *P. ostreatus, P. sajor-caju, P djamor* and *P. florida* respectively. The sequences of the identified species were submitted in NCBI GenBank under the accession number KT768095, KT818506, KT 768094 and KT826605 for *P. ostreatus, P sajor-caju, P. djamor* and *P florida* respectively.
- Cultivation of the four identified *Pleurotus* species were practiced in this area. Several lignocellulosic wastes were tasted for the cultivation of all the four species. Paddy straw, wheat straw and saw dust were used in singly or in combined form to check the effect of substrates on yield of *P. ostreatus, P. sajor-caju, P djamor* and *P florida*.
- In North Bengal, *P. ostreatus, P sajor-caju* and *P florida* commonly cultivated. A new species namely *P djamor*, the pink oyster mushroom introduced in this area and successfully cultivated in this area.
- Effect of substrate was evaluated and it was found that the combination of paddy straw with wheat straw and also the paddy straw with saw dust enhances the yield per kg substrate. In case of *P djamor*, wheat straw was found to be the appropriate substrate in compare to other three substrates. *P. ostreatus P sajor-caju*, and *P florida* showed higher yield in case of paddy straw and wheat straw but saw dust resulted lower yield per kg substrates.

- Along with the different substrates, the seasonal productivity of all the selected *Pleurotus* species was determined. The results clearly indicate the variable seasonal productivity. Depending upon the temperature, relative humidity and rainfall, the productivity was found to be different. In case of *P. ostreatus*, February to September was found to be suitable while in case of *P sajor-caju*, temperature and relative humidity was quite higher and thus it found to be suitable to cultivate during May to September.
- Seasonal productivity of *P florida* and *P djamor* was found to be quite similar depending upon the temperature, relative humidity and rainfall required for the growth and fruiting body initiation. It was observed that at higher temperature, the fruiting initiation required very long time and also the productivity decreased during May to September. It was also observed that the productivity increased during winter season in North Bengal.
- Polypropylene bags are very commonly used as container for the cultivation of *Pleurotus* species in this region. Various type containers were also tasted for the cultivation practice of *Pleurotus* species like waste bottles, laboratory glassware and also paper boxes. Using this type of containers was found to be very effective as the containers can be recycled for many times and it requires small area for the cultivation. It was observed that the bottles and boxes produces same amount of fruiting body of *Pleurotus* while it takes less time for fruiting initiation. In case of *P ostreatus* and *P djamor* waste bottles was found to be very effective and the productivity was also very high.
- Tea is one of the major plantation crop largely practiced throughout North Bengal especially in Darjeeling and Jalpaiguri. Pruning is commonly practiced for tea plantation and the pruned tea leaves commonly used for fuel in the tea gardens. Pruned tea leaves were dried and used as a substrate for cultivation of *Pleurotus ostreatus* as well as *P. sajor-caju* and tea leaves waste found to be very promising in the spawn run and also fruiting body initiation. Tea leaves along with paddy straw was also tasted and the yield was remarkably found very high in compare to other substrates.
- Biochemical constituents such as moisture, total sugar, reducing sugar, protein and lipid content were also estimated of cultivated *Pleurotus* species. Results revealed that the selected mushroom species possess a high amount of moisture content. All four species cultivated using paddy straw, wheat straw and saw dust

were found to be very high amount of protein, total sugar and reducing sugar content. Results also revealed that mushroom possess very low amount of lipid content and among the all four selected species *P djamor* and *P ostreatus* contains lower amount of lipid content.

- Antioxidant activity of selected *Pleurotus* species were also estimated and it was found that all four species showed very high amount of antioxidant activity such as DPPH scavenging activity, ferric reducing antioxidant power activity as well as flavonoid activity. Among the cultivated *Pleurotus* species, *P djamor* and *P ostreatus* showed comparatively higher antioxidant activity.
- *In vivo* antidiabetic activity of *Pleurotus* species were also tasted using Streptozotocin induced albino rats. Results found that the oral treatment helps in regaining the body weight as well lowering the plasma glucose level in compare to control. *P djamor, P sajor-caju* and *P ostreatus* found to be effective in lowering the plasma glucose level.
- Blood urea, creatinine, triglyceride, cholesterol as well as liver enzymes like serum glutamic pyruvate transaminase (SGPT) and serum glutamic oxaloacetic transaminase were also estimated and the oral treatment of *P. djamor* and *P. ostreatus* found to be very effective in recovering the other blood parameters.
- Spent mushroom substrate is an important by product of *Pleurotus* cultivation and this spent mushroom substrate were applied as fertilizer for crop improvement. *Capsicum chinense, C annuum, Solanum lycopersicum* and *Amaranthus* sp. were tasted using the spent mushroom substrates of *Pleurotus* species which was found to be very effective as a soil conditioner and also helps in increasing growth and yield of crop plants in compare to untreated plants.
- Processing of oyster mushroom is very important step in the cultivation practices. Short term processing of *Pleurotus* species was done which include Packaging of mushroom for sell as well as different recipes were tasted in laboratory like mushroom pakora, soup, curry, scrambled mushroom. Long term processing of *Pleurotus* was also practiced in the form of drying, powder and also preparing mushroom biscuits. Drying method includes sundry, freeze dry and oven dry and among them, indirect sundry and freeze drying was found to be very effective in long term preservation of *Pleurotus* species.
- Contaminants were found to be a very serious problem during the cultivation of *Pleurotus* species. Several fungal species like *Coprinus, Fusarium* as well as

Trichoderma; bacterial species like *Pseudomonas* and pastes like Sciarid, phorid and Beetle fly drastically affected the growth and yield of *Pleurotus*. Management strategies like application of bavistin, phenyl, carbandazium and formaldehyde were adopted which reduces the effect of the fungal as well as bacterial genera. Racks of the mushroom production unit were covered with nylon nets which helped in reducing the attack of flies on the substrates.

- Promotion of mushroom cultivation and marketing were also done. Several unemployed youth, post graduate students as well as mushroom growers on North Bengal were trained about the seasonal productivity, spawn preparation as well as post-harvest processing of *Pleurotus* species. Promotion of *Pleurotus* cultivation was also done at the Krishi Mela organised by the Department of Agriculture, Govt. of West Bengal.
- Several unemployed youth, retired persons as well as students of different colleges and women of self-help groups were trained successfully and established their own cultivation unit. They are also very much efficient in spawn production and thus the growers produce their own spawn for cultivation.
- Economic efficiency of mushroom production and marketing were also studied and it was found that the growers selling mushroom at very high price and the cost benefit ration become very high which results in economic upliftment of different economically weaker people.