

GPATVAC01 - EDIBLE MUSHROOM PRODUCTION TECHNOLOGY

Learning Objectives

- To study the land marks of mushroom science and techniques involved in mushroom production
- To study the mushroom cropping pattern and production constraints
- To study the cost benefit analysis in mushroom cultivation

Course Outcome

- Updated knowledge about new edible and medicinal mushrooms
- Trained in isolation and identification of mushroom
- Awareness about the mushroom production constraints
- Having knowledge about the uses of Mushroom
- Expertise in cost analysis in mushroom production and project preparation

Theory

Unit- I Importance of mushroom

Mushroom science: Important land marks of mushroom science, Global production - Morphology and life cycle: *Pleurotus*, *Calocybe*, *Agaricus*, *Lentinus* and *Volvariella*. physiology of fruiting body development; Economic importance and medicinal values - Role of enzymes in mycelium and basidioma development; poisonous mushrooms and mushroom poisoning. Development of commercial cultivation, present status

Unit - II Breeding techniques

Genetics and breeding of cultivated mushrooms: Approaches to breeding: Selection, mutation and hybridization - homothallism and heterothallism, primary and secondary mycelium, parasexuality, homokaryotic fruiting. Biotechnological methods for strain improvement; study of strain variability using markers -Allozyme, RFLP, AFLP, RAPD and PCR -Laboratory techniques, equipments, culture media, sterilization, pure culture techniques - Preservation of cultures - Tissue culture, single and multispore isolates.

Unit - III Mushroom production

Spawn: mother spawn and bed spawn- establishment of commercial spawn production laboratory -Mushroom Farm- Establishment; Seasonal and environmental control for commercial cultivation: Ventilation and CO₂, Maintenance of Temperature and RH. Cultivation: oyster mushroom, milky mushroom, paddy straw mushroom, button mushroom and other edible mushrooms.

Unit - IV Constraints and mushroom usage

Problems in cultivation: weed moulds, diseases, pests, abiotic disorders and their management- Uses of mushroom as food, nutritional and pharmaceutical values. Post-harvest technology: Methods of preservation and value addition. Mushroom recipes: Cooking methods, value added products-pickling, sauce, ketchup and chutney, instant food mixes, extruded and bakery products-quality and organoleptic evaluation.

Unit - V Economics of edible mushroom

Economics in mushroom cultivation. Cost analysis and project preparation: Market survey, export procedures. Agricultural finance: Sources of finance and acquisition. mushroom enterprises management, project analysis and financial management.

Practical

Introduction to mushroom - Edible and poisonous mushrooms - Preparation of culture media - Pure culture techniques - Sterilizing techniques - Media - Maintenance of culture -Mother spawn and commercial spawn production - Type of spawn - establishment of commercial spawn production laboratory- mushroom cultivation techniques - Polybag method -Maintenance of spawn running and cropping room. Mushroom Farm - Establishment - cultivation of edible mushrooms: *Pleurotus*, *Calocybe*, *Agaricus*, *Volvariella*, *Lentinus*, *Auricularia* sp. and other edible mushrooms - Harvest - Packing and storage of mushroom - Problems in cultivation: pests, diseases and weed moulds, management strategies - Nutritional value - Post-harvest technology - Methods of preservation -Cost analysis and project preparation.

Theory Lecture Schedule

1. Important land marks of mushroom, Development of commercial cultivation, present status; Economic importance and medicinal value and global production
2. Morphology and life cycle: *Pleurotus*, *Calocybe*, *Agaricus*, *Lentinus* and *Volvariella*. Morphogenesis in mushrooms, Role of enzymes in mycelium and basidioma development; physiology of fruiting body development; poisonous mushrooms and mushroom poisoning.
3. Genetics and breeding of cultivated mushrooms: Approaches to breeding: Selection, mutation and hybridization; homothallism and heterothallism, primary and secondary mycelium, parasexuality, homokaryotic fruiting.
4. Biotechnological methods for strain improvement; study of strain variability using markers -Allozyme, RFLP, AFLP, RAPD and PCR; Laboratory techniques, equipments, culture media, sterilization, pure culture techniques; Preservation of cultures, Tissue culture, single and multispore isolates.
5. Spawn types: mother spawn and bed spawn; establishment of commercial spawn production laboratory; Mushroom Farm- Establishment; Seasonal and environmental control for commercial cultivation; Ventilation and CO₂, Maintenance of Temperature and RH.
6. Cultivation technology of oyster mushroom, milky mushroom, paddy straw mushroom, button mushroom and other edible mushrooms
7. Problems in cultivation: weed moulds, diseases, pests, abiotic disorders and their management- Uses of mushroom as food, nutritional and pharmaceutical values. Post-harvest technology.

8. Methods of preservation and value addition; Mushroom recipes, Economics in mushroom cultivation, Cost analysis and project preparation: Market survey, export procedures
9. Agricultural finance: Sources of finance and acquisition. Principles of enterprise management, preparation of projects, project analysis and financial management.

Practical Schedule

1. Introduction to mushroom; Edible and poisonous type; Preparation of culture media; Pure culture techniques; Sterilizing techniques; Culture media; Maintenance of culture and establishment of commercial spawn production laboratory.
2. Mother spawn production; Type of spawn - Polybag method; Multiplication of spawn mushroom cultivation techniques; Maintenance of spawn running and cropping room.
3. Mushroom Farm; Cultivation of *Pleurotus*, *Calocybe*, *Agaricus*,
4. Cultivation of *Volvariella*, *Lentinus*, *Auricularia* sp. and other edible mushroom; Harvest - Packing and storage of mushroom.
5. Problems in cultivation: pests, diseases and weed moulds, management strategies; Nutritional value; Post-harvest technology and methods of preservation
6. Cost analysis and project preparation.

Reference Books

1. Chadha, K.L. and Sharma, S.R. 1995. Mushroom Biotechnology Advances in Horticulture. Malhotra Publishing House.
2. Aneja, K.R. 2018. Experiments in Microbiology, Plant Pathology, Tissue culture and Cultivation of Mushroom, New Age International Publishers.
3. Bahl, N. 2000. Handbook of Mushrooms. Oxford & IBH Publishing Co. Pvt. Ltd.
4. Chauhan, N.M., Gagre, N.K. and Prajapati, V.P. 2013. Scientific Cultivation of Mushroom. Biotech books.
5. Kannaiyan, S., Marimuthu, T. and Leni, K. 2011. Diversity and Production of Edible Mushrooms. Associated Publishing Company.
6. Krishnamoorthy, A.S., Marimuthu, T. and Nakkeeran, S. 2005. Mushroom Biotechnology, TNAU Press, Coimbatore.
7. Manjit Singh, B., Vijay, B., Kamal, S. and Wakchaure, G.C. 2011. Mushrooms Cultivation, Marketing and Consumption. National Research Centre for Mushroom, Solan.
8. Rai, R.D., Upadhyay, R.C. and Sharma, S.R. 2005. Frontiers in Mushroom Biotechnology. National Research Centre for Mushroom, Solan.
9. Miles, P.G. and Chang, S.T. 2004. Mushrooms: Cultivation, Nutritional Value, Medicinal Effect and Environmental Impact. CRC Press.

e-References

1. www.emushroom.net
2. www.mushroomdays.com.cn
3. <https://www.mushroomcouncil.com>
4. <https://fungiforthepeople.org>
5. nrcmushroom.org