BIOTECHNOLOGY

Skill Based Elective I (Semester IV)

Updated on 19.02.2018

AQUA CULTURE

Objectives

This course is planned to give basic idea about aqua culture so that one can think of establishing aqua culture as a means for their future.

Unit I Introduction

History, definition, scope and significance of aquaculture, comparison of aquaculture with agriculture and commercial fisheries; Different aquaculture systems. Aquaculture- Global and Indian Scenario; General characters of fishes, and shell fishes. Criteria for the selection of species, Freshwater and marine cultivable fishes and their biology.

Unit II Aquaculture ponds

Preparation and Management of Ponds; Types of ponds – Nursery ponds, Rearing ponds, Grow out ponds. Pre-stocking management – Liming of ponds, Fertilization of ponds, Control of algal blooms, weed control. Water quality management.

Unit III Systems of aquaculture

Concept of different systems of aquaculture - Monoculture, Polyculture, Composite culture, Monosex culture, Mixed culture; Pen, Cage and raft culture. Extensive, Semi-intensive, Intensive aquaculture. Integrated fish farming; Shell fish – culture of prawns and molluscs.

Unit IV Fish feed

Fish feed and its importance, Factors affecting feed design, production and feeding. Manufacture of aquaculture feeds – Feed types, selection of ingredients and additives, Formulation of feeds and storage, Feed techniques – Manual and Mechanical.

Unit V Disease management & Product export

Introduction to fish diseases; Diseases in aquaculture – bacterial, viral and fungal pathogens of fish; Methods for disease control and management – Environment management, chemotherapeutic agents, vaccines and probiotics; Export of fishery products from India - major countries, important products.

Text Books

1. S. Ayyappan, J. K. Jena, A. Gopalakrishnan, Dr. A. K. Pandey. 2010. Handbook of Fisheries and Aquaculture. Indian Council of Agricultural Research. New Delhi.

2. K.K. Balachandran. 2001. Post harvest Technology in Fish and Fishery Products. Daya Publishing House. New Delhi.
3. Jhingran V.G. 1985. Fish and Fisheries of India. 3rd Edition. Hindustan Publ. Crop. India. Ltd. New Delhi.
4. T. V. R. Pillay and M. N. Kutty. 2005. Aquaculture Principles and Practices. Wiely Black-Well

Reference Books

1. Aline W. 1980. Fish diseases. Springer Verlag.
2. Midlen A.B and Redding T.A. 1998. Environmental Management for Aquaculture. 6th Edition. London: Chapman & Hall.
3. Wedmeyer G. Meyer F.P. and Smith L. 1999. Environmental Stress and Fish Diseases. Narendra Publ. House.
4. Woo P.T.K and Bruno D.W. 1999. Fish Diseases and Disorders. Vol. 3 Viral, Bacterial and Fungal Infection. Center for Agriculture and Biosciences International.
5. Felix S. Riji John K, Prince Jeyaseelan M.J. and Sundararaj V. 2001. Fish Disease Diagnosis and Health Management.

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Skill Based Elective II (Semester V)

BIOFERTILIZER

Objectives

This course is planned to give adequate knowledge on biofertilizer to train the students for self employment.

Unit I Microbes and Agriculture

Importance of Carbon, Nitrogen and Phosphorus cycles. Benefits of Biofertilizers - strain selection - seed pelleting - Inoculant and inoculant carriers - Nitrogen fixing Bacteria (*Azotobacter*, *Beijerinckia*, *Clostridium*, *Cyanobacter*). Media for *Azotobacter*, *Azospirillum* and phosphate solubilizer - New nitrogen fixers - 'Nif' genes (Hybrid *E.coli*)

Unit II Blue Green algae as Biofertilizers

Mass cultivation of Cyanobacteria (*Anabaena*, *Cylindrospermum*) - Mass cultivation of *Azolla*, *Azolla* - *Anabaena* complex - Algal inoculants - methods of production (Trough method, Pit method, Field scale,) application.

Unit III Microbial Symbiotic association

Rhizobium - Taxonomy, physiology, Host-*Rhizobium* interaction, mass cultivation, carrier and base inoculants. Vermiculture - Earth worms and micro organisms - Microbial enzymes - Bioprocessing.

Unit IV Mycorrhiza

Types of mycorrhizal associations, VAM mycorrhizal association: taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield, collection of VAM, isolation, stock plants and inoculums production of VAM.

Unit V Production and quality control in Biofertilizers

Isolation and identification of different nitrogen fixing ability of different strains under controlled and field conditions, direct and indirect methods, culture production, fermenter, storage of culture, carrier, packing, quality control, ISI Standards, inoculums requirements, packing, marketing and storage, inoculums requirements methods of application.

Text Books

1. S. G. Borkar, 2015. Microbes as Bio-fertilizers and their Production Technology, Woodhead Publishing India in Agriculture, India.
2. R Shankara Reddy, 2012. Biofertilizer Technology, Adhyayan Publishers, India.

Reference Books

1. Moshrafuddin Ahmed and Basumatary, S.K.2006. Applied Microbiology, M.J.P. Publishers, Chennai.
2. Dubey, R.C.2003. A text book of Biotechnology. S. Chand & company, New Delhi.

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Skill Based Elective III (Semester V)

MUSHROOM CULTIVATION AND VALUE ADDITION

Objectives

This course is planned to give adequate knowledge on mushroom cultivation and value addition to train the students for self employment.

Unit I Introduction to Mushrooms

History –Mushroom, taxonomic position, characteristic features, types, merits & demerits, applications as food, pharma products. Scope of edible mushroom cultivation. Types of edible mushrooms, identifying features, physical & chemical characters, nutritive value, merits & demerits. *Calacybe indica, Volvariella Volvacea, Pleurotus sp., Agaricus bisporus.*

Unit II Pure culture

Preparation of media (PDA and Oatmeal agar media) sterilization – Preparation of test tube slants to store mother culture – culturing of Pleurotus mycelium on petriplates – Preparation of mother spawn in saline bottle and polypropylene bags and their multiplication.

Unit III Cultivation of Mushrooms :

Infra structure, Substrates (locally available) polythene bag, vessels, Inoculation hood – inoculation loop – low cost stove – sieves – Culturel rack mushroom unit (Thatched house) – Mushroom bed preparation – Paddy straw, sugarcane trash, maize straw, banana leaves. Preparation of inoculums, Spawn production, preparation of bed, inoculation, growth conditions, harvest.

Unit IV Storage and nutrition :

Short term storage – Long term storage (scanning, Pickles, papads, drying, storage in salt solutions) – Nutrition : Proteins, amino acids, mineral elements. Nutrition : Carbohydrates – Crude fiber content, vitamins.

Unit V Value addition and Preservation of Mushrooms -

Types of foods prepared from mushroom - soup, cutlet, omelette, samosa, pickles, curry. Research Centres – National level and Regional Level Cost benefit ratio – Marketing in India and abroad – Export value

Reference Books

1. Marimuthu et al., (1991) Oyster Mushrooms, Dept. of Plant pathology, TNAU, Coimbatore.
2. Nita Bahl (1988) Hand book of Mushrooms, II edition, Vol.I & II.
3. Paul Stamets, J.S. and Chilton, J.S. (2004). Mushroom Cultivator: A practical guide to growing mushrooms at home, Agarikon Press.
4. Shu-Ting Chang, Philip G. Miles, Chang, S.T. (2004). Mushrooms: Cultivation, nutritional value, medicinal effect and environmental impact, 2nd ed, CRC press.
5. Swaminathan M. (1990) Food and Nutrition, Bappco. The Bangalore Printing and Publishing Co. Ltd., Bangalore.
6. Tewari and Pankaj Kapoor S.C. (1988) Mushroom cultivation, Mittal Publications, Delhi. *

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