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Choice Based Credit System (CBCS)

Hand book of

BOTANY PRACTICAL

F.Y. B. Sc. Semester I & II

Plant Taxonomy

[BOT : 103, 203]

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Botany Practical

[BOT: 103, 203]

SEMESTER-I & II

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PREFACE

The authors are very happy to bring out the Practical book of “Botany” for F.Y. B.Sc. Botany students of Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon.

The authors have great pleasure to place the book in the hands of F.Y.B. Sc students and teachers. This book has been written according to the new syllabus of F.Y.B.Sc. of Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon.

We have tried our best to make this book informative simple and lucid. We hope this book will generate interest among students and helps them in understanding the subject.

We offer our sincere thanks to publisher Kumud Publications and Vrinda Publications, Jalgaon for their co-operation and Keen interest in publishing this book. Although care have been taken while writing, editing and proof reading of the book, errors might has been left unnoticed. We will definitely welcome the healthy suggestions from the readers.

Authors

Paper III BOT:103, 203 Practical

(Based on Bot.101 and Bot.102)

(Based on Bot.201 and Bot.202)

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Note: 1. Submission of any five plants from Archegoniates
2. Tour report.

Semester- I

BOT: 101 and BOT:102

Practical –1

Aim: Study of equipments used in Microbiology: Spirit lamp, Inoculation Loop, Hot air oven, Laminar Air Flow (LAF) and Incubator.

1. Spirit lamp:

An alcohol lamp is used for heating, sterilization, and combustion in a laboratory. The alcohol lamp uses ethyl alcohol or spirit as a fuel. An alcohol burner or spirit lamp is used to produce an open flame. It is generally made up of glass, brass or aluminum. Most chemical and biological reactions require heating of the substrate to get the desired product. Their flame is limited to approximately two inches (5 centimetres) in height, with a comparatively lower temperature than the gas flame of the Bunsen burner. They are sufficiently hot for performing some chemistry, standard microbiology laboratory procedures and can be used for flame sterilization of other laboratory equipments.

2. Inoculating Loop:

The most commonly used tools for aseptic transfer. An inoculating loop consists of an insulating handle provided with screw device at the top which holds a heat resistance nichrome or platinum wire, approximately three inches long. The wire end is bent round to form a loop. It is sterilized by heating or flaming in the blue (hottest) portion of the Bunsen burner flame or electric incinerator until it is red hot. The loop is mainly used to transfer (sub culture) from liquid culture, the liquid drop being held across the loop area by surface tension.



Fig: Spirit lamp



Fig: Inoculating Loop

3. Hot Air Oven:

Hot- air ovens are most commonly used for sterilizing glassware like Petri dishes, test tubes, pipettes, metal instruments that can tolerate prolonged heat exposure, oils, powders, waxes and other articles that are either spoiled or not effectively sterilized by the moist heat of the autoclave. Sterilization is completed by exposure of items to 150-180 °C for 2-4 hrs.

An oven consists of an insulated cabinet which is held at a constant temp. by means of an electric heating mechanisms and thermostat. It is fitted with a fan to keep the hot air circulating at a constant temp. and thermometer for recording the temp. of the oven .For proper circulation of the hot air the shelves are perforated .For normal sterilization work ,the oven should be operated at 160 °C and most glassware will require a period of two hrs. for total sterilization.

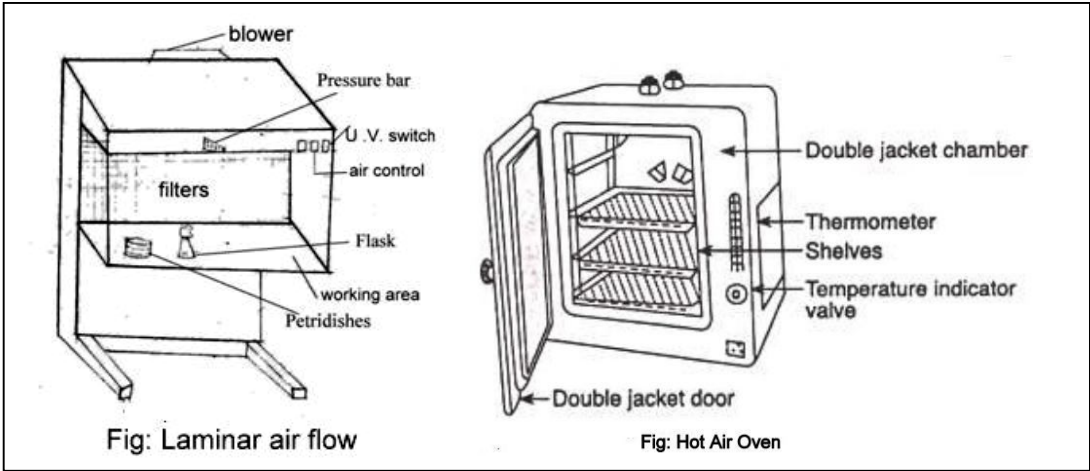
4. Laminar air flow:

Laminar air flow cabinet is the most suitable, convenient and reliable instrument for aseptic work. It allows working for a longer period. The cabinet is usually made of stainless steel with no gaps or joints.

Principle - Laminar Air Flow is based on the flow of air current to create uniform velocity, along parallel lines, which helps in transforming microbial culture in aseptic conditions to avoid the dust and contaminants.

When fresh air is passed in the laminar air flow it replaces the contaminated air inside and keeps it contamination free.

Working: Laminar Air Flow system is equipped with filter pad, a fan and a HEPA (high efficiency particulate air) filter having a pore diameter of just 0.3 microns. The fan sucks the air through the filter pad where dust is trapped. After that the prefiltered air has to pass the HEPA filter where contaminating fungi, bacteria, dust, etc. are removed. The ultraclean air which is free from fungal and bacterial contamination, flows at the velocity of about 27 ± 3 m/minute through the work area. Now the sterile air flows into the working (flasking) area where you can do all your flasking work without risk of contamination. Moreover it is fitted with UV lamps. Before starting work, LAF is put on for 10-15 minute. The flow of air does not put out the flame of a spirit lamp. Therefore, a spirit lamp can be used conveniently during the work.



5. Incubator

An incubator is very similar to an oven in construction and consists of an insulated cabinet fitted with a heating element at the bottom. The temp. of the incubator is maintained at the desired level by an automatic device called thermostat which cuts the connection off when the temperature reaches the point for which the thermostat is set and turns it on again when the temperature falls slightly below that point. The incubator is properly ventilated by the perforated shelves. They are provided with double doors, the inner one made of glass so that the contents of the incubator may be viewed without admitting outside air. An incubator is used for incubation (i.e. culturing of microorganisms at a constant temp. favorable to the growth and development) of microorganism. Most incubators used dry heat for maintaining temp. Moisture can be supplied by placing a beaker of water in it to retard dehydration of the medium, during the growth period of microorganisms. Some incubators are provided with fluorescent light arrangement to provide light to microorganisms which require light for sporulation and / or growth.

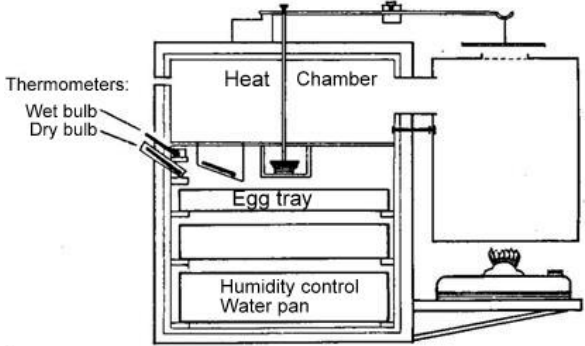


Fig: Incubator

Practical –2

A) Study of viruses and Bacteria using Electron Photomicrographs (TMV, Bacteriophage, Cocci, Bacillus, Spirillum Bacteria)

B) Gram staining technique.

A) Tobacco mosaic virus (TMV):

It is a single stranded RNA virus, that infects a wide range of plants, especially Tobacco and many members of the family Solanaceae. The infection causes characteristic patterns, such as "mosaic" like mottling and discoloration on the leaves, hence the name TMV. TMV was the first virus ever to be discovered it is an infectious disease which damage tobacco crops.

TMV is a simple rod-shaped helical virus consisting of centrally located single-stranded RNA enveloped by a protein coat. The rod is considered to be $3,000 \text{ \AA}$ in length and about 180 \AA in diameter. The protein coat is called 'capsid'. The sub-units, of capsid is capsomere. In a complete helical rod, there would be about 130 turns per rod of TMV. Total 2130 capsomeres are arranged in a helicle. Each capsomere is a grape like structure containing about 158 amino acids.

The diameter of RNA helix is about 80 \AA the central core of the rod is about 40 \AA in diameter.

The coiled RNA is little more in length (about 3300 \AA) slightly protruding from one end of the rod. The RNA molecule consists of about 7300 nucleotide.

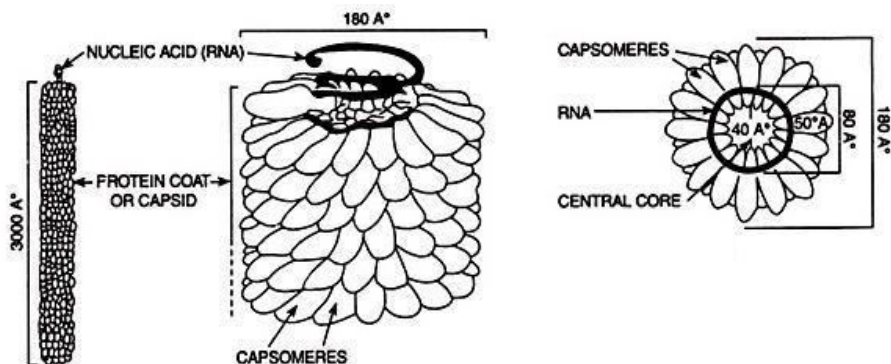


Fig:Tobacco mosaic virus (TMV)

Bacteriophage:

Bacteriophages, are the viruses that infect bacteria. A bacteriophage infects bacteria by inserting its genetic material into the host cell. Bacteriophages attacking *Escherichia coli* are called coliphages or T-phages. These are tadpole like structure.