PG DEPARTMENT OF BOTANY

KAHM UNITY WOMEN'S COLLEGE, MANJERI, MALAPPURAM, KERALA, 676122

ADD-ON COURSE

PLANT TISSUE CULTURE TECHNOLOGY

COURSE DESCRIPTION: Plant tissue culture technology provides better plant propagation method to produce a large number of plantlets from a desirable mother plant explant within a short period of time using the suitable artificial nutrient medium under sterile environmental conditions. The course provides a proper procedure for *in vitro* plant multiplication usable for agricultural practices and germplasm conservation. Beyond, it aims to provide the knowledge regarding sterilization methods, explant and media selection and hardening together with the familiarization about worldwide applications of plant tissue culture for the wellbeing of society.

SYLLABUS

CREDIT: 2 DURATION: 30 HOURS

OBJECTIVES

- To make awareness about the better strategy to multiply and establish the valuable plants needed for the welfare of human beings.
- To practice the proper procedure of *in vitro* multiplication of plantlets in germplasm conservation.
- To understand the method to produce stress tolerant plants that can grow under environmental stress.

LEARNING OUTCOMES

- Familiarize the correct procedure of *in vitro* plant multiplication
- Gain the knowledge on proper precautions to reduce the microbial contamination
- Understand about the necessity of rare plant conservation

- Obtain the information on income generating job practice to the society

MODULE I (10 HOURS)

1. Plant tissue culture: Principles and techniques; Cellular totipotency; *in vitro* differentiation- de differentiation and re-differentiation
2. Tissue culture medium: Basic components in tissue culture medium - Solid and liquid medium; Murashige and Skoog medium - composition and preparation
3. Aseptic techniques in *in vitro* culture: sterilization methods, sterilization of instruments, glass wares, medium, explants; working principle of laminar air flow and autoclave
4. Preparation of explants: Surface sterilization, inoculation, incubation, subculturing
5. Micropropagation: Different methods - Apical, axillary bud proliferation, direct and indirect organogenesis and somatic embryogenesis
6. Different phases of micropropagation: Multiple shoot induction, shoot elongation, *in vitro* and *in vivo* rooting hardening, transplantation and field evaluation; advantages and disadvantages of micropropogation, somaclonal variation

MODULE II (10 HOURS)

1. Methods and Applications of tissue culture:
    1. Shoot tip and meristem culture
    2. Somatic embryogenesis and synthetic seed production
    3. Embryo culture
    4. Protoplast isolation culture and regeneration: Transformation and transgenics
    5. Somatic cell hybridization, cybridization.
    6. *In vitro* secondary metabolite production: Cell immobilization, bioreactors
    7. *In vitro* production of haploids: Anther and pollen culture, *In vitro* preservation of germplasm

PRACTICAL (10 HOURS)

1. Preparation of nutrient medium: Murashige and Skoog medium using stock solutions

2. Familiarize the technique of preparation of explants, surface sterilization, inoculation and subculturing
3. Preparation of synthetic seeds
4. Demonstration of anther culture

REFERENCES

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4. Edwin F. George, Michael A. Hall & Geert-Jan De Klerk (2008) Plant propagation by tissue culture Volume 1. The Background. Springer, P.O. Box 17, 3300 AA Dordrecht. The Netherlands.
5. Madhavi Adhav (2010) Practical book of Biotechnology and Plant Tissue culture
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8. Roberta H. Smith (2012) Plant Tissue Culture: Techniques and Experiments. Academic Press
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