Sankalchand Patel University

Faculty of Science

B.Sc. (Biotechnology) (SEM-VI)

In Effect from Academic Year 2018-19

Subject Code: 1SC1010604	**Subject Title: Plant Biotechnology**

Course Objective: This course is designed to enable students to acquire the knowledge of plant tissue culture and techniques in plant transgenics. The study also includes the role of markers in genetic transformation and application of plant biotechnology to develop commercially important plants.

Teaching scheme (hours) per week		**Credit**			**Theory Marks**		**Practical Marks**		**Total**
Theory	**Practical**	**Theory**	**Practical**	**Total**	**Uni. Assessment**	**Cont. Assessment**	**Uni. Assessment**	**Cont. Assessment**	
3	**--**	**3**	**--**	**3**	**70**	**30**	**--**	**--**	**100**

Unit	**Content**	**Lectures**	**Weightage**
1	**Overview of Tissue Culture** Plant Tissue culture : History, The laboratory facilities: Equipments and apparatus, Design Concepts of totipotency of cells, Cell growth and cytodifferentiation – morphogenesis. Plant tissue culture media: Media composition, Types of media, media preparation procedure and sterilization of media Selection, isolation and preparation of explant Micropropagation and its stages	**15**	**33%**
2	**Techniques of tissue culture** Culture of organized tissues: Root culture, shoot culture, meristem culture, embryo culture, Pollen and anther culture (production and uses of haploids.) Callus culture Protoplast culture: Somatic hybridization and its application. Somatic embryogenesis Cell suspension culture and production of secondary metabolite Synthetic seeds Cryo preservation of germplasm and distribution of clonal material	**15**	**33%**
3	Physical and chemical methods used for gene transfer in plants Agro bacterium mediated gene transfer in plants Other biological gene transfer methods Structure of plant gene Plant cloning vectors: Use of different promoters, selectable markers, reporter genes Seed terminator technology Chloroplast transformation – a potential alternative to nuclear transformation Transgenic plants: Insect resistance-BT Cotton, herbicide resistance, Disease resistance, Stress tolerance, improvement of crop yield and	**15**	**34%**

	quality, molecular pharming Post-harvest technology: RNAi and antisense RNA technology for extending shelf life of fruits (delay of softening and ripening of fleshy fruits eg. tomato, banana, water melons)and flowers (ACC synthase gene and polygalactoronase)		

Learning Outcome: Developing an understanding towards fundamentals of plant biotechnology.Generation of capacity to design and perform experiments of Plant tissue culture and Plant transformation. Enabling students to understand types, advantages and disadvantages molecular markers. Development of capacity to formulate application of plant biotechnology for production of commercial transgenic plants.

REFERENCES

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- Biotechnology in crop improvement – H S Chawla.
- Practical application of plant molecular biology – R J Henry, Chapman & Hall.
- Elements of biotechnology – P K Gupta.
- An introduction to plant tissue culture – M K Razdan.
- Plant propagation by tissue culture: The technology (Vols. 1 & 2) – Edwin George.
- Handbook of plant cell culture (Vols. 1 to 4) – Evans et. al., Macmillan.
- Plant tissue and cell culture – H E Street, Blackwell Scientific.
- Cell culture and somatic cell genetics of plants (Vols. 1 to 3) – A K Vasil, A. Press.
- Plant cell culture technology – M M Yeoman.
- Plant tissue culture and its biotechnological applications – W Bary, et. al., Springer Verlag.
- Principles of plant biotechnology: An introduction to genetic engineering in plants – S H Mantel, et. al.
- Applied and fundamental aspects of plant cell tissue and organ culture edited by Reinert & Bajaj Y P S, Springer Verlag.
- Plant cell and tissue culture – S Narayanswamy, Tata Mc Graw Hill Co
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- Plant and tissue culture Radint and Bhojwani.