

TRANSGENIC TECHNOLOGY

Semester	Subject Code	Category	Lecture		Theory		P	C
III	21CPBT3A	Core - VII	5 hrs per week	75	5 hrs per week	75	0	5

COURSE OBJECTIVE: In this course, students will

- Understand the basics, concepts in transgenics including transgenic technology in plants, animals, regulation of gene expression, gene silencing, gene targeting, inducible expression systems, chromosome engineering, gene tagging, bio-safety, regulation and IPR issues of GMO and application of transgenic technology for developing farm animals, poultry birds, crop yield and vaccine development.

COURSE OUTCOMES: Up on successful completion of course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL (K2-K6)
CO1	Understand the basic of transgenic in plants and animals, and its application to basic research. Tools, techniques and methodologies for developing transgenic plants and animals.	K2
CO2	Understand the organization of genome, regulation of gene expression and gene silencing in plants and animals. Concept of gene targeting.	K2
CO3	Apply their knowledge in developing Transgenic plants and animals. Advantages and disadvantages of Transgenic model.	K3 & K5
CO4	Determine the fundamentals in advances of transgenics include Inducible expression systems- endogenous inducible promoters, recombinant inducible systems, site-specific recombination, chromosome engineering, gene tagging.	K4
CO5	To determine the ethical issues of transgenics, Innovation and entrepreneurship development of transgenic technology.	K6

Knowledge level: K1- Remember; K2- Understand; K3- Apply; K4- Analyze; K5- Synthesize; K6- Evaluate

MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	S	M
CO2	S	S	M	M	M	M
CO3	S	S	S	M	S	M
CO4	S	M	M	S	S	S
CO5	M	S	M	S	S	M

S-strong; M- medium; L-low

UNIT I**TRANSGENIC TECHNOLOGY****15 Hours**

Introduction to Transgenic technology in plants and animals: Gene transfer methods: Methods used for animals-DNA micro injection, Retrovirus-mediated gene transfer, Sperm mediated gene transfer methods, embryonic stem cell mediated gene transfer and its application to basic research and commercial benefit.

UNIT II**GENE EXPRESSION****15 Hours**

Organization of genome, regulation of gene expression and gene silencing in plants and animals. Factors inducing gene expression, Structure and mechanisms of action. Transcription factors: Types of transcription factors. Strategies and methodologies of screening, selection, verification and characterization of transformed tissues of plants and animals. Concept of gene targeting.

UNIT III**TRANSGENIC SYSTEMS****15 Hours**

Application of transgenic technology for enhancement of crop yield: Rice, Maize Transgenic farm animals: Construction of a transgene, Production and applications of transgenic animals. Transgenic animal models: Sheep, Mice (DOLLY & MOLLY)

UNIT IV**ADVANCES IN TRANSGENICS****15 Hours**

Advances in transgenics: Inducible expression systems- endogenous inducible promoters, recombinant inducible systems (*lac* repressor systems and *tet* repressor systems), (*tet* activator system and *reverse* activator system), site- specific recombination, chromosome engineering: power tools for plant tools.

UNIT V**QUALITY CONTROL****15 Hours**

Quality control: Introduction, Bio safety, regulation and IPR issues of genetically modified crops and animals. Transgenic crops approved by Food and Drug Administration, Major Indian developments in transgenic research and application in public sector. Nutritional quality. Innovation and entrepreneurship development of transgenic technology.

TEXT BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	J.F. Jackson and H.F. Linskens	Genetic Transformation of Plants	Springer Verlag Berlin, Germany	1935

2.	Kirsi-Marja Oksman-Caldentey, Wolfgang H. Barz	Plant Biotechnology and Transgenic plants	New York: Marcel Dekker.	2002
3	Portner R	Animal Cell Biotechnology	Humana Press, USA.	2007
4	Sandeep Kumar, Pierluigi Barone and Michella Smith	Transgenic Plants	Academic Press	1864
5	Shain-dow kung	Transgenic Plants	Academic Press	1992

REFERENCE BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Carl.A.Pinkert	Transgenic animal Technology	Academic Press	2012
2.	Eng Chong Pua and Michael R.	Transgenic Crops VI	Springer science & Business media	2007
3.	Leandro Pena	Transgenic Plants	Springer science & Business media	2005
4.	Gerorge C. Khachatourisns and Hui.Y.H	Transgenic Plants and crops	CRC Press	2002
5.	Carl A. Pinkert	Transgenic Animal Technology	Newnes	2014

WEB RESOURCES:

1. <https://ijpsr.com/bft-article/transgenic-animals-production-and>
2. https://en.wikipedia.org/wiki/Transgenic_plant
3. <https://www.sciencedirect.com/science/article/pii/S0974694313003289>
4. <https://www.biotechnologynotes.com/animals/transgenic-animals/top-12>
5. https://www.researchgate.net/publication/257380036_TRANSGENIC_ANIMALS
6. <https://www.biotechnologynotes.com/animals/transgenic-animals/top-12>

Syllabus Designer:

- Mrs. J. Hanusha
Assistant Professor