



Department of Biotechnology	LP: BT18020 Rev. No: 00 Date: 01.03.2022
B.E/B.Tech /M.E/M.Tech : Biotechnology Regulation: 2018 (Autonomous) PG Specialisation : NA Sub. Code / Sub. Name : BT18020 Plant Biotechnology Unit : I	

Unit Syllabus: Organization of Genetic Material (9 h)

Genetic Material of plant cells – nucleosome structure and its biological significance – junk and repetitive DNA – outline of transcription and translation.

Objective: To understand the fundamentals of plant cells, structure and functions

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Introduction to Plant Biotechnology and Genetic Material of Plants	RB10; Pg. (68-84) RB10; Pg. (1-6)	PPT/BB
2.	Nucleosome structure and Biological significance of nucleosome structure	RB14; Pg. (256-260) RB14; Pg. (260-266)	PPT/BB
3.	Transposons	RB12; Pg. (234-245)	PPT/BB
4.	Junk and Repeat sequences	RB13; Pg. (1-19) RB14; Pg. (231-245)	PPT/BB
5.	Outline of Transcription	RB10; Pg. (23-27) RB15; Pg. (347-406)	PPT/BB
6.	Outline of Translation.	RB10; Pg. (27-32) RB15; Pg. (411-456)	PPT/BB
7.	Regulation of Gene Expression	RB10; Pg. (10-15) RB10; Pg. (288-391)	PPT/BB
8.	Alternative and Trans Splicing	RB9;Pg.(697-750)	PPT/BB
9.	Constitutive and Differentially expressed genes	RB9;Pg.(279-301)	PPT/BB

Content beyond syllabus covered (if any): Tandem chimerism

* Session duration: 50 minutes



Sub. Code / Sub. Name: **BT18020 & Plant Biotechnology**

Unit : **II**

Unit Syllabus: **CHLOROPLAST & MITOCHONDRIA (9 h)**

Structure, function and genetic material; rubisco synthesis and assembly, coordination, regulation and transport of proteins. Mitochondria: Genome, cytoplasmic male sterility and import of proteins.

Objective: To impart a thorough grounding in the major plant organelles its genome structure and function.

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Chloroplast Genome: Structure and function	RB10; Pg. (32-35)	PPT/BB
2.	Copy Number of Plastid Genome and Localisation	RB10; Pg. (35-37)	PPT/BB
3.	Gene Content, Transcription and RNA processing	RB10; Pg. (38-43)	PPT/BB
4.	Protein Genes, Chloroplast Promoter sequences	RB10; Pg. (44-46)	PPT/BB
5.	Rubisco synthesis and Assembly	RB11; Pg. (166-168)	PPT/BB
6.	Coordination and regulation of proteins	RB9; Pg. (168-171)	PPT/BB
7.	Transport of Proteins	RB12; Pg. (27-36)	PPT/BB
8.	Mitochondrial Genome: Structure and function	RB10; Pg. (47-56) RB14; Pg. (245-250)	PPT/BB
9.	Cytoplasmic male sterility and import of proteins.	RB10; Pg. (56-60) RB12; Pg. (28-36)	PPT/BB

Content beyond syllabus covered (if any): T-CMS

* Session duration: 50 mins



Sub. Code / Sub. Name: **BT18020 & Plant Biotechnology**

Unit : **III**

Unit Syllabus: **Nitrogen Fixation (9 h)**

Nitrogenase activity – nod genes – nif genes – bacterioids.

Objective: To illustrate and explain the molecular genetics and physiology of nitrogen fixation

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Nitrogen Fixation - Introduction	RB9; Pg. (307-308)	PPT/BB
2.	Legumes	RB9; Pg. (308-309)	PPT/BB
3.	Symbiosis	RB9; Pg. (309-311)	PPT/BB
4.	Nitrogenase activity	RB9; Pg. (313-316)	PPT/BB
5.	Nod genes and Nif Genes	RB9; Pg. (311-312) RB9; Pg. (311-313)	PPT/BB
6.	Bacterioids and Nitrogen Fixation at low oxygen Concentration	RB9; Pg. (309-311) RB9; Pg. (316-318)	PPT/BB
7.	Plants symbiosis with Fungi and Root Nodule Symbiosis Evolution	RB9; Pg. (318-320) RB9; Pg. (320-321)	PPT/BB
8.	Production of Secondary metabolites	RB18; Pg. (17-19)	PPT/BB
9.	Flavanoid synthesis and metabolic engineering.	RB18; Pg. (19-21)	PPT/BB
Content beyond syllabus covered (if any): Flavanoid metabolic engineering in Tomato			

* Session duration: 50 mins



Sub. Code / Sub. Name: **BT18020 & Plant Biotechnology**

Unit : **IV**

Unit Syllabus: **Agrobacterium and Viral vectors (9 h)**

Pathogenesis, crown gall disease, genes involved in the pathogenesis, Ti plasmid – T-DNA, importance in genetic engineering. Viral vectors: Gemini virus, Cauliflower mosaic virus, viral vectors and its benefits.

Objective: To illustrate and describe the genetic transformation in plants by the aid of different vector systems.

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Pathogenesis of <i>Agrobacterium tumefaciens</i>	RB8; Pg. (55-56)	PPT/BB
2.	crown gall disease	RB8; Pg. (56)	PPT/BB
3.	Genes involved in the pathogenesis	RB8; Pg. (59-62)	PPT/BB
4.	Ti plasmid – T DNA	RB8; Pg. (56-59)	PPT/BB
5.	Direct Gene Transfer Methods	RB5; Pg. (468-472)	PPT/BB
6.	Binary Vectors for plant Transformation	RB8; Pg. (79-100)	PPT/BB
7.	Viral Vectors: Gemini virus	RB5; Pg. (465-466)	PPT/BB
8.	Viral Vectors: cauliflower mosaic virus	RB13; Pg. (465-466)	PPT/BB
9.	Viral Vector Benefits and methods for transgene identification	RB13; Pg. (464)	PPT/BB

Content beyond syllabus covered (if any): Whiskers

* Session duration: 50 mins



Sub. Code / Sub. Name: **BT18020 & Plant Biotechnology**

Unit : V

Unit Syllabus : **Applications of Plant Biotechnology (9 h)**

Outline of plant tissue culture- Transgenic plants: herbicide and pest resistant plants, molecular pharming, therapeutic products.

Objective: To illustrate and explain the different techniques and applications of plant tissue culture and plant regeneration; to elaborate the major target for the genetic manipulation of crops and how they are being approached or have been achieved.

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Outline of plant tissue culture	RB5; Pg. (356-400) RB8; Pg (35-52)	PPT/BB
2.	Transgenic plants	RB5; Pg. (445-446)	PPT/BB
3.	Herbicide Resistant Plants	RB5; Pg. (478-480)	PPT/BB
4.	Pest/Insect Resistant Plants	RB5; Pg. (480-486)	PPT/BB
5.	Stress Tolerant Plants	RB8; Pg. (205-229)	PPT/BB
6.	Viral resistant Plants	RB8; Pg. (179-202) RB5; Pg. (487-489)	PPT/BB
7.	Molecular Pharming	RB8; Pg. (261-302)	PPT/BB
8.	Therapeutic Products	RB5; Pg. (515-519) RB8; Pg. (288-298)	PPT/BB
9.	RNA i, Transgene silencing ,ethical issues	RB8; Pg.76	PPT/BB
Content beyond syllabus covered (if any): RNAi in Tomato			

* Session duration: 50 mins



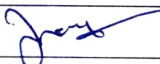

Sub Code / Sub Name: **BT18020 & Plant Biotechnology**

TEXT BOOKS:

1. Chawla, H.S., "Introduction to Plant Biotechnology", 3rd Edition, Science Publishers, 2009.
2. Gamburg OL, Philips GC, "Plant Tissue & Organ Culture fundamental Methods", Narosa Publications, 1995.
3. Adrian Slater, Nigel Scott, Mark Fowler, "Plant Biotechnology: The genetic manipulation of plants", 2nd Edition, Oxford University Press, 2008.

REFERENCES:

1. Stewart Jr., C.N., "Plant Biotechnology and Genetics: Principles, Techniques and Applications", Wiley-Interscience, 2008.
2. Heldt HW, "Plant Biochemistry & Molecular Biology", Oxford University Press, 1997.
3. Ignacimuthu .S, "Applied Plant Biotechnology", Tata McGraw Hill, 1996.
4. Grierson D. and Covey, S.N. Plant Molecular Biology, 2nd ed., Blackie, 1988
5. Singh BD. Text Book of Biotechnology, Kalyani Publishers. 1998
6. Heldt HW. Plant Biochemistry & Molecular Biology, Oxford University Press. 1998.
7. Ignacimuthu .S, Applied Plant Biotechnology, Tata McGraw-Hill. 1996.
8. Adrian Slater, Nigel Scott, Mark Fowler, Plant Biotechnology, The Genetic Manipulation of Plants, Oxford University Press, 2003.
9. Hans-Walter Heldt, Plant Biochemistry, 4th edition, Academic Press, Elsevier
10. S. Ignacimuthu, Plant Biotechnology, Oxford and IBH publishing.
11. Photosynthesis physiology and metabolism, Richard C Leegood, Kluwer academic publishers.
12. Molecular Cell Biology, Lodish, 5th Edition, W. H. Freeman and company
13. Multimedia E-textbook of medical biology, genetics and genomics, 4th Chapter Author: MUDr. Ondřej Šeda, PhD. Department of Metabolism and Diabetes, Institute for Clinical and Experimental Medicine, Prague, Czech Republic
14. Molecular Cell Biology, Lodish, 7th Edition, W. H. Freeman and company
15. Molecular Biology of the Cell, Watson, Baker, Bell -2004, 5th edition, Pearson
16. Gamburg O.L., Philips G.C. Plant Tissue & Organ Culture: Fundamental Methods. Narosa , 1995.
17. Wilkins M.B .Advanced Plant Physiology , ELBS, Longman, 1987
18. Plant secondary metabolites, occurrence structure and role in human diet. A.Croizer, M.N. Clifford, Blackwell publishing.
19. Genes VIII- Benjamin Lewin, Pearson prentice hall.

	Prepared by	Approved by
Signature		
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Date	01.03.2022	01.03.2022
Remarks *	The same lesson plan will be followed in the subsequent semester	

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD