LS684 Crop Genomics

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S. No	Topic	No. of lectures	Faculty
1.	Conventional breeding methods: Pedigree, Mass selection, Hybrid and Mutation breeding approaches for crop improvement	3	NR**/PKV
2.	Molecular breeding: Molecular markers, QTL mapping, comparative genetics, genome-wide association studies and marker-assisted selection/transfer of important traits into crop plants and speed breeding.	4	NR**/PKV
3.	Phenomics: Classical to modern plant phenotyping techniques.	2	AKS/PKV
4.	Genome sequencing strategies: hierarchical and whole genome sequencing, Next Generation Sequencing, and their application in crop improvement, with case studies.	4	PKV
5.	Functional genomics approaches: RNAseq, microarray and other expression studies, development and application of tilling populations, T-DNA tagging, transposon tagging, proteomics and metabolomics-based approaches.	4	PKV
6.	Transgenic approaches: development of transgenics and their utility in crop improvement, with examples	3	AKS
7.	Genome editing: CRISPR/Cas9 and other techniques, and their potential applications in crop improvement through targeted genome engineering.	3	AKS
8.	Plant non-coding RNAs: miRNAs, siRNAs, long non-coding RNAs, and their applications in crop improvement.	3	AKS
9.	Epigenetic regulation of gene expression and their potential application in crop improvement.	3	NR**/PKV
10	Crop variety development, ethical and regulatory issues, origin and ownership of crop plants, plant variety protection and farmers right.	3	NR**/PKV

* Coordinator, **NR: not teaching this year

Suggested Readings:

1. Genome IV, T.A Brown, 4th edition, Garland Science Publications
2. Principles of Gene Manipulation and Genomics, 7th Edition Sandy B. Primrose, Richard Twyman, Wiley Publications
3. Plant Biotechnology: The genetic manipulation of plants: A. Slater, N. Scott, M. Fowler (editors), Oxford Publisher.
4. Advancement in Crop Improvement Techniques: N. Tuteja, R. Tuteja, N. Passricha, S.Saif (Editors), Woodhead Publisher.
5. Epigenetic Memory and Control in Plants; Gideon Grafi and Nir Ohad (Eds.). Publisher: Springer.
6. Law of Plant Varieties Protection by Elizabeth Verkey, Publisher: Eastern Book Co.
7. Non-coding RNAs in Plants: Erdmann, A. Volker, J. Barciszewski (Eds.), Springer publisher.

***Additional study materials and relevant information will be provided during class hours