

Crop Genomics (LS632A)

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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 | BC |
| 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 | BC |
| 3. | Phenomics: Classical to modern plant phenotyping techniques. | 2 | AKS |
| 4. | Genome sequencing strategies: hierarchical and whole genome sequencing, next generation and 3 rd generation sequencing, and their application in crop improvement, with case studies. | 6 | 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 | 2 | BC |
| 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 its potential application in crop improvement. | 3 | AKS |
| 10 | Crop variety development, ethical and regulatory issues, origin and ownership of crop plants, plant variety protection, and farmers right. | 2 | PKV |

Suggested Readings:

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