

Scientist B – Botany / Plant Breeding

Name of the post	Subject	Syllabus
Scientist B - Botany/Plant Breeding	Botany	<p>Plant Diversity & Evolution: Viruses, Bacteria, Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms, Angiosperms. Plant Structure & Function: Morphology, Anatomy (of angiosperms), Embryology, Plant Physiology, Biochemistry. Genetics & Molecular Biology: Cell Biology, Genetics, Genomics, Recombinant DNA Technology, Plant Biotechnology. Ecology & Environment: Plant Ecology, Phytogeography, Environmental Botany, Plant Pathology. Applied Botany: Economic Botany, Plant Breeding, Phytopathology, Biotechnology Applications.</p>
	Agriculture	General Agriculture-All basic courses (Agronomy, Genetics & Plant Breeding, Soil Science & Agricultural Chemistry, Plant Physiology, Plant Pathology, Agricultural Economics & Agricultural Marketing, Statistics, Plant Biotechnology, Plant Biochemistry)
	Genetics & Plant Breeding	<p>General Genetics & Cytogenetics: Mendelian laws, gene concept, linkage, DNA structure & replication, mutations, cell structure, chromosomes, polyploidy, aberrations, sex determination. Molecular Genetics: Genetic code, gene expression (transcription/translation), gene regulation, molecular basis of mutations, recombinant DNA, gene cloning, DNA fingerprinting, molecular markers (MAS, MARS). Quantitative Genetics: Heritability, genetic advance, genotype-environment interaction, gene action, population genetics, biometrical genetics. Plant Breeding Methods Foundations: Objectives, evolution of crops, plant introduction, germplasm conservation, landraces. Breeding Methods: Mass</p>

		selection, pedigree, bulk, progeny selection, hybridization (heterosis, inbreeding), population breeding, mutation breeding, polyploidy breeding. Special Techniques: Marker-assisted selection (MAS), Genetic Engineering (Transgenics, RNAi, Agrobacterium).
	Biotechnology	Biochemistry: Biomolecules (carbs, lipids, proteins, nucleic acids), Metabolism, Enzymes, Photosynthesis, Respiration. Cell Biology: Cell structure, dynamics, signaling, membrane transport. Microbiology: Microbial diversity, culture, growth, antibiotics, human-microbe interactions. Genetics: Mendelian genetics, DNA replication, gene expression, mutations, linkage, mapping. Biophysics & Instrumentation: Principles, basic math, data analysis, use of equipment (spectroscopy, electrophoresis).
	Molecular Biology	Foundations & Biomolecules: Introduction to cells, biomolecules (DNA, RNA, Proteins, Amino Acids), cellular structures, and basic biochemistry. Central Dogma: DNA structure, replication (prokaryotic/eukaryotic), transcription (RNA synthesis), and translation (protein synthesis). Gene Regulation: Operons, prokaryotic/eukaryotic control mechanisms, chromatin structure, and post-transcriptional/translational modifications. Molecular Techniques: PCR, DNA Sequencing, Southern/Northern/Western Blotting, Electrophoresis, Chromatography, Spectroscopy, Calorimetry. Recombinant DNA & Genetic Engineering: Vectors, gene cloning, genetic modification, and creating transgenics. Advanced/Applied Areas: Genomics, Proteomics, Bioinformatics (BLAST, alignments, modeling), Molecular Evolution, Nanobiotechnology, and Bioethics.
	Physiology	Plant Cell structure & function; cell cycle; totipotency and regeneration; Photosynthesis in plants; Water uptake and stomatal movements; Plant

		<p>developmental biology; vegetative & reproductive growth and development : germination, pollination, fertilization, seed development seed maturation, dormancy, ripening, senescence and structural changes; flowering in perennial species; Sensory Photobiology; Environmental responses: Plants adaptation to abiotic stresses, such as light, water and temperature; Phytohormones in growth and development. Metabolism: Cellular respiration, respiration and synthesis. Physiology of plantation crops.</p>
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