

# U.P. HIGHER EDUCATION SERVICES COMMISSION, ALLAHABAD

## AGRICULTURAL BOTANY

(Subject Code-85)

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### **Unit-1: Introductory Microbiology and Plant Pathology :**

Historical, symptomology, properties and nature of plant viruses, modes of transmission of plant viruses. General principle of control of viral diseases in plants. A knowledge of the common viral diseases of potato, tobacco, hibiscus, cucurbits, beans and banana. Historical, broad outlines of morphology, reproduction, nomenclature and classification of plant pathogenic bacteria. History of Mycology, Taxonomy and nomenclature of fungi. Origin and phylogeny of fungi. Different systems of classification and their basis. Structure and life history of the chief representatives of fungi. History of plant pathology. Dissemination of diseases, modes of infection symptomology, physiology of parasitism, mechanism of disease resistance, fungicides and their action.

### **Unit-2: Cytogenetic, Molecular genetics and plant breeding :**

Cell structure and function, cell wall, nucleus, mitochondria, golgi apparatus, chloroplasts and other cell organelles, their structure and function. Cell division: mitosis and meiosis. Polyploidy : Nature and classification of Polyploidy. Heredity and environment, laws of heredity; Linkage, crossing over and mapping of chromosomes. The nature of gene and factors affecting mutation. History of plant breeding, its present status and scope. Breeding methods for self –pollinated cross-pollinated and clonally propagated crops. Component, recombinational and transgressive breeding. Single seed descent. Populations, their improvement methods and maintenance, Hybrid breeding and genetic basis of heterosis. Ideotype breeding. Mutation breeding.

### **Unit-3: Crop physiology, growth and nutrition and soil relation :**

Regional soils of India in relation to crops and their production. Secondary effects on micro flora. Physical nature of soils and water relation of soils. Concept of water requirement of crops and the critical period of water requirement of plants and its significance in crop production. Principle and practices of dry farming, special problems in dry farming mixed cropping and strip cropping in agriculture in India. Agronomic practices in relation to soil acidity and alkalinity. Soil nitrogen losses and its restoration, Phosphorous deficiency and soil fertility. Fixation of nutrients in soil potassium in relation to soil fertility and plants growth and development. Plant production and methods. C/N ratio as a function of growth and development. The problems of non-irrigated soils. Tillage and its influence on plant growth. Formation of usar soils and their measurement. Control of alkalinity and salinity, Soil micro-organisms and their role in production. Physiology of flowering, photoperiodism, vernalization and their impact on crop production. Seed formation, longevity and multiplication. Physiology and biochemistry of herbicides. Physiology of propagation. Physiology of fertilization, fruit growth and ripening. Mineral nutrition, uptake and translocation of solutes. Mutually beneficial and toxic influence of plants. Physiological role of Some major and minor elements such as N,P,K,Ca,Mg,B, Mo, Mn, Zn. Abiotic stresses affecting plant productivity. Basic principles of a crop improvement programme under stress, interactions between biotic and abiotic stresses. Growth, methods of growth analysis, control of growth by hormones, mechanism of action of growth regulators, control of differentiation, flowering, dormancy and senescence.

#### **Unit-4:Economic Botany & Plant genetic Resources :**

A study of the botany of important weeds associated with the crop plants of U.P., Methods of preventing introduction and spread of weeds. Principles and procedures of weed control Growth. Inhibiting, and promoting chemicals and their composition. Horticulture –importance and present position. Origin, history, breeding and production technology of important fruits such as Mango, Banana, Citrus, Guava, papaya, Grape, Pineapple, Ber, Apple, Pear and Walnut, Cereals : (Wheat, rice, maize, sorghum, pearl millet and minor millets), Pulses: (Pigeon pea, chickpea, black gram, cowpea, soyabean, pea, lentil), Oilseeds: (Groundnut, sesame, castor, rape seed, mustard, sunflower), Fibres: (cotton, silk cotton, jute, sunnhemp, agave, flax and Mesta), Vegetables: (tomato, brinjal, okra, cucumber, cole crops, gourds), Spices (Black cardamom, Black pepper, Black Cumin, Capsicum, Cloves, Coriander, Ginger, Turmeric) with special reference to climate, soil, propagation, cultivars, nutrition, irrigation and other orchard management practices. History of gardening of India. Styles of gardening, their principles and practices with special reference to Mughal, Japanese and English gardens. Frequency distribution. Mean, median and mode. Plant species richness and endemism; concept and importance of plant genetic resources and its increasing erosion; Centres of origin and diversity of crop plants, domestication, evaluation, bioprospecting; National and International organizations associated with PGR; Convention on Biological Diversity (CBD), recent issues related to access and ownership of PGR, IPR, PBRs, farmers rights, *sui-generis* system etc.

#### **Unit-5:Seed Science and Technology :**

Floral biology, mode of reproduction, sporogenesis, pollination, fertilization, embryogenesis, fruit and seed development. Apomixis, parthenocarpy, polyembryony and somatic embryoids and synthetic seeds. Seed structure of monocot and dicot. Seed maturation and longevity in orthodox and recalcitrant seed. Chemical composition of seed. Seed dormancy-types, causes and mechanisms of induction and release, factors affecting, methods to overcome dormancy and its significance in agriculture. Seed germination- requirements, imbibitions pattern, physiological and biochemical changes, and role of hormones.

Principles of seed processing. Seed drying principles and methods, Precleaning, grading, treatment, pelleting and packaging. Seed invigoration and enhancement treatment and their applications. Seed processing machines like cleaner cum grader, specific gravity separator, indented cylinder, seed treater, weighing and bagging machines, their operation and maintenance. Seed quality maintenance during processing.

Seed legislation –Seeds Act 1966, Seed Rules 1969 and New Seed Bill 2004, Seed Law Enforcement. Seed certification- history, concept, organization, phases and minimum certification standards. Field inspection principles and methods. Inspection at harvesting threshing and processing. Pre and post quality testing or genetic purity. Seed certification Schemes, concepts and procedures. Seed Testing concepts and objectives, its role in seed quality control. Seed sampling, seed moisture testing, purity analysis, germination testing, tolerance tests and equipment.

Note- There should be ten question from each unit.