

**SYLLABUS FOR THE ALL INDIA COMPETITIVE
EXAMINATION FOR
ADMISSION TO DOCTORAL DEGREE PROGRAMMES AND
THE AWARD OF**

**JRF/SRF (PGS):
SYLLABUS FOR ICAR AICE PHD JRF/SRF (PGS) EXAM
FOR**

12. VEGETABLE SCIENCE / OLERICULTURE:

Unit 1: Production Technology of Cool Season Vegetable Crops

- Introduction, climatic, and soil requirements
- Commercial varieties/hybrids
- Sowing/planting times and methods
- Seed rate and seed treatment
- Nutritional and irrigation requirements
- Intercultural operations
- Weed control
- Mulching
- Physiological disorders
- Harvesting of various vegetables, including potato, chow chow, cabbage, cauliflower, knolkhol, broccoli, root crops (carrot, radish, turnip, beetroot), bulb crops (onion, garlic), peas, beans, and palak.

Unit 2: Production Technology of Warm Season Vegetable Crops

- Introduction, climatic, and soil requirements
- Commercial varieties/hybrids
- Sowing/planting times and methods
- Seed rate and seed treatment
- Nutritional and irrigation requirements
- Intercultural operations
- Weed control
- Mulching
- Physiological disorders
- Harvesting of various vegetables, including tomato, eggplant, pepper (hot and sweet), okra, vegetable cowpea, Dolichos lablab, cluster bean, cucurbitaceous crops, sweet potato, cassava, yams, coclocasia, moringa, and amaranths.

Unit 3: Breeding of Vegetable Crops

- Cytogenetics and genetics
- Breeding objectives
- Breeding methods (introduction, selection, hybridization, mutation)
- Varieties and varietal characterization
- Resistance breeding for biotic and abiotic stress
- Quality improvement
- Biotechnology and its use in breeding in vegetable crops

- Molecular markers, genomics, marker-assisted selection, and QTLs in various vegetable crops.

Unit 4: Growth and Development

- Cellular structures and their functions
- Growth and development definitions
- Growth analysis in vegetable production
- Physiology of dormancy and germination of vegetable seeds, tubers, and bulbs
- Role of hormones and growth regulators
- Application of synthetic hormones and plant growth retardants
- Role of light, temperature, and photoperiod
- Physiology of fruit set, fruit development, fruit growth, flower and fruit drop
- Parthenocarpy in vegetable crops
- Ethylene, senescence, and abscission
- Fruit ripening and physiological changes associated with ripening
- Plant growth regulators in relation to morphogenesis and tissue culture techniques.

Unit 5: Seed Production

- Importance and status of the vegetable industry
- Modes of propagation in vegetables
- Seed morphology and development
- Floral biology
- Quality seed production steps and methods
- Seed production technology for various vegetable types
- Clonal propagation and multiplication in tuber crops
- Hybrid seed production technology
- Use of male sterility and self-incompatibility in hybrid seed production.

Unit 6: Systematics of Vegetable Crops

- Principles of classification
- Methods of classification
- International code of nomenclature of vegetable crops
- Origin, history, evolution, and distribution of vegetable crops
- Taxonomy and botanical description of various vegetable families, genera, and species
- Role of molecular markers in evolution and taxonomy of vegetable crops.

Unit 7: Production Technology of Underexploited Vegetable Crops

- Introduction and botany
- Climatic and soil requirements
- Commercial varieties/hybrids
- Planting time and method
- Seed rate and seed treatment
- Nutritional and irrigation requirements
- Intercultural operations
- Weed control
- Mulching
- Physiological disorders
- Harvesting of underexploited vegetables.

Unit 8: Post-Harvest Technology of Vegetable Crops

- Importance and scope of post-harvest management
- Maturity indices and standards

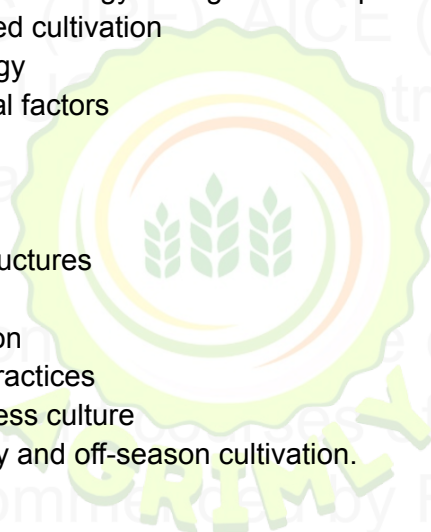
- Methods of maturity determination
- Biochemistry of maturity and ripening
- Harvesting practices
- Grading and packaging
- Post-harvest physiological and biochemical changes
- Disorders and prevention
- Storage methods and practices
- HACCP, Codex, FSSAI.

Unit 9: Organic Vegetable Production Technology

- Principles and components of organic production
- Managing soil fertility, pests, diseases, and weeds in organic farming
- Crop rotation
- Methods of enhancing soil fertility
- Mulching and green manure crops
- Composting and biodynamic preparations
- Organic certification standards and challenges.

Unit 10: Hi-tech Production Technology of Vegetable Crops

- Importance of protected cultivation
- Greenhouse technology
- Effect of environmental factors
- Energy management
- Low-cost structures
- Engineering aspects
- Types of protected structures
- Cladding materials
- Irrigation and fertigation
- Special horticultural practices
- Hydroponics and soilless culture
- Enhancing productivity and off-season cultivation.



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