UPSC OPTIONAL SYLLABUS FOR AGRICULTURE

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AGRICULTURE

UPSC OPTIONAL SYLLABUS FOR AGRICULTURE PAPER 1:

1.1) ECOLOGY: Ecology and its relevance to man, natural resources, their sustainable management and conservation.

- Physical and social environment as factors of crop distribution and production.
- Agroecology, cropping patterns as indicators of environments. Environmental pollution and associated hazards to crops, animals and humans.
- Climate change – international conventions and global initiatives. Greenhouse effect and global warming.
- Advanced tools for ecosystem analysis – Remote sensing (RS) and Geographic Information Systems (GIS).

1.2) AGRONOMY: Cropping patterns in different agro-climatic zones of the country.

- Impact of high-yielding and short-duration varieties on shifts in cropping patterns.
- Concepts of various cropping and farming systems.
- Organic and Precision farming.
- Package of practices for production of important cereals, pulses, oilseeds, fibres, sugar, commercial and fodder crops.

1.3) FORESTRY: Important features and scope of various types of forestry plantations, such as social forestry, agroforestry, and natural forests.

- Propagation of forest plants. Forest products.
- Agroforestry and value addition.
- Conservation of forest flora and fauna.

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1.4) WEED SCIENCE:

Weeds, their characteristics, dissemination and association with various crops; their multiplications; cultural, biological, and chemical control of weeds.

1.5) SOIL SCIENCE AND NUTRIENT MANAGEMENT:

Soil- physical, chemical and biological properties.

- Processes and factors of soil formation.
- Soils of India, Mineral and organic constituents of soils and their role in maintaining soil productivity.
- Essential plant nutrients and other beneficial elements in soils and plants.
- Principles of soil fertility, soil testing and fertiliser recommendations, integrated nutrient management.
- Biofertilizers.
- Losses of nitrogen in the soil, nitrogen-use efficiency in submerged rice soils, and nitrogen fixation in soils.
- Efficient phosphorus and potassium use.
- Problem soils and their reclamation.
- Soil factors affecting greenhouse gas emission.

1.6) SOIL AND WATER CONSERVATION:

Soil conservation, integrated watershed management.

- Soil erosion and its management.
- Dryland agriculture and its problems.
- Technology for stabilising agriculture production in rainfed areas.
- Water-use efficiency in relation to crop production, criteria for scheduling irrigations, ways and means of reducing runoff losses of irrigation water.

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- Rainwater harvesting.
- Drip and sprinkler irrigation.
- Drainage of waterlogged soils, quality of irrigation water, the effect of industrial effluents on soil and water pollution.
- Irrigation projects in India.

1.7) AGRICULTURAL ECONOMICS:

Farm management, scope, importance and characteristics, farm planning.
- Optimum resource use and budgeting.
- Economics of different types of farming systems.
- Marketing management – strategies for development and market intelligence.
- Price fluctuations and their cost; role of cooperatives in agricultural economy; types and systems of farming and factors affecting them.
- Agricultural price policy.
- Crop Insurance.

1.8) AGRICULTURAL EXTENSION:

Agricultural extension, its importance and role, methods of evaluation of extension programmes, socio-economic survey and status of big, small and marginal farmers and landless agricultural labourers. s

- Training programmes for extension workers.
- Role of Krishi Vigyan Kendra's (KVK) in the dissemination of Agricultural technologies.
- Non-Government Organizations (NGO) and self-help group approach for rural development.

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UPSC OPTIONAL SYLLABUS FOR AGRICULTURE PAPER 2:

2.1) CELL BIOLOGY/PLANT GENETICS:

- Cell structure, function and cell cycle.
- Synthesis, structure and function of genetic material.
- Laws of heredity.
- Chromosome structure, chromosomal aberrations, linkage and cross-over, and their significance in recombination breeding.
- Polyploidy, euploids and aneuploids.
- Mutations – and their role in crop improvement.
- Heritability, sterility and incompatibility, classification and their application in crop improvement.
- Cytoplasmic inheritance, sex-linked, sex-influenced and sex-limited characters.

2.2) PLANT BREEDING:

- History of plant breeding. Modes of reproduction, selfing and crossing techniques.
- Origin, evolution and domestication of crop plants, centre of origin, law of homologous series, crop genetic resources conservation and utilization.
- Application of principles of plant breeding, and improvement of crop plants.
- Molecular markers and their application in plant improvement.
- Pure-line selection, pedigree, mass and recurrent selections, combining ability, and its significance in plant breeding.
- Heterosis and its exploitation.
- Somatic hybridization.
- Breeding for disease and pest resistance.
- Role of interspecific and intergeneric hybridization.
- Role of genetic engineering and biotechnology in crop improvement.
- Genetically modified crop plants.

2.3) SEED PRODUCTION AND TECHNOLOGY:

- Seed production and processing technologies.

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- Seed certification, seed testing and storage.
- DNA fingerprinting and seed registration.
- Role of public and private sectors in seed production and marketing.
- Intellectual Property Rights (IPR) issues, WTO issues and its impact on Agriculture.

2.4) PLANT PHYSIOLOGY:

- Principles of Plant Physiology with reference to plant nutrition, absorption, translocation and metabolism of nutrients. Soil – water- plant relationship.
- Enzymes and plant pigments; photosynthesis- modern concepts and factors affecting the process, aerobic and anaerobic respiration; C3, C4 and CAM mechanisms.
- Carbohydrates, protein and fat metabolism.
- Growth and development; photoperiodism and vernalisation.
- Plant growth substances and their role in crop production.
- Physiology of seed development and germination; dormancy.
- Stress physiology – draught, salt and water stress.

2.5) HORTICULTURE AND LANDSCAPING:

- Major fruits, plantation crops, vegetables, spices and flower crops.
- Package practices of major horticultural crops.
- Protected cultivation and high-tech horticulture.
- Post-harvest technology and value addition of fruits and vegetables.
- Landscaping and commercial floriculture.
- Medicinal and aromatic plants.
- Role of fruits and vegetables in human nutrition.

2.6) PLANT PROTECTION:

- Diagnosis of pests and diseases of field crops, vegetables, orchard and plantation crops and their economic importance.

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- Classification of pests and diseases and their management. Integrated pest and disease management.
- Storage pests and their management.
- Biological control of pests and diseases.
- Epidemiology and forecasting of major crop pests and diseases.
- Plant quarantine measures.
- Pesticides, their formulation and modes of action.

2.7) FOOD PRODUCTION AND NUTRITION MANAGEMENT:

- Food production and consumption trends in India.
- Food security and growing population – Vision 2020.
- Reasons for grain surplus.
- National and international food policies.
- Production, procurement, and distribution constraints.
- Availability of food grains, per capita expenditure on food.
- Trends in poverty, Public Distribution System and Below Poverty Line population, Targeted Public Distribution System (PDS), policy implementation in context to globalisation.
- Processing constraints.
- Relation of food production to National Dietary Guidelines and food consumption patterns.
- Food-based dietary approaches to eliminate hunger.
- Nutrient deficiency – Micronutrient deficiency: Protein Energy - - Malnutrition or Protein Calorie Malnutrition (PEM or PCM), Micro nutrient deficiency and HRD in the context of the work capacity of women and children.
- Food grain productivity and food security.

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