

## AGRICULTURE

### I. **Introductory Agriculture and Agro meteorology**

- Definition of Agriculture, Brief history of Agriculture.
- Disciplines of Agriculture: Agronomy, Soil Science, Plant breeding and genetics, Horticulture, Entomology, Plant pathology, Extension education, Agricultural economics, Agricultural engineering, Agricultural statistics ( One paragraph description on each discipline)
- National and International agricultural institutes in India.
- Agro climatic Zones of India and Bihar.
- Elements of Weather-rainfall, temperature, humidity, wind velocity, sunshine, weather forecasting' Climate change in relation to crop production.
- Tillage: Definition, Objective and types of tillage.
- Tillage implements (primary, secondary and inter tillage).
- Soil tilth, its importance and effect on soil properties.
- Tillage practices (conventional) Vs. conservation and zero tillage).
- Methods of sowing / planting, Depth of sowing, transplanting and harvesting.

### II. **Soil as a medium of plant growth**

- Soil as a natural three dimensional resource.
- Soil classification, major soils of India/ Bihar.
- Soil profile, soil texture and structure, Soil Organism, Soil reaction / pH.
- Soil water.
- Soil fertility & productivity and their indicators.
- Essential plant nutrients, their functions and deficiency symptoms.
- Sufficiency and toxic levels of nutrients.
- Fertilizers, manures, bio=fertilizers, integrated nutrient management.
- Fertilizer placement, top dressing ad foliar application.

### III. **Plant breeding and genetics.**

- Mendel's Laws of inheritance and its exception and significance.
- Qualitative and quantitative traits and their inheritance.
- Plant Breeding: Definition, history, objective and its achievements.
- Heterosis, its basis and exploitation.
- Breeding methods for crop improvement:- Introduction, selection, hybridization, mutation, polyploidy, population improvement.
- Recent method of crop improvement, plant biotechnology and genetic engineering.
- Plant Genetic Resources: their collection, conservation and utilization.
- Seed: Formation, classification and multiplication.
- Intellectual Property Right: Definition, Classification and its importance.

### IV. **Agricultural Engineering**

- Agricultural Implements:- cultivators, M.B. plough, Disc, Zero till seed drill, Rotavator, Power tiller, Tractor, Harvester
- Engine- I.C. Engine: parts of engine and their work. Working of I.C. Engine, Working of 2 and 4 stroke engines. Difference between 2 stroke and 4 stroke engine, Difference between diesel and petrol engine, problems and troubleshooting of engine, Maintenance of engine, Maintenance after 100 hours and Maintenance after 500 hours.
- Electric motor: D.C. and A.C. 3 phase induction motor, Single phase induction motor, Types of motor, Capacitor, Selection of electric motor.
- Sowing: Method of seeding or sowing, Seed-cum-fertilizer drill, Calibration of seed drill machine, thresher- its working and maintenance, winnower.
- Harvesting Equipment, working principle of mower, Problems and maintenance of harvesting equipments.

### V. **Crop protection**

- Importance of crop insect-pests, diseases, nematodes, rodents.
- Important insect-pest and diseases of field crops, vegetables, fruits and stored grain pests and their management.
- Methods of control of insect-pest and disease:- Physical, Mechanical, Cultural, biological, chemical, antocidal, legal method and integrated pest management.
- Pesticides and their classification, symptoms of poisoning, First aids and antidotes.
- Harmful effects of insecticides.
- Effect of environment (temperature, moisture, wind, light, soil pH) on pest development.

### Animal Husbandry, Dairy and Fish Production

- Importance of livestock in agriculture & industry
- Important developmental programmes by Central or State Government for improvement of livestock ( Operation Flood)
- Important indigenous and exotic breeds of Cattle, buffalo, sheep, goat & poultry.
- System of housing in cattle & poultry.
- Principles of feeding.
- Management of cattles at the time of (i) calving (ii) new born calf (iii) heifers (iv) milch animals (v) pregnant animals and poultry (vi) Bullocks (Chicks pullets, Layers, Broilers)
- Principles of feeding of different classes of animals, calves, pregnant animals, lactating animals, Bullocks and Poultry (Chicks, Pullets, Layers & Broilers)
- Methods of conservation of green fodder (hay making & silage making)
- Sign of sick & healthy animals, etiology symptoms, prevention and control of common diseases in cattle & poultry.  
(i) Rinderpest (ii) Foot & mouth disease (iii) Rabies (iv) Haemorrhagic septicaemia (v) Black quarter (vi) Mastitis (vii) Trypanosomiasis (viii) Basesiosis (ix) Coccidiosis (x) Ranikhat disease (xi) Fowl pox (xii) I.B.D. or Gumboro disease.
- Artificial insemination (Definition, Benefits, Drawbacks).
- Principle and methods of milking, clean milk production.
- Modern methods of fish production.

### Crop Production

#### Cultivation of crops:

Economic importance, origin, distribution, soil and climatic requirement, varieties, cultural practices (Seed bed preparation, seed treatment, time and method of sowing/ planting, seed rate; dose, method and time of fertilizer application, irrigation, inter culture and weed control; common pests and diseases caused by bacteria, fungi, virus and nematode, integrated pest management, harvesting, threshing, post harvest technology, storage, processing and marketing and major production constraints) of following crops:

- Cereals: Paddy, Wheat, maize.
- Pulses: pigeon pea, gram, lentil, pea mung bean, urd bean.
- Oilseeds: Groundnut, rapeseed and mustard, Linseed, sunflower.
- Cash crops: Sugarcane, jute.
- Fooder and forage crops: Sorghum, maize, oat, napier grass berseem

#### Cropping system

- Crop rotation, sequential cropping, mixed cropping, inter cropping, parallel cropping multi-storied cropping, multiple cropping, cropping system / cropping pattern, cropping intensity.
- Important cropping system for rainfed and irrigated ecosystem of Bihar.

#### Soil and water management

- Water requirement, Irrigation requirement, concept of irrigation scheduling.
- Field capacity, permanent wilting point, plant available water.
- Method of irrigation.
- Importance of drainage, drainage methods.
- Problem soils and its management-saline alkaline, acid soil and water logged (Diara and Tal)

#### Weed management

1. Definition of weeds, Characteristics of weeds, Harmful and beneficial effects of weeds.
2. Crop-weed competition,
3. Weed management : Principles, mechanical, cultural, chemical, biological, Integrated weed management.
4. Herbicides.

#### Recent trends in agriculture

Organic farming, Integrated farming system, recycling of plant nutrients, precision farming, watershed management, ground water recharge, targeted yield concept.

#### Agricultural economics

- Major economic problems in agriculture.
- Role and share of agriculture in state economy.
- Land use classification.
- Land distribution and size of holding.

- Area, production, and productivity of major crops in the state with reference to country.
  - Marketing of agricultural produce, cooperative farming, corporate farming, contract farming, integrated value chain
- I. Basic Horticulture**
- Importance of fruits and vegetables in human diet.
  - Area & production of horticultural crops and its future prospect.
  - Classification of horticultural crops according to climatic adaption and economic use.
  - Planting system, high density orchard, training, pruning, intercropping and rejuvenation of fruit trees.
  - Protection from frost and sunburn
  - Plant propagation and nursery management.
- II. Fruit Production**
- Establishment of new orchards and its layout.
  - Cultivation of major fruit crops :  
Mango, Papaya, Banana, Guava, Citrus, Litchi, Strawberry, Coconut, Aonla, Ber, Jack fruit.
- III. Vegetable production**
- Cultivation practices of major vegetables -  
Radish, Carrot, Sugar beet, Potato, Onion, Garlic, Chillies, Cauliflower, Brinjal, Tomato, Spinach, Cabbage, Elephant foot yam, Colocasia, Corriender, Pointed gourd, Bottle gourd, Bitter gourd, Sponge gourd and Cucumber, Bhindi, Cowpea, French bean, Pea.
  - Nutritional kitchen gardening.
- IV. Flowers, medicinal and aromatic plants**
- Cultivation of Chrysanthemums, Roses, Dahlia, Marigold, Tube rose, Gladiolus.
  - Cultivation of ornamental shrubs, avenue trees, and climbers.
  - Cultivation of Mentha, Lemon grass, Citronella.
  - Introduction of medicinal plants.
- V. Presevation of fruits and vegetables**
- Principles and methods of fruit and vegetable preservation.
  - Preparation of fruit squash, jellies, jams, ketchup, chips, pickles and their packing.
- VI. Extension education**
- Extension education : Definition, Scope, Objective, Importance.
  - Extension methods and tools.