



**Department of Agronomy**  
**Sher-e-Bangla Agricultural University**  
**Dhaka-1207, Bangladesh**

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**Curriculum Layout**  
**For**  
**MS Degree in Agronomy**

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**Composed by:**  
**Mirza Hasanuzzaman**  
**Lecturer**  
**Department of Agronomy**

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**Department of Agronomy**  
**Sher-e-Bangla Agricultural University**  
**Dhaka-1207, Bangladesh**  
**Course Requirement for MS Degree in Agronomy**

SI No.	Course	Credit Hour
<b>A. Compulsory</b>		
1.	AGRO 501: Advance Crop Production technology	3
2.	AGRO 502: Sustainable Agriculture and Organic farming	3
3.	AGRO 503: Principle of Seed Technology	3
4.	AGRO 504: Applied Weed Science	3
5.	AGRO 505: Farming System	3
6.	AGRO 506: Crop Physiology and Stress Agronomy	3
<b>Total</b>		<b>18</b>
<b>B. Elective</b>		
1.	AGRO 507: Agro Meteorology	3
2.	AGRO 508: Field Experiment and Crop Modeling	3
3.	AGRO 509: Post Harvest technology	3
4.	AGRO 510: Land Management	3
5.	AGRO 511: Fodder Production and Grassland Management	3
6.	AGRO 512: Hill and Coastal Agriculture	3
7.	AGRO 513: Fertilizer Management	3
8.	AGRO 514: Irrigation Water Management	3
9.	AGRO 515: Seed Technology Practices	3
10.	AGRO 516 : Agronomic Research	3
<b>Minimum</b>		<b>12</b>
<b>C. Seminar</b>		<b>1</b>
<b>D. Research</b>		<b>16</b>
<b>Total Number of Credits</b>		<b>47</b>

<sup>1</sup> First semester

<sup>2</sup> Second semester

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## **AGRO 501: Advance Crop Production Technology** **Credit Hour: 3 (Compulsory)**

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### **Crop production Statistics**

World crop production statistics of major crops and their comparison with Bangladesh.

Interpretation of lower crop yields under Bangladesh condition.

### **Yield and Quality of crops**

Yields, yield components, concept of yield improvement, agronomic means of improving yield and quality of crops.

### **Advanced Production Technology of Crops**

Economic importance, varieties, soil and climatic requirements, production technology, resource response and post-harvest processing of the following crops:

Cereal crops: Rice, Wheat, maize

Fibre crops: Jute, Cotton

Sugar crops: Sugarcane

Pulse crops: Lentil, Chickpea, Grasspea, Mungbean, Blackgram

Oilseed crops: Mustard, Groundnut, Soybean, Sesame, Sunflower, Safflower

Narcotic crops: Tobacco

Beverage crop: Tea, Coffee

Minor crop: Kaon, Cheena, Sorghum, Bajra, Jowar

## AGRO 503: Principle of Seed Technology

Credit Hour: 3 (Compulsory)

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### **Introduction of Seed technology**

Seed and Civilization; Seed and Agriculture; Definition of Seed, Parts of Seed, Different kinds of seeds; Concept of Seed Technology; Subjects related to Seed technology.

### **Component of Seed technology**

**Varietal Development:** Plant breeding system (including OP+Hybrid+recomb.); definition of a variety, importance of Varietal development and variety; variety evaluation-DUS; variety release, registration maintenance, Breeder seed production.

**Seed Multiplication:** Factors influencing seed multiplication; Techniques of seed multiplication.

**Seed Processing:** Drying, Cleaning, Preservation, Seed treatment, Seed packaging.

**Quality Assurance:** Seed Quality-Concept of seed quality, seed standard, seed lot; Moisture content of seed: purity-cultivar purity and analytical purity; germination capacity; Seed and Seedling vigour; Seed health; Seed size; Dormancy. Seed Legislation, Seed Certification, Truthfully labeled Seed.

**Seed Marketing:** Marketing Functions, Seed sale; Quality of salesman, Seed extension and promotion.

### **Seed Engineering**

**Crop Production Equipment:** Tractor and accessories; Seed drill and planters; Threshers and harvesters; Combines (Threshers+Harvesters).

**Seed Cleaning Equipment:** Seed Pre-cleaners; Seed Cleaners; Graders, Cylinder, separators, Colour sorter.

**Seed Testing Equipment:** Seed Sampling instruments-Triers, Dividers-gravity, boerner. Moisture testing Equipment-Oven, Grinder, Balance (precision): Seed Counter: balance. Microscope, Petri dish, Dehumidifier, Air conditioner.

**Seed Store:** design principles; Agro-meteriology related to drying and storage.

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## **AGRO 506: Crop Physiology and Stress Agronomy**

### **Credit Hour: 3 (Compulsory)**

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#### **Crop Physiology:**

Growth curve, relations of dry matter accumulation with interception and conversion of solar radiation, soil-water-plant relationships and thermal time in relation to plant's growth. Agronomic management for optimum growth. Growth assessment: plant height, leaf area, leaf area index, specific leaf weight, net assimilation rate, crop growth rate, relative growth rate, specific leaf weight, light transmission ratio.

Rate of development, relationships of development to temperature, photoperiod, photothermal time, solar radiation, assimilate supply, stress, determinacy and growth.

Yield components, factors influencing grain formation and grain filling, relations of yield with climatic parameters, determinacy, harvest index, source-sink relations, partitioning of dry matter, plasticity of vegetative growth, growth and development, green area duration, senescence, duration of reproductive period, crop nutrition and water management, population density, cropping system and agronomic management.

#### **Stress Agronomy:**

**Deep water stress:** Concept, crop response to deep water stress, characteristics of flood water, factors affection survival and morphological change of submerged plants, management of deep water stress in crops.

**Drought Stress:** Concept, nature, causes and kinds of drought, effect of drought on crops, basis of drought tolerance, available technologies to reduce crop losses from drought.

**Light Stress:** Nature and causes of light stress; crop growth, development and yield mechanisms due to light intensity and photoperiod.

**High temperature stress:** Concept, high temperature injuries in plants, adaptation features in plants due to high temperature, agronomic manipulations to mitigate crop losses due to high temperature.

**Cold Stress:** Concept, types of cold shocks, symptoms of cold temperature injuries in plants, management of cold stress in crops.

**Salinity Stress:** Concept, kinds of salinity, occurrence, nature and extent of crop damage, salinity management.

**Hailstorm, Strom and Cyclone stress:** Occurrence, nature and extent of crop damage, available technologies to mitigate crop losses.

## **AGRO 514: Post Harvest technology**

### **Credit Hour: 3 (Elective)**

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#### **Post harvest technology**

Concept, objectives and importance.

Classification and steps of post harvest operations.

#### **Post harvest technology of the following crops**

Grain crops

- i. Cereal crops: Rice, wheat, maize, barley, sorghum and millets.
- ii. Oil seed crops: Rapeseed/mustard, groundnut, sesame, sunflower, soybean, safflower, nizer, cotton seed, flax, coconut, castor etc.
- iii. Pulse crops: Lentil, gram, black gram, grass pea, pigeon pea, soybean, field pea, cow pea, bush bean etc.

Physio-chemical properties of grains, theory and grain drying, safe moisture content of grains and seeds, methods of grain drying, grain dryer, cleaning, grading, marketing, storing, transportation, parboiling, milling.

Fibre crops: Jute, cotton, kenaf, sunnhemp, mesta, flax (retting, ginning and drying).

Sugar crops: Sugarcane and sugarbeat- crushing, sugar, gurr and syrup manufacture.

Narcotic crops: Tobacco curing, handling and marketing.

Beverage crops: Tea, coffee and cocoa- processing, handling and marketing.

Tuber/Root crop: Potato, sweet potato, cassava and yams- storage and use.

Forrage crops: Alalfa, Lucerne, para, napier grass and cowpea- hay and silage preparation.

GM crops: Preparation of green manure.

Other crops: Rubber manufacture.

Spices/condiments: Onion, garlic, turmeric and ginger- their curing, processing, storing and marketing.

Visit to different post harvest technological plants.

# **AGRO 513: Fertilizer Management**

**Credit Hour: 3 (Elective)**

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## **Introduction:**

Fertilizer elements, types of fertilizers, fertilizer use statistics in Bangladesh, fate of applied fertilizers in crops and soil, contribution of fertilizers to crop yield.

## **Soil fertility management:**

Fertility status of Bangladesh soil, Means of increasing soil fertility under intensive and extensive cropping systems.

## **Fertilizer dose:**

Types of fertilizer dose, determination of optimum fertilizer dose, factors influencing fertilizer dose, fertilizer doses in different crops under varying agro-ecological conditions and cropping systems.

## **Fertilizer use efficiency:**

Balanced fertilization, laws of fertilizer applications, principles of fertilizer applications, means for increasing fertilizer use efficiency, fertilizer management in different crops.

## **Organic, mixed and bio-fertilizers:**

Quality aspects of organic fertilizers, organic fertilizer management in crop production, preparation of mixed fertilizers for different crops, uses of bio-fertilizers in different crops.

## **AGRO 502: Sustainable Agriculture and Organic farming**

### **Credit Hour: 3 (Compulsory)**

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#### **Sustainable agriculture**

Concept, importance, evolution of sustainable agricultural system of Bangladesh.

#### **Factors affecting sustainable agriculture**

**Biotic** – Availability of plant and animal genetic resources, degree of pest incidence, animal health. **Abiotic** – Soil properties, water resources, air quality, energy resources.

#### **Factors causing loss of sustainability in agriculture**

Nutrient mining, soil erosion, deterioration of water resources, accumulation of harmful levels of organic or inorganic substances on the environment, major changes in soil pH, climatic changes, desertification, build up of disease, pest, weeds etc, problems of marketing and trade, changes in cropping systems.

#### **Management of agricultural pollution**

**Soil pollution** – Soil as a pollutant, plant nutrients, soil as air pollutant, soil as depollutant, waste disposal, element toxicity, polluted soil, salinization, heavy metals.

**Agrochemicals** – Agrochemicals and their implications on soil environment, rate of agrochemicals in intensive agriculture, fate of agrochemicals in the soil environment, adverse impact of agro-chemicals on soil quality, pesticide pollution.

#### **Maintenance of sustainability in agriculture through organic farming**

Concept, principles and practices of organic farming

#### **Components of organic farming**

Soil and crop management, non-chemical weed management, farm waste management, domestic and industrial waste recycling, energy use and food quality.

#### **Biogas technology for farming**

Composition of biogas slurry, agronomic importance of biogas slurry, transfer of biogas technology.

#### **Soil management**

Increasing rooting depth, replenishing soil organic matter, special soil management practices.

#### **Crop management**

Choice of cultivars, crop diversification, planting time, plant population, regulating time, rate and placement of fertilizers, herbicides and pesticides.

#### **Farm waste management**

Animal waste and crop waste, time of application, rate of application, effect of farm waste on soil and crop.

#### **Domestic and industrial waste management**

Types and characteristics, waste decomposition in soil and associated problems, management of waste.

#### **Biopesticides for insect, pest and disease management**

Insect management, nematode management and disease management

#### **Future trends in organic farming**

Agricultural technology and productivity future challenges, meteorology and climatic change, biotechnology, sustainable agriculture, research and development needs under organic farming.



## **AGRO 504: Applied Weed Science**

### **Credit Hour: 3 (Compulsory)**

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#### **Weed biology and Ecology**

Propagation by means of vegetative propagules and seed. Factors related to weed seed production and germination. Bio-diversity of weeds. Dormancy of weed-seed and factors affecting it. Soil as a weed seed bank.

Weed adaptation in relation to climatic, edaphic and biotic factors, crop-weed interference, capability and factors affecting it. Allopathy.

#### **Weed management:**

##### **Crop husbandry in Weed Management**

Role of seedbed preparation, planting geometry, establishing proper crop stand, crop rotation, hydrology, soil moisture regime and soil fertility in managing weeds.

##### **Biological Methods in Weed management**

History of biological weed control, bio-agents to control weeds viz. insects, nematodes, fungi, bacteria as well as plant-based chemicals. Interaction of bioherbicides and herbicides.

##### **Herbicidal Methods in Weed Management**

Herbicide formulation and adjuvant/additives. Mode of action of herbicides. Fate of herbicides in soil and plant. Interaction of herbicide, plant and environment. Selectivity of herbicides.

##### **Integrated Weed management (IWM)**

Definition, importance and basic concepts of IWM. Role of weeds in IWM. Interaction between weed and management practices. Ecological, eco-physiological approaches of weed management.

##### **Herbicide Resistance in Weed**

Major concept, development of herbicide resistance in weeds. Factors affecting weed resistance to herbicides. Mechanism to develop herbicide resistance. Crop resistance to herbicides, biotechnology in developing herbicide-resistance crops. Concerns regarding use of herbicide-resistant crops.

##### **Weed Management of Major Crops in Bangladesh**

Present status and future strategy of weed management in rice jute, wheat, sugarcane, cotton.

## **AGRO 505: Farming System**

### **Credit Hour: 3 (Compulsory)**

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**Systems:** Concept, properties, agroecosystem, systems hierarchy.

#### **Farming System**

Concept, characteristics, resources, components and enterprises.

#### **Interaction of components of farming system**

Interaction of crop and livestock; crop and fish; crop, livestock and fish.

#### **Determinants of farming systems**

Physical, biological, economic and socio-cultural.

#### **Social, economic and infra-structure**

Socio-economic condition of the farming communities, communication, market and storage facilities, inputs and credits, linkage mechanism between research, extension and education, information and support service, land tenure, national policy.

#### **Biodiversity and sustainable farming systems**

Diversity and biodiversity, the role of biodiversity in farming systems, maintenance of biodiversity through creation of micro-environments, properties of micro-environments, contribution of micro-environments towards sustainability of farming systems.

#### **Types of farming systems**

World farming systems and farming systems of Bangladesh

#### **Farming System Research and Development (FSRD)**

Introduction, concept, importance, categories, processes, characteristics and strategies.

#### **Category of FSRD Trials**

On-farm, On-station, Component, Technology system, Farmer's managed and Researcher's Managed Trials.

#### **Farming System Research Methodology**

National Methodology, Site selection, Site description, design and testing, Validation trial, Technology transfer.

#### **Participatory Research**

Concept, objectives and modes of farmer's participation.

#### **Methods and Techniques of PRA (Participatory Rural Appraisal)**

Concept and importance of PRA. Methods of PRA-visualized analysis, intervening, group and team dynamics, direct observation and review of secondary sources. Techniques of PRA-transects, physical mapping, social mapping, Venn diagram, seasonal calendar, time line, production flow chart, matrix ranking, preference ranking and SOWT (Strength, Opportunity, Weakness and Threat).

#### **Cropping Systems**

Evolution of cropping system in Bangladesh, its impact on environment; designing, testing and evaluation on cropping systems.

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## **AGRO 509: Irrigation Water Management**

### **Credit Hour: 3 (Elective)**

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#### **Introduction**

History, importance of Irrigation, harmful effect of excess Irrigation, Hydrological cycle, Source of Water for crop Plants, Irrigated area in Bangladesh, Rainfall and Evaporation pattern in Bangladesh.

#### **Soil Water Relationship**

Physical properties influencing Soil Water Relationship, Classification of Soil water, Soil Water constants, Soil water relation, Infiltration, Permeability, Water movement in soils, Soil water measurement.

#### **Soil Water-Plant Relationship**

Role of Water in Plants, Transpiration, Soil water availability to plants, Water deficit and plant responses, Water requirement of plants, Estimation of Evapotranspiration, Duty of water, Irrigation requirement.

#### **Methods of Irrigation**

Classification of Irrigation; Surface, Subsurface, Overhead and Drip Irrigation methods.

#### **Irrigation Efficiency and Scheduling**

Efficiency of Irrigation practices, Water use and operation of Irrigation system, Time of Irrigation, Critical stages of Water need of crops, Criteria for Scheduling Irrigation, Frequency and Interval of Irrigation, depth of Irrigation.

#### **Irrigation and Fertilizer Use**

Synergism of Irrigation and Fertilizer, Water and Nutrient availability in soil affecting crop yield, Irrigation and fertilizer interaction on crop growth and yield, Quality of crops as influenced by Irrigation and Nutrient use, Water and fertilizer use efficiency of crops.

#### **Irrigation Practices in Crops**

Cereal Crops, Pulses, Oilseeds, Fibre crops, Sugar crops, Narcotic crops, beverage crops, Tuber crops, Green Manuring crops, and Fodder crops.

**AGRO 516: Agronomic Research**  
**Credit Hour: 3 (Elective)**

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**Agricultural Research System in Bangladesh:** NARS, National and International organization involved in agronomic research

**Research Planning Methodology:** Purpose of conducting research, Research planning, Identification of researchable problems, Prioritization of agronomic problems and their possible solutions through agronomic research, Data collection for different crops

**Experimental design:** Types of experiments, Experimental designs appropriate for agronomic experimentation, their merits and demerits

**Statistical Analysis of Experimental data:** Analysis of variance, Comparison of treatment means, Regression and correlation analysis, Statistical packages for data analysis.

**Thesis/ Scientific paper writing:** Structure and procedure, data interpretation, Writing-up

**Presentation of Research Findings:** Write-up, Slide preparation, Points considered for effective and enjoyable presentation

# **Our Teachers**

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## **Chairman**

Professor Dr. Md. Zafar Ulah

## **Professors**

Mr. Md. Sadrul Anam Sardar

Dr. Md. Hazrat Ali

Dr. Md. Fazlul Karim

Dr. Parimal Kanti Biswas

Dr. Md. Jafar Ullah

Dr. A. K. M. Ruhul Amin

## **Associate Professors**

Dr. H. M. M. Tariq Hossain

Mr. Md. Shahidul Islam

Mr. Tuhin Suvra Roy

## **Assistant Professors**

Mr. Md. Obaidul Islam

Mr. Abdullahil Baque

## **Lecturers**

Mirza Hasanuzzaman

Quazi Nasim Ahmed

Md. Asaduzzaman



To  
All the students  
of  
The Department of Agronomy  
Sher-e-Bangla Agricultural University  
Dhaka-1207

From  
Mirza Hasanuzzaman  
328, Sher-e-Bangla Hall  
Sher-e-Bangla Agricultural University

**Special Thanks!**  
**To**

**All the Honourable Teachers of  
The Department of Agronomy**