

SYLLABUS OF PG PROGRAMME

DEPARTMENT OF AGRONOMY

Courses offered by Department of Agronomy in the M. Sc.(Ag.) programme

Course No.	Course Title	Credits	Semester
AGR 501*	Modern concepts in crop production	3 + 0	I
AGR 502*	Principles and practices of soil fertility and nutrient management	2 + 1	III
AGR 503 *	Principles and practices of weed management	2 + 1	I
AGR 504*	Principles and practices of water management	2 + 1	II
AGR 505	Agrometeorology and crop weather forecasting	2 + 1	III
AGR 506	Crop growth analysis and productivity modelling	1 + 1	III
AGR 507	Agronomy of major cereals	2 + 1	II
AGR 508	Agronomy of pulse crops	2 + 1	III
AGR 509	Agronomy of oilseed crops	2 + 1	II
AGR 510	Agronomy of fibre, sugar and tuber crops	2 + 1	I
AGR 511	Agronomy of medicinal, aromatic and under-utilized crops	2 + 1	III
AGR 512	Agronomy of fodder and forage crops	2 + 1	II
AGR 513	Agrostology and agro-forestry	2 + 1	II
AGR 514	Cropping systems and sustainable agriculture	2 + 0	II
AGR 515	Dryland farming and watershed management	2 + 1	I
AGR 516	Principles and practices of organic farming	1 + 1	II
AGR 517	Crop ecology and geography	2 + 0	II
AGR 591	Credit seminar	0+1	IV
AGR 599	Master's Research (Thesis)	0+20	I to IV

* core courses

AGR 501 : Modern concepts in crop production

3 + 0

Objectives:

To teach the basic concepts of soil management and crop production

Syllabus:

Theory

UNIT I

Crop growth analysis in relation to environment; agro-ecological zones of India, Crop distribution.

UNIT II

Quantitative agro-biological principles and inverse yield nitrogen law; Mitscherlich yield equation, its interpretation and applicability; Baule unit.

UNIT III

Effect of lodging in cereals; physiology of grain yield in cereals; optimization of plant population and planting geometry in relation to different resources, concept of ideal plant type and crop modeling for desired crop yield.

UNIT IV

Scientific principles of crop production; crop response production functions; concept of soil plant relations; yield and environmental stress.

UNIT V

Integrated farming systems, organic farming and resource conservation technology including modern concept of tillage; rainfed farming; determining the nutrient needs for yield potentiality of crop plants, concept of balanced nutrition and integrated nutrient management; precision agriculture.

Learning Outcome:

Students will get basic idea about crop growth analysis, principles and modern concepts of crop production.

AGR 502: Principles and practices of soil fertility and nutrient management 2+1

Objectives:

To impart knowledge of fertilizers and manures as sources of plant nutrients and to appraise integrated approach of plant nutrition and sustainability of soil fertility.

Theory

UNIT I

Soil fertility and productivity – factors affecting; features of good soil management; problems of supply and availability of nutrients; relation between nutrient supply and crop growth; organic farming – basic concepts and definitions.

UNIT II

Criteria of essentiality of plant nutrients; essential plant nutrients – their functions, nutrient deficiency symptoms; transformation and dynamics of major plant nutrients.

UNIT III

Preparation and use of farm yard manure, compost, green manures, vermicompost, biofertilizers and other organic concentrates; their composition, availability and crop responses; recycling of organic wastes and residue management, role of organic matter in maintenance of soil fertility.

UNIT IV

Commercial fertilizers, composition, relative fertilizer value and cost; crop response to different nutrients, residual effects and fertilizer use efficiency, fertilizer mixtures and grades; agronomic, chemical and physiological methods of increasing fertilizer use efficiency; SSNM, nutrient interactions.

UNIT V

Time and methods of manures and fertilizers application; relative performance of organic manures and inorganic fertilizers; economics of fertilizer use; integrated nutrient management; use of fertilizers in intensive cropping systems.

Practical

Determination of soil pH, E_{Ce}, organic C, total N, available N, P, K and S in soils. Determination of total N, P, K and S in plants. Interpretation of interaction effects and computation of economic and yield optima

Learning Outcome:

Students will get basic idea about importance of essential elements, nutrient use efficiency and methods of soil nutrient management

AGR 503: Principles and practices of weed management

2+1

Objectives:

To familiarize the students about the weeds, herbicides and methods of weed management.

Syllabus:

Theory

UNIT I

Weed biology and ecology, classification, crop-weed competition including allelopathy; principles and methods of weed management; weed indices.

UNIT II

Herbicides introduction and history of their development; classification based on chemical, physiological, application and selectivity; mode and mechanism of action of herbicides.

UNIT III

Herbicide structure - activity relationship, factors affecting the efficiency of herbicides, herbicide formulations, mixtures, herbicide resistance and management, herbicide rotation, adjuvants, antidotes and protectants, degradation of herbicides in soil, plants and environment; herbicide resistance in crops and weeds, weed management through bio-herbicides, myco-herbicides and allelochemicals; application of biotechnology in weed management.

UNIT IV

Weed management in major crops and cropping systems; parasitic weeds; weed shifts in cropping systems; aquatic and perennial weed management, quarantine regulations of weed management.

UNIT V

Integrated weed management; cost; benefit analysis of weed management.

Practical

Identification of important weeds of different crops, Preparation of a weed herbarium, Weed survey in crops and cropping systems, Crop weed competition studies, Calculation of herbicidal requirement, Preparation of spray solutions of herbicides for high and low-volume sprayers, Use of various types of spray pumps and nozzles and calculation of swath width, Economics of weed control, Herbicide residue analysis in plant and soil, Bioassay of herbicide residue, Precautionary measures in herbicide use.

Learning Outcome:

Students will get basic idea about weeds, herbicides and methods of management

AGR 504 : Principles and practices of water management**2+1****Objectives:**

The course fulfils the comprehensive knowledge on irrigation water management; the course brings out different aspects of irrigation, drainage, and quality of irrigation water.

Syllabus:**Theory**

UNIT I

Water and its role in plants; water resources of India, major irrigation projects, extent of area and crops irrigated in India and different states.

UNIT II

Soil water relations; water retention by soil, soil moisture characteristics; moisture conservation, soil water movement in soil and plants; soil-water-plant relationships; concept of evaporation and evapotranspiration; different approaches of ET determination; development of crop water deficit, plant response to water stress, crop adaptation to water deficit, morpho-physiological effect of water deficit, crop plant adoption to moisture stress condition.

UNIT III

Soil, plant and meteorological factors determining water needs of crops; principles and methods of irrigation; concepts of irrigation scheduling; different approaches of irrigation scheduling, depth and micro-irrigation system; fertigation; management of water in controlled environments and poly houses.

UNIT IV

Water management of the crops (rice, wheat, sugarcane, potato, mustard, sesame and mung) and cropping systems; quality of irrigation water and management of saline water for irrigation; irrigation and water use efficiency; fertilizer use in relation to irrigation.

UNIT V

Excess of soil water and plant growth; water management in problem soils, drainage requirement of crops and methods of field drainage; water table in relation to crop production, rain water harvesting, storage and recycling.

Practical

Determination of soil water by thermo-gravimetric and volumetric methods; Measurement of soil water potential by using tensiometer, pressure plate and membrane apparatus; Determination of evapo-transpiration by Blaney-Criddle and Thornthwaite; Measurement of evaporation by USWB class A pan evaporimeter; Soil moisture characteristics curves; Water flow measurement using different devices; Determination of irrigation requirement; Calculation of irrigation efficiency; Determination of infiltration rate; Laying out fields for irrigation by border strip, check basin and furrow methods; Determination of quality of water; Determination of saturated/unsaturated hydraulic conductivity; Field drainage.

Learning Outcome:

Students will be benefitted by this course for deciding irrigation scheduling for crops, crop planning according to the availability of water sources; the course will help the students by handling different instruments of irrigation water management; it will be helpful to ameliorate the problem soil and water for raising crops; students can gather knowledge to check soil and water losses.

AGR 505 : Agrometeorology and crop weather forecasting

2+1

Objectives:

To impart knowledge about agro-meteorology and crop weather forecasting to meet the challenges of aberrant weather conditions.

Syllabus:

Theory

UNIT I

Agro meteorology – aim and development in relation to crop environment; composition of atmosphere, distribution of atmospheric pressure and wind.

UNIT II

Characteristics of solar radiation; energy balance of atmosphere system; radiation distribution in plant canopies, photosynthesis and efficiency of radiation utilization by field crops; energy budget of plant canopies.

UNIT III

Temperature profile in air, soil, crop canopies; soil and air temperature effects on plant processes; environmental moisture and evaporation; measures of atmospheric temperature and relative humidity, vapor pressure and their relationships; evapo-transpiration and meteorological factor; determining evapo-transpiration.

UNIT IV

Modification of plant environment; artificial rain making, heat transfer, controlling heat load, heat trapping and shading; protection from cold, sensible and latent heat flux, controlling soil moisture; monsoon and their origin, characteristics of monsoon; onset, progress and withdrawal of monsoon, weather hazards, drought monitoring and planning for mitigation.

UNIT V

Weather forecasting in India – short, medium and long range; aerospace science and weather forecasting; benefits of weather services to agriculture, remote sensing; application in agriculture and its present status in India; atmospheric pollution and its effect on climate and crop production; climate change and its impact on agriculture.

Practical

Visit to agro-meteorological observatory and to record sun-shine hours, wind velocity, wind direction, relative humidity, soil and air temperature, evaporation, precipitation and atmospheric pressure; Measurement of solar radiation outside and within plant canopy; Measurement/estimation of evapo-transpiration by various methods; Measurement/estimation of soil water balance; Rainfall variability analysis; Determination of heat-unit requirement for different crops; Measurement of crop canopy temperature; Measurement of soil temperatures at different depths; Remote sensing and familiarization with agro-advisory service bulletins; Study of synoptic charts and weather reports, working principle of automatic weather station; Visit to solar observatory.

Learning Outcome:

Students will get basic idea about agro-meteorology and crop weather forecasting to meet the challenges of aberrant weather conditions.

AGR 506 : Crop growth analysis and productivity modelling

1+1

Objectives:

To teach students regarding system approach through growth analysis of crop plants for achieving higher yield.

Syllabus:

Theory

UNIT I

Crop growth analysis : concept, CGR, RGR, RLGR, NAR, LAD, LAI; validity and limitations in interpreting crop growth and development.

UNIT II

Canopy architecture, light interception and utilization, energy use efficiency optimum LAI, critical and ceiling LAI.

UNIT III

Photosynthetic system, factors influencing transport and partitioning of photosynthate; source-sink relationships.

UNIT IV

Concept of plant ideotypes, characteristics of ideotype for rice, Maize, Arhar; Physiological basis of yield variation of Rice, Potato, Sugarcane.

UNIT V

Crop growth models – empirical models testing and yield prediction.

Practical

Plant sampling for measurement of biomass, LAI, LAD, CGR, NAR; Measurement of light interception, light extinction coefficient and critical LAI; Preparation of growth curves based on growth analysis data; Study of crop growth and productivity modeling based on crop growth analysis data.

Learning Outcome:

Students will get basic idea about how to measure growth analysis of crop and crop ideotype.

AGR 507 :

Agronomy of major cereals

2+1

Objectives:

To teach the crop husbandry of cereals.

Syllabus:

Theory

Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, water and cultural requirement, nutrition, quality components, handling and processing of the produce for maximum production of

UNIT I

Rabi cereals (wheat, barley, *boro* rice)

UNIT II

Kharif cereals (Rice, maize)

Practical

Phenological studies at different growth stages of crop; Estimation of crop yield on the basis of yield attributes; Formulation of cropping schemes for various farm sizes and calculation of cropping and rotational intensities; Working out growth indices (CER, CGR, RGR, NAR, LAD) and competition functions (aggressiveness, relative crowing coefficient, monetary yield advantages and ATER) of prominent intercropping systems of different crops; Preparation of rice nurseries; Planning and layout of field experiments; Intercultural operations in different crops; Judging of physiological maturity in different crops; Determination of cost of cultivation of different crops; Working out harvest index of various crops; Study of seed production techniques in various crops; Visit of field experiments on cultural, fertilizer, weed

and water management aspects; Visit to nearby villages for identification of constraints in crop production.

Learning Outcome:

Students will get basic idea about crop husbandry of cereals

AGR 508: Agronomy of pulse crops

2+1

Objectives:

To teach the crop husbandry of pulse crops.

Syllabus:

Theory

Origin and history, area and production, economic importance, classification, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition, quality components, handling and processing of the produce for the maximum production of

UNIT I

Rabi pulses (chickpea, pea, lentil and lathyrus)

UNIT II

Summer and *Kharif* pulses (pigeon pea, mung bean, urdbean and cowpea)

Practical

Phenological studies at different growth stages of pulse crops; Estimation of crop yield on the basis of yield attributes; Formulation of cropping schemes for various farm sizes and calculation of cropping and rotational intensities; Working out growth indices (LAI, CGR, RGR, NAR, LAD) aggressiveness, relative crowding coefficient, monetary yield advantages and ATER of prominent intercropping systems of different crops; Nodulation studies; Planning and layout of field experiments; Judging of physiological maturity in different pulse crops; Intercultural operations in different pulse crops; Determination of cost of cultivation of different pulse crops; Working out harvest index of various pulse crops; Study of seed production techniques in various pulse crops; Visit of field experiments on cultural, fertilizer, weed and water management aspects; Visit to nearby villages for identification of constraints in pulse production.

Learning Outcome:

Students will be enriched with the knowledge of pulse crops cultivation; course will be supported to aware about the importance of pulse crop in sustainable crop production.

AGR 509 : Agronomy of oilseed crops

2+1

Objectives:

To teach the production technology of oilseed crops.

Syllabus:

Theory

Origin and history; area, production and productivity; classification; improved varieties; adaptability; climate, soil and water requirement; crop nutrition; weed management, cultural practices; quality component; handling and processing of the produce and the value added products.

UNIT I

Rabi oilseeds – Rapeseed and mustard, linseed, sunflower and safflower.

UNIT II

Kharif oilseeds – Groundnut, sesame, castor and soybean.

Practical

Planning and layout of field experiments; Judging of physiological maturity in different crops and working out harvest index; Working out cost of cultivation of different oilseed crops; Estimation of crop yield on the basis of yield attributes, formulation of cropping schemes for various farm sizes and calculation of cropping intensities; Study of seed production techniques of various oilseed crops; Interculture operations in different oilseed crops; Determination of oil content in oilseeds and computation of oil yield; Formulation of cropping schemes.

Learning Outcome:

Students will get basic idea about crop husbandry of oilseeds

AGR 510 : Agronomy of fibre, sugar and tuber crops

2+1

Objectives:

To teach the crop husbandry of fibre and sugar crops.

Syllabus:

Theory

Origin and history; area and production, economic importance, classification, improved varieties, adaptability; climate, soil, agro techniques, cropping systems, quality component; handling and processing of the produce, constraints in production.

UNIT I

Fibre crops – jute, cotton, mesta, sisal, sunhemp.

UNIT II

Sugar crops – Sugarcane and sugar-beet.

UNIT III

Tuber crop : Potato

Practical

Planning and layout of field experiments; Preparation of sugarcane setts, sett treatment and methods of planting, tying and propping of sugarcane; Determination of cane maturity and calculation of purity percentage, recovery percentage and sucrose content in cane juice, phenological studies at different growth stages of crop; Intercultural operations in different crops; Working out growth indices (LER, CGR, RGR, NAR, LAD), aggressivity, relative crowding coefficient, monetary yield advantage and ATER of prominent intercropping systems; Judging of physiological maturity in different crops and working out harvest index; Working out cost of cultivation of different crops; Estimation of crop yield on the basis of yield components; Formulation of cropping schemes for various farm sizes and calculation of cropping and rotational intensities; Estimation of quality of fibre of different fibre crops; Study of seed production techniques in various crops; Visit to field experiments on cultural, fertilizer, weed and water management aspects; Visit to nearby villages for identification of constraints in crop production; Production of seeding materials.

Learning Outcome:

Students will get basic idea about crop husbandry of fibre, sugar and tuber crops

AGR 511 : Agronomy of medicinal, aromatic and under-utilized crops 2+1

Objectives:

To apprise students about different medicinal, aromatic and under-utilized crops, their package of practices and processing.

Syllabus:

Theory

UNIT I

Importance of medicinal and aromatic plants in human health, national economy and related industries, classification of medicinal and aromatic plants according to botanical characteristics and uses.

UNIT II

Climate and soil requirement; cultural practices; yield and important constituents of medicinal plants (*Rauwolfia*, *Poppy*, *Aloe vera*, *Satavar*, *Stevia*, *Kalmegh*, *Black pepper*, *Brahmi*, *Mango ginger*, *Ekangi* and *Turmeric*).

UNIT III

Climate and soil requirements; cultural practices, yield and important constituents of aromatic plants (*Citronella*, *Palmarosa*, *Mentha*, *Basil*, *Lemon grass*, *Geranium* and *Lavander*).

UNIT IV

Climate and soil requirements; cultural practices; yield of under-utilized crops [Grain *Amaranth*, *Bhringaraj* (*Wedelia*), *Broom grass*, *Fennel*, *Jowan* (*Trachyspermum*), *Senna* (*Cassia*), *Butterfly pea* (*Clitoria*), *Thankuni* (*Centella*), *Mehedi*, *Latkan* and *Sabai grass*].

Practical

Identification of crops based on morphological and seed characteristics; Raising of herbarium of medicinal, aromatic and under-utilized plants; Quality characters in medicinal and aromatic plants; Methods of analysis of essential oil and other chemicals of importance in medicinal and aromatic plants.

Learning Outcome:

Students will get basic idea about crop husbandry of medicinal, aromatic and under-utilized crops

AGR 512 : Agronomy of fodder and forage crops

2+1

Objectives:

To teach the crop husbandry of different fodder and forage crops along with their processing.

Syllabus:**Theory**

UNIT I

Adaptation, distribution, varietal improvement, agro-techniques and quality aspects including anti-quality factors of important fodder crops like sorghum, oats, cowpea, rice bean, berseem, clusterbean, maize, dinanath.

UNIT II

Adaptation, distribution, varietal improvement, agro-techniques and quality aspects including anti-quality factors of important forage crops/grasses – napier, panicum, cenchrus and stylo.

UNIT III

Year round fodder production and management, preservation and utilization of forage crops.

UNIT IV

Principles and methods of hay and silage making; chemical and biochemical changes, nutrient losses and factors affecting quality of hay and silage, use of physical and chemical enrichments and biological methods for improving nutrition and value addition of poor quality fodder.

UNIT V

Economics of forage cultivation, uses and seed production techniques.

Practical

Practical training of farm operations in raising fodder crops; Canopy measurement, yield and quality estimation, like crude protein, NDF, ADF, lignin, silica, cellulose etc. of various fodder and forage crops; Anti-quality components like HCN in sorghum and such factors in other crops; Hay and silage making and economics of their preparation.

Learning Outcome:

Students will get basic idea about crop husbandry of fodder and forage crops

AGR 513 : Agrostology and agro-forestry

2+1

Objectives:

To teach crop husbandry of different fodder, forage and agroforestry crops/trees along with their proceedings.

Syllabus:

Theory

UNIT I

Agrostology : definition and importance; grassland ecology – principles, community, climax, dominant species, succession, biotype, ecological status of grasslands in India, grass cover of India; problems and management of grasslands.

UNIT II

Importance, classification (various criteria), scope, status and research needs of pastures; pasture establishment, their improvement and renovation – natural pastures, cultivated pastures; common pasture grasses.

UNIT III

Agroforestry: definition and importance; agroforestry systems, agri-silviculture, silvipasture, agrisilvipasture, agrihorticulture, aqua-silviculture, alley cropping and energy plantation.

UNIT IV

Crop production technology in agro-forestry and agrostology system; silvipastoral system : meaning and importance for wasteland development; selection of species, planting methods and problems of seed germination and nursery management in agro-forestry systems; irrigation and manuring in agro-forestry systems, associative influence in relation to above ground and underground interferences; lopping and coppicing in agro-forestry systems; social acceptability and economic viability, nutritive value of trees; tender operation; desirable tree characteristics.

Practical

Preparation of charts and maps of India showing different types of pastures and agro-forestry systems; Identification of seeds and plants of common grasses, legumes and trees of economic importance with reference to agro-forestry; Seed treatment for better germination of farm vegetation; Methods of propagation/planting of grasses and trees in silvipastoral system; Fertilizer application in strip and silvipastoral systems; After-care of plantation; Estimation of protein content in loppings of important fodder trees; Estimation of calorie value of wood of important fuel trees ; Estimation of total biomass and fuel wood; Economics of agro-forestry; Visit to important agro-forestry research stations.

Learning Outcome:

Students will get basic idea about agrostology and agro-forestry

Objectives:

To apprise about different enterprises suitable for different agroclimatic conditions for sustainable agriculture.

Theory

UNIT I

Cropping systems : definition, indices and importance; classification of cropping systems according to type of rotation, degree of commercialization, water supply, enterprises, land use assessment.

UNIT II

Production potentials of different cropping systems, Interaction and mechanism of different production factors; stability in different systems through research; eco-physiological approaches to intercropping, yield advantage in intercropping systems.

UNIT III

Simulation models for intercropping; soil nutrient in intercropping; preparation of different cropping system models; evaluation of different cropping systems.

UNIT IV

New concept and approaches of farming systems and cropping systems and organic farming; case studies on different farming systems.

UNIT V

Concept of sustainability in cropping systems; efficient farming systems.

UNIT VI

Concerns of natural resources and their management; modern agriculture and sustainability; LEIA vs. HEIA; LEISA; agrobio-diversity and sustainable agriculture; diversification in cropping systems and its importance; IWM and INM in cropping system for sustainable crop production.

Learning Outcome:

Students will get basic idea about sustainability and cropping system

Objectives:

To teach the concept of dryland farming, how to harvesting of rain water and its proper utilization for crop production. To give idea about contingency crop planning, water shed management, mulching and use

Syllabus:**Theory**

UNIT I

Definition, concept of dryland farming; dryland farming vs rain-fed farming; significance and dimensions of dryland farming in Indian agriculture.

UNIT II

Soil and climatic parameters with special emphasis on rainfall characteristics; constraints limiting crop production in dry land areas; types of drought, drought syndrome, effect on plant growth; crop planning including contingency, crop diversification, varieties, cropping systems, conservation cropping for erratic and aberrant weather conditions.

UNIT III

Physiology of moisture stress and drought resistance, drought avoidance, drought management; mid-season corrections for aberrant weather conditions.

UNIT IV

Tillage, tillage, frequency and depth of cultivation, compaction in soil tillage; concept of conservation tillage and agriculture; precipitation-collection, conservation and utilization; techniques of moisture conservation in situ to reduce evapo-transpiration (mulching and anti-transpirants), runoff control to increase infiltration, time lines and precision key factors timely sowing, precision in seeding, weed control; fertilizer placement, top dressing and foliar application.

UNIT V

Definition, concept, Objectives, approach, components and problems of watershed management; steps in implementation of watershed; development of cropping systems for water shed areas.

Practical

Seed soaking, seed treatment with chemicals, seed germination, seeding depth and crop establishment in relation to soil moisture contents; Effect of plant density, thinning, leaf removal under moisture stress condition on crop growth; Study of the salient features of a model watershed; methods of measurement and determination of run-off; Estimation of stress index through plant analysis like proline, chlorophyll, relative leaf water content, chlorophyll stability index; Spray of anti-transpirant and their effects on crops; Practical utility of mulches, their mode of application and effects on soil and crop growth; Water use efficiency; Preparation of crop plans for different drought conditions; Study of field

experiments relevant to dryland farming. Visit to dryland research stations and watershed projects.

Learning Outcome:

Students will be highlighted about the crop production under dry land situation; students will be given idea about rainfall pattern, importance of rain water harvesting and run off water storage etc; it will be helpful to prepare crop planning under rainfed, dryland condition.

AGR 516 : Principles and practices of organic farming 1+1

Objectives:

To study the principles and practices of organic farming for sustainable crop production.

Theory

UNIT I

Organic farming – concept and definition, its relevance to India and global agriculture and future prospects.

UNIT II

Land and water management – land use, minimum tillage, shelter zones, hedges, pasture management, Agroforestry, organic farming and water use efficiency.

UNIT III

Organic farming and soil fertility management, nutrient recycling, organic residues, organic manures, composting, soil biota and decomposition of organic residues, earthworms and vermicompost, green manures and biofertilizers.

UNIT IV

Farming systems, crop rotations, multiple and relay cropping systems, intercropping in relation to maintenance of soil productivity.

UNIT V

Management of weeds, diseases and insect

pests by non-chemical materials, use of biological agents, fire, water, pheromones and bio-pesticides.

Practical

Aerobic and anaerobic methods of making compost; Making of vermicompost; Effect of use of biofertilizers, techniques of treating legume seeds with *Rhizobium* cultures, use of *Azotobacter*, *Azospirillum* and PSB cultures in field; Visit to organic farms; Quality standards, inspection, certification and labeling and accreditation procedures for farm produce from organic farms; Preparation and use of different bio-products for weed management, seed preservation, rodent and insect repelling and bird scaring.

Learning Outcome:

Students will get basic idea about organic farming

AGR 517: Crop ecology and geography

2+0

Objectives:

To acquaint the students about the agricultural systems, agro-ecological regions, and adaptation of crops to different agro-climatic conditions.

Theory

UNIT I

Concept of crop ecology, agricultural systems, ecology of cropping systems, principles of plant distribution and adaptation, crop and world food supply.

UNIT II

Ecosystem characteristics, types and functions, terrestrial ecology, flow of energy in ecosystem, ecosystem productivity, biomass, succession and climax concept.

UNIT III

Physiological response of crop plants to light, temperature, CO₂, moisture and solar radiation; influence of climate on photosynthesis and productivity of crops; effect of global climate change on crop production.

UNIT IV

Exploitation of solar energy in crops; vertical distribution of temperature; efficiency in crop production.

UNIT V

Competition in crop plants; environmental pollution, ecological basis of environmental management and environment manipulation through agronomic practices; improvement of unproductive lands through crop selection and management.

UNIT VI

Agro-climatic zones and agro-ecological regions in India, Geographic distribution of crop plants, factors determining crop distribution - agro-climatic, socio-economic and infrastructure development, access to processing, preservation and marketing; Shifts of ecosystems, extent and result; Changes in flora and fauna and their management strategies; Impact of short duration HYVs and hybrids on shift in agro-ecosystems.

Learning Outcome:

To get basic knowledge about crop ecology, ecosystem, agro-ecological regions, and adaptation of crops to different agro-climatic conditions.