DR BHIM RAO AMBEDKAR UNIVERSITY, AGRA

COURSE STRUCTURE FOR M.Sc. (Ag.) AGRONOMY UNDER SEMESTER SYSTEM TO BE IMPOSED FROM ACADEMIC SESSION 2019-20

M.Sc. (AGRICULTURE) AGRONOMY (SEMESTER WISE)

M.Sc. (Ag.) AGRONOMY
COURSE STRUCTURE UNDER SEMESTER SYSTEM

Course No.	Course title	Credit Hrs.
AGR-501*	Modern Concepts in Crop Production	3(3+0)
AGR-502*	Principles and Practices of Weed Management	3(2+1)
AGR-503*	Agronomy of Major Cereals and Pulses	3(2+1)
AGR-504*	Principles and Practices of Water Management	3(2+1)
AGR-505*	Agronomy of Oil Seed, Fibre and Sugar Crops	3(2+1)
AGR-506*	Crop Production in Problem Soils	3(2+1)
AGR-507*	Principles and Practices of Soil Fertility and Nutrient Management	3(2+1)
AGR-508*	Dryland Farming and Watershed Management	3(2+1)
AGR-509*	Advances in Crop Growth and Productivity	3(2+1)
AGR-510*	Agronomy of Fodder and Forage Crops	3(2+1)
AGR-516*	Master's Seminar	1(0+1)
AGR-517	Master's Research (Thesis) **OR**	20
Special Papers (Following courses may be taken to fulfill the requirements)		
AGR-511	Agro-meteorology and Crop Weather Forecasting	4(3+1)
AGR-512	Agrostology and Agro-forestry	4(3+1)
AGR-513	Cropping Systems and Sustainable Agriculture	4(3+1)
AGR-514	Principles and Practices of Organic Farming	4(3+1)
AGR-515	Agronomy of Medicinal, Aromatic and Underutilized Crops	4(3+1)
Supporting Courses		
AST-501*	Experimental Designs	3(2+1)
AST-503*	Computer Application in Agriculture	2(1+1)

***Compulsory for Master's Programme**

M.Sc. (Ag.) AGRONOMY
SEMESTER WISE COURSE DISTRIBUTION

Course No.	Course Title	Credit Hrs.	Marks			
			Mid term	Practical	Theory	Total
I Semester						
AGR-501	Modern Concepts in Crop Production	3(3+0)	20	-	80	100
AGR-502	Principles and Practices of Weed Management	3(2+1)	20	30	50	100
AGR-503	Agronomy of Major Cereals and Pulses	3(2+1)	20	30	50	100
AGR-511	Agro-meteorology and Crop Weather Forecasting	4(3+1)	20	30	50	100
AST-501	Experimental Designs	3(2+1)	20	30	50	100
II Semester						
AGR-504	Principles and Practices of Water Management	3(2+1)	20	30	50	100
AGR-505	Agronomy of Oil Seed, Fibre and Sugar Crops	3(2+1)	20	30	50	100
AGR-506	Crop Production in Problem Soils	3(2+1)	20	30	50	100
AGR-512	Agrostology and Agro-forestry	4(3+1)	20	30	50	100
AST-503	Computer Application in Agriculture	2(1+1)	20	30	50	100
III Semester						
AGR-507	Principles and Practices of Soil Fertility and Nutrient Management	3(2+1)	20	30	50	100
AGR-508	Dryland Farming and Watershed Management	3(2+1)	20	30	50	100
AGR-509	Advances in Crop Growth and Productivity	3(2+1)	20	30	50	100
AGR-513	Cropping Systems and Sustainable Agriculture	4(3+1)	20	30	50	100
IV Semester						
AGR-510	Agronomy of Fodder and Forage Crops	3(2+1)	20	30	50	100
AGR-514	Principles and Practices of Organic Farming	4(3+1)	20	30	50	100
AGR-515	Agronomy of Medicinal, Aromatic and Underutilized Crops	4(3+1)	20	30	50	100
AGR-516	Master's Seminar	1(0+1)				100
AGR-517	Master's Research (Thesis) **or** Special Papers	20	Satisfactory/ Unsatisfactory			
	Total	**56**				

AGR-501 MODERN CONCEPTS IN CROP PRODUCTION 3(3+0)

Objective: To teach the basic concepts of soil management and crop production.

THEORY

UNIT-I

Crop growth analysis in relation to environment; Agro ecological zones of India. Agro-climatic zones of U.P. and India

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 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, dry farming determining the nutrient needs for yield potentiality of crop plants, concept of balance nutrition and integrated nutrient management, precision agriculture.

AGR-502 PRINCIPLES AND PRACTICES OF WEED MANAGEMENT 3(2+1)

Objective: To familiarize the students about the weeds, herbicides and methods of weed control.

THEORY

UNIT-I

Weed biology and ecology, crop weed competition including allelopathy; principles and methods of weed control and classification; 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, herbicide mixtures; herbicide resistance and management; weed control through bio-herbicides, myco-herbicides and allelochemicals. Degradation of herbicides in soil and plants; herbicide resistance in weeds and crops; herbicide rotation.

UNIT-IV

Weed management in major crops and cropping systems; parasitic weeds; weed shifts in cropping systems; aquatic and perennial weed control.

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.
- 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 resistance analysis in plant and soil.
- Bioassay of herbicide resistance
- Calculation of herbicidal requirement.

AGR-503 AGRONOMY OF MAJOR CEREALS AND PULSES 3(2+1)

Objective: To teach the crop husbandry of cereals and pulse crops

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

UNIT- I

***Rabi* Cereals:** Wheat, Barley and Oat

UNIT-II

***Kharif* Cereals:** Rice, Maize, Sorghum and Pearl millet

UNIT-III

***Rabi* Pulses:** Chickpea, Field Pea, Lentil and Rajmash

UNIT-IV

***Kharif* Pulses:** Arhar, Urd, Moong, Cowpea, and Soybean

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, and LAD), aggressiveness, relative crowding coefficient, monetary yield advantage and ATER of prominent intercropping systems of different crops.
- Estimation of protein content in pulses.
- Planning and layout of field experiments.
- Judging of physiological maturity in different crops.
- Intercultural operations 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 control and water management aspects.
- Visit to nearby villages for identification of constraints in crop production.

AGR-504 PRINCIPLES AND PRACTICES OF WATER MANAGEMENT 3(2+1)

Objective: To teach the principles of water management and practices to enhance the water productivity.

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 movement in soil and plants; transpiration; soil–water-plant relationships; water absorption by plants; plant response to water stress, crop plant adaptation to moisture stress condition.

UNIT-III

Soil , Plant and meteorological factors determining water needs of crops; scheduling, depth and methods of irrigation; micro irrigation system; fertigation; management of water in controlled environments and polyhouses.

UNIT-IV

Water management of the crops and cropping systems; quality of irrigation water and management of saline water for irrigation; water use efficiency.

UNIT-V

Excess of soil water and plant growth; water management in problem soils; drainage requirement of crops and methods of field drainage, their layout and spacing.

PRACTICAL

- Measurement of soil water potential by using tensiometer, and pressure plate and membrane apparatus.
- Soil moisture characteristics curves
- Water flow measurements using different devices.
- Determination of irrigation requirements.
- Calculation of irrigation efficiency.
- Determination of infiltration rate
- Determination of saturated/unsaturated hydraulic conductivity.

AGR-505 AGRONOMY OF OIL SEED, FIBRE AND SUGAR CROPS 3 (2+1)

Objective: To teach the crop husbandry of oil seeds, fibre and sugar crops.

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

UNIT-I

***Rabi* Oilseeds:** Rapeseed and Mustard, Linseed

UNIT-II

***Kharif* Oilseeds**: Groundnut, Sesame, Castor, Sunflower and Soybean

UNIT-III

Fiber Crops: Cotton, Jute and Sunhemp

UNIT-IV

Sugar Crops: Sugar-beet and Sugarcane

PRACTICAL

- Planning and layout of field experiments
- Cutting of sugarcane setts, its treatment and methods of sowing, tying and propping of sugarcane.
- Determination of cane maturity and calculation on purity percentage, recovery percentage and sucrose content in cane juice phonological studies at different growth stages of crop.
- Intercultural operations in different crops.
- Cotton seed treatment.
- 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 attributes.
- Formulation of cropping schemes for various farm sizes and calculation of cropping and rotational intensities.
- Determination of oil content in oil seeds and computation of oil yield.
- Estimation of quality of fibre of different fibre crops.
- Study of seed production techniques in various crops
- Visit of field experiments on cultural, fertilizer, weed control and water management aspects
- Visit to nearby villages for identification of constraints in crop production.

AGR-506 CROP PRODUCTION IN PROBLEM SOILS 3(2+1)

Objective: To impart knowledge of problem soils and their management, attention will be on crop production in problem soils and their reclamation.

THEORY

UNIT-I

Problem soils and their distribution in India; acid, saline and waterlogged soils: origin of problematic soils and factors responsible.

UNIT-II

Response of crop to acidity, salinity, sodicity, excess water and nutrient imbalances.

UNIT-III

Reclamation of problem soils, role of amendments and drainage. Lime requirement for acid soils and gypsum requirement for sodic soils.

UNIT-IV

Crop production techniques in problem soils-crops, varieties, cropping system and agronomic practices.

UNIT-V

Effects of water table fluctuation on crop growth. Degraded lands and their rehabilitation.

PRACTICAL

- Characterization of acid, salt affected and calcareous soils.
- Lime requirement of acid soils.
- Gypsum requirement of Sodic Soils.
- Determination of cations ($Na^{+,}$ $K^{+,}$, $Ca^{+,+,}$, and $Mg^{+,+,}$) in soil samples
- Determination of anions (Cl, So_4, Co_3) in soil samples.
- Reclamation of problem soils by agronomic practices

AGR-507 PRINCIPLES AND PRACTICES OF SOIL FERTILITY AND NUTRIENT MANAGEMENT 3(2+1)

Objective: To impart knowledge of fertilizers and manures as sources of plant nutrients and apprise about the 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 nutrients; Essential plant nutrients-their functions; nutrient deficiency symptoms; transformation and dynamics of major plant nutrients.

UNIT-III

Preparation and use of farmyard manure, compost, green manures, vermicompost, biofertilizers and other organic concentrates their composition, availability and crop responses, recycling of organic wastes and residue management.

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; nutrient interactions.

UNIT-V

Time and methods of manures and fertilizers application, foliar application and its concept, relative performance of organic and inorganic manures; economics of fertilizer use, integrated nutrient management, use of vermicompost and residue wastes in crops.

PRACTICAL

- Determination of soil pH, ECe, 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.
- Calculation on manures & fertilizers requirement of crops.

AGR-508 DRYLAND FARMING AND WATERSHED MANAGEMENT 3(2+1)

Objective: To teach the basic concepts and practices of dryland farming and soil moisture conservation.

THEORY

UNIT-I

Definition, concept and characteristics of dry land farming; dry land versus rained farming; significance and dimensions of dry land 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, characterization of environment for water availability ; crop planning for erratic and aberrant weather conditions.

UNIT-III

Stress physiology and resistance to drought, adaptation of crop plants to drought, drought management strategies; preparation of appropriate crop plans for dry land areas; mid contingent plan for aberrant weather conditions

UNIT-IV

Tillage, tilth, frequency and depth of cultivation, compaction in soil tillage; concept of conservation tillage; tillage in relation to weed control and moisture conservation; techniques and practices of soil moisture conservation(use of mulches, kinds, effectiveness and economics); anti-transpirants; soil and crop management techniques, seeding and efficient fertilizer use.

UNIT-V

Concept of watershed resource management, problems, approach and components.

PRACTICAL

- Seed treatment, seed germination and crop establishment in relation to soil moisture contents.
- Moisture stress effects and recovery behavior of important crops.
- Estimation of moisture index and aridity index.
- Spray of anti-transpirants and their effect on crops.
- Collection and interpretation of data for water balance equations.
- 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.

AGR -509 ADVANCES IN CROP GROWTH AND PRODUCTIVITY 3(2+1)

Objective: To import knowledge regarding crop growth analysis and different yield prediction models.

THEORY

UNIT-I

Crop growth analysis, key growth parameters. Analysis of factors limiting crop growth and productivity-the concept of rate limitation.

UNIT-II

Phenology- Growth stages, internal and external factors influencing flowering. Photoperiodic and thermo-periodic responses and the concept of Degree days and crop growth duration.

UNIT-III

Canopy architecture, light interception, energy use efficiency of different canopies. LAI, LAD concept of optimum LAI.

UNIT-IV

Source–sink relationships. Translocation of photosynthetes and factors influencing transport of sucrose. Physiological and molecular control of sink, activity-partitioning efficiency and harvest index.

UNIT-V

Plant growth analysis techniques, yield structure analysis, theoretical and actual yields. Plant ideotypes, Simple physiological yield models –Duncan's, Monteith's and Passioura's, Crop growth models- empirical models testing and yield prediction.

PRACTICAL

- Plant sampling for leaf area and biomass estimation, analysis of growth and yield parameters-LAD, NAR, CGR, LAI, LAR, SLA portioning efficiency HI,
- Measurement of light interception, light extinction coefficient, energy utilization efficiency based energy intercepted and realized.
- Computer application in plant physiology, crop productivity and modeling.

AGR-510 AGRONOMY OF FODDER AND FORAGE CROPS 3(2+1)

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

THEORY

UNIT-I

Adaptation distribution, varietal improvement, agro-techniques and quality aspects including anti-quality factors of important fodder crops like maize, teosinte(Mukchari) sorghum, bajra, guar, cowpea, oats, barley, berseem, senji, lucern etc.

UNIT-II

Adaptation, distribution, varietal improvement, agro-techniques and quality aspects including anti-quality factors of important forage crops/grasses, napier grass, guinea grass, nandi grass, dinanath grass etc**.**

UNIT-III

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

UNIT-IV

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

UNIT-V

Economics of forage cultivation uses and seed production techniques**.**

PRACTICAL

- Practical raining of farm operations in raising fodder crops.
- Canopy measurement, yield and quality estimation, viz. crude protein, NDF, ADF, lignin, silica, cellulose etc of various fodders 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.

AGR-511 AGRO METEOROLOGY AND CROP WEATHER FORECASTING 4(3+1)

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

THEORY

UNIT-I

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

UNIT-II

Characteristic of solar radiation, energy balance of atmosphere system, radiation distribution in plant canopies, radiation utilization by field crops, photosynthesis and efficiency of radiation utilization by field crops energy budget of plant canopies , environmental temperature; soil, air and canopy temperature.

UNIT-III

Temperature profile in air, soil , crop canopy; soil and air temperature effects on plant processes; environmental moisture and evaporation: measures of atmospheric temperature and relative humidity vapor pressure and their relationship; evapo-transpiration and meteorological factors determining evapotranspiration.

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 evapotranspiration 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.

AGR-512 AGROSTOLOGY AND AGRO-FORESTRY 4(3+1)

Objective: To teach crop husbandry of different forage, fodder and agro-forestry crops/ trees along with their processing.

THEORY

UNIT-I

Agrostology: definition and importance; principles of grassland ecology; grassland ecology-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, agrisilviculture, silvipasture, agrisilvipasture, agrihorticulture, aquasilviculture, alley cropping and energy plantation.

UNIT-IV

Crop production technology in agroforestry and agroforestry system; silvipastoral system: meaning and importance for wasteland development; selection of spacies, planting methods and problems of seed germination in agro-forestry systems.

UNIT-V

Irrigation and manuring in agroforestry system, 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 silvi-pastoral system.
- Fertilizer application in strip and silvipastoral systems.
- After-care of plantation.
- Estimation of protein content in lopping 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.

AGR-513 CROPPING SYSTEMS AND SUSTAINABLE AGRICULTURE 4(3+1)

Objective: To acquaint the students about prevailing cropping systems in the country and practices to improve their productivity.

THEORY

UNIT-I

Cropping systems: definition, indices and its importance; physical resources, soil and water management in cropping systems; assessment of land use

UNIT-II

Concept of sustainability in cropping systems and farming systems, scope and objectives; production potential under monoculture cropping multiple cropping, alley cropping, sequential cropping and intercropping , mechanism of yield advantage in intercropping systems.

UNIT-III

Above and below ground interactions and allelopathic effects; competition relations; multistoried cropping and yield stability in intercropping, role of non-monetary inputs and low cost technologies; research need on sustainable agriculture.

UNIT-IV

Crop diversification for sustainability; role of organic +matter in maintenance of soil fertility; crop residue management; fertilizer use efficiency and concept of fertilizer use in intensive cropping system.

UNIT-V

Plant ideotypes for dry lands; plant growth regulators and their role in sustainability.

PRACTICAL

- Tools for determining productions & efficiencies in cropping and farming systems.
- Indicators of sustainability of cropping & Farming systems.
- Site specific development of IFS models for different agro-climatic zones.
- Visit of IFS models in different agro climatic zones of nearby state Universities/ Institutes and Farmer fields.

AGR 514 PRINCIPLES AND PRACTICES OF ORGANIC FARMING 4(3+1)

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

UNIT-I

Organic farming-concept and definition, its relevance to India and global agriculture and future prospects; land and water management- land use , minimum tillage; shelter zones, hedges, pasture management, agro-forestry.

UNIT-II

Organic farming and water use efficiency: soil fertility, nutrient recycling, organic residues, organic manures, composting, soil biota and decomposition of organic residues, earthworms and vermicompost, green manures and bio-fertilizers.

UNIT-III

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

UNIT-IV

Control of weeds, diseases and insect pest management, biological agents and pheromones, bio-pesticides.

UNIT-V

Socio-economic impacts; marketing and export potential: inspection, certification, labeling and accreditation procedures; organic farming and national economy.

PRACTICAL

- Aerobic and anaerobic methods of making compost.
- Making of vermicompost.
- Identification and nursery raising of important agro-forestry tress and tress for shelter belts.
- Efficient use of biofertilizers, techniques of treating legume seeds with *Rhizobium* cultures, use of *Azotobacter*, *Azospirillum* and PSB cultures in field.
- Quality standards, inspection, certification and labeling and accreditation procedures for farm produce from organic farms.
- Visit to an organic farm.

AGR 515 AGRONOMY OF MEDICINAL, AROMATIC AND UNDER-UTILIZED CROPS 4(3+1)

Objective: To acquaint students about different medicinal, aromatic and underutilized field crops, their package of practices and processing.

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 requirements; cultural practices; yield and important constituents of medicinal plants (Isabgol, Rauwolfia, Poppy, Aloe vera, Satavar, Stevia, Safed musli, Kalmegh, Asaphoetida, Nux vomica, Rosadle etc)

UNIT-III

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

UNIT-IV

Climate and soil requirements; cultural practices; yield of under–utilized crops (Rice bean, Lathyrus, Sesbania, Cluster bean, French bean, Fenugreek, Grain Amaranth, Coffee, Tea and Tobacco)

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.