

GURU KASHI UNIVERSITY
UNIVERSITY COLLEGE OF AGRICULTURE
MASTER OF SCIENCE -AGRONOMY

SUBJECT CODE	SUBJECT NAME	L	T	P	Credits
504001	Agronomy of Major Cereal and Pulse crops	3	-	-	3
504002	Lab- Agronomy of Major Cereal and Pulse crops		-	2	1
504003	Agronomy of Oilseed, Fibre, Sugar and important Medicinal and Aromatic Crops	2	-	-	2
504004	Lab- Agronomy of Oilseed, Fibre, Sugar and important Medicinal and Aromatic Crops		-	2	1
504005	Agronomy of Fodder and Forage Pasture Crops	1	-	-	1
504006	Lab -Agronomy of Fodder and Forage/ Pasture Crops		-	2	1
504007	Dry Land Farming and Water Shed Management	2	-	-	2
504008	Lab -Dry Land Farming and Water Shed Management	-	-	2	1
504009	Irrigation Water Management	2	-	-	2
504010	Lab -Irrigation Water Management	-	-	2	1
504011	Weed Management	2	-	-	2
504012	Lab - Weed Management		-	2	1
504013	Cropping system and Sustainable Agriculture	3	-	-	3
504014	Modern Concepts in Crop Production	2	-	-	2
504015	Soil Fertility and Fertilizer Use	2	-	-	2
504016	Lab- Soil Fertility and Fertilizer Use		-	2	1
504017	Crop production in Problem Soils and Water	2	-	-	2
504018	Lab- Crop production in Problem Soils and Water		-	2	1
504019	Plant Physiology	2	-	-	2
504020	Lab- Plant Physiology		-	2	1
504021	Agricultural Statistics	3	-	-	3
504022	Lab- Agricultural Statistics		-	2	1
504023	Seminar		-	4	2
504024	Lab -Fundamental of Computer Application		-	2	1*
504025	Lab -Library and Information Services		-	2	1*
504026	Lab-Technical Writing and Communication Skills		-	2	1*
504027	Masters Research		-	48	24*
	Total	26		78	38+27(NC)

*= Non credit(NC)

Note: 1 Dean College of agriculture will offer a course load between 12-18 credit hours per semester

2 A flexible system will be adopted for offering the courses. The students of I & II year class can jointly opt for a course

GURU KASHI UNIVERSITY
UNIVERSITY COLLEGE OF AGRICULTURE
MASTER OF SCIENCE -AGRONOMY

- 3 The credits for courses number 504001 and 504005 will be 2 each for students admitted in the 2013-14 session. From 2014-15 session the above programme will apply

Course contents- Agronomy

504001 Agronomy of Major Cereal and Pulse crops 3

Origin, history, area, production, classification, morphology, phenology, physiology, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition, quality components, handling and processing of the produce for maximum production of kharif and rabi cereals and pulses (rice, maize, sorghum, millets, wheat, barley), important grain legumes Pigeonpea, mungbean, urdbean, chickpea and lentil).

504002 Lab- Agronomy of Major Cereal and Pulse crops 1

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 of prominent intercropping systems of different crops; Estimation of protein content in pulses; Planning and layout of field experiments; 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

504003 Agronomy of Oilseed, Fibre, Sugar and important medicinal and aromatic Crops 2

Origin and history, area and production, classification, morphology, phenology, physiology, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition quality component, handling and processing of the produce for maximum production of kharif and rabi oilseed crops (Groundnut, sesame, castor, sunflower, soybean, rapeseed and mustard, linseed), fibre crops (Cotton, jute, sunhemp) and sugar crops (Sugar-beet and sugarcane). Description, distribution, climate, soil requirements, cultural practices, processing and important constituents/ quality of medicinal, aromatic, plantation and under-utilized crops, viz., Isabgol, Mentha, Lemongrass, Citronella, Lathyrus, Sesbania, Clusterbean, French bean, Celery, Fenugreek, Grain Amaranth, Coffee, Tea and Tobacco Turmeric.

504004 Lab- Agronomy of Oilseed, Fibre, Sugar and important medicinal and aromatic Crops 1

Planning and layout of field experiments. Cultivation of sugarcane crop and estimation of its quality parameters. Intercultural operations in different crops; Cotton seed treatment; Working out growth indices 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 oilseeds 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. Identification of crops based on morphological and seed characteristics; Raising of herbarium of medicinal, aromatic and under-utilized plants;

GURU KASHI UNIVERSITY
UNIVERSITY COLLEGE OF AGRICULTURE
MASTER OF SCIENCE -AGRONOMY

504005 Agronomy of Fodder and Forage/ Pasture Crops **1**

Adaptation, distribution, varietal improvement, agro-techniques and quality aspects including antiquality factors of important fodder crops like maize, bajra, guar, cowpea, oats, barley, berseem, senji, lucerne etc. and forage crops like, napier grass, panicum, lasiuras, cenchrus etc. Year-round fodder production and management, preservation and utilization of forage and pasture crops. 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. Value addition of poor quality fodder. Economics of forage cultivation uses and seed production techniques.

504006Lab- Agronomy of Fodder and Forage/ Pasture Crops **1**

Farm operations in raising fodder crops; Canopy measurement, yield and quality estimation, viz. 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

504007 Dry Land Farming and Water Shed Management **2**

Definition, concept and characteristics of dry land farming. Dry land versus rainfed farming. Significance and dimensions of dry land farming in Indian agriculture. 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. Stress physiology and resistance to drought, adaptation of crop plants to drought and drought management strategies. Preparation of appropriate crop plans for dry land areas, mid contingent plan for aberrant weather conditions. 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. Fertilizer placement top dressing foliage application. Concept of watershed resource management, problems, approach and components. Plant ideotypes for drylands

504008 Lab- Dry Land Farming and Water Shed Management **1**

Seed treatment, seed germination and crop establishment in relation to soil moisture contents, moisture stress effects and recovery behaviour 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 and soil conservation research stations and watershed projects.

504009 Irrigation Water Management **2**

History of irrigation in India; Major irrigation projects in India; Water resources development; Crop water requirements; Concepts of irrigation scheduling, Different approaches of irrigation scheduling; Soil water depletion plant indices and climatic parameters; Concept of critical stages of crop growth

GURU KASHI UNIVERSITY
UNIVERSITY COLLEGE OF AGRICULTURE
MASTER OF SCIENCE -AGRONOMY

in relation to water supplies; Crop modeling, crop coefficients, water production functions; Soil water movement in soil and plants, transpiration, soil-water-plant relationships and water absorption by plants. Plant response to water stress. Methods of irrigation viz. surface methods, overhead methods, drip irrigation and air conditioning irrigation, merits and demerits of various methods, design and evaluation of irrigation methods; Measurement of irrigation water, application and distribution efficiencies; Management of water resources (rain, canal and ground water) for agricultural production; Agronomic considerations in tile-design and operation of irrigation projects, characteristics of irrigation and family systems affecting irrigation management; Irrigation legislation; Water quality, conjunctive use of water, irrigation strategies under different situation of water availability, optimum crop plans and cropping patterns in canal command areas; Drainage requirement of crops, methods of field drainage, their layout and spacing.

504010 Lab- Irrigation Water Management

1

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

504011 Weed Management

2

Weed biology, ecology and crop-weed competition including allelopathy Scope and principles of weed management and control/weed classification, biology, ecology and allopath, crop weed indices. History and development of herbicide. Classification and selectivity of herbicides based on chemical, physiological application and selectivity. Mode and mechanism of action of important herbicides. Herbicide structure- activity relationship and factors affecting the efficiency of herbicides. Herbicide formulations and mixtures. Weed control through bio-herbicides, myco-herbicides and allelochemicals. Degradation of herbicides in soil and plants. Herbicide resistance in weeds and crops herbicide rotations. Weed management in major crops and cropping systems. Management of parasitic weeds and special weed problems. Weed shifts in cropping systems. Aquatic and perennial weed control. Integrated weed management. Cost: benefit analysis of weed management.

504012 Lab- Weed Management

1

Identification of important crop weeds. Preparation of a weed herbarium. Weed survey in crops and cropping systems. Crop-weed competition studies. Weed indices. 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. Calculation of herbicidal requirement

504013 Cropping System and Sustainable Agriculture

3

Cropping systems- definition, indices and its importance. Physical resources, soil and water management in cropping systems, assessment of land use. Concept of sustainability in cropping systems, scope and objectives. Production potential under monoculture cropping, multiple cropping, alley cropping, sequential cropping and intercropping. Mechanism of yield advantage in

GURU KASHI UNIVERSITY
UNIVERSITY COLLEGE OF AGRICULTURE
MASTER OF SCIENCE -AGRONOMY

intercropping systems. Multi-storied cropping and yield stability in intercropping. Role of nonmonetary inputs and low cost technologies. Research need on sustainable agriculture. Crop diversification for sustainability. Organic farming - concept and definition, its relevance to India and global agriculture and future prospects. Soil fertility- nutrient recycling, organic residues, organic manures, composting, soil biota and decomposition of organic residues, earthworms and vermicompost, green manures and biofertilizers. Farming systems, crop rotations, intercropping in relation to maintenance of soil productivity. Control of weeds, diseases and insect pest management, biological agents, pheromones and biopesticides. Socio-economic impacts. Marketing and export potential, Organic standards, certification, labeling and accreditation procedures. Organic farming and national economy.

504014 Modern Concepts in Crop Production

2

Crop growth analysis in relation to environment. Agro-ecological zones of India. Quantitative agrobiological principles and inverse yield nitrogen law. Mitscherlich yield equation, its interpretation and applicability, Baule unit. 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. Scientific principles of crop production and crop response production functions. Concept of soil plant relations. Yield and environmental stress. Integrated farming systems. Resource conservation technology including modern concept of tillage, dry farming. Determining the nutrient needs for yield potentiality of crop plants. Crop residue management-recycling and its effective utilization. Remote sensing for yield forecasting. Precision agriculture.

504015 Soil Fertility and Fertilizer Use

2

Soil fertility and soil productivity. Nutrient sources – fertilizers and manures. Soil N – sources and N transformations. Biological nitrogen fixation. Nitrogenous fertilizers - their fate in soils and enhancing N use efficiency. Soil P - forms, reactions in soils and factors affecting availability. Management of P fertilizers. Potassium- forms, mechanism of fixation, Q/I relationships. Management of K fertilizers. Sulphur, Ca and Mg – source, forms, fertilizers and their behavior in soils and management. Micronutrients- critical limits in soils and plants, factors affecting their availability, sources and management. Common soil test methods for fertilizer recommendations. Site-specific and plant need based nutrient management. Concept of balanced nutrition and integrated nutrient management. Blanket fertilizer recommendations- usefulness and limitations. Soil fertility evaluation. Soil quality in relation to sustainable agriculture.

504016 Lab- Soil Fertility and Fertilizer Use

1

Laboratory and greenhouse experiments for evaluation of indices of nutrient availability and their critical values in soils and plants. Chemical analysis of soil for total and available nutrients. Analysis of plants for essential elements.

504017 Crop production in Problem Soils and Water

2

Area, distribution, origin and basic concepts of problematic soils. Morphological features and characterization of salt-affected soils. Management of salt- affected soils. Salt tolerance of crops - mechanism and ratings. Monitoring of soil salinity in the field. Management principles for sandy,

GURU KASHI UNIVERSITY
UNIVERSITY COLLEGE OF AGRICULTURE
MASTER OF SCIENCE -AGRONOMY

clayey, red lateritic and dry land soils. Acid soils – nature, sources and management. Effect on plant growth. Lime requirement of acid soils. Biological sickness of soils and its management. Quality of irrigation water, management of brackish water. Salt balance under irrigation. Characterization of brackish waters, area and extent. Agronomic practices in relation to problematic soils. Cropping pattern for utilizing poor quality ground waters.

504018 Lab - Crop Production in Problem Soils and Water

1

Characterization of acid, acid sulfate, salt- affected and calcareous soils. Determination of cations (Na⁺, K⁺, Ca⁺, and Mg⁺⁺) in ground water and soil samples. Determination of anions (Cl⁻, SO₄²⁻, CO₃²⁻ and HCO₃⁻) in ground waters and soil samples. Lime and gypsum requirement of acid and sodic soil.

504019 Plant Physiology

2

Photosynthesis, pigments, CO₂ fixation and reduction. Carbohydrate synthesis in C₃, C₄ and CAM plants. Translocation of metabolites. Photo respiration. Environmental and agricultural aspects of photosynthetic efficiency, source- sink relationship and productivity. Respiration. Concept of growth, differentiation and pattern formation. Factor affecting growth and general aspects of development. Hormones and growth regulators -auxins, gibberellins, cytokinins, ethylene and ABA. Other inhibitors. Retardants. Polyamines. Aliphatic alcohols. Brassins. Hormonal regulation of growth & development. Photoperiodism. Flowering hormones, Vernalization. Abscission.. Aging. Senescence. Physiology of seed and fruit development. Seed germination. Seed and bud dormancy. Plant water relationship. Osmotic potential, water potential. Pressure potential and their relationship. Plasmolysis. Imbibitions. Absorption and translocation of water. Stomata, stomata mechanism. Factor affecting water loss. Physiological role of nutrients.

504020 Lab - Plant Physiology

1

Experiments related to photosynthesis. Chlorophyll and other pigment determination. Experiments related to respiration, Osmosis, Imbibition, Plasmolysis. Measurements of μ_w and μ_s . Membrane permeability. Transpiration experiments. catalase, peroxidase and nitrate reductase activities as indicators of Nutrient status of crop. Experiment on growth measurements. Experiment on quality of light on seed germination. Breaking of dormancy. Experiment on photoperiodism. Experiment on hormonal regulation and development.

504021 Agricultural Statistics

3

Frequency distribution, standard error and deviation, correlation and regression analyses, co-efficient of variation; Hypothesis testing. Concept of p-value. Tests of significance-t, F and chi-square (X²); Data transformation and missing plot techniques; Design of experiments and their basic principles, completely randomized, randomized block, split plot, strip-plot, factorial and simple confounding designs; Efficiency of designs; Methods of statistical analysis for cropping systems including intercropping; Pooled analysis.

504022 Lab- Agricultural Statistics

1

Correlation analysis. Regression analysis (exponential, power function, quadratic, multi-variate, selection of variables, validation of models, ANOVA and testing of hypothesis). Tests of

GURU KASHI UNIVERSITY
UNIVERSITY COLLEGE OF AGRICULTURE
MASTER OF SCIENCE -AGRONOMY

significance (Z-test, t-test, F-test and Chi-square test). Analysis of variance. Completely randomized design. Randomized block and latin square designs. Missing plot and analysis of covariance. 2^3 , 2^4 and 3^3 simple and confounded experiments. Split plot designs. Factorial in split plot designs.

504023 Lab-Seminar **1**

504024 Lab-Fundamental of Computer Application **1(NC)**

Ms-word: creating a document, saving and editing, use of options from tool bars, format, insert and tools(spelling and grammar), alignment of text, creating a table, merging cells, column and row width. Ms-excel: entering expressions through the formula tool bar and use of inbuilt functions, sum, average, max, min. Creating graphs and saving with and without data in Ms-excel. Ms-access: creating database, structuring with different types of fields. Ms-power point: preparation of slides on power point. Internet Browsing: browsing a web page and creating of E-Mail ID. Agri. net (ARIS).

504025 Lab- Library and Information Services **1(NC)**

Introduction to Library and its services; five laws of library science; type of documents; classification and cataloguing; organization of documents; sources of information primary, secondary and tertiary; current awareness and SDI services; tracing information from reference sources; library survey; preparation of bibliography; use of Online Public Access Catalogue; use of CD-ROM databases and other computerized library services, CeRA, J-Gate; use of Internet including search engines and its resources; e-resources and

504026 Lab-Technical Writing and Communication Skills **1(NC)**

Various forms of scientific writings: theses, technical papers, review, manuals etc., various parts of thesis and research communications: title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion; writing of abstracts, summaries, precis, citations etc. commonly used abbreviations in the theses and research communications; illustrations, photographs and drawings with suitable captions; paginations, numbering of tables and illustrations; writing of numbers and dates in scientific write-ups; editing and proof reading; writing a review article. access methods.

504027 Masters Research **24 (NC)**