

University of Lucknow
M.Sc. (Ag.) Agronomy Programme
Regulations 2020

1. Applicability

These Regulations shall apply to the M.Sc. (Ag.) Agronomy programme from the session 2020-21.

2. Minimum Eligibility for Admission

- i) Bachelor's degree in respective/ related subjects.
- ii) 7.0/10 or equivalent OGPA/equivalent percentage of marks at Bachelor's degree.

3. Objective

- i) Describe the following cropping systems: monoculture, rotation, double-crop, intercrop, and ratoon.
- ii) Describe the following crop functions: green manure crop, cover crop, companion/nurse crop, and trap crop.
- iii) Describe factors that influence seed quality. 2. Understand why the Tetrazolium and Accelerated Aging tests are important. 3. Read a seed tag and find information on it. 4. Calculate pure live seed.

4. Program Outcome

Agriculture is the art and science of cultivating the soil, growing crops and raising livestock. It includes the preparation of plant and animal products for people to use and their distribution to markets. Agriculture is practiced for the purpose of producing food and other human needs such as clothing, medicines, tools and livestock feed. Thus it is practiced as a business for economic gain. Agronomy is that branch of agricultural science that deals with principles and practises of crop production for obtaining maximum economical yield from a field without impairing the fertility and productivity of the field. Agronomy is a branch of agriculture that deals with field crop production and soil management. It is a back bone of agriculture. All disciplines are depending on agronomy. Agronomy is correlated with different disciplines such as agril. botany, soil science and agriculture chemistry, water management, plant protection, biological control, plant breeding, agro meteorology, agril. economics and agril. Statistics etc. The cereal crops are the consumed at the largest scale worldwide. Hence agronomy is the one that deals with how the crop is grown what conditions are required for its cultivation etc. Agronomy provides the knowledge about the time of sowing, seed rate, and the variety suited for an area, fertilizer rate, pest and disease management etc. The importance of agronomy provides farmers with agricultural information about how to grow and care for plants and soil in certain environments. Factors such as climate, roots, moisture, weeds, pests, fungi, and erosion can pose significant challenges when farmers attempt to produce a plentiful harvest.

M.Sc. (Ag.) AGRONOMY

NAME OF DEPARTMENT: AGRONOMY

Course No.	Course Title	Credit(s)		
		T	P	
SEMESTER I				
1	AGRMA-101	Modern Concepts in Crop Production	2	1
2	AGRMA-102	Principals and Practices of Soil Fertility and Nutrient Management	2	1
3	AGRMA-103	Principles and Practices of Weed Management	2	1
4	AGRMA-104	Principles and Practices of Water Management	2	1
5	AGRSS-101	Essential Statistical Method	2	1
6	AGRNC-101	Library and Information Services	-	-
7	AGRNC-102	Basic Concepts in Laboratory Techniques		
8	AGRRES-101	Research Work	0	2
			10	7
	Total Credit		17	
SEMESTER II				
1	AGR-MA-201	Agronomy of major Cereals and Pulses	2	1
2	AGR-MA-202	Principles and Practices of Organic Farming	2	1
3	AGRMI-201	Seed Production Techniques of Major Field Crops	2	1
4	AGRMI-202	Soil Fertility and Plant Nutrition	2	1
5	AGRNC-201	Disaster Management	-	-
5	AGRNC-202	Agricultural Research, Research Ethics and Rural Development Programmes	-	-
6	AGRRES-201	Research Work	0	4
			8	8
	Total Credit		16	
SEMESTER III				
1	AGRMA-301	Agronomy of oilseed, fibre and sugar crops	2	1
2	AGRSS-301	Agronomy of Fodder and Forage Crops	2	1
3	AGRSS-302	Soil Biology and Biochemistry	2	1
4	AGRES-301	Masters' Seminar	0	1
5	AGRNC-301	Intellectual Property and its Management in Agriculture	-	-
6	AGRRES-401	M.Sc.(Ag.) Research	0	6
			6	10
	Total Credit		16	
SEMESTER IV				
1	AGRNC-401	Technical Writing and Communications Skills	-	-

2	AGRRES-401	Research Work, Research Report and Viva-Voce	-	8
		Total Credit		8
Grand Total Credits				57

M.Sc. (Ag.) AGRONOMY

AGRMA- 101: Modern Concepts in Crop Production

2+1

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.

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 and 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.

Suggested Readings

Balasubramaniyan P & Palaniappan SP. 2001. *Principles and Practices of Agronomy*. Agrobios.

Fageria NK. 1992. *Maximizing Crop Yields*. Marcel Dekker.

Havlin JL, Beaton JD, Tisdale SL & Nelson WL. 2006. *Soil Fertility and Fertilizers*. 7th Ed. Prentice Hall.

Paroda R.S. 2003. *Sustaining our Food Security*. Konark

Publ. Reddy SR. 2000. *Principles of Crop Production*.

Kalyani Publ.

Sankaran S & Mudaliar TVS. 1997. *Principles of Agronomy*. The Bangalore Printing & Publ.

Singh SS. 2006. *Principles and Practices of Agronomy*. Kalyani.

AGRMA-102: Principals and Practices of Soil Fertility and Nutrient Management
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, vermin-compost, bio-fertilizers 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 vermin- compost and residue wastes in crops.

Practical

- Determination of soil pH, EC, 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

Suggested Readings

Brady NC & Weil R.R 2002. *The Nature and Properties of Soils*. 13th Ed.

Pearson Edu.

Fageria NK, Baligar VC & Jones CA. 1991. *Growth and Mineral Nutrition of Field Crops*. Marcel Dekker.

Havlin JL, Beaton JD, Tisdale SL & Nelson WL. 2006. *Soil Fertility and Fertilizers*. 7th Ed. Prentice Hall.

Prasad R & Power JF. 1997. *Soil Fertility Management for Sustainable Agriculture*. CRC

Press. & BokdeS. 2000. *Manures and Fertilizers*. Agri-Horti Publ.

AGRMA -103 : Principles And Practices of Weed Management 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

Suggested Readings

Aldrich RJ & Kramer RJ. 1997. *Principles in Weed Management*. Panima Publ.

Ashton FM & Crafts AS. 1981. *Mode of Action of Herbicides*. 2nd Ed. Wiley Inter-Science.

Gupta OP. 2007. *Weed Management – Principles and Practices*. Agrobios.

Mandal RC. 1990. *Weed, Weedicides and Weed Control - Principles and Practices*. Agro-Botanical Publ.

Rao VS. 2000. *Principles of Weed Science*. Oxford & IBH.

SubramanianS, AliAM & Kumar RJ. 1997. *All About Weed Control*. Kalyani.

Zimdahl RL. 1999. *Fundamentals of Weed Science*. 2nd Ed. Academic Press.

AGRMA-104: Principles and Practices of Water Management

2+1

Objective

To teach the principles of water management and practices to enhance the water use efficiency.

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 poly-houses.

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

Suggested Readings

Lenka D. 1999. *Irrigation and Drainage*. Kalyani

Michael AM. 1978. *Irrigation: Theory and Practice*. Vikas Publ.

Paliwal KV. 1972. *Irrigation with Saline Water*. IARI Monograph, New Delhi.

Panda SC. 2003. *Principles and Practices of Water Management*.

Agrobios.

Prihar SS & Sandhu BS. 1987. *Irrigation of Food Crops - Principles and Practices*. ICAR.

Reddy SR. 2000. *Principles of Crop Production*. Kalyani.

AGRSS-101: Essential Statistical Methods 2+1

UNIT I

Descriptive statistics: probability distributions, binomial, probability distributions of functions of random variables. Classification and tabulation of data. Diagrammatic and Graphical representations of research results.

UNIT II

Sampling distributions of sample mean and sample variance from Normal population, aim, method. Normal distribution - marginal and conditional

distributions.

UNIT III

Distribution of quadratic forms. Regression and correlation rank correlation, Regression analysis, partial and multiple correlation and regression, linear and nonlinear relationship. Mechanical errors. Principles of experimental design, precision and accuracy, advantage of replication, experimental technique. Analysis of variance, fundamental principles of analysis of variance. Critical difference, limitations of the analysis of variance.

UNIT IV

Statistical analysis and advantage and disadvantage of basic design-completely randomized design, randomized block design, Latin square design. Factorial concept: simple effects, main effects and interaction, factorial experiments (without confounding), Yates method. Confounding, principles of confounding in a 2^3 factorial experiments. Split plot design.

UNIT V

Missing plot technique; Bartlett's techniques for missing plots, cross-overdesign or switch-over trials, Rotational experiments, progeny selection, compact family block design, uniformity trial, sire index, sampling in field experiments.

Practical:

CRD, RBD and LSD designs, Data analysis on co relation and regression on experimental data. Data presentation in bar and pie diagram.

Suggested Readings

Chakrabarti MC. 1962. *Mathematics of Design and Analysis of Experiments*. Asia Publ House.

Cochran WG & Cox DR. 1957. *Experimental Designs*. 2nd Ed. JohnWiley.

Dean AM & Voss D. 1999. *Design and Analysis of Experiments*. Springer.

Dey A & Mukerjee R. 1999. *Fractional Factorial Plans*. JohnWiley.

AGRNC-101 : Library and Information Services 0+1

Objective

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literaturesurvey, to formulate information search strategies, and to use modern tools(Internet, OPAC, search engines etc.) of information search.

Practical

Introduction to library and its services; Role of libraries in education, research and technology transfer; Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.); Tracing information from reference sources; Literature survey; Citation techniques/Preparation of

bibliography; Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; e-resources access methods.

AGRNC-102: Basic Concepts in Laboratory Techniques 0+1

Objective

To acquaint the students about the basics of commonly used techniques in laboratory.

Practical

Safety measures while in Lab; Handling of chemical substances; Use of burettes, pipettes, measuring cylinders, flasks, separatory funnel, condensers, micropipettes and vials; washing, drying and sterilization of glassware; Drying of solvents/chemicals. Weighing and preparation of solutions of different strengths and their dilution; Handling techniques of solutions; Preparation of different agro-chemical doses in field and pot applications; Preparation of solutions of acids; Neutralisation of acid and bases; Preparation of buffers of different strengths and pH values. Use and handling of microscope, laminar flow, vacuum pumps, viscometer, thermometer, magnetic stirrer, micro-ovens, incubators, sandbath, waterbath, oilbath; Electric wiring and earthing. Preparation of media and methods of sterilization; Seed viability testing, testing of pollen viability; Tissue culture of crop plants; Description of flowering plants in botanical terms in relation to taxonomy

Suggested Readings

Furr AK. 2000. *CRC Hand Book of Laboratory Safety*. CRC Press.

Gabb MH & Latchem WE. 1968. *A Handbook of Laboratory Solutions*. Chemical Publ. Co.

AGRMA- 201: Agronomy of Major Cereals And Pulses

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 of crops.

UNIT I

Rabi cereals: Wheat, Barley and Oat

UNIT II

Kharif cereals: Rice, Maize, Sorghum, Pearlmillet and Minor millet

UNIT III

Rabi pulses: Chickpea, pea, Lentil and Rajmash

UNIT IV

Kharif pulses: Arhar, Greengram, Blackgram and Cowpea

UNIT V

Zaid crops: Urd and Moong

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), 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

Suggested Readings

Das NR. 2007. *Introduction to Crops of India*. Scientific Publ.

Hunsigi G & Krishna KR. 1998. *Science of Field Crop Production*. Oxford & IBH.

Jeswani LM & Baldev B. 1997. *Advances in Pulse Production Technology*.

ICAR.

Khare D & Bhale MS. 2000. *Seed Technology*. Scientific Publ.

Kumar Ranjeet & Singh NP. 2003. *Maize Production in India: Golden Grain in Transition*.

Pal M, Deka J & Rai RK. 1996. *Fundamentals of Cereal Crop Production*.

Tata McGraw Hill.

Prasad, Rajendra. 2002. *Text Book of Field Crop Production*. ICAR.

Singh C, Singh P & Singh R. 2003. *Modern Techniques of Raising Field Crops*. Oxford & IBH.

Singh SS. 1998. *Crop Management*. Kalyani. Yadav DS. 1992. *Pulse Crops*. Kalyani.

AGRMA- 202: Principles and Practices of Organic Farming 2+1

Objective

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; 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 biofertilizers.

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, biopesticides.

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 trees and trees for shelterbelts
- Efficient use of biofertilizers, technique of treating legume seeds with *Rhizobium* cultures, use of *Azotobacter*, *Azospirillum*, and PSB cultures in field
- Visit to an organic farm

- Quality standards, inspection, certification and labeling and accreditation procedures for farm produce from organic farms

Suggested Readings

Ananthakrishnan TN. (Ed.). 1992. *Emerging Trends in Biological Control of Phytophagous Insects*. Oxford & IBH.

Gaur AC. 1982. *A Manual of Rural Composting*, FAO/UNDP Regional Project Document, FAO.

Lampin N. 1990. *Organic Farming*. Press Books, Ipswich, UK.
Palaniappan SP & Anandurai K. 1999. *Organic Farming – Theory and Practice*. Scientific Publ.

Rao BV Venkata. 1995. *Small Farmer Focused Integrated Rural Development: Socio-economic Environment and Legal Perspective*: Publ.3, Parisaraprajna Parishtana, Bangalore.

Reddy MV. (Ed.). 1995. *Soil Organisms and Litter Decomposition in the Tropics*. Oxford & IBH.

Sharma A. 2002. *Hand Book of Organic Farming*. Agrobios.

Singh SP. (Ed.) 1994. *Technology for Production of Natural Enemies*. PDBC, Bangalore.

Subba Rao NS. 2002. *Soil Microbiology*. Oxford & IBH.

Trivedi RN. 1993. *A Text Book of Environmental Sciences*, Anmol Publ.

Veeresh GK, Shivashankar K & Suiglachar MA. 1997. *Organic Farming and Sustainable Agriculture*. Association for Promotion of Organic Farming, Bangalore.

WHO. 1990. *Public Health Impact of Pesticides Used in Agriculture*.

WHO.

Woolmer PL & Swift MJ. 1994. *The Biological Management of Tropical Soil Fertility*. TSBF & Wiley.

AGRMI- 201: Seed Production Techniques of Major Field Crops

2+1

Objective:

To make the students aware of various techniques of seed production as it is

important component of crop raising.

Theory:

Unit I: Classes of seed; Seed Act regulations; Seed certification and testing,

Unit II: Seed production and processing of principal crops: Cereals (Rice, Hybrid rice, Wheat, Maize, Hybrid maize),

Unit III Pulses (Chickpea, Lentil, Green gram, Black gram, Lathyrus), Oilseeds (Mustard and Rapeseed, Groundnut, Sunflower, Sesame),

Unit-IV Tuber crops (Potato), Fibre crops (Jute), Fodder crops (Rice bean, Cowpea).

PRACTICALS:

Selection of land and study on specific cultivation practices (isolation distance, seed treatment, sowing / planting pattern, rouging, harvesting, etc.) in seed production plots; Varietal identification at different growth stages in seed production fields; Study on parental lines in hybrid seed production; Methodology of seed testing for physical purity, moisture content, viability, germination, vigour index, etc.; Calculation on seed production methods, economics and testing procedures; Visit to seed production plots of hybrid rice, green gram, rapeseed-mustard, groundnut, sesame, jute, etc.; Understanding of seed certification process; Visit to Seed Processing Plant for post-harvest processing and storage; Visit to Seed Testing Laboratory and making a report.

AGRMI -202: Soil Fertility and Plant Nutrition

2+1

Objective

To teach basics of soil fertility evaluation, techniques of soil fertility evaluation, plantnutrients, integrated approach of plant nutrition, and environmental quality.

Unit I

Soil fertility concept. Factor effecting of soil fertility. Essential and beneficial elements.

Unit II

Nutrient deficiencies and toxicities-recent diagnostic techniques and ameliorative measures.

Unit-III

Nutrient and nutrient water interaction. Balanced use of nutrients. Integrated plant nutrient supply and management.

UnitIV

Nutrient Uptake mechanisms, nutrient release and carry-over effects, quantity-intensity relationship.

UnitV

Soil fertility evaluation, soil test crop response correlations.

Practical

Laboratory and greenhouse experiments for evaluation of indices of nutrient availability and their critical value in soil and plant. Determination of different pools of macro and micro nutrients. Quantity-intensity relation of P and K.

AGRNC-201 : Agricultural Research, Research Ethics 1+0
(E-Course) And Rural Development Programmes

Objective

To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

Theory

UNIT I

History of agriculture in brief; Global agricultural research system: need, scope, opportunities; Role in promoting food security, reducing poverty and protecting the environment; National Agricultural Research Systems (NARS) and Regional Agricultural Research Institutions; Consultative Group on International Agricultural Research (CGIAR): International Agricultural Research Centres (IARC), partnership with NARS, role as a partner in the global agricultural

research system, strengthening capacities at national and regional levels; International fellowships for scientific mobility.

UNIT II

Research ethics: research integrity, research safety in laboratories, welfare of animals used in research, computer ethics, standards and problems in research ethics.

UNIT III

Concept and connotations of rural development, rural development policies and strategies. Rural development programmes: Community Development Programme, Intensive Agricultural District Programme, Special group – Area Specific Programme, Integrated Rural Development Programme (IRDP) Panchayati Raj Institutions, Co-operatives, Voluntary Agencies/Non-Governmental Organisations. Critical evaluation of rural development policies and programmes. Constraints in implementation of rural policies and programmes.

Suggested Readings

Bhalla GS & Singh G. 2001. *Indian Agriculture - Four Decades of Development*.

Sage Publ.

Punia MS. *Manual on International Research and Research Ethics*. CCS, Haryana Agricultural University, Hisar.

Rao BSV. 2007. *Rural Development Strategies and Role of Institutions - Issues, Innovations and Initiatives*. Mittal Publ.

Singh K.. 1998. *Rural Development - Principles, Policies and Management*. Sage Publ.

AGRNC -202: Disaster Management 1+0

(E-Course)

Objectives

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

Theory

UNIT I

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic eruptions,

Heat and cold Waves, Climatic Change: Global warming, Sea Level rise, Ozone Depletion

UNIT II

Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire. Oil fire, air pollution, water pollution, deforestation, Industrial wastewater pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT III

Disaster Management- Efforts to mitigate natural disasters at national and global levels. International Strategy for Disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, Community-based organizations, and media. Central, State, District and local Administration; Armed forces in Disaster response; Disaster response: Police and other organizations.

Suggested Readings

Gupta HK. 2003. *Disaster Management*. Indian National Science Academy. Orient Blackswan.

Hodgkinson PE & Stewart M. 1991. *Coping with Catastrophe: A Handbook of Disaster Management*. Routledge.

Sharma VK. 2001. *Disaster Management*. National Centre for Disaster Management, India.

AGRRES-201: Research Work

0+4

AGRMA-301: Agronomy of Oilseed, Fibre and Sugar Crops

2+1

Objective

To teach the crop husbandry of oilseed, fiber and sugar crops.

Theory

Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition quality

component, handling and processing of the produce for maximum production of :

UNIT I

Rabi oil seeds – Rapeseed and mustard, linseed, etc.

UNIT II

Kharif oil seeds - Groundnut, sesame, castor, sunflower, soybean etc.

UNIT III

Fiber crops - Cotton, jute, sunhemp etc.

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 phenological 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 oilseeds and computation of oil yield
- Estimation of quality of fibre of different fibre crops

AGRSS-301 : Agronomy of Fodder and Forage Crops
Objective

2+1

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, *bajra*, *guar*, cowpea, oats, barley, berseem, *senji*, lucerne etc.

UNIT II

Adaptation, distribution, varietal improvement, agro-techniques and quality aspects including anti-quality factors of important forage crops/grasses- lime, napier grass, *Panicum*, *Lasiurus*, *Cenchrus* 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 affecting 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 raising of 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

Suggested Readings

Chatterjee BN. 1989. *Forage Crop Production - Principles and Practices*.

- Oxford & IBH.
Das NR. 2007. *Introduction to Crops of India*. Scientific Publ.
Narayanan TR & Dabadghao PM. 1972. *Forage Crops of India*.
ICAR.
- Singh P & Srivastava AK. 1990. *Forage Production Technology*. IGFRI,
Jhansi.
- Singh C, Singh P & Singh R. 2003. *Modern Techniques of Raising Field
Crops*. Oxford & IBH.
- Tejwani KG. 1994. *Agroforestry in India*. Oxford & IBH.

AGRSS -302: Soil Biology and Biochemistry

2+1

Objective

To teach students the basics of soil biology and biochemistry, including biogeochemical cycles, plant growth promoting rhizobacteria, microbial interactions in soil and other soil activities.

Theory

UNIT I

Soil biota, soil microbial ecology, types of organisms in different soils; soil microbial biomass; microbial interactions; un-culturable soil biota.

UNIT II

Microbiology and biochemistry of root-soil interface; phyllosphere; soil enzymes, origin, activities and importance; soil characteristics influencing growth and activity of microflora.

UNIT III

Microbial transformations of nitrogen, phosphorus, sulphur, iron and

manganese in soil; biochemical composition and biodegradation of soil organic matter and crop residues, humus formation; cycles of important organic nutrients.

UNIT IV

Biodegradation of pesticides, organic wastes and their use for production of biogas and manures; biotic factors in soil development; microbial toxins in the soil.

UNIT V

Preparation and preservation of farmyard manure, animal manures, rural and urban composts and vermicompost. Biofertilizers – definition, classification, specifications, method of production and role in crop production.

Practical

- Determination of soil microbial population
- Soil microbial biomass
- Elemental composition, fractionation of organic matter and functional groups
- Decomposition of organic matter in soil
- Soil enzymes
- Measurement of important soil microbial processes such as ammonification, nitrification, N₂ fixation, S oxidation, P solubilization and mineralization of other micro nutrients
- Study of rhizosphere effect

Suggested Readings

Alexander M. 1977. *Introduction to Soil Microbiology*. John Wiley & Sons.

Burges A & Raw F. 1967. *Soil Biology*. Academic Press.

McLaren AD & Peterson GH. 1967. *Soil Biochemistry*. Vol. XI. Marcel Dekker.

Metting FB. 1993. *Soil Microbial Ecology – Applications in Agricultural and Environmental Management*. Marcel Dekker.

Paul EA & Ladd JN. 1981. *Soil Biochemistry*. Marcel Dekker.

Reddy MV. (Ed.). *Soil Organisms and Litter in the Tropics*. Oxford & IBH.

AGRRES-301 Masters Seminar **0+1**

AGRRES-301: Research Work **0+6**

AGRNC-301: Intellectual Property and its Management in Agriculture (E-Course) **1+0**

Objective

The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledgebased economy.

Theory

Historical perspectives and need for the introduction of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement; Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs; Indian Legislations for the protection of various types of Intellectual Properties; Fundamentals of patents, copyrights, geographical indications, designs and layout, trade secrets and traditional knowledge, trademarks, protection of plant varieties and farmers' rights and bio-diversity protection; Protectable subject matters, protection in biotechnology, protection of other biological materials, ownership and period of protection; National Biodiversity protection initiatives; Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture; Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License Agreement.

Suggested Readings

Erbisch FH & Maredia K.1998. *Intellectual Property Rights in Agricultural Biotechnology*. CABI.

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Ganguli P. 2001. *Intellectual Property Rights: Unleashing Knowledge Economy*. McGraw-Hill.

Intellectual Property Rights: Key to New Wealth Generation. 2001. NRDC & Aesthetic Technologies.

Ministry of Agriculture, Government of India. 2004. *State of Indian Farmer*. Vol. V. *Technology Generation and IPR Issues*. Academic Foundation.

Rothschild M & Scott N. (Ed.). 2003. *Intellectual Property Rights in Animal Breeding and Genetics*. CABI.

Saha R. (Ed.). 2006. *Intellectual Property Rights in NAM and Other Developing Countries: A Compendium on Law and Policies*. Daya Publ. House.

The Indian Acts - Patents Act, 1970 and amendments; Design Act, 2000; Trademarks Act, 1999; The Copyright Act, 1957 and amendments; Layout Design Act, 2000; PPV and FR Act 2001, and Rules 2003; National Biological Diversity Act, 2003.

AEXNC--401: Technical Writing and Communications Skills 0+1

Objective

To equip the students/scholars with skills to write dissertations, research papers,etc.

To equip the students/scholars with skills to communicate and articulate in English (verbal as well as writing).

Practical

Technical Writing - Various forms of scientific writings- theses, technical papers, views, 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, précis, citations etc.; commonly used abbreviations in the theses and research communications; illustrations, photographs and drawings with suitable captions; pagination, numbering of tables and illustrations; Writing of numbers and dates in scientific write-ups; Editing and proof-reading; Writing of a review article.

Communication Skills - Grammar (Tenses, parts of speech, clauses, punctuation marks); Error analysis (Common errors); Concord; Collocation; Phonetic symbols and transcription; Accentual pattern: Weak forms in connected speech: Participation in group discussion: Facing an interview; presentation of scientific papers.

Suggested Readings

Chicago Manual of Style. 14th Ed. 1996. Prentice Hall of India.

Collins' Cobuild English Dictionary. 1995. Harper Collins.

Gordon HM & Walter JA. 1970. *Technical Writing*. 3rd Ed. Holt, Rinehart & Winston.

Hornby AS. 2000. *Comp. Oxford Advanced Learner's Dictionary of Current English*. 6th Ed. Oxford University Press.

James HS. 1994. *Handbook for Technical Writing*. NTC Business Books.

Joseph G. 2000. *MLA Handbook for Writers of Research Papers*. 5th Ed. Affiliated East-West Press.

Mohan K. 2005. *Speaking English Effectively*. MacMillan India.

Richard WS. 1969. *Technical Writing*. Barnes & Noble.

Robert C. (Ed.). 2005. *Spoken English: Flourish Your Language*. Abhishek.

Sethi J & Dhamija PV. 2004. *Course in Phonetics and Spoken English*. 2nd Ed. Prentice Hall of India.

Wren PC & Martin H. 2006. *High School English Grammar and Composition*. S. Chand & Co

