SUBJECT CODE-AG 401

Principles of Seed Technology Credit: 3 (2+1)

UNIT-1. seed demand forecasting and planning for certified, foundation and breeder seed production,Deterioration of crop varieties, factors affecting deterioration and their control, maintenance of genetic purity during seed production,Seed quality, definition, characters of good quality seed,Different classes of seed, production of nucleus and breeder's seed,

UNIT-2. Seed production : foundation and certified seed production in Maize (varieties, hybrids, synthetics and composites), Rice (varieties and hybrids),Sorghum and bajra (varieties, hybrids, synthetics and composites), Cotton and sunflower (varieties and hybrids).

UNIT-3. Seed certification : phases of certification, procedure for seed certification, field inspection and field counts etc, Seed Act and Seed Act enforcement : Central Seed Committee, Central Seed Certification Board, State Seed Certification Agency, Central and State Seed Testing Laboratories, Duties and powers of seed inspectors, Offences and penalties.

UNIT-4. Seed control order : Seed Control Order 1983, Seed Act 2000, other issues related to seed quality regulation, intellectual property rights, patenting, WTO, plant breeders rights,
Seed Drying : Forced air seed drying, principle, properties of air and their effect on seed drying, heat air drying, Seed treatment : importance of seed treatment, types of seed treatment,

UNIT-5. Seed packing and seed storage : stages of seed storage, factors affecting seed longevity during storage, conditions required for good storage, general principle of seed storage,constructional features for good seed warehouse,Seed marketing : Marketing structure, marketing organization, sales generation activities, pricing policy, factors affecting seed marketing.

Practical

1. Seed sampling principles and procedures
2. Physical purity analysis of Field and Horticultural crops
3. Germination analysis of Field and Horticultural crops
4. Moisture tests of Field and Horticultural crops
5. Viability test of Field and Horticultural crops
6. Seed health test of Field and Horticultural crops
7. Vigour tests Field and Horticultural crops
8. Seed dormancy and breaking methods
9. Grow, out tests and electrophoresis for varietal identification
10. Visit to seed production plots of Maize, Sunflower, Bajra, Rice, Sorghum, Cotton, Chillie and Vegetables (add or delete crops of the region)

References

1. Seed Technology – Harpal Singh Tomar, Publisher of Agra
2. Seed Technology – R.L. Agrawal, Kalyani Publisher

SUBJECT CODE-AG 402

Manures, Fertilizers and Agro-Chemicals Credit: 3(2+1)

UNIT-1. Manures: Introduction, Raw materials, Bulky and concentrated composition, FYM: Composts, Different methods of composting mechanical compost plants, vermicomposting, green manures, oil cakes, sewage and sludge. Biogas plant slurry, plant and animal refuges.

UNIT-2. Fertilizers: Classification of fertilizers, process of manufacturing major nitrogenous, (Ammonium Sulphate, Urea, Calcium Ammonium Nitrate, Ammonium Nitrate and Ammonium Sulphate Nitrate) fertilizers and properties, manufacturing of phosphatic fertilizers (Single Super Phosphate,Enriched Super Phosphate, Diammonium Phosphate and Ammonium Polyphosphate)

UNIT-3. Manufacturing of potassic and complex fertilizers, Nutrients, secondary and micronutrients fertilizer, Amendments, Fertilizer control order and fertilizer storage, Biofertilizer, types of biofertizers advantages of biofertilizers, Organic chemistry as a prelude to agro-chemicals, diverse types of agrochemicals

UNIT-4. Bioinsecticides (botanical) neem, pyrethrum and Synthetic pyrethroids, Synthetic organic insecticides, major classes, properties and use of some important insecticides under each class

UNIT-5. Classifiation of insecticides, herbicides-major classes, properties and uses of 2,4-D, atrazine, glyphosate, butachlor and benthiocarb, Fungicides – major classes of fungicides, properties and uses of Carbendazim, Carboxin, Captan, tridemorph and copper oxycloride, Plant growth regulators

Practical

1. Estimation of total nitrogen in manures/compost, Ammonical and nitrate nitrogen
2. Estimation of total phosphorous in manures/compost
3. Estimation of water soluble P2O5, potassium, calcium, sulphur and zinc contents of fertilizers
4. COD in organic waste
5. Identification of adulteration in fertilizer
6. Compatibility of fertilizer with pesticides

References

1. The Nature Properties of Soil – Brady, N.C. & Weil R.R.
2. Fundamentals of Soil Science
3. Soil Fertility and Fertilizers – Nelson Tisdale
4. Methods of Soil Fertilization – A.J. Pieters
5. Organic Farming Theory and – N.S. Subbarao Biofertilizer in Agriculture

SUBJECT CODE-AG 403

Insect Ecology and Integrated Pest Management Including Beneficial Insects
Credit:3(2+1)

UNIT-1. Insect ecology : Introduction, environment and its components, Effect of abiotic factors-temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents, Effect of biotic factors – food competition, natural and environmental resistance. Concepts of balance of life in nature, Biotic potential and environmental resistance, Causes for outbreak of pests in agro-ecosystem.

UNIT-2. Categories of pests. IPM, Introduction, importance, concepts principles/and tools of IPM-Host plant resistance, Cultural method, Mechanical and physical control methods, Legislative control, Chemical control – importance, hazards and limitation.

UNIT-3. Classification of insecticides,Toxicity of insecticides and formulations of insecticides,Study of important insecticides,Botanical insecticides– neem based products,Cyclodine organophosphates,
Carbamates, synthetic pyrethroids,Novel insecticides, Pheromones, Nicotinyl insecticides,
Chitin synthesis inhibitors, Phenyl pyrazoles, Avermectins, Macrocyclic lactones, Oxadiazimes, Thiourea derivaties, Pyridine azomethines, pyrroles, etc. Nematicides, Rodenticides, acaricides.

UNIT-4. Fumigants,Recent methods of pest control, repellents, antifeedants, hormones, Attractants, gamma radiation and genetic control,Practices, scope and limitations of IPM, Insecticides Act 1968 – Important provisions, Application techniques of spray fluids.

UNIT-5. Beneficial insects: parasites and predators used in pest control, Mass multiplication techniques,Important groups of micro-organisms, bacteria, viruses and fungi used in pest
control and their mass multiplication techniques, Important species of pollinators, weed killers and scavengers, their Importance, Non insect pests – mites, Nematology, Rodents and birds, Vermiculture.

Practical

1. Visit to meteorological observatory
2. Visit to automatic weather reporting station
3. Study of terrestrial and pond ecosystems of insects
4. Studies on behaviour of insects and orientation (repellency, stimulation,deterancy)
5. Study of distribution patterns of insects
6. Sampling techniques for the estimation of insect population and damage
7. Pest surveillance through light traps, pheromone traps and field incidence
8. Practicable IPM practices, mechanical and physical methods
9. Practicable IPM practices, cultural methods
10. Biological methods
11. Chemical control, insecticides and their formulations
12. Calculation of doses and concentrations of insecticides
13. Compatibility of pesticides and phytotoxicity of insecticides

14. IPM case studies; identification of common phytophagous mites and their morphological characters

References

1. Plant Protection Techniques – P.B. Chatterjee
2. Text Book of Agricultural Entomology – H.S. Pruthi
3. General and Applied Entomolog – K.K. Nayar, T.N. Ananthakrishnan and B.V. David
4. Insect Pests of Field Crops – S. Pradhan
5. Introduction of Plant Quarantine – Abhishek Shukla and O.P. Veda
7. Destructive and Useful Insects – Mctcalf and Flint
8. Integrated Pest Management : – Dhaliwal and Aroraconcept and approach
9. Insect Resistance in Crop Plants – Painter, R.H.

SUBJECT CODE-AG 404

Agricultural Marketing, Trade and Prices Credit: 3(2+1)

UNIT-1. Agricultural Marketing : Concepts and Definition, Scope and subject matter,
Market and Marketing : meaning, definition, components of a market, Classification of market, Market structure, conduct and performance, marketing structure, Market functionaries or agencies,
Producer's surplus : Meaning, types of producers surplus, marketable surplus.

UNIT-2. Marketing channels : Meaning, definition, channels for different products,Market integration, meaning, definition, types of market integration, Marketing efficiency : Meaning, definition, marketing costs, margins and price spread, factors affecting the cost of marketing, reasons for higher marketing costs of farm commodities, ways of reducing marketing costs.

UNIT-3. Theories of International Trade : Domestic trade, Free trade, International Trade, Market access, domestic support, export subsidies,EXIM policy and ministerial conferences, Cooperative marketing.

UNIT4..StateTrading,WareHousingCorporation;CentralandState,objectives,functions,advantages Food Corporation of India : Objectives and functions, Quality control, Agricultural products.

UNIT-5. AGMARK, Price characteristics of agricultural products process, Meaning, Need for Agricultural Price Polity, Risk in marketing : Meaning and importance, types of risk in marketing,
speculations and hedging, futures trading, contract farming.

Practical

1. Identification of marketing channels
2. Study of Rythu Bazars, Regulated markets
3. Study of unregulated markets
4. Study of livestock markets
5. Price spread analysis
6. Visit to market institutions, NAFED
7. Study of SWS, CWC and STC
8. Analysis of information of daily prices
9. Marketed and marketable surplus of different commodities

References

1. Agricultural Marketing in India – S.S. Acharya and N.L. Agrawal, Oxford and IBH Publication Co. Pvt. Ltd., New Delhi
2. An introduction to Marketing – Amarchand, D. and B. Vardhrajan,Vikash Publication House Pvt. Ltd., New Delhi
3. Export Marketing – Balagopal
4. Agricultural Marketing and – L.K. Wader and C. Murty, ICAR, New Cooperat

SUBJECT CODE-AG 405
Diseases of Field Crops and their Management Credit: 3(2+1)

UNIT-1. Study of following diseases with reference to their economic importance, symptoms, causal organism, etiology, epidemiology, diseases cycle and integrated management, Rust diseases of wheat, groundnut, sunflower, soybean, tea,Smuts of paddy, sorghum, bajra, Whip smut of sugarcane.

UNIT-2. Loose smut of wheat,Wilt of sugarcane, cotton, redgram, black gram, green gram and bengal gram,Leaf blights of wheat and maize,Bacterial blight and streak of rice, Blast of paddy, Brown spot of paddy, Sheath blight of paddy.

UNIT-3. Leaf spot of sorghum (Gloeocercospora, Colletotrichum, Helminthosporium, Ascochyta), Downy mildew of bajra, Ergot of sorghum and bajra, Earcockle and yellow ear rot of wheat, Karnal bunt of wheat, Grassy shoot of sugarcane, Leaf spot of turmeric.

UNIT-4. Tikka disease of groundnut (early and late leaf spot), Collar rot of groundnut,Root rots (dry, wet, black) of gram, cotton, Phyllody of sesamum.

UNIT-5. Bacterial leaf spot of sesamum, Cercospora leaf spot of sesamum, Phytophthora blight of arhar, Alternaria leaf spot of sunflower, Angular leaf spot of cotton, Ramularia leaf spot of cotton, Bacterial pustule of soybean, Myrothecium leaf spot of soybean, Anthracnose of soybean, Mosaic of soybean, Sterility mosaic of arhar.

Practical

Study of symptoms, etiology, host-parasite relationship and specific control measures of the following crop diseases. Presentation of disease samples survey and collection of diseases of rice, sorghum; Diseases of wheat, bajra and maize; Diseases of sugarcane, turmeric and tobacco; Diseases of groundnut, castor and sunflower; Diseases of sesamum and cotton; Diseases of red gram, green gram, black gram, bengal gram and beans; Field visits at appropriate time during the semester.

Note : Students should submit 50 pressed, well mounted diseased specimens in three installments during the semester.

References

1. Plant Pathology - G.N. Agrios
2. Plant Diseases - R.S. Singh
3. Plant Pathology - P.D. Sharma
4. Diseases of crop plants in India - G. Rangaswami
7. Practical manual of Plant Pathology - V.N. Pathak
8. Essentials of Plant Pathology - V.N. Pathak
9. Plant Pathology - M.N. Kamat

SUBJECT CODE-AG 406

Production Technology of Spices, Aromatic, Medicinal and Plantation Crops
Credit:2(2+0)

UNIT-1. Importance, scope and definitions of spices, aromatic, medicinal and plantation crops

UNIT-2. Production technology of spices – Ginger, turmeric, Black Pepper, Cardamom, Coriander, Cumin, Fenugreek

UNIT-3. Production Technology of Aromatic Plants-Lemon grass, Citronella, Palmarose, Geranium, Dawana, Vetiver

UNIT-4. Production Technology of plantation crops-Coconut, Arecanut, Betelvine, Cashew nut, Cocoa, Coffee, Oil palm

UNIT-5. Production Technology of Medicinal plants – Diascoria, Rauvofia, Opium, Aloe, Guggul, Ocimum, Perwinkle, Belladonna, Nuxvomica, *Solanum khasiamum*, Aonla, Senna, Plantago, Stevia, Coleus

References

1. Fruit in India, Tropical and Substropical – T.K. Bose
2. Medicinal, Aromatic, Plantation and Spices – N. Kumar
3. A hand book of medicinal plants – N.D. Prajapati
4. Medicinal plant cultivation – S.S. Purohit
5. Minor spices – J.S. Purthi
6. Spices – V.B. Singh and K. Singh

SUBJECT CODE-AG 407

Statistics Credit: 2 (2+0)

UNIT-1. Introduction : Definition of Statistics and its use and limitations; Frequency Distribution and Frequency Curves,Measures of Central Tendency : Characteristics of ideal Average, Arithmetic mean, Median, Mode, Merits and Demerits of Arithmetic Mean, Measures of Dispersion : Variance Standard deviation, and Coefficient of Variation.

UNIT-2. Probability : Concept of probability definition and; Normal Distribution and its properties,
Introduction to Sampling : Random Sampling; the concept of Standard Error.

UNIT-3. Tests of Significance – Types of Errors, Null Hypothesis, Level of Significance and Degrees of Freedom, Steps involved in testing of hypothesis; Large sample Test : SND test for means, Single Sample and Two Samples (all types); Small Sample Test for means; Students t-test for Single
Sample, Two Samples and Paired t test. F test : Chi-Square Test in 2X2 Contingency Table, Yate's Correction for continuity.

UNIT-4. Correlation : Types of Correlation and identification through Scatter Diagram, computation of Correlation Coefficient 'r' and its testing, Linear Regression : Of Y on X and X on Y, Inter-relation between 'r' and the regression coefficients, fitting of regression equations.

UNIT-5. Experimental Designs : Basic Designs, Completely Randomized Design (CRD), Layout and analysis with equal and unequal number of observations, Randomized Block Design (RBD), Layout and analysis, Latin Square Design (LSD), Layout and analysis

References

1. Fundamentals of Mathematical Statistics – S.C. Gupta and V.K. Kapoor
2. Basic Statistics – B.L. Agrawal
3. Design and Analysis of Experiments for – B.L. Mishra Agriculture workers
4. Theory of Sample Surveys and Statistical – K.S. Kushwaha and Decisions Rajesh Kumar

SUBJECT CODE-AG 408

Practical Crop Production – II (Rabi crops) Credit: 1 (0+1)

Practice of raising 8-10 prevailing *Rabi* crops of the agro-climatic zone will be done by the student. One crop will be grown by a student or group of 2-4 students depending upon the strength of students in the class, on a minimum of 100 m² area.Following practices will be performed by the student(s) for raising the allotted crop to them separately, besides observing the practices performed by other students in their plots for raising the crops.

Practical

S.No.	Exercise	No. of classes
1	Crop planning for raising Rabi-crops	2
2	Field preparation and preparation of nursery beds for crop	1
3	Seed treatment, seed inoculation and sowing of crop	2
4	Fertilizer application (basal, top dressing and foliar spray) in crop	2
5	Water management (irrigation & drainage) in crop	1
6	Weed management (cultural/mechanical/chemical) in crop	1
7	Management of insect pests and diseases in crop	1
8	Harvesting, drying, and tying bundles and transport to threshing floor of crop.	1
9	Threshing, winnowing and drying of produce	1
10	Storage and marketing	1
11	Preparation of balance sheet including cost of cultivation and value of produce	2
12	Determination of net monetary returns per student or per group of students and benefit cost ratio	1
	Total	**16**

Note : Final report of raising the crop will be submitted by the student or group of students for valuation