SR UNIVERSITY

SCHOOL OF AGRICULTURE

Paper-I: Research Methodology

Research and Types of research: Meaning of Research- Objectives of Research- Motivation in Research. Research methods vs Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical. Research Process. Criteria of good Research. Research Formulation – Defining and formulating the research problem - Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem – Literature review – Primary and secondary sources – reviews, treatise, monographs-patents – web as a source – searching the web - Critical literature review – Identifying gap areas from literature review - Development of working hypothesis. Data Collection and analysis: Execution of the research - Observation and Collection of data - Methods of data collection – Modeling, Mathematical Models for research, Sampling Methods- Data processing and Analysis strategies. Data Analysis with Statistical Packages – Hypothesis-testing, Generalization-and Interpretation

Paper – II: SOIL SCIENCE

Soil Genesis, Morphology, Taxonomy and Survey

Concept of soil, land, and soil science, Composition of earth crust, rocks and minerals, weathering of rocks and minerals, factors of soil formation, fundamental and pedogenic processes, soil development, soil taxonomy, soil survey and study of base maps.

Soil Physics

Soil texture, soil structure, soil consistency, soil crusting, bulk density and particle density of soils and porosity, soil water, soil temperature, soil air, soil erosion and soil conservation measures, land degradation, Identification, monitoring and management of waste lands, land use-land cover mapping and land use and concept of watershed.

Soil Chemistry

Chemical composition of soil, soil colloids, charge development on clays and organic matter, buffer capacity of soils, Inorganic and organic colloids, Soil organic matter fractionation, clay-organic interactions, different cation exchange theories, thermodynamics, anion and ligand exchange- inner sphere and outer-sphere surface complex formation, fixation of oxyanions, hysteresis in sorption-desorption of oxy-anions and anions. nutrient fixation in soils and management aspects, chemistry of acid soil, acid sulphate soil, saline soil, sodic soil, saline sodic soil and submerged soil.

Soil Fertility

Essential elements in plant nutrition, nutrient cycles in soil, manures and fertilizers – production, fate, reaction, type and quality control, soil fertility evaluation – soil testing, plant and tissue tests and biological methods, Common soil test methods for fertilizer recommendation, soil test crop response correlations, Integrated nutrient management, Use of isotopic tracers in soil research, site specific nutrient management (SSNM) for precision agriculture, Carbon sequestration in mitigating greenhouse effect.

Problematic soils and water management

Development of acid, acid sulphate, saline and alkali and their management, Irrigation water quality indices, soil fertility degradation and management, soil pollution causes and management, radioactive contamination of soil.

Soil Biology and Biochemistry

Soil biota, soil microbial ecology, types of organisms. Soil microbial biomass, microbial interactions, unculturable soil biota. Microbiology and biochemistry of root soil interface, phyllosphere, Soil enzymes, soil characteristics influencing growth and activity of microflora, microbial transformations of nutrients in soil, humus formation – theories and important organic nutrients, biodegradation of pesticides, organic wastes and their use for production of biogas and manures, biofertilizers – definition, classification.

Soil Analyses and Instrumentation

Modern methods of soil, plant and fertilizer analysis, Instruments - flame photometry, inductively coupled plasma optical emission spectroscopy, spectrophotometry, atomic absorption spectrophotometry

Agricultural Statistics

Descriptive statistics, experimental designs for pot culture computer use in soil research.