# Syllabus of Research Methodology for RET in Agriculture

**Unit 1: Concepts of research methodology**

Importance and scope of research in agriculture. Types of research: Fundamental vs. Applied. Concept of researchable problem, Research prioritization, Selection of research problem. Approach to research, Research process.

**Unit 2: Hypostheis Testing**

Hypothesis- meaning- characteristics- types of hypotheses- Review of literature, Setting of course objectives and Hypothesis, Testing of hypothesis, z, t, chi-square and f-distribution

**Unit 3: Data collection and descriptive analysis**

Data- meaning, assessment of data needs, sources of data collection, collection of data in different fields of agriculture, Types of data, Classification, tabulation, and graphical representation of data, measures of central values, measures of dispersion, correlation and regression analysis.

**Unit 4: Sampling**

Sampling Theory and sampling design, methods of sampling; probability and non-probability sampling methods, Research design and techniques, Types of research design.

**Unit 5: Probability**

Theory of probability, Random experiment, Mathematical or classical definition of probability, Statistical definition of probability, conditional probability, Mathematical expectation.

**Unit 6: Data analysis**

Data coding, cleaning, transformation of data, Universal procedures for preparation of bibliography, writing of research articles, Project proposal, Introduction to ANOVA: One way and two-way, Introduction to SPSS

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# SYLLABUS FOR RESEARCH ENTRANCE TEST (RET)
# HORTICULTURE
# PAPER-II
# (SUBJECT CONTENT)

**Unit-I:**

**Tropical and Dry land Fruit Production:**

Commercial varieties of regional, national and international importance, eco-physiological requirements, recent trends in propagation, rootstock influence, planting systems, cropping systems, root zone, nutrient management, water management, fertigation, role of plant growth regulators, abiotic factors for limiting fruit production, physiology of flowering, fruit set and development, pests and disease management, physiological disorders- causes and remedies, quality improvement by management practices; maturity indices, harvesting,; industrial and export potential and Agri. Export Zones (AEZ). Mango, Banana,Citrus, Papaya, Guava, Sapota, Jackfruit, Pineapple, Custard Apple, Avocado and Bael

**Production Technology of Cool Season Vegetable Crops:**

Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties/hybrids, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post-harvest management, plant protection measures and seed production of: Potato, Cole crops: cabbage, cauliflower, knol-khol, sprouting broccoli ,Brussels sprout, Root crops: carrot, radish, turnip and beetroot,Bulb crops: onion and garlic.

**Unit -II:**

**Sub-tropical and Temperate Fruit Production:**

Commercial varieties of regional, national and international importance, eco-physiological requirements, recent trend sinpropagation, root stock influence, planting systems, cropping systems, root zone and canopy management, nutrient management, water management, fertigation, bio-regulation, abiotic factors limiting fruit production, physiology of flowering, fruit set and development, abiotic factors limiting production, physiological disorders-symptoms, causes and remedies, quality improvement by management practices; maturity indices, harvesting, grading, packing, pre-cooling, storage, transportation and ripening techniques: industrial and export potential, Agri Export Zones (AEZ) and industrial support. Crops: Apple, pear and grapes Plums, peach, apricot, litchi, loquat, persimmon, kiwi fruit, strawberry.

**Unit-III:**

**Post-Harvest Management of Horticultural Crops:**

Maturity indices, harvesting practices for specific market requirements, influence of pre-harvest practices, enzymatic and textural changes, respiration and transpiration. Physiology and biochemistry of ripening and senescence, ethylene evolution and ethylene management, factors leading to post-harvest loss and pre-cooling. Treatments prior to shipment, viz., chlorination, waxing, chemicals, bio-control agents and natural plant products. Methods of storage, ventilated, refrigerated, MAP, CA storage, zero energy cool chamber, hypobaric storage, spoilage: microbial and bio-chemical, physical injuries and storage dis-orders. Packing methods and transport, principles and methods of preservation, processing and canning. Preparation of fruit juices, beverages, pickles, jam, jellies, candies and tomato products. Value addition and post-harvest management of loose and cut flowers. Dried and dehydrated products, nutritional lyenriched products, fermented fruit beverages, packaging technology, management of processing wastes and food safety standards.

**Production Technology of Warm Season Vegetable Crops:**

Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties/hybrids, sowing/planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, plant protection measures, and seed production of: Tomato, eggplant, hot and sweet peppers okra, beans, cowpea, cucurbitaceous crops, Tapioca , sweet potato.

**Unit-IV:**

**Protected Cultivation of Horticultural Crops:**

Prospects of protected floriculture in India; Types of protected structures – Greenhouses, polyhouses, shade nets, rain shelters etc., Designing and erection of protected structures; Low cost/Medium cost/High cost structures – economics of cultivation; Location specificdesigns:Structuralcomponents;Suitablecropsforprotectedcultivation:Strawberry,capsicum, tomato, cucumber, rose, gerbera and carnation. Environment control – management and manipulation of temperature, light, humidity, air and CO2; Heating and cooling systems, ventilation, naturally ventilated greenhouses, fan and pad cooled greenhouses, lightregulation. Containers and substrates, soil decontamination, layout of drip and fertigation system, water and nutrient management, weed management, physiological disorders, IPM and IDM. Crop regulation by chemical methods and special horticultural practices (pinching, disbudding, de-shooting, de-blossoming, etc.); Staking and netting, Photo period regulation. Harvest indices for domestic and export market: harvesting techniques.

Unit-V:

**Landscaping and Ornamental Gardening:**

Landscape designs, types of gardens, English, Mughal, Japanese, Persian, Spanish, Italian, Vanams, Buddha garden; Styles of garden, formal, informal and free style gardens. Urban landscaping. Landscaping for specific situations, institutions, industries, residences, hospitals, roadsides, traffic islands, dam sites, IT parks, corporate offices. Garden plant components, arboretum, shrubbery, arches and pergolas, edges and hedges, climbers and creepers, cacti and succulents, herbs, annuals, flower borders and beds, ground covers; Production technology for selected annual ornamental plants. Lawns, establishment and maintenance of vertical garden, roof garden, bog garden, sunken garden, rock garden. Bio-aesthetic planning, eco-tourism, indoor gardening, xeri-scaping, hard-scaping.

**Production Technology of Cut flowers:**

Scope of cut flowers in global trade, Global Scenario of cut flower production, Varietal wealth and diversity, area under cut flowers and production problems in India- Patent rights, nursery management, media for nursery, special nursery practices. Flower production– water and nutrient management, fertigation, weed management, rationing, training and pruning, disbudding, special horticultural practices, use of growth regulators, physiological disorders and remedies. IPM and IDM, production for exhibition purposes. Flower forcing and year round flowering through physiological interventions, chemical regulation, environmental manipulation. Cut flower standards and grades, harvest indices, harvesting techniques, post-harvest handling, Methods of delaying flower opening, Pre- cooling, pulsing, packing, Storage &transportation, marketing, export potential, institutional support, Agri Export Zones. Crops: Cut rose, cut chrysanthemum, carnation, gerbera, gladioli, tuberose, orchids, dahlia, gypsophilla, statice, cut foliages and fillers.

Unit-VI:

**Production Technology of Medicinal and Aromatic Crops:**

Export and import status, Indian system of use of medicinal plant, Indigenous Traditional Knowledge, IPR issues, Classification of medicinal crops, Systems of cultivation, Organic production Production technology for Senna, Periwinkle, Coleus, Aswagandha, Glory lily, Sarpagandha, Dioscoreasp., Aloevera, Andrographis paniculata. Production technology for Isabgol, Poppy, Safed musli, Stevia rebaudiana, Ocimum sp. Post-harvest handling of above mentioned medicinal plants and herbal products and phytochemical extraction techniques.

Aromatic industry, Indian perfumery industry, History, Advancements in perfume industry reduction technology for palmarosa, lemongrass, citronella, geranium, artemisia, mentha, patchouli, lavender.

**Breeding of Horticultural Crops:**

Origin, botany, taxonomy, cytogenetics, genetics, breeding objectives, breeding methods (introduction, selection, hybridization, mutation, polyploidy), varieties and varietal characterization, resistance breeding for biotic and abiotic stress, quality improvement, achievements and future thrust in the following selected crops. Issue of patenting, PPVF Ract. Mango, banana, papaya and grapes,Citrus and apple, Potato, tomato and brinjal, Hot & Sweet pepper, okra, cabbage and cauliflower, Rose, chrysanthemum, gladiolus and dahlia

UNIT WISE ITEM COMPOSITION (TOTAL:50 Items)

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|---|---|
| Unit-I | :09 |
| Unit-II | :07 |
| Unit-III | :09 |
| Unit-IV | :07 |
| Unit-V | :09 |
| Unit-VI | :09 |