SCHOOL OF AGRICULTURE
SR University, Warangal

Ph.D. IN HORTICULTURE

Specializatios Offered:

1. **FRUITSCIENCE / POMOLOGY**

2. **VEGETABLE SCIENCE / OLERICULTURE**

SCHOOL OF AGRICULTURE
SR University, Warangal

Fruit Science /Pomology

I: **Tropical and Dry Land Fruit Production**

Commercial varieties of regional, national and international importance, eco-physiological requirements, recent trends in propagation, scion-stock relationship, planting systems, cropping systems, canopy management, nutrient management, water management, fertigation, role of bio-regulators, abiotic factors limiting fruit production, physiology of flowering, pollination, fruit set and development, honeybees in cross pollination, physiological disorders–causes and remedies, quality improvement by management practices; maturity indices, harvesting, grading, packing, storage and ripening techniques; industrial and export potential, Agri. Export Zones (AEZ) and industrial supports. Crops: Mango, Banana, Citrus, Papaya, Guava, Sapota, Annonas, Aonla, Bael, Wood apple, Jamun, Pomegranate**,** Ber and minor fruits of tropics.

II: Subtropical and Temperate Fruit Production

Commercial varieties of regional, national and international importance, eco-physiological requirements, recent trends in propagation, scion-stock relationship, planting systems, cropping systems, root zone and canopy management, nutrient management, water management, fertigation, role of bio - regulators, abiotic factors limiting fruit production, physiology of flowering, pollination, fruit set and development, honeybees in cross pollination, physiological disorders-causes and remedies, quality improvement by management practices; maturity indices, harvesting, grading, packing, storage and ripening techniques; industrial and export potential, Agri. Export Zones (AEZ) and industrial supports. Crops: Avocado, Pineapple, Jackfruit, Mangosteen, Carambola, Fig and Rambutan, Litchi, Loquat, Apple, Pear, Quince, Grapes, Plums, Peach, Apricot, Cherries, Persimmon, Kiwifruit, Strawberry, Walnut, Almond, Pistachio, Hazelnut.

III: Biodiversity and Conservation

Biodiversity and conservation; issues and goals, centers of origin of cultivated fruits; primary and secondary centers of genetic diversity; present status of gene centers; exploration and collection of germplasm; Role of NAGS ; Conservation of genetic resources–conservation *insitu* and *exsitu.* Germplasm conservation – problem of recal citrancy-cold storage of scions, tissue culture, cryopreservation, pollen and seed storage; inventory of germplasm, introduction of germplasm, plant quarantine; intellectual property rights, regulatory horticulture. Detection of genetic constitution of germplasm and maintenance of core group; GIS and documentation of local biodiversity, geographical indication. Crops: Mango, Sapota, Citrus, Guava, Banana, Papaya, Grapes, Jackfruit, Custard apple, Ber, Aonla, Malus &*Prunus* sp., Litchi and Nuts.

IV**: Canopy Management in Fruit Crops**

Canopy management - importance and advantages; factors affecting canopy development; Canopy types and structures with special emphasis on geometry of planting, canopy manipulation for optimum utilization of light. Light interception and distribution in different types of tree canopies; Spacing and utilization of land area - canopy classification; Canopy management through rootstock and scion; Canopy management through plant growth retardants, training and pruning and management practices; Canopy development and management in relation to growth, flowering, fruiting and fruit quality in temperate fruits, Grapes, Mango, Sapota, Guava, Citrus and Ber.

V: Breeding of Fruit Crops

Origin and distribution, taxonomical status - species and cultivars, cytogenetics, genetic resources, blossom biology, breeding systems, breeding objectives, breeding constraints ideo types, approaches for crop improvement – introduction, selection, hybridization, mutation breeding, polyploidy breeding, rootstock breeding, improvement of quality traits, resistance breeding for biotic and abiotic stresses, biotechnological interventions, achievements and future thrust in the following selected fruit crops. Crops: Mango, Banana, Pineapple, Citrus, Grapes, Guava, Sapota, Jackfruit, Papaya, Custard apple, Aonla, Avocado, Ber, Litchi, Jamun, Phalsa, Mulberry, Raspberry, Apple, Pear, Plums, Peach, Apricot, Cherries and Strawberry.

SCHOOL OF AGRICULTURE
SR University, Warangal

Vegetable Science/Olericulture

Unit I: Production Technology of Vegetable Crops (Cool and Warm Season)

- Introduction to vegetable crop production
- Climatic and soil requirements
- Commercial varieties/hybrids
- Sowing/planting times and methods
- Seed rate and treatment
- Nutritional and irrigation requirements
- Intercultural operations and weed control
- Mulching practices
- Physiological disorders
- Harvesting methods
- Cool season crops: Potato, chow chow, cabbage, cauliflower, knoll khol, sprouting broccoli, Brussels sprout, carrot, radish, turnip, beetroot, onion, garlic, peas, beans, palak
- Warm season crops: Tomato, eggplant, hot and sweet pepper, okra, vegetable cowpea, Dolichos lablab, cluster bean, cucurbits, sweet potato, cassava, yams, colocasia, moringa, amaranths

Unit II: Breeding and Growth Physiology of Vegetable Crops

- Cytogenetics and genetics of vegetables
- Breeding objectives and methods: Introduction, selection, hybridization, mutation
- Resistance breeding for biotic and abiotic stress
- Biotechnological tools: Molecular markers, genomics, MAS, QTLs
- Breeding and varietal characterization of key crops
- Growth and development: Cellular structures, dormancy, germination physiology
- Plant growth regulators (PGRs): Auxins, gibberellins, cytokinins, ABA
- Use of synthetic hormones and inhibitors
- Sex expression and fruit set control
- Physiology of fruit development, ripening, senescence, abscission
- Applications of PGRs in tissue culture and morphogenesis

Unit III: Seed Production and Systematics of Vegetable Crops

- Importance and status of seed industry
- Propagation modes and seed development
- Floral biology, dormancy, pollination behavior
- Quality seed production practices
- Seed production techniques by crop groups

- Hybrid seed production: Male sterility, self-incompatibility
- Seed certification, testing, grading, storage
- Clonal propagation techniques (e.g., potato, sweet potato, TPS)
- Systematics: Classification principles, taxonomy, cytology
- Botanical descriptions and molecular tools in taxonomy
- Taxonomic coverage: Solanaceous, Cucurbitaceous, Leguminous, Malvaceous, Root, Tuber, Bulb, Leafy vegetables

Unit IV: Post-Harvest and Underexploited Vegetable Crops

- Post-harvest importance and scope
- Maturity indices and biochemical basis of ripening
- Harvesting and handling techniques
- Physiological disorders and packaging
- Storage methods: Ventilated, refrigerated, CA/MA storage, zero energy chambers
- Transport principles
- Post-harvest treatments and technologies
- Underexploited crops: Asparagus, leek, Chinese cabbage, Chinese potato, kale, amaranth, parsnip, rhubarb, basella, bathu, lima bean, winged bean, pigeon pea, sword bean, sweet gourd, spine gourd, pointed gourd, ivy gourd

Unit V: Organic and Hi-Tech Vegetable Production Technologies

- Organic production principles and components
- Soil fertility and pest management in organics
- Crop rotation and mulching
- Indigenous technologies and biocontrol agents
- Organic certification standards, GAP, GMP
- Protected cultivation: Structures, media, mulching, solarization
- Irrigation and fertigation systems
- Soilless culture techniques: Hydroponics, vertical farming
- Hi-tech crop examples: Tomato, capsicum, cucumber
- Sustainability and off-season production