

1. Fruit orchard establishment and management

- 1.1 Climatic requirements
- 1.2 Site selection, land preparation, lay-out, planting methods
- 1.3 Water management
- 1.4 Training and pruning
- 1.5 Top working
- 1.6 Weed management
- 1.7 Soils, manure and fertilizer management
- 1.8 Meadow orchard system
- 1.9 High density planting

2 Production packages of major fruits, vegetables, spices, plantation crops and ornamentals relating to classification, location, altitude, aspect, soil, climate, seed, open pollinated and hybrid cultivar, sowing/transplanting time, grafting, spacing, irrigation, drainage, manure, fertilizer micro-nutrients, mulching, major varieties, insect pests, diseases, harvesting time, mix-cropping on production and productivity.

- 2.1. **Major fruit crops** (mandarin, sweet orange, lime, lemon, aonla, apple, pear, walnut, mango, litchi, banana, pine apple, grape, papaya, strawberry, olive, almond, coconut, and arecanut),
- 2.2. **Major vegetables** (potato, sweet potato, tomato, brinjal, chilly pepper, sweet pepper, cauliflower, cabbage, broccoli, pea, radish, carrot, onion, garlic, cucumber, broad-leaf mustard, lettuce and guards)
- 2.3. **Major spices** (ginger, large cardamom, turmeric and cumin)
- 2.4. **Major ornamental plants** (orchid, rose, marigold, petunia, bougainvillea, dahlia, chrysanthemum and gladiolus)
- 2.5. **Major plantation crops** (tea and coffee)

3 Crop physiology

- 3.1 Photosynthesis and respiration
- 3.2 Transpiration and translocation
- 3.3 Photoperiodism
- 3.4 Stress physiology
- 3.5 Plant growth regulators and retardant
- 3.6 Vernalization
- 3.7 Growth and development
- 3.8 Diffusion and osmosis
- 3.9 Flowering and fruiting phenomenon

4 Special topics in horticulture

- 4.1 Self unfruitfulness
- 4.2 Fruit drop
- 4.3 Citrus decline
- 4.4 Alternate bearing
- 4.5 Heterosis and development of hybrid variety
- 4.6 Genetic erosion and transformation
- 4.7 Parthenogenesis
- 4.8 High density plantation
- 4.9 Tree structure and canopy

- 4.10 Landscaping
- 4.11 Urban and peri-urban horticulture
- 4.12 Role and importance of medicinal plants in Nepal
- 4.13 Controlled cultivation
- 4.14 Integrated crop management (ICM) – IPM, IDM, IPNS
- 4.15 Organic farming
- 4.16 Hydroponics/aeroponics

5 Off-season Production

- 6.1 Present status, constraints and potentiality
- 6.2 Utilization of diverse agro-climatic zones for off-season production
- 6.3 Suitable crops, varieties and time for off-season production.
- 6.4 Protected cultivation: Green house, lath house, plastic culture, hot beds and cold frame.
- 6.5 Improved cultural and management technologies for off-season production.
- 6.6 Cost and benefits of off-season production.
- 6.7 Marketing strategies for off-season production.

6 Seed and planting materials production

- 6.1 Nursery management of fruits, vegetables, spices and ornamental plants
- 6.2 Plant propagation methods
- 6.3 Root stocks and their use in fruit cultivation with their compatibility & effect
- 6.4 Nursery media
- 6.5 Scion use, compatibility and effects on rootstock
- 6.6 Rootstock and its compatibility
- 6.7 Influence of location, aspects, altitude, temperature, light, day-length, spacing, irrigation, manure, fertilizers, micro nutrients, hormone, direct seedling, stickling-transplanting, seedling and planting time on seed yield and seed/sapling quality.
- 6.8 Nucleus, breeder, foundation and improved seed production.
- 6.9 Pollination, fertilization, seed development, dormancy and germination.
- 6.10 Variety maintenance methods.
- 6.11 Seed testing, certification and field inspection.
- 6.12 Seed production methods for open pollinated and hybrid cultivars.
- 6.13 Effects of harvesting time, threshing, drying, grading, packing, packaging and storage of horticultural commodities.
- 6.14 Major problems and weaknesses in seed/saplings production.

7 Post-harvest technology

- 7.1 Post harvest technology; respiration and transpiration.
- 7.2 Maturity indices
- 7.3 Method of harvesting, cleaning, grading, and packaging.
- 7.4 Post harvest handling and transportation.
- 7.5 Harvesting for local and distant markets.
- 7.6 Markets and marketing
- 7.7 Storage (cellar store, rustic store, controlled atmospheric storage, diffused light storage, zero energy and cold storage)
- 7.8 Causes of deterioration of horticultural products.
- 7.9 Quality standardizations.
- 7.10 Processing and preservation.

8 Indigenous Technology

- 8.1 Local and wild edible fruits and vegetable species, cultivars and their usefulness.
- 8.2 Indigenous practices of vegetable cultivation.
- 8.3 Indigenous methods of disease and pest control and preventive measure.
- 8.4 Indigenous methods of soil fertility improvement and management.
- 8.5 Indigenous methods and management of water conservation and utilization.

9 Plant genetics and crop improvement

- 9.1 Tissue culture technology and bio-technology
- 9.2 Superior hybrid and superior open pollinated cultivars
- 9.3 Use of transgenic plants in horticulture
- 9.4 GMOs
- 9.5 Genes and their action
- 11.2 Genotypes and phenotype.
- 9.6 Breeding methods: self-pollinated species, cross-pollinated species,
- 9.7 Concept of heterosis and development of hybrid variety.
- 9.8 Mutation breeding.
- 9.9 Genetic erosion and transformation.
- 9.10 Temperature stress, moisture stress and nutrient stress

10. Statistics

- 10.1.1 Basic statistics: Standard deviation, standard error, normal distribution, sampling theory, test of hypothesis, and confidence interval, T-test, F-test and Chi-square tests
- 10.2 Research problem identification and project prioritization
- 10.3 Research and development project proposal preparation
- 10.4 Designs of experiment (single factor and factorial)
- 10.5 General methodologies to carry out RRA, PRA, Action research, Adoptive research, Exploratory, Academic research, Multi-disciplinary research, Multi-location research, Outreach research, Farmers' participatory research, Socioeconomic and market research, Collaborative research and Multi-partnership research.
- 10.6 Sampling methods, sampling size, data analysis, technical report writing and presentation
- 10.7 Estimate of experimental error and Control of error
- 10.8 Comparison: Pair comparison by Least Significant Different (LSD) and Duncan's Multiple Range Test (DMRT) group comparison - between - group comparison. Within group comparison, trends comparison and factorial comparison.
- 10.9 Regression and correlation: (Simple linear regression and correlation, multiple-linear regression and correction, simple non-linear regression and correlation, multiple nonlinear regression)
