नेपाल सरकार
नेपाल कृषि अनुसन्धान परिषद्
पदपूर्ति समिति

मुख्य वैज्ञानिक, एस-५, (Principal Scientist, S-5), सबै उप-समूहको आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको लागि पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ।
प्रथम चरणः लिखित परीक्षा (Written Examination) पूर्णाङ्कः २००
द्वितीय चरणः अन्तरवार्ता (Interview) पूर्णाङ्कः ३०

१. प्रथम चरण (First Phase): लिखित परीक्षा (Written Examination) पूर्णाङ्कः २००

Paper	Subject	Mark	Full Mark	Pass Mark	No. Questions (Q)xMark (M) = Total Marks	Time Allowed
I	Part I: Management	20	100	40	2 Q x 10 M = 20 (Long Answer)	3.00 Hours
	Part-II: Agriculture Research an development Issues	80			6 Q x 10 M = 60 (Short Answer) 1 Q x 20 M = 20 (Long Answer)	
II	Technical Subject		100	40	5 Q x 10 M = 50 (Critical Analysis) 2 Q x 25 M = 50 (Problem Solving)	3.00 Hours

२. द्वितीय चरण (Second Phase): Interview पूर्णाङ्कः ३०

Subject	Full Marks	System
Interview	30	Oral

द्रष्टव्यः

१. यो पाठ्यक्रम योजनालाई प्रथम चरणमा लिखित परीक्षा र द्वितीय चरणमा अन्तरवार्ता परीक्षा गरी दुई चरणमा विभाजन गरिएकोछ।
२. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुबै हुन सक्ने छ।
३. समान पद/तहको प्रथम पत्र सबै उपसमूहको लागि पाठ्यक्रम एउटै भएको कारण एकिकृत परीक्षा सञ्चालन हुनेछ। तर द्वितीय पत्र Technical Subject को पाठ्यक्रम उपसमूह अनुरुप फरक फरक हुनेछ।
४. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ।
५. प्रथम पत्रको Part-I र Part-II का लागि छुट्टाछुट्टै एक एक वटा उत्तर पुस्तिका हुनेछन्।
६. परीक्षामा कुनै प्रकारको विद्युतीय उपकरण तथा क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन।
७. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयबस्तुमा जेसुकै लेखिएको भएतापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ।
८. पाठ्यक्रममा भएका यथासम्भव सबै पाठ्याशंहरुबाट प्रश्नहरु सोधिने छ। प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवाहरुलाई मात्र द्वितीय चरणको अन्तरवार्तामा सम्मिलित गराइने छ।
९. प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारको प्राप्ताङ्क र द्वितीय चरणको अन्तरवार्तामा प्राप्त गरेको अंक जोडी योग्यताक्रम अनुसार सिफारिस गरिनेछ।
१०. यो पाठ्यक्रम तुरुन्त लागू हुनेछ।
११. यस भन्दा अगाडि लागू भएको पाठ्यक्रम खारेज गरिएको छ।

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Paper: I

Management and Agricultural Research and Development
(Common for all sub-groups)

Part-I: Management

A. Management:

1. Concept, principles, functions, scope, challange, leadership style.
2. Participative Management: concept, opportunity, techniques of participation.
3. Conflict management: concept, approaches to conflict, levels of conflict, causes of conflict and strategies for conflict management.
4. Stress management: Concept, causes and sources of stress, techniques of stress management.

B. Finance and Human Resource:

1. Human resources management: concepts, approaches and functions
2. Leadership: concept, opportunity and functions.
3. Coordination: concept, need, types, techniques and approaches for effective coordination.
4. Motivation: Concept, theories of motivation, reasons for low productivity, techniques of employ motivation.
5. Decision making: importance, types, rational process of decision process.
6. Financial management: concept, approaches, budget formulation, and implantation, auditing and reporting.

Part-II: Agriculture Research and Development Issues

1. Constitution of Nepal: Food, agriculture and natural resources related issues.
2. Current National Agricultural policies and plans : National Agriculture Policy, Agricultural biodiversity policy, Climate change policy, Agriculture Development Strategy (ADS), Long term seed vision and agriculture related issues in periodic plan, Poultry policy, Pasture policy and Floriculture promotion policy,
3. Structure and responsibilities of Nepal Agricultural Research Council (NARC), Role and responsibilities of NARC as an apex body of research.

4. International Agricultural Research Organizations - CGIAR and IARCS, CIAT, CIMMYT, CIP, ICRISAT, ICARDA, World Fish, ICRAP, IFPRI, IITA, ILRI, Bioversity international, IRRI, IWMI, AVRDC, ICIMOD, IFDC, IFAD, FAO.

5. Agricultural Innovation System: concept, actors, relationship between actors and accountability to stakeholders.

6. National Agricultural Research Systems: in global and national perspectives.

7. Agricultural research farm management.

8. Agricultural research project management: Problem and objective tree analysis, logframe development, effect and impact assessment and its linkage with technology users.

9. Public private partnership in agriculture research.

10. Entrepreneurs and agri-business development through agricultural research.

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Paper: II

Technical Subject
Sub Group: Agronomy/Plant Breeding and Genetics

Part one - Agronomy

1. Crop Production

Rice, maize, wheat, finger millet, barley, buckwheat, amaranthus, lentil, soybean, chickpea, pigeon-pea, mung-bean, rapeseed mustard, sunflower, mustard, groundnut, sugarcane, jute, cotton with respect to:

1.1 Introduction, origin and distribution
1.2 Botany, physiology, morphology and growth stages
1.3 Climate and soil
1.4 Released, recommended registered and pipe-line cultivars and their characteristics
1.5 Cultivation practices: land preparation, seed treatment, planting methods, planting time, seed rate, inter-culture operations and harvesting indices (maturity), package of practices and Integrated Crop Management (ICM)
1.6 Organic manures and chemical fertilizers: recommended doses, method of application, time of application and fertilizer use efficiency
1.7 Water management: time and frequency of water application during critical stages, irrigation methods, water requirement, and drainage
1.8 Plant protection measures: major insects and diseases, causal agents, symptoms and control/management practices, IPM, use of safe chemical pesticides/ non-chemical pesticides, pesticides residues and storage pests
1.9 Harvesting, post-harvest technologies, cleaning, transportation, storage, and marketing intelligence
1.10 Economics of crop production of major crops and cost-benefit

2. Climate, Land Resources and Agro-Biodiversity

2.1 Climate: temperature, humidity, wind pressure, rainfall, effective rainfall, sunshine hours, solar radiation and its importance in crop productivity and production
2.2 Climate of Nepal : climatic zones, their features and vegetation; and crop zoning
2.3 Physiographic distribution of Nepal
2.4 Land capability and irrigation suitability
2.5 Soils of Nepal and their classification, soil carbon sequestration and carbon trading
2.6 Importance of agro-biodiversity and approaches for conservation and utilization
2.7 Climate change and challenges in food and nutritional security
2.8 Greenhouse Gases (GHGs) emission, approaches to mitigate methane gas emission form paddy fields in Nepal, climate smart agriculture and its application in Nepal
2.9 Adaptation and mitigation measures and strategies concerning the climate change impacts
2.10 Agro-climatic normal for different crops
2.11 Concept of weather forecasting and its implication in crop production
2.12 Weather and climatic abnormalities and natural calamities and its impact on crop production and food security

3. Soil and Plant Nutrition Management

3.1 Soil formation and morphology
3.2 Soil physical properties: soil sampling, soil texture, particle density, porosity and friability
3.3 Soil chemical properties: cation exchange, soil reaction (pH), organic carbon and available nitrogen, phosphorus and potassium, clay minerals, organic colloids (humus), soil testing
3.4 Organic matter, decomposition and Vermi-compost
3.5 Macro and micro nutrients deficiency symptoms and their corrections
3.6 Balancing the plant nutrients, INM, IPNS, soil health
3.7 Bio-fertilizers and green manuring for soil improvement

4. Soil Water and Water Management for Plants

4.1 Soil water classification for water management
4.2 Water flow into soil, its uptake by plants
4.3 Reducing water losses and managing in field crops
4.4 Water requirements of crops, water table, water-harvesting and water use efficiency
4.5 Innovative irrigation techniques and irrigation efficiency
4.6 Drainage systems and its management in field crops
4.7 Water-saving technologies

5. Tillage, Weed and Weed Management

5.1 Conservation Agriculture (CA) and Resource Conservation Technologies (RCTs)
5.2 Weed problems and their management in crop production
5.3 Pattern of weed distribution and common weeds of major field crops
5.4 Herbicides: types of herbicides, herbicide formulation, application, mode of action, physiology of herbicides and herbicides use in Nepal
5.5 Integrated weed management in important crops: rice, maize, wheat, finger millet, lentil, soybean
5.6 Economic use of herbicides

6. Sustainable Agriculture, Agro-ecologies and Food Security

6.1 National food production, requirement and balance
6.2 Agro industry and commercialization
6.3 Sustainable agriculture and agro-ecologies
6.4 Traditional and modern sustainable agriculture
6.5 Environmental-friendly technologies
6.6 Positive and negative aspects of sustainable and modern agriculture
6.7 Pros and cons of green revolution
6.8 Technology generation, adaptation and adoption for sustainability in agriculture in Nepal
6.9 Organic and precision farming for sustainable and maximization of crop yield
6.10 Food Security: concept, basis principles, issues related to national and global food production and consumption, challenges in food and nutritional security - nationally and globally
6.11 Weather and climate hazards and its impact on food and nutritional security
6.12 Sustainable crop production under rainfed condition and different agro-ecologies
6.13 Agro-forestry system for sustainable agriculture

7. Seed Technology

7.1 Pollination, seed development and seed maturation
7.2 Principles and practices of seed production
7.3 Seed quality and seed categories
7.4 Seed certification procedures and certification standards in major crops in Nepal
7.5 Seed production, distribution, marketing and legislation
7.6 Scope of hybrid and genetically modified seeds for Nepal

8. Crop Physiology

8.1 Growth and development: stages, cell division, enlargement and differentiation crop growth stages, LAI and HI
8.2 Photo-periodism, photosynthesis, photorespiration, transpiration, respiration absorption and translocation
8.3 Stress physiology: cold and heat stresses, low and high moisture stresses

9. Farming System and Outreach Research

9.1 Crop rotation, relay cropping, cropping intensity and farming system.
9.2 Socio-economic and institutional aspects of farming system
9.3 On-farm farming system research methodology, characteristics of FSR, and diagnostic phase of FSR (RRA, agro-ecosystem analysis, RRA, conventional survey)
9.4 Gender perspective of technology generation and adoption
9.5 Out-reach research: definition, concept, importance
9.6 Out-reach research as means of technology transfer and dissemination
9.7 Indexes of different cropping sequences

10. Agri-mechanization

10.1 Agri-mechanization for Terai and Hills: Prospects, objectives, concepts, opportunities and limitations
10.2 Agri-mechanization in the perspective of gender and youth farmers
10.3 Agri-mechanizaton and commercial farming

<u>Part two - Plant Breeding and Genetics</u>

1. Plant Genetic Resources and Ecosystems

1.1 Plant distribution and their limiting factors
1.2 Origin of cultivated plants and the ecotype concept
1.3 Crop germplasm conservation, evaluation and their utilization
1.4 Crop ecosystem

2. Plant Genetics

2.1 Reproductive systems:
  2.1.1 Sexual Reproduction
  2.1.2 Asexual Reproduction
2.2 Male sterility, self-incompatibility and techniques of hybridization
2.3 Genetic basis of plant breeding
  2.3.1 Variation
    - Environmental variations
    - Agro-ecotypic variations

2.3.2 Ecotypes
2.3.3 Heredity
- Inheritance of qualitative characters
- Inheritance of quantitative characters

2.3.4 Methods of estimating genetic parameters
2.4 Heterosis
2.5 Selection
2.5.1 Natural selection
2.5.2 Directional selection
2.5.3 Genetic advance under selection
2.6 Inter-specific and inter-generic hybridization

3. Methods of Plant Breeding

3.1 Pure line selection
3.2 Pedigree method
3.3 Bulk population method
3.4 Backcross method
3.5 Population improvement
3.5.1 Intra-population methods
3.5.2 Inter-population methods
3.6 Recurrent selection
3.7 Composite and synthetic varieties
3.8 Asexually propagated crops
3.9 Apomictic grasses
3.10 Maize hybrids
3.11 Hybrid varieties
3.12 Mutation Breeding
3.13 Polyploid Breeding
3.14 Disease resistance breeding
3.15 Insect resistance breeding
3.16 Abiotic stresses
3.17 breeding for specific traits
3.18 Plant tissue culture
3.18.1 Micro-propagation
3.18.2 Production of virus free plants.
3.18.3 Embryo culture
3.18.4 Anther culture
3.18.5 Ovule culture
3.19 Genetic Engineering
3.19.1 Gene cloning
3.19.2 Gene transfers in plants
3.19.3 Application and use of genetic engineering in plant breeding
3.19.4 GMOs for crop improvement

4. National Seed Production System

4.1 Plant variety release, National seed act and National Agricultural Extension System
4.2 Plant varieties diffusion through private sector: current status and future scope
4.3 Plant variety protection

4.4 Hybrid seed production

5. Others

5.1 Status of plant breeding activities in Nepal in cereals, grain-legumes, oilseeds, potato, vegetables, fruits, spices
5.2 Collaboration with IARCs In crop improvement: their scope and limitations
5.3 Bio-Technology Revolution: Implications for Agriculture
5.4 Bio-Technology Policy: Public Perception, Participation and the Law
5.5 International Dimensions of Bio-technology

6. Biological Statistics

6.1 Probability and simple statistics
6.2 Estimate of error: replication and randomization
6.3 Control of error: blocking, field plot technique and data analysis
6.4 Different statistical design for field crops (RCBD, Latin Square, Split Plot Design and other factorial experiment)
6.5 Comparison: Least significant difference (LSD) and Duncan's Multiple Range Test (DMRT), group comparison between groups and within group, trend comparison, factorial comparison and interpretation of results
6.6 Regression and correlation and their use in agronomical researches
6.7 Data transformation and missing plot techniques
6.8 Statistical methods for cropping systems, inter cropping, mixed cropping, sequential cropping and cropping patterns

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Paper: II

Techinical Subject
Sub-Group: Soil Science

1. Scientific and Technical Knowledge related to Soil Science
1.1 Surface soil and sub-soil as a natural body
1.2 Morphology, colour, constituents, profile, horizons, texture, structure, consistency, concretions of soil in agriculture
1.3 Classification of Soil and land use planning
1.4 Soil genesis, weathering, factors and process of soil formation
1.5 Dynamic properties of soil
1.6 Soil pollution and its control
1.7 Soil erosion and Soil conservation
1.8 Soils of Nepal and their classification
1.9 Problem soils of Nepal
1.10 Soil management for sustainable farming in Nepal

2. Soil and Water Relation
2.1 Water in soils - where and how the water is held, suction and pF curves for soils, movement of water in soils, permeability, field capacity, evaporation, the transfer of water from soil to plant, amount of water used by different crops
2.2 Plant-foods and their sources
2.3 Amount of nutrients removed by plants
2.4 Response of major and trace elements in major crops in Nepalese soils
2.5 Nitrogen cycle in the soil - mineralization and nitrification
2.6 Phosphorus fixation
2.7 Role of potassium in plant nutrition
2.8 Different tillage systems
2.9 Cation Exchange Capacity and factors affecting them
2.10 Principles underlying the control of soil erosion, wind erosion and soil drifting, erosion by run-off water

3. Soil Fertility Management
3.1 Recommended doses of nutrients, method and timing of application
3.2 Effect of imbalanced fertilizer use on soil health and environmental pollution.
3.3 Methods of soil chemical analysis for different elements
3.4 Recommendation of nutrients on the basis of soil chemical analysis
3.5 Soil reaction (soil pH), its measurement, liming material their response when applied in soil, reclamation of acidic, saline, alkaline and sodic soil
3.6 Nature of Cation and Anion Exchange, Cation Exchange Capacity versus Soil pH
3.7 Classification of elements on the basis of their functions
3.8 Deficiency symptoms of elements on the crops
3.9 Forms of element utilized by plants

3.10 Inorganic fertilizer, composition, formula and their transformation from fertilizer to available form of element
3.11 Absorption process of nutrients by plant roots
3.12 Plant nutrients - losses from soil
3.13 Determination of nutrients requirement of crops

4. Soil Ecology

4.1 Microbial population of the soil, their function, their role on ammonification, nitrification, denitrification
4.2 Function and importance of rhizobium, azotobacter, clostridium, algae, phosphor-bacterium, worms, nematodes, fungi, virus, rodents, ants
4.3 Decomposition of plant material, composting, micro-organisms responsible for the decomposition of plant remains, green manuring, desirable characteristics of green manure, plants suitable for green manure, green manuring and the maintenance of soil fertility, constraints of green manuring
4.4 Bio-fertilizers, their types and commercially available bio-fertilizers
4.5 Nitrogen fixing microbes and their plant association
4.5 Azolla and biogas, and their economic importance
4.6 Plant nutrition management in organic farming and its importance in Nepalese context
4.7 Composition of soil organic matter, nutrient content of different animal dung, humus, composition of humus colloids, carbon - nitrogen (C/N) ratio, its importance in nutrient uptake, properties of soil humus, the clay - humus complex, decomposability of soil humus
4.8 Moisture conservation and weed management in rainfed agriculture

5. National and International Research on Soil Science

5.1 Major issues and achievements of soil science research in Nepal
5.2 Major issues and achievements of soil science research in neighboring countries and international institutions

6. Statistics

6.1 Probability
6.2 Estimate of error: replication and randomization
6.3 Control of error, field plot technique and data analysis
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11.2 Estimate of error: replication and randomization
11.3 Control of error: blocking, field plot technique and data analysis
11.4 Different statistical design for field crops (RCBD, Latin Square, Split Plot Design and other factorial experiment)
11.5 Comparison: Least significant difference (LSD) and Duncan's Multiple Range Test (DMRT), group comparison between groups and within group, trend comparison, factorial comparison and interpretation of results
11.6 Regression and correlation and their use in agronomical researches
11.7 Data transformation and missing plot techniques
11.8 Statistical methods for cropping systems, inter cropping, mixed cropping, sequential cropping and cropping patterns

मुख्य वैज्ञानिक, एस-५, (Principal Scientist, S-5), प्लाण्ट ब्रिडिङ एण्ड जेनेटिक्स उपसमूहको आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको लागि पाठ्यक्रम

Paper: II

Techinical Subject
Sub Group: Plant Breeding and Genetics

1. Plant Genetic Resources and Ecosystems
- 1.1 Plant distribution and their limiting factors
- 1.2 Origin of cultivated plants and the ecotype concept
- 1.3 Crop germplasm conservation, evaluation and their utilization
- 1.4 Crop ecosystem

2. Plant Genetics
- 2.1 Reproductive systems:
  - 2.1.1 Sexual Reproduction
  - 2.1.2 Asexual Reproduction
- 2.2 Male sterility, self-incompatibility and techniques of hybridization
- 2.3 Genetic basis of plant breeding
  - 2.3.1 Variation
    - Environmental variations
    - Agro-ecotypic variations
  - 2.3.2 Ecotypes
  - 2.3.3 Heredity
    - Inheritance of qualitative characters
    - Inheritance of quantitative characters
  - 2.3.4 Methods of estimating genetic parameters
- 2.4 Heterosis
- 2.5 Selection
  - 2.5.1 Natural selection
  - 2.5.2 Directional selection
  - 2.5.3 Genetic advance under selection
- 2.6 Inter-specific and inter-generic hybridization

3. Methods of Plant Breeding
- 3.1 Pure line selection
- 3.2 Pedigree method
- 3.3 Bulk population method
- 3.4 Backcross method
- 3.5 Population improvement
  - 3.5.1 Intra-population methods
  - 3.5.2 Inter-population methods
- 3.6 Recurrent selection

3.7 Composite and synthetic varieties

3.8 Asexually propagated crops
3.9 Apomictic grasses
3.10 Maize hybrids
3.11 Hybrid varieties
3.12 Mutation Breeding
3.13 Polyploid Breeding
3.14 Disease resistance breeding
3.15 Insect resistance breeding
3.16 Abiotic stresses
3.17 breeding for specific traits
3.18 Plant tissue culture
    3.18.1 Micro-propagation
    3.18.2 Production of virus free plants.
    3.18.3 Embryo culture
    3.18.4 Anther culture
    3.18.5 Ovule culture
3.19 Genetic Engineering
    3.19.1 Gene cloning
    3.19.2 Gene transfers in plants
    3.19.3 Application and use of genetic engineering in plant breeding
    3.19.4 GMOs for crop improvement

4. National Seed Production System

4.1 Plant variety release, National seed act and National Agricultural Extension System
4.2 Plant varieties diffusion through private sector: current status and future scope
4.3 Plant variety protection
4.4 Hybrid seed production

5. Others

5.1 Status of plant breeding activities in Nepal in cereals, grain-legumes, oilseeds, potato, vegetables, fruits, spices
5.2 Collaboration with IARCs In crop improvement: their scope and limitations
5.3 Bio-Technology Revolution: Implications for Agriculture
5.4 Bio-Technology Policy: Public Perception, Participation and the Law
5.5 International Dimensions of Bio-technology

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मुख्य वैज्ञानिक, एस-५, (Principal Scientist, S-5), ईण्टोमोलोजी उपसमूहको आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको लागि पाठ्यक्रम

Paper: II

Technical Subject
Sub Group: Entomology

1. Crop Pests

1.1 Bio-ecology of insects, mite and rodent pests of the following crops and stored products:
- 1.1.1 Cereals
- 1.1.2 Grain legumes
- 1.1.3 Oil seed crops
- 1.1.4 Vegetable crops
- 1.1.5 Fruit crops
- 1.1.6 Tobacco, Jute, Cotton, Sugarcane, Tea, Coffee, Potato.
- 1.1.7 Stored grains and other products

2. Integrated Pest Management

2.1 Concepts
2.2 Tools
2.3 Present status and progress in Nepal.

3. Biological Control

3.1 Parasitoids and predators
3.2 Techniques in biological control
3.3 Integrated biological control
3.4 Commercial production of bio-control agents
3.5 Integration with other tactics

4. Microbial Control

4.1 Concepts
4.2 Bacterial pathogens
4.3 Fungal pathogens
4.4 Viral pathogens
4.5 Other pathogens
4.6 Potential in IPM

5. Botanical Control

5.1 Promising plant species
5.2 Effects on non-target organisms
5.3 Environmental impact
5.4 Potential in IPM

6. Synthetic Organic Pesticides

6.1 Major groups of insecticides

- 6.1.1 Organochlorines
- 6.1.2 Organophosphates
- 6.1.3 Carbamates
- 6.1.4 Synthetic pyrethroids

6.2 Other pesticides
- 6.2.1 Miticides
- 6.2.2 Rodenticides
- 6.2.3 Miscellaneous

6.3 Status of pesticide use in Nepal
6.4 Selection of insecticides for IPM
6.5 Application technology
6.6 Environmental impact

7. Biotechnological Approaches

7.1 Concept
7.2 Methodology
7.3 Transgenic plants
7.4 Pyramiding genes
7.5 Potential in IPM

8. Bio-rational and other Approaches

8.1 Chemicals based on insect cuticle
8.2 Chemical based on endocrine system
8.3 Chemicals based on communication system
8.4 Miscellaneous approaches
- 8.4.1 Light - activated pesticides
- 8.4.2 Propesticides
- 8.4.3 Avermectins
- 8.4.4 Spinosyns
- 8.4.5 Genetic control
- 8.4.6 Chemosterilants
- 8.4.7 Repellents

8.5 Current status of biorational use
- 8.5.1 Insect growth regulators
- 8.5.2 Semiochemicals

9. Others

9.1 Plant protection organization under the Ministry of Agriculture and Livestock development
9.2 Plant protection organization under the Nepal Agricultural Research Council
9.3 Pests and pesticide regulations

Paper: II

Technical Subject
Sub-Group: Pomology

1. Concepts in Basic Horticulture and Physiology

1.1 Opportunities and potentialities for different fruits and plantation crops
1.2 Constraints and remedies for production and marketing
1.3 Area coverage, production and trade situation
1.4 Physiological aspects of seed germination, dormancy, flowering, fruiting and ripening
1.5 Plants growth regulators and their application
1.6 Causes and mitigation measures of unfruitfulness in fruits and plantation crops

2. Orchard Management and Production Technology of Native and Exotic Fruit and Plantation Crop Species

2.1 Environmental requirement and varieties
2.2 Advance of soil and water management practices
2.3 Canopy management
2.4 Nutrient management
2.5 Weed management
2.6 Disease and insect pest management
2.7 Abiotic and biotic stresses and their management
2.8 High density planting; concepts, techniques, applications and constraints
2.9 Organic production of fruits and plantation crops
2.10 Precision horticulture; concepts, application and technologies in fruits and plantation crops
2.11 Pollination management
2.12 Protected cultivation

3. Conservation and Varietal Improvement of Perennial Crops

3.1 Genetic diversity of fruits and plantation crops in Nepal
3.2 Collection, conservation and use of germplasm
3.3 Nature and strategies for variety improvement of fruits and plantation crop
3.4 Propagation techniques
3.5 Root stocks and their effects
3.6 Use of biotechnology in horticulture
3.7 Maintenance of fruits and plantation crops varieties

4. Climate Change and Environmental Issues

4.1 Climate change causes and effect
4.2 Impact of climate change on fruits and plantation crops
4.3 Mitigation of adverse effect of climate change with special reference to fruits and plantation crops

5. Postharvest Management and Marketing

5.1 Postharvest physiology of fruits and plantation crops
5.2 Maturity indices, ripening and harvesting techniques
5.3 Factors affecting postharvest losses and their management

5.4 Packing house operation; sorting, grading, curing, washing, waxing, de-greening, ripening, fumigation, disinfection, irradiation, heat treatment, packaging

5.5 Pre-cooling and cold-chain movement
5.6 Methods of storage
5.7 Management of postharvest disease pest and physiological disorders
5.8 Processing and preservation techniques
5.9 Sanitization, sanitary and phytosanitary requirements
5.10 Market value chain management

6. Research and Development

6.1 Fruit and plantation crop research and development programs in Nepal- critical review
6.2 Organizational structures for effective technology generation and its delivery
6.3 Research and development programs of Government on fruits and plantation crop: critical review
6.4 Linkages between extension and research for technology generation and delivery system
6.5 Strategies for import substitution and export promotion fruits and plantation crops
6.6 Opportunities and challenges of WTO and SAFTA for Nepalese fruits and plantation crops
6.7 Experimental design, data analysis and interpretation of results

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