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<tr>
<td>COURSE COORDINATOR:</td>
<td>Jaime Prohens Tomás</td>
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<td>TEACHING STAFF:</td>
<td>Jaime Prohens Tomás</td>
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València, 17 de Junio de 2003
COURSE TITLE: Plant Genetic Resources

OBJECTIVES

The objective of this subject is that the students become conscious of the importance of plant genetic resources in the present and future feeding of the world population, as well as informing them of the increasing risk of genetic erosion caused by modern agriculture. To achieve the global objectives the students have to know the strategies of recovery, conservation and management of these natural resources, as well as the structure of national and international organisms and their activities for the safeguard of plant genetic resources. In addition, the patents international system and its effects on the development of new cultivars is presented, with an important emphasis being made on the impact of new biotechnologies.

EVALUATION

As it is a half-yearly subject, for the theory part only one exam will be made. This exam will include practical questions on the acquired knowledge (70% of the final mark). Furthermore, each student will present a discussion work on a contemporary issue on plant genetic resources (30% of the final mark). Assistance to practice sessions will be compulsory.

COURSE TITLE: Plant Genetic Resources

CONTENTS: THEORY (1/2)

Theme 1. Introduction.
   1.1. Biodiversity: What is it and why it is necessary?
   1.2. The Neolithic revolution and the origins of agriculture. Domestication, centers of origin and diversity of cultivated plants.
   1.3. Genetic diversity.
   1.5. The need for developing complementary strategies for conservation.

Theme 2. International activities for the safeguard of plant genetic resources.
   2.1. Background on the initiatives in favour of the conservation of plant genetic resources.
   2.2. FAO Commission on Plant Genetic Resources.
   2.3. CGIAR collections. Associated centres for divulgation.
2.4. Separation of IBPGR from CGIAR and creation of IPGRI (International Institute for Plant Genetic Resources)
2.5. The Keystone center. Structure, functioning and actions to develop.
2.6. The United Nations Convention and the Convention on Biological Diversity

Theme 3. Sources of information.
3.1. Sources of information on plant genetic resources.
   3.1.1. Reference works
   3.1.2. Primary publications – journals
   3.1.4. Updating mechanisms/alert systems
3.2. Organizations dealing with plant genetic resources and the information they have: To whom ask for information?

Theme 4. Collection.
4.1. Reasons for collecting germplasm.
4.2. Types of collecting missions.
4.3. Centralized collection vs. decentralized collection.
4.5. Elements of a successful collection mission.
4.7. Plant breeders’ rights
4.8. Patents
4.9. The FAO World System
4.10. CNUMAD
4.11. Participative strategies on plant genetic resources collection, including the auctoctonous knowledge
4.12. Sampling strategies
4.13. Strategies for collecting wild species

Theme 5. In situ conservation
5.1. Conservation in exploitations.
5.2. In situ conservation of wild species.
5.3. Vigilance of the conserved diversity.
5.4. Management of the conserved diversity.
5.5. Data management.
5.6. Participation of the local communities in in situ conservation.

Theme 6. Ex situ conservation.
6.2. Conservation of seeds.
   6.2.1. Principles for the storage of seeds (orthodox vs. recalcitrant)
   6.2.3. Germplasm banks design
   6.2.4. Genetic stability
6.3. Root and tuber crops.
6.4. Tree crops.
6.5. Forest tree nurseries and botanical gardens.
6.6. In vitro conservation
   6.6.1. Tissue culture (slow growth)
   6.6.2. Cryopreservation
6.7. Conservation of other materials
   6.7.1. Pollen/ovules
   6.7.2. DNA

Theme 7. Regeneration of samples.
   7.1. Genetic principles of regeneration (including stability)
   7.2. Methods, frequencies, number of plants and places for regeneration.
   7.3. Norms and directions
   7.4. Regeneration by farmers
   7.5. Data management

Theme 8. Characterization and evaluation.
   8.1. Measurement of genetic variation (including descriptors lists)
      8.1.1. Morphological and physiological characters
      8.1.2. Cytological characters
      8.1.3. Biochemical (isozymes) markers
      8.1.4. Molecular markers (RAPD, RFLP, SSRs, AFLP, etc.)
      8.1.5. Characterization and evaluation by farmers.
   8.2. Data analysis (introduction to genetical statistics, diversity indexes).
   8.3. Data management.
      8.3.1. Design and development of databases.
      8.3.2. Publication of results, catalogues.

Theme 9. Documentation.
   9.1. General concepts.
   9.2. Design and use of databases.

Theme 10. Germplasm utilization.
   10.1. Uses and types of users (importance of sustainability). Research. Introduction of
        plants. Selection. Plant breeding. Utilization by local populations (ethnobotany, community
        forestry, farmers’ breeding, etc.)
   10.2. Obstacles for the utilization and how to overcome them. Information on collections,
        Base collections. Plant health aspects. Policies restricting access and exchange of plant genetic
resources.
  10.3 Nuclear collections.

Theme 11. Plant health and safe transport of germplasm.
  11.1. Transport of germplasm.
  11.2. Directions for the exchange.
  11.3. Quarantine services.
  11.4. Selection for resistance to pests/diseases.

Theme 12. Study cases.
  12.1. Wild species vs. crops.
  12.2. Seeds vs. vegetative propagation.
  12.3. Orthodox vs. recalcitrant seeds.
  12.4. Allogamous vs. autogamous reproduction.
  12.5. Annual vs. perennial crops
  12.6. Available resources (human, facilities)
  12.7. Climatic factors.

COURSE TITLE: Plant Genetic Resources

CONTENTS: THEORY (2/2)

COURSE TITLE: Plant Genetic Resources

CONTENTS: PRACTICE

Practice 1. Functioning of germplasm banks. Visit to COMAV Bank and conference on their activities (2 sessions).
Practice 2. Characterization of wild and cultivated species (laboratory) (1 session).
Practice 3. Characterization of wild and cultivated species (greenhouse) (1 session).
Practice 4. Genetic diversity in germplasm collections. Morphological and molecular characterization and data analysis techniques (laboratory) (5 sessions).
Practice 5. Databases. International activities for the safeguard of plant genetic resources (computers room) (2 sessions).

COURSE TITLE: Genetics and Breeding

RECOMMENDED BIBLIOGRAPHY


