

Working Group on Conservation Strategies

Introduction to Working Group on Conservation Strategies

Dr. Patricia Barkley, Australia

Activities within this working group are to identify citrus germplasm locations, promote exploration and characterization efforts, and gather and disseminate appropriate citrus germplasm.

Dr. Nicotri mentioned the workshop, sponsored by IPGRI (International Plant Genetic Resources Institute) in Australia. This workshop tried to identify the germplasm that existed in the Asian region. ACIAR (Australian Center for International Agricultural Research) also has recognized the importance of Asian resources for breeding and disease resistance. CIRAD will be involved more with the pathology side, that project will begin sometime next year.

Presentation on ex-situ conservation of citrus: the Spanish programme

Dr. Luis Navarro, INIA, Valencia, Spain

The Spanish Citrus Industry covers 300,000 ha with production of 6 million metric tons. About 90% is fresh market fruit and 10% is processed. Of this 50%, or 1.8 billion US dollars, is exported. There are 36 total nurseries, ten of these having foundation plantings.

Problems associated with the ex situ maintenance of citrus germplasm banks as field collections include: risk of plant losses due to diseases, risk of character changes due to diseases, high risk of introducing exotic pests and diseases with exchange of genotypes, risk of plant losses due to climatic hazards, high possibilities of duplication of assessments, high costs of maintenance and evaluation.

Strategies used in Spain to overcome the problems associated with the ex situ maintenance of citrus include: maintain only pathogen-free genotypes, maintain a collection of plants growing in containers in insect-proof screenhouses or greenhouses, developing cryoconservation methodologies, morphological characterization of all genotypes, and developing a database system for efficient collection and data management.

The IVIA Citrus germplasm bank contains 370 assessments from 40 species of the genus Citrus. Certified nursery plants originating from the IVIA Citrus Germplasm Bank and planted in the field from 1982 totals 81 million plants.

Currently, efforts are progressing toward cryopreservation of citrus germplasm. The tissues for testing cryostorage include seeds, ovules, embryos, nucellar callus, nucellar cells, and apices.

Presentation on ex-situ experiences in China

Dr. Xiuxin Deng, Wuhan, China

Germplasm conservation has occurred usually in open fields. We are testing use of tissue culture for preservation. Chromosome variation is a phenomenon, we checked the chromosome numbers and compared it with the chromosome numbers from 17 years ago. They are nearly the same. However, many of the cells cannot pass this test. You will find that there is some variation in nearly 18% of the protoplasts generated just 14 days after culturing.

Ex-situ Experiences in China

Dr. Chen Zhusheng, Citrus Research Institute, BeiBei, Chaongqing, China

A full report on the ex-situ collection at the National Citrus Germplasm Genebank was presented at the 1996 Congress of the International Society of Citriculture (Proceedings International Symposium on Identification and Conservation of Genetic Resources of Citrus and its Relatives, 13 May 1996, L. G. Albrigo, ed. FAO Div. Seed and Plant Genetic Resources, publ., pp. 11-17)). Maintaining the citrus germplasm collection in China has been a problem in recent years, because many factors have contributed to losses of assessments in recent years. The citrus BeiBei collection area has been partially destroyed due to diseases, poor climate, and little financial support. There are many scientists and much commercial citrus germplasm in the province, but there is little in-situ germplasm in existence.

Presentation on In-Situ conservation potential: a case study in India

Dr. R. K. Arora, India

The full text of this presentation is presented in Appendix 7. Both intergenetic and interspecific hybrids, segregation and mutation with stable hybrids being maintained through polyembryony make the identification of citrus species difficult. These stabilized hybrids have led to the production of over-lapping types. In spite of these difficulties the North Eastern Himalayan range is a significant area of origin for citrus.

Discussion and Identification of Potential Cooperative Activities

Dr. Nito (Saga University, Honjo, Saga, 840, Japan), is collecting citrus and citrus relatives in Asia. The assessments are kept in greenhouses, and are fairly small. He has some of the relatives collected in Asia that do not exist anywhere else in the world, but virtually no characterization of the material is occurring. Interested persons are welcome to evaluate the collection. Most material goes into the natural germplasm system.

If you are really trying to gain diversity, you must track the origination of the tree. You may have a tree that came from someone else's tree. The question was raised on how good the records of the trees in many collections are. How many different trees of a given species do we have in the worldwide collections? Many of the assessments may come from the same original exploration. It is not clear how many species, listed in older records, exist presently. We are losing material of various species from various areas. Although relatively accessible, there is no comprehensive collection of some of the species in Australia. It was suggested that locations like Dr. Nito's and the University of Malaysia be contacted as well as each individual country with citrus collections to develop a comprehensive list of ex-situ holdings. Some of this effort is occurring in the CIRAD - Corsica database (EGID).

In expanding current collections quarantine becomes another major issue. Due to consideration of canker and other diseases that are not existent in Australia, it costs \$3,000 to have one new selection brought into Australia. Australia has been working with Vietnam to build their ex situ collection. Vietnam has been a difficult collection site, first, because material was not concentrated in one location and, secondly, they did not have the expertise in micro-satellite marker techniques to ensure that what they have can be verified in the field as non-duplicated. There is a limit to the number of assessments that can be cleaned up, but there is a major demand for cleanup of commercial cultivars. Germplasm has taken a back seat. Genetic erosion in countries of origin is partly due to introduction of new cultivars. There is increasing concern in a lot of countries about this erosion (comments by Dr. P. Barkley). Dr. Deng from China stated that since 1950 some older commercial cultivars cannot be found in the field. This is a clear example of genetic erosion. At the same time there is concern that some growers continue to

grow a traditional, inferior cultivar instead of replacing it with a more productive, higher quality cultivar. An international citrus germplasm storage facility was proposed. The point was made that each country working toward their own storage facility, is a waste of resources. By grouping both government and industry resources, there could be a greater collection of citrus germplasm maintained and greater leaps in the advancement of research. Problems of access to this material were not discussed. A coordinated effort to expand ex-situ collections does not appear feasible at this time.

What is going to happen to the material in a collection after an industry accesses it? They may see little value in most of the collection. There have to be principals placed on the scientific value and the research that should be conducted with these collections. Dr. Barkley stated that the project between Australia, China, and Vietnam was supposed to be a mutual benefit, equal sharing partnership. We were able to sell this program to ACIAR, but we were also able to sell it to the local growers, to fund the field research. GCGN does not have a standing as a legal entity which is a barrier to seeking funding from a government or the United Nations directly. Some type of action could be taken towards becoming a legal entity, but becoming a legal entity has some complications. The network is under the FAO, and FAO can be a vehicle for funding to be obtained. There is a mechanism through FAO to solicit funding whenever necessary, however, the spending and overhead control reside with FAO. On the other hand, for spending money directly, we have no legal status in order to be held responsible.

As to finding funding for citrus germplasm projects, there are many aid agencies in Southeast Asia. ACIAR has discussed a cooperative effort in southeast Asia with CIRAD. At this meeting, there was no knowledge of collaboration with Spain in the project. Going through international agencies to seek funding requires a strong project proposal. There is a need to establish a viable network working group that is willing to identify the citrus relatives and carry out other proposed activities.

To upgrade working group activity, Dr. Albrigo suggested that an e-mail be sent to the official chair person for each working group not present to ascertain their intent to be active in coordination. The decision in the absence of the conservation working group chair is to develop this project, if he can not do this we need to find someone who can.