

CHAIRS' SUMMARY PAPER: Conservation, Evaluation and Utilization of Plant Resources

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SUMMARY OF PLENARY PRESENTATIONS

Dr. Charmet's presentation illustrated the growth in the number of scientific publications on forage genetic resources since the 1970's. There has been a major increase in multitrait evaluations and more recently, an increasing use of biochemical and molecular markers. Successes in the use of the ecological approach (collection in same environment in which a crop is to be used) to germplasm collection were given, and the advantages and disadvantages of using this method described. Correlations and multivariate analysis have sometimes shown that the ecological approach does not work. It can be used to identify areas with the highest probability of finding good germplasm, but should be accompanied by an evaluation for the characteristics that are the goals of breeding programs. Genetic markers (isozymes, storage proteins and molecular) have high heritability and are useful in germplasm classification, but not for evaluating adaptation. The importance of a breeding oriented evaluation of genetic resources (focused on traits which limit current use of a species) was stressed. Since forage breeding programs have multiple objectives, the evaluation should also be multitrait, which would only be practical on core collections. Some core collections have been established and it is likely that they will become more widely available and used in the future.

Dr. Hanson's presentation focused on tropical forage genetic resources, indicating that the centre of origin and diversity of legume species is tropical America, while most perennial grasses originated in sub-saharan Africa. There has been considerable collection of tropical germplasm since the 1970's carried out by agencies such as CSIRO, CIAT, ILRI and IPGRI. Many collected legume species have been adequately stored under low temperature conditions in seed genebanks, while many grasses have proven to be short-lived under these conditions and alternative methods have been used. Seed increase of these mainly outcrossing species continues to be a challenge. There is considerable duplication of collections at one or more locations for security reasons. Germplasm at international and many national genebanks is freely available; however, there is a diversity of opinion on whether it will remain so, particularly in view of the framework provided by the Convention on Biological Diversity. Characterization of the germplasm stored in genebanks is underway using either classical or molecular approaches, and has indicated that there is considerable variation in material already collected. Future needs include: increased collection in highland tropical areas; more research on appropriate conditions for seed storage; and continued effort on the systematic characterization of present collections.

SUMMARY OF POSTER PRESENTATIONS

Approximately half of the posters focused on the evaluation of genetic resources including evaluation of:

1. Ecotypes - *Lolium*, *Trifolium*, *Leucaena*, *Poa*. Intra-population variation was often higher than inter-population variation.
2. Genera - New genera in which species were identified which showed forage potential included *Silphium*, *Dorycnium*, *Arachis*, and *Codariocalyx*. Cultivated species within the genera *Lolium*,

Festuca, and *Medicago* spp.

3. Cultivars - *Avena* and *Festuca*
4. Accessions - *Macroptilium*, *Lotus*, tropical grasses and legume, temperate grasses from the North America and China.
5. Landraces - *Medicago*, *Zea* and *Dactylis*. RAPD*s were useful in identifying *Medicago* landraces.

Approximately 70% of the posters on germplasm evaluation were on temperate species, with presentations from all continents.

Posters on the utilization of genetic resources included:

- 1) the direct use as new cultivars;
- 2) use in selection or crossing programs to develop new cultivars;
- 3) the use of accessions as animal feed or for wetland remediation.

Conservation issues covered by the posters included:

- 1) collection management;
- 2) development of core collections;
- 3) seed increase methodologies;
- 4) collection strategies; and
- 5) recent collections.

DISCUSSION SESSION

- The status and availability of European collections was questioned. Most are still open to unrestricted access and some are accessible through the internet (see below).
- Users have the major stake in germplasm preservation and should be actively involved in characterization and seed increase. Characterization of germplasm is very expensive, and although breeders are supportive of more evaluation, little funding is available.
- Most collections are of grasses and legumes, however, it was pointed out that there are also a few significant collections of forage Brassicas.
- Seed production is a critical need for new germplasm and thus should be a high priority for evaluation. This is especially important for species that will be grown on larger commercial scales rather than on small farms.
- Many of the tropical legumes, especially woody species, have multiple uses, thus germplasm should be evaluated for these multiple characteristics. In temperate areas, evaluation is being carried out for soil conservation purposes (western USA), and for the ability to revegetate disturbed environments (Australia).

- The ILRI collection is being used mainly by sub-saharan African countries, with about 3,000 samples being distributed in a year.
- No priority species have been identified for further collections in the highland tropics. There is, however, particular interest in fodder trees that will resist frosts and droughts in the highlands.
- The lack of information on in situ conservation in the plenary presentations was noted. It was pointed out that there are large national park areas in Africa that contain a number of indigenous forages. These areas could likely be further used for in situ conservation.
- There is an important requirement for vegetatively-propagated germplasm in Africa. ILRI is not using liquid nitrogen storage for these materials, but some are being maintained in slow growing in vitro cultures. The main method of conserving vegetatively-propagated germplasm is in field nurseries.
- The benefits of genetic resources were questioned. Increased productivity of our forages plants and ultimately, increased wealth, is the main benefit.

FUTURE NEEDS

1. Development of core collections for a wider range of species.
2. Increased collection in highland tropical areas for species resistant to frost and drought.
3. More research on optimum conditions for seed storage.
4. More effort in the systematic characterization of present germplasm collections.

Access to collections on the world wide web:

1. United States - <http://www.ars-grin.gov/npgs/>
2. Europe - <http://www.cgiar.org/ecpgr/platform>
3. CGIAR germplasm collections - <http://www.cgiar.org/singer>