

DNA CONSERVATION AND THE DNA BANK-NETWORK

Dr. Robert P. Adams
Baylor University, USA

Genetic transfers from insects, bacteria, viruses, animals, and plants to unrelated organisms indicate that we must now view the world's genetic resources (genes, DNA) from a horizontal perspective in which gene transfers will cut across species, genera and family boundaries. The world's biota should now be considered a horizontal gene pool.

Previously, we have utilized only vertical gene pools (i.e., breeding with ancestral or derived taxa that are closely related in order to make fertile or semi-fertile crosses. The development of pharmaceutical farming, bioreactors and even insect resistance in our field crops will now utilize genes from distantly related taxa (i.e., the horizontal gene pool).

The recent advances in technology for the extraction and immobilization of DNA, coupled with the prospect of the loss of significant plant genetic resources throughout the world, has led to the establishment of DNA BankNet. DNA BankNet is an association of institutions focused on preserving DNA as well as in vitro cryopreservation of plant cells. There are over forty institutions, representing 25 nations and every continent, that have expressed interest in DNA BankNet.

Topics:

I. Structure and Operation of DNA BankNet

A. Working (DNA dispensing) nodes

- a. Collection of plant material by taxonomists.
- b. DNA extraction by molecular biologists or trained staff.
- c. Long term preservation of DNA-rich materials and/or extracted DNA in liquid nitrogen.
- d. DNA analysis/gene replication by molecular biologists or trained staff.
- e. Distribution of DNA (genes, gene segments, oligonucleotides, etc.).

B. Reserve (base) nodes

- a. Long term DNA preservation in liquid nitrogen and monitoring of potential DNA degradation.
- b. Act as genetic reserve buffer for working nodes.
- c. Replenishment of DNA if a working node experiences the catastrophic loss of storage parameters and DNA.

II. General Requirements for Nodes in the DNA BankNet

III. Plant specimens collectors as an underutilized resource

IV. Interim Field Preservation of Specimens

V. Future Directions

- A. in vitro amplification
- B. Immobilized DNA

References

Adams, R. P. and J. E. Adams. 1992. Conservation of plant genes: DNA banking and in vitro Biotechnology. Academic Press, NY.

Doyle, J. J. and J. L. Doyle. 1987. A rapid DNA isolation procedure for small quantities from fresh leaf tissue. *Phytochem. Bull.* 19:11-15.

Pyle, M. M. and R. P. Adams. 1989. In situ preservation of DNA in plants specimens. *Taxon* 38:576P581.