

# DNA Bank-Net To Use DNA Technology to Save Endangered Germplasm

by Robert P. Adams

DNA Bank-Net, an association of institutions dedicated to preserving DNA and using *in vitro* cryopreservation of plant cells, been has established to capitalize on recent technological advances in DNA extraction and immobilization to help prevent the loss of significant plant genetic resources throughout the world.

DNA Bank-Net's first organizational meeting — held April 16-18, 1991 in the United Kingdom at the Royal Botanic Gardens, Kew, London — was attended by 18 invited representatives. Since that meeting, over 40 institutions from 25 nations have expressed interest in DNA Bank-Net.

At the London meeting, a task force defined the functions and recommended the minimum staffing and equipment required for DNA Bank-Net's two basic types of institutional nodes: "working," or DNA dispensing nodes; and "reserve," or base nodes (see box). It is likely that some working nodes would actively acquire and/or dispense DNA from one geographic area (Africa, for example) while maintaining separate cryovats that function as a reserve node for another area (South America, for example).

A recent experience in China suggests that a third kind of node will be defined. Its function would be to acquire plant material and store desiccated (dried) materials in liquid nitrogen. This type of node, which may be called a "regional working node," may not have on site expertise in molecular biology. But it would be able to fill a gap between the centralized molecular laboratories and the strictly reserve nodes. In fact, the regional working nodes may be the primary groups that intensively collect floristic elements in a geographic region. For example, Northwest Normal University in Lanzhou already has responsibility for training teachers in northwestern China. It is likely that they will be given the responsibility for collecting endangered plant materials from the region.

## Node Requirements

The London meeting produced a number of general recommendations for establish-

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### Recommendations For Working & Reserve Nodes

#### Working Node Functions:

- Collect plant materials. (This may be the primary function of a node or be undertaken in association with another organization, such as a university or botanic garden.)

- Extract DNA.
- Prepare DNA-rich materials and/or extracted DNA in liquid nitrogen for long-term preservation.

- Perform DNA analysis/gene replication.
- Distribute DNA (genes, gene segments, oligonucleotides, etc.).

**Staff:** Taxonomists/collectors, biochemists/molecular biologists, technicians, and administrators.

**Equipment:** Storage facilities (liquid nitrogen, cryovats); extraction facilities (centrifuges, gel electrophoresis, UV spectrophotometer, etc.); DNA analysis and PCR duplication equipment (PCR thermal cycler, micro-centrifuges, etc.); distribution systems (packaging and mailing supplies); and computers (database for inventory and correspondence).

#### Reserve Node Functions:

- Long term DNA preservation in liquid nitrogen and monitoring potential DNA degradation.

- Act as a reserve buffer for working nodes.
- Replenish DNA if a working node experiences catastrophic loss.

- DNA collections stored at the reserve nodes should be split initially into at least two or three samples: one should be stored at a working node; the others at back-up reserve nodes. The reserve nodes should be in different countries and, if possible, on different continents.

**Staff:** Technicians and administrators.

**Equipment:** Storage facilities (liquid nitrogen, cryovats); computer (database for inventory and correspondance).

ing and operating DNA Bank-Net nodes:

- DNA should be extracted from cryopreserved DNA-rich materials only when the DNA is needed. Delaying extraction has the advantage of letting technology catch up, so advanced techniques can be used as they become available.

- Generally, working nodes should be an existing organization with adequate biochemical expertise and have an associated herbarium. An on-site herbarium is not required, but a very close, local association with a recognized herbarium is required.

- Working and reserve nodes need a strong institutional commitment so that the collection can be maintained in perpetuity, not just for the lifetime of one committed person.

- In determining the feasibility of establishing a node, consideration should be given to the availability of dependable electricity and liquid nitrogen.

Participants also expressed considerable interest in the concept of storing composite DNA samples — for example, a DNA composite of DNA from all legumes in a region — to be used for screening or retrieval of unusual genes.

## The Role of Plant Collectors

The cheapest and most practical way to preserve the largest percentage of plant genes would be to utilize the plant collectors of the world's major herbaria. These professional botanists are regularly in the field collecting and are already familiar with both the vegetation of a region and the techniques of pressing and identifying plants for shipment. With just a few additional steps, these botanists could also field preserve materials for DNA use and create collections of DNA-rich materials — often leaves — with little effort.

Due to the great bulk of material that plant collectors have to process and ship, they require a quick, simple, and trouble-free protocol for the collection of samples for DNA storage. Collectors working in tropical areas, for example, cannot be expected to preserve hundreds or thousands of collections for months under tropical conditions, arrange transport through customs, and keep individual specimens frozen. Fortunately, at least as far as DNA preservation is concerned, interim preservation in silica gel or drierite is an effective way to preserve plant materials in the field and in transit for several months at ambient temperatures.

## Next Meeting Set for April 1993

The second meeting of DNA Bank Net is scheduled for April 5-7, 1993 at the Missouri Botanical Garden in St. Louis. The meeting will focus on a wide range of subjects, including: intellectual property rights and plant materials; gene amplification and utilization; and special workshops on operational problems.

For more information on the meeting, DNA Bank-Net, and proceedings from the first meeting, contact: Dr. Robert P. Adams, DNA Bank-Net, 2747 E. Willow Bend Drive, Sandy, UT 84093, USA; Tel. 801-944-9304; FAX 801-944-9311. ☘