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Resources of Plant Germplasm

Conserving the world's biological diversity has emerged as a matter of international concern. Annually, many species are disappearing. Of particular importance are plant species related to those employed in agriculture. Some of the plants that produce little or no food possess genetic traits that enable them to withstand stress, pests, or diseases of many kinds. In the United States, most of the plants grown in agriculture have been bred to resist many known hazards. However, it is inevitable that destructive capabilities of pests and disease organisms will evolve. When such contingencies arise, plant breeders seek to incorporate germplasm having the necessary resistant characteristics. Preserving biodiversity of relevant plant species is in effect an inexpensive insurance policy to safeguard future low-cost supplies of food.

In this matter, the National Plant Germplasm System (NPGS) of the United States has an important role. It has responsibility for about 400,000 accessions of 8,700 species. Additional accessions are held by commercial breeders, universities, other organizations, and individuals. Most species are not originally native to the United States. The major crop plants were brought here by immigrants or plant collectors. Among those who brought seeds to the United States were Benjamin Franklin and Thomas Jefferson. Later, U.S. botanists roamed the world collecting many thousands of specimens. In recent decades much of the new germplasm has been acquired through exchanges with organizations or individuals elsewhere. Other countries, including Russia, China, and India, have substantial collections. However, the United States is reputed to have the most extensive one.

In the United States only a small fraction of the varieties of plants is grown intensively. Most of the germplasm is safeguarded in the special facilities of the NPGS. Under special conditions seeds can remain viable for many years. However, circumstances in many small tropical countries are such that heavy losses would occur rather quickly. Seeds must be dried to a moisture content of about 6% and then maintained in cold storage. A new facility located at Fort Collins, Colorado, will provide vaults cooled to liquid nitrogen temperatures. About 230,000 accessions are stored there. Special problems of germplasm preservation arise when seeds behave poorly after desiccation or when plants do not produce useful seeds. In any event, it is necessary from time to time to propagate the germplasm accessions. This activity is conducted at a substantial number of places, including Ames, Iowa; Geneva, New York; Griffin, Georgia; and Pullman, Washington. These four regional centers are responsible for management, regeneration, characterization, evaluation, and distribution of more than a third of the accessions of the national system.

Until the recent past, the primary motivation for collecting and maintaining germplasm was to ensure the self-sufficiency of U.S. agriculture. In effect, the effort has been broadened. Today, the United States is the world's largest distributor of plant germplasm. Each year, the NPGS supplies, free of charge, 230,000 samples from its collections to more than 100 nations. When seeds are involved, a sufficient number are provided to plant a row 15 meters long. The NPGS is rendering an important service both domestically and internationally. However, a recent report* of the Board of Agriculture of the National Research Council, which described NPGS in detail, also indicated that both the nation and the world could be even better served. The NPGS is a loose network of facilities that is administratively under the Agricultural Research Service of the Department of Agriculture. It is in effect an orphan. The NRC report recommended a substantial improvement in the status of NPGS and increases in its multifaceted efforts to manage some of the world's most precious genetic resources.

There is a basis for expectation that the situation may be improved. Under terms of congressional legislation (S2830-386), the structure and objectives of a National Genetic Resources Program have been outlined. The provisions of the act are broad and constructive in mandating research on genetic materials. The provisions also include, "Make available upon request without charge and without regard to the country from which the request originates the genetic material which the program originates." The next step in the process will be a report by the secretary of agriculture, due 1 November 1991, to Congress, followed by implementing appropriations.—PHILIP H. ABELSON

*Board on Agriculture, National Research Council, *Managing Global Genetic Resources. The National Germplasm System* (National Academy Press, Washington, DC, 1991).