

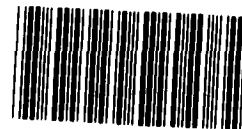
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STATEMENT OF
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BEFORE THE
SUBCOMMITTEE ON DEPARTMENT OPERATIONS,
RESEARCH, AND FOREIGN AGRICULTURE
HOUSE COMMITTEE ON AGRICULTURE
ON
DEPARTMENT OF AGRICULTURE'S
GERMPLASM PROGRAM



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MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

We are here today to discuss the Department of Agriculture's management of plant genetic resources--or germplasm. My testimony is based on our report, "The Department of Agriculture Can Minimize the Risk of Potential Crop Failures," issued on April 10, 1981, (CED-81-75) and upon our ongoing work to be completed later this summer.

Our April report assessed the overall management of the germplasm system. In our ongoing work, we are addressing specific operational problems associated with the Department's germplasm program.

Plant Genetics and Crop Production

Improved plant production has been achieved by breeding plants for uniformity, high yield, and selection of particular characteristics desired by the farmer, the food processing industry, and the consumer. A large amount of the original diversity found in these crop plants, however, has been eliminated. This occurs when particular genes for undesirable characteristics are dropped

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through breeding. Other genes closely associated physically with those eliminated may also be dropped in the process. Plant breeding can and often does result in a loss of many genetic characteristics of plants.

This loss increases the vulnerability of individual species. A plant species, such as corn, consists of plants that share many similar characteristics which are generally capable of interbreeding. A variety is a strain of that species having a defined genetic makeup. Plants are susceptible to stress factors such as disease, weather, or insects. This susceptibility is largely determined by genetic makeup. Therefore, if an individual plant is susceptible to infestation, then all plants of the same variety are generally susceptible. Planting many crop varieties (genetic diversity) minimizes the chances of a particular infestation affecting a large portion of the crop. Conversely, planting a smaller number of varieties increases the risk of major loss.

The effects of vulnerability can be disastrous. The Irish potato blight in 1845 reduced Ireland's population by almost one-third. The U.S. has been luckier. Wheat stem rust took 65 percent of the pasta in 1953 and 75 percent in 1954, and 25 percent of the bread wheat in 1954. The 1970 southern corn blight destroyed approximately 20 percent of the U.S. corn crop. The effect of the U.S. disasters was higher food costs. Such a corn crop failure would have been disastrous in countries like Guatemala or Kenya where corn is half the daily calorie intake.

The Department of Agriculture is responsible for preserving domestic and wild food plants, or germplasm, which make up the

genetic base of our plant resources. These resources provide two benefits: (1) a source of variety (genetic variability) and (2) a source of plant germplasm for evolutionary development and breeding of plant material.

Most of the Nation's primary food crops are grown from only a few plant varieties. Farmers are interested in high yields and, therefore, plant primarily a few high yield varieties. For example, according to a National Academy of Sciences' (NAS') study in 1972, there were 6 major varieties of corn and 2 major varieties of potatoes. This information was current in 1969. The Department was unable to provide us with updated data.

The National Plant Germplasm System

The Department of Agriculture recognizes both the risks associated with genetic vulnerability and the opportunities afforded by diversity. Because the Nation's major crops have been developed from plants not native to the United States, the Department, in association with State experiment stations, land-grant colleges, and private curators (germplasm storekeepers), has long maintained a series of germplasm storage units which generally collect, store, and distribute plant germplasm. This system--the National Plant Germplasm System--is supposed to meet national needs for plant genetic resources.

In our April 1981 report we concluded that, as currently organized and managed, this system does not determine the risks of genetic vulnerability or adequately perform the housekeeping chores of collection, maintenance, and evaluation of germplasm stock. The

system's inadequacy is primarily attributable to the decentralized management of germplasm resources, which effectively prohibits the development and implementation of an integrated germplasm development, maintenance, and research program.

The system's various programs have a relatively high degree of separation from one another. The regional and interregional plant introduction stations are cooperatively managed by Agriculture and the States. The Federal portion of the stations is managed by different regional directors within Agricultural Research. Other Federal facilities and programs, such as the Federal plant introduction stations and the Plant Genetics and Germplasm Institute, are managed by the appropriate regional director.

These facilities and programs, although designated as part of a national system, are independently administered. A national coordinator within Agricultural Research keeps track of program activities. Overseeing the entire system is the National Plant Germplasm Committee, which also helps coordinate program objectives and advises the system. However, neither of these parties has any administrative control over program budgets, personnel, or activities. Those who do have such authority, such as the regional and area directors, are not members of the oversight committee.

The net result is a set of components that is not really a system at all. Rather, it is an aggregate of regional and local efforts loosely bound together by common interests but effectively separated by organizational boundaries.

More importantly, the system lacks a sense of direction and purpose. There is no planning function, except at individual program units. Several basic questions about germplasm protection and preservation have not been addressed: What are our germplasm resources? How vulnerable are they? How much germplasm is needed? What priorities must be set to meet these concerns with limited available assets?

In our April 1981 report we recommended that the Secretary of Agriculture place planning, budget, and other management functions for the Department's germplasm activities under a central authority which could be placed within the Department's Science and Education Administration. Further, the Secretary should direct the Science and Education Administration to develop a comprehensive plan to assess the genetic vulnerability of U.S. crops; determine gaps in existing germplasm collections; assure that desirable genetic characteristics of individual species are made available; and develop an information system for disseminating information on collections and evaluations. Such planning is essential even if management of the system is not centralized.

The Department agreed with our recommendation that a comprehensive plan for genetic resources should be developed and established a working group to develop specifications for such a plan.

The Department stated that a lack of resources has prevented it from developing a comprehensive genetic resources program. The Department did not state how much such a program would cost. A Department germplasm task force is currently developing a

proposal for a long-range plan on genetic resources which should address this question.

The Department also made management changes to provide a better focal point for program management. The system, however, remains decentralized although the Department's Science and Education Administration-Agricultural Research could impose central authority over the system through direct intervention. This has not been done on a systematic basis.

Management of Plant
Genetic Resources

The Department of Agriculture has collected, catalogued, and distributed plant germplasm since the 1800's. Since the late 1940's the Department has maintained regional plant introduction stations and since 1958 has operated the National Seed Storage Laboratory for long-term seed preservation. The Department works with the States and private germplasm curators to coordinate and manage germplasm resources.

This effort has relatively straightforward objectives: (1) introduction of plant materials into collections, (2) germplasm maintenance, (3) evaluation, and (4) distribution of plant germplasm to users.

Our ongoing review indicates that there are a number of major operational problems.

--The Department does not have good information on who the germplasm curators are and what germplasm exists in storage or native environs.

- There is too little front-end planning to assure the proper collection and storage of genetic material for crops important to U.S. agriculture.
- Although the National Seed Storage Laboratory was established to provide permanent backup storage for the germplasm systems to prevent the loss of germplasm stored at only one location as the result of some incident like a fire or tornado, the curators we contacted had sent only about 51 percent of the germplasm they held to the Laboratory. Also, about 33 percent of the Laboratory's germplasm was not stored with these curators.
- Although the germplasm stored at the Laboratory seems to comply with generally accepted storage conditions, most of the storage conditions at the other curators are not adequate. Of the 308,000 varieties of germplasm we identified as being stored in the U.S., 183,500 (60 percent) are stored in inadequate containers or in an undesirable climate. This could result in the loss of germplasm viability and is of particular concern for germplasm not in backup storage at the Laboratory.
- When we took a random sample of 450 varieties of the six small grains (wheat, oats, barley, etc.) stored at Beltsville, Maryland, we found that 9 percent were missing and 12 percent were in short supply.
- The germination rates (viability) of the varieties sampled was good, but 22 percent of the seeds were more than 10

years old and nearing a point in time when viability will decline rapidly.

--The small grain curator and some of the other curators do not have testing equipment to identify when a sudden loss of viability occurs so that germplasm can be replenished.

--Some curators are behind in replenishing germplasm that is in danger of losing its viability.

--The Department is considering a proposal to expand the National Seed Storage Laboratory but does not have all the information necessary to determine how large the facility should be.

We are in the process of completing our work and developing recommendations to address these problems.

Mr. Chairman, this concludes my statement. My colleagues and I would be happy to answer any questions you might have.