

A News Journal for the Plant Genetic Resources Community

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DIVERSITY



DIVERSITY

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Contents

From the Editors- p.2

- **DIVERSITY:** Your link to the National Plant Germplasm System

Capitol Views- p.5

- 1983 Germplasm Budget • Interview with ARS Administrator • Long Range Plan • GAO Reports on Germplasm • OTA Charges Ag Research Lag • 1982 Funding for Germplasm Explorations • New Plant Exploration Officer

NPGS Network News-p. 13

- Pioneer Aids CIMMYT • East Asia Exploration • Germplasm Advisor Appointed • Reports from the Regions • From GRIP to GRIN • NPGC/IBPGR Workshops • NPGRB and NPGC Meeting Highlights • Crop Advisory Committees

International Perspective- p. 21

- State Department Conference on Biological Diversity • Plants Panel Makes Recommendations

Viewpoints-p. 23

- Controversy Over Plant Variety Protection Act

News In Brief-p. 24

Publications-p. 24

Meetings-p. 25

Why DIVERSITY?

To the Editors:

The name you have chosen for your new publication is an apt one indeed. The National Plant Germplasm System (NPGS) is characterized by diversity. Its components-federal, state, and private-represent every state in the union, as well as commonwealths and trust territories. The NPGS deals with all countries of the world, directly or indirectly, in the exchange of germplasm.

The interests of user groups of the NPGS encompass as much diversity as the plant sciences in their broadest sense. And the objective of the NPGS is to acquire, preserve, evaluate and make readily accessible for use as broad as possible a range of genetic diversity of economic plants.

The development of an understanding of what the NPGS is, what it does, and how it does it requires good information and its effective communication. We have great expectations that **DIVERSITY** will play a major role in this communication function.

Private industry has demonstrated in a special way its commitment to helping forge **DIVERSITY**. It is now up to all of us to see that **DIVERSITY** meets these expectations by using it as an open forum for information exchange.

Best of luck in an exciting endeavor whose success can only benefit all who are involved with the NPGS.

Quentin Jones
Assistant to the Deputy
Administrator for Germplasm
United States Department of
Agriculture/Agricultural Research
Service

To the Editors:

I want to take this opportunity to add my support and best wishes for success to the new national agricultural science publication called **DIVERSITY**.

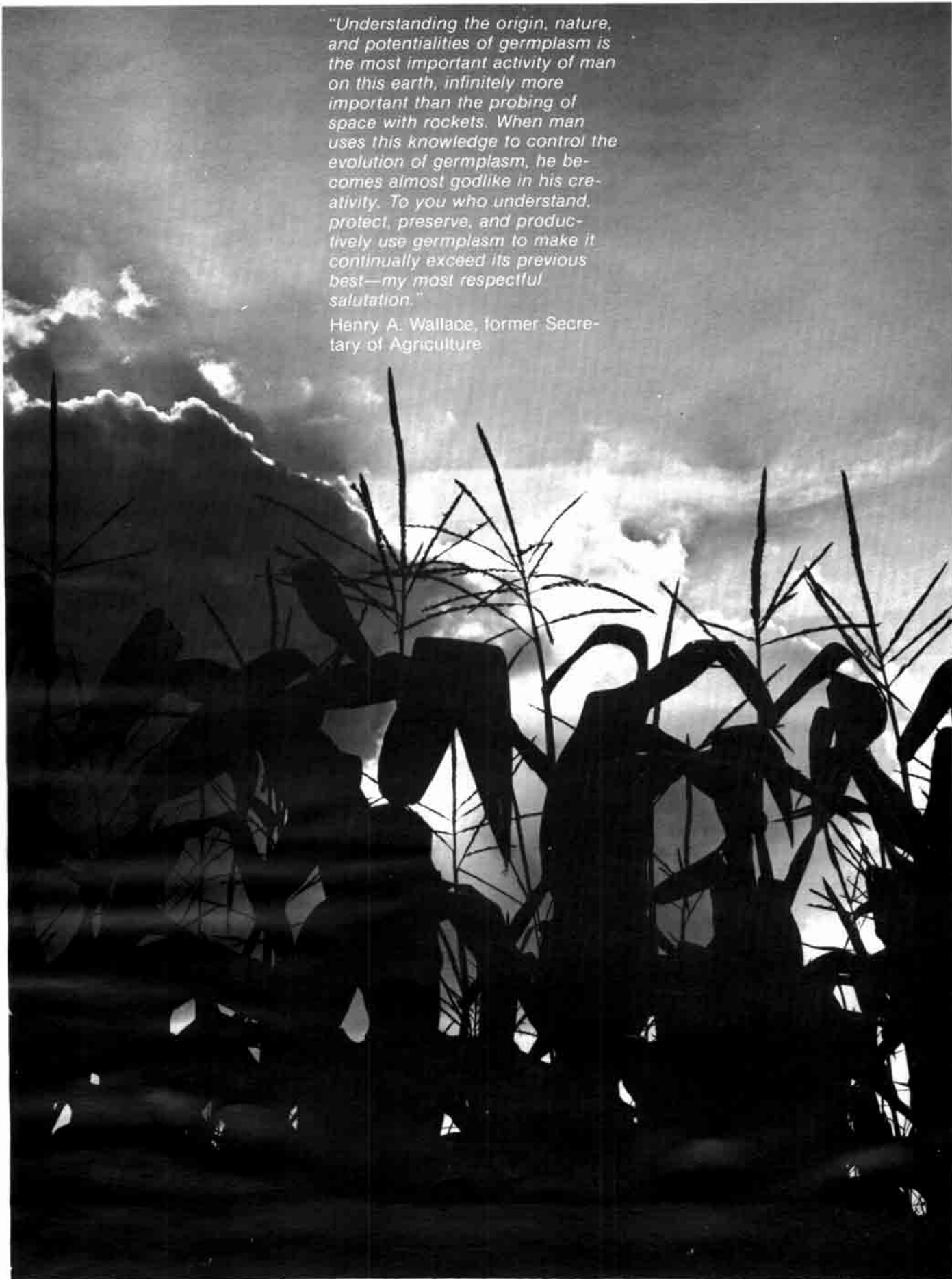
DIVERSITY will dedicate itself to reporting on issues and advancements by private industry, academia, state agricultural research institutions, the U.S. Department of Agriculture and foreign governments to improve this nation's plant germplasm base.

Of particular importance to me, **DIVERSITY** will address a national priority program, that of locating, assembling, and preserving in a vast national germplasm reservoir system all known, available and existing plants and seeds. This system will make available to tomorrow's agricultural scientists a vast collection of genetic material from which to create or develop new, diversified and unique crops which will give future farmers the plants and seeds to grow a stable, plentiful and reasonably inexpensive supply of food, feed, and fiber for future generations.

William C. Wampler
Ranking Member,
House Committee
on Agriculture

"Understanding the origin, nature, and potentialities of germplasm is the most important activity of man on this earth, infinitely more important than the probing of space with rockets. When man uses this knowledge to control the evolution of germplasm, he becomes almost godlike in his creativity. To you who understand, protect, preserve, and productively use germplasm to make it continually exceed its previous best—my most respectful salutation."

Henry A. Wallace, former Secretary of Agriculture



DIVERSITY: Your Link to the National Plant Germplasm System

"People [who] several years ago did not know what germplasm was-or did not care-are now across the land in universities, professional societies, back-to-nature movements, and in Congress, speaking out in concerned tones that this renewable but irreplaceable resource be given the national priority that it merits," according to USDA's 1981 Annual Report on Crop Production Research.

A brief chronology of the events that led to this new attitude toward preserving the nation's plant genetic resources can serve as both an explanation and preview of the challenges currently facing the National Plant Germplasm System (NPGS).

To understand the magnitude of the potential crisis that losing our plant genetic resources base could pose for the United States, American food producers and consumers must first acknowledge the almost total U.S. dependence on foreign sources for the plant genetic resources necessary to develop this country's agricultural base.

U.S. Dependence on Foreign Germplasm

The startling fact is that all of the primary U.S. food crops have been developed from genetic resources (germplasm) native to other countries. Many Americans would be shocked to learn that if they were asked to live on food produced from native crops, their diets would consist of sunflower seeds, cranberries, blueberries, strawberries, pecans and not much else. Even the traditionally accepted American staple-corn (maize)-was brought to the U.S. by Indians from Mexico and Central America. According to USDA, of the 15 crops "that literally stand between mankind and starvation, not one is native to the U.S."

Our largely imported germplasm collections, critical to crop development in any part of the world, are the primary source for future crop improvements (such as breeding to produce higher

yields) and serve as our most critical defense weapon against natural or manmade threats to crop survival. A broad germplasm base is also needed to provide the resource pool of traits that will determine the extent to which genetic engineering can revolutionize crop production.

The Threats: Vulnerability and Uniformity

Because plant reaction to environmental conditions and stress is determined by the plant's genetic makeup, a plant variety susceptible to a particular form of stress becomes "vulnerable." Furthermore, because plants are complex organisms and susceptible to a wide variety of stress agents, our food supply may become vulnerable if a single variety or a small number of varieties dominate crop production.

Uniformity-or lack of genetic diversity-is the key to this vulnerability. And, unfortunately, the economic demands of U.S. producers and consumers to produce superior crop lines, increase yields, and use mechanized planting and harvesting equipment, has led to a dependence on uniformity that has seriously narrowed the genetic base of our crops in the field. The U.S. system of agriculture has also become popular in other countries as they modernize their agriculture. As a result, traditional genetic material is being replaced with modern varieties in an effort to produce more food. The wide diversity and unique traits which enabled these varieties to survive, and which may be needed if climates and/or production centers change, may be lost forever as these old landraces give way to the newer, more uniform varieties.

The irreplaceable nature of genetic diversity and the rapid shift from traditional agriculture to the use of new varieties occurring worldwide are the reasons for the escalating concern within the agricultural community about the loss of native strains. Just as serious is the increased probability of epidemics when large numbers of plants are genetically uniform. Native varieties can become extinct once they are replaced in favor of seed intro-

duced through plant breeding, and the genetic heritage of a thousand years can be lost in a single year.

This lack of genetic diversity has been responsible for tragic epidemics and agricultural catastrophes-most notably the Irish potato famine of the 1840s-throughout history. Responsible agricultural leaders in this country and abroad have long recognized the disastrous impacts of lost plant genetic resources and reduced genetic variability among plant varieties. However, it took a near national disaster-the 1970 southern corn leaf blight epidemic that produced losses reaching 50 percent in some states-to shock the U.S. into the long overdue conclusion that conservation and proper use of plant germplasm by the nation is essential to its well being. In fact, officials coined the term "genetic vulnerability" to explain the 1970 corn blight to the American public.

U.S. Fights Back with NPGS

Characteristically, the country garnered its resources in a time of crisis and responded by coordinating the appropriate components of the agricultural community into what is now known as the National Plant Germplasm System (NPGS). The threat to the existence of a major crop-posed by the 1970 corn blight-so alarmed officials that the National Academy of Sciences (NAS) Agricultural Board of the National Resources Council (NRC) appointed a Committee on Genetic Vulnerability of Major Crops to consider what caused the 1970 epidemic and what could be done to prevent or offset future losses.

The resulting report, *Genetic Vulnerability of Major Crops*, issued in 1972, concluded that crop vulnerability stems from genetic uniformity and that, consequently, some American crops are "highly vulnerable." The NAS study asserted that this "disturbing uniformity" poses a "severe dilemma for the sciences that society holds responsible for its agriculture." The landmark NAS report questioned whether the existing national germplasm preservation system was sufficient, noting that "every introduction of

variability to combat vulnerability depends on germplasm resources.”

NPGRB and NPGC Established

In recognition of the significance of the 1972 NAS report, USDA and the National Association of State Universities and Land Grant Colleges established a Committee on Genetic Vulnerability and issued a 1973 report recommending that the Secretary of Agriculture appoint a National Plant Genetic Resources Board (NPGRB). The USDA report envisioned a Board, with members representing both public and private interests, that would advise the Secretary of the national and international needs to properly manage our germplasm resources. Such a Board was established in 1975, one year after the USDA Administrator of Agricultural Research Service (ARS) ordered the creation of a national coordinating system to centralize and clarify responsibilities within the germplasm program: The National Plant Germplasm System. The coordinating arm of the NPGS—the National Plant Germplasm Committee (NPGC)—was also established in 1974.

Both of these groups now play the major leadership role in the NPGS, and their activities and decisions affect most national and many international activities involving germplasm preservation. The NPGRB published a report for the Secretary of Agriculture in 1979, *Plant Genetic Resources: Conservation and Use*, describing an eight-phase priority program for NPGS research and development activities. These priorities continue to serve as the general foundation for all current initiatives within the NPGS:

- **Acquisition**
- **Maintenance**
- **Evaluation**
- **Development of Improved Germplasm**
- **Research on Conservation of Genetic Diversity**
- **Monitoring Genetic Vulnerability**
- **Information Management**
- **Training**

DIVERSITY to Chart NPGS Course

DIVERSITY plans to cover these and any other issues that pertain to NPGS activities. An overview of how the NPGS, and its various state, federal, international, and private sector components, actually works is included as a *Special Report* to readers of our first issue. The next issue of **DIVERSITY** will include a directory of “Who’s Who in the NPGS.”

The remarkable progress made by the NPGS in the last decade is evidenced by the articles contained in this first issue of **DIVERSITY**: The proposed **USDA budget for germplasm activities** has been increased by over one-third at a time when almost every other federal program has suffered severe cutbacks (see story, p. 5). **Congressional concern and interest in the NPGS has intensified** dramatically. Public hearings held last year by the House of Representatives and **two recently released General Accounting Office (GAO) reports** focusing on the achievements, controversies, and future needs of the NPGS are examples of this continued attention (see story, p. 8). Congress is also awaiting the completion of a **USDA study on the impacts of the Plant Variety Protection Act** on the NPGS and the U.S. seed industry before scheduling hearings on the controversial law (see story, p. 23). **International concern over the global problem of lost genetic diversity** was voiced at a recent conference on Biological Diversity sponsored by the State Department. That conference is the first of many currently planned by groups such as the American Chemical Society and National Academy of Sciences with concern over genetic vulnerability (see story, p. 21). A recently released **report on the urgent need for increased support of all U.S. agricultural research** is also certain to further impact the NPGS (see story, p.11).

DIVERSITY’s editorial team, motivated by the growing national awareness of the NPGS and its vital service to both our economy and the U.S. position in world affairs, hopes our readers will share our enthusiasm. We encourage you to volunteer your views

and information about the valuable contributions you are making to the NPGS. We look forward to your participation.

Read The Next Issue of DIVERSITY For Reports On:

- The **International Board for Plant Genetic Resources** ninth annual meeting in Rome.
- Germplasm programs funded by the **Rockefeller Foundation**, with a special report on the Foundation’s construction of a germplasm facility in the People’s Republic of China.
- The role **genetic engineering** is expected to play in maintaining the diversity of plant resources. How the loss of germplasm could impact genetic engineering.
- The **Consultative Group on International Agricultural Research** (CGIAR) and activities at other international agricultural research centers.
- Strategies for **foreign germplasm exploration and exchanges** through USDA’s Agricultural Research Service (ARS) and the Office of International Cooperation and Development (OICD).
- **NPGS Updates** from Congress, USDA, the states, regions, and Crop Advisory Committees.



Proposed 1983 USDA Budget Increases Funding for Germplasm

With a proposed increase of \$3.8 million in the Administration's 1983 USDA budget for national plant germplasm resource activities, the National Plant Germplasm System (NPGS) may fare very well in comparison with other national programs.

Quentin Jones, Assistant to the Deputy Administrator for Germplasm, told **DIVERSITY** that he was "exceedingly pleased" that the Office of Management and Budget (OMB) approved the recommended 1983 budget increases for the NPGS. Those proposed increases were submitted to OMB last summer as part of a Special Analysis on Germplasm for the USDA Science and Education Administration. The increased allocations are as follows:

▪ Acquisition of Germplasm	\$ 335,000
▪ Maintenance of Germplasm	1,195,000
▪ Evaluation of Germplasm	1,495,000
▪ Development of Improved Germplasm	675,000
▪ Monitoring of Genetic Vulnerability	100,000
TOTAL	\$3,800,000

ARS Increases Defended by USDA Officials

The \$3.8 million increase over the estimated 1982 \$9,302,000 budget made the total 1983 budget proposal for NPGS activities \$13,102,000. The proposed USDA 1983 budget included an overall net increase of \$42.9 million (ten percent) for the Agricultural Research Service (ARS), the USDA program under which the NPGS operates. The ARS increase contrasts with an overall USDA budget decrease of over \$9 billion from the 1982 spending level.

Acknowledging that the severe "austerity" of the new budget "will cause reductions in nearly every area," USDA Budget Director Stephen Dewhurst defended the ARS increases as actu-

ally "catch-up" from the previous spending restraints on agricultural research.

Research is USDA Top Priority, Block Tells Congress

Dewhurst accompanied Agriculture Secretary John Block to a House Agriculture Committee hearing shortly after the budget was sent to Congress to help the beleaguered Secretary explain a USDA budget proposal for 1983 that had most committee members-and the depressed agriculture communities they represent-angered. The one program from which Block could derive any sense of congressional approval was the budget proposal for ARS. "We continue to hold agricultural research as our highest priority," the Secretary told the Committee.



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In testimony before the House Appropriations Subcommittee on Agriculture, ARS Administrator T. B. Kinney said ARS "is genuinely appreciative of the priority placed on research in this budget" in light of the "intensified competition for available resources" among the many USDA programs. Acting Science and Education Director Anson Bertrand also defended the ARS increase to the committee as "a way of shoring up the sagging activities of ARS." He pointed to a recently released Office of Technology Assessments (OTA) report that was highly critical of the alleged neglect USDA has shown ARS since the 1960s (see story, p. 11).

Kinney further justified the ARS increases by pointing to research programs that are "a

uniquely federal responsibility." The development and maintenance program for national plant germplasm collections is a prime example of such a program, Kinney told the congressional panel.

Some in Congress Want to Restore CSRS Budget

These arguments, however, are apparently unconvincing to some members of Congress, who charged that the combined increases for ARS and the proposed decreases for the Cooperative State Research Service (CSRS) run counter to President Reagan's policy of New Federalism. To back up their support for state research efforts, Representatives William Wampler (R-Va.) and Pat Roberts (R-Kan.) are proposing to decrease the ARS budget by \$17 million with a corresponding increase for CSRS funding.

ARS Administrator Kinney told **DIVERSITY** that he doesn't "take this threat too seriously." It is important to fund germplasm activities through ARS, Kinney explained, because ARS funds must go to specific locations such as the National Seed Storage Laboratory (NSSL). This approach assures that important germplasm activities are being supported. In comparison, CSRS funds must be divided by formula throughout the fifty states. "Let's face it," said Kinney, "there are states with no interest in germplasm. Providing them with funding serves no purpose and takes vital resources away from the NPGS."

The exception to this CSRS funding approach is with the CSRS Special Grants program. Funding for the 1983 CSRS Special Grants for germplasm activities remained at the 1982 funding level of \$902,000. Clarence Grogan, CSRS Assistant Deputy Administrator, said most of those funds are applied to germplasm activities at the clonal repositories.

Although other programs may be cut as the Administration escalates its fight against the federal deficit, sources on Capitol Hill told **DIVERSITY** that the proposed 1983 budget for germplasm is "safe." Final congressional approval for the USDA budget may come as early as May.

Kinney Predicts Continued Support for NPGS

"The National Plant Germplasm System (NPGS) will continue to get high priority attention from USDA because I plan to make sure it does," Agricultural Research Service (ARS) Administrator T. B. Kinney told **DIVERSITY** in an exclusive interview following his recent appearance before the House Appropriations Subcommittee on Agriculture.

Kinney is pleased with the proposed FY83 USDA budget increase for ARS which includes a sizable increase for the NPGS (see story, p. 5). The germplasm system "will no longer suffer from the administrative and budgetary neglect of the past," asserted the ARS Administrator. He pointed to the inadequacy of the Small Grains Collection facility and the lack-until recently-of a good data base system for the NPGS as products of this neglect.

Deputy Administrator Will Be "National Focal Point"

Kinney described the "tremendous pressure" exerted on him by USDA and the National Plant Genetic Resources Board (NPGRB) to create "a national focal point" for the National Plant Germplasm System (NPGS). Additional pressure came from the first Government Accounting Office (GAO) report released last year on the NPGS, said Kinney. The GAO recommended the appointment of a National Coordinator to further centralize the program.

"I needed someone who could be a resource to me-as well as someone I could blame!" said the ARS Administrator of his subsequent appointment last year of Quentin Jones to the new post of Assistant to the Deputy Administrator for Germplasm. Though Jones had actually been responsible for most NPGS activities prior to his appointment, "the lines of authority and communication under the new system are now much better clarified," according to Kinney. The agricultural community "is very fortunate in this appointment," he asserted, "because Quentin Jones is the best

qualified individual in the United States to fill the post."

NPGS: "Unique Spirit of Cooperation"

The ARS Administrator is very enthusiastic about the challenges facing the NPGS, and stressed the program's unique spirit of cooperation between the state, federal, university, and private sectors as the reason for the success he anticipates.

Kinney referred to this cooperative relationship when discussing ideas for the future. "What we need more than anything is to offer the much needed training for plant geneticists through cooperative arrangements between post-graduate university programs and major germplasm facilities such as the Corvallis, Ore., repository or the National Seed Storage Laboratory (NSSL) in Fort Collins," suggested Kinney.

Another example of such cooperation involves the private sector, whose role Kinney sees as expanding during this period of federal budgetary constraints. He is very supportive of the maize germplasm agreement between CIMMYT and Pioneer Hi-Bred International and would like to see other companies take similar action (see story, p. 13).

Sees NPGS as Model

Kinney's hope is that the NPGS will serve as a model for the ultimate preservation of all biological diversity. His background as an animal geneticist has enabled him to appreciate the need for a broad base of diversity, he explained. "If our genetic pool continues to narrow," warned Kinney, "it will become impossible to obtain genetic improvement through selection." In Kinney's opinion, a successful model for plant germplasm preservation provided by the NPGS could lay the foundation for initiatives that would offer protection for species of all genera.

Task Force Completes Long Range Plan for NPGS

Germplasm Task Force Chairman Charles Murphy is "very pleased" with the initial response

by Congress and members of the agriculture community to the Long Range Plan (LRP) on the National Plant Germplasm System (NPGS). The Task Force recently submitted the plan to the USDA Director of Science and Education. Murphy told **DIVERSITY** his hope that the LRP would serve as a "blueprint or guideline for future NPGS activities" is already being realized.

GAO Calls Plan Top Priority for the NPGS

In a report issued last April the General Accounting Office (GAO) had recommended that the first priority for the NPGS be the development of a "comprehensive, long range plan." The GAO called such a plan "essential, regardless of management structure."

In response to the concerns raised by the GAO, and those previously raised by the National Plant Germplasm Committee, USDA Acting Director of Science and Education Anson Bertrand approved the formation of a Germplasm Task Force and a Steering Committee to formulate a long range plan for the NPGS. The resulting document, known as the "Long Range Plan" (LRP) includes three reports generated by the Task Force: I. Current Status; II. Strengths and Weaknesses; and III. Long Range Plan (1983-1997).

The report's **Current Status** section gives a historical perspective of the NPGS and outlines how the various NPGS components work and interact. The section on **Strengths and Weaknesses** addresses the following issues:

(See opposite page)

Long Range Plan (1983-1997)

The third and most significant part of the Germplasm Task Force study, the Long Range Plan (1983-1997), is presented in two subsections.

General recommendations by the Task Force focused on the need to clearly define the roles of the individuals and institutions that make up the system and the need to improve communication within the NPGS. The LRP also

NPGS Strengths and Weaknesses

Working Components

Plant Introduction

- | Strengths | Weaknesses |
|--|--|
| <ul style="list-style-type: none"> ■ Procedure in existence ■ Recognized need ■ Strong exchange system ■ Availability of genetic diversity | <ul style="list-style-type: none"> ■ No apparent strategy ■ Slow to react ■ Lack of trained collectors ■ Too few collecting trips ■ Limited by regulations (quarantine) ■ Problems identifying requested domestic material |

Working Collections

- | Strengths | Weaknesses |
|---|--|
| <ul style="list-style-type: none"> ■ Technology exists to have excellent facilities ■ Collections within the system are secure ■ Recognition of Importance ■ Heavy use ■ Material is readily accessible; free to users | <ul style="list-style-type: none"> ■ Inadequate grow-out procedures ■ Lack of succession policy for some curators ■ Inadequate facilities ■ Insufficient descriptor information ■ Redundancy among collections ■ Seed viability not adequately monitored ■ Curator role poorly defined ■ Regional perspective of curatorial units ■ Impact of Plant Variety Protection Act ■ Omissions of domestic material in most collections ■ Limited maintenance research ■ Not all "major" collections have full-time curators |

Base Collection

- | Strengths | Weaknesses |
|---|--|
| <ul style="list-style-type: none"> ■ Effective seed storage ■ Strong research program ■ National recognition | <ul style="list-style-type: none"> ■ Lack of space ■ Coordination with working collections ■ Effects of sample size and storage containers on space needs |

Users of the NPGS

- | Strengths | Weaknesses |
|---|--|
| <ul style="list-style-type: none"> ■ User community is diverse | <ul style="list-style-type: none"> ■ Lack of communication ■ Inefficient use of germplasm collections ■ Insufficient germplasm enhancement efforts ■ Genetic vulnerability not adequately assessed ■ Insufficient feedback from users |

Information Management

- | Strengths | Weaknesses |
|--|---|
| <ul style="list-style-type: none"> ■ Information management system is being implemented ■ Data are being processed | <ul style="list-style-type: none"> ■ Data not perceived as a system resource ■ Lack of perception of potentials of information management ■ Lack of descriptor information |

Management Components

- | Strengths | Weaknesses |
|--|--|
| <ul style="list-style-type: none"> ■ Commitment of managers and operators of NPGS | <ul style="list-style-type: none"> ■ Unclear lines of authority ■ Autonomy of state programs ■ Curators lack technical guidance ■ Inadequate recognition of service activities ■ Lack of accountability |

Advisory Components

- | Strengths | Weaknesses |
|--|--|
| <ul style="list-style-type: none"> ■ Creation of Crop Advisory Committees ■ Participation increases commitment | <ul style="list-style-type: none"> ■ Incomplete representation on key NPGS committees ■ Committee roles are poorly defined |

addressed the need for decision makers in the system to recognize the "continuum of activities within the NPGS and the importance of tight control and accountability in activities such as maintenance and evaluation; whereas activities such as germplasm enhancement and conservation of genetic diversity are more creative activities which demand less control."

The first subsection presents forty specific recommendations directed at either correcting operational and/or managerial flaws or providing mechanisms to minimize the occurrence of such flaws. These recommendations are specific to problems involving the working components, the management components, the advisory components, and facilities in the NPGS.

The recommendations involving the NPGS **working components** call for a Plant Exploration Office, a National Plant Exploration Committee, and Higher Education funded fellowships and/or strengthening grants to cover special germplasm system manpower needs. In addressing the need for better organization and interaction among working collections, the report recommends that all working collections be backed by samples at the National Seed Storage Laboratory (NSSL), and that the NSSL assume all germination testing responsibilities. The report also proposes the appointment of a Data Base Manager who "will utilize all practical means to communicate the availability and potentialities of the Data Base Management System planned to be a part of the Germplasm Resources Information Network which is nearing completion."

Recommendations addressed to the **management components** of the NPGS include reaffirmation by the Agricultural Research Service (ARS) Administrator of the leadership of the Assistant to the Deputy Administrator for Germplasm; funding and coordination for germplasm evaluation through ARS either in-house or via cooperative agreements with non-federal organizations; and the development of an ARS/APHIS (Animal and Plant Health Inspection Service of USDA) Germplasm Oversight Committee.

The long range planning recommendations for **advisory components** called for support of the National Plant Genetic Resources Board (NPGRB) by allocation of at least a half-time staff position to provide secretarial services; financial support for NPGRB activities; and a facilitator to assist the operations of the Crop Advisory Committees under the Assistant to the Deputy Administrator for Germplasm.

The major **facilities needs** discussed in the LRP include a new facility for the USDA Small Grains Collection; a "Germplasm Center" at Beltsville, Md., to house the US. Plant Introduction (Quarantine) Station, the Plant Introduction Office, the Data Base Management Unit, the Economic Botany Laboratory, and the Plant Taxonomy Laboratory; and the expansion of the National Seed Storage Laboratory (NSSL).

Budget Recommendations: 1983-1997

The second subsection of the report proposes a budgetary plan for FY83 through FY97 totaling \$27 million. Priorities used to determine the level and sequence of the budget recommendations were based on:

- immediate exploration needs, especially in those habitats where man's encroachment may offer an immediate threat to native germplasm;
- the strengthening of the maintenance and evaluation portions of the NPGS continuum, plus the information management and training components which support the system;
- support for genetic vulnerability monitoring activities;
- long range planning for germplasm enhancement, acquisition, and research on conservation of genetic diversity;
- recognizing that components of the state/federal (and sometimes private) partnership can best perform these key objectives;
- minimal NPGS facility needs which must be met to support the expanded system.

LRP: Foundation for Budget Decisions

Murphy, on loan to USDA from North Carolina State University while writing the LRP, said he was gratified by the congressional response he received to the Long Range Plan recommendations during a recent visit to the House and Senate Agriculture Appropriations Subcommittees.

The increases proposed for the FY83 NPGS budget are further evidence of the LRP's impact, according to Murphy (see story, p. 5). The existence of such a tangible, "unsanitized" planning document, that Congress and USDA can continue to use as a foundation for budget discussions, will also continue to benefit the NPGS in fulfilling its long-term needs, he asserted.

LRP Not Appropriate Forum for Some Issues

Murphy also explained why two areas of controversy—the issue of genetic vulnerability and the question of centralized line authority for the NPGS within USDA—were not comprehensively addressed in the LRP.

In spite of GAO and Office of Management and Budget (OMB) opinions to the contrary, Murphy said many in the NPGS felt the vulnerability issue would be better handled separately on a crop-by-crop basis through the National Research Program or the Crop Advisory Committees. The Office of Management and Budget, in particular, also wanted the LRP to address Agricultural Research Service (ARS) management problems, but the majority of the Germplasm Task Force members felt the specialized NPGS study "was not the appropriate vehicle through which to fight those battles," said Murphy.

The National Plant Germplasm Committee reviewed the LRP recommendations at the Committee's January meeting. The Committee members, many of whom contributed to the Germplasm Task Force deliberations, submitted suggestions on implementing the LRP recommendations to ARS Administrator T. B. Kinney.

ARS Administrator Responds to Congressional Criticism of the NPGS

"For the most part, germplasm in the National Plant Germplasm System (NPGS) is being stored adequately," asserted USDA Agricultural Research Service Administrator T. B. Kinney, in comments recently submitted to the Senate Committee on Governmental Affairs and the House Committee on Government Operations. Kinney's remarks were in response to a report released December 4, 1981 by the General Accounting Office (GAO) which charged that "*insufficient management attention by USDA to germplasm collection, storage, and maintenance has endangered germplasm preservation within the United States.*"

The report was the second study of the NPGS initiated by the GAO, the investigative arm of Congress, in less than a year. The first report (CED-81-75), issued last April, was highly critical of the low priority given to the NPGS by USDA and faulted the decentralized management of the germplasm program for not adequately addressing the risks posed to this country by the genetic vulnerability of U.S. crops.

Controversy over the initial GAO findings on the NPGS resulted in a House Agriculture Subcommittee hearing last summer during which Department Operations, Research, and Foreign Agriculture Subcommittee Chairman, George Brown, Jr. (D-Calif.) heard testimony from USDA Science and Education Acting Director Anson Bertrand on steps initiated by the Department to improve NPGS performance (see story, p. 11).

GAO Recommends NPGS Action

The December 4 GAO report (CED-82-7) acknowledged the significant progress made by USDA since the initial investigation, but insisted that "*serious deficiencies*" in "*NPGS collection and maintenance procedures still must be overcome in order to have a viable U.S. germplasm resource.*"

Continued on pg. 10



To ensure the viability of U.S. germplasm collections, the GAO recommended that Agriculture Secretary John R. Block take the following actions:

- **Initiate action to assure that germplasm in the United States is stored adequately.** Such action should include contacting both federal and non-federal germplasm curators to determine whether their germplasm holdings are being stored under adequate temperature and humidity controls and whether they are using moisture-resistant containers. GAO contends that federal curators should be required to meet minimum acceptable conditions and non-federal curators should be "encouraged" to take similar action.
- **Initiate projects to implement backup storage.** Such projects should include identifying all curators and their germplasm holdings and comparing that data with the germplasm holdings stored at the National Seed Storage Laboratory (NSSL) in Fort Collins, Colorado. Again, GAO recommends that USDA require federal curators to provide germplasm for backup storage to NSSL and "encourage" non-federal curators to do so.
- **Verify the need for germination testing equipment at all curator storage facilities.** If such equipment is not available at non-federal locations, USDA should encourage the curator to move enough seed to an appropriate storage facility to ensure continued preservation, according to GAO.
- **Take an accurate inventory of the Small Grains Collection** to include a physical comparison of germplasm in storage and on inventory records, and acquire missing germplasm.

▪ **Determine the extent curators are behind in their germplasm grow-out programs** and develop a ranking of needs to assure preservation of germplasm most in danger of losing its viability.

Site Review Teams To Evaluate Working Collection and Assess Grow-Out Schedules

Though Kinney defended the adequacy of most germplasm storage in the U.S., he acknowledged that there was "room for improvement in germplasm storage environments," in his written response to GAO criticism. To address this need, Kinney said USDA, under the supervision of Assistant to the Deputy Administrator for Germplasm Quentin Jones, is currently establishing site review teams to evaluate storage conditions at each working collection. These site reviews will serve as a followup to a questionnaire sent out by the GAO review team.

Kinney explained, however, that because accessions in most working (active) collections are regrown frequently to maintain adequate seed for distribution to users, working collection storage conditions are not as critical as they are for the base (long-term) collection housed in the NSSL.

These same assessment teams will also determine the status of each curator's grow-out schedule. Backlogged material will be prioritized so that the best use can be made of limited resources, according to the ARS Administrator.

GRIN Will Flag Backup Storage Problems

GAO's concern over backup storage will be addressed, said Kinney, when the Germplasm Resources Information Network (GRIN) is implemented this year (see story, p. 17). The computer-assisted NPGS information system, known as GRIP prior to implementation, will provide updated inventories to identify germplasm collections having backup storage in the NSSL and flag for attention those which need to be sent to NSSL, he explained.

Small Grains Inventory Progresses

An inventory of wheat, representing the largest number of accessions in the Small Grains Collection, has been essentially completed by an inventory project USDA initiated over a year ago, Kinney told the congressional committees. Work on barley accessions is currently in progress and will be followed by an inventory of oats. Accessions no longer represented by a seed sample are being flagged by the GRIN inventory for possible replacement, he added.

NSSL Responsible For Germination Testing

USDA has concluded that seed germination testing for the NPGS can be most cost-effectively accomplished by centralizing the responsibility at the NSSL, said Kinney in response to GAO's recommendation that all curator storage facilities be supplied with the appropriate testing equipment. Some of the funding for the additional work will be made available through a FY82 budget increase, said Kinney, noting that the NSSL has the requisite technology and staff experience to either provide this service in-house and/or through contractual arrangements.

Future Congressional Action on the NPGS

House and Senate Agriculture Committee staffers told **DIVERSITY** that Congress will probably continue its oversight of NPGS activities during the current session. Hearings scheduled this spring on the general status and adequacy of the U.S. Agricultural Research Service (ARS) (see following story) and appropriation hearings on the Administration's FY83 budget proposals for USDA are expected to draw debate on the NPGS. Congress is also waiting for completion of a USDA report assessing the impact of the Plant Variety Protection Act (PVPA) on the U.S. seed industry before initiating hearings on the PVPA and the NPGS. According to sources, that report should be completed by early summer (see story, p. 23).

Congressional Study Charges USDA Responsible for Agricultural Research Lag

Insufficient funding indicates a "lack of appreciation at the USDA policy level of the importance of agricultural research," according to a recently released congressional report lambasting the Department for failing to adequately maintain the U.S. agricultural research system. Most alarming to many in the agricultural research community was the finding that despite increasing demands on agricultural research, USDA spends proportionately less of its budget on research than any other federal agency.

USDA Lacks National Research Goals and Policy

The study, released by the Office of Technology Assessment (OTA), a congressional research and policy arm, charged that U.S. standing as a world leader in agricultural research is being threatened by "a lack of well-defined achievable national goals for U.S. agriculture." Such goals are necessary, says OTA, to formulate a national policy to guide the research community in planning its agenda.

ARS and CSRS Need Improved Research Management

OTA attributes much of the problem to USDA's structure which "hinders its ability to manage and conduct nationally focused research." Though the study notes recent efforts to reorganize USDA Science and Education programs to address this problem, OTA maintains that much national USDA research has been conducted more like "a series of regional programs."

The report asserts that additional improvements in research management procedures are needed in the Agricultural Research Service (ARS) and the Cooperative State Research Service (CSRS).

State and National Research Overlap

Another related problem, according to OTA, is that USDA and the State Agricultural Experiment Stations (SAES) "appear to be working on indistinguishable problems." The OTA investigation found considerable overlap and duplication which has increased concern among many scientists that "national research issues are not receiving adequate attention."

Long-Term Research Evaluation Needed

OTA also found that the U.S. "has no satisfactory long-term process for evaluating existing research activities, potential research opportunities, and development of research priorities." The report said basic decisions are currently made on an "ad hoc basis" with inadequate coordination between federal and state agencies.

USDA Addresses Long-Term Planning Needs

Both the OTA report and a previously released General Accounting Office (GAO) study on the USDA research program agreed on the need for increased emphasis by USDA on long-term planning in agricultural research to meet future national and world food needs.

Some of that planning has already begun, according to USDA Acting Director for Science and Education Anson Bertrand. USDA Secretary Block has asked the Joint Council for Food and Agricultural Science, an advisory board under Bertrand composed of research representatives, to begin a research needs assessment. The 1981 Farm Bill requires such a needs assessment to be completed by January 1984. After the initial assessment is completed, Congress will then require the Secretary to provide five-year rolling plans for research and education that will be updated every two years, Bertrand explained.

Though Bertrand defended the goals and management of USDA agricultural research against many of the OTA criticisms, he acknowledged that more attention needs to be given to conservation. He singled out germplasm development as one of the research areas that needs greater emphasis.

Congress to Hold Hearings on ARS

The House Agricultural Subcommittee on Department Operations, Research, and Foreign Agriculture, chaired by Rep. George Brown, Jr. (D-Calif.), is planning a series of oversight hearings on USDA's agricultural research system that will focus on many of the issues raised in the OTA study. Brown, who also serves as a member of OTA's Congressional Board, says the OTA assessment "adds to our understanding of the demands being placed on the food and agricultural research systems and presents policy options that could improve the system's performance."

ARS Responds With Strategic Plan

In response to the OTA report, as well as other appeals by Congress and the Administration, ARS is currently developing a strategic plan as a basis for operational planning. ARS Deputy Administrator Tom Army is heading an *ad hoc* committee appointed by ARS Administrator T. B. Kinney to work on the project. Kinney said the project "will help ARS estimate future U.S. needs for food and fiber and to devise ways to meet these needs."

The strategic plan, which targets germplasm research as top priority, will include both a program strategy and a six-year implementation plan to meet high priority research objectives. It will also identify scientific research programs to be continued, as well as new programs needed to achieve ARS' strategic objectives. ARS sources say the strategic plan will be completed this spring.

ARS Approves Funding for 1982 Plant Germplasm Explorations

Agricultural Research Service (ARS) Administrator T. B. Kinney recently approved funding for nine plant germplasm explorations during calendar year 1982. The ARS Plant Germplasm Coordinating Committee recommended funding the explorations based on a review of proposals from the four Regional Technical Committees.

In addition to a recently completed phaseolus exploration in Mexico, conducted by George Freytag, ARS, Mayaguez Institute of Tropical Agriculture, ARS budgeted approximately \$35,000 to fund the following explorations in 1982:

Lettuce

Plant pathologist Rosano Provvidenti, New York Agricultural Experiment Station, Geneva, N.Y., will team up with Tom Whittaker, a former ARS lettuce breeder and geneticist, to explore Greece and Turkey for *Lactuca* collections of *L. sativa*, *L. serriola*, *L. saligna*, and *L. virosa*. The exploration will take place next June and July.

The exploration will emphasize sources of resistance to diseases and insects, problems which increasingly concern the U.S. lettuce industry. Other favorable traits the scientists will be looking for include improved color, more efficient root and photosynthetic systems, and greater tolerance of heat, cold, soil salinity, and other stress factors.

Turf Grasses

In May, Jack Murray, USDA/ARS, Beltsville, Md., and M. C. Engelke, Texas A&M University, will begin a four-month exploration for *Zoysia* spp. germplasm in Japan, Korea, Taiwan, and the Philippines. The exploration will also focus on *Cynodon*, *Festuca*, *Poa*, and other grass genera.

Potatoes

A two-month trip to collect wild tuber-bearing *Solar-turn* species in Mexico and Central America by Robert Hanneman, ARS, University of Wisconsin, and/or Roman Ross, Potato Introduction Station (IR-1), Sturgeon Bay, Wis., will begin August 1982. The

scientists' proposal notes that IR-1 holds less than 15 accessions of each taxa to be collected and that the collected germplasm will be included as part of the IR-1 collection for distribution to users.

Woody Ornamentals

A two-month exploration of Hokkaido, Japan, and its vicinity for cold-tolerant woody ornamentals will be undertaken in September by Makato Kawase, of the Ohio Agricultural Research and Development Center. The project will focus on species adaptable to the North Central United States. Kawase will be joined by Sylvester March and Frederick Meyer from the National Arboretum, Washington, D.C., which will fund their part of the trip.

Carambola and Lychee

R. J. Knight, ARS, Miami, Fla., will conduct a six-week exploration for carambola and lychee in Malaysia and Sumatra beginning next July. Knight says carambola has definite potential as a new commercial crop, and that a lychee of good quality and one which will fruit dependably without chilling, is still needed in the Western Hemisphere. Knight will also be searching for members of the beech family that offer potential as nut crops for warm regions; any *Rosaceous* fruit (cherry, peach, pear, apple) adapted to warm regions; and any plant of potential as a new ornamental species.

Peanuts

A peanuts germplasm exchange program between the United States and the People's Republic of China (PRC) will continue with an August trip to the PRC by Ray Hammons, ARS, Tifton, Ga., and Morris Porter, ARS, Suffolk, Virginia.

The exchange proposal notes that since China ranks second and the U.S. third-in world peanut production, the exchange of information on peanut breeding and genetics, variety development, wild species, and cultivated germplasm resources will greatly benefit both countries. The one-month trip will also include discussions with Chinese officials on establishing cooperative germplasm research projects.

Caneberries

Ervin Denisen, Iowa State University, and Otto Jahn, curator of the Northwest Plant Germplasm Repository, will collect *Rubus* germplasm in England and Ireland for raspberry breeders during two separately funded explorations next summer. Both initiatives will focus on building up the collections at the Northwest Clonal Repository in Corvallis, Ore., as a germplasm source for U.S. and Canadian plant breeders. According to the proposal, the explorations will seek quality, yield, hardiness, and disease resistance characteristics as well as breeding compatibility.

Plant Exploration Officer Vacancy Filled

Management and funding of plant explorations received considerable attention at the January meeting of the National Plant Germplasm Committee (NPGC). Committee Chairman Wilson Foote, Associate Director of the Corvallis, Ore. State Agricultural Experiment Station, expressed the Committee's contention that U.S. dependence on plant exploration made it crucial for ARS to fill the post of Plant Exploration Officer. The position, which had been vacant for over a year, was recently filled by Robert E. Perdue, Chief of the Plant Taxonomy Laboratory in Beltsville, Maryland.

"Setting up explorations is complicated," said Assistant to the Deputy Administrator for Germplasm Quentin Jones, "and requires the attention and expertise of a full-time professional to seek advice from curators and appropriate NPGS committees on proposals as well as to be the liaison for trip planning and follow-up." According to Jones, Perdue has had many years of plant exploration experience with the anti-cancer screening program and will ably fill the position.

The NPGS Long Range Plan also places great importance on the Plant Germplasm Exploration Program: "*Plant explorations and exchanges are the foundation upon which the NPGS is built. . . Acquisition activities must be guided by sound strategy and effective coordination.*"

Pioneer Hi-Bred Project to Aid CIMMYT Maize Preservation

Pioneer Hi-Bred International, Inc. is funding a maize germplasm preservation project that will assist Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT) in the regeneration of maize accessions held at the Center's germplasm bank. The CIMMYT germplasm bank, which currently holds 13,000 maize germ plasm collections, has the largest collection of maize germplasm in the world. The Center is sponsored by the Consultative Group on International Agricultural Research (CGIAR).

Latin American Maize Losses "Serious Problem"

Pioneer Chairman William L. Brown explained why his company decided to undertake this project—the first private sector arrangement of its kind—in a recent interview with **DIVERSITY**. Members of both the NPGS and the International Board for Plant Genetic Resources (IBPGR) recognized several years ago that lack of resources and facilities was causing "a serious problem" in Latin American maize germplasm maintenance, said Brown. The number of accessions in seed banks in Mexico (CIMMYT), Colombia (Instituto Colombiano Agropecuario-ICA), and Peru (Programa Cooperativo de Investigaciones en Maiz-PCIM) "was getting so large that it was becoming impossible to regenerate accessions rapidly enough to maintain their viability," he explained.

When testing showed that only 30 percent of the CIMMYT material was viable, concern over the consequent loss of genetic diversity increased. What was needed, according to many observers, was a program to annually regrow a certain number of accessions in order to revitalize and increase seed. These increases could then replace the seed in base and working collections as fresh stock.

Florida Facility to Regrow Accessions

Pioneer started such a program last fall at the company's facilities at Homestead, Florida. The program is under the supervision of Pioneer plant scientist Wilfredo Salhuana. The bulk of the regenerated seed will be returned to CIMMYT, though Pioneer may retain a small sample of seed from the accessions having potential value as breeding material. Pioneer will also transfer, on behalf of CIMMYT, a sample of each regenerated accession to the National Seed Storage Laboratory (NSSL) for permanent storage.

Pioneer Hopes Project Will Encourage Other Companies to Act

Pioneer has invested \$200,000 in the initial stages of the project and plans to continue the program "for a long period," according to Brown. The company has offered to have the project become an extension of the National Plant Germplasm System (NPGS).

One of Brown's hopes is that the Pioneer/CIMMYT maize program will encourage other companies to establish similar programs as part of a concerted private sector/government effort to rescue other types of germplasm from extinction. International Board for Plant Genetic Resources Executive Secretary Trevor Williams expressed the International Board's support of Pioneer's endeavor, noting that "it is surely the first time that a large commercial organization has become involved in our work at its own cost."

U.S. and Mexican Governments to Discuss Future Programs

Salhuana, pleased with the progress of the Pioneer project he oversees, says he also hopes to see it used as a model for similar projects in the future. He will soon accompany Assistant to the Deputy Administrator for Germplasm Quentin Jones to Mexico for discussions with the Mexican government's Instituto Nacional de Investigaciones Agrícolas (INIA). Their talks will focus on establishing additional programs for maize preservation and evaluation.

Maize Advisory Committee Proposes Preservation Project for Latin America

The Maize Crop Advisory Committee, co-chaired by Brown and North Carolina State University plant geneticist Major Goodman, identified Latin American maize collection and evaluation as its top priority at the Committee's first meeting last spring. The Committee recently submitted a proposal to the NPGRB that would establish a ten-year maize germplasm preservation and evaluation project to further protect the more than 300,000 Latin American collections held at CIMMYT, INIA, ICA, and PCIM.

The proposal is currently under consideration and will be further discussed at the Committee's next meeting, tentatively scheduled for May. The Committee will probably reevaluate the proposal at that time, in light of additional information Jones and Salhuana hope to obtain when they visit Mexico.

NWPGR Research Director Reports on Successful East Asian Exploration

"We wanted to collect as much genetic diversity as we could from the wild species on this trip to East Asia," Northwest Plant Germplasm Repository (NWPGR) Research Director Melvin Westwood told members of the National Plant Germplasm Committee (NPGC) in describing his 48-day fruit and nut germplasm exploration last summer to Japan, Taiwan, and Korea. The trip was funded by the Agricultural Research Service.

"Wild species are especially valuable to us," Westwood explained, "because many are immune to our insect problems." With urban encroachment threatening many wild species in East Asia, Westwood felt it was imperative to focus on their collection during this exploration. "Many of the wild fruits collected in Asia during the past 100 years have been lost or hybridized with other types to the extent that the

Continued on pg. 14

genetic makeup of many forms is in doubt," he told the NPGC January meeting.

Acquisitions

Westwood and Paul Li, a plant hardiness expert from the University of Minnesota, were able to collect 57 fruit and nut species, representing 22 genera. These included 18 *Rubus* (raspberry), 7 *Pyrus* (pear), 4 *Malus* (apple), 1 *Juglans* (walnut), 2 *Vitis* (grape), 2 *Ribes* (currant), 1 *Vaccinium* (blueberry), and 1 *Humulus* (hops). Others include the minor genera *Sambucus* (elder), *Zizyphus* (jujube), *Elaeagnus*, and *Actinidia* (Chinese gooseberry). The two plant scientists also collected eight genera of the sub-family *Pomoideae* which have some graft compatibility with pear, and might, according to Westwood, be useful as dwarfing rootstocks.

He emphasized that the acquisitions from this "highly successful" trip will be distributed to the clonal repositories in Davis, Calif., and Geneva, N.Y., after the Beltsville Plant Quarantine Office clears them for the Corvallis, Ore., repository. In addition to these acquisitions, Westwood's Asian colleagues will also be collecting a number of late-ripening species and will soon be sending them to the U.S.

Asian Exploration Highlights

Westwood called a new computerized seed germplasm storage system at the fruit tree research station at Tsukuba-Yatabe, Ibaraki "a first-class operation." The system's Director, K. Kymagai, has programmed the system to call up or print out any information on an accession. Seed selection and retrieval from cold storage is also automatic, according to Westwood.

One of Westwood's most satisfying acquisitions was found on the last day of his trip, at an old orchard near Seoul. He had been told the orchard grew the ancient edible apple *Malus asiatica* which he had not been able to find in the wild. The satisfaction of such a find is best described in Westwood's own words: "The one old tree-at the edge of the hill-was no more

than 20 centimeters in diameter, but it had survived on a sterile granite slope for more than 100 years, having been planted by the owner's great grandfather in two edible varieties-one early and one late. We got fruit of the late one. The rootstock is wild apple and is the same as which I am calling M. prunifolia. It was cultivated for centuries before European apples were introduced so it is not a hybrid. This is a great find after failing at all turns previously. It made my day and I am now ready to return home."

Contacts As Valuable As Germplasm

The NWPGR scientist lavished praise on the more than 70 foreign cooperators who contributed to the success of the trip and expressed the belief that "contacts made throughout the exploration may be as valuable as the collected plant germplasm." Westwood noted in particular the international symposium he attended on plant hardiness sponsored by Japan's Hokkaido University: "The subject matter alone was worth the time and effort, but the contacts made with people from many countries will be even more valuable in developing the necessary liaisons for future germplasm collections."

New Repositories Motivate Future Chinese Exploration

Westwood is convinced that the loss of many Asiatic wild species from U.S. fruit and nut collections seriously threatens the range of genetic diversity in U.S. holdings. This conviction led to another proposal by him and Li to make a similar exploration next September in the People's Republic of China (PRC), to collect deciduous fruit and nut species. The completion of the clonal repositories at Corvallis and Davis and the planned 1982 initiation of a repository at Geneva-increase the value and necessity of such a project, he added.

In Westwood's opinion, the reopening of China for scientific and agricultural exchange provides an opportunity to reobtain many of the species which were

lost from North American collections due to freezes or attacks by pests and diseases.

In addition to collecting wild species-the main sources of genetic resistance to diseases and insects-the proposed Chinese exploration will also focus on cold hardiness. With cold stress contributing to substantial U.S. crop losses annually and climatologists predicting cold stress to be even more influential during the next fifty years, Westwood feels "It is imperative to find and preserve plants resistant to cold." If the PRC exploration occurs, the U.S. team plans to explore the North China/Manchuria area to collect such hardy species.

ARS Appoints National Technical Advisor for Crop Germplasm Enhancement

The recent appointment of Douglas Dewey as National Technical Advisor (NTA) for Crop Germplasm Enhancement fills a void that has long concerned many in the National Plant Germplasm System (NPGS).

Dewey, a supervisory research geneticist at Logan, Utah's Crops Research Laboratory, was recommended for the newly created Agricultural Research Service (ARS) position by Assistant to the Deputy Administrator for Germplasm Quentin Jones. "Dr. Dewey is recognized by his peers around the world as a leader in taxonomy, cytogenetics, and breeding of range grasses," said Jones.

"National Technical Advisor assignments and the expertise they provide USDA are among the most important functions that an ARS scientist can assume," said ARS Administrator T. B. Kinney when announcing the new appointment.

NTA Responsibilities

As NTA for Crop Germplasm Enhancement, Dewey will spend a portion of his time assisting Jones by:

- encouraging and facilitating the work of Crop Advisory Committees (CACs) in assisting the resource needs of their crops to fill gaps in germplasm collections and



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to better address breeding objectives:

- working with CACs in planning germplasm evaluation activities for their crops; and
- defining, planning and recommending effective germplasm enhancement projects that will ensure greater use of plant germplasm and better information feedback into the Germplasm Resources Information Network (GRIN).

Germplasm Enhancement Essential to Farmers

“Germplasm enhancement or ‘pre-breeding’ work is widely recognized as an essential, but now badly neglected, step in moving genetic diversity from exotic or raw germplasm into productive new varieties for our farmers’ fields,” Jones told ARS officials in his request for the NTA appointment.

“Germplasm we now have in our collections is not being utilized to anywhere near the extent that it should be nor are we able to adequately identify the gaps in our collections that need to be filled through acquisition activities,” he stressed.

Jones sees Dewey’s role as especially crucial to the progress of the Crop Advisory Committees. As the CACs become more active in identifying genetic resources needs of their crops, they will require the input of someone of Dewey’s stature—“who knows the NPGS thoroughly—how it is organized, how it operates, and what it can do for the users of germplasm,” Jones told **DIVERSITY**.

North Central Regional Plant Introduction Station (NC-7)

Over 1,000 new agronomic, horticultural and industrial plant introductions entered the NC-7 Regional Plant introduction Station (RPIS) in 1981. Because the primary maintenance responsibility for annual alfalfa was transferred from the S-9 RPIS to the NC-7 RPIS, a large portion of the new introductions included the annual alfalfa collection.

Other new accessions included over 300 *Amaranthus* accessions primarily from Rodale Press, 130 *Brassica* and 54 *Setaria* accessions from the People's Republic of China, as well as 31 ornamental accessions from the Arboretum of the Chinese Academy of Forestry in Beijing.

In 1981, 200 perennial alfalfa plant introductions were increased in isolation cages. Seed production was highly variable ranging from zero in a few lines to 600 grams in the best producers. The use of leafcutter bees in place of honeybees as pollinators aided seed production in many lines. The station anticipates that improved leafcutter bee management in 1982 will enhance overall seed production, according to a report by Bill Thyr, ARS plant pathologist, Reno, Nevada.

Plant Pathology Program staff recently performed disease screening for tomato fruit rot, cucumber belly rot, diplodia stalk rot of corn, rust on corn and septonia leafspot of tomatoes. The staff also examined *Cucurbita* and *cucumis* in the greenhouse for presence of seed-borne viruses.

Southern Regional Plant Introduction Station (S-9)

The S-9 Regional Plant Introduction Station added 8,028 new introductions to the germplasm collection from July 1980 through June 1981. A major collection (5,413 accessions) of *Sorghum bicolor* from Ethiopia contributed to the majority of introductions. Researchers expect the Ethiopian sorghums to have a superior level of resistance to a new biotype of

the "greenbug" (*Schizaphis graminum*) and want to increase this new collection as quickly as possible, according to Gil Lovell, S-9 Coordinator.

A total of 696 plant introductions composed of 33 genera were included in the 1981 increase planting at S-9. The crops in the planting included: peanut, castorbean, grasses, peppers, gourds, cowpeas, watermelon, and cucurbitas.

Research plant pathologist Grover Sowell, Jr. is responsible for screening for disease resistance at S-9. His recent investigations include studies on pepper for bacterial spot; muskmelon for powdery mildew; cowpea viruses; sorghum anthracnose; seed-borne microorganisms; *Colletotrichum dematium*; muskmelon bacterium; Dallisgrass ergot and watermelon anthracnose.

The Southern Regional Plant Introduction Station's ongoing research projects include grow-outs and evaluations of 24 *Vicia sativa*, various testing programs, and the establishment of nurseries for new crops for oil and hydrocarbon production. These crops include *Asclepias syriaca*, *Apocynum* spp., *Rhus glabra*, *Eupatorium* and *Ambrosia artemisifolia*. A kenaf, *Hibiscus cannabinus*, and a roselle, *H. sabdariffa*, are also being tested and evaluated. When the project is completed, cuttings will be taken for seed production of selected lines.

Western Regional Plant Introduction Station (W-6)

According to W-6 Coordinator Sam Dietz, a large portion of the 3,034 accessions the Station received last year was *Cicer arietinum* (chickpea) from the Iranian Pulse Improvement Project. Dietz said the station plans to increase one-third of the material each year.

The Station is losing its bean seed increase facilities at the University of Hawaii and will be transferring the work to Mayaguez Institute of Tropical Agriculture (MITA) on a trial basis. Because the beans are tropical and short-day types, they demand the type of climate that the MITA location can provide, according to Dietz.

In an Administrator's Report presented at the 1981 W-6 Regional Technical Committee meeting, Administrative Advisor Wilson Foote recommended that a five-year statement of goals, benefits and commitments for the W-6 RPIS be presented to the appropriate State Agricultural Experiment Stations. At the same meeting, Dietz described the Station's ongoing work with the Pakistani National Germplasm Program and detailed progress at the new clonal facility at Davis, California.

Northeastern Plant Introduction Station (NE-9)

Plantings at the NE-9 Regional Plant Introduction Station at Geneva, N.Y., included over 1,200 plant introductions in 1981. Researchers at the Station last year recorded descriptive and evaluation notes for incorporation into the annual catalogs of Available Vegetable and Forage Legume and Grass Introductions.

Five locations joined in a three-year evaluation of 75 timothy introductions as part of a NE-9 Cooperative Project that began three years ago. The State Agricultural Experiment Stations involved were: Geneva, N.Y., Morgantown, W.Va., Burlington, Vt., and Kingston, R.I. A Soil Conservation Service Plants Material Center in Big Flats, N.Y., was also part of the project. Although the Vermont and Rhode Island Stations will continue work for another year, final reports from the other stations are expected soon.

The Vermont SAES staff completed a domestic exploration for native azaleas and rhododendrons. Staffers from the Maine SAES will soon begin a domestic exploration for flowering dogwoods, according to the NE-9 1981 Annual Report.

Rodrigo Alconero, NE-9 plant pathologist, recently reported that there are approximately 2,800 accessions in the *Pisum* germplasm collection. According to Alconero's report, attempts to eliminate pea seed-borne mosaic virus from the pea collection show that the plants need to be kept under controlled greenhouse con-

ditions during the virus assays to eliminate infected plants. The report, part of the 1981 NE-9 Annual Report states that, even with the purchase of a new greenhouse, it would take many years to complete the 2,800 accessions, Alconero is investigating alternative approaches to the problem.

The NE-9 staff is evaluating the *Trifolium hybridum* germplasm collection for resistance to various viruses. Field plantings were established last year for accessions of *Trifolium* spp. and of *T. ambiguum*. The staff also collected several hundred wild clovers growing among the field plantings in order to identify the plants' viruses and measure their effect on the field's perennial clover accessions.

According to Alconero's report, the use of serology and tissue culture in disease resistance evaluations appears promising for developing routine, efficient techniques to evaluate disease resistance. The ELISA (enzyme-linked immunosorbent assay) technique is being successfully used in the greenhouse trials and in identifying viruses from field samples.

From GRIP to GRIN

The plant germplasm user community is scheduled to have access to the computer-assisted Germplasm Resources Information Network (GRIN) by the end of 1982, according to Steve Snyder, head of the User Services Team of the Germplasm Resources Information Project (GRIP). GRIN is the result of a joint effort between the USDA Agricultural Research Service (ARS) (assisted by the Communications and Data Systems Division) and the Laboratory for Information Science in Agriculture, a department in the College of Agricultural Sciences at Colorado State University.

The Germplasm Resources Information Project, begun in 1977 as a five-year analysis, design and implementation project, resulted from a feasibility study requested by T. W. Edminster, then Administrator of ARS. The project was to determine the need and potential effectiveness of a computer-assisted informa-

tion network for the National Plant Germplasm System (NPGS). In February 1981 the *GRIP Design Recommendations Working Report* was presented to the GRIP Coordinating Committee for advice and approval. With minor modifications, these design recommendations are now being implemented.

GRIN implementation is keyed to the arrival of critical computer-related equipment needed to augment USDA's computer installation at Beltsville, Md., and at several of the NPGS sites around the country, explained Snyder. Equipment delivery has been slightly delayed by the late passage of the FY82 budget and vendor back-orders. Times for the four basic implementation phases will be announced when the equipment is in place.

Four-Phased GRIN Implementation

During the **first implementation phase**, computer-related hardware, software and telecommunications facilities will be installed at various NPGS sites. The Regional Plant Introduction Stations and the Small Grains Collection will have the ability to load plant characteristic data (as defined by the Crop Advisory Committees), germplasm maintenance and order processing data during the **second phase**.

The **third phase** will allow for refinement required in earlier phases and for the entry of plant taxonomy, geopolitical and original sources information. With completion of the **fourth phase**, special and general reports for administrative and control purposes can be obtained including user oriented "special interest" reports. The NPGS is expected to continue to evolve and develop, and GRIN has been designed with this in mind, said Snyder.

Observers see GRIN as an important model for demonstrating how the use of formal scientific information networks can assist in the work of national agricultural research programs. "The system is a fine example for future work between ARS and a university in implementing advanced technologies," said Donal D. Johnson, Dean of the

College of Agricultural Sciences and Associate Director of the State Agricultural Experiment Station at Colorado State University.

"GRIN will be valuable not only to breeders and scientists but especially to administrators," predicts Allan Stoner, ARS Plant Genetics and Germplasm Institute Chairman. "The system will give us a better understanding and appreciation of what is contained in the NPGS. We will then be able to make decisions that better reflect this knowledge."

NPGC/IBPGR-Sponsored Workshops Premiere in August

The first in a series of National Plant Germplasm Committee/International Board for Plant Genetic Resources (NPGC/IBPGR)-sponsored workshops will be held August 16-19, 1982 at Colorado State University (CSU), Fort Collins, Colorado. The workshop will be held in conjunction with meetings of the NPGC, the National Plant Germplasm System/Operations Committee (NPGS/OC), and the IBPGR Executive Committee.

The workshop, **Cell and Tissue Culture and Cryogenic Storage**, is the result of an NPGC decision to provide appropriate forums in which to present papers on relevant topics, assemble knowledgeable people in the field of germplasm, and involve germplasm users in discussions with other members of the NPGS.

The first of two workshop sessions on August 16 will focus on *Tissue Culture: Principles and Prospects in Management of Crop Germplasm*. Contributors will present papers on the following topics:

- Acquisition and Exchange-Phytosanitary Requirements
- Maintenance-Working Collections, Base Collections
- Meeting Users' Needs-Evaluation, Characterization, Breeding

Papers to be presented during the second session, *Cryopreservation: Principles and Prospects in Management of Crop Germplasm*, will focus on:

- Seed and Pollen

- Vegetative Material
- Curatorial, Safety, and Cost Aspects

The balance of the workshop will include working sessions and visits to the National Seed Storage Laboratory and the CSU Seed Testing Laboratory.

For more information, contact Pam Johannsen, Laboratory for Information Science in Agriculture, Colorado State University, Fort Collins, Colo. 80523, (303) 491-5863.

Block to Renew National Plant Genetic Resources Board

The National Plant Genetic Resources Board (NPGRB) is awaiting final Board renewal and approval of new members by USDA Secretary John Block before finalizing plans to meet in May 1982, according to NPGRB Executive Secretary Clarence Grogan. At press time, sources told **DIVERSITY** that USDA had renewed the NPGRB and had sent the proposal to the White House for final approval.

At the Board's last 1981 meeting, Assistant to the Deputy Administrator for Germplasm Quentin Jones briefed NPGRB members on the changes that have occurred in the NPGS as a result of two General Accounting Office (GAO) reports and recommendations by the National Plant Germplasm Committee (NPGC).

Those changes include restructuring the NPGC for better representation of Agricultural Research Service line management; formalizing Jones' position as Assistant to the Deputy Administrator for Germplasm; and developing the NPGS mission statement. The statement is as follows:

The National Plant Germplasm System (NPGS) provides the genetic diversity necessary to improve crop productivity and to reduce genetic vulnerability in future food and agriculture development, not only in the United States but for the entire world. The NPGS acquires, maintains, evaluates, and makes readily accessible to plant scientists a wide range of genetic diversity in the form of seed and

clonal germplasm of crops and potential new crops.

Jones also gave NPGRB members an update of activities at the National Seed Storage Laboratory (NSSL) in Fort Collins, Colo. based on a report by NSSL Director Louis Bass. Progress on cataloging the unincorporated stocks at the NSSL includes completion of the world wheat collection catalog. Cataloging of the CIMMYT maize collection and the world oats collection are ongoing, according to Jones.

NPGRB Meeting Highlights

- Fred Bliss, University of Wisconsin, briefed the Board on a three-year **program for utilizing unadapted germplasm collections to improve quantitative traits in self-pollinating species**. The program was funded by USDA/Cooperative State Research Service.
- Major Goodman, North Carolina State University, co-chairman of the Maize Crop Advisory Committee, detailed a **10-year plan of action for preserving and utilizing Latin American Maize accessions**. The NPGRB voted to expedite funding and implementing the final proposal through USDA.
- U.S. Forest Service (USFS) geneticist Stanley Krugman described **germplasm exchanges with the People's Republic of China**. In exchange for U.S. contributions of wind-break material, the U.S. has gained access to bamboo, tung oil, and olive collections, he reported.
- Germplasm exchange is and can continue to be a significant part of the **USDA Science and Technology Exchange Program**, USDA International Coordinator John Naegele told NPGRB members. He said the program was primarily a device to assist the domestic U.S. program. He contrasted technology exchange programs with technical assistance programs whose purpose is directed at helping the coun-

try where the work is being conducted. Naegele emphasized the need for a global perception in future planning of technology exchange programs, stressing that our domestic scientists can benefit a great deal from these exchanges.

- In a report on **activities at the Economic Botany Laboratory (EBL)**, Alan Atchley, USDA/ARS explained that the loss of National Cancer Institute funding will slow the expansion of the EBL data base. The EBL conducts research in ecosystematics and serves as a repository for information on ecological tolerances, biotic interactions, and agronomic factors. NPGRB Chairman Bertrand noted that one GAO criticism of the NPGS was that the System does not have an adequate understanding of the ecological setting in which plants are derived. The data base developed by EBL has the potential to fortify such an understanding, according to Bertrand.

NPGC Briefed on Canadian Germplasm Activities

Agriculture Canada Research Coordinator Charles Bishop briefed the final 1981 meeting of the National Plant Germplasm Committee (NPGC) on plant genetic resources activities in Canada. The Expert Committee on Plant Gene Resources, established in 1971 by the Canadian Agricultural Services Coordinating Committee, has responsibility for developing Canada's program on germplasm inventory, documentation, preservation and utilization.

The operational office responsible for this work is Plant Gene Resources of Canada (PGRC), located in Ottawa. The PGRC is headed by Roland Loiselle. The PGRC's seed storage facilities house alfalfa, barley, oats, tomato, wheat, flax, and millet, in addition to smaller amounts of miscellaneous stocks.

Apple germplasm will be preserved in six new clonal repositories located at Agriculture Canada Research Stations, according to Bishop. He told the Committee that computerized crop information banks currently in operation provide trait inventories for alfalfa, barley, oats, tomato and wheat.

Bishop also noted Canada's participation in the International Board for Plant Genetic Resources program for cooperative preservation. One of PGRC's contributions will be to preserve stocks of pearl millet and crucifers.

NPGC Meeting Highlights

The NPGC agreed to develop a plan for holding workshops that will provide a forum for papers on such topics as prebreeding strategies, germplasm evaluation, and long-term seed storage in liquid nitrogen. The members also agreed to formalize, via a memorandum of understanding, the NPGS Curator Role definition approved by the Committee, and formally endorsed the role of Crop Advisory Committees in the work of the NPGC and NPGS.

Much of the first 1982 NPGC meeting was devoted to the review of recommendations contained in the recently released NPGS Long Range Plan (see story, p. 6).

Other NPGC business included a description by NPGS National Coordinator Quentin Jones of the phased screening research being undertaken on cuphea, a new crop prospect for short-chain fatty acids. Melvin Westwood, Research Director of the Northwest Plant Germplasm Repository, reported on his exploration to Japan, Korea, and Taiwan for fruit and nut wild species.

NPGC Chairman Wilson Foote reported that a fifth clonal repository that will maintain apples and eastern grapes is scheduled for construction at Geneva, N.Y. The Cooperative State Research Service (CSRS) Special Grants Program has slated \$86,240 for this project for 1982, according to Foote. CSRS has also granted \$384,210 to the clonal repository at Corvallis, Ore., for 1982. The Davis Repository in California, where construction is nearly complete, received \$218,250.

The Committee will meet again on August 19, 1982 at Colorado State University in Fort Collins, in conjunction with the National Plant Germplasm Committee/International Board for Plant Genetic Resources workshop on Cell and Tissue Culture and Cryogenic Storage (see story, p. 17).

Crop Advisory Committees Represent User Community

From its inception in 1975 the National Plant Genetic Resources Board (NPGRB) realized the need for crop-specific advice on the conservation and use of plant genetic resources for the planning, monitoring, and operations of the NPGS.

During the initial stages of the Germplasm Resources Information Project (GRIP), GRIP staff also recognized this need and began forming Crop Advisory Committees (CACs) to help ensure the operational success of the NPGS information system. The CACs represent first-hand the "demand" side of the plant genetic resources community—the plant germplasm users. Their purpose is to provide critical analysis, data, and recommendations to the GRIP team—and ultimately the NPGS—on the conservation and use of plant genetic resources.

Over the past five years, the GRIP team has assisted in assembling twelve Crop Advisory Committees. Some of these CACs already existed as germplasm subcommittees of particular commodity [crop] organizations. Other CACs have subsequently petitioned for affiliation with their corresponding crop association.

Although many of the CACs were originally convened by GRIP, each committee is now a self-sustaining group, with responsibilities to the NPGS and their specific commodity organizations.

Crop Advisory Committee Goals

The common goal for all the Crop Advisory Committees is to achieve better use of plant germplasm. To reach this goal, germ-

plasm characteristics must first be identified and the information must be made available to users. Therefore, many CACs begin their work by identifying and defining standard plant descriptors. The next step is to plan evaluations of these descriptors as well as specific germplasm designated by the Committee as of priority importance. Other CAC concerns included the amount of genetic diversity within their crop, maintenance, storage and regeneration procedures, germplasm enhancement, monitoring crop-specific genetic vulnerability and creating work plans for these initiatives.

Many CACs meet at least once a year, usually in conjunction with crop association meetings. The following CACs are currently in operation and have met one or more times: alfalfa, maize, oats, pea, phaseolus (bean), potato, sorghum (including sweet sorghum), soybean, tomato, and wheat. In addition to these, cotton and peanut CACs have been established and will meet during the summer of 1982. Formation of Crop Advisory Committees for grasses, sweet potatoes and barley is anticipated this year.

Crop Advisory Committee Highlights

■ **The NPGS Pea Crop Advisory Committee** held its third meeting in conjunction with the January 1982 National Pea Improvement Association meetings in Gainesville, Fla. Of continuing concern to the Pea CAC is the screening and elimination of pea seed-borne mosaic virus from the pea germplasm collection held at Geneva, N.Y.

Rodrigo Alconero, research plant pathologist, Northeast Region, reviewed his work on the virus problem and explained to the Committee the enzyme-linked immunosorbent assay (ELISA) method which is the primary tool for detection of the virus. Having already developed standard pea descriptors and definitions, members selected eight disease descriptors as high priority for evaluation.

■ In recent meetings of the **NPGS Phaseolus Crop Advisory Committee**, members expressed concern over the status of the

phaseolus (bean) collection with respect to bean seed-borne mosaic virus and outlined the problems in cleaning up the material, growing it out, and evaluating it for its true characteristics.

The phaseolus seed increase facilities at University of Hawaii are no longer available. Committee members strongly recommended that a seed increase project be undertaken on a trial basis at the Mayaguez Institute for Tropical Agriculture (MITA) in Puerto Rico. The Committee also began developing a strategy for evaluating phaseolus germplasm.

The next meeting of the Phaseolus CAC is scheduled for November 1983 in Minneapolis, Minnesota.

- The primary focus of the most recent **NPGR Alfalfa Crop Advisory Committee** was the development of an alfalfa germplasm evaluation proposal. Parts of the proposal included compilation of a list of high priority standard plant descriptors. The members also identified geographic locations where collections are needed to obtain alfalfa germplasm not presently held in the U.S. These locations include the USSR, Central Europe, Yugoslavia, Greece, North Africa, South Mediterranean, Peru, Bulgaria, Hungary, Romania, North India, and Pakistan.

Alfalfa CAC members also voiced concern over the lack of communication within the alfalfa community, both nationally and internationally. They assigned a high priority to reporting Alfalfa CAC activities to international organizations as well as to national bodies such as the National Alfalfa Improvement Conference.

In other action, members proposed developing a **status** report on alfalfa germplasm and reestablishing a varietal seed repository at Beltsville, Md., to accommodate foreign seed requests.

The next Alfalfa CAC meeting is scheduled for fall 1982 in Ames, Iowa.



Alarm Over Worldwide Loss of Genetic Diversity Voiced at State Department Conference

Threats to the diversity of plant genetic resources ranked high on the agenda of concerns debated at the Strategy Conference on Biological Diversity sponsored by the State Department last fall in Washington, D.C.

The conference, attended by top government policy advisors, environmentalists, and genetic resources specialists from around the world, was co-sponsored by the Agency for International Development, the Departments of Agriculture, Commerce, and Interior; the Council on Environmental Quality, the Smithsonian Institution, and the National Science Foundation.

Though budget cuts threaten the resource conservation programs of most of these agencies, serious concern over the continued loss of genetic diversity worldwide brought them together to devise and recommend domestic and international actions that the United States could take over the next three to five years to help maintain the earth's biological diversity.

Estimates that habitat destruction could, by the end of the century, cause the loss of a million species in existence today, may make biological diversity the crucial environmental issue for the rest of this century, high-level officials told the conferees.

Buckley Fears "Awesome Finality" of Extinction

What many observers considered the most powerful statement of concern came from an address by James L. Buckley, Undersecretary of State for Security, Assistance, Science, and Technology. "Extinction," said Buckley, "is an act of awesome finality. . . . The process is tantamount to book burning; but it is even worse in that it involves books yet to be deciphered and read."

One United Nations spokesman, quoting Harvard University professor Edward O. Wilson, said the loss of genetic diversity would be worse than "energy depletion,

economic collapse, limited nuclear war, or conquest by a totalitarian government." Those catastrophes, according to Wilson, could be mitigated within a few generations, whereas the loss of genetic and species diversity would take millions of years to correct. "This is the folly our descendants are least likely to forgive us," warns Wilson.

USDA Acting Director of Science and Education Anson Bertrand also addressed the general session of the three-day conference. Bertrand asserted that the Department of Agriculture "has the clear responsibility to provide leadership and coordination in scientific efforts to preserve biological diversity for agricultural needs."

Bertrand Stresses Need For Unified Effort

Bertrand spoke with pride about the efforts of the National Plant Germplasm System (NPGS), as well as those of the International Board for Plant Genetic Resources (IBPGR), to stem the erosion of genetic diversity. Bertrand stressed that the solution to the problem lies in "pooling our collective efforts," and urged the continuation of cooperative efforts involving USDA, universities, states, industry, private curators, and international centers, as well as the expansion of all international activities. Noting current budgetary constraints, Bertrand insisted that the total worldwide effort, including that of the United States, was "unacceptably low in relation to the magnitude of the job to be done and the very short time for doing it."

Following the general session, the conference divided into five panels charged with formulating recommendations on: (1) terrestrial plant species; (2) terrestrial animal species; (3) aquatic species; (4) microbial resources; and (5) ecosystem maintenance. The panels presented their recommendations during the final session of the three-day conference. (See following story.)

Professional staff from congressional committees with oversight responsibility for genetic diversity addressed the final session of the conference. They emphasized the critical need to

educate both the public and Congress on the growing threat of a genetically impoverished world. House Subcommittee on Department Operations, Research and Agriculture staff member Skip Stiles said that the Subcommittee plans to hold hearings on genetic diversity later this year.

A copy of the conference proceedings and formal recommendations will soon be available. *For more information, contact: Bill Long, Department of State OES/ENR, Room 7819, Washington, D. C. 20520.*

State Department Panel Recommends Open Exchange of Plant Germplasm

The question of how to most effectively deal with the preservation and use of plant genetic diversity was the source of considerable debate throughout a full day of deliberations by the terrestrial plants panel at the State Department's Strategy Conference on Biological Diversity.

The panel, attended by policy makers and scientists from both the public and private sectors, was chaired by USDA Assistant to the Deputy Administrator for Germplasm Quentin Jones, and Pioneer Hi-Bred International, Inc. Chairman William L. Brown. In its final report to the conference, the group asserted that the preservation of diversity required "serious attention in all plant categories" but gave the highest priority to major crops, the source of world food supplies. The plants panel report offered specific recommendations on a number of controversial issues.

Encourages Cooperative Interchanges

Supporting the ethic that plant genetic resources are "a human heritage from the past which belongs to all people," the panel recommended the free and open international exchange of plant germplasm resources and information.

Continued on pg. 22

Developed and developing countries "are becoming increasingly aware of the essential nature of plant germplasm," observed the panel. Rather than promoting an international convention on plant germplasm at this time, the panel recommended that existing bilateral, regional, and international cooperative interchanges "be encouraged and given opportunity to grow." If, however, these processes do not continue to progress, the panel said "a formal, quasi-legal convention of this type might be indicated."

Increased Support for NPGS and IBPGR

The panel commended the International Board for Plant Genetic Resources (IBPGR) for its effective role in "catalyzing and supporting" germplasm activities and recommended that the U.S., through the Departments of State and Agriculture, continue and strengthen its support of the IBPGR through the Consultative Group for International Agricultural Research (CGIAR) and through direct cooperation in plant germplasm activities. The IBPGR was also singled out by the conference as the only existing organization to focus international attention on biological resource conservation and was recommended as a model for dealing with the conservation of animal germplasm.

The lack of native germplasm sources in the United States increases U.S. dependence on other parts of the world for genetic resources, observed the panel. The Office of Management and Budget, USDA, and Congress "should give high priority to increased support for the NPGS [National Plant Germplasm System]," the panel advised.

Genetic Engineering Is Not Panacea

While recognizing "the great potential value of genetic engineering to agriculture, medicine, and industrial technologies," the panel said it was nonetheless "convinced that [the technology] will not replace the continuing need for naturally occurring genes." The plants panel report, therefore, emphasized the need for "access to as great an extent

as possible a range of biological diversity" through assessment, acquisition, evaluation, and information management.



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Tropics Are Greatest Source of Diversity

According to the panel, the greatest diversity of the world's plant species is found in the tropics where many of these species have yet to be cataloged or given scientific names. With projections that land conversion could make one-third of them extinct during the next 30 to 40 years, the panel said it was "urgent" to give the cataloging and evaluations of these tropical species a top priority. In order to expedite this project, the report endorsed and urged the implementation of recommendations made in the National Academy of Sciences Natural Resource Council report *Research Priorities in Tropical Biology*.

The panel further observed that plant species whose potential usefulness to man has not been evaluated are also mostly found in tropical regions. Studies should, therefore, be undertaken "to identify natural communities in tropical areas that are threatened by serious environmental change with the objective of identifying their species composition, community structure, and species interaction," the report recommended. These species, observed the panel, "represent a tremendous reservoir of genetic diversity."

Technical Problems Prevent Plant Usefulness

Research should be undertaken to solve technical problems that are restricting the usefulness of many plant species, asserted the panel. Such underexploited plant species, including timber trees, "can only be properly utilized when technical solutions are found to such biological problems as erratic flowering, recalcitrant seed, specific pollination, and other propagation constraints," according to the panel's final report to the conference.

Appropriate Regulations Must Be Enforced

Concern over the environmental risks posed by the overexploitation of locally or regionally important plant species led to the panel's recommendation that harvest and trade laws and regulations of local authorities, the United States, and other governments "should be implemented, maintained, and enhanced." The panel further recommended that "existing legal and administrative mechanisms, such as the Endangered Species Act, for conserving plant species and their habitats should be maintained and enhanced."

At press time, the State Department was in the process of reviewing additional comments by interested observers who attended the plants panel deliberations. Some of these comments may be incorporated into the final report of the Strategy Conference on Biological Diversity. *For further information, contact: Bill Long, Department of State, OES/ENR, Room 7819, Washington, D.C. 20520.*

New Report May Calm Controversy Over Plant Variety Protection Act

Have the genetic characteristics of plant varieties become increasingly uniform and more vulnerable to disease since the 1970 passage of the Plant Variety Protection Act?

The answer to this and many other questions surrounding the controversial law (Public Law 91-577) may be answered when scientists at the University of Wisconsin complete an impact study of the Plant Variety Protection Act (PVPA) on plant genetic research and the U.S. seed industry.

What Is The Law And What Does It Do?

The PVPA, supported from the outset by the American Seed Trade Association and USDA, was designed to encourage the development of new plant varieties reproduced by seeds. The law provides patent-like protection to plant breeders who develop or discover such varieties.

A certificate of protection, issued by the USDA Plant Variety Protection Office in Beltsville, Md., provides recognition of ownership and exclusive marketing rights for eighteen years. The certificates are granted on the basis of novelty, stability, and uniformity within the variety.

Participation in the PVPA program is voluntary and the enforcement of the law is the sole responsibility of the plant breeder-not the federal government-through civil law. Under the program, a plant breeder is required to submit 2,500 viable seeds for permanent storage in the National Seed Storage Laboratory (NSSL).

If USDA determines that the variety is needed by the public during the eighteen-year certification period, the Department has the right to declare it open to use. The law also provides specific exemptions that (1) allow protected varieties to be used for *bona fide* research and (2) allow farmers to increase protected varieties for their own use, as well as for limited seed sales.

Does The PVPA Threaten Genetic Diversity?

Proponents of the legislation insist that these provisions offer sufficient public protection. But those who continue to oppose plant patenting claim that it will result in increased genetic uniformity of food crops and a reduction in genetic diversity worldwide. They argue that the PVPA will increase seed prices and delay the development and release of new varieties because the free exchange of information, germplasm, and breeding stock will be inhibited.

The opponents also predict the PVPA will place small companies at a serious competitive disadvantage because the larger companies, able to devote more funds to research, will have increased control over genetic resources. Even more worrisome, they claim, are the recent acquisitions of seed companies by large conglomerates.

Supporters Say PVPA Offers Necessary Economic Incentives

Supporters of the PVPA offer some convincing arguments to counter these criticisms. In their opinion, the PVPA actually *adds* to the diversity of material available to growers by encouraging the development of more new varieties and, thus, expanding the total genetic diversity among commercially available varieties.

Proponents further argue that the economic incentives produced by the law greatly stimulate private plant breeding research and make American agricultural products more competitive in world markets. Several companies told **DIVERSITY** that they wouldn't even be investing in this area of agri-business without the protection of the law. "The PVPA takes a lot of risk out of the future," said one company executive whose firm has invested millions of dollars during the past year in agricultural research.

Proponents Stress Benefits of the PVPA

In addition to the economic incentives the PVPA provides the private sector, supporters say that plant protection under the PVPA will also:

- permit public expenditures for applied plant breeding to

be diverted to important areas that industry might not pursue;

- give farmers and gardeners more varietal choice, as well as higher yielding and better quality varieties;
- provide benefits to consumers of crops and crop products through improved quality and greater production; and
- expedite breeding of new varieties by university experiment stations which can license them to seed companies for a share of the proceeds.

"Far from benefiting only large seed companies which can afford large research budgets, the PVPA has already fostered the creation of several one or two person companies," a Senate Agriculture Committee staffer told **DIVERSITY**. In response to criticism that the PVPA further motivates conglomerates to acquire smaller companies, the Senate staffer pointed to the fact that prior to the PVPA only three companies were breeding new soybean varieties, while today there are more than twenty-five companies developing soybean varieties.

Both Sides Hope Study Will Resolve Doubts

The heated debate over these issues, which first arose when the bill was passed in 1970, surfaced again in 1980 when Congress passed several amendments to the law. In order to address some of the concerns raised by those representing the public sector, the Senate Agriculture Committee mandated USDA to undertake a study to assess, in particular, the PVPA's impact on genetic diversity and seed price increases. Those on both sides of the issue hope the study will conclusively resolve at least some of their concerns.

The Food System Research Group, part of the University of Wisconsin's Department of Agricultural Economics, is working jointly with USDA on the study. Some of the questions the joint project will address include whether basic plant genetic re-

search at land grant universities has significantly increased since 1970 and whether the flow of information and plant breeding materials between various public and private plant breeders has declined since 1970.

According to the University of Wisconsin project director for the study, L. J. (Bees) Butler, the dearth of information on the seed industry made it necessary to

devise two confidential questionnaires for U.S. seed companies to answer in order to obtain the required data.

Congress Will Convene Hearings on Findings

With final responses coming in now, Butler hopes to have the report completed for Congress by early summer. Charles Benbrook, staff director for the House Sub-

committee on Department Operations, Research, and Foreign Agriculture, told **DIVERSITY** that the Subcommittee will convene hearings to reexamine the PVPA in the context of the study's findings. The Subcommittee will also review related recommendations made in the recently completed USDA Long Range Plan for the National Plant Germplasm System (NPGS).

News In Brief

■ The **American Genetic Association (AGA)** awarded NE-9 Regional Coordinator **Desmond Dolan** the 1982 **Frank N. Meyer Memorial Medal** for distinctive service in the field of foreign plant introduction. The AGA, in conjunction with the USDA, has awarded thirty-six medals since 1920 in the memory of Frank N. Meyer. Meyer, a USDA Office of Foreign Plant Introduction plant explorer, lost his life on the Yangtze River in China where he was on a plant collecting trip for the U.S.

■ **NPGS National Coordinator Quentin Jones** received Thailand's **Ratnabhorn Medal** during a March 1 ceremony at Phuphing Palace. **His Majesty the King Bhumibol Adulyadej** cited Jones for his leadership role in the King's project to identify and extend new crops and technology to the North Hill Tribe farmers. Jones, who received the **Frank N. Meyer Memorial Medal** in 1978 for distinguished service in foreign plant introduction, serves as Executive Secretary to the National Plant Germplasm Committee and is a member of the International Board for Plant Genetic Resources and the Board's Executive Committee.

■ **Gerry Marx**, professor of plant breeding at Cornell University's New York State Agricultural Experiment Station, was awarded the **1981 Meritorious Service Award by the National Pea Improvement Association** at the group's annual February meeting. The core of his

Quentin Jones receiving Thailand's Ratnabhorn Medal.



research program is a gene bank containing 5,000 lines of peas. Marx is a member of the Pea Crop Advisory Committee which serves the Germplasm Resources Information Project and the NPGS.

■ The **Vegetable Grower's Association of New Jersey** awarded USDA Plant Genetics and Germ-

plasm Institute Chairman **Allan Stoner** the **1982 Award of Achievement** for "Outstanding Service to the Vegetable Industry of the State of New Jersey." Stoner was credited with creating tomato varieties for use in various productions in the U.S.

Pioneer Hi-Bred International, Inc. recently established the **William L. Brown Fellowship** for post-doctoral candidates at the **Missouri Botanical Garden** to commemorate Brown's retirement as Chief Executive of Pioneer. Brown, who recently began serving his term as **President of the Crop Science Society of America** was last year elected a member of the **National Academy of Sciences**.

Brown has developed and coordinated breeding programs in maize, sorghum, soybeans, and wheat throughout the U.S. and abroad. He remains active in the conservation and utilization of plant genetic resources, and serves as chairman of both the Rockefeller Foundation Maize Germplasm Committee and the Maize Committee of the International Board for Plant Genetic Resources. Brown also serves as the Vice-chairman of the National Plant Genetic Resources Board.

Publications

A Standard Procedure for the Development of a Gene Resource Management Plan for a Crop Species, National Council on Gene Resources (NCGR), 1981, 28 pp. For more information and a list of available publications contact: NCGR, 2855 Telegraph Avenue, Berkeley, Calif. 94705.

Chromosome Constitution of Races of Maize, by Barbara McClintock, Takeo Angel Kato,

and Almiro Blumenschein, The Postgraduate College at Chapingo, Mexico, 1981, 517 pp. The book discusses the relationships between the races and varieties of maize in the Americas. The book is available from: Colegio de Postgraduados, Institucion de Enseñanza e Investigacion en Ciencias Agricolas, Chapingo, Mexico.

Handbook of Legumes of World Economic Importance, by

James A. Duke, Plenum Publishing Co., N.Y., 1981, 345 pp. illus., \$45.00. *Bioscience* (32:146,1982) ranks this work "as a major addition to the literature, one that promises to become a standard reference work."

DIVERSITY will intermittently supply information on periodicals which regularly feature items of interest to our readers.

April 21-22 - Potato Crop Advisory Committee Meeting at Sturgeon Bay, Wis. Contact: R. E. Hanneman, Jr., (608) 262-1399.

May 13-14 - National Plant Genetic Resources Board meets in Washington, D.C. (202) 447-6195.

May 16-19 - "Genetic Engineering: Applications to Agriculture," the 7th Beltsville Symposium in Agricultural Science, will be held in Beltsville, Md. The agenda includes sessions on Molecular Genetics, Commercial Applications, DNA Cloning, Genetic Modification, and New Plants Via Tissue Culture. (301) 344-4072.

June 2-4 - Council on Botanical and Horticultural Libraries 14th Annual Meeting, will be held in Washington, D.C. (301) 344-3704.

June 14-17 - Society for Economic Botany 23rd Annual Meeting at University of Alabama, University, Ala. The agenda includes a mini-symposium on "U.S. Oilseeds Industry-Germplasm to Utilization." (205) 348-5947.

June 14-18 - Annual Meeting of American Society of Plant Physiologists at Urbana, Ill. (301) 251-0560.

June 17-20 - Cary Arboretum in Millbrook, N.Y., will host the **Annual Meeting of American Association of Botanical Gardens and Arboreta** at Vassar College, Poughkeepsie, N.Y. (804) 971-2844.

June 19-24 - The Association of Official Seed Analysts meets in Corpus Christi, Texas. (601) 325-3430.

June 21-23 - American Oat Workers Conference and First International Oat Research Workshop will be held at the Nittany Lion Inn, University of Pennsylvania, University Park, Pa. Contact: H. G. Marshall (814) 865-1141.

June 27-July 1 - The American Seed Trade Association (ASTA) holds its annual meeting at the Loews Anatole in Dallas, Texas. (202) 223-4080.

June 29-30, July 1 - NC-7 Regional Technical Committee Meeting, (TENTATIVE), Manhattan, Kan. Contact: W. H. Skrdla (515) 294-3265.

July 7-8 - Grass Breeders Work Planning Conference will be held at the University of Pennsyl-

vania, University Park, Pa. (801) 750-3078.

July 12-13 - The first meeting of the Peanut Crop Advisory Committee will be held in Albuquerque, N.M. Contact: J. C. Wynne (919) 737-3281.

July 13-16 - 28th National Alfalfa Improvement Conference will be held at the University of California, Davis, Calif. (612) 373-0865.

July 14-15 - W-6 Regional Technical Committee Meeting, Reno, Nev. Contact: S. Dietz (509) 335-1502.

July 27-28 - S-9 Regional Technical Committee Meeting, Blacksburg, Va. Contact: G. Lovell (404) 228-7255.



Colorado State University Photo

July 29-30 - Council for Agricultural Science and Technology (CAST) will meet in Ames, Iowa (515) 294-2036.

August 1-4 - American Soybean Association will meet at the Hyatt Regency, Minneapolis, Minn (319) 988-3295.

August 1-5 - The Potato Association of America meets at Monterey, Calif. (207) 581-2771.

August 1-9 - Annual Meeting of American Phytopathological Society, Salt Lake City, Utah. (612) 454-7250.

August 8-11 - Soil Conservation Society of America holds its 37th Annual Meeting at New Orleans, La. (515) 289-2331.

August 8-13 - American Institute of Biological Sciences 33rd Annual Meeting will be at Pennsylvania State University, University Park, Pa. Societies participating in the meeting include **American Society of Plant Taxonomists, Association for Tropical Biology, and Ecological Society of America** (703) 527-6776.

August 8-14 - American Society for Horticultural Science 79th Annual Meeting will be held at Iowa State University, Ames, Iowa. (703) 836-4606.

August 16-19 - The National Plant Germplasm Committee and International Board for Plant Genetic Resources are jointly sponsoring a workshop on **Cell and Tissue Culture and Cryogenic Storage** at Colorado State University, Fort Collins, Colo. (303) 491-5863.

August 18-20 - Fourth International Conference on Resource-Conserving Environmentally Sound Agricultural Alternatives is being held at Cambridge, Mass. (617) 628-5000, ext. 6109.

August 19 - National Plant Germplasm Committee meets at Colorado State University, Fort Collins, Colo. (503) 754-4251.
August 29-September 4 - 21st International Horticultural Congress will meet in Hamburg, Germany. Write: Congress Secretariat, Hamburg Messe und GmbH, P.O. Box 30 23 60, D-2000 Hamburg 36, Federal Rep. of Germany.

September 13-16 - The Utilization of Genetic Resources in Fodder Crop Breeding, a EUCARPIA Fodder Crops Section Meeting, at the Welsh Plant Breeding Station, Plas Gogerddan, Aberystwyth, Wales, U.K. Write: M. D. Hayward at Welsh Plant Breeding Station.

November 4 - Wheat Crop Advisory Committee Meeting at West Lafayette, Ind. Contact: E. Smith (405) 624-6415.

November 28-December 3, 1983 - Kyoto, Japan will be the site of the **Sixth International Wheat Genetics Symposium**. Contact: S. Sakamoto, Local Coordinating Secretary, Plant Germplasm Institute, Faculty of Agriculture, Kyoto University, Mozume, Muko, Kyoto 617, Japan.

December 6-10 - The International Food Policy Research Institute is sponsoring an **International Conference on Chemistry and World Food Supplies-The New Frontiers** in Manila, Philippines. (202) 862-5653.