MINUTES OF THE MEETING OF THE S-9 TECHNICAL COMMITTEE ON THE INTRODUCTION, MULTIPLICATION, AND EVALUATION OF NEW PLANTS FOR AGRICULTURAL AND INDUSTRIAL USES AND THE PRESERVATION OF VALUABLE GERMPLASM

USDA/ARS, TROPICAL AGRICULTURAL RESEARCH STATION
MAYAGUEZ, PUERTO RICO

JULY 26-27, 1990

SUBMITTED BY
NORMAN TAYLOR, SECRETARY
S-9 TECHNICAL COMMITTEE 1989-1990

AGENDA
S-9 TECHNICAL ADVISORY COMMITTEE

Mayaquez, Puerto Rico
July 26 - 27, 1990

1. Tour - 7:30 AM (Thursday)
   Group Dutch-Treat Dinner, 7:30 PM

2. Meeting - Call to Order - 8:00 AM, July 27
   Conference Room - Tropical Agriculture Research Station, USDA-ARS

3. Introduction of Attendees

4. Official Welcome; Dean of College of Agriculture, University of Puerto Rico and Dr. Tony Sotomayor, USDA-ARS

5. Approval of Minutes, 1989 Meeting

6. Additions to and Approval of Agency, 1990 Meeting

7. Appointment of Committees
   A. Nominations
   B. Time and Place of Next Meeting
   C. Resolutions

8. Remarks from the S-9 Administrative Advisor

9. National Program Staff Reports

10. Special Issues for Discussion -
    Dr. David Sleper, CSRS; Dr. Gerald Arkin, Administrative Advisor

11. State Progress Reports and Research Plans

12. Other Agency Reports

13. Plant Exploration Proposals - Gil Lovell

14. Committee Reports and Acceptance
    A. Nominations
    B. Time and Place of Next Meeting
    C. Resolutions

15. Unfinished or New Business

16. Adjournment, July 27, 1990

1. CALL TO ORDER

The S-9 Technicial Committee meeting was called to Order by Chairman Francisco Vazquez at 8:00 AM, July 27, 1990.

2. INTRODUCTION OF ATTENDEES

	Name	Address	Phone
	Gerald Arkin	GAES Griffin, GA 30223-1797	404/228-7263
*	David W. Bradshaw	Clemson University Dept. of Horticulture Clemson, SC 29631	803/656-3404 656-4949
*	William Branch	UGA/Dept. of Agromony Coastal Plains Exp. Sta. Tifton, GA 31793-0748	912/386-3561
	Michael L. Cagley	USDA/NCGR/Citrus Route 2, Box 375 Groveland, FL 32736	904/787-5078
*	David L. Coffey	Dept. of Plant Sciences University of Tennessee P. O. Box 1071 Knoxville, TN 37901	(615)974-3391
*	Ruben Velez Colon	Agri. Exp. Sta.,HC 02 Box 7115 Juana Diaz, PR 0665-9601	(809)842-9196 837-3905
	Wayne Everett	USDA/SCS,Ft. Worth Fed. Center Ft. Worth, TX 76115	(817)334-5282 FTS 334-5282
*	W. T. Fike	N. C. State University Dept. of Crop Science Raleigh, NC 27695-7620	(919)737-3267
*	Phillip T. Ito	Univ. of Hawaii College of Tropical Agric. 461 W. Lanikaula Street Hilo, HI 96720	(808)935-2885
*	James S. Kirby	Oklahoma State University Dept. of Agronomy Stillwater, OK 74078	(405)744-6417
	Robert Kleiman	USDA/ARS Northern Reg. Res. Center 1815 N. University Street Peoria, IL 61604	(309)685-4011

	Gilbert R. Lovell	USDA/ARS, S.Reg. Plt. Intro.Sta. Ga.Exp.Sta.,1109 Experiment St. Griffin, GA 30223-1797	(404)228-7255 FAX: (404)228-7270
*	Jorge A. Mosjidis	Agronomy Department Auburn University Auburn, AL 36830	(205)844-3976 FAX: (205)844-3945
*	Gordon M. Prine	Univ. of Florida,Dept. Agronomy 304 Newell Hall Gainesville, FL 32611	(904)392-1811
	Raymond J. Schnell	USDA/ARS Subtropical Hort. Res. Sta. Miami, FL 33158	(305)238-9321
	Henry L. Shands	USDA/National Program Staff BARC-West, Bldg. 005, Rm. 140 Beltsville, MD 20705	(301)344-3311 (301)344-3191
*	Norman Taylor	University of Kentucky Dept. of Agronomy Lexington, KY 40506	(606)257-2644
*	William J. Blackmon	Louisiana State University Dept. of Agronomy Baton Rouge, LA 70803-2110	(504)388-2158
	Francisco Vazquez	USDA/ARS Tropical Agric. Res. Sta. P. O. Box 70 Mayaguez, PR 00709	(809)831-3435 831-3439
*	C. E. Watson	Mississippi State University Dept. of Agronomy Mississippi, MS 39762	(601)325-2311
	George A. White	USDA/ARS, Germplasm Res. Lab. Bldg. 001, Rm. 322, BARC-West Beltsville, MD 20705	(301)344-3328 FAX: (301)344-3036

* Members of the S-9 Technical Committee

3. WELCOME

Dr. J. A. Quinones, Acting Director of Agricultural Experiment Stations, University of Puerto welcomed the Committee. Dr. Antonio Sotomayor, Location Coordinator, USDA-ARS, TARS also welcomed the Committee as host of the meeting.

4. APPROVAL OF MINUTES

Jim Kirby moved that the Minutes of the 1989 meeting be approved as circulated. The motion was seconded and approved.

5. APPROVAL OF AGENDA

The 1990 Agenda was approved as circulated.

6. APPOINTMENT OF COMMITTEES

A. Nominations - C. E. Watson and Norman Taylor

B. Time and Place of Next Meeting - Gordon Prine and Bob Knight

C. Resolutions - David Bradshaw and Bill Fike

7. REMARKS FROM ADMINISTRATIVE ADVISOR

A. The increasing role of the Crop Advisory Committees was reviewed. They are technical advisors to help set priorities of developing and maintaining needed germplasm collections.

B. The Technical Advisory Committee to the Regional Projects should continue to advise the Coordinator of the S-9 Project on the needs of the plant scientists in the Southern states regarding plant germplasm.

C. It was suggested that annual S-90 meetings involve less details from the Progress Reports and leave more time for presentation and responses to current germplasm issues.

8. National Program Staff Reports

A. Dr. Henry Shands, National Program Leader for Plant Germplasm acknowledged Dr. Sotomayor and the staff of TARS for their continuing efforts in winter nursery operations for regeneration of S-9 germplasm collections.

B. He reported that the National Plant Germplasm Quarantine Laboratory and the Germplasm Services Laboratory have been merged into the new National Germplasm Resources Laboratory under the direction of Dr. Allan Stoner.

C. Germplasm funding for FY 90 is $28,059,000 a reduction of $444,000 from the FY 89 allocations. No major increase is expected in FY 91.

9. SPECIAL ISSUED FOR DISCUSSION

A. Dr. David Sleper, CSRS Representative, reviewed the National Research Support Project for Plant Genetics Resources. It proposes to coordinate, through a National Research Support Project (NRSP) Committee, the plans and activities of the six germplasm projects in the CSRS regional system. These six projects are NC-7, NE-9, S-9, W-6, IR-1 and IR-2.

B. Dr. Sleper introduced a change in the approval process of Regional Project Outlines. In the future the Regional Association of Agricultural Experiment Station Directors will approve or disapprove the revised regional projects before it can go forward to the Committee of Nine.

C. Dr. Henry Shands reviewed the progress of the Subcommittee on Plant Genetic Resources of the National Academy of Science. The report of this subcommittee examines the management of plant germplasm in the United States and the activities of the National Plant Germplasm System (NPGS). It is expected that the report will be made public early in 1991 and would be available to the S-9 Technical Committee.

D. Dr. Gerald Arkin suggested that an agenda be developed to cover policy and critical issues affecting germplasm. This agenda would be most effective if prepared early enough to allow committee members to prepare for discussion.

10. TOUR

A whole day was required to effectively tour Puerto Rico's agricultural research facilities and some innovative agri-business locations.

TARS Staff reviewed in the field the Winter Nursery Operations and emphasized the research projects of the Southern states that are enhanced by the services provided by TARS.

Mr. Rueben Colon, S-9 member, acted as host at the Fortuna Tropical Fruit Station.

A shrimp production farm was visited and all members gained enlightment of the potential of this specialty food industry. A small but successful mango producer with an international market was also very impressive.

11. STATE PROGRESS REPORTS AND RESEARCH PLANS

The following state representatives presented their annual reports. Copies of the state reports are included in Appendix I.

Representative	State
Jorge A. Mosjidis	Alabama
T. E. Morelock	Arkansas
Gordon M. Prine	Florida

Representative	State
William Branch	Georgia
Phillip T. Ito	Hawaii
Norman Taylor	Kentucky
W. J. Blackmon	Louisiana
C. E. Watson, Jr.	Mississippi
W. T. Fike	North Carolina
James S. Kirby	Oklahoma
Ruben Velez Colon	Puerto Rico
D. W. Bradshaw	South Carolina
David Coffey	Tennessee
George G. McBee	Texas
R. E. Veilleux	Virginia

12. OTHER AGENCY REPORTS

The following agency reports were made and are included in Appendix I:

Representatives	Agency
Vickie Binstock	Germplasm Resources Lab
Michael L. Cagley	National Clonal Germplasm Repos. - Citrus
Henry L. Shands	National Program Staff
Loren Weisner	National Seed Storage Lab
Robert Kleiman	Northern Regional Res. Center
Wayne Everett	Soil Conservation Service
Gilbert R. Lovell	Southern Plant Introduction Sta.
Raymond Schnell	Subtropical Hort. Res. Centerl
Francis T. Zee	National Clonal Germplasm Repos.- Tropical Fruit

13. COMMITTEE REPORTS AND ACCEPTANCE

A. Nominations
Chairman - Dr. Norman Taylor
Secretary - Dr. Gordon Prine

B. Time and Place of Next Meeting
Gainville, FL, July 24 - 25, 1991

C. Resolutions

Be It Resolved That the S-9 Technical Committee Approves the Following Resolutions:

1. Expresses its appreciation to Francisco Vazquez and Ruben Colon for co-hosting the S-9 meeting and the extensive and informative tour.

2. Special Thanks go to Dr. Tony Sotomayor and the staff of TARS for their generosity in time and effort in their presentations in the Winter Nursery plots and providing the transportation which made our tour a success.

14. UNFINISHED OR NEW BUSINESS

A. Consideration is to be given that "Progress Reports" by the committee members be based on a January-December calendar year. These annual progress reports would be submitted to the S-9 Coordinator in the January following the progress report period. Members are to be prepared to review procedures and possible problems accomplishing this at the 1991 meeting in Gainesville, FL.

B. Dr. Shands introduced the development of a new section in the Agronomy Society of America that will address the plant germplasm activities in the United States.

16. ADJOURMENT

The meeting was adjourned by Chairman Francisco Vazquez at 4:00 PM, July 27, 1990.

APPENDIX I

STATE AND FEDERAL REPORTS

Written progress reports are attached in the following order:

Alabama

Arkansas

Florida

Georgia

Hawaii

Kentucky

Louisiana

Mississippi

North Carolina

Oklahoma

Puerto Rico

South Carolina

Tennessee

Texas

Virginia

Germplasm Resources Laboratory

National Clonal Germplasm Repository - Citrus
Groveland, FL

National Clonal Germplasm Repository - Tropical
Fruit - Hilo, HI

National Program Staff

National Seed Storage Laboratory

Northern Regional Research Center

Soil Conservation Service

Southern Regional Plant Introduction Station

Subtropical Horticultural Research Station
Miami, FL

S-9 Technical Committee Report
July 1990

Agency: Auburn University and Alabama Agricultural Experiment Station
Submitted by: J. A. Mosjidis
Address: Department of Agronomy and Soils and
Alabama Agricultural Experiment Station
Auburn University
Auburn, AL 36849-5412

* * * * * * *

Accession User: J. A. Mosjidis
Address: Department of Agronomy
Auburn University
Auburn, AL 36849-5412

Nature of Research: Evaluation of Lespedeza spp. for tannin content.

Progress to Date: Seventy-six accessions of 18 Lespedeza species obtained from the Regional Plant Introduction Station, Experiment, Georgia, were evaluated for condensed tannins using the vanillin/HCl spot test. Tannin content of the plants was scored 1 to 9 where 1= no tannin, 3= traces, 5= slight, 7= medium, 9= high. A total of 1,319 individual plants of 38 accessions and 8 experimental lines of L. cuneata, 3 of L. japonica, 3 of L. juncea, 3 of L. hedysaroides, 1 of L. striata, 1 L. sp., 1 of L. stipulacea, 8 of L. bicolor, 4 of L. cyrtobotrya, 2 of L. thunbergii, 1 of L. pilosa, 1 of L. serperens, 2 of L. divaricata, 2 of L. inschanica, 2 of L. daurica, 1 of L. intermixta, 1 of L. tomentosa, 1 of L. virgata, and 1 of L. capitata were evaluated in the field in August 1988. Most species were found to be polymorphic for tannin production. Fifty-three percent of L. cuneata accessions were not polymorphic. In general, the tannin level of the accessions was high (between 8 and 9). However, some accessions of L. japonica, L. stipulacea, L. bicolor, and L. cyrtobotrya had plants with traces or slight content of tannins.

Publications:
Mosjidis, J.A. 1989. Lespedeza spp. and Vicia spp. research. Progress Report - Clovers and Special Purpose Legumes 22:1-4.

Cultivar Releases: None

Accession User: Edzard van Santen
Address: Dept. of Agronomy and Soils
and Alabama Agricultural Experiment Station
Auburn University
Auburn, AL 36849-5412

Nature of Reseach: Evaluation of the adaptation of crimson clover germplasm to Alabama.

Progress to Date: One hundred and twenty five seedlings of five accessions, PI 233812 (Italy), PI 251563 (Yugoslavia), PI 258454 (Italy), PI 251562 (Yugoslavia), and PI 255892 (Poland), were established in the greenhouse and transplanted at the Gulf Coast Substation in Fairhope, Alabama, in late November 1988. In March 1989, all plants were rated for vigor on a scale of 1 to 5. All plants with a score of 4 and above were selected and intermated. Separate populations were established for PI's 233812, 251562, and 255892. This experiment will be repeated in the fall of 1989. One PI (258454) was found not to be Trifolium incarnatum L., but tenatively identified as Trifolium arvense L.
Publications: none
Cultivar release: none

Accession User: J. A. Mosjidis
Address: Department of Agronomy and Soils and
Alabama Agricultural Experiment Station
Auburn University
Auburn, AL 36849-5412

Nature of Research: Study of the breeding system of several Vicia spp.

Progress to Date: Thirty-one accessions of V. articulata, V. benghalensis, V. cracca, V. cracca subsp. tenuifolia, V. ervilia, V. lutea, V. narbonensis, V. pannonica, V. peregrina, V. pisiformis, V. villosa, and V. villosa ssp. varia were obtained from the Plant Introduction Station, Experiment, Georgia. From this plant material, 11 accessions of V. articulata, V. benghalensis, V. cracca, V. ervilia, V. lutea, V. narbonensis, V. pannonica, V. peregrina, V. villosa, and V. villosa ssp. varia were selected to be planted. Because of the low germination and poor seed quality of some accessions, they were planted in pots last October and transplanted to the field (Plant Breeding Unit, Tallassee, Alabama) early November 1989. The three accessions of V. cracca (PI's 371785, 372763, and 494680) were lost because of poor seedling vigor. Plants of Vicia articulata (PI 220879), Vicia benghalensis (PI's 298003 and 449330), and V. ervilia (PI's 203145 and 252053) were lost or damaged by the low temperatures (-2 to -6 C) of last December 12 and 29, 1989.

Plants of Vicia articulata (PI's 206390, 220879, and 449362), Vicia benghalensis (PI's 298001, 298003, and 449330), Vicia lutea (PI's 201994, 249880, and 250797), and Vicia villosa (PI's 201883,

206493, and 222217) were enclosed in cages when the first flower buds appeared to prevent pollinators from reaching the flowers. Ten to 70 flowers of each accession in each of two replications were subjected to the following manipulations: 1) tagged flowers with no further manipulation (isolated), 2) flowers were tripped with forceps to artificially self-pollinate them (tripped), 3) flowers emasculated and artificially cross-pollinated with other plants of the same population (PI), (crossed), 4) flowers emasculated (emasculated). Gathering of results is beginning.

When the plants flowered, it was observed that several types of insects were damaging flower buds and open flowers. Larvae and adults of the Orders Coleoptera (beetles), Thysanoptera (thrips), and Lepidoptera (moths) were found. Stamens of the Vicia lutea accessions were particularly damaged by those insects. Green aphids (Order Homoptera, Family Aphidae) damaged leaves and flowers of Vicia articulata (PI's 206390 and 449362).

Several morphological observations are being taken on the plants of the different species.

Publications: none

Cultivar release: none

Accession User: C. S. Prakash,
Address: Tuskegee University
School of Agriculture & Home Economics
Tuskegee, AL 36088
Telephone: (205) 727-8023

Nature of Research: Development/Identification of DNA Markers in Sweet Potato

Progress to Date: We have collected 50 accessions of sweet potato from SW. Pot. Germplasm Introduction Center, Griffin, Georgia (USDA/ARS). We maintain them in vitro and also ex vitro. We also obtained seeds of nearly 10 Ipomoea wild species. We have extracted DNA from all lines. We will soon be testing the lines for Restriction Fragment Length Polymorphism. Our goal is to identify linkage of agronomic traits with RFLP markers, fingerprint cultivars and elucidate the evolutionary biology of Ipomoea batatae.

Publications: None

Cultivar Releases: None

Accession User: Dr. C. S. Prakash,
Address: Tuskegee University
School of Agriculture & Home Economics
Tuskegee, AL 36088
Telephone: (205) 727-8023

Nature of Research: Development of Gene Transfer System for Sweet Potato

Progress to Date: To identify a suitable gene transfer method for sweet potato, chimaeric constructs of B-glucuronidase (GUS) and neomycin phosphotransferase (NPT II) genes under the control of CaMV 35S and NOS promoters, respectively, were employed. DNA-coated microscopic tungsten particles were bombarded on leaf and stem explants with the aid of high velocity microprojectiles in a particle delivery apparatus. Three to seven days after the particle delivery, expression of GUS genes could be observed in leaf tissue by the appearance of blue cells in X-gluc treated tissues.

Publications:
Prakash, C. S. 1990. Microprojectile delivery of foreign genes into sweet potato - VIIth International Congress on Plant Tissue and Cell Culture, Amsterdam 24-29 June 1990

Cultivar Releases: None

Accession User: Kenneth M. Rogers
Address: 163 Woodfield Drive
Auburn, AL 36830

Nature of Research: Evaluate peanut PI's for home garden use. Looking for an early, bunch type for home garden use.

Progress to Date: Just started in 1990

Publications: None

Cultivar Releases: None

Accession User: Joseph Norton/George Boyhan
Address: Dept. of Horticulture and
Alabama Agricultural Experiment Station
101 Funchess Hall
Auburn University, AL 36849

Nature of Research: Emphasis is placed on incorporation of resistance to Zucchini Yellow Mosaic Virus into multiple disease resistant breeding lines and cultivars of muskmelon and watermelon. Plant introduction 414723 of muskmelon and PI 4822-6 of watermelon are being used as sources of resistance. Screening is underway for resistance to Zucchini Yellow Mosaic Virus. We are looking at several lines and part of the PI collection especially Citrullus colocynthis which has been reported to have resistance.

Progress to Date: Currently screening material in the greenhouse, no results to report.

Publications: J.D. Norton and R.D. Cosper. 1989. AC-70-154. A gummy stem blight resistant muskmelon breeding line. HortScience 24:709-711.

Cultivar Releases: AC-70-154 muskmelon. Gummy stem blight resistant. Also multiple disease resistant.

ACCESSION USER: Sand Mountain-Lake Guntersville Water Quality Project
Address: USDA Soil Conservation Service
P.O. Box 968
Rainsville, AL 35986

NATURE OF RESEARCH: Plant material field plantings have been established to explore the concept of pollutants being filtered out or absorbed by the plants. Evaluations will be made to their relative efficiency, tolerance to various contaminants and methodology for their use.
The Sand Mountain-Lake Guntersville Watershed containing 400,800 acres is experiencing significant water quality deterioration. According to reports prepared by Alabama Department of Environmental Management and Geological Survey of Alabama, bacteria in the form of fecal coliform or streptococci were detected in 93 percent of the ground-water well sites. Nitrate as N concentrations exceeded the national primary drinking water standard of 10 mg/L in 23 percent of the sites.
This is due to a complex combination of factors, such as naturally shallow soils, porous limestone bedrock, and high densities of livestock, poultry, and rural populations in the watershed. The principal pollutants are nutrients (nitrogen, phosphorus, and potassium), bacteria, and sediment. Potential sources include livestock and poultry waste, runoff from cropland, and malfunctioning septic tank systems. In addition, the concentration of swine and poultry in this watershed is among the highest in Alabama. Complicating the problem of sheer numbers of animals is their density in relation to the land available for spreading waste. Most livestock and poultry producers confine large numbers of animals or birds to improve efficiency of production; however, many of these producers do not own sufficient land to fully utilize the nutrients available. Thus, wastes are often spread on small areas at high rates which preclude full utilization of nutrients by the receiving crop. These high application rates increase the potential for polluted runoff. The high nutrient levels in surface waters during the spring are attributed, in part, to improper land application of wastes. High concentrations of nitrogen and phosphorus have been recorded by Tennessee Valley Authority during stream monitoring.

PROGRESS TO DATE: The Sand Mountain Substation of the Alabama Agricultural Experiment Station has a constructed wetland cell adjacent to a swine operation with three long-established lagoons where screening of the plant materials will take place. The

constructed wetland cells were planted with the following materials: Halifax maidencane, California bulrush, giant cutgrass, smooth cordgrass, common reed, and water chestnut.

Methodology for loading the nutrients through the system will be evaluated to determine if batch loading applications or continuous loading applications are most successful for improving water quality.

Another site was selected on George LaMunyon's farm for evaluating plant materials for water quality improvement. This poultry (layer) operation with a two-stage lagoon system is typical for the watershed. Nutrient-laden waste water will be irrigated on five acres of cropland for the production of vegetable crops. Rainfall runoff will be channeled through a filter strip planted with the following plant materials: Tifton 44 bermuda, Eastern gammagrass, Tifton 78 bermuda, Brunswickgrass, Alamo switchgrass, giant cutgrass and smooth cordgrass.

Plant materials will be evaluated for their potential to grow under a wide range of soil conditions, capability of withstanding frequent applications of irrigated wasted water, and potential for assimilating high nutrient uptake of nitrogen, phosphorus, and copper from poultry waste. In addition, various vegetable crops will be assessed for production associated with high nutrient levels and market acceptance.

Reprinted from HortScience, Vol. 24(4), August 1989
A Publication of the American Society for Horticultural Science, Alexandria, VA 22314

HortScience 24(4):709–711. 1989.

AC-70-154, A Gummy Stem Blight-resistant Muskmelon Breeding Line

J.D. Norton[1] and R.D. Cosper[2]
Department of Horticulture and Alabama Agricultural Experiment Station, Auburn University, AL 36849

Additional index words. *Cucumis melo*, vegetable breeding, *Didymella bryoniae*, powdery mildew, *Sphaerotheca fuliginea*, downy mildew, *Pseudoperonospora cubensis*

Diseases, particularly gummy stem blight [*Didymella bryoniae* (Auersw.) Rehm], downy mildew [*Pseudoperonospora cubensis* (Berk. and Curt.) Rostow], and powdery mildew [*Sphaerotheca fuliginea* (Schlecht) Poll], are major factors limiting production of muskmelon in the southern United States (Anonymous, 1962; Chiu, 1948; Ellis, 1951; Norton and Prasad, 1965; Prasad and Norton, 1967; Winstead et al., 1960). Severe economic losses have been reported in the field, in transit, and in storage. Although satisfactory control of gummy stem blight (GSB), downy mildew (DM), and powdery mildew (PM) may be accomplished with the proper application of organic fungicides during normal weather conditions, chemical control is not effective during periods of high humidity and rainfall. Furthermore, only three cultivars—Chilton, Gulfcoast, and AUrora—are reported to be resistant to GSB (Norton, 1971; Norton, 1972; Norton et al., 1985). The discovery that plant introduction 140471 had a high level of resistance to GSB (Sowell et al., 1966) led to the initiation of an Alabama Agricultural Experiment Station muskmelon breeding program to develop multiple disease-resistant breeding lines with high yields of excellent-quality fruit (Norton and Prasad, 1965; Prasad and Norton, 1967).

Received for publication 14 Dec. 1987. Alabama Agricultural Experiment Station Journal Series no. 11-8714. We gratefully acknowledge the assistance of Grover B. Sowell, Jr. for discovery of resistance to *Didymella bryoniae* and in screening techniques and of H.M. Bryce, J.A. Pitts, and K.C. Short, Chilton Area Horticulture Substation, Clanton, Ala., in increasing seed for distribution and conducting evaluation trials. The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.
[1]Professor.
[2]Former Research Associate.

Origin

AC-70-154 originated from the cross 'Georgia 47' x PI 140471 and was developed through a program of backcrossing, disease screening, and inbreeding (selfing and sibbing) to obtain resistance to GSB, PM, and DM (Fig. 1). PI 140471 was a "smell melon" collected from Texas by G.H. Godfrey. Its fruits were small, orange-yellow, and striped while still green.

Single plant selections of *C. melo* introduction PI 140471, which were resistant to *D. bryoniae*, and the GSB susceptible cultivar Georgia 47 were used as parents. Controlled pollinations were made in a greenhouse.

Disease resistance

Resistance to GSB was incorporated into AC-70-154 through a screening program that used artificial inoculations in an incubation chamber and greenhouse to identify susceptible plants (Norton, 1971; Norton, 1972; Norton et al., 1985). The *D. bryoniae* isolate, 464-8 = CS-1, described by Sowell and Pointer (1962) was used for this study. A modification of the cultural and inoculation techniques developed by Sowell and Pointer (1962) was used in the tests. Seedlings were inoculated in the two-leaf stage by spraying to drip with a suspension of 2×10^5 spores/ml. The plants were immediately placed in

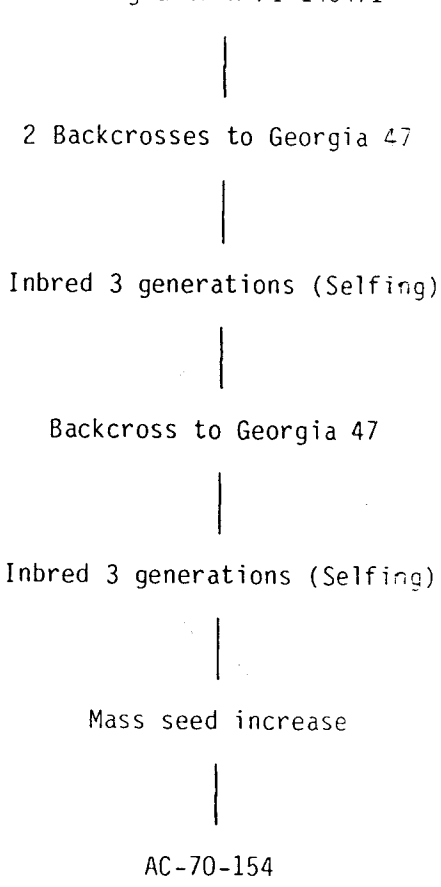

Fig. 1. Pedigree of AC-70-154 muskmelon

an incubation chamber at 25 ± 2C and 100% RH for 48 hr and were then transferred to greenhouse benches. After 21 days, the plants were rated individually for GSB damage using the following disease index: 0 = no injury, 1 = 1% to 20%, 2 = 21% to 40%, 3 = 41% to 60%, 4 = 61% to 80%, and 5 = 81% to 100% injury.

Seedlings were also evaluated in field plantings. Seedlings were inoculated in the two-leaf stage by spraying to drip with 2×10^5 spores/ml suspension. The plants were rated for damage from *D. bryoniae* 21 days after inoculation by using the disease index noted above.

PI 140471, with a disease index rating of 1, showed a high degree of resistance under greenhouse conditions conducive to severe infection. All plants of 'Georgia 47' were severely damaged by GSB and had disease indexes of 5 (Table 1). AC-70-154 has been consistently rated high for resistance to GSB in Alabama and at the Southeastern Regional Plant Introduction Station, Experiment, Ga. (G. Sowell, Jr., personal communication).

In addition to GSB resistance, resistances to DM and PM were incorporated into the breeding line. Resistances to DM and PM were apparently obtained from 'Georgia 47' (G. Sowell, Jr., personal communication). Selection of plants with resistance to PM race 2 was made from greenhouse inoculation tests. The PM race was determined from the different reactions of 'PMR 45' and 'PMR 6' for identification and was maintained on yellow straightneck squash. Inoculations were made by dusting inoculum on seedlings at the two-leaf stage of growth. The plants were rated for severity of infection 21 days after inoculation using the same disease index as that used for the GSB tests. Selections of plants with resistance to natural infection by DM were made in field plantings. Field ratings for foliar injury from DM were made using the same disease index as that for GSB.

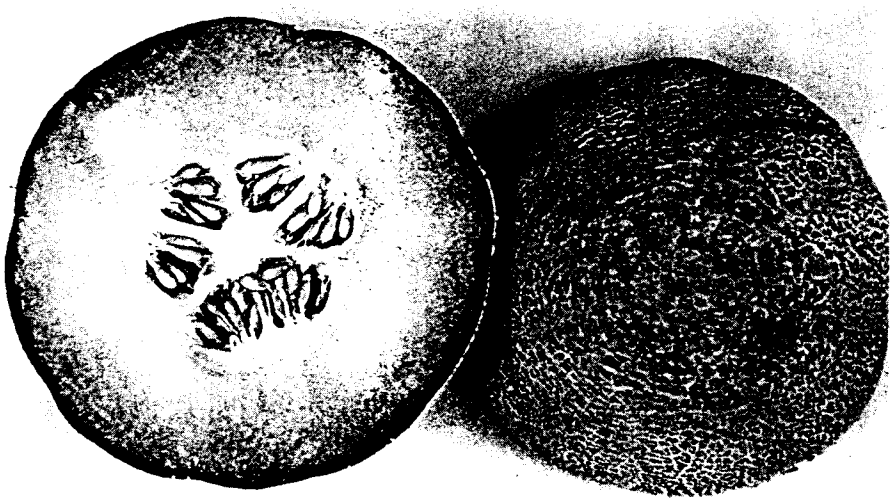

Fig. 2. Fruit of AC-70-154 muskmelon.

Table 1. Disease index ratings of muskmelon cultivars for three diseases, Auburn, Ala.

Cultivar	Disease index[z]		
	Downy mildew[y]	Gummy stem blight[x]	Powdery mildew[x]
AC-70-154	1.0	1.0	1.0
AUrora	1.0	2.0	1.0
Chilton	1.0	1.5	1.0
Edisto 47	1.5	5.0	1.5
Gerogia 47	1.0	5.0	1.0
Gulfcoast	1.0	1.5	1.0
Mainstream	1.5	4.0	1.5
Planters Jumbo	1.5	4.0	1.5
PI 140471	2.0	1.0	3.0
Hales Best Jumbo	3.5	5.0	3.5

[z]Disease index: 0 = no injury, 1 = 1% to 20%, 2 = 21% to 40%, 3 = 41% to 60%, 4 = 61% to 80%, and 5 = 81% to 100% injury; plants individually rated.
[y]Field ratings of plants.
[x]Greenhouse screening tests, 40 plants evaluated.

Table 2. Average yield, fruit weight, and soluble solids concentration (SSC) of muskmelon cultivars (E.V. Smith Research Center, Shorter, Ala., 1977–84).

Culitvar	Yield ($t \cdot ha^{-1}$)	Fruit wt (kg)	SSC[z] (%)
AC-70-154	37.7 a[y]	1.59 b	12.3 b
AUrora	38.4 a	1.90 a	11.9 bc
Chilton	32.0 b	1.32 c	12.9 a
Edisto 47	26.4 c	1.96 a	11.8 bc
Gulfcoast	32.9 b	1.38 c	12.1 bc
Mainstream	25.9 c	1.23 d	10.6 c
Planters Jumbo	22.0 d	1.64 b	10.6 c

[z]Soluble solids concentration determined with a Bausch and Lomb refractometer, 0% to 25% scale.
[y]Mean separation within columns by Duncan's multiple range test, 5% level.

Description

The fruits of AC-70-154 are round to oblong-round (Fig. 2). They measure 15 to 18 cm in diameter and have an average weight of 1.59 kg (Table 2). Some variation in size, shape, and netting is present in the breeding line. AC-70-154 fruits are comparable in size to other "jumbo" melons commonly grown in Alabama and hauled loose from farm to market.

The fruit mature in 70 to 75 days from field-seeded plantes. They are slightly ribbed and well-covered with a medium net varying from the 'PMR 45' to 'Edisto' type of net. The flesh is thick, deep orange 24A (Colour Chart, The Royal Horticultural Society), and of excellent flavor and aroma, as judged by us. The seed cavity is small (7 to 10 cm in diameter).

The fruits are ripe and firm at the full-slip stage of maturity; however, harvested fruit will soften to an excellent condition for dessert quality within 3 to 4 days at room temperature.

AC-70-154 compares favorably with established jumbo-type cultivars AUrora, Planters Jumbo, and Edisto 47 in yielding ability and soluble solids content (Table 2).

Seed availability

A limited quantity of seed is available from J.D.N. for distribution to muskmelon breeders as a germplasm release of the Alabama Agricultural Experiment Station.

Literature Cited

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Norton, J.D. 1971. Gulfcoast—a sweet cantaloupe for the produce chain store market. Ala.

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Winstead, N.N., D.L. Strider, and L.H. Person. 1960. Vegetable diseases in North Carolina during 1958–1959. Plant Dis. Rptr. 44:491–495

ABSTRACT FORM

VII International Congress on Plant Tissue and Cell Culture

Amsterdam 24-29 June 1990
International Association
for Plant Tissue Culture

MICROPROJECTILE DELIVERY OF FOREIGN GENES INTO SWEET POTATO

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Sweet potato (Ipomoea batatas) is the sixth most important food crop in the world which provides valuable nutrition and sustenance to people in developing countries. Genetic engineering approaches provide rapid means of introducing useful genes and thus circumvent several reproductive constraints (e.g., sterility and compatability) that impede sweet potato improvement. To identify a suitable gene transfer method for sweet potato, chimaeric constructs of β-glucuronidase (GUS) and neomycin phosphotransferase (NPT II) genes under the control of CaMV 35S and NOS promoters, respectively, were employed. DNA-coated microscopic tungsten particles were bombarded on leaf and stem explants with the aid of high velocity microprojectiles in a particle delivery apparratus. Three to seven days after the particle delivery, expression of GUS genes could be observed in leaf tissue by the appearance of blue cells in X-gluc treated tissues. Research supported by USAID grant under HBCU program. Thanks to Dr. Karen Kindle and colleagues (Cornell University - NSF Plant Science Center) for advice and access to equipment.

1990 S-9 TECHNICAL COMMITTEE REPORT FOR ARKANSAS

AGENCY: Arkansas Agricultural Experiment Station
SUBMITTED BY: T.E. Morelock
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ACCESSION USER: S.J. Scott
ADDRESS: Department of Horticulture
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NATURE OF RESEARCH: Breeding for resistance to tomato spotted wilt in tomato.
PROGRESS TO DATE: Plants resistant to one Arkansas isolate of tomato spotted wilt virus have been identified in Lycopersicon peruvianum and L. pimpinelliofolium. Additional tests of resistance are in progress.
PUBLICATIONS: None
CULTIVAR RELEASES: None

1990 S-9 TECHNICAL COMMITTEE REPORT FOR ARKANSAS

AGENCY: Arkansas Agricultural Experiment Station
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NATURE OF RESEARCH: Breeding for root rot resistance in snap bean.
PROGRESS TO DATE: High levels of resistance to Rhizoctonia root rot have been fixed in white seeded bush types. Several PI's have been used but PI165426 has been the most useful.
PUBLICATIONS: None
CULTIVAR RELEASES: None

1990 S-9 TECHNICAL COMMITTEE REPORT FOR ARKANSAS

AGENCY: Arkansas Agricultural Experiment Station
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NATURE OF RESEARCH: Determining genomic relationships of cotton.

PROGRESS TO DATE: Seed increases were made of the Kimberley cottons collected in the wet-dry tropics of Western Australia in 1985. Numerous interspecific crosses were made among the Kimberley group and with other Gossypium species to determine their genomic relationships within the genus. Verification of the Asiatic cotton collection was continued. Accessions grown in 1987 which appeared to have questionable identification or genetic stability were field grown again in 1988 for confirmation. Also, individual segregants of accessions with mixed populations from 1987 were grown for seed increase this year. Eighty-five accessions of G. arboreum and G. herbaceum were tested for Heliothis resistance in a no-choice square feeding screen. Twelve accessions representing ten Gossypium species were tested for their ability to adjust the osmotic potential of their leaves and roots in response to water stress. An accession of G. hirsutum collected in Australia was found to have twice the level of osmotic adjustment of four cultivated lines of the same species and of other species examined. Cytoplasms of wild Gossypium continue to be introgressed into the tetraploid nuclear background. Cytoplasmic male sterility has been identified in three of these cytoplasms. A male fertile line did not restore fertility to a sibling male sterile line in one of the cytoplasms tested. Several nuclear traits are being transferred from wild species accessions to cultivated cottons.

PUBLICATIONS: None

CULTIVAR RELEASES: None

1990 S-9 TECHNICAL COMMITTEE REPORT FOR FLORIDA

University of Florida
Institute of Food and Agricultural Sciences
Florida Agricultural Experiment Stations
and USDA Cooperators

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Nature of Research: Evaluating tropical forage legumes and grasses for persistence, quality, and dry matter production for excessively well-drained soils in the subtropics. Genera being evaluated include: Leucaena, Stylosanthes, Arachis, Alysicarpus, Indigofera, and Pennisetum.

Progress to Date: Various Leucaena spp. and hybrids (KX1A, KX2, L. esculenta, KX3C, K636, K409, K376 [L. pallida], K584, and K8) are being evaluated for forage production, persistence, and psyllid (Heteropsylla cubana) resistance. Leucaena pallida, K376, and L. esculenta have proved to be most resistant, having essentially no psyllids present. Four semi-dwarf breeding lines of Pennisetum purpureum (N114, N127, N128, and N129) were compared to Merkeron (N43) and Mott (N75) for leaf:stem ratio, dry matter (DM) production, and forage quality. Generally, leaf to stem ratios were negatively correlated with total DM production.

Publications:

Hammond, A. C., M. J. Williams, W. T. Butts, and E. L. Adams. 1989. Evaluation of rhizoma perennial peanut hay as a protein source for wintering cows. J. Anim. Sci. 67(Suppl. 2):52.

Hammond, A. C., M. J. Allison, M. J. Williams, G. M. Prine, and D. B. Bates. 1989. Prevention of Leucaena toxicity of cattle in Florida by ruminal inoculation with 3,4-DHP-degrading bacteria. Amer. J. Vet. Res. 50(12):2176-2180.

Hammond, A. C., M. J. Allison, and M. J. Williams. 1989. Persistence of DHP-degrading ruminal bacteria between growing seasons in subtropical Florida. Leucaena Res. Rep. 10:66-68.

Williams, M. J., A. C. Hammond, W. T. Butts, and W. E. Kunkle. 1989. Dynamics of a tropical grass-legume sward in the subtropics and its effect on animal performance. pp. 1021-1022. XVI Intl. Grassld. Congr., Nice, France. 1660 p.

Williams, M. J. 1989. Evaluation of microhistological analysis for determining peanut-grass composition of cattle diet, rumen and fecal samples. pp. 142-146. Proc. For. Grassld. Conf., Amer. For. Grassld. Council, Guelph, Ontario. 356 pp.

Padgett, L. J., A. C. Hammond, M. J. Williams, and W. E. Kunkle. 1990. Evaluation of perennial peanut hay as a supplement for wintering cows and heifers. pp. 105-109. Proc. For. Grassld. Conf., Amer. For. Grassld. Council, Blacksburg, VA. 358 pp.

Williams, M. J. 1990. Influence of planting date and plantbed preparation on emergence and survival of rhizoma perennial peanut. pp. 24-28. Proc. For. Grassld. Conf., Amer. For. Grassld. Council, Blacksburg, VA. 318 pp.

Accession User: P. L. Pfahler
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Nature of Research: Crop: Sesame (Sesamum indicum L.). To examine the nature and extent of genetic variability in this crop for potential basic research involving all aspects of pollen formation, germination, and transmission studies.

Progress to Date: In August 1988, I received 984 sesame accessions from the Plant Introduction Station at Experiment, Georgia. These accessions were planted in the field in June 1989 and evaluated for genetic variability and useful genetic characters. Seeds from single plants or rows were harvested from 28 accessions whose PI numbers (country of origin) are as follows:

PI 154308 (Mexico)
PI 158044 (China)
PI 158045 (China)
PI 158056 (China)
PI 158062 (China)
PI 158769 (Venezuela)
PI 158770 (Venezuela)
PI 158771 (Venezuela)
PI 158906 (China)
PI 159035 (China)
PI 162563 (China)
PI 279542 (Mexico)
PI 317383 (Korea)
PI 345670 (Soviet Union)
PI 165593 (India)
PI 165899 (India)
PI 170757 (Turkey)
PI 180481 (India)
PI 238455 (Turkey)
PI 240844 (Turkey)
PI 263446 (Japan)
PI 263448 (Japan)
PI 263456 (Soviet Union)
PI 263466 (Soviet Union)
PI 279539 (Mexico)
PI 490035 (Korea)
PI 490044 (Korea)
PI 490244 (Sudan)

These accessions were planted in the field in June 1990 for further evaluation and selection.

Publications: None

Accession User: D. A. Knauft
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Nature of Research: Peanut (Arachis hypogaea L.) breeding and genetics, as well as molecular genetic work, are being conducted to understand and improve yield, quality, and pest resistance. PIs continue to be used in our program.

Progress to Date: PIs 221068, 268882, 315624, 315630, and 343365 were used in a series of crosses for home-garden peanut types, with upright plant growth habit, large seed, and early maturity. These materials are now in the F_3 generation. PI 476835, an introduction from China, was identified as having some resistance to late leafspot (Cercosporidium personatum (Berk. & Curt.) Deighton) and has been used in several crosses this year. Several additional PIs from the original collection of 33 PIs from Chian will be grown again this year for further evaluation of disease resistance and other desirable traits. PIs 362130 and 405915 are being used in crosses to understand the inheritance of a narrow leaf mutation.

PI262090, as well as the wild species Arachis batizocoi (PIs 298639, 468325, 468327, 468328, and 4683340), A. cardenasii (PIs 262141, 475998, 475999, 476011, and 476014), A. duranensis (PIs 219823, 468198, 468200, and 468201), and A. spinaclava (PIs 468336, 468341, 4458342, and 468343), are being used in RFLP work. Considerable variability exists especially within batizocoi for DNA polymorphism. The PIs from the wild species were received courtesy of Dr. H. T. Stalker at North Carolina State University.

Publications (refereed articles from research with PI material):

Knauft, D. A., and D. W. Gorbet. 1989. Analysis of peanut production in stress and non-stress environments. Trop. Agric. 66:243-248.

Knauft, D. A., and D. W. Gorbet. 1989. Genetic diversity among peanut cultivars. Crop Sci. 29:1417-1422.

Knauft, D. A., and D. W. Gorbet. 1989. Peanut breeding for leafspot resistance in wide and narrow intrarow spacings. Peanut Sci. 16:119-122.

Knauft, D. A., and D. W. Gorbet. 1990. Variability in growth characteristics and leafspot resistance parameters of peanut lines. Crop Sci. 30:169-175.

Gorbet, D. W., D. A. Knauft, and F. M. Shokes. 1990. Response of peanut genotypes with differential levels of leafspot resistance to fungicide treatments. Crop Sci. 30:529-533.

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Nature of Research: We continue to select in peanut progeny populations from crosses from various PIs, mainly for leafspot resistance. We received seed of the following PIs in 1989, but have not planted them in our greenhouse yet (leafspot resistant): 149261, 196701, 196716, 210824, 229553, 259747, 268502, 300596, 314818, 315615, 319807, 326506, 336950, 338338, 339964, 343412, 363059, 407483, 483244, 483249.

Progress to Date: We have new (F2) progeny to select from PIs 483245, 483247, and 483250 for leafspot resistance in the field this year. We have advance line selections from PIs 372263 and 265553 in yield test this year for the first time. PIs 215696, 270806, 341879, 350680, 381622, 390595, and 393516 are included in leafspot breeding nurseries, as well as some lines from ICRISAT and Zimbabwe that do not yet have PI numbers.

Most of the leafspot material in 1990 peanut breeding nurseries and in yield tests are from PIs mentioned in previous reports. PI 203396 probably has more progeny in tests now than any other PI. For sorghum we have PIs 499311, 499312, 499313, 499318, 499320, 499323, and 499324 still in test.

Publications:

Aquino, V. M., F. M. Shokes, D. W. Gorbet, and D. A. Berger. 1989. Relationship between components of resistance and disease progress of late leafspot on peanut. Proc. Amer. Peanut Res. and Ed. Soc. 21:17.

Chiteka, Z. A, D. W. Gorbet, D. A. Knauft, F. M. Shokes, and T. A. Kucharek. 1988. Components of resistance to late leafspot in peanut. II. Correlations among components and their significance in breeding for resistance. Peanut Sci. 15:76-81.

Gorbet, D. W., D. A. Knauft, and F. M. Shokes. 1990. Response of peanut genotypes with differential levels of leafspot resistance to fungicide treatments. Crop Sci. 30:529-533.

Knauft, D. A., and D. W. Gorbet. 1989. Analysis of peanut production in stress and non-stress environments. Tropical Agric. 66:243-248.

Knauft, D. A., and D. W. Gorbet. 1989. Peanut breeding for leafspot resistance in wide and narrow intrarow spacings. Peanut Sci. 16:119-122.

Knauft, D. A., and D. W. Gorbet. 1989. Disease assessment of peanut genotypes at commercial and breeding nursery intrarow spacings. Proc. Amer. Peanut Res. and Ed. Soc. 21:50.

Sanders, T. H., D. W. Gorbet, F. M. Shokes, E. J. Williams, and J. L. McMeans. 1989. Effect of cholorthalonil application frequency on quality factors of peanuts (Arachis hypogaea). J. Sci. Food and Agric. 49:281-290.

Shokes, F. M., D. W. Gorbet, and D. A. Berger. 1989. Southern Runner leafspot disease management. Univ. of Fla., IFAS, Quincy NFREC Res. Rep. NF89-3.

Accession User: L. S. Dunavin
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Nature of Research: Evaluation of forage and biomass crops for Northwest Florida.

Progress to Date: The introduction, PI 300086, Pennisetum purpureum, was evaluated for biomass. In 1989, it produced 9.8 Mg ha^{-1} of dry biomass. The 4-year total yield was 80.2 Mg ha^{-1}. The following introductions of Giant Reed, Arundo donax, produced the indicated dry biomass yields (Mg ha^{-1}) in 1989: PI 432425 (15.3), PI 432427 (10.3), and PI 432432 (12.0). No fertilizer was applied in 1989 to the giant reeds.

The following introductions of rose clover have been crossed with a white-flowered rose clover and second generation seed have been gathered in 1990: PI 120135, PI 311483, and PI 311484.

Publications: None

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Nature of Research: (1) Compare a 3- vs. 5-paddock rotation on animal performance of Cynodon grasses. (2) Test several St. Augustine (Stenotaphrum secundatum Walt.) entries on sandy flatwood soils. (3) Test five Pennisetum entries for dry yield, quality, and silage characteristics.

Progress to Date: Grazing studies are in progress to compare Cynodon nlemfuensis Vanderyst var. nlemfuensis cultivars Florico (Puerto Rico #2341) and Florona with C. dactylon cultivars Callie 35-3 and Brazos bermudagrass. Preliminary results indicate daily gains of cattle increased in favor of the

5-paddock over the 3-paddock rotation. Generally cattle grazing low quality pasturage benefitted more from the faster rotation than the cattle grazing high quality forage. Florico and Florona have been sent to nine countries since its release in 1988. In addition, about 150 Florida growers are increasing the acreage of each cultivar.

Grazing was initiated on a St. Augustinegrass experiment established during the summer of 1989. This study consists of four rest periods and three entries. Variables recorded will be dry yield, forage quality, and specie persistence.

Plots are presently being established to study physiological characteristics of Pennisetum entries.

Publications:

Brown, W. F., W. D. Pitman, and P. Mislevy. 1988. Intake and digestibility of, and performance by, cattle grazing cynodon varieties. Nutrition Reps. Intl. 38:(6)1201-1209.

Green, A., J. Wagner, B. Green, H. Van Ravenswaay, D. Rockwood, G. Prine, and P. Mislevy. 1988. Co-combustion of waste, biomass, and natural gas. Biomass.

Adjei, M. B., P. Mislevy, R. S. Kalmbacher, and P. Busey. 1989. Production, quality, and persistence of tropical grasses as influenced by grazing frequency. Soil and Crop Sci. Soc. Fla. Proc. 48:1-6.

Mislevy, P., W. G. Blue, and C. E. Roessler. 1989. Productivity of clay tailings from phosphate mining. I. Biomass crops. J. Environ. Qual. 18:95-100.

Prine, G. M., W. G. Blue, and P. Mislevy. 1989. Potential of energy and industrial crops grown on phosphatic clays. Florida Sci. 52:6.

Kalmbacher, R. S., P. Mislevy, F. G. Martin, J. W. Prevatt, C. G. Chambliss, and G. Kidder. Establishment of aeschynomene in bahiagrass sod. Fla. Agric. Exp. Stn. Circ. S-355.

Mislevy, P. 1989. Good care makes stargrass a good cow feed. Fla. Cattlemen and Livestock J. 53:(8)18.

Mislevy, P., J. E. Rechcigl, and W. F. Brown. 1989. Grazing management and animal performance on stargrass. Intl. Conf. on Livestock in the Tropics, IFAS, Univ. of Fla., Gainesville, FL.

Rechcigl, J. E., P. Mislevy, and G. G. Payne. 1989. Fertilization of stargrass. Intl. Conf. on Livestock in the Tropics, IFAS, Univ. of Fla., Gainesville, FL.

Brown, W. F., and P. Mislevy. 1989. Feed value of stargrass forage. Intl. Conf. on Livestock in the Tropics, IFAS, Univ. of Fla., Gainesville, FL.

Mislevy, P., F. G. Martin, and M. B. Adjei. 1989. Changes in elephantgrass plant components with maturity. II. Crude protein and digestibility. XVI Intl. Grassld. Congr., Nice, France.

Mislevy, P., F. G. Martin, and M. B. Adjei. 1989. Changes in elephantgrass plant components with maturity. I. Percentage dry yield. XVI Intl. Grassld. Congr., Nice, France.

Larbi, A., P. Mislevy, W. F. Brown, and M. B. Adjei. 1989. Evaluation of three tropical perennial grasses for beef production in south central Florida. XVI Intl. Grassld. Congr., Nice, France.

Mislevy, P., F. G. Martin, J. B. Downs, and K. L. Singer. 1989. Response of stargrass to grazing management. XVI Intl. Grassld. Congr., Nice, France.

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Nature of Research: Forage grass and legume management and utilization.

Progress to Date: Response of Florigraze rhizoma peanut (Arachis glabrata Benth.) to grazing (in 1988 and 1989) and to shade (1989) were evaluated. Peanut was most productive when grazed moderately (residual dry matter after grazing of 1100 to 2500 kg ha^{-1}) with intervals between grazing of 35 d or longer. Persistence of the legume was excellent if residual dry matter was greater than 1500 kg ha^{-1} and intervals between grazing longer than 35 d. Stands were maintained with continuous grazing if herbage mass was 2000 kg ha^{-1} or greater. When clipped every 5 to 6 wk and grown under shade (levels ranged from 34 to 100% of mid-day PAR), peanut seasonal yields ranged from 8300 kg ha^{-1} (full light) to 5300 kg ha^{-1} (34% PAR). Relative to full sun, single leaf net photosynthetic rates averaged 96, 73, and 47% at 78, 54, and 34% PAR. At season end, rhizome total nonstructural carbohydrate concentra-tions decreased linearly with light from 250 to 90 g kg^{-1}. In spring 1990, 78% PAR stands were of equal vigor as 100% PAR stands, but shoot density had decreased in the 34 and 54% PAR stands, suggesting that Florigraze was only moderately shade tolerant.

In 1989 and 1990, Pennisetum purpureum by P. glaucum hybrids (Selections 4, 41 and 360) were evaluated in small plots and compared to 'Mott' dwarf elephantgrass (P. purpureum). Hybrid stands, though not defoliated during the 1989 season, were depleted by 30 to 70% over winter. Mott stands showed no plant loss. Temperatures were below 0°C for approximately 36 h in late December 1989 and reached a low of -9°C. Plots were made uniform again in spring 1990 and clipping management treatments will be imposed in summer 1990. These lines were also sent to frost-free locations in Mexico for testing.

Publications:

Canudas, E. G., K. H. Quesenberry, L. E. Sollenberger, and G. M. Prine. 1989. Establishment of two cultivars of rhizoma peanut as affected by weed control and planting rate. Trop. Grassld. 23:162-170.

Moore, J. E., L. E. Sollenberger, K. A. Albrecht, P. T. Beede, and W. F. Brown. 1989. Effect of regrowth interval upon canopy structure and utilization of aeschynomene-limpograss pastures. p. 1029-1030. In R. Desroches (ed.) Proc. XVI Intl. Grassld. Congr., Nice, France. 4-11 Oct. 1989. The French Grassland Society.

Sollenberger, L. E., and C. S. Jones, Jr. 1989. Beef production from nitrogen-fertilized Mott dwarf elephantgrass and Pensacola bahiagrass pastures. Trop. Grassld. 23:129-134.

Sollenberger, L. E., C. S. Jones, Jr., and G. M. Prine. 1989. Animal performance on dwarf elephantgrass and rhizoma peanut pastures. p. 1189-1190. In R. Desroches (ed.) Proc. XVI Intl. Grassld. Congr., Nice, France. 4-11 Oct. 1989. The French Grassland Society.

Sollenberger, L. E., G. M. Prine, W. R. Ocumpaugh, W. W. Hanna, C. S. Jones, Jr., S. C. Schank, and R. S. Kalmbacher. 1989. Registration of 'Mott' dwarf elephantgrass. Crop Sci. 29:827-828.

Sollenberger, L. E., G. A. Rusland, C. S. Jones, Jr., K. A. Albrecht, and K. L. Gieger. 1989. Animal and forage responses on rotationally grazed 'Floralta' limpograss and 'Pensacola' bahiagrass pastures. Agron. J. 81:760-764.

Johnson, S. E., L. E. Sollenberger, and J. M. Bennett. 1990. Yield and physiological responses of rhizoma peanut to four levels of irradiance. Agron. Abst. (in press).

Ortega-S., J. A., L. E. Sollenberger, and K. H. Quesenberry. 1990. Grazing management for optimum rhizoma peanut production. p. A1-A4. In Intl. Conf. on Livestock in the Tropics, Gainesville, FL, 6-9 May 1990. IFAS, Univ. of Fla., Gainesville, FL.

Ortega-S., J. A., L. E. Sollenberger, and K. H. Quesenberry. 1990. Persistence, productivity, and nutritive value of rhizoma peanut under different grazing managements. p. 344-348. In Proc. 1990 For. and Grassld. Conf., Blacksburg, VA, 6-9 June 1990. Amer. For. and Grassld. Council, Belleville, PA.

Sollenberger, L. E., C. S. Jones, Jr., K. A. Albrecht, and G. H. Ruitenberg. 1990. Vegetative establishment of dwarf elephantgrass: Effect of defoliation prior to planting stems. Agron. J. 82:274-278.

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Nature of Research: Forage legume breeding and genetics including the species red clover (Trifolium pratense), aeschynomene (Aeschynomene americana), carpon

desmodium (Desmodium heterocarpon), and rhizoma peanut (Arachis glabrata). Primary objectives are to develop varieties which have perenniality under conditions in Florida or have good reseeding ability. Specific objectives include selection for root-knot nematode resistance, leafspot resistance, and herbicide tolerance.

Progress to Date: A southern U.S. adapted red clover population was approved for seed increase and future release. This population has several plant introductions (PIs) in its background. During the past two years, more than 500 PIs of various Trifolium spp. have been screened for response to four species of root-knot nematode (Meloidogyne spp.) as part of a program of germplasm evaluation under the direction of the Clover and Special Purpose Legume crop Advisory Committee. Eight advanced lines of Aeschynomene americana which trace to crosses with plant introductions are currently in regional test for selection of an improved cultivar. An extensive evaluation of Desmodium heterocarpon plant introductions has been completed. A summary of this work was presented at the 16th International Grassland Congress in October 1989. Selected F_4 lines from crosses among this material are currently being evaluated for agronomic potential. Evaluation of a collection of over 100 plant introductions of perennial Arachis spp. has been completed. This germplasm demonstrates a wide range of variability for traits of agronomic importance. Nineteen superior lines from this collection were moved into advance evaluation experiments in 1990 and the balance of the germplasm is being maintained.

Publications:

Canudas, E. G., K. H. Quesenberry, L. E. Sollenberger, and G. M. Prine. 1989. Establishment of two cultivars of rhizoma peanut as affected by weed control and planting rate. Trop. Grassld. 23:162-170.

Quesenberry, K. H., C. K. Kouame, and R. A. Dunn. 1990. Evaluation of red and white clover and related species germplasm for response to root-knot nematodes. Proc. 11th Trifolium Conf., Sublimity, OR. p. 32.

Accession User: G. M. Prine
Agronomy Department
304 Newell Hall
University of Florida
Gainesville, FL 32611-0311
904-392-6181 or 904-392-1811

Nature of Research: Developing new crops from plant introductions; research includes energy, forage, fiber, and grain crops.

Progress to Date: Elephantgrass (Pennisetum purpureum) accessions, PI 300086, N51, and Merkeron have been shown to be effective high biomass-producing energy crops in Lower South USA.

The commercial acreage of perennial rhizoma peanuts (Arachis glabrata) continues to climb at a rate of about 40% per year. The acreage of Florigraze

is estimated to be in excess of 3,000 acres and Arbrook (PI 262817) at about 100 acres. PIs 262839 and 262840 are being increased for possible future release for ornamental purposes.

Progress continues on developing a pigeonpea (Cajanus cajan) cultivar from random mating of numerous pigeonpea PIs evaluated over the years. Freeze damage from early frosts have been a problem in North Florida. Different growth habits under different environments have made it difficult to get stable and uniform growth.

Devastating freezes in the 1980's killed plantings of blue lupine (Lupinus angustifolius) until we are no longer seriously looking at this crop. This is a needed crop in southeast and it can be successful if greater cold tolerance is introduced and incorporated into the crop. There is need for a plant breeder on this crop in Southeast to develop crop for grain, forage, and green manure.

I am continuing my annual ryegrass breeding program using both introductions and existing cultivars.

Publications:

Prine, G. M., E. C. French, K. H. Quesenberry, and L. E. Sollenberger. 1990. Development of perennial peanut as a forage crop. 1990 Proc. 11th Trifolium Conf., Silver Falls Conf. Ctr., Sublimity, OR. p. 4.

Baltensperger, D. D., G. M. Prine, K. H. Albrecht, L. S. Dunavin, and R. L. Stanley. 1989. Registration of 'Flame' crimson clover. Crop Sci. 29:1088-1089.

Prine, G. M., L. S. Dunavin, R. J. Glennon, and R. D. Roush. 1990. Registration of 'Arbrook' rhizoma peanut. Crop Sci. 30:743-744.

Cultivar Release:

Prine, G. M., L. S. Dunavin, P. Mislevy, and R. J. Stephenson. 1989. Surrey annual ryegrass. Fla. Agric. Exp. Sta. Circ. S-364, 10 p.

Accession User: J. M. Crall
Central Florida Research and Education Center
5336 University Avenue
Leesburg, FL 34748-8203
904-787-3423 or 904-392-7272

Nature of Research: Development of disease resistance in watermelon (Cirtullus lanatus [Thunb.] Matson & Nakai).

Progress to Date: PI 189225, with purported resistance to gummy stem blight (GSB) (Plant Disease Reptr. 46:883-885, 1962) was used in crosses with various breeding lines from our program in 1981. Progenies in the F5 after six

backcrosses to our lines appeared to have tolerance to GSB in our 1990 breeding field.

Race 2 Fusarium wilt resistance from C. lanatus was incorporated into our breeding lines by crosses made in 1989 with PI 296341 and our superior breeding lines and released cultivars. Crosses to the F_1s were made in our 1990 breeding field.

Initiated in 1990 were studies on small-seeded accessions of watermelon. Two lines ("tomato seed") and PI 271771 have exceptionally small seeds that could lead to improved fruit quaity in progenies developed from them. First generation crosses were made this season in our breeding field.

Publications: None

Cultivar releases: None

Accession User: D. S. Wofford and K. H. Quesenberry
Agronomy Department
2183 McCarty Hall
University of Florida
Gainesville, FL 32611-0152
904-392-1823

Nature of Research: Two hundred thirty-four plant introduction lines of Trifolium species are being evaluated for resistance to Cylindrocladium crotolariae. This fungus attacks several species of clover in addition to common peanut, alfalfa, and other leguminous crops. A screening technique has been developed which allows for seedling evaluation for resistance to this soil-borne pathogen. In the present evaluation, 75 individuals of each introduction line are inoculated with the fungus and an equal size group is grown as a control treatment. The results will be tabulated and reported in terms of resistance as a percentage of the control within each entry. Entries under investigation include 100 lines of both T. repens, white clover, and T. pratense, red clover. Thirty-four entries from other species include 12 from T. ambigum, 4 of diffusum, 11 of medium, and 7 of nigrescens. At this time, data for one replication have been collected. Based on these preliminary results, there is a wide range of resistance among entries across species and within species. If results from the other two replications are similar, the identification of sources of resistance should be possible within some of these clover species.

Publications: There are currently no publications from this research study.

Accession User: Philip Busey
Ft. Lauderdale Research and Education Center
3205 S.W. College Avenue
Ft. Lauderdale, FL 33314-7799
305-475-8990

Nature of Research: Breeding of warm-season turfgrasses, especially Stenotaphrum secundatum, St. Augustinegrass, and Paspalum notatum, bahiagrass. Applied goals are drought resistance, chinch bug resistance, nematode resistance, and acceptable turf characteristics. Basic interests are the biology of chinch bug/grass interaction, taxonomy, and risk assessment.

Progress to Date: Introduced 2_n=30 S. secundatum germplasm, when recombined, generated superior turf types with moderate resistance to the PDP (polyploid damaging population) southern chinch bug, which kills Floratam. The germplasm is unusual, with abundant laminar hairs. FX-10 and FX-33 were licensed commercially. Additional hybrids are being tested.

FX-313 dwarf St. Augustinegrass is being delayed from possible cultivar release due to susceptibility to sting nematode, Belonolaimus longicaudatus.

Publications:

Busey, P. 1989. Progress and benefits to humanity from breeding warm-season grasses for turf. p. 49-70. In D. A. Sleper, K. H. Asay, and J. F. Pedersen (eds.) Contributions from breeding forage and turf grasses. CSSA Spec. Publ. 15, Crop Science Society of America, Madison, WI.

Reinert, J. A., P. Busey, and F. Bilz. 1989. Bermudagrass resistance to the tropical sod webworm (Lepidoptera: Pyralidae). p. 325-327. In Proc. Sixth Int. Turfgrass Res. Conf.

Busey, P. 1990. Polyploid Stenotaphrum germplasm: Resistance to the polyploid damaging population southern chinch bug. Crop Sci. 30:588-593.

Busey, P. 1990. Inheritance of host adaptation in the southern chinch bug (Heteroptera: Lygaeidae). Ann. Entomol. Soc. Amer. 83:563-567.

Accession User: S. C. Schank
Agronomy Department
2183 McCarty Hall
University of Florida
Gainesville, FL 32611-0152
904-392-1823

Nature of Research: Breeding and evaluation of Pennisetum spp. for biomass yield and forage yield quality.

Progress to Date: Intraspecific hybrids in the genus Pennisetum purpureum have involved Kinggrass, PI 300086, and Mott, PI 517947. The cross was successful using Kinggrass as the female and also as the male parent. Survival of progeny over the 1989-90 winter was over 95%. IVOMD, CP, and NDF laboratory analyses of plant parts of three of the hybrids, as well as of the PI parents, will be accomplished in 1990. In addition, 40 new interspecific hybridizations have been made with the pearl millet brown-midrib mutant, and approximately 2000 progeny are under field evaluation in 1990.

Publications:

Schank, S. C., R. L. Smith, and S. L. Russo. 1989. Characterization of genetic variability among accessions and crosses of napiergrass, Pennisetum purpureum. Proc. XVI Intl. Grassld. Cong. 1:341-342.

Schank, S. C., D. Diz, and R. L. Smith. 1990. Genetic advances in a new hexaploid Pennisetum (Pearl millet x napiergrass) hybrid for biomass and/or forage. Suncoast Biotech. Conf. 1:19.

Schank, S. C., R. L. Smith, and J. Seib. 1990. Evaluation of triploid and hexaploid derivatives from Pennisetum glaucum x Pennisetum purpureum crosses for biomass. Caribbean Food Crops Soc. Mtg., Mayaguez, PR (in press).

Schank, S. C. 1990. Status reports on Digitaria and Hemarthria. In B. L. Burson (ed.) Status Report Crop Advisory Committee Forage and Turf Grasses. 112 p.

1989-90 GEORGIA S-9 TECHNICAL COMMITTEE REPORT

SUBMITTED BY: Wm. D. Branch
University of Georgia
Department of Agronomy
Coastal Plain Experiment Station
Tifton, GA 31793-0748

NATURE OF RESEARCH: Peanut Breeding and Genetics.

PROGRESS TO DATE: Several new crosses were made in the greenhouse this past winter, and numerous plant selections were made during the 1989 season which had PI's in the pedigree. Most of these are being utilized for disease (late leafspot and white mold) and insect resistance in the Georgia Peanut Breeding Program.

A long-term concurrent selection and evaluation study involving Georgia and Zimbabwe was recently concluded. The environment was found to strongly influence the yield adaptability of peanut genotypes developed from the same cross populations. For example, Georgia pure-line selections tested at the Georgia location had significantly higher pod yields than the Zimbabwe selections, and conversely the yield of the Zimbabwe selections (PI 468133-468140) tested in Zimbabwe was significantly higher than that of the Georgia selections. Thus, peanut genotypes developed in a breeding program at one location should not be expected to perform comparably in different environments.

Genetic studies just completed have also revealed the complex inheritance of maturity between two extreme peanut genotypes: Chico, a very early-maturing spanish type and PI 383421, a very late maturing virginia type from the Xingu region of Brazil.

SELECTED PUBLICATIONS:

Branch, W. D. and G. L. Hildebrand. 1989. Pod yield comparison of pure-line peanut selections simultaneously developed from Georgia and Zimbabwe breeding programs. Plant Breeding 102:260:263.

Holbrook, C. C., C. S. Kvien, and W. D. Branch. 1989. Genetic control of peanut maturity as measured by the hull-scrape procedure. Oleagineaux 44: 359-364.

CULTIVAR RELEASES: None

GERMPLASM RELEASES: None

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ACCESSION USER: R. Harold Brown
University of Georgia
Department of Agronomy
Athens, GA 30602

NATURE OF RESEARCH: Study of water-use-efficiency in peanut.

PROGRESS TO DATE: During 1989, it was found that water-use-efficiency could be predicted from ^{13}carbon:^{12}carbon ratios in

peanut foliage. Many of the genotypes evaluated were drought tolerant PI's.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASES: None

GERMPLASM RELEASES: None

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ACCESSION USER: Melvin S. Fuller
University of Georgia
Botany Department
Athens, GA 30602

NATURE OF RESEARCH: Surveying Arachis germplasm for resistance to Sclerotium rolfsii Sacc.

PROGRESS TO DATE: This research has just been started. Plants are currently in the field to increase seed.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASES: None

GERMPLASM RELEASES: None

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ACCESSION USER: J. Ernest Harvey, Dir.
Agronomic Research
AgraTech Seeds, Inc.
Ashburn, GA 31714-0644

NATURE OF RESEARCH: Screening for unique flavor characteristics in peanut.

PROGRESS TO DATE: Approximately 200 PI's from around the world were initially selected and just planted in 1990 for subsequent evaluations.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASE: None

GERMPLASM RELEASE: None

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ACCESSION USER: C. Corley Holbrook
USDA-ARS
Department of Agronomy
Coastal Plain Experiment Station
Tifton, GA 31793-0748

NATURE OF RESEARCH: The development of techniques and the identification of germplasm for use in developing peanut cultivars with resistance to the peanut root-knot nematode Meloidogyne arenaria), late leafspot (Cercosporidium personatum), white mold (Sclerotium rolfsii) and pre-harvest aflatoxin contamination.

PROGRESS TO DATE:

Peanut root-knot nematode. Approximately one-third of the U.S. germplasm collection has been examined in a preliminary three replication greenhouse screen. Additional greenhouse tests using the most promising entries from the preliminary screen have identified six P.I.'s which support 1/10th the nematode reproduction per gram of fresh root weight as Florunner. A field study is ongoing to verify these results. Additional screening is also ongoing to identify other sources of resistance.

Late leafspot. Over one-half of the U.S. germplasm collection has been examined in a preliminary field screen. Over 50 P.I.'s have been identified which have high levels of resistance to late leafspot. Additional field and greenhouse tests have shown that one of these (P.I. 215695) has resistance to infection, a response which has never before been observed in peanut. Field studies are ongoing to gather additional information on these resistant selections which will be useful in parental selection. Additional field screening is also ongoing to identify other sources of resistance.

White mold. Five hundred P.I.'s have been examined in a preliminary field screen. The most promising genotypes are undergoing additional field and greenhouse studies.

Preharvest aflatoxin contamination. Research is ongoing to develop effective and efficient field and greenhouse mass screening techniques for identifying resistance to preharvest aflatoxin contamination. With the cooperation of R. N. Pittman, a core collection has been developed for peanut and seed of these genotypes is being increased this year. The core collection will be screened for resistance to preharvest aflatoxin contamination in 1991.

SELECTED PUBLICATIONS:

Holbrook, C. C., T. B. Brenneman and A. K. Culbreath. 1990. Evaluation of selected peanut germplasm (Tifton set A) for resistance to leafspot. Biol. and Cult. Tests for Control of Plant Dis. Vol. 5: (In Press).

CULTIVAR RELEASE: None

GERMPLASM RELEASE: None

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ACCESSION USER: Gary D. Kochert
University of Georgia
Botany Department
Athens, GA 30602

NATURE OF RESEARCH: Screening peanut germplasm with RFLP.

PROGRESS TO DATE: Some 24 accessions of U.S. cultivars, 32 landraces, and 14 wild species have been tested for restriction fragment length polymorphisms (RFLPs).

SELECTED PUBLICATIONS: None

CULTIVAR RELEASE: None

GERMPLASM RELEASE: None

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ACCESSION USER: Robert E. Lynch
USDA-ARS Insect Bio. & Pop.
Management Res. Laboratory
Tifton, GA 31793-0748

NATURE OF RESEARCH: Screening peanut genotypes for resistance to several foliar and soil-borne insects.

PROGRESS TO DATE: The following PI's have shown sufficient resistance to either thrips damage or Heliothus defoliation to warrant additional evaluation: PI 179630, 186482, 196612, 196627, 196631, 196636, 196665, 196832, 203397, 259820, 259829, 279627, 295719, 295724, 295725, and 298867.

SELECTED PUBLICATIONS:

Lynch, R. E. 1990. Resistance in peanut to major anthropod pests. Florida Entomologist 73: (In Press).

CULTIVAR RELEASES: None

GERMPLASM RELEASES: None

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ACCESSION USER: Wayne A. Parrott
University of Georgia
Department of Agronomy
Athens, GA 30602

NATURE OF RESEARCH: Peanut cell culture.

PROGRESS TO DATE: This research has also just been started. Peanut germplasm are currently being increased for seed.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASES: None

GERMPLASM RELEASES: None

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ACCESSION USER: James W. Todd
University of Georgia
Department of Entomology
Coastal Plain Experiment Station
Tifton, GA 31793-0748

NATURE OF RESEARCH: Evaluation of peanut germplasm (both cultivated as well as wild species) for insect resistance.

PROGRESS TO DATE: Over 2000 peanut accessions have been screened in the field, greenhouse, or laboratory for various insect resistance. The most promising of these genotypes have been carried forward in replicated field experiments. Most recently, additional studies have also been conducted for TSWV/thrips resistance in cooperation with peanut breeders and pathologists.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASES: None

GERMPLASM RELEASES: None

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ACCESSION USER: Billy R. Wiseman
USDA-ARS Insect Bio. & Pop.
Management Res. Laboratory
Tifton, GA 31793-0748

NATURE OF RESEARCH: Plant resistance in the converted sorghums to Spodoptera frugiperda.

PROGRESS TO DATE: Three hundred converted sorghums have been evaluated for seedling, whorl stage, and panicle resistance to Spodoptera. Also, several biological parameters and the mechanism of resistance and some biochemical relationships have been identified.

SELECTED PUBLICATIONS:

Diawara, M. M., B. R. Wiseman, D. J. Isenhour, and G. R. Lovell. 1990. Resistance to fall armyworm in converted sorghums. Fla. Ent. 73:111-117.

CULTIVATED RELEASES: None

GERMPLASM RELEASES: None

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ACCESSION USER: Ronny R. Duncan
University of Georgia
Department of Agronomy
Georgia Experiment Station
Griffin, GA 30223-1797

NATURE OF RESEARCH: Sorghum breeding for acid soil stress tolerance.

PROGRESS TO DATE: Thus far approximately 5000 accessions in the world sorghum collection have been evaluated for aluminum toxicity (pH 4.2-4.3, 50% Al saturation) and Mn toxicity (pH 4.5-4.6, 20% Al saturation) with another 1600+ planted in 1990. Less than 5% can withstand Al toxicity.

SELECTED PUBLICATIONS:

Shuman, L. M., E. L. Ramseur, and R. R. Duncan. 1990. Soil aluminum effects on the growth and aluminum concentration of sorghum. Agron. J. 82:313-318.

Wilkinson, R. E., and R. R. Duncan. 1989. Influence of H^+, Ca^{++}, and Mn^{++} on the development of amylase in the endosperm of several sorghum cultivars. J. Plant Nutr. 12:1483-1501.

CULTIVAR RELEASE: None

GERMPLASM RELEASES:

GPP4BR(H)C5 Sorghum population (PI 531231)
GTPP7R(H)C5 Sorghum population (PI 533653)

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ACCESSION USER: Wayne W. Hanna
USDA-ARS
Department of Agronomy
Coastal Plain Experiment Station
Tifton, GA 31793-0748

NATURE OF RESEARCH: Introduction and preservation of wild subspecies and species of Pennisetum. Specifically, interested in pest resistance and apomixis. Midge resistance transfer in sorghum.

PROGRESS TO DATE: Progress is being made in transferring gene for apomixis from P. squamulatum (PI 248534) to pearl millet. Midge resistance has been transferred from an African sorghum introduction (PI 383856) to a dwarf cultivated sorghum.

SELECTED PUBLICATIONS:

Hanna, W. W., H. D. Wells, and G. W. Burton. 1987. Registration of pearl millet inbred parental lines, Tift $85D_2A_1$ and Tift $85D_2B_1$. Crop Sci. 27: 1324-1325.

Hanna, W. W., H. D. Wells, and G. W. Burton. 1985. Dominant gene for rust resistance in pearl millet. J. Hered. 76:134.

Dujardin, M. and W. Hanna. 1986. An apomictic polyhaploid obtained from a pearl millet x Pennisetum squamulatum apomictic interspecific hybrid. Theor. Appl. Genet. 72:33-36.

Dujardin, M. and W. W. Hanna. 1985. Cytology and reproduction of reciprocal backcrosses between pearl millet and sexual and apomictic hybrids of pearl millet x Pennisetum squamulatum. Crop Sci. 25:59-62.

Hanna, Wayne W. and Warren G. Monson. 1988. Registration of dwarf Tift N75 napiergrass germplasm. Crop Sci. 28:870-871.

Wells, Homer D. and Wayne W. Hanna. 1988. Genetics of resistance to Bipolaris setariae in pearl millet. Phytopathology 78:1179-1181.

Hanna, W. W., B. R. Wiseman, R. R. Duncan, and K. F. Schertz. 1989. Registration of Tift MR88 midge resistant sorghum germplasm. Crop Sci. 29:245-246.

Hanna, W. W. and H. D. Wells. 1989. Inheritance of Pyricularia leaf spot resistance in pearl millet. J. Hered. 80:145-147.

Dujardin, M. and W. W. Hanna. 1989. Developing apomictic pearl millet - characterization of a BC_3. J. Genet. and Plant Breeding 43:145-151.

CULTIVAR RELEASES:

Tift N75 napiergrass (Mott) (PI 517947)

GERMPLASM RELEASES:

Tift 86 Ryegrass (PI 517948)
Tift MR88 Sorghum (PI 520602)

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ACCESSION USER: A. Graves Gillaspie, Jr.
USDA-ARS Southern Regional
Plant Introduction Station
Griffin, GA 30223-1797

NATURE OF RESEARCH: Screening of watermelon germplasm for watermelon mosaic virus II resistance.

PROGRESS TO DATE: Selfed progeny of watermelon PI's showing resistance to WMVII in greenhouse tests will be tested for resistance to natural infection under field conditions at Byron, Georgia during 1990. Plants showing field resistance will be selfed for further studies.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASES: None

GERMPLASM RELEASES: None

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ACCESSION USER: Doyle A. Smittle
University of Georgia
Department of Horticulture
Coastal Plain Experiment Station
Tifton, GA 31793-0748

NATURE OF RESEARCH: Melon breeding.

PROGRESS TO DATE: Disease resistance and small fruit type have been found. These characters are now being fixed in more desirable types.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASES: None

GERMPLASM RELEASES: None

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ACCESSION USER: Harbans L. Bhardwaj
Fort Valley State College
Agricultural Research Station
Fort Valley, GA 31030-3298

NATURE OF RESEARCH: Feasibility of production studies with guar, chickpea, vernonia, and Pysllium.

PROGRESS TO DATE: Guar seems to have potential as a row crop for Georgia farmers. Transplanting of Psyllium was not successful. Direct seeding is now being evaluated. Vernonia experiments are underway to study photoperiod response. Chickpea production is not clear. Additional work is underway.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASES: None

GERMPLASM RELEASES: None

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ACCESSION USER: Richard B. Chalfant
University of Georgia
Department of Entomology
Coastal Plain Experiment Station
Tifton, GA 31793-0748

NATURE OF RESEARCH: Screening Vigna germplasm for resistance to insects.

PROGRESS TO DATE: PI lines 292900, 353383, 293579, 269667, 352857, 352926, and 353041 exhibited less external and internal cowpea curculio damage than the standard varieties Mississippi Silver and Pinkeye Purple Hull. Non-preference is suggested as the main mechanism of

resistance, however internal damage was reduced by podwall thickness and/or toughness.

SELECTED PUBLICATIONS:

N'Guessan, F. K. 1989. Management of major insect pests of cowpea with insecticides and host plant resistance in Georgia. MS thesis, University of Georgia.

CULTIVAR RELEASES: None

GERMPLASM RELEASES: None

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ACCESSION USER: Will L. Corley
University of Georgia
Department of Horticulture
Georgia Experiment Station
Griffin, GA 30223-1797

NATURE OF RESEARCH: New ornamentals for Georgia conservascapes.

PROGRESS TO DATE: Dwarf red okra was developed from PI 288632. Selections of dwarf, cold tolerant, leafspot resistant seedlings from Raphiolepis umbellata (PI 277653) x Raphiolepis 'Ovata' are being evaluated.

SELECTED PUBLICATIONS:

Corley, W. L. 1985. UGA Red Okra: A new edible ornamental. Ga. Exp. Stn. Res. Rep. 484.

CULTIVAR RELEASES:

UGA Red Okra

GERMPLASM RELEASES: None

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S-9 TECHNICAL COMMITTEE REPORT FOR HAWAII - JULY 1990

Agency: Hawaii Institute of Tropical Agriculture and Human Resources

Submitted by: P. J. Ito

Address: 461 W. Lanikaula Street
Hilo, HI 96720

ACCESSION USER: USDA-SCS HAWAII - PLANT MATERIALS CENTER

ADDRESS: P. O. BOX 236 HOOLEHUA, HAWAII 96729

NATURE OF RESEARCH: RESEARCH AND DEVELOPMENT OF PLANT MATERIALS FOR SOIL AND WATER CONSERVATION USE.

PROGRESS TO DATE:
PI-224980 glycine (G. wightii) is a legume that has performed well in Hawaii's low rainfall zones for forage and erosion control and is scheduled for release in 1991.

PI-213903 vetivergrass (V. zizanioides) is a deeply rooted long lived, perennial grass that is doing exceptionally well and is currently being evaluated for contour hedgerow applications for the natural formation of terraces using vegetation.

PI-315868 pennisetum (P. flaccidum) and 9042665 pennisetum (P. orientale) are warm-season, strongly rhizomatous perennial grass for forage and erosion control. Current evaluations are part of the intercenter specie trial to find their full range of adaptability.

9037942, 9037940 and 9037941 broadleaf carpetgrass (A. compressus) a low growing, shade tolerant perennial grass continues to be increased and tested for groundcover applications in orchard.

9037869 napiergrass (P. purpureum) a stiff growing grass has been crossed with a sterile pearl millet grass strain (P. glaucum) to produce a lower growing sterile napier/millet grass for applications as an alternate forage and erosion control grass for lower rainfall zones.

PI-421777 stargrass (Cynodon nlemfuensis) a vigorous, fast spreading grass, similar in appearance to "giant" bermudagrass continues to show promise as a forage and erosion control grass, for low rainfall zones and as an alternate grass for areas where

pangolagrass (Digiteria decumbens) has been affected by droughty conditions.

Increase and testing continues with Desmodium heterophyllum HA-4704 and Desmodium triflorum HA-4706 as a low growing perennial legume for erosion control applications in orchards.

PUBLICATION: NONE

CULTIVAR RELEASE: NONE

ACCESSION USER: P. J. Ito and L. Chia

ADDRESS: Hilo, HI 96720

NATURE OF RESEARCH: Introduction, Maintenance and evaluation of Germplasm.

PROGRESS TO DATE: Collected 10 litchi, 3 longan, and 5 mango cultivars from China and made arrangements to receive several other species within the year. Also, collected 11 litchi, 5 longan, 3 langsat, 6 rambutan and 1 durian from Thailand. Seventeen other introductions were made. Several cultivars of durians, pulasans, litchi, longan and carambola fruits were analyzed for quality and found to be acceptable for market.

PUBLICATIONS:
Mango. 1988. World Book Encyclopedia Vol. 17, pa. 140.
Litchi. 1989. World Book Encyclopedia Vol. 12, pg 350.
Guava. 1990. World Book Encyclopedia Vol. 8, pg. 442.

CULTIVAR RELEASE: None

NATURE OF RESEARCH: Interspecific hybridization the genus Lactuca.

PROGRESS TO DATE: A comprehensive study of interspecific hybridization in Lactuca has been started, using mostly accessions from the PI collection. Many of these are apparently mislabeled as to species. Crosses which produced seed have been made with accessions labeled as L. augustana, dregeana, livida, perennis, quercina, saligna, sativa, serriola, squarrosa, and virosa.

ACCESSION USER: Richard W. Hartmann

ADDRESS: Department of Horticulture
3190 Maile Way, Room 102
University of Hawaii
Honolulu, HI 96822

NATURE OF RESEARCH: Investigation of daylength reaction and root and plant characteristics of segregants of Pachyrrhizus erpsus x ahipa.

PROGRESS TO DATE: These progeny are supposed to segregate for the bush growth habit and day neutrality of P. ahipa, which contrasts with the vine habit and short-day requirement of P. erosus, the commonly grown species. Common names include yam bean root, chop suey yam, jicama, sinkimas.) An initial planting of F_3 seed received from Denmark confirmed the segregation of bush habit and day neutrality for flowering. A tuberization is also day neutral in these progeny and variability in root size and shape.

when the cut came. Of 9 BC_1F_2 progenies that were tested 5 clearly had some resistance, while 4 did not, showing that the method is working, although still with only about 50% efficiency!

Other backcross programs which did not get as far along as the one to "Manoa' are: Valmaine - 25 F_2 selections which had resistant F_3 were progeny were backcrossed to 'Valmaine', Mesa 659: 3 F_2 selections which had resistant F_3 progeny were grown to make backcrosses to 'Mesa', but all the 'Mesa' plants succumbed to an unidentified soil disease and no backcrosses were made. Calmar: Discontinued, growers no longer grow this variety in Hawaii. Salinas: Progeny of a cross of 'Salinas' X 'Tinto' were grown but the F_2 had no resistance and no white seed (like 'Tinto'), so was discarded. 33 possibly resistant selections were made from the F_2 of a cross of 'Salinas' X 'Ancora', but the progeny have not been tested. Paris island: An F_2 of 'Paris Island' X 'Tinto' was grown but only 3 of 120 plants survived, so it is suspected there is no resistance in this progeny. Ithaca: One F_2 progeny of 'Ithaca' X 'Ancora' was grown, but did not seem to have any resistance.

FUTURE WORK: Since it will no longer be possible to test by inoculating (inoculations in the hotter greenhouses on Oahu do not work and any attempt to test populations except in an isolated facility results in unintended natural thips infection of other susceptible research materials in the vicinity), the project will probably have to end. One hope of continuation is to possibly test materials in the field at the Poamoho Farm on Oahu. On this farm there has always been some TSWV, but not enough, except in a few cases, to prevent obtaining research results with susceptible crops. If the disease can give tests without building up to where the farm is useless for the plantings, it may be possible to continue the work with the 'Manoa' progeny since this variety is more adapted to the warmer low elevation climate. Such a trial is now underway, but the first observations do not indicate that the disease pressure is strong enough to infect all the susceptible 'Manoa'.

ACCESSION USER: Richard W. Hartmann and Patrick J. O'Malley

ADDRESS: Department of Horticulture
3190 Maile Way, Room 102
University of Hawaii
Honolulu, HI 96822

NATURE OF RESEARCH: Search for, characterization of, and incorporation into useful lettuce cultivars of tomato spotted wilt virus resistance.

PROGRESS TO DATE: In our 1989 report to S-9 we reported essentially that our progress on this project was at a standstill due to changes in technicians and loss of infectiveness of the strain of virus we had been using throughout our tests. However, just about that time the new technician started using a new collection of virus and the tests once again worked. Testing has continued successfully for the last year and the project has been going well. However, recently the funds necessary to support the testing were suddenly terminated so the project also is being terminated. Thus, this report will be the final one on this project.

TESTING PROCEDURE: Inoculum is maintained in Nicotiana tobaccum reinoculated form lettuce in order to prevent the inoculum from losing its ability to infect lettuce as a result of being continuously maintained in tobacco as we suspect happened previously. When the virus is at its highest titer in the tobacco (just as the symptoms start to appear), leaves are ground with a pestle in chilled buffer and applied to all carborundum-sprinkled leaves of + 4 week old plants with a camel's hair brush. Plants are evaluated weekly for 6 weeks after inoculation. Two pots of each accession are tested with 20 plants per pot. Each test includes Green Mignonette (called Manoa in Hawaii) as a susceptible check. All tests were done in a cooled greenhouse at the Kula, Maui branch station (elevation 2500', where temperatures are cool enough for inoculations to work and too cool to permit natural thrips populations to spread the virus). Plants are examined for the presence of local lesions at the site of inoculations after one week and any without local lesions are reinoculated. Weekly the number of plants in which the infection has become systemic are recorded until a maximum of 6 weeks. 90-100% systemic plants 6 weeks or earlier are considered susceptible, 50-85% are questionable, and < 50% are considered resistant.

VARIABILITY IN INOCULATION RESULTS: Much of the difficulty of working with this virus in lettuce comes from the variability in inoculation results. The susceptible Green Mignonette can often show less than 100% infection, and in the last year, has ranged from 100% infection as soon as 3 weeks after inoculation to only 70% infection 6 weeks after inoculation. This variability is documented in O'Malley and Hartmann, HortScience 24:360-362, 1989. This variability seems to occur within inoculation dates

as well as between them, so it makes it extremely difficult to identify individual resistant plants without subsequent progeny tests. We suspect that this variability may be associated with variability in the titer of the virus in the inoculum because tests seem to be more severe in cases where it is thought the virus titer was high.

SOURCES OF RESISTANCE: Screening lettuce germplasm for resistance started in 1979 and continued until the project was cut off. The resistance of "Tinto' and 'Ancora' was documented in O'Malley and Hartmann, HortScience 24. No significantly better level of resistance has subsequently been found in L. sativa or closely related species, although some distantly related species have appeared to be resistant and other lines with about the same level of resistance as 'Tinto; and 'Ancora' seem to exist. Only 'Tinto' and 'Ancora' have been used for breeding so far, however.

BREEDING SCHEME: In order to develop a resistant variety under such conditions of variable inoculation results and only a moderate level of resistance available it was planned to use a backcross method (to recover the already accepted horticultural types) with F_2 selection between the backcrosses and F_3 progeny testing of possibly resistant F_2 plants to be used for the next backcross.

Progress during last year:

RETESTING OF PEVIOUSLY-TESTED MATERIALS: 100 lines which had been treated at least once previously and showed some possible resistance were retested. Of these, 38 were judged susceptible, 54 were judged intermediate and would have been retested again when time permitted, and 6 seem to actually have some resistance. These are E5443, Manolia, and Violin from Enza Zaden, Laura from Vilmorin, PI 491078, and PI 491084.

NEW MATERIALS TESTED: New materials were received from two sources, from I. W. Boukema at CGN in Wageningen, and from R. Provvidenti in Geneva, New York. 200 lines were received from Boukema but only 154 were tested before the cut-off. Of these 39 were susceptible, 70 were intermediate and need retesting, and 45 have not been finished yet. Of 32 lines of F_4 L. saligna X L. sativa received from Provvidenti, 11 were susceptible, 10 were intermediate and 11 seemed to be resistant. However, many of these were very poor seed producers, 11 progeny of individual plants were retested, 6 were susceptible and 5 were intermediate. Further work with these lines was also halted by the cut-off.

BREEDING PROGRESS TO DATE: The lines farthest along are those descended from a cross of 'Tinto' and 'Manoa.' F_2 plants were tested and selected, the F_3 were progeny tested, the F_2 plants with the more resistant F_3 progeny were backcrossed to 'Manoa,' the F_2 was again tested and selected, the F_3 were progeny tested, and some were identified for making a second backcross to 'Manoa'

Louisiana S-9 Technical Report

Agency: Louisiana Agricultural Experiment Station
Louisiana State University Agricultural Center

Submitted by: William J. Blackmon for Ann Marie Thro

Address: Agronomy Department
Louisiana State University
Baton Rouge, LA 70803

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1. Accession User: William J. Blackmon
Horticulture Department
Louisiana State University
Baton Rouge, LA 70803

2. Nature of Research: Domestication of Apios americana

3. Progress to date: In vitro systems have been developed for clonal propagation of A. americana. Experiments to produce tetraploids and to develop a transformation system with A. americana are being conducted. Accessions have been identified for use as breeding lines and considerable progress has been made in the quality of germplasm identified.

4. Publications:

Abstracts:

Wells, D.W., R.J. Constantin, W.J. Blackmon, and B.D. Reynolds. 1989. Herbicide utilization in the domestication of Apios americana. Proc. So. Weed Sci. 42:165.

Johnson, H.R., M. Hegsted, and W.J. Blackmon. 1990. Protein quality evaluation of Apios americana tubers. In: J. Janick and H. Shands (eds.) Advances in new corps. Timber Press. Portland, Oregon. (In Press).

Musgrave, M.E., A.G. Hopkins, Jr., and W.J. Blackmon. 1990. Evaluating the potential of Apios americana as a wetland tuber crop. In: J. Janick and H. Shands (eds.) Advances in New Crops. Timber Press. Portland, Oregon. (In Press).

Picha, D.H., W.J. Blackmon, P.W. Wilson, L.P. Hanson, and B.D. Reynolds, 1990. Compositional changes in Apios americana tubers during storage. In: J. Janick and H. Shands (eds.) Advances in new crops. Timber Press. Portland, Oregon. (In Press).

Wells, D.W., R.J. Constantin, W.J. Blackmon, and B.D. Reynolds. 1990. Evaluations of pre-emergence herbicides for use in Apios americana. In J. Janick and H. Shands (eds.) Advances in new crops. Timber Press. Portland, Oregon. (In Press).

Wilson, P.W., F.J. Pichardo, W.J. Blackmon and B.D. Reynolds. 1990. Protein quality in Apios americana tubers and seeds. In J. Janick and H. Shands (eds.) Advances in new crops. Timber Press. Portland, Oregon. (In Press).

Articles:

Reynolds, B.D., W.J. Blackmon, M. Wickremesinhe, M.H. Wells, and R.J. Constantin. 1990. Domestication of Apios americana. In: J. Janick and H. Shands (eds.) Advances in new crops. Timber Press. Portland, Oregon. (In Press).

Wickremesinhe, E.R.M., W.J. Blackmon, and B.D. Reynolds. 1990. Adventitious shoot regeneration and plant production from Apios americana. HortScience (In Press).

Wickremesinhe, E.R.M., W.J. Blackmon, and B.D. Reynolds. 1990. In vitro propagation of Apios americana. HortScience (In Press).

5. Cultivar Releases: None

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1. Accession User: Christopher A. Clark
Plant Pathology and Crop Physiology Department
Louisiana State University
Baton Rouge, LA 70803

2. Nature of Research: Sweet potato pathology

3. Progress to date: Screening of heirloom cultivars for resistance to Streptomyces ipomea, Fusarium solani, Erwinia chrysanthemi, and Diplodia gossypina has been completed. Advanced breeding lines and a large number of plant introductions (PIs) were screened for resistance to the above pathogens in 1989. Several new sources of resistance have been identified for each pathogen. Forty PIs are being evaluated in field plots for reaction to the reniform nematode, Rotylenchulus reniformis.

4. Publicactions:

Clark, C.A., Wilder-Ayers, J.A. and Duarte, V. 1989. Resistance of sweet potato to bacterial root and stem rot caused by Erwinia chrysanthemi. Plant Dis. 73: 984-987.

5. Cultivar Releases: Not applicable

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1. Accession User: James Fontenot
Horticulture Department
Julian C. Miller Hall
Louisiana State University
Baton Rouge, LA 70803

2. Nature of Research: Okra breeding and production

3. Progress to date: Forty new lines derived from plant introductions are being used as parents to confer desirable horticulture traits including spinelessness, good culinary quality, and very green pod color; disease and drought resistance, and high yield.

4. Publications:

   a. Sandifer, L.C., P.W. Wilson, J.F. Fontenot. 1989. Methods for obtaining a uniform okra stand in home gardens and in commercial plantings. Submitted to Louisiana Agriculture.

   b. Fontenot, J.F. 1989. Okra breeding and production, Biennial Report of vegetable breeding in the Southern United States, Hawaii, and Puerto Rico. U.S. Veg. Lab. USDA. Charleston, SC, pp. 41-43.

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1. Accession User:

James Fontenot
Horticulture Department
Julian C. Miller Hall
Louisiana State University
Baton Rouge, LA 70803

2. Nature of Research: Pepper (Capsicum) breeding and production.

3. Progress to date: Plant introduction materials are being used to confer high yield, ease of abscission, improved fruit shape, color, cooking quality; shipping and storage quality; and disease, insect, and stress resistance. Twenty-two new Chinese plant introductions and 35 new frutescens introductions are being evaluated in 1990.

4. Publications:

   a. Shuh, D.M. and J.F. Fontenot. 1990. Gene transfer of multiple flowers and pubescent leaf from Capsicum chinese into Capsicum annuum backgrounds. J. Amer. Soc. Hort. Sci. 115:499-502.

   b. Shuh, D.M. 1989. Genetics and morphology associated with the flowering pattern, flowers, and leaves of Capsicum annuum L. and Capsicum chinese Jacq. Ph.D. dissertation.

   c. Fontenot, J.F. 1989. Pepper breeding and production. Biennial Report of vegetable breeding in the Southern United States, Hawaii, and Puerto Rico. U.S. Veg. Lab. U.S.D.A., Charleston, SC, pp. 50-52.

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1. Accession User:

James Fontenot
Horticulture Department
Julian C. Miller Hall
Louisiana State University
Baton Rouge, LA 70803

2. Nature of Research: Potato breeding

3. Progress to date: Plant introduction materials are being evaluated for tolerance to drought, air pollution, heat and frost; for disease and insect resistance, high solids, and improve culinary quality. Sixty-one new plant introductions are being evaluated in 1990.

4. Publications:

   a. Fontenot, J.F., G. Shaver, P.W. Wilson, W.A. Young and W. A. Meadows. 1989. National potato germplasm evaluation and enhancement report, 1988, Fifty-ninth Annual Report, USDA-ARS Beltsville, MD, 56-64.

   b. Fontenot, J.F. ET AL. 1989. LaBelle a widely adapted high yielding white skin potato cultivar. Accepted for publication in American Potato Journal.

   c. Fontenot, J.F. 1989. Potato Breeding and Production. Biennial Report of vegetable breeding in the Southern United Stated, Hawaii, Puerto Rico. U.S. Veg. Lab. USDA. Charleston, SC, pp. 58-60.

5. Cultivar Releases: LaBelle

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1. Accession User: Stephen A. Harrison
   Agronomy Department
   Louisiana State University
   Baton Rouge, LA 70803

2. Nature of Research: Wheat breeding

3. Progress to date: The program has about 20,000 lines representing over 900 crosses made since 1985. The lines are all in segregating generations (F1-F5). Sources of parents include: 1) USDA regional nurseries, 2) CIMMYT nurseries, and 3) germplasm obtained in cooperative exchanges with other breeders.

4. Publications: None relevant to germplasm.

5. Cultivar Release: None

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1. Accession User: Jack Jones
   Agronomy Department
   Louisiana State University
   Baton Rouge, LA 70803

2. Nature of Research: Cotton breeding and genetics

3. Progress to date: The cotton germplasm collection has been used extensively over the years as parental sources for insect, nematode and disease resistance, fiber quality traits, and morphological traits that impact on incidence of pests, earliness of maturity and quality of lint.

4. Publications:

Jones, J.E., J.I. Dickson, J.B. Graves, A.M. Pavloff, B.R. Leonard, E. Burris, W.D. Caldwell, S. Micinski, and S.H. Moore. 1989. Agronomically enhanced insect-resistant cotton. In Proceedings, 1989 Beltwide Cotton Prod. Res. Conf. pp 135-137.

Novick, R.G. 1989. Effects of genetic traits on non-lint trash and nep content of cotton, Gossypium hirsutum L. Ph.D. Disseration, Louisiana State University.

Leonard, B.R., J.B. Graves, J.E. Jones, S.H. Moore, and A. Laine. 1989. heliothis spp. management in cotton utilizing host-plant resistance in combination with selected insecticides. In Proceedings, 1989 Beltwide Cotton Prod. Res. Conf. pp. 323-327.

Leonard, B.R., J.E. Jones, and J.B. Graves. 1989. Influence of resistant cotton strains on development and survival at Heliothis spp. Paper presented at 63rd Southeastern Branch Entomological Society of America, 30 Jan. - 2 Feb. 1989, Nashville, TN.

McCarty, J.C., Jr. and J.E. Jones. 1989. Boll weevil (Coleoptera: Curculionidae) nonpreference for primitive cotton. J. Econ. Entomol. 82:298-300.

Muhammad, N. and J.E. Jones. 1989. Inheritance of reniform nematode resistance in upland cotton. (Abst.) In Proceedings, 1989 Beltwide Cotton Prod. Res. Conf. p. 128.

Muhammad, N. and J.E. Jones. 1990. Genetics of resistance to reniform nematode in upland cotton. Crop Science 30:13-16.

Kennedy, C.W. and J.E. Jones. 1990. Chemical removal of early squares: Treatment efficacy and effects on reproductive growth of super okra-leaf cotton. In Proceedings, 1990 Beltwide Cotton Prod. Res. Conf. (In press).

Novick, R.G.. J.E. Jones, W. S. Anthony, W. Aguillard, and J.I. Dickson. 1990. Seed Cotton cleanability and non-lint trash as the gin as affect by morphological traits. In Proceedings 1990 Beltwide Cotton Prod. Res. Conf. (In press).

5. Cultivar Releases: LA 830997 was released as a cultivar in a restricted-release arrangement with the Stoneville Pedigreed Seed Company. LA 830887 is a high yielding, broadly adapted, genotype with high fiber quality and good resistance to the Fusarium wilt-root knot nematode disease complex.

Seed of two strains (LA 850075 and LA 850082) with resistance to the Heliothis spp complex and the boll weevil are being increased for a possible cultivar release in 1991.

6. Need for additional germplasm collections: Tolerant to acid subsoils.

1. Accession User: Don R. La Bonte
Horticulture Department
Louisiana State University
Baton Rouge, LA 70803

2. Nature of Research: Sweetpotato breeding and genetics

3. Progress to date: Plant introductions are currently being evaluated for resistance to Cylas formicarus elegantulus, Phyllophaga ephilida, and Diabrotica balteata. Tetraploid Ipomoea clones and true seed have been obtained for two genetic studies: 1) clarification of the genetic nature of unreduced pollen mother cells in Ipomoea and 2) inheritance of fleshy roots.

4. Publications: None

5. Cultivar releases: None

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1. Accession User: Elizabeth Zimmer
Biochemistry Department
Louisiana State University
Baton Rouge, LA 70803

2. Nature of Research: Biochemical genetics of Grasses.

3. Progress to date: Restriction enzyme polymorphisms that can serve as markers were identified in maize and teosinte plant introductions and used to study genes coding for ribosomal RNA. Parallel studies have been done on Sorghum in Bennetzen's laboratory at Purdue University.

4. Publications:

Hamby, R.K. and E.A. Zimmer. 1988. Ribosomal RNA sequences for inferring phylogeny within the grass family (Poaceae). Plant Syst. Eol. 160:29-37.

Zimmer, E.A., E.R. Jupe, and V. Walbot. 1988. Ribosomal gene structure, variation, and inheritance in maize and its ancestors. Genetics 120:125-136.

Springer, P., Zimmer, E.A. and J.L. Bennetzen. 1989. Genomic organization of the ribosomal DNA of sorghum and its close relatives. Theo. Appl. Genetics 77:844-850.

Jupe, E.R. and E. A. Zimmer. 1989. Undermethylated regions in the intergenic spaces of maize and teosinte ribosomal RNA genes. Plant Mol. Biol. 14:333-347.

5. Cultivar Releases: Not applicable

1990
MISSISSIPPI
S-9 TECHNICAL COMMITTEE REPORT

AGENCY: Mississippi Agricultural & Forestry Experiment Station
SUBMITTED BY: C. E. Watson, Jr.
ADDRESS: Department of Agronomy, Box 5248,
Mississippi State, MS 39762

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ACCESSION USER: W. P. Williams
ADDRESS: USDA-ARS Crop Science Research Laboratory, P. O. Box 5248, Mississippi State, MS 39762
NATURE OF RESEARCH: Evaluation of corn, Zea mays L., for resistance to insect and nematode pests.
PROGRESS TO DATE: Forty-four open pollinated maize varieties were increased and placed in storage at the National Seed Storage Laboratory, Fort Collins, Colorado and the Plant Introduction Station, Ames, Iowa. These were evaluated for yield, flowering data, plant height, ear height, and resistance to Southern root-knot nematode (Meloidogyne incognita), southwestern corn borer (Diatraea grandiosella Dyar), and fall armyworm [Spodoptera frugiperda (J. E. Smith)]. Approximately 200 maize lines obtained from CIMMYT (Mexico) were also evaluated for resistance to southwestern corn borer and fall armyworm.
PUBLICATIONS: None
CULTIVAR RELEASES: None

ACCESSION USER: G. A. Pederson
ADDRESS: USDA-ARS, Forage Research Unit, P.O. Box 5367, Mississippi State, MS 39762
NATURE OF RESEARCH: Evaluation of intermediate white clover (Trifolium repens) plant introductions for survival under frequent defoliation and associated agronomic characters.
PROGRESS TO DATE: A total of 98 PIs were planted as space plants with no defoliation and in plots under frequent defoliation. Germination was good (i.e. 70-90%) for 96 of the 98 white clover PIs except PI 418911 (48%) and PI 418917 (39%). Plant type for all PIs was intermediate except for PI 115416-A, 204512, and 314588 which were small-type and PI 195529, 195533, 282378, 291839, 300156, and 326144 which were large-type. Wet saturated soils and freezing temperatures in late December resulted in only 63% survival of space plants. Plant introductions that did not survive well as space plants (2 of 10 or less) included PI 200372, 214208, 215680, 287989, 287991, 298485, 345529, 418905, 418906, and 418911. In plots, PI 214208, 298485, 311495, and 345529 had stands less than 40%. Additional data on crown width, plant size (spring), leafiness, growth habit, flowering density and alfalfa weevil damage has been taken, but not yet summarized.
PUBLICATIONS: None
CULTIVAR RELEASES: None

ACCESSION USER: G. A. Pederson
ADDRESS: USDA-ARS, Forage Research Unit, P.O. Box 5367, Mississippi State, MS 39762
NATURE OF RESEARCH: Evaluation of Trifolium species and Trifolium interspecific hybrids for resistance to southern root-knot nematode (Meloidogyne incognita) and viruses.
PROGRESS TO DATE: Evaluations for root-knot nematode resistance of a number of Trifolium species that have been reported to hybridize with white clover (Trifolium repens) were conducted. The following species and plant introductions (PI) or populations had less root galling and percent of the root system galled than 'Regal' white clover: T. ambiguum MS-2X, MS-4X, and MS-6X; T. isthmocarpum PI 244679; T. nigrescens PI 206769; and T. uniflorum PI 341938. Trifolium occidentale PI 368174 had a lower percent of the root system galled than white clover and T. uniflorum PI 341939 had less root galling than white clover. Trifolium hybridum had more root galling and percent of the root system galled Regal white clover. Results with Trifolium interspecific hybrids indicated that (T. repens x T. nigrescens) x T. repens plants also had resistance to root-knot nematode and were fertile. The resistance of T. nigrescens to M. incognita may be incorporated into improved white clover germplasm.

Peanut stunt virus susceptibility was found in T. ambiguum Pi 238154, PI 405935, and No. 222 University of Reading , England. All other T. ambiguum entries (36 PIs and & 7 other) were resistant to both peanut stunt virus and clover yellow vein virus by mechanical infection.

PUBLICATIONS: Pederson, G. A., and G. L. Windham. 1989. Resistance to Meloidogyne incognita in Trifolium interspecific hybrids and species related to white clover. Plant Dis. 73:567-569.

Pederson, G. A., and M. R. McLaughlin. 1989. Resistance to viruses in Trifolium interspecific hybrids related to white clover. Plant Dis. 73:997-999.
CULTIVAR RELEASES: None

ACCESSION USER: P. G. Thompson
ADDRESS: Department of Horticulture, P.O. Box T, Mississippi State, MS 39762
NATURE OF RESEARCH: Evaluation of Sweet potato (Ipomoea batatas) and closely related species as sources of variability for yield, quality, disease, and insect resistance.
PROGRESS TO DATE: Through evaluations of 82 cultivars obtained from the Plant Introduction Station at Experiment, GA 12 clones with high yield were identified. These clones are presently being evaluated for disease and insect resistance and then intermated. Additionally, seeds of 17 related species were obtained and plants are being evaluated for disease and insect resistance. Studies are underway to develop methods for intermating these species with sweet potato.
PUBLICATIONS: None
CULTIVAR RELEASES: None

ACCESSION USER: P. E. Igbokwe, S. C. Tiwari, and J. L. Burton
ADDRESS: Department of Agriculture, Alcorn State University, Lorman, MS 39096
NATURE OF RESEARCH: Production
PROGRESS TO DATE: Our primary objective was to increase four vetiver grass germplasms under greenhouse conditions in order that we may have enough samples for both greenhouse and field studies. Although greenhouse space is our limiting factor, our germplasms have been increased significantly. In 1989 some germplasms were used in our preliminary greenhouse studies, and in May 1990 samples were used in establishing a vetiver grass field-nursery on our campus. Samples currently in the greenhouse are to be increased as soon as greenhouse space is available.

The effect of minimum input conditions on some growth characteristics of four vetiver germplasms (PI 196257, 213903, 271633 and 302300) was investigated in the greenhouse. These germplasms grown for 7 months in 8" plastic pots of Pro-Mix BX soiless media received only one cup of "Miracle Grow" soluble fertilizer prepared by dissolving 1 teaspoon of 15-30-15 in 1 gallon of water. Water was applied only when plants were tending towards their permanent wilting point. The range for both plant height (163.5 to 176.0 cm) and number of tillers (6.00 to 8.00) were not different among the germplasms. Mature seed heads were obtained for all germplasms at the end of the study except for PI 213903. It seems that the germplasms can survive under minimum nutrient and moisture conditions.

The influence of four growth regulators on some growth characteristics of greenhouse grown vetiver grass germplasm (PI 196257) was investigated for 5 months. Four weeks after potting, fertilization with osmocote 14-14-14 was made at the rate of 1.9 g per pot. Two weeks later Cycocel®, Florel®, A-Rest® and B-Nine® treatments, prepared by dissolving their respective amounts of 2, 1, 2 and 1.2 oz per gallon of water, were soil-applied at the rate of 1/2 cup per pot. Although root fresh weight (57.41 g) and shoot fresh weight (67.74 g) were significantly lower due to cyocel application, it increased root length (75.5 cm), root dry matter (60.47%) and shoot dry matter (41.82%). A-Rest application increased both root fresh weight (88.16 g) and shoot fresh weight (90.52 g). It seems that growth of vetiver grass can be directed by the application of some growth regulating chemicals.

PUBLICATIONS: None
CULTIVAR RELEASES: None

S-9 TECHNICAL COMMITTEE REPORT

New Crops Research Station
Mayaguez, Puerto Rico
July 26 and 27, 1990

Agency: NORTH CAROLINA STATE UNIVERSITY

Submitted By: William T. Fike

Address: Crop Science Department, North Carolina State University, Raleigh, North Carolina 27695-7620

Thirteen persons from a pool of 25 cooperators received 1644 PIs from 9 species of 8 genera since the last report.

A listing of accession users, the nature of their research and their progress to date follows.

1. Accession User - Dr. T. C. Wehner, Horticulture Department, North Carolina State University, Raleigh, North Carolina 27695-7609

   Nature of Research: Improving cultivar development from cucumber PI accessions.

   Progress to Date: The PIs of cucumber (Cucumis sativus L.) that we are maintaining in the NCSU breeding program include all 800 available from the Regional Station at Ames, and the 200 old cultivars from the National Seed Storage Lab at Fort Collins. The PIs are being maintained for evaluation of root size, chilling resistance and cold germination ability. A database has been developed that shows the traits and lines that have been evaluated. Crosses are being made to incorporate useful traits into commercial lines, but no cultivars have been released in the last two years that have PI germplasm in the pedigree. I would like to obtain material for the U.S. from the large cucumber collections in Wageningen, The Netherlands, and from India, China and the USSR.

2. Accession User - Dr. Wanda W. Collins, Horticulture Department, North Carolina State University, Raleigh, North Carolina 27695-7609

   Nature of Research: Breeding sweet potatoe for improving dry matter and disease resistance.

   Progress to Date: Attached is a list of PIs (see Appendix) that we are now maintaining in the sweet potatoe breeding program. We are maintaining these because we have a contract with USDA for their evaluation for internal root quality characteristics according to the Descriptor List for sweet potatoes. We used about 15 of these in a large, wide-based random-

2. Accession User - Dr. W. W. Collins (Continued)

mating crossing block in 1989. The purpose was to develop a wide-based population for selection for high dry matter and high protein content but which also has resistance to Fusarium wilt and Root-knot nematode. We have evaluated many of these PIs for their reaction to Fusarium wilt and Root-knot nematode.

I believe we should have more germplasm from the South Pacific but we are making efforts to get those clones from Australia. I think we have about as much germplasm as the breeders can work with for right now, but the Repository still needs to continue to bring in germplasm. I don't know about the feasibility of actual collection efforts -- there are so many clones out there that are already in collections and which would probably be available to us on request that I think we could get most anything we want just by asking. The Sweet Potatoe CAC recently submitted a new Priorities Report. In that Report we also supported acquisition by bringing in available collected material -- no explorations were recommended.

3. Accession User - Dr. Tom Isleib, Crop Science Department, North Carolina State University, Raleigh, North Carolina 27695-7620

Nature of Research: Breeding peanut cultivars with quality fruit and pest resistance.

Progress to Date: The peanut PIs that are presently of use in the program appear in the 1989 report. Dr. Tom Isleib came on board at the end of March to replace Dr. Johnny Wynne, who is now head of the Crop Science Department. Dr. Bill Anderson is now at Tifton, Georgia; Dr. Tracey Halward is at Athens, Georgia; and Dr. Mike Fitzner is at the USDA in Washington, DC.

4. Accession User - Dr. Randy Holley, Corn breeder with The New Northrup King Company in Bell Arthur, North Carolina

Nature of Research: Very much interested in future collections of "potentially improved high yielding quality competitive corn inbreds" from around the world. Is presently evaluating those collected by Dr. Jim Brewbaker of Hawaii.

5. Accession User - Dr. J. R. Ballington, Horticulture Department, North Carolina State University, Raleigh, North Carolina 27695-7609

Nature of Research: Collection and breeding of Vaccinium and Rubus species.

Progress to Date: One of Dr. Galletti's blueberry collections, PI 346603 (V. constablaei) was crossed with Rabbiteye. Two F-I lines, NC 1827 and NC 1832, are being tested as home garden types and for processing types. Berry quality is great and both lines will be put into the Regional blueberry trials in the near future. A backcross derivitive from a cross of NC 1827 x Highbush backcrossed to Highbush was also developed. This tetraploid looks good due to its late blooming and early ripening habit with high quality fruit. Collections of his past explorations are in the repository in Oregon and summaries of these explorations are available from them. Their exploration to Ecudor is planned for late October and early November. The participants will be collecting wild and cultivated Vaccinium spp. and Rubus spp.

PLANT INTRODUCTIONS - USDA

	NC CODE	Q#	PI	ORIGINS
	1. 87-30	18137A	308200	TONGA
GH ✓	[redacted]	19865	508523	GUATEMALA
	[redacted]	20057	390482	GUATEMALA
	4. 87-33F	201174	508522	NIGERIA F
	5. 87-34F	21023	508511	AUSTRALIA
	6. 87-35	21025	508512	AUSTRALIA
	7. 87-36	21584	439749	MEXICO
GH ✓	[redacted]	21754A	508525	PUERTO RICO
	9. 87-38	21755A	508524	PUERTO RICO
	10. 87-39	21756A	508526	PUERTO RICO
	[redacted]	21757	508528	USA
	[redacted]	21758A	508529	PUERTO RICO
	[redacted]	21762A	508514	PR CHINA
	14. 87-43	21765A	508517	PR CHINA
	15. 87-44	21766A	508516	PR CHINA
	16. 87-45F	21767A	508515	PR CHINA
	17. 87-46F	21768A	508518	PR CHINA
	18. 87-47F	21783A	508521	PR CHINA
	19. 87-48F	21784A	508519	PR CHINA
	20. 87-49	21785	508520	PR CHINA
	21. 87-50	21791	508507	JAPAN
	[redacted]	21792	508506	JAPAN
	23. 87-52	21793	508505	JAPAN
	24. 87-53	21989	508510	KOREA
	25. 87-54	22004	508508	JAPAN
	[redacted]	22005	508509	JAPAN
	27. 87-56F	22459A	508530	VENEZUELA
	28. 87-57F	22460A	508532	VENEZUELA
	29. 87-58	22461A	508531	VENEZUELA
	30. 87-59F	22463A	508534	VENEZUELA
	31. 87-60F	22881	508513	BRAZIL F
	[redacted]	21759	508527	PUERTO RICO
	33. 88-01	23703	531117	PERU
	34. 88-02F	23704	531118	PERU F
	35. 88-03	23705	531119	PERU
	36. 88-04	23708	531122	PERU
	37. 88-05	23709	531123	PERU
	38. 88-06	23710	531124	PERU
	39. 88-07F	23712	531125	PERU
	40. 88-08	23704	531127	PERU
	41. 88-09	23715	531128	PERU
	[redacted]	23717	531130	PERU
	43. 88-11	23720	531132	PERU
	44. 88-12	23725	531133	PERU
	45. 88-13	23707	531121	PERU
	46. 88-14	23713	531126	PERU
	47. 88-15F	23728		PERU
	48. 88-16	23876		PERU
	49. 88-17	23877		PERU
	50. 88-18	24951		PERU
	51. 88-19F	24959		PERU
	52. 88-20	24976		PERU

PLANT INTRODUCTIONS - USDA

NC CODE	Q#	PI	ORIGINS
[redacted] 88-21	24956		PERU
[redacted] 88-22	24996		PERU
[redacted] 88-23	24998		PERU
56. 88-24	23716	531129	PERU
57. 88-25	23718	531131	PERU
58. 88-26	23837		COSTA RICA
59. 88-27	23841		COSTA RICA
60. 88-28	23842		COSTA RICA
61. 88-29	23871		TAIWAN
62. 88-30	23875		UNK
63. 88-31	23878		TAIWAN
64. 88-32F	24948		PERU
65. 88-33F	24952		PERU
66. 88-34	24962		PERU
67. 88-35	24968		PERU
68. 88-36	24978		PERU
69. 88-37	24981		PERU
70. 88-38	24984		PERU
71. 88-39	24991		PERU
72. 88-40	25004		PERU
73. 88-41	25005		PERU
74. 88-42	25007		PERU
75. 88-43	25009		PERU
76. 88-44	25010		PERU
[redacted]	25011		PERU
76. 88-46	25015		PERU
77. 88-47	25026		PERU
78. 88-48F	25350		GUATEMALA
79. 88-49	25353		GUATEMALA
80. 88-50F	25361		GUATEMALA
81. 88-51	25364		GUATEMALA
82. 88-52F	SPV43		PUERTO RICO
83. 88-53	SPV44		PUERTO RICO
84. 88-54F	SPV49		PUERTO RICO
85. 88-55	SPV51		PUERTO RICO
86. 88-56	SPV56		PUERTO RICO
87. 88-57F	SPV61-1		PUERTO RICO
88. 88-58	SPV67		PUERTO RICO
89. 89-01	23710		PERU
90. 89-02	23834		COSTA RICA
91. 89-03	23835		COSTA RICA
92. 89-04	23836		COSTA RICA
93. 89-05	23873		TAIWAN
94. 89-06	23874		TAIWAN
95. 89-07F	23944		PERU F
96. 89-08	24947		PERU

PLANT INTRODUCTIONS - USDA

	NC CODE	Q#	PI	ORIGINS
TC ✓	97. 89-09	24966		PERU
	98. 89-10	24977		PERU
TC ✓	99. 89-11	24995		PERU
	100. 89-12	24999		PERU
	101. 89-13	25003		PERU
	102. 89-14	25020		PERU
	103. 89-15	25029		PERU
	104. 89-16	25034		PERU
	105. 89-17	23706	531120	
	106. 89-18	23838	531102	
	107. 89-19	24513	531093	
	108. 89-20	24515	531095	
	109. 89-21	24517	531097	
	110. 89-22F	24528	531098	
	111. 89-23	24529	531096	
	112. 89-24	25343	531094	
	113. 89-25	25351	531099	
	114. 89-26	25362	531101	
	115. 89-27	25737	531104	
	116. 89-28	25740	531105	
	[redacted]	25741	531106	
	[redacted]	25742	531107	
	119. 89-31	25743	531108	
	[redacted]	25745	531109	
	121. 89-33	25750	531110	
	[redacted]	25753	53111	
	[redacted]	25756	531112	
	124. 89-36	25757	531113	
	125. 89-37	25760	531114	
	126. 89-38	25762	531115	

1990 S-9 TECHNICAL COMMITTEE REPORT

AGENCY: Oklahoma Agricultural Experiment Station
SUBMITTED BY: James S. Kirby
ADDRESS: Department of Agronomy, Oklahoma State University, Stillwater, OK 74078

* * * * * * *

ACCESSION USERS: James S. Kirby
ADDRESS: Dept. of Agronomy, Oklahoma State University, Stillwater, OK 74078
NATURE OF RESEARCH: Peanut Breeding
PROGRESS TO DATE: Peanut introductions of all market types continue to be evaluated for adaptation to the growing season and conditions in Oklahoma. In 1989, 325 peanut P.I.'s were planted for seed increase and preliminary evaluation for the Regional PI Station. A few had no viable seed, and several others had very poor stands resulting in a very small increase. Introductions with limited seed increase in 1988, and replanted in 1989, had good stands and substantially better increase. Low germinating introductions in 1989 are being increased this year although Gramm-Rudman resulted in no funds available for the third year of the 3-year contract for increase and evaluation. Surplus fresh seed of additional peanut introductions grown for our local working collection were also provided to the Regional PI Station.
SELECTED PUBLICATIONS: See D.J. Banks' report.
CULTIVAR RELEASES: None

ACCESSION USERS: B. B. Johnson
ADDRESS: Department of Botany, 104 Life Sciences East, Oklahoma State University, Stillwater, OK 74078
NATURE OF RESEARCH: Transformation experiments using leaf tissue from Arachis villosulicarpa and Agrobacterium tumifaciens.
PROGRESS TO DATE: Agrobacterium having Ti plasmids with a kanamycin resistance gene was used in an attempt to transform leaf explants. Ampicillin was used to eliminate the Agrobacterium after 48 hours of incubation with leaf explants. Exposure to ampicillin did not appear to harm the explants. After incubation with the bacteria, explants were cultured on antibiotic free medium for two weeks to allow callus proliferation. After two weeks, explants were transferred to kanamycin containing medium. Kanamycin killed all explants exposed to it. No evidence of transformation was observed.
SELECTED PUBLICATIONS: None
CULTIVAR RELEASES: None

OK-2

ACCESSION USERS: Darold L. Ketring
ADDRESS: USDA-ARS, Plant Science Research Laboratory, 1301 N. Western, Stillwater, OK 74075
NATURE OF RESEARCH: Determine plant physiological criteria for tolerance to drought and heat stress.
PROGRESS TO DATE: Several peanut genotypes have been tested for water relation parameters (water potential, osmotic potential, relative water content) under three different levels of irrigation in the field. These data with yield data are being analyzed. Differences in sap velocity among peanut genotypes under drying soil conditions have been found. The relation of thermal time to peanut development has been investigated and is highly correlated with both vegetative and reproductive development of the crop.
SELECTED PUBLICATIONS: Ketring, D. L. and Wheless, T. G. 1989. Thermal time requirements for phenological development of peanut. Agron. J. 81:910-917.

Ketring, D. L., Erickson, P. I., and Stone, J. F. 1990. Apparent sap velocity in peanut genotypes under control and stress conditions. Peanut Sci. (In press).

CULTIVAR RELEASES: None

ACCESSION USERS: D. J. Banks
ADDRESS: USDA, ARS, Department of Agronomy, Oklahoma State University, Stillwater, OK 74078
NATURE OF RESEARCH: Peanut Introduction, Increase, Maintenance and Evaluation
PROGRESS TO DATE: Maintenance of the wild Arachis germplasm in greenhouses and nurseries at Weslaco, TX and Brooksville, FL were continued during 1989. Additional plant selections from segregates of A. hypogaea crosses with large seed size, early maturity, compact plant form, favorable harvest indices and improved seed production potential were made at Ft. Cobb, OK. Seeds of wild and cultivated peanut accessions and vegetative materials of wild peanuts were distributed to various scientists in support of their research.
SELECTED PUBLICATIONS: Banks, D. J. 1988. Use of reproductive:vegetative ratios and efficiency factors as potential criteria for single plant selection in peanut breeding. Proc. Am. Peanut Res. Educ. Soc. 20:12. (Abstract).

Banks, D. J., Kirby, J. S. and Sholar, J. R. 1989. Registration of 'Okrun' peanut. Crop Sci. 29:1574.

Banks, D. J. 1989. Pollen size and fertility estimations in Arachis species and hybrids via electronic particle counter analyses. Proc. Am. Peanut Res. Educ. Soc. 21:51. (Abstract).

Banks, D. J. 1989. Origin, evolution, and early culture of peanut. Agron. Abstr. pp. 73-74.

Banks, D. J. and Kirby, J. S. 1990. Characteristics of a rare monosomic peanut (Arachis hypogaea L.). Oléagineux 45(1):31-34.

Kirby, J. S., Banks, D. J. and Sholar, J. R. 1989. Registration of 'Spanco' peanut. Crop Sci. 29:1573-1574.

CULTIVAR RELEASES: None

ACCESSION USERS: H. A. Melouk
ADDRESS: USDA-ARS, Department of Plant Pathology, Oklahoma State University, Stillwater, OK 74078-9947
NATURE OF RESEARCH: Reaction of peanut genotypes to Cercospora arachidicola under controlled conditions.
PROGRESS TO DATE: Reaction of peanut genotypes to Cercospora arachidicola was determined under controlled conditions in 1989. Five to six genotypes were grown in the greenhouse for each test. The cultivar Tamnut 74, susceptible to C. arachidicola, was included in each group of genotypes as a reference for comparison. Fifteen seeds from each genotype were planted in 10-cm diameter pots (1 seed/pot) in a mixture consisting of soil, sand, and peat (1:2:1; v/v/v). The five most vigorous 6-wk old plants were inoculated with a conidial suspension (30,000 conidia/ml) of C. arachidicola (Protection Ecology 4:109-113, 1982). Inoculated plants were placed in darkness at 24-25 C and 100% relative humidity for 48 hr in a Percival Dew Chamber Model I35 DL (Percival Manf. Co., Boone, Iowa). Light (45 microEinstein/m^2/sec) was provided, and a 12/12 hr cycle was maintained for an additional 10-12 days. During illumination the relative humidity dropped to 70%. Plants were than moved to a bench in a greenhouse to allow the lesions to mature. Twenty-one days after inoculation, the number of lesions on 16 leaflets that exhibited the most disease reaction from each plant were counted. Degree of sporulation of C. arachidicola in the lesions was determined by incubating 16 leaflets with dark brown lesions at 100% relative humidity for 96 hr at about 25 C. Degree of sporulation was scored as described previously (Plant Disease 68:395-397, 1984).

Two entries, PI 237511 (group I) and PI 483249 (group VI), exhibited resistance to C. arachidicola based on mean separation at p= 0.01 of the number of lesions developed on the genotypes as compared with the susceptible cultivar Tamnut 74. Degree of sporulation of C. arachidicola on the genotypes varied; however, most of the entries supported medium sporulation of the pathogen. A combination of the two parameters, number of lesions per leaflet and the degree of sporulation, is recommended as criteria in selecting for resistant genotypes for inclusion in breeding programs (Plant Disease 68:395-397, 1984; Phytopathology 73:556-558, 1983).
SELECTED PUBLICATIONS: None.
CULTIVAR RELEASES: None.

ACCESSION USERS: S.D. Kindler and T.L. Springer
ADDRESS: USDA-ARS, Plant Science Research Laboratory, 1301 N. Western St., Stillwater, OK 74075.
NATURE OF RESEARCH: Evaluation of cool-season grass (Agropyron, Elymus, Festuca, Hordeum, Lolium, and Bromus) introductions for resistance to the Russian wheat aphid (Diuraphis noxia Mordvilko). This evaluation program is a cooperative effort with the USDA-ARS Plant Introduction Program to characterize traits of accessions in the world collection. In addition to the evaluation of accessions, resistant plants are to be used to form wide gene based resistant germplasm to this aphid.

PROGRESS TO DATE: Genera of accessions evaluated to date include Agropyron (1270), Bromus (777), Elymus (308), Festuca (1309), Hordeum (1147), and Lolium (669). Resistant entries identified in Hordeum bulbosum and Agropyron trachycaulum are being crossed with spring barley.
SELECTED PUBLICATIONS: Kindler, S.D. & T.L. Springer. 1989. Alternate hosts of Russian wheat aphids (Homoptera: Aphididae). J. Econ. Entomol. 82: 1358-1362.
CULTIVAR RELEASES: None.

ACCESSION USERS: J.L. Caddel and R.C. Berberet
ADDRESS: Departments of Agronomy and Entomology, Oklahoma State University, Stillwater, OK 74078-0507.
NATURE OF RESEARCH: Evaluation of alfalfa (Medicago spp.) introductions for resistance to the blue alfalfa aphid (Acyrthosiphon kondoi Shinji) and for resistance to the spotted alfalfa aphid [Therioaphis maculata (Buckton)]. This work is carried out as a cooperative effort with the USDA-ARS Plant Introduction Program to characterize traits of accessions in the alfalfa world collection. In addition to the evaluation of accessions, resistant plants are used to form wide gene base germplasm, resistant to these aphids.
PROGRESS TO DATE: An additional 24 accessions were evaluated for resistance to the blue alfalfa aphid during the past year. During this year, 125 accessions were evaluated for resistance to the spotted alfalfa aphid. Four populations have been formed with resistance to the blue alfalfa aphid and will be described for registration and germplasm release during the upcoming months.
SELECTED PUBLICATIONS: None
CULTIVAR RELEASES: None

ACCESSION USERS: LeRoy V. Peters
ADDRESS: 1921 El Camino, Ponca City, OK 74064-2711
NATURE OF RESEARCH: Adaptation of selected P.I. accessions of finger millet, Eleusine coracana, and pearl millet, Pennisetum glaucum to the growing season and conditions in north central Oklahoma.
PROGRESS TO DATE: This is the first year for this planting near Kildare, Oklahoma, of 19 finger millet P.I.'s from three countries, and 26 pearl millet P.I.'s from five countries. Plantings were made at two locations, one on May 20th and another on May 23rd. Both plantings were sprinkle irrigated at the time of planting and establishment, and then ditch irrigated to date, as there has been only one effective rain. Seed viability of the finger millets was very low, resulting in very poor stands. However, germination of the pearl millets was very good and stands are excellent. As of this date, July 10, 1990, no finger millets are heading; however, three pearl millets are showing head exertion. Hopefully additional entries can be evaluated next year.
SELECTED PUBLICATIONS: None
CULTIVAR RELEASES: None

ACCESSION USERS: B. F. Carver and E. Nevo
ADDRESS: Dept. of Agronomy, Oklahoma State Univ., Stillwater, OK 74078-0507; Institute of Evolution, Univ. Haifa, Mt. Carmel, Haifa 31999, Israel.
NATURE OF RESEARCH: Photosynthetic potential of wild emmer wheat (Triticum dicoccoides).
PROGRESS TO DATE: Wild emmer accessions were sampled from three ecogeographical regions of Israel. Accessions derived from the center of distribution showed the greatest diversity in photosynthetic rate. Leaf area was not a significant cofactor in assessing genetic potential for photosynthesis. Accessions with the highest photosynthetic efficiency were derived from upland steppic populations located in marginal habitats extending southward into Israel. Some accessions having high photosynthetic capacity with no significant reduction in leaf size constitute a valuable resource for genetic improvement of hexaploid bread wheat (T. aestivum). Interspecific hybrids have been produced to initiate introgression. Future identification of wild emmer accessions with high photosynthetic potential will be facilitated by ecological factors and allozyme markers.
SELECTED PUBLICATIONS: Carver, B.F. and E. Nevo. 1991. Genetic diversity of photosynthetic characters in native populations of Triticum dicoccoides. Photosynth. Res. 25:119-128.
Nevo, E., B.F. Carver, and A. Beiles. 1991. Photosynthetic performance in wild emmer wheat, Triticum dicoccoides: Ecological and genetic predictability. Theor. Appl. Genet. (In press).
CULTIVAR RELEASES: None

ACCESSION USERS: F. J. Gough
ADDRESS: USDA-ARS, Plant Science Research Laboratory, 1301 N. Western, Stillwater, OK 74075
NATURE OF RESEARCH: Evaluate wheats for receptivity to colonization by epiphytic bacteria that suppress foliar diseases.
PROGRESS TO DATE: Greenhouse and field studies have indicated that wheat cultivars differ in response to colonization by an applied epiphytic bacterium that suppresses septoria tritici leaf blotch. Introduced cultivars used in the study originated in Europe, Northern Africa, and North and South America. Several of the cultivars also are being analyzed for inheritance of resistance to septoria tritici blotch.
SELECTED PUBLICATIONS: Gough, F. J. and El-Nashaar, H. 1989. Evaluating wheats for ability to host a bacterial antagonist of Septoria tritici. Proc. 3rd Int. Workshop on Septoria Diseases of Cereals, pp. 139-140, Zurich.
CULTIVAR RELEASES: None

ACCESSION USERS: D.R. Porter, J.A. Webster, C.A. Baker, and R.L. Burton
ADDRESS: USDA-ARS, Plant Science Research Laboratory, 1301 N. Western St., Stillwater, OK 74075
NATURE OF RESEARCH: Evaluation of small grain accessions for resistance to the Russian wheat aphid (RWA) (*Diuraphis noxia* (Mordvilko)) and the greenbug (*Schizaphis graminum* (Rondani)).
PROGRESS TO DATE: Accessions of wheat (*Triticum aestivum* L.) and barley

(*Hordeum vulgare* L.) from various collections have been tested for resistance to the RWA. Over 200 accessions of wheat and 10 accessions of barley expressing varying degrees of resistance to the RWA have been selected for retesting and seed increase. Single plant segregants and homogeneous germplasm lines have been isolated and will be used for further physiological and biochemical characterization and genetic analysis of RWA resistance. RWA-resistant germplasm will be targeted for release from these accessions in addition to moving RWA resistance genes from other sources into a series of adapted wheats and barleys.

SELECTED PUBLICATIONS: Smith, E.L., Sharma, R.C., Merkle, O.G., Sebesta, E.E., Burton, R.L., Webster, J.A., Hunger, R.M., Abbott, D.C., Carver, B.F. and Morgan, G.H. 1989. Registration of Century wheat. Crop Sci 29:1093-1094.

Webster, J.A. and Merkle, O.G. 1988. Evaluating small grain germplasm for resistance to the Russian wheat aphid. Proc. Beltsville Symp. Agric. Res. Sec. II, No. 36.

Webster, J.A. and R.L. Burton. 1989. The Russian wheat aphid: Its status and research on management strategies. Proc. 27th Barley Imp. Conf. pp. 57-61.

Webster, J.A., Baker, C.A., and R.L. Burton. 1989. Progress in locating Russian wheat aphid resistance in barley and rye. Proc. Russian Wheat Aphid Conf. pp. 18-19.

CULTIVAR RELEASES: None

University of Puerto Rico
College of Agricultural Sciences
AGRICULTURAL EXPERIMENT STATION
Río Piedras, Puerto Rico

S-9 Technical Committee Report 1990

July 26, 1990
Mayaguez, Puerto Rico

Submitted by:
Rubén Vélez Colón
Fortuna Agricultural Experiment Substation
HC 02 Box 7115
Juana Díaz, PR 00665-9601

ACCESION USERS : Sonia L. Martínez, Rubén Vélez Colón, Octavio Colberg, Hernán Ruiz, Alvaro Acosta.

ADDRESS : Department of Horticulture
College of Agricultural Sciences
University of Puerto Rico
Mayaguez Campus, Mayaguez, PR 00709

NATURE OF RESEARCH : To obtain throught plant introduction, evaluation and preservation, better fruit crops (sapodilla - Manilkara zapota (L.) P. V. Rogen), soursop - (Annona muricata L.), avocado - (Persea americana Mill.), with high yielding ability, resistant to prevalent maladies and adapted to our climatic conditions.

PROGRESS TO DATE : Data of production per tree was recorded in the soursop experiment and the avocado (32 varieties) experiment. Fruit analyses were done in the sapodilla (16 varieties) experiment and the soursop experiment in relation to brix, pH, acidity, % reducing sugars and % total sugars. These evaluations were conducted by personnel of the Food Technology Laboratory at the Río Piedras Agricultural Experiment Station. Evaluation of fruit appearance and flavor was done with sapodilla fruits. The results of this evaluation show that the varieties found more than acceptable (1.1 - 1.9 mean values) in appearance were: Modello (1.86), Hanna (1.67), Mendigo 1, (1.62), Vasallo IV (1.43), Mendigo II (1.41), Vasallo I (1.27), and Guilbe (1.27). In relation to the flavor criterion, Guilbe (1.55), Modello (1.50), Hanna (1.50), Mendigo I (1.08), Mendigo Playa (1.00) and Vasallo IV were found acceptable (1.00) or more than acceptable (1.1 - 1.9) in flavor.

Preliminary evaluation of avocado variety Semil 26 suceptibility to the Phytophthora cinnamomi problem was done at the greenhouse at Fortuna Substation by Mr. Hernán Ruiz. Replanting of trees in the soursop experiment was done in order to substitute all the dead trees of the Clon VI-12 with another selection. General maintenance (fertilization, irrigation and pesticides application) was given to all the orchards and experiments included in the H-94 (S-9) Project at Fortuna Agricultural Experiment Substation.

PUBLICATIONS : Medina Gaud S., F. D. Bennet, A. E. Segarra Carmona and A. Pantoja. 1989. Notes on Insect Pests on Soursop (Guanabana), Annona muricata L. and their Natural Enemies in Puerto Rico. J. Agric. Univ. P. R. 73(4): 383-389.

Vélez, R., I. Caloni and S. L. Martínez. 1989. Sapodilla (Manilkara sapota (L) P. v Rogen) Trials at Southern Puerto Rico. J. Agric. Univ. P. R. 73(3): 255-264.

CULTIVAR RELEASES : None.

H-94-C

ACCESSIN USER : Agenol González, Miguel A. Santiago and Dora Ramos

ADDRESS : Corozal Agricultural Experiment Station
HC-02 Box 10233, Bo. Padilla,
Corozal, PR 00643

NATURE OF RESEARCH : Plantains and bananas, their introduction, multiplication, evaluation and preservation

PROGRESS TO DATE : The Lacknau clon of plantain showed the highest yield with 39.4 mt/ha and the Hartón the lowest with 19.5 mt/ha from seven plantain clones evaluated. The Congo 300 produced an average of 82.3 fruits/bunch and was significantly different to the others clones with the exception of Congo Enano. In spite of Congo 300 showing the highest number of fruits/bunch, it also showed the lowest fruit weight average (131 grams). This characteristic makes this clon unsuitable for the Puertorican market.

Four local banana clones and Grand Nain cultivar did not show any significant difference in yield and yield components among them. Also they exhibited similar yellow Sigatoka, nematodes and corm weevil damages.

PUBLICATION : González Agenol, Miguel A. Santiago and Luis A. Figueroa, 1990. Comportamiento hortícola de siete clones de plátano. (In press).

CULTIVAR RELEASES : None

H-94-D

ACCESSION USER : Agenol González, Miguel A. Santiago and Dora Ramos

ADDRESS : Corozal Agricultural Experiment Station
HC-02 Box 10322
Corozal, PR 00643

NATURE OF RESEARCH : Root crops their introduction, multiplication, evaluation and preservation.

PROGRESS TO DATE : Cassava roots of the Forastera and the Serrallés cvs. were found to be acceptable in a sensory evaluation performed 12 days after harvest. Furthermore, cassava roots obtained from a plantation pruned three weeks before were rated as acceptable (at least 4.70 or more out of 6.00) in a sensory evaluation conducted 12 days after harvest. Cassava roots of the Forastera and Serrallés cvs. harvested one or two weeks after the plants were pruned showed a faster postharvest deterioration than the ones obtained the same day of pruning or the ones harvested three weeks after pruning.

The cultivars of yams Kinabayo, P. I. 15567 and P. I. 15487 showed good production and tolerance to anthracnose during a first year field evaluation.

PUBLICATIONS : González Agenol and Miguel A. Santiago, 1989. Rendimiento y resistencia a la antracnosis de cinco cultivares de ñame, Dioscorea alata. J. Agric. Univ. of P. R. 73 (4): 381-382.

González Agenol, Miguel A. Santiago e Isabel B. de Caloni. Rendimiento y evaluación sensorial de cultivares de los ñames D. rotundata y D. cayenensis, 1989. J. Agric. Univ. of P. R. 73 (3): 203-208.

CULTIVAR RELEASES : None

H-94-F

ACCESSION USER : Wigmar González, Osvaldo Bosques, Carlos Flores and Evelio Hernández

ADDRESS : Agricultural Experiment Station
HC-02 Box 4508
Barrio Limaní
Adjuntas, PR 00601-9717

NATURE OF RESEARCH : To introduce coffee germplasm, increase, maintain and evaluate it, to select the best accessions according to their quality, yield and disease resistance.

PROGRESS TO DATE : During 1989-90 we completed the second harvest data of seven coffee selections of Catuai varieties and the first harvest data of coffee rust resistance varieties (Catimor and Icatu). Laboratory tests are being carried out to evaluate the resistance of these varieties to coffee rust race II present in Puerto Rico. We introduced four selection from Portugal which are resistant to 29 coffee rust races at least. Four trials will be established in different locations to evaluate the adaptation, yield and other agronomic and horticultural characteristics of these recent introductions.

PUBLICATIONS : None

RELEASES : None

H-94-G

ACCESSION USER : Elvin Caraballo

ADDRESS : Agricultural Experiment Station
Fortuna Substation
HC-02 Box 7115
Juana Díaz, PR 00665-9601

NATURE OF RESEARCH : To introduce and evaluate under local conditions cultivars ot tomatoes (Lycopersicon esculentum), peppers (Casicum annuum) and egg plant (Solanum melongena) in order to find germplasm with outstanding characteristics such as higher yield and superior product quality.

PROGRESS TO DATE : Preliminary trials (2 plots/cv.) on tomatoes (28 cultivars), Bell pepper (22 cultivars) and egg plant (6 lines from Rosita Cultivar) were performed during our main vegetable crops growing season (November, 1989 to May, 1990). Final data analyses are in progress.

PUBLICATIONS : Fornaris Guillermo, Elvin Caraballo and Isabel Beauchamp de Caloni, 1989. Marketable yield and acceptability of eight fresh market tomato cultivars. Research Note. J. of Agric. of Univ. of P. R. In press.

CULTIVAR RELEASES : None

H-94-P

ACCESSION USER : Pedro E. Márquez

ADDRESS : Agricultural Experiment Station
Box 506
Isabela, PR 00662

NATURE OF RESEARCH : To introduce and preserve new germplasm of pineapple. To publish records of their permormance and possible commercial or experimental use.

PROGRESS TO DATE : Plant material has been collected to make a new planting in the field. The last planting was destroyed by a fungus attack.

PUBLICATIONS : None

CULTIVAR RELEASES : None

H-94-Q

ACCESSION USER : Agenol González, Félix Román, Carlos A. Flores, Osvaldo Bosques, and Evelio Hernández

ADDRESSES : Corozal Agricultural Experiment Station
HC-02 Box 10322
Bo. Padilla
Corozal, PR 00643

and

Agricultural Experiment Station
HC-02 Box 4508
Adjuntas, PR 00601-9717

NATURE OF RESEARCH : Citrus-their introduction, multiplication, evaluation and preservation. Evaluation of orange selection grafted on sour orange and Cleopatra mandarin in terms of production and fruit quality. Evaluation of eight rootstock grafted on Valencia orange.

PROGRESS TO DATE : At Corozal, the Orlando Tangelo, Chironja and Grapefruit trees are showing higher yield and development than others citrus under the soil environment conditions at the Corozal Station. The chironja trees show more susceptibility to "Gomosis" disease (Phytophtora citrophthora) than other citrus. Most of the citrus varieties of the collection exhibit symtoms of Mg deficiency. Dolomita are being applied to the trees to try correct the situation.

Trees of chironja clones prunned (61 cm. of canopy) were not significantly different in terms of yield than trees that were not prunned during the first two years of evaluation.

At Adjuntas, the orange selections (Citrus sinensis L.) 24 Rico 2, 32 Saint Just, 10-12-7, 50 Rico 5 and 333 Pietri produced more fruits than the others 25 evaluated in te Adjuntas Substation. Those grafted on Cleopatra mandarin produced more fruits than those grafted on sour orange. There was no difference in fruit size between rootstocks. Nevertheless, the selections 376 Rico 2, 24 Rico 2, 78 W. Navel, 82 Lares, 42-10-10 W. Navel and 334 Pietri produced fruits bigger than the others evaluated. The best selections with suitable characteristics such as none or small amount of seeds, high juice weight per fruit and high percent of juice per fruit are 334 Pietri, 82 Lares, 374 Rico 1, 24 Rico 2, 78 W. Navel, 333 Pietri, 20 Hamlin, 42-10-10 W. Navel and 32 Saint Just.

Eight rootstocks grafted on Valencia orange are being evaluated in terms of fruits production, fruit quality, fruit size and tree vigor. No field data is available at this time.

PUBLICATIONS : None

CULTIVAR RELEASES : None

H-94-R

ACCESSION USAR : Octavio Colberg, Hernán Ruiz and Jaime Escudero

ADDRESS : Agricultural Experiment substation
Box 940
Lajas, PR 00667

NATURE OF RESEARCH : Plant germplasm introduction, increase, evaluation, documentation, maintenance and distribution; Cucurbits.

PROGRESS TO DATE : Preliminary replicated trials on 20 watermelon (Citrulus lanatus) varieties were conducted at Fortuna Substation from January 1990 to May 1990. The following types are being considerated: Charleston Grey and Jubilee. Other considerations are good yield, brix and performance (expected weight 10-3- pound, table 1). During next fiscal year (1990-91), we intend to evaluate 15 watermelon varieties in replicated trials, one in the Fortuna Substation and the other in the Lajas Substation. These varieties represent the following seed producers: Northrup King, Petoseed, Sunseed, Asgrow and Harris Moran.

WATERMELON (Citrus lanatus)

Variety Trial Results - Fortuna

Table 1.

Planted : February 6, 1990
Harvested: May 1 and 8
Soil type: San Antón

Variety	Source	Yield Kg/acre x 10^2	Average weight of fruit (kg)	Distribution per size of fruit (%) 8.9 kg	9-13.6 kg	13.7 kg	Total soluble solids	Maturity in Puerto Rico	Non Commercial Fruits (%)
Royal Sweet	Peto Seed	253.6	8.8	93	7	3	9.0	85	26
Royal Charleston	Peto Seed	240.5	9.0	89	11	-	9.8	77	26
Mirage	Asgrow	233.6	8.8	98	1	1	10.0	84	33
Perola	Asgrow	225.9	7.7	98	2	-	10.0	84	21
Sweet Charlee	Northrup King	224.5	8.8	90	4	-	8.8	77	34
Oasis	Harris Moran	220.5	8.9	91	9	-	10.3	77	20
Prince Charles	Peto Seed	213.6	9.0	90	10	-	8.8	84	34
Crimson Sweet	Asgrow	212.3	7.8	92	8	-	10.5	84	26
Regency	Peto Seed	211.4	9.7	85	15	-	9.0	85	31
Sunshade	Asgrow	205.5	8.0	97	3	-	9.3	84	42
Charleston Grey	Sun Seed	196.4	7.5	95	5	-	10.5	84	29
Jubilation	Northrup King	188.2	9.7	91	9	-	10.5	77	15
Jubelee	Sun Seed	184.5	8.0	91	9	-	10.0	90	28
Charleston Grey	Asgrow	175.0	8.6	96	4	-	9.3	84	49
Sangria	Northrup King	172.7	9.7	91	9	-	9.0	84	26
Baby Grey	Peto Seed	170.5	3.7	100	-	-	11.3	80	14
Charleston 76	Harris Moran	170.0	7.5	94	6	-	10.0	84	46
Paradise	Harris Moran	170.0	7.3	100	-	-	11.0	77	28
Charleston Elite	Northrup King	159.1	10.0	93	7	-	8.5	84	34
Charleston Grey-133	Northrup King	137.7	7.0	96	4	-	9.8	84	29

PUBLICATIONS : Research Note, Evaluación de variedades de sandía (Citrulus lanatus) en la costa sur de Puerto Rico, 1990. In press.

Research Note, Evaluación de seis variedades de pepinillo (Cucumis sativus) en la costa sur de Puerto Rico, 1989. In press.

CULTIVAR RELEASES : None

H-94-S

ACCESSION USER : Elvin Caraballo

ADDRESS : Agricultural Experiment Station
Fortuna Substation
HC-02 Box 7115
Juana Díaz, PR 00665-9601

NATURE OF RESEARCH : To introduce and evaluate under local conditions cultivars of cabbage (Brassica oleracea group Capitata) and onion (Allium cepa) with superior characteristics such as higher yields, resistance to insects and diseases, high performance and good marketing.

PROGRESS TO DATE : During our main growing season (November, 1989 to May, 1990) the best performing cabbage and onion cultivars from previous trials during last year were grown (4 plots/cv.) and evaluated. These trials included cabbage cultivars such as Head Start (Asgrow), Vedette (Sunseeds), Fortuna (Petoseed), Izalco (Northrup King), and Onion Cultivars such as Granex 429 (Asgrow), Granex Yellow PRR (Ferry Morse), Ringer Grano (Sunseeds), Primavera (Petoseed) plus others. Final data analyses are in progress.

PUBLICATIONS : Caraballo E., G. Fornaris, R. Guadalupe and E. Recio de Hernández, 1989. Performance, sising, and total solids of nine onion (Allium cepa) cultivars. Journal of Agric. of Univ. of P. R. Vol. 74 No. 1, page 21-27.

CULTIVAR RELEASES : None

H-94-T

ACCESSION USER : Lucas V. Ramírez, Alvaro Acosta and Jaime Escudero

ADDRESSES : Agricultural Experiment Station
Box 306
Gurabo, PR 00658

and

Agricultural Experiment Station
HC-02 Box 7115
Juana Díaz, PR 00665-9601

NATURE OF RESEARCH : To obtain through introduction, increase, evaluation, documentation and maintenance of the papaya plant, better papaya trees of Cariflora cultivars (Carica papaya L.) and Cariflora hybrids with high yielding ability, tolerant to papaya viruses and diseases, and adapted to local climatic conditions.

PROGRESS TO DATE : Cariflora and Solo papaya have been planted at Gurabo Substation on December 1989 to evaluate their tolerance to papaya Ringspot Virus (PRV). At Juana Díaz, Fortuna, Cariflora, Cariflora hubrids and Solo papaya have been planted under drip irrigation and with plastic mulch on August 1989 to evaluate their tolerance to PRV. On both experiments, Cariflora papaya demonstrated to be very tolerant to PRV and presented a fast recuperation to the virus infectation.

At Fortuna, dato of production per tree were recorded on the papaya varieties. The data recorded from August 1989 to September 1990 is being tabulated and the results will be published. Fruits of Cariflora and Cariflora hybrids (F_1) were evaluated by the Food Technology Laboratory of the Experimental Station at Río Piedras, in relation to brix, pH, % citric acid, color, and texture.

At Gurabo, the experiment continues and evaluation and recollection of phytopathological and production data is on its way.

PUBLICATIONS : None

CULTIVAR RELEASES : None

H-94-W

ACCESSION USER : Hernán Ruiz

ADDRESS : Agricultural Experiment Station
Fortuna Substation
HC-02 Box 7115
Juana Díaz, PR 00665-9601

NATURE OF RESEARCH : To evaluate the resistance of commercial varieties of honeydew melons and cooking pepper to the mayor diseases that affect these crops.

PROGRESS TO DATE : Honeydew melons (Cucumis melo) offers a good economical potential for both local and export market. Varieties resistant to diseases are needed. Five commercial varieties of melon were evaluated to determine their resistant to powdery milder disease (Erysiphe cichoracearum), under field conditions. Two of them: Tamdew improved from Harris Moran and Honeydew green flesh from Ferry-Morse showed highly resistant to the disease.

Five commercial varieties of cooking peppers (Capsicum annuum) from Harris Moran, Ferry-Morse, Petoseed and the Agricultural Experiment Station, University of Puerto Rico, were evaluated, under field conditions, to determine their resistance to powdery mildew disease (Leveillula taurica). None of the varieties showed resistance to the disease. However, further investigation is needed to obtain accurate results.

PUBLICATIONS : None

CULTIVAR RELEASES : None

1990

S-9 Technical Committee Report

Agency: Clemson University
Submitted By: D.W. Bradshaw
Address: Department of Horticulture, Clemson University, Clemson, S.C. 29634-0375

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Accession User: Nancy H. Ferguson
Address: Agronomy & Soils Department
275 Poole Agricultural Center
Clemson University
Clemson, S.C. 29634-0359

Nature of Research: The goal of the project was to achieve interspecific hybridization in the genus Trifolium, section Lotoidea using embryo and ovule culture to rescue hybrids and to introduce desireable traits such as drought tolerance and disease resistance.

Progress to Date: Trifolium repens L. is an important legume worldwide. However, lack of drought tolerance and disease resistance limit its usefulness. Although other Trifolium species express these traits, routine crossing to develop interspecific hybrids and introduce desireable traits has achieved limited success. The objective of this work was to culture embryos and ovules to rescue hybrids and regenerate plants in new interspecific combinations. A media regime is described which is generally useful with Trifolium hybrid embryos at the torpedo stage or later. Novel interspecific combinations include T. ambiguum M. Bieb. with T. montanum L. and T. occidentale D. Coombe; T. isthmocarpum Brot. with T. repens and T. nigrescens Viv.; a trihybrid designated Ruo of T. repens, T. uniflorum L., and T. occidentale with hexaploid T. ambiguum. The RUO- T. ambiguum hybrid was produced in several genotypic combintions, one of which bloomed and yielded viable pollen. Interspecific hybridization in Trifolium offers a route to enhancement of forage germplasm by introducing traits which increase longevity while maintaining the superior forage quality of T. repens.

Publications:

N.H. Ferguson, E.A. Rupert and P.T. Evans. Interspecific Trifolium hybrids produced by embryo and ovule culture. Crop Science, Sept.-Oct., 1990. In Press.

Cultivar Releases: None

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Accession User: Richard L. Fery & Philip D. Dukes
Address: U.S. Vegetable Laboratory
2875 Savannah Highway
Charleston, S.C. 29414

Nature of Research: Research conducted at the P.I. Station, Griffin,

Georgia, indicated that cowpea(Vigna unguiculata) introductions 441917, 441920 & 468104 have exceptionally high degrees of resistance to root-knot nematode. Objectives of our research in Charleston was to characterize resistance to root-knot nematodes. Objectives of our research was to characterize the resistance exhibited by these lines and to determine if the resistances are conditioned by genes that are allelic to the root-knot resistance genes in 'Mississippi Silver".

Progress To Date: Roots of PI 441917 exhibited the **highest level** of resistance to root-knot nematode (Meloidogyne incognita) **that we have ever observed** in an innoculated cow pea test. PI 441920 segregated for resistance and appeared to be superior to 'Mississippi Silver'. All PI 468104 plants exhibited a level of resistance comparable to PI 441920. Results of allelism tests indicate that the genes conditioning those resistances are allelic to the root-knot resistant genes in 'Mississippi Silver'.

Publications: HortScience manuscript in preparation

Cultivar Releases: None

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Accession User: Richar L. Fery & Philip D. Dukes

Address: U.S. Vegetable Laboratory
2875 Savannah Highway
Charleston, S.C. 29414

Nature of Research: Evaluation of all accessions of Bambura groundnut (Vigna subterranea) available for distribution (12 PI's) for general adaptation to coastal South Carolina.

Progress To Date: All 12 available accessions were planted in the field in June in an unreplicated trial. Notes on adaptation, disease resistance, yield, etc. will be recorded.

Publications: None

Cultivar Releases: None

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Accession User: Richard L. Fery & Philip D. Dukes

Address: U.S. Vegetable Laboratory
2875 Savannah Highway
Charleston, S.C. 29414

Nature of Research: Evaluation of okra PI's reported to be resistant to root-knot nematode.

Progress To Date: The following okra PI's were evaluated in a replicated greenhouse test: 357989, 357994, 357998, 357990, 357992, 35796. Each plant was inoculated with 2840 Meloidogyne incognito eggs at seeding time. Except for an occassional plant exhibiting an intermediate level of resistance, all plants were very susceptible. All introductions tested appeared to be as susceptible as 'Clemson Spineless'.

Publications: None

Cultivar Releases: None

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Accession User: Ellis L. Jourdain & Claude E. Thomas
Address: U.S. Vegetable Laboratory
2875 Savannah Highway
Charleston, S.C. 29414

Nature of Research: Evaluation of U.S. P.I. collection of Cucumis melo for resistance to downy mildew (Pseudoperospora cubensis) to generate data for entry into GRIN.

Progress to Date: Field and growth chamber/greenhouse evaluations have been completed on 1237 accessions. A field evaluation of 277 more is currently in progress.

Publications: None

Cultivar Releases: None

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Accession User: Billy B. Rhodes
Address: Department of Horticulture
Clemson University
Clemson, S.C. 29634-0375

Nature of Research: 'Congo' watermelon, developed at the USDA Vegetable Laboratory in Charleston, S.C. from a PI from South Africa, was screened for restistance to a pathogen similar to Pseudomonas. This pathogen is believed to be the cause of the Watermelon Fruit Blight which devastated fields in 1989. 'Congo', PI 299583, and PI 299378 are being selected for resistance to Watermelon Fruit Blight.

Progress to Date: Initial screening has taken place and selections made for controlled pollinations.

Publications: None

Cultivar Releases: None

1990

S-9 TECHNICAL COMMITTEE REPORT

AGENCY: Tennessee Agricultural Experiment Station
SUBMITTED BY: D. L. Coffey
ADDRESS: Department of Plant and Soil Science, University of Tennessee, P.O. Box 1071, Knoxville, Tennessee 37901-1071

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ACCESSION USER: B. V. Conger

ADDRESS: Department of Plant and Soil Science, University of Tennessee, P.O. Box 1071, Knoxville, Tennessee 37901-1071

NATURE OF RESEARCH: Development of orchardgrass (Dactylis glomerata) germplasm from in vitro cultures.

PROGRESS TO DATE: In 1982, we developed an orchardgrass genotype that has a very high capacity for regeneration from in vitro cultures through somatic embryogenesis. The ability to produce somatic embryos directly from mesophyll cells on cultured leaf segments and embryos to a fully developed (germinable) stage in a single liquid medium is unique in the Gramineae. These cell and tissue culture systems provide novel research opportunities in plant development and biotechnology.

Experiments using this genotype have been conducted almost exclusively in our laboratory. However, through collaborative research and/or requests from colleagues, this genotype is or has been in research institutes, commercial firms and universities in Austria, West Germany, Poland, Bulgaria, Wisconsin, North Carolina, Oregon and Maryland. I have had several requests and continue to receive requests for cultures or plant material. Similar germplasm releases have been made in other crops, e.g., 'Regen S' alfalfa from the University of Wisconsin and KS206 alfalfa from Kansas State University.

During the latter months of 1981 and early months of 1982 more than 100 plants of 'Potomac' were screened for their ability to regenerate plants from leaf segments when cultured on Schenk and Hildebrandt medium containing 30μM dicamba. Two embryos were discovered on a leaf segment from one of the plants by Ph.D. student, Gary Hanning. The embryos were rescued, germinated and established as seedlings in pots. The plants were maintained in the greenhouse. When leaves of these plants were placed in vitro culture, a very high capacity for somatic embryogenesis was observed. The embryogenic response was maintained with additional in vitro culture cycles. The genotype is propagated by division of existing plants and in vitro regeneration from leaf cultures.

Plants are phenotypically normal in color and morphology. They are fertile and can be used in crosses with other genotypes. Limited cytological studies have revealed no chromosome abnormalities. Plants established in the field, especially those from third or fourth regeneration cycles, appear to be slightly less stress tolerant, e.g., drought and winter hardiness, compared to seed grown plants of 'Potomac'.

The genotype is maintained in the Department of Plant and Soil Science, University of Tennessee Agricultural Experiment Station. Requests for it will be honored by supplying sterile cultures of leaf segments or live propagules from greenhouse plants. Establishment of the genotype with the American Type Culture Collection will be considered if the requests become too numerous. It will be requested that users give appropriate acknowledgement when the genotype contributes to the development of new germplasm or cultivars or when it is used in laboratory experiments.

PUBLICATIONS:

Conger, B. V., G. E. Hanning, D. J. Gray, and J. K. McDaniel. 1983. Direct embryogenesis from mesophyll cells of orchardgrass. Science 221:850-851.

Gray, D. J., B. V. Conger, and G. E. Hanning. 1984. Somatic embryogenesis in suspension and suspension-derived callus cultures of Dactylis glomerata. Protoplasma 122:196-202.

Hanning, G. E. and B. V. Conger. 1982. Embryoid and plantlet formation from leaf segments of Dactylis glomerata L. Theor. Appl. Genet. 63:155-159.

Hanning, G. E. and B. V. Conger. 1986. Factors influencing somatic embryogenesis from cultured leaf segments of Dactylis glomerata. J. Plant Physiol. 123:23-29.

Horn, M. E., R. D. Shillito, B. V. Conger, and C. T. Harms. 1988. Transgenic plants of orchardgrass (Dactylis glomerata L.) from protoplasts. Plant Cell Rep. 7:469-472.

CULTIVAR RELEASES: Embryogen-P

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ACCESSION USER: D. R. West

ADDRESS: Department of Plant and Soil Science, University of Tennessee, P. O. Box 1071, Knoxville, Tennessee 37901-1071

NATURE OF RESEARCH: Breeding and improvement of corn (Zea mays)

PROGRESS TO DATE: As part of the germplasm preservation activities of the Southern Corn Improvement Conference, it was agreed that seed of selected old Tennessee lines, as well as seed of lines developed by other southern states that have discontinued corn breeding programs be submitted for storage. The list of lines of seed submitted for storage to the North Central Regional Plant Introduction Station appears in Table 1. With the exception of T202 and Val2c, seed of these same lines were also submitted to the National Seed Storage Laboratory. The quantity of seed sent in May 1990 was 300 kernels for most of the lines.

T204 is the only one of the lines listed in Table 1 that has been registered in Crop Science (22:696). At the time of registration, PI numbers were not being assigned to all germplasm registered; it was given the registration No. GP111 by Crop Science Society of America. It is not known if any of the lines listed in Table 1 have been assigned PI numbers.

PUBLICATIONS: None.

CULTIVAR RELEASES: None.

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Table 1. Inbred lines of corn (Zea mays) from the University of Tennessee Agricultural Experiment Station submitted for storage to the North Central Regional Plant Introduction Station and the National Seed Storage Laboratory.

Agronomic Variety	Origin	Tennessee Seed Identification Number
Ab18	Auburn University, Alabama	TN89:211
Ab610	"	TN89:214
Ab616	"	TN89:215
Ok22	Oklahoma State University	TN89:216
SC84	Clemson University, South Carolina	TN89:217
SC155	"	TN89:218
SC229	"	TN89:219
SC301	"	TN89:220
SC343	"	TN89:222
SC359	"	TN89:223
SC401	"	TN89:224
T202	University of Tennessee	TN89:202
T204	"	TN89:203
T222	"	TN89:204
T238	"	TN89:205
T250	"	TN89:207
T252	"	TN89:208
T264	"	TN89:209
T268	"	TN89:210
Va3a	Virginia Polytechnic Inst. and State Univ.	TN89:225
Va4	"	TN89:226
Va5	"	TN89:227
Va6	"	TN89:228
Va10	"	TN89:229
Va12c	"	TN89:230
Va14a	"	TN89:231
Va33	"	TN89:232
Va35c	"	TN89:233
Va36a	"	TN89:234

* * * * *

ACCESSION USER: E. C. Bernard

ADDRESS: Department of Entomology and Plant Pathology, University of Tennessee, P. O. Box 1071, Knoxville, Tennessee 37901-1071

NATURE OF RESEARCH: Screening of legumes for nematode susceptibility

PROGRESS TO DATE: In greenhouse studies, thirty-one cultivars and PI accessions among eight annual and perennial species of Trifolium were highly susceptible to an undescribed Meloidgyne species isolated from Southwest Tennessee.

PUBLICATIONS: None.

CULTIVAR RELEASES: None.

* * * * *

ACCESSION USER: S. L. Melton

ADDRESS: Department of Food Technology and Science, University of Tennessee, P. O. Box 1071, Knoxville, Tennessee 37901-1071

NATURE OF RESEARCH: Evaluation and characterization of oils of Brassica species

PROGRESS TO DATE: Seeds of B rapa PI 392025 and seeds of B napus PI 431572, PI 432392, PI 432394, PI 432395, PI 469728, PI 478339 and PI 478340 received from the North Central Regional PI Station in Fall 1989 were forwarded to a cooperative research worker in the Peoples Republic of China for seed increase and evaluation of environmental adaptation.

PUBLICATIONS: None

CULTIVAR RELEASES: None

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1990
S-9 Technical Committee Report

AGENCY: The Texas Agricultural Experiment Station
SUBMITTED BY: Frank M. Hons
ADDRESS: Soil and Crop Sciences Department
Texas A&M University
College Station, TX 77843-2474
PHONE: (409)845-4620
FAX #: (409)845-0456

****

ACCESSION USER: Ordie R. Jones
USDA-ARS Southern Plains Area
Conservation and Production Research Lab
P.O. Drawer 10
Bushland, TX 79012
PHONE: (806)378-5745
FAX #: None reported
TELEX: None reported
NATURE OF RESEARCH: Vetiver grass (Vetivera zizanoides)
PROGRESS TO DATE: Planted three PI's in April, 1989. PI's 271633 and 302300 established well with irrigation. PI 196357 did not establish and no plants survived the summer. All plant killed by -10°F temperaturess in December, 1989. Vetiver grass apparently will not survive in the Texas Panhandle.
PUBLICATIONS: None reported
CULTIVAR RELEASES: None reported

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ACCESSION USER: J.D. Bilbro
ADDRESS: USDA-ARS
P.O. Box 909
Big Spring, TX 79721-0909
PHONE: (915)263-0293
FAX #: None reported
TELEX: None reported
NATURE OF RESEARCH: Vetiver grass (Vetivera zizanoides)
PROGRESS TO DATE: PI's 196257, 213903, 271633, and 302300 were planted in late April, 1989. The grasses made tremendous growth and were 4 to 5 ft tall by November, 1989. All plants were winter-killed by the December 1989 freeze.
PUBLICATIONS: None reported
CULTIVAR RELEASES: None reported

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ACCESSION USER:	Keith F. Schertz
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PHONE:	(409)260-9252
FAX #:	(409)845-0456
TELEX:	7400668
NATURE OF RESEARCH:	Sorghum (Sorghum bicolor L. Moench)
PROGRESS TO DATE:	Chinese lines were received with 63 being increased and sent to the Regional Plant Introduction Station. Twenty lines were assayed for isozymes. None were evaluated for agronomic traits, but some from nothern China should have cold tolerance. Two male-sterile lines, A3T x 430 and A3T x 7000, with the cytoplasm IS111 2C were released. IS1112C is a line from the USDA-TAES Sorghum Conversion program and traces back to line IS1112 in India. The released male-sterile lines will be of use in breeding programs.
PUBLICATIONS:	None reported
CULTIVAR RELEASES:	Male-sterile lines, A3T x 430 and A3T x 7000

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ACCESSION USER:	Gary C. Peterson
ADDRESS:	Texas A&M University Agricultural Research and Extension Center Rt. 3, Box 219 Lubbock, TX 79401-9757
PHONE:	(806)746-6101
FAX #:	(806)746-6528
TELEX:	None reported
NATURE OF RESEARCH:	Sorghum (Sorghum bicolor L. Moench)
PROGRESS TO DATE:	PI's 453951 and 457709 have been identified as resistant to the yellow sugarcane aphid, Sipha flavor (Forbes). These lines are photoperiod sensitive and have been entered into the sorghum conversion program. Lines resistant to biotype E greenbug, Schizaphis graminum, and sorghum midge, Contarinia sorghicola, have also been developed.
PUBLICATIONS:	None reported
CULTIVAR RELEASES:	TX 2859-TX2868 are resistant to biotype E greenbug. The source of resistance is Capbam through TX2783. TX2869-TX2890 are resistant to sorghum midge.

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ACCESSION USER: Kay Porter
ADDRESS: Pioneer Hi-Bred International, Inc.
Plant Breeding Division - Dept. of Sorghum Breeding
Box 1506
Plainview, TX 79073-1506
PHONE: (806)293-4377
FAX #: None reported
TELEX: None reported
NATURE OF RESEARCH: Sorghum (Sorghum bicolor L. Moench)
PROGRES TO DATE: Are crossing accessions with their own proprietary materials to add traits or build diversity. The large number of accessions being made available to U.S. breeding programs through the St. Croix location is invaluable.
PUBLICATIONS: None reported
CULTIVAR RELEASES: None reported

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ACCESSION USER: James A. Glueck
ADDRESS: Garst Seed Company - Research Division
Rt. 3, Box 236C
El Campo, TX 77437
PHONE: (409)543-1850
FAX #: (409)543-1856
TELEX: None reported
NATURE OF RESEARCH: Sorghum (Sorghum bicolor L. Moench)
PROGRESS TO DATE: 483 PI accessions were planted for increase/evaluation in the Plainview nursery. Due to late planting, early freezes, and late maturation, no seed was harvested in 1989. Remnant seed from 1989 accessions plus additional materials totaling 2200 accessions were planted in Wharton County in 1990. Materials will be evaluated for disease and insect resistance, maturity, and height.
PUBLICATIONS: None reported
CULTIVARS RELEASES: None reported

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ACCESSION USER: John W. Sij
ADDRESS: Texas A&M University Agricultural
Research and Extension Center
Rt. 7, Box 999
Beaumont, TX 77713
PHONE: (409)752-2741
FAX #: (409)752-5560
TELEX: None reported
NATURE OF RESEARCH: Lupines (Lupinus sp)
PROGRESS TO DATE: 250 lupine lines were evaluated in fall 1989 and spring 1990 plantings at Beaumont, TX. The fall study was abandoned after loss of all plants in the December 1989 freeze (8°F). The spring planting also failed due to Rhizoctonia and Southern blight damage.
PUBLICATIONS: None reported
CULTIVARS RELEASED: None reported

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ACCESSION USER: Maurice J. Lukefahr
ADDRESS: Rio Farms, Inc.
Rt. 1
Edcouch, TX 78538
PHONE: (512)262-1387
FAX #: None reported
TELEX: None reported
NATURE OF RESEARCH: Lablab beans (Lablab vulgaris), velvet bean (Stizolobium sp), jack bean (Dolichos ensiformis L.), and sword bean (Canavalia gladiata D.C)
PROGRESS TO DATE: Materials were received in the spring of 1990 and planted. No information on these accessions is available at this time.
PUBLICATIONS: None reported
CULTIVAR RELEASES: None reported

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ACCESSION USER: Ellen B. Peffley
ADDRESS: Dept. of Agronomy, Horticulture, and Entomology
Texas Tech University
Lubbock, TX 79409-2134
PHONE: (806)742-2828
FAX #: None reported
TELEX: None reported
NATURE OF RESEARCH: Onion (Allium cepa L.) and spring onion (Allium fistulosum L.)
PROGRESS TO DATE: Forty-four plant introductions were evaluated for pink root and earliness. Most accessions had little pink root and ranged in flowering tissue from early to late.
PUBLICATIONS: Polymorphism of isozymes within plant introductions of Allium cepa L. and A. fistulosum L. 1987. Hortscience 22(5):956-957.
Micropropagation of Allium fistulosum and its hybrid (Allium fistulosum x A. cepa) derivatives. 1990. In: Biotechnology in Agriculture and Forestry. YPS Bajaj, Ed. Volume 19.

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ACCESSION USER: Frank M. Hons
ADDRESS: Soil & Crop Sciences Dept.
Texas A&M University
College Station, TX 77843-2474
PHONE: (409)845-4620
FAX #: (409)845-0456
TELEX: None reported
NATURE OF RESEARCH: New and alternative crops
PROGRESS TO DATE: Eighteen introductions of pigeonpea (Cajanus cajan L.) from ICRISAT are being evaluated for grain yield. Five additional introductions are being evaluated for forage production and quality. Eight chickpea (Cicer arietinum L.) introductions are also being observed for yield and susceptibility to iron deficiency. Twenty-four sesame (Sesamum indicum L.) introductions are also being screened in the field for Phytophthora parasitica resistance. Twenty-three entries of rapeseed (Brassica napus L.) were examined in a replicated trial this past season.
PUBLICATIONS: Pigeonpea Evaluation Trials, 1988, College Station, Texas. Progress Report Texas AGricultural Experiment Station (in press).
CULTIVAR RELEASES: None reported

1990

S-9 TECHNICAL COMMITTEE REPORT

Agency: Virginia Agricultural Experiment Station
Submitted by: Richard E. Veilleux
Address: Department of Horticulture, VPI & SU, Blacksburg, VA 24061

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Accession User: M. Rangappa

Address: Virginia State University
Petersburg, VA 23803

Nature of Research: Evaluation of bean germplasm accessions (Plant Introductions (PI's) commercial cultivars and advanced breeding lines) for biotic and abiotic stress factors and nutritional and biochemical components.

Progress to Date: Eighty five accessions have been evaluated for their tolerance to ozone (O_3). Eleven accessions (PI's 146757, 151783, 155209, 156961, 161956, 165616, 166151, 169740, 169791, 169838, and 171177) were identified as tolerant ($<$ 35% leaf injury) at 0.6 ppm O_3 exposure for 2 h in a growth chamber. Thirty accessions were intermediate ($>$ 35% but $\leq$ 75% injury) and 44 were sensitive ($>$ 75% injury). Bush Blue Lake (BBL) 290, a homozygous commercial snap bean was used as O_3 sensitive standard in all exposures to permit comparison of exposures over time. O_3 effects were determined by a percent visual estimation of foliar injury on each of the two primary leaves used to identify sensitivity of each accession. Further evaluation of highly tolerant accessions for yield, biomass, agronomic characteristics as well as nutritional and biochemical components are continuing. Ambient field experiments in replicated trials and field open-top chambers are being used. Varietal development of beans resistant to air pollutants is an integral part of the interdisciplinary research.

Publications:

Mersie, W., T. Mebrahtu, and M. Rangappa. 1989. Ozone-metolachor interaction on corn (*Zea mays*), bean (*Phaseolus vulgaris*), and soybean (*Glycine max*). Weed Technol. 3(4):650-653.

Mebrahtu, T., W. Mersie, and M. Rangappa. 1990. A seven-parental diallel analysis of ozone insensitivity in common beans. J. Genet. Breeding (In press).

Mebrahtu, T., W. Mersie, and M. Rangappa. 1989. Inheritance of ambient ozone insensitivity in common beans. Eighth biennial research symposium, P-39, Arlington, Va., October 8-11.

Mersie, W., T. Mebrahtu, and M. Rangappa. 1989. Ozone metolachlor interactions on corn (*Zea mays*), bean (*Phaseolus vulgaris*) and soybean (*Glycine max*). Eighth biennial research symposium, P-39. Arlington, Va., October 8-11.

Mersie, W. and M. Rangappa. 1989. Evaluation of bean (*Phaseolus vulgaris*) for insensitivity to ozone. Virginia State University Research Information Series, Leaflet No. 113.

Mohamed, A. I. and M. Rangappa. 1989. The role of peroxidase and its isoenzymes in resistance to ozone in bean (*Phaseolus vulgaris* L.). Eighth biennial research symposium, P-40. Arlington, Va., October 8-11.

Cultivar Releases: none

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Accession User: Thomas R. Omara-Alwala

Address: Virginia State University
Box 476
Petersburg, VA 23803

Nature of Research. Evaluation of vegetative parts of four *Cuphea* species for total lipids and fatty acids

Progress to Date:. Significant differences for lipid composition among species and different plant parts were found. Leaves were found to be the richest source followed by whole plants, stems, and roots. Fatty acids with longer chain than 18:3n3 were not found. *C. carthagenesis* was identified as the species with the most desirable agronmic properties for domestication.

Publications:

Omara-Alwala, T. R. and T. Mebrahtu. 1990. Evaluation of four *Cuphea* species for total lipids and fatty acids. 81st Annual Meeting Amer. Oil Chemist's Soc. Apr. 22-25, Baltimore, Md.

Cultivar Releases: none

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Accession User: D. P. Belesky and J. M. Fedders

Address: USDA-ARS-ASWCRL
P.O. Box 867, Airport Road
Beckley, WV 25802-0867

Nature of research. Improve floristic composition of Appalachian pasture communities. Identification of *Lotus corniculatus* genotypes for soil acidity tolerance.

Progress to Date: Root-length bioassay studies are underway with methods refinement a critical concern

Publications: none

Cultivar Releases: none

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Accession User: Joseph T. McFadden and Linda D. Domenico

Address: 513 Mowbray Arch
Norfolk, VA 23507

Chesapeake Corp.
James Center
1021 East Cary St.
Richmond, VA 23218

Nature of Research. Alternative crops

Progress to Date: Crop failure due to heavy rain and flooding

Publications: none

Cultivar Releases: none

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Accession User: David A. Nuttle

Address: Incon Corporation
Rt. 2, 137 White Oak Dr.
Youngsville, NC 27596

Nature of Research: Intercropping

Progress to Date: Seed is in frozen storage until a suitable field site can be identified.

Publications: none

Cultivar Releases: none

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Accession User: Khidir W. Hilu, Asim Esen and John L. Johnson

Address: Biology Department
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061

Nature of Research: Phylogenetic relationships among grasses and cereals and the cytoplasmic diversity of finger millet (*Eleusine coracana*).

Progress to Date: Protein size and structural similarities are being examined by immunological cross-reactivities as a means to determine genetic relatedness in different groups of grasses. In some genera, like *Bromus, Eleusine, Triticum*, and *Avena*, both chloroplast DNA and protein and immunological studies were conducted. The material was also used for studying the nuclear diversity in wild and domesticated finger millet.

Publications:

Esen, A. and K. W. Hilu. 1989. Immunological affinities among subfamilies of the Poaceae. Amer. J. Bot. 76:196-203.

Cultivar Releases: none

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Accession User: Michael Pillay

Address: Department of Biology
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061

Nature of Research: The objective of the research is to determine evolutionary relationships in the genus *Bromus* using molecular techniques.

Progress to Date: The seed accessions were used to obtain leaf material for extraction of chloroplast DNA. Some material was ground to obtain seed storage proteins.

Publications:

Pillay, M. and K. M. Hilu. 1990. Chloroplast DNA variation in diploid and polyploid species of *Bromus* [Poaceae subgenera *Festucaria* and *ceratochloa*]. Theor. Appl. Genet. (in press)

Cultivar Releases: none

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Accession User: T. A. Coffelt and D. M. Porter

Address: USDA, ARS
Tidewater Agricultural Experiment Station
P.O. Box 7099
Suffolk, VA 23437

Nature of Research. Two hundred sixty-eight *Arachis hypogaea* L. lines were received from the Regional Plant Introduction Station for seed increase in 1989 and return to the system.

Progress to Date: The seed have been harvested and, following shelling, classification, and packaging, will be returned to the regional plant introduction station. Approximately 250 lines received for increase in 1988 were evaluated for resistance to early leafspot (*Cercospora arachidicola*) and Sclerotinia blight (*Sclerotinia minor*) and a few selected lines for agronomic potential. The data are being analyzed.

Publications: none

Cultivar Releases: none

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REPORT OF THE
GERMPLASM SERVICES LABORATORY
TO THE
REGIONAL TECHNICAL COMMITTEES ON PLANT GERMPLASM

June 1990

'Let the earth put forth vegetation, plants yielding seed, and fruit trees bearing fruit in which is their seed, each according to its kind' (Genesis 1:11)

LABORATORY LEADER OFFICE
Allan K. Stoner

The mission of the U.S. National Plant Germplasm System (NPGS) is to effectively collect, document, preserve, evaluate, enhance, and distribute plant genetic resources for continued improvement in the quality and production of economic crops important to the U.S. and world agriculture. This is achieved through a coordinated effort by the U.S. Department of Agriculture in cooperation with other public and private U.S. and international organizations. The NPGS's plant genetic resources are made freely available to all bona fide users for the benefit of mankind.

The Germplasm Services Laboratory is responsible for all of the activities at the Beltsville Agricultural Research Center that are directly involved with the NPGS, except for the National Plant Germplasm Quarantine Center (Glenn Dale). Specific activities include the Plant Introduction Office, the Germplasm Resources Information Network Database Management Unit, the Plant Exploration Office, ecogeographic research, and facilitation of Crop Advisory Committees. All of these activities support the NPGS and are essential to its effective functioning.

Crop Advisory Committee Mark A. Bohning

The National Plant Germplasm System (NPGS) is currently supported by 39 Crop Advisory Committees (CAC) which provide crop specific advice on plant genetic resources. The CAC's are involved in numerous activities, including 1) compiling lists of germplasm sources in the U.S. and worldwide (both collected and wild); 2) determining the needs for additional germplasm and developing proposals to obtain material either through exchange or exploration; 3) advising germplasm curators on maintenance and increase techniques, etc.; 4) determining evaluation and enhancement priorities for their crops and developing proposals to accomplish these tasks; 5) working with the GRIN DBMU and germplasm curators to ensure that evaluation data entered into the database is accurate and standardized; 6) developing special reports for the ARS National Program Staff (NPS), the National Plant Germplasm Committee (NPGC), etc. Mark Bohning and Allan Stoner of the GSL continue to serve as a link between the CAC's

and other components of the NPGS and to work with the CAC's to facilitate their activities.

PLANT EXPLORATION OFFICE
Calvin R. Sperling

The Plant Exploration Office (PEO) continues to provide expertise in planning, coordinating and executing USDA/ARS supported plant explorations. A list of explorations undertaken in FY1989 and those approved for FY1990 is presented below. These explorations reflect continuing interest by the user community to obtain unique germplasm. In addition to responding to requests for explorations, the PEO is revising exploration priorities for the National Plant Germplasm System (NPGS) so that a proactive rather than reactive approach can be taken. Several expeditions listed below originated in response to identified NPGS exploration priorities.

A revised exploration proposal format was modified to include a "Code of Conduct" for travelers on foreign expeditions. This is in an attempt to set high standards for all international germplasm explorations.

A PEO research proposal received outside funding from the Agency for International Development to evaluate in situ conservation as a means of preserving plant germplasm. This study is in collaboration with The Nature Conservancy, Universidad Católica in Quito, Ecuador and Ecuador's national plant germplasm program. This project will survey the wild crop genetic resources of two protected areas in Ecuador and attempt to document the benefits to germplasm programs which are derived through broader efforts to conserve Ecuador's biological diversity in situ.

Another grant, with PEO as a contributor, was received from the National Science Foundation to study the loss of diversity in wheat germplasm in Turkey. This project, in cooperation with scientists at University of California, Davis will compare diversity from collections in the NPGS with those currently existing in Turkey.

Securing funds for acquisition of germplasm through exploration often requires novel methods. The PEO recognizes this and continues to arrange collaborative explorations. Invitations to collaborate with botanists in Belize, Ecuador and the USSR will likely result in future joint expeditions. Contacts are being developed with the national and international conservation community, where efforts to conserve biodiversity overlap with NPGS goals of conserving wild crop relatives. A project underway will document the wild crop genetic resources of the U.S. This will provide documentation to the conservation community of the potential agricultural utility of native genetic resources of the

U.S.

To enable the PEO to expand research activities, a support scientist has been assigned to the Office. This will allow further research activities while maintaining the service activities associated with coordinating numerous explorations.

USDA/ARS Plant Explorations Undertaken in FY1989

Plant Exploration	Country	Principal Contacts
Solanum spp.	Argentina, Chile	D. Spooner, M. Contreras
Lotus spp.	Morocco	P. Beuselink, W. Graves, J. Kirkbride
Vaccinium spp.	U.S. (Eastern states)	N. Vorsa, L. Bruederle
Fragaria spp.	U.S. (Rocky Mts.)	J. Luby, J. Hancock
Allium spp.	USSR	P. Simon, L. Pike, J. Swenson
Allium fimbriatum	U.S. (California)	Ctr. for Plant Conservation
Prunus alleghaniensis	U.S. (Michigan)	Ctr. for Plant Conservation
Helianthus paradoxus	U.S. (Texas)	Ctr. for Plant Conservation
Helianthus spp.	U.S. (Upper Midwest)	G. Seiler, J. Pomeroy, V. Gavrilova
Cuphea aspera	U.S. (Florida)	Ctr. for Plant Conservation
Cuphea spp.	Brazil	W. Roath, J. Kirkbride (as observers)
Cuphea viscosissima	U.S. (East Cental)	W. Roath, M. Widrlechner
Amaranthus pumilus	U.S. (SE States)	D. Brenner
Ipomoea spp.	Australia	R. Jarret, D. Austin
Food legumes	Turkey	F. Muehlbauer, W. Kaiser, C. Sperling
Forage grasses	U.S. (Midwest)	K. Vogel
Forage grasses	USSR	D. Dewey, K. Jensen
Beta spp.	Europe	D. Doney, G. Seiler
Malus spp.	USSR	M. Aldwinckle, B. Dickson, C. Sperling (in cooperation with Cornell Univ.)

USDA/ARS Plant Explorations Planned/Undertaken in FY1990

Plant Exploration	Country	Principal Contacts
Cuphea	Brazil	B. Roath, G. Christenson (observers)
Fragaria chiloensis	Chile	J. Cameron, C. Shanks, T. Sjulin
Solanum spp.	Argentina, Chile	D. Spooner, A. Clausen, A. Contreras
Phaseolus spp.	Colombia, Ecuador	P. Gepts, D. Debouck
Trifolium spp.	Bulgaria	K. Quesenberry, D. Smith
Fruits and nuts	USSR	C. Sperling, M. Thompson, D. Ramming
Mangifera spp.	Malaysia	R. Schnell, R. Knight, F. Zee
Forage grasses & legumes	PRC	M. Rumbaugh, D. Johnson
Beta spp.	USSR	G. Seiler
Medicago spp.	PRC	OICD/T.A. Cambell
Food & forage legumes	PRC	OICD/F. Muehlbauer, W. Kaiser
Walnuts	PRC	OICD/G. McGranahan
Carya spp.	PRC	L. Grauke, B. Wood
Vaccinium spp. & Rubus spp.	Ecuador	J. Ballington, J. Luteyn
Arachis spp.	Bolivia	D. Williams

PLANT INTRODUCTION OFFICE
George A. White & Staff

Exchanges - The number of items sent abroad during 1989 declined to 27,564, down slightly from 1988. Ninety two countries received materials in 1078 shipments. Dr. White made invited presentations in Bulgaria, the Soviet Union, and Tennessee (Natural Areas Association). New foreign contacts are already leading to meaningful exchanges of valuable plant germplasm and to direct field collaboration by American scientists in Bulgaria. The Plant Introduction Office (PIO) briefly hosted Japanese panel members of the United States Japan Natural Resources Project on Forage Seed Production and related Biotechnology. Dr. Austin Campbell of the Germplasm Quality and Enhancement Laboratory cochairs the U.S. panel. He will attend a joint meeting this summer in Japan and give presentations on plant introduction and biotechnology relative to forage crop breeding and seed production. PIO also coordinated the training of a young Korean scientist on quarantine aspects of plant genetic resources and an Indian scientist from New Delhi about plant germplasm exchange and passport data documentation.

Quarantine import requirements of other countries pose serious problems in the movement of plant germplasm into foreign research programs. The most commonly encountered problems are the requirements for an import permit and/or additional declarations (ADs) that call for field inspections of parental materials or that a certain organism (s) does not occur in the growout area (region,country).

Curators of germplasm collections and researchers that exchange a lot of samples with overseas cooperators need to have regularly scheduled and properly documented field inspections. For some crops, the inspectors need to check carefully for the absence or presence of specific disease organisms. An example is Stewart's disease (Erwinia stewartii) of corn. Field inspections need to be documented by date, findings, and listing of accessions. The inspector (indicate title) should sign the inspection report. PIO plans to pinpoint the most frequently affected species and countries. Sites will then be asked to contact us before filling any requests received direct from these countries.

Howard Scott Gentry, formerly an ARS plant explorer before his retirement in 1971, has been recently honored in Arizona. On May 12, 1990, he was granted an honorary Doctor of Letters degree from the University of Arizona, Tucson. The dedication of the H.S. Gentry Center for Desert Botanical Resources occurred on May 14, 1990. Howard, who remains active in plant collecting, has significantly contributed to various collections in NPGS. His current mailing address is:

2336 N. 57th PL
Scottsdale, AZ 85257

Documentation of PI's and Q numbers - During 1989, 9138 PI numbers were assigned. The loading of cotton collection data into the GRIN database resulted in the assignment of PIs. The number of Crop Science Registrations rose to 405 in 1989 for a 1987-9 three year total of 1,058. IBPGR sponsored explorations accounted for 1,508 PI's. PI numbers for selected groups of accessions for 1989 and 1990 are given below.

Other documentation activities included:

- Q number assignments (with passport data) - 263 accessions of potato, sweet potato, and vegetative fruit introductions.
- Rust & powdery mildew disease data - approx. 30,000 records added to database.
- Rice accession records - about 2000 added to database
- Others - 8004 priority site assignments, about 150 taxon additions to taxonomy file, and entered 409 records for W-6.

To update in 1990 a bit, 4,277 PIs have been assigned through May 31. Plant Inventory No. 198 for 1989 was submitted for publication in early May. Plant Variety Protection (PVP) accessions are being assigned PI numbers as soon as PVP identifying numbers are given to them. Also, items submitted to NSSL that will be registered by Crop Science are now assigned PI numbers as received by NSSL. This means that some will be PI'd before Dr. Shands receives the registration manuscripts. In view of the crunch to get PI numbers assigned to large groups of accessions at NSSL and other sites and the heavy involvement of GRIN staff in doing this, Dr. Stoner now coordinates the overall prioritization and assignment of PIs in close cooperation with PIO staff.

Some examples of PI number assignments for 1989 and early 1990 follow:

YEAR	CROP(S)	ORIGIN/COLLECTOR/ OTHER	PI RANGE
1989	Amaranth, *Triticum* *Sorghum*, etc	Oman, IBPGR	532151-330
	Cucurbita	Mexico, Andres	532331-433
	Pennisetum, *Sorghum*	Chad, IBPGR	532526-618
	Cucumis, *Pennisetum*	Niger, IBPGR	532673-713
	Cucurbita,	Zaire, IBPGR	532714-788

	Zea		
	Grasses, misc. spp.	Pakistan, D. Johnson	532915-973
	Phaseolus	various countries, W-6	533239-590
	Elymus, etc.	Australia, Crane/Carmen	533012-239
	Cicer, etc.	Spain, Kaiser	533669-744
	Sorghum	conversions/Rosenow	533745-534167
	Cuphea	Mexico, S. Graham	534660-912
	Secale	NSGC	534927-535199
	Arachis	Brazil, Simpson	536051-312
1990	Lettuce	NSSL	536692-864
	Sugarbeets	France, Doney	540557-702
	Grasses, etc.	USSR, Asay	538782-539101

PIO facts that you've always wanted to know-
-STARTED FORMALLY IN 1898-
-OLDEST FORMAL ENTITY OF NPGS-
-HOWARD HYLAND SERVED FROM 1948- APRIL, 1977-
-COMPUTERIZED PI DOCUMENTATION IN 1979-
-AVERAGED 5,833 PIS PER YEAR THROUGH 1989-
-AVERAGED 9,604 PIS DURING LAST 10 YEARS-
-197 USDA PLANT INVENTORIES IN PRINT-

Plant and Seed Materials Project (AID) -

During 1989, 270 shipments of 2978 accessions were made to 54 countries with the main country recipients being Nepal, Bolivia, India, Italy, Mozambique, and Pakistan. Cereals (49.5%), forages (32.5%) and vegetables (11%) accounted for most of the accessions. Our records reflect some developed countries receiving plant materials through this project; these are mostly items that were requested from us by the AID Ag-Forestry Unit.

In 1990 through May 15, 39 shipments of 172 accessions were made to 21 countries. We have acquired Calliandra seeds and are in the process of filling the back orders.

Personnel changes have taken place. Sharon Stern resigned Jan. 1990. Vicki Binstock assumed the position in March. Vicki has experience with documentation of passport data and assigning

Plant Introduction numbers, using the GRIN system. All AID distributions and seed orders are automated through order processing on the GRIN system. This enables rapid movement of materials to recipients and speedy generation of reports.

Dr. White traveled to Pakistan and Nepal under the auspices of the project. Upon his return, a large shipment of naked barley seed was assembled and forwarded to Nepal. Two way beneficial exchanges of plant materials are anticipated. Several requests from Pakistan have been filled and others are pending action. Requirements for quarantine import permits slows up the movement of plant materials to Pakistan.

The Plant Introduction Office provided the IRRI rice project in Madagascar with various cultivar's of clovers and vetch for green manure testing. A progress report indicated that results greatly exceeded expectations for several of the test entries. The best performing accessions include cultivars/lines of red clover (FL-6-E, FL-MTC, FL5), crimson clover (Chief, Dixiee, Tibbee), white clover (Florida x PL-3, Louisiana S1, Osceola ladino, CW 600 ladino) and three Vicia sativa accessions. Most of these were bred/selected for the Southern U.S. Further tests are to be conducted with these items and some retesting with earlier planting of some items that did not perform very well in 1989.

Future plans include purchasing of a FAX machine for the Plant Introduction Office. An article will be published in STAR to highlight the services provided through the Plant and Seed Materials Project. We also plan to seek out and automate information on reliable sources of plant materials for AID mission countries that are not readily available via NPGS or U.S. scientists. Extensive interaction with the AID mission in Sanaa, Yemen is expected. Considerable information has been provided to the mission thus the next step will be the timing of shipment of various fruit propagules. Travel to Haiti and Dominican Republic in May was cancelled because of the civil unrest in Haiti. Rescheduling for late August or September is anticipated. Cooperation with missions in Haiti, Pakistan, and Madagascar will likely continue at a high level throughout 1990 and beyond.

BIODIVERSITY

James A. Duke

Dr. Jim Duke was shifting gears during 1989, finishing up an AID paper on Economic Aspects of Tropical Biodiversity and an invited chapter on Tropical Legumes. The National Cancer Institute leaned heavily on Jim in setting up their $20-million Designer Food Program. Dr. Herb Pierson, NCI, invited Duke to two symposia to present papers on his phytochemical data base (FNF), a data base tabulating the nutritive and biologically active compounds in all GRAS herbs and in many

vegetables and fruits. The Designer Food Program intends to prepare standardized chemopreventive foods, containing quantified units of compounds shown to prevent cancer *in vitro*. GSL and Dr Duke is expected to assist NCI in this 5-year program, obtaining the best germplasm of the best species to provide the best phytochemicals. Some candidate species are conventional foods, like soybeans and cabbage, while others, like burdock, flax, garlic-mustard, licorice and rosemary, aren't in everybody's food basket. Selected designer foods from selected designer germplasm will then be put into clinical trials with human subjects. Jim's FNF Data Base was also copied to the Toxicology Branch of the FDA, a branch also interested in biologically active compounds. In November, Jim joined Calvin Sperling and The Nature Conservancy's Steven King in an AID-sponsored survey of wild crop relatives in selected forest preserves in Ecuador. Early 1990 found Jim in Pakistan reviewing his PL-480 projects on medicinal plants and in Sao Tome on an AID-sponsored project to assess the feasibility of black pepper as an alternative crop to cacao, whose world market has seen hard years. Between assignments, Jim's unit worked on his Alternative Crop book, proposed for CRC, and published a Handbook of Nuts, an outgrowth of his Alternative Crop Program.

ECOGEOGRAPHIC STUDIES

A. A. Atchley

In 1989 I was mainly concerned with facilitating the setting up of core collections for selected major crops. I met with the Phaseolus CAC in March and was appointed to their core collection subcommittee. I attended the Alfalfa CAC meeting in August, at which time their Chair (D. Barnes) suggested I meet with him and other personnel in Minnesota once the data from a mass growout of the collection was entered and a core collection could be selected. In October I drove to Ithaca and Geneva, NY to assess the prospects for core collection formation in wheat (consulting with M. Sorrels, then CAC Chair for wheat) and tomato (consulting with J. McFerson in Geneva, curator for tomato); I also visited with D. Viands (Cornell) about alfalfa. In November I attended the Phaseolus, Pea, and Special Purpose Legume CAC meetings in Toronto, Ontario, CANADA. At the latter meeting a definite decision was taken to set up a core collection for lentils.

The lentil core had been selected by this writing (May 1990); the Phaseolus core will require more data (fide R. Hannan, curator). The wheat CAC decided in November 1989 to remand data problems to the curator (Bockelman, Aberdeen, ID) and to postpone consideration of a core collection until after he had reworked the documentation of the National Small Grains Collection's holdings for wheat. There did not seem to be a role for me in the setting up of a tomato core collection, and the lack of documentation of Rick's Davis CA material makes the setting up of a core for that crop a difficult job. Various approaches to core collections in other crops are being taken and in 1990 I expect to summarize these and try to evolve a general system. Elements of Geographical Information System technology are to be brought into the setting up of representative cores.

Germplasm Resources Information Network (GRIN)
J. D. Mowder

1. Data Entered into GRIN:

Allium CAC, Squash, NSGC Wheat Rust, and Polish Rye data loaded.

Began conversion of S9 crops to small observation records (Okra, Guar, etc).

Assigned PI numbers to lettuce cultivars at NSSL.

Provide daily assistance to 22 sites.

2. Data Preparation in Progress:

Began project to identify Crop Science Registry (CSR) accessions in the GRIN database and initiated a search for those CSR accessions not in the database.

Initiated formatting of Genetic Stock data.

3. GRIN Training Sessions:

Site training was held at Beltsville for Urbana, Stoneville, Miami, Davis, and Ft. Collins.

Training was held the following sites: Orlando, Miami, Davis, Urbana, Stoneville, National Arboretum, and Glendale.

Site training/data loading assistance was held at Aberdeen for Rice (Dec 3-15) and for other small grains on (Oct 30-Nov 4).

The annual GRIN site meeting was held at the W-6 Regional Plant Introduction Station, in Pullman, WA. We thank Dr. Dietz and his staff for the great hospitality and excellent meeting arrangements.

4. GRIN Demonstrations:

ASA Meeting, Oct 15-19, Las Vegas, NV.

ASHS Meeting Aug 1-2, Tulsa, OK.

Cucurbit Conference, Nov 28-Dec 1, Charleston, S.C.

5: Database Activity;

The patent data was included as part of the GRIN.

Completed and released a new Public version of the database in September, 1989. We have received several very favorable comments from the user community.

Enhanced data loaders, maintenance modules, and some reports.

Upgraded the Prime DBMS software to eliminate internal errors in data storage.

Installed Oracle and Informix relational databases on microcomputers for evaluation. Also, installed SCO Xenix on a microcomputer for training and evaluation.

6. Personnel:

Diane Goldberg, programmer/analyst, Lockheed Corp., joined the DBMU staff in August, 1989.

Mark Perry left the Database Management Unit to work as the Information/Documentation Officer for the International Board for Plant Genetic Resources, Rome, Italy.

7. Hardware:

Installed intelligent communication system (ICS3) controllers to enhance communication. Each port can be set to handle a range of communication speed and reduced demand on central processor.

Upgraded Primos operating system to Ver. 21.0.6.R23 to permit multiple synchronous communication ports.

Extensive rewiring between the Uninterruptable Power Supply and the computer equipment to provide stable electrical power and reduce ground wire feedback.

Upgraded the Primenet communication software to include X.25 communication protocol.

Purchased new communication software Xmodem and Ymodem.

Contracted with Tymnet and CGNET to provide network communication worldwide to the GRIN. This

allows international centers access to GRIN and Mail.

Machine time availability was excellent for 1989. With the exception of the machine room rewiring effort, there was only minor disruptions.

8. Visitors:

Mr. Ho Ki Park, Agronomist, Korean RDA, spent three months with the DBMU learning database design methodology and operations of the GRIN.

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1990 ANNUAL REPORT TO THE REGIONAL TECHNICAL COMMITTEES

NATIONAL PLANT GERMPLASM QUARANTINE LABORATORY
PLANT SCIENCES INSTITUTE
AGRICULTURAL RESEARCH SERVICE
11601 OLD POND DRIVE
GLENN DALE, MARYLAND 20769

During the past year we received ca. 600 accessions representing 25 of the 60 genera that must be in quarantine upon arrival in the U.S. Among them were rice, coffee, pome and stone fruits, various grasses, sugarcane, small fruits, ornamentals, and potatoes. With an increased number of technicians, the numbers of tests completed for viruses has also increased. New technologies for detecting exotic latent pathogens are being adopted in the program. But they have been a mixed blessing in that some are more sensitive, meaning that a higher number of accessions are found to be infected, or that new pathogens have been discovered. This results is delays in releasing germplasm from quarantine until it can be freed of the pathogens.

Potato and Sweet Potato

The potato and sweet potato programs continue to operate smoothly with no backlogs of accessions. Tests for a whitefly-transmitted virus of sweet potato have been modified to improve test reliability. New procedures have been adapted in these programs such as the use of broad spectrum monoclonal antibodies to detect rod-shaped potyviruses and the use of nucleic acid probes to detect viroids in potatoes. Procedures for testing true seed of potato accessions have also been modified to improve reliability.

We received 18 potato accessions as vegetative propagations this year. Most came in as tissue cultured plantlets. Nineteen lots of true potato seed were released without testing since they were seed of nontuber bearing species. We tested and released 96 additional lots of true potato seeds. Forty-two vegetatively propagated accessions completed the testing cycle and were released. An additional 99 accessions, primarily germplasm from Mexico, are projected for release in September as this year's tests are concluded.

We are in the process of starting a heat therapy program. The recipients and the potato CAC have been contacted to recommend which virus positive clones should be heat treated first.

Since June 1989, 45 new accessions of sweet potatoes have been received, primarily from Australia. We anticipate the release of 42 clones at the end of this summer.

A support scientist with expertise in tissue culture joined the staff in December, and is commencing a meristem tip culture program to eliminate viruses from the collection of 59 virus-infected clones. We are communicating with the CAC to prioritize the order in which the infected clones will be processed.
S. Hurtt

Sugarcane

Our inventory currently contains quarantined germplasm from; 1) collection trips in China, India, Indonesia, New Guinea, Thialand, The Phillipines, Brazil, and Argentina; 2) selected breeding lines for international exchange and evaluation programs between the United States and Australia, Argentina, Brazil, Fiji and Mexico, and 3) lines in U.S. breeding programs. Substantial progress has been make in reducing the backlog of accessions in quarantine from 2,500 to 700 clones. A section of greenhouse has been renovated for exclusive use in the interstate exchange of germplasm. We participated in a project to establish ca 500 Nobel canes from the World Collection to Hawaii. Reference lines of sugarcane were distributed to pathologists in 20 locations for use in
an international project to evaluate races of smut pathogen.
Radioimmunoassay was instituted as a means to detect ratoon stunt disease. Serological tests for sugarcane and sorghum mosaic viruses are being developed. The interstate exchange program continues to increase in activity. Ca 275 clones were released to the World Collection in Miami. Project Leader visited six major sugarcane producing countries to examine the disease situation and explore pathogen detection and elimination techniques.
S. Hurtt

Pome Fruits

We received nine apples and 11 new pears since June 1989. Five apples were released, and an additional 15 we hope will be released this fall. Greenhouse tests on about 80 pear and 50 apple accessions were conducted in the greenhouse this past winter. And with this action, there is no backlog of accessions awaiting tests for virus infections. We initiated a heat therapy program on virus infected apples. A pre-establishment test for three viruses has been instituted from which allow early decisions regarding additional tests vs therapy treatment.
S. Hurtt

Stone Fruits

Approximately 350 accession of Prunus are in various stages of being tested for the 25 or so viruses that may be present in foreign germplasm. Another 200 or so have not yet been tested for any viruses. Prunus is the only genus in which we have a backlog of awaiting tests. Tests were completed on 28 accessions, they were released from quarantine and sent to the Prunus repository in Davis, California. A special initiative is underway to move the Prunus germplasm. Accordingly, more than 1000 tests were performed this year on circa 200 accessions with plans to repeat this level of activity again next year.

Tests for viruses that produce a symptom only in the fruit in field trees, require three to four years to completed. A new protocol has been described and agreed upon by APHIS that will allow limited distribution of accessions after preliminary greenhouse/laboratory tests are completed, and in which no viruses are detected. The long term field tests would continue after initial distribution has been made.
H. Waterworth -

Rice

In our report last year, we stated that the backlog of 350 rice accessions that were inherited with this project two years earlier, had been processed through quarantine. Since then, 105 new accessions of rice germplasm were processed and the next generation seed will be sent to the rice collection in Idaho or specific breeders. Ca. 135 additional accessions are currently being grown and will be eligible for release from quarantine in December. With our initiative to increase communications with the U.S. rice community, a larger percentage of rice germplasm entering the U.S. is being processed by the Glenn Dale Quarantine Laboratory, rather than by the individual breeders with permits from APHIS. There is no backlog of rice in quarantine awaiting processing.
B. Parliman

ADP

Progress was made in developing software that is unique for the programs of this Laboratory. Several additional computers were purchased and installed. NPGQL-IS architecture design and functional specifications plans were drafted. Plans for an in-house automated data information system to collect, process, report, archive, and share inventory and quarantine processing data, were developed and initiated. An automated communications system was designed and partially implemented. Preliminary draft of the NPGQL-IS operations manual was written. Development of an automated interface between the NPGQL-IS and GRIN is nearly completed. Technicians were trained in dBase IV, and are now entering inventory and virus-test data which will increase program efficiency.

In cooperation with the Geneva repository staff, apple range and passport data for 939 accessions were verified and entered into GRIN. This represents 85% of all of the existing GRIN apple accession data. A similar but larger effort has been initiated for entering detailed passport data for Prunus.

Parameters for local and NPGS bar code labeling systems for plant germplasm processing and preservation were defined. The NPGQL bar code labeling system was designed, implemented, and tested. Suitable bar code label materials for long and short term use were found for labeling accessions and experimental plant materials in the orchard, greenhouse, and laboratory. Scanning and decoding equipment and software were purchased and installed. Members of national plant germplasm system were advised by NPGQL staff on implementing bar code systems.
B. Parliman

Therapy on Infected Germplasm

Hundreds of accessions of stone and pome fruits, potatoes and sweet potatoes are infected with viruses and have not been released from quarantine. Two projects were initiated to deal with these accessions by producing disease free germplasm. Infected apples have been heat treated, and infected sweet potatoes are being tissue cultured as a means toward this end. We plan to expand to include stone fruits this summer. Unfortunately each of these items will have to be re-tested to verify success in eliminating the pathogens.

Other Quarantined Crops

Current inventory include circa 275 accessions, including circa 100 Ribes received from England this year, 50 grasses representing 12 genera and smaller numbers of Acer, Rubus, Morus, Syringa, Citrus, Euonymus, Vitis, Zea, and Coffea. Much effort was devoted to assembling the many rare virus sensitive indicators needed to conduct the tests for viruses. Ca. 180 tests, primarily on the grasses, were completed. The six CACs who represent these crops were notified of the expanded capabilities to process these genera through quarantine.
H. Waterworth

Pathogen Detection Research

The causal agent of infectious apple fruit blemish disease, dapple apple, has been shown to be a viroid, and to be related to another apple viroid that causes scar skin disease. Procedures have been developed to reduce the testing period for these viroids from several years, by inciting fruit symptoms on grafted indicator trees, to a few days by molecular hybridization assay. This technology is now being adopted in the virus indexing program on foreign fruit accessions.

Sequence homology between RNA_2 of arabis mosaic virus and RNA1 of strawberry latent ringspot virus has been demonstrated. This homology indicates the definitive assignment of the strawberry latent ringspot virus to the nepovirus group.

An accurate and sensitive method to detect tomato ringspot virus in fruit crops, based on recombinant DNA technology, has been developed. This method is superior to ELISA, the currently used immunological method, for detecting the virus from nectarine trees with Prunus stem pitting disease and from apple trees with apple union necrosis and decline disease. This method is particularly useful for confirming the etiology of disease of woody plants with symptoms similar but not identical to the above diseases, and for evaluating fruit crop germplasm for resistance to tomato ringspot virus.
A. Hadidi

Howard E. Waterworth
Research Leader

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TO: Members of the S-9 Regional Technical Advisory Committee (RTAC)

FROM: Michael L. Cagley, Curator
USDA-ARS
National Clonal Germplasm Repository for Citrus
Route 2, Box 375
Groveland, FL 34736
Phone: 904-787-5078 FAX: 904-787-5710

SUBJECT: 1990 S-9 RTAC report

There has been considerable progress made in the past year with respect to Repository operations. Since we are only in our second year of operation, we have made minimal distributions of germplasm. The major portion of our distributions to date have been of a recent USDA citrus rootstock called "Sun Chu Cha". This mandarin type rootstock shows promise in the flatwoods areas of the state where magnesium deficiencies have been a problem. In lieu of a formal report dealing with the use of distributed germplasm, I will submit an update of progress during the past year.

With regard to Repository personnel, we have doubled our staff with the recent hiring of Laura Maple as Technician. She has an extensive background in nursery operations, and has been a significant help since her arrival in early June of this year.

As far as the Germplasm collection itself is concerned, we have received a considerable amount of material from Don Hutchison. Most noteworthy of this material is a collection of Pummelo germplasm that he has collected in Thailand back in 1985. Unfortunately, no one has been able to evaluate these Pummelos due to the recent freezes our location has encountered. We have made arrangements to plant this material at the Miami Repository so that we can at least get the trees to fruiting stage and then be able to make evaluations on them.

We also have added several disease-free materials from Charles Youtsey and Frank Rosenthal of the Florida Division of Plant Industry (DPI). We are trying to get some citrus germplasm into the Repository that has been held for several years at the National Plant Quarantine Center located in Glenn Dale, MD. The bottle neck seems to be with the Florida DPI quarantine facility in Gainesville. They have limited facilities and resources which in turn limits both the amount and the speed with which citrus material can come into the state and ultimately the Repository.

As for the actual facility itself, the greenhouses are fully operational now and are filling up fast. We are waiting on some contract work which will renovate the screenhouse at which time it will be operational and available to house disease-free budwood trees. A new horizontal laminar flow hood has been ordered and will arrive soon, which will give us the capability to carryout disease elimination via shoot tip micrografting.

We are entering GRIN data as resources allow. We will also be doing isozyme analysis of the collection, again as resources allow.

As was the case last year, if anyone has any questions and/or comments, please feel free to contact me at the above location. I'll be glad to help in any way I can.

PROGRESS REPORT TO THE W-6 AND S-9 REGIONAL TECHNICAL COMMITTEE
NATIONAL CLONAL GERMPLASM REPOSITORY - HILO, HI

FRANCIS ZEE, CURATOR
JUNE 18, 1990

Activities between October 1989 to June 1990 were concentrated in the collection of tropical fruit and nut germplasm from university experiment stations, arboreta, industries and private collections from both U.S. and foreign sources. A total of 123 accessions were added, which increased our total to 659. The new materials primarily include elite germplasm of rambutan, lychee, carambola, and papaya. A mango collection trip in August 1990 to Eastern Malaysia with Drs. Bob Knight and Ray Schnell will provide NCGR-Hilo a great opportunity to expand our contacts and secure some crop varieties.

One of the goals at NCGR-Hilo in FY 90 is to introduce the facility to the world. We accomplished this by sending our newly composed distribution list to all the major centers of tropical fruit collection. Since January, we distributed over 60 accession lists to introduce the National Clonal Germplasm Repository - Hilo, and received 15 favorable responses. We will continue our efforts to cultivate our contacts both in and outside of the U.S. Our germplasm distribution is currently at 35, with 32% of the distribution to foreign requests.

We field planted the majority of our collection and learned how to successfully bud graft rambutan. We improved our rambutan budding from zero to over 80% success since April 1990. We continue our seed regeneration in papaya and passion fruit; evaluation of pineapple and papaya; tissue culture storage of pineapple; and in cooperation with Dr. Sharon Sowa at NSSL, initiated studies on seed storage of passion fruit, papaya, lychee, macadamia, pili nut and longan. A manuscript has been prepared for lychee seed storage in N_2O (S. Sowa, E. Roos and F. Zee).

In October 1989, we initiated over 20 clones of native Hawaiian banana into tissue culture; this is a rescue mission to secure these materials before they are lost to the panama wilt disease, bunchy top virus and corm weeviles. Ten of these bananas were submitted to NCGR-Miami in May, and arrangements have been made to ship the rest later this summer. NCGR-Hilo will terminate the banana mission when the materials are established in the Miami repository, various arboreta and collection sites on Oahu, Hawaii.

Our pineapple field collection has been replanted and a cooperative agreement with the University of Hawaii is being prepared for the evaluation of these materials and to establish zymogram of these accessions.

National Program Staff Report
July 26, 1990
Henry L. Shands

FY 1991 Budget. The Congress has not yet reached agreement on the budget and no appropriation bills have been passed. The Administration has delivered furlough notices to nearly all employees to effect large cuts in paid time. As of this date, the House has marked up $2.2 Million of new money for Germplasm for FY91 to support specific germplasm programs in quarantine, acquisition, preservation and winter nursery activities. It only approved $2 Million of the requested $4 Million for NSSL construction. The Senate marked up the full $4 Million and we must await the Conference Committee action to determine if we can proceed with construction.

Germplasm Funding:

Activity	FY 1988	FY 1989	FY 1990
Acquisition	$ 3,184,000	$ 3,762,000	$ 3,861,000
Preservation	9,497,000	10,175,000	11,369,200
Evaluation	8,142,000	8,537,000	6,980,000
Enhancement	5,633,000	6,029,000	5,849,100
TOTALS:	$26,456,000	$28,503,000	$28,059,000

NSSL Construction. Merrick and Company, Denver, is the engineering firm doing the NSSL planning and design work. The 100 percent planning meeting was held July 12 and final designs were delivered in early August. Pending the outcome of the budget hearings, construction could begin in the spring of 1991. The expansion construction will take approximately two years and the renovation of the old facility will take an additional year.

Personnel. Congratulations to Ray Clark for being named new Research Leader and Coordinator of the Regional Plant Introduction Station at Pullman, Washington. Dick Wilson has been named Acting Research Leader at Ames.

National Germplasm Resources Laboratory. The National Plant Germplasm Quarantine Laboratory and the Germplasm Services Laboratory have been merged into the new laboratory to be under the direction of Dr. Allan Stoner, Research Leader. In effect this is the arrangement that existed two years ago before the Beltsville reorganization which placed them into the Plant Sciences Institute as two laboratories.

Foundation on Economic Trends (FOET) Lawsuit on Germplasm. The lawsuit of FOET, led by Jeremy Rifkin, against the USDA was dismissed from U.S. District Court in Washington, D.C. The legal issue centered on whether an Environmental Impact Statement (EIS) was required on the germplasm system under the National Environmental Policy Act (NEPA), with FOET claiming it to be necessary by claiming a neglect of germplasm by USDA to be a "major Federal action". The Court ruled that there was no major Federal action. It further stated that the voluntary Environmental Assessment (EA) in which the USDA filed a funding of no significant impact (FONSI) would obviously not necessitate an EIS, particularly since the EA was not challenged by FOET (or any other party). FOET has filed an appeal with the Federal Appeals Court.

CAC Chair and PGOC meetings. The Crop Advisory Committee Chair meeting was held July 16-18 at Beltsville, MD, to bring the Chairpersons up to date, particularly in light of normal turnover of CAC and NPGS personnel. Previous meetings were held in 1986 and 1988. Since the leading site persons were in attendance, the Plant Germplasm Operations Committee (PGOC) meeting was held immediately thereafter, July 19-20.

International Activities of the NPGS. Several important international activities have taken place in the past year. INDIA. The agreement between ARS and the USDA's Office of International Cooperation and Development (OICD) to provide training at the germplasm repositories and to provide consulting expertise to the Government of India through the USAID Germplasm Project has been signed. PRC. A Joint Project Plan on Plant Genetic Resources between the Chinese Academy of Agricultural Sciences and ARS was signed 10 March 1990 to further a program of cooperation and scientific exchange in the area of conservation, characterization, development and exchange of PGR including training. This opens new opportunities in the evaluation and exchange of germplasm. USSR. A Joint Program of Cooperation and Scientific Exchange ofPlant Genetic Resources was developed between the N.I. Vavilov Institute of Plant Industry, Leningrad was developed to help develop compatible databases and exhange germplasm. Institute de la Vie. A plan to develop a database center for plant genetic resources was the result of a three day meeting at the National Arboretum in May. It is planned to be an information exchange center and not germplasm exchange. Paul Fitzgerald agreed to serve as an interim Director.

Keystone International Dialogue on PGR. The Second Keystone Dialogue was held in January 1990 at Madras, India. The final consensus report was distributed in May 1990 by the Keystone Center through a contract with Diversity magazine. The Dialogue was established in 1988 to help resolve international tensions at the FAO concerning the ownership and management of PGR. A special dialogue will be held in Ottawa from September 29-October 2, 1990 on Intellectual Property Rights.

NAS/BOA Report on Managing Global Genetic Resources. The Report on the part dealing with the National Plant Germplasm System was presented to the Administrators of ARS, CSRS, and the Assistant Secretary for S&E on September 21. The remainder of the reports dealing with global plants, animals, aquatic species, and forestry will be available over the next six months.

United States Department of Agriculture
Agricultural Research Service
Northern Plains Area
National Seed Storage Laboratory
Colorado State University
Fort Collins, CO 80523

Telephone: (303) 484-0402
Fax: (303) 221-1427

June 11, 1990

SUBJECT: NSSL Progress Report

TO: Regional Technical Committees on Germplasm

FROM: National Seed Storage Laboratory
Steve A. Eberhart, Director
Eric E. Roos, Research Leader
Loren E. Wiesner, Curator

Merrick and Company has submitted the 95% design of the NSSL expansion with the final design due in July. Because congress has only partially funded construction (2.75 million in FY 89 and 5.5 million in FY 90), the remaining 4 million required was requested in the FY 91 budget. The failure to appropriate the total construction funds in FY 90 will delay construction six months. If the remaining 4 million is approved in FY 91, construction can begin in early 1991 with completion possible by mid 1993. A 65,000 square foot addition to the north and west of the current building will include seed vaults, laboratories, and offices. The current facility will be renovated and used for administration and visiting scientists' offices, conference rooms, growth rooms, and miscellaneous uses.

Because the last conventional cold vault is nearly filled, we will be placing newly received small-seeded accessions in cryotanks in the cryoannex added last year. We have purchased movable carts so that large-seeded accessions can be stored on these carts in the cold vault aisles. PI numbers are being assigned to NSSL cultivars so that samples can be divided to provide duplicates at the Regional Stations whenever seed number and seed quality permit. Multiple samples derived from a single accession will be reviewed and only the original and last sample will be retained. Only a single sample of pure-line cultivar and inbred lines with multiple NSSL or PI numbers will be retained. CAC's will be consulted in the identification and verification of these redundant accessions. Elimination of redundant material as rapidly as possible is critical for the total NPGS to reduce costs of storage, regeneration, and germination retests.

Dr. Eric Roos was elected Fellow of the American Society of Agronomy at the 1989 annual meeting in Las Vegas. Dr. Steve Eberhart is serving as President of the Crops Science Society and Dr. Loren Wiesner is serving as Editor for the Journal of Seed Technology.

Regional Technical Committees on Germplasm

Seed Viability and Storage Research Unit

NSSL and the Regional PI Station at Ames have cooperated with GRIN in a pilot program to evaluate the use of a satellite disk to receive and transmit GRIN data to Beltsville with very satisfactory results. Costs are only $6,000 per year versus $22,000 for a dedicated line through telemail.

Computers have been installed in the seed quality laboratory with direct input from scales for determining seed moisture and seed number. In the near future germination test results will also be keyed into the computer as determinations are made. The NSSL inventory is down-loaded from GRIN bi-monthly in dBase program so that any employee can quickly scan for information.

The addition of the Supervisory Computer Programmer, Freda Thomas, has provided needed programming expertise. A cooperative planning effort by the data accessions and seed quality sections produced several improvements. These included: developing of a computerized system for sample check-in and tracking, initiating a process for inventorying and bar coding all samples at NSSL, initiating the use of order processing for distribution of seed, developing and initiating a process for cryopreservation check-in of samples, and developing a one-card system for laboratory use.

A total of 22,882 tests were conducted to evaluate seed viability. Of these tests, 13,522 were germination retests, 9,318 were initial germination tests and 42 samples could only be tested for moisture and checked for seed number. During the year 13,895 new samples were received. Of these samples, 365 were received from plant variety protection office, 1,625 from plant quarantine, 4,145 were regenerated by Regional Plant Introduction Stations and the remaining 7,760 accessions were new items received for storage from plant breeders, Regional Plant Introduction Stations, conservation groups, and other individuals and organizations. This group of samples also contain those accessions received for storage for Crop Science registration. In November 1989, there were 224,600 accessions (excluding multiples with the same accession number) stored at NSSL. A total of 3,063 accessions were distributed to 65 scientists in 13 different countries and 92 plant virus indicator samples were distributed. In addition to these distributions, approximately 10,000 oat accessions and 28,000 barley accessions were sent to the Plant Gene Resources Bank of Canada. Seven hundred twenty-two sorghum accessions were prepared and shipped to St. Croix for planting under quarantine after the facilities were repaired from the hurricane damage.

With the expanding work load at NSSL, a computer assistant, Lynda Fencl, two technicians in the seed quality laboratory, Jolene Hansen and Cheryl Johnson, a part-time secretary, Saundra Garrett, and a clerk-typist, Alice Arnold, have been added to the staff.

April 4, 1990

TITLE: REPORT - PLANT GERMPLASM PRESERVATION RESEARCH CY 1989

TO: National Plant Germplasm Committee
Regional Technical Committees on Plant Germplasm

FROM: Eric E. Roos, Research Leader
PGPR, NSSL, Fort Collins, CO 80523

INTRODUCTION

Significant events during the past 15 months.

1. Dr. Cecil Stushnoff was hired as a Senior Research Scientist in the Dept. of Biochemistry at Colorado State University under a joint program sponsored by NSSL and RJR-NABISCO.

2. Dr. Bhim Sain Chhabra from Haryana Agricultural University in Hisar, India spent 4 months with E. Roos doing research on ion leakage from seeds.

3. Dr. Yue Luan Hor from the University Pertanian in Malaysia spent a month working on recalcitrant seed preservation with P. Stanwood.

4. In December we welcomed Dr. Marcia A. Browers as a post-doctoral research associate with C. Vertucci

5. This past January Dr. Patricia Berjak and Dr. Norman Pammenter from South Africa, worked with C. Vertucci on methods for drying and storing recalcitrant seeds.

6. We have received notification from IBPGR of a $97,000 (over 3 yr) research grant to E. Roos, S. Sowa and F.D. Moore (CSU) to work on non-destructive methods for viability assessment.

RESEARCH PROGRESS

Marcia A. Browers (Plant Physiologist, RJR grant):

Major emphasis will be on elucidating the role of lipid peroxidation in seed deterioration. The goal is to determine if peroxidation products can be detected in membrane lipids of critical organelles, and which organelles are more sensitive to peroxidation. It is hypothesized that the effects of peroxidation in aged seeds are not always detected because of the comparatively small contributions of particular membranes to the overall lipid content of the seed. This study should allow us to better understand the aging process under cold and dry conditions.

Kristina F. Connor (Plant Physiologist, ARS post-doc-Res. Assoc.):

Pollen or flowers were received from Athens and Brownwood (pecan), Riverside (citrus, date), Corvallis (filbert, pear), and Geneva (apple), and methods for in vitro germination testing were developed. Media constituents, moisture content, pollen density, time, and rehydration were some of the elements that had to be defined for each pollen. Samples were dried and stored under low temperatures. Pollen stored in liquid nitrogen (LN) for 1-2 hr showed no drop in viability. After 6 mo., apple and pecan pollens showed no reduction in viability. In all cases, rehydration of pollen was necessary for accurate viability estimates. Filbert and citrus pollen have been tested for fertility in the field.

Mass collections of pine (2 l), spruce (1.5 l), pecan (200 ml), and cattail pollen (120 ml) have allowed us to begin biochemical and physiological tests. Current experiments using transmission FTIR indicate changing biochemical properties as pollen deteriorates. FTIR has also been used to measure changes in vibrational frequency that occur in membrane hydrocarbons with changes in temperature as membranes shift from the liquid crystalline to the gel phase.

Preliminary findings with the DSC indicate an absence of glass formations at temperatures ranging from 10 to -70°C in pine pollen sampled at varying moisture contents. At moisture contents of +30%, it was possible to detect thermal transitions as water crystallized in the pollen grains.

Moisture isotherms have been developed for pine, spruce, maize, and barley pollens. Initial findings indicate rapid water loss or gain during the first 30 min. of exposure to saturated salt solutions of $MgCl_2$, $Mg(NO_3)_2$, NH_4NO_3, and KCl. Experiments have been conducted both at room temperature (23°C) and under refrigeration (-5°C).

Attempts to examine pollen using freeze-fracture techniques were successful with moist pollen; however, very dry pollens tended to fracture along grain surfaces and failed to yield views of internal membrane structures.

Eric E. Roos (Plant Physiologist):

Experiments were conducted using the ASA 1000 conductivity apparatus to determine the earliest time during seed imbibition when reliable data might be obtained for use in seed quality evaluations. The criterion used to judge the data was derived from a computer program which calculates an index value we call "internal slope". Derivation of internal slope is achieved by modeling the frequency distribution of individual seed leachate values using the Richards function and calculating the maximum derivative of the distribution function. This value turns out to be the inflection point of the S-shaped curve of the cumulative frequency distribution of micro-amp values. At the earliest stages of imbibition the internal slope values are very high and then decline and level off. At this point it is assumed that no further leaching is needed to produce reliable data. Results for corn, wheat and soybean appear to indicate that 4 hr of leaching may be sufficient. For Phaseolus beans longer soak times are needed.

Vigor differences were apparent in two lots of corn (B73 x LH51) produced under different watering regimes. Germination of the lots (after hand sorting) was 99% (dryland) and 97.5% (irrigated). The internal slope, after 9 to 11 hr of leaching, for irrigated corn was significantly lower than that for dryland (2.7 vs 3.7) indicating a higher vigor of the dryland seed. This was confirmed by seedling root length measurements and artificial aging studies.

Deteriorated seeds of tomato, bean, cantaloupe, okra, celery and sunflower from the Project 27 research files at the NSSL were germinated at low moisture content (mc) which simulates the mc of samples coming out of routine storage. These samples were then equilibrated to higher mc to determine if germination could be improved simply by relieving stress at the seed imbibition stage. Overall, no significant improvement was observed following equilibration. Tests are being conducted on surface sterilizing seeds to eliminate or reduce fungal contamination in the hope of improving total germination.

Sharon Sowa (Research Chemist, RJR grant):

Changes in whole bean seed respiration were measured during germination. Effector molecule experiments with CO, N_2O, and D_2O showed correlations between respiratory activities of whole seeds, mitochondrial and CcO extracts, and seedling vigor (root length). D_2O effects were measured on fresh and aged corn and pea seed germination and mitochondrial respiration. Seed respiration was also measured in onion seeds that had been stored for 10 years at +5C, -18C, and LN temperatures in a collaborative experiment with Phil Stanwood.

Our effector molecule application experiment, using nitrous oxide to prolong viability of recalcitrant seeds, is on its second round. This year, Francis Zee supplied samples of longan, passionfruit, and macadamia seed, and a new species, lychee. Storage longevities of both longan and lychee were doubled using humid, anesthetic conditions. Passionfruit and macadamia results are pending.

The most exciting findings in 1989 involve FTIR analysis of plant germplasm. In a collaborative experiment with Leigh Towill, ATR sampling was used to determine plant cell viability of suspension cultures on a noninvasive basis. A clear "viability peak" which corresponds to intracellular CO_2 was quantitatively measured in viable cells. This was a first step in developing a method of intact viability assessment.

DRIFT analysis was used to measure biochemical characteristics of intact pollen grains and lyophilized potato tissue. Transmission IR was used to measure the temperature of lipid phase transitions in intact pollen of different moisture contents in a collaborative experiment with Kris Connor. Changes in pollen protein structure with temperature are also being analyzed as part of this experiment. Transmission IR was also used to examine biochemical features of dry vs imbibed excised bean embryos.

Philip C. Stanwood (Research Agronomist):

Germination results (Table 1) of onion seed clearly demonstrate a loss of viability at 5C storage with little difference noted between -18C and -196C storage after 10 years. One can also

see that cultivars differ in their ability to maintain germination over time. For example Yellow Ebenezer (1) maintained germination while Yellow Ebenezer (2) lost viability.

Vigor tests (Table 2, root lengths) provide a more sensitive test than germination to estimate how well seed is storing under a give condition. One can see that -196C is providing the best storage conditions.

Table 1: Onion Seed Germ. After 10 Yr. Storage at 5, -18 & -196 C.

Cultivar	Storage Temperature 5 C	-18 C	-196 C
	-- Germination % --		
1055C	76 a	89 b	85 b
Abundance	78 a	91 b	93 b
B21088	72 a	89 b	92 b
B2264A	51 a	90 b	92 b
Bronze Age	22 a	83 b	80 b
El Capitan	87 a	97 b	95 b
Fiesta	92 a	97 b	96 b
Granada	94 a	98 a	97 a
IA736A	27 a	89 b	94 c
M1411B	27 a	88 b	90 b
South Port White Globe 1	88 a	91 a	92 a
Yellow Ebenezer 1 (Crook.)	93 a	95 ab	96 b
Yellow Ebenezer 2 (Dessert)	69 a	86 b	83 b
Yellow Sweet Spanish	95 a	98 a	97 a
AVERAGE	69 a	92 b	92 b

Table 2: Onion Seedling Root Lengths After Four Days.

Cultivar	Storage Temperature (10 y) 5C	-18C	-196C
	------	mm	------
1055C	4.22 a	9.47 b	8.73 b
Abundance	3.24 a	4.83 b	5.48 c
B2108B	2.85 a	6.78 b	8.03 b
B2264A	0.85 a	3.32 b	4.65 c
Bronze Age	0.37 a	2.68 b	4.77 b
El Capitan	3.03 a	6.37 b	7.95 b
Fiesta	2.61 a	6.18 b	6.57 c
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Cryopreservation of seed germplasm in liquid nitrogen in very beneficial for most of the species under consideration. Biological, mechanical reliability and cost factors are all favorable for the recommended species. The results of research over the past 10 years has lead the NSSL and other similar worldwide facilities to the conclusion that cryopreservation would become an increasing part of their overall preservation strategy.

Determining the underlying processes associated with desiccation damage in recalcitrant seeds (e.g. wild rice) may provide researchers and gene banking organizations tools to preserve these materials. Currently, the only method of preserving these types of materials is through vegetative methods, if available.

Cecil Stushnoff (Research Associate, CSU/NSSL RJR grant):

Initial results on the apple bud cryopreservation pilot project (cooperative with L. Towill and P. Forsline) showed an average of only 28% survival after cryopreservation. After one year in liquid nitrogen buds averaged over 50% survival. The difference in survival reflects problems with rehydration of the buds and the delay in bud grafting as we were working out the initial protocols on this project. A second series of buds were placed in cryo-storage this past winter. This project represents the first tangible results on large scale cryopreservation of clonal species.

Techniques to cryopreserve Prunus dormant buds were developed for 6 cold tolerant species (besseyi, fruiticosa, pennsylvanica, salicina, tenella, and tomentosa) and 4 cold tender species (armeniaca, avium, cerasus, and persica), followed by research to provide a linkage of the dormant bud procedure to in vitro germplasm preservation. Recovery of dormant buds, with 80-100% viability, was achieved with both groups, although the protocol for the cold tolerant species was different from that required for the cold tender species. The cold tolerant species could be cryopreserved, without desiccation, from November through February and with desiccation in October. The tender species could only be recovered from the December harvest after employing a controlled acclimation regime, consisting of slow freezing and incubation at -25C for 3 weeks prior to controlled desiccation and cryopreservation. Increased survival of cold tender species may be obtained by excising the meristematic apex from cryopreserved dormant buds or by direct cryopreservation of in vitro derived shoots, because the meristematic apex often survives, yet cannot be recovered by patch budding to rootstocks due to the death of the surrounding cortical tissues.

Leigh E. Towill (Plant Physiologist):

Vitrification of shoot tips from mint and other species was emphasized in CY 1989. Methods using DMSO, polyethylene-glycol and propylene glycol and related compounds were developed and significant survival was obtained with rapid cooling after controlled application of defined mixtures. Although survival, generally, is not greater than that obtained with two-step cooling, shoots directly developed from treated buds rather than going through a brief unorganized growth stage (as often occurs in two step cooling). Survival was obtained with potato, papaya, and carnation. The applied solution does vitrify with fast cooling rates (differential scanning calorimetry (DSC) data); however, conclusive evidence for vitrification of the cell contents was not obtained.

Information about two-step cooling as a means of cryopreservation was obtained with additional mint and potato lines. After application of cryoprotectants and low temperature exposure, regenerants were examined for true-to-type characteristics. No abnormal regenerants were observed in field-grown potato or greenhouse-grown mint.

A postdoctoral fellow in my lab, Kris Conner, has examined and identified practical aspects of exchange, handling, storage and viability testing for pollen preservation. The results suggest that cryopreservation of desiccation-resistant pollen is feasible. Some long term studies have been established in cooperation with different NCGR units.

Christina W. Vertucci (Plant Physiologist):

In all of our studies, we have looked for relationships between bound water and physiological activity. By measuring various properties of hydrating tissues using DSC (differential scanning calorimetry), we have identified at least five "types" of water in seeds. Studies of physiological reactions in seeds suggest that the type of water available to the tissue is an important factor in the nature and kinetics of deteriorative reactions.

Studies relating lipid properties with seed longevity have demonstrated that there are few correlations between lipid content and/or chemistry and seed longevity. However, the physical properties of the lipid in vivo and aging rates are correlated.

The desiccation sensitivity of recalcitrant tissues can be reduced if they are dried rapidly, such that freezable water can be removed without causing death to the seed axis. Preliminary results suggest that these seeds now can be dried to levels where they can be cryopreserved without additions of cryoprotectants.

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* Copies or reprints available from:

Plant Germplasm Preservation Research Unit
USDA-ARS National Seed Storage Laboratory
Colorado State University Campus
Fort Collins, Colorado 80523

Report for 1990 Meetings of the W-6, S-9,
and NC-7 Technical Committees

Robert Kleiman
New Crops Research
Northern Regional Research Center

The New Crops Group has been busy this last year on a variety of research areas dealing with new industrial oilseed crops. Organizationally we have remained about the same except for the guayule project. Since the retirement of G. Earle Hamerstrand we have discontinued the guayule project at NRRC. We are using those funds to strengthen the new industrial oil seed project, primarily in the area of *Lesquerella*. We lost Doug Burg, one of the two full time research chemist working on meadowfoam, to industry. Hopefully we will replace these two positions (Mr. Hamerstrand and Dr. Burg) with research associates this coming fiscal year.

A CAC for New, Minor, and Potential Crops has been formed. This first meeting for this committee has been tentatively scheduled for October.

Lesquerella

Two successful pilot plant extractions of *Lesquerella fendleri* seed, of 500 lbs. each were accomplished. One was a prepress-solvent extraction procedure at Piqua, Ohio. The other an extrusion-solvent extraction at Texas A&M. We are now evaluating these extractions and researching the refining of this hydroxy-oil.

While breeding and agronomic work on this crop continues at the Water Conservation Laboratory, ARS, in Phoenix, commercial interest has made Anson Thompson to consider a 30 acre planting so that oil is available for industrial applications.

All *Lesquerella* species available in the germplasm system was analyzed for fatty acid composition. Using modern chromatographic techniques the analyses that were done twenty years ago was updated.

Meadowfoam

We have prepared a number of products from meadowfoam oil and are evaluating them for their properties. These include dimer acids for lubricants and anti-corrosion additives, vulcanized oil for rubber formulation, and amides for polyethylene film additives. These applications look promising except for the initial price of the oil.

Jojoba

We used both native enzymes and microorganisms to detoxify jojoba meal. The microorganism work was done at Hyder, AR. The detoxified meal was then shipped to El Reno, OK for ruminant feeding trials.

to host materials in the field. The beetles can respond to a wide variety of host-type compounds; over 50 individual esters, alcohols, acids, ketones, and aldehydes were found to be synergistic with the pheromones in wind tunnel tests. With further refinements, the pheromones and host volatiles together are expected to become useful pest management tools. Bioactivity-guided isolation studies are in progress on several plant extracts that have demonstrated antifeedant or insecticidal activity.

Plant Bioactives

Further elucidation of the role of phytoalexin medicarpin in alfalfa autotoxicity was accomplished. Alfalfa seedlings absorb exogenously applied medicarpin and apparently metabolize it as evidenced by the finding that seedlings place on medicarpin-treated media contained measurable amounts of the compound after 20 hours. Although treated seedlings did not grow, the concentration of medicarpin in the media was reduced to about 40% of the original concentration after 44 hours. At that time, the seedlings resumed growth at rates comparable to those of controls. A major effort to produce gram quantities of medicarpin was initiated with the processing of five bales of alfalfa hay. Some 15 loline derivatives were screened for growth inhibition of ryegrass and alfalfa; some gave significant growth reductions, but the compounds were not considered to be competitive with current herbicides. Several promising leads for potential plant growth regulators were found from the screening of plant extracts and fractions therefrom. Of particular interest were extracts of dyers woad (*Isatis tinctoria*) and big bluestem (*Andropogon gerardii*).

Methods have been developed to measure Fumonisin B1, a mycotoxin produced by Fusarium moniliforme and reported to cause Equine Leukoencephalomalacia, in feed samples and culture materials. Fumonisin B1 was identified and measured for the first time in corn samples associated with field cases of this disease. High levels of fumonisins have also been detected in samples from farms with cases of lung edema in swine, a mycotoxicoses previously associated with contamination by *Fusarium moniliforme* but not yet shown to be caused by fumonisins. One gram of fumonisin B1 has been purified from laboratory cultures of *Fusarium moniliforme* and the bulk of this material will be provided to Dr. William Norred of the Russell Research Center for animal toxicity studies. Reference analytical standards have been provided to about a dozen other laboratories and the remainder of the fumonisins will be used for chemical characterization. Insertion of the trichodiene synthase gene from the fungus Fusarium sporotrichioides, into the bacterium escherichia coli, and production of trichodiene were reported. Analysis of trichothecene mycotoxins and several novel precursors by mass spectrometry and tandem mass spectrometry was reported. Ergobalansine, a new ergot-type peptide alkaloid was isolated and characterized from sandbur grass infected with the endophyte *Balansia obtecta*. An aggregation pheromone of the dried fruit beetle was characterized.

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Determining the underlying processes associated with desiccation damage in recalcitrant seeds (e.g. wild rice) may provide researchers and gene banking organizations tools to preserve these materials. Currently, the only method of preserving these types of materials is through vegetative methods, if available.

Cecil Stushnoff (Research Associate, CSU/NSSL RJR grant):

Initial results on the apple bud cryopreservation pilot project (cooperative with L. Towill and P. Forsline) showed an average of only 28% survival after cryopreservation. After one year in liquid nitrogen buds averaged over 50% survival. The difference in survival reflects problems with rehydration of the buds and the delay in bud grafting as we were working out the initial protocols on this project. A second series of buds were placed in cryo-storage this past winter. This project represents the first tangible results on large scale cryopreservation of clonal species.

Techniques to cryopreserve Prunus dormant buds were developed for 6 cold tolerant species (bessevi, fruiticosa, pennsylvanica, salicina, tenella, and tomentosa) and 4 cold tender species (armeniaca, avium, cerasus, and persica), followed by research to provide a linkage of the dormant bud procedure to in vitro germplasm preservation. Recovery of dormant buds, with 80-100% viability, was achieved with both groups, although the protocol for the cold tolerant species was different from that required for the cold tender species. The cold tolerant species could be cryopreserved, without desiccation, from November through February and with desiccation in October. The tender species could only be recovered from the December harvest after employing a controlled acclimation regime, consisting of slow freezing and incubation at -25C for 3 weeks prior to controlled desiccation and cryopreservation. Increased survival of cold tender species may be obtained by excising the meristematic apex from cryopreserved dormant buds or by direct cryopreservation of in vitro derived shoots, because the meristematic apex often survives, yet cannot be recovered by patch budding to rootstocks due to the death of the surrounding cortical tissues.

Leigh E. Towill (Plant Physiologist):

Vitrification of shoot tips from mint and other species was emphasized in CY 1989. Methods using DMSO, polyethylene-glycol and propylene glycol and related compounds were developed and significant survival was obtained with rapid cooling after controlled application of defined mixtures. Although survival, generally, is not greater than that obtained with two-step cooling, shoots directly developed from treated buds rather than going through a brief unorganized growth stage (as often occurs in two step cooling). Survival was obtained with potato, papaya, and carnation. The applied solution does vitrify with fast cooling rates (differential scanning calorimetry (DSC) data); however, conclusive evidence for vitrification of the cell contents was not obtained.

Information about two-step cooling as a means of cryopreservation was obtained with additional mint and potato lines. After application of cryoprotectants and low temperature exposure, regenerants were examined for true-to-type characteristics. No abnormal regenerants were observed in field-grown potato or greenhouse-grown mint.

A postdoctoral fellow in my lab, Kris Conner, has examined and identified practical aspects of exchange, handling, storage and viability testing for pollen preservation. The results suggest that cryopreservation of desiccation-resistant pollen is feasible. Some long term studies have been established in cooperation with different NCGR units.

Christina W. Vertucci (Plant Physiologist):

In all of our studies, we have looked for relationships between bound water and physiological activity. By measuring various properties of hydrating tissues using DSC (differential scanning calorimetry), we have identified at least five "types" of water in seeds. Studies of physiological reactions in seeds suggest that the type of water available to the tissue is an important factor in the nature and kinetics of deteriorative reactions.

Studies relating lipid properties with seed longevity have demonstrated that there are few correlations between lipid content and/or chemistry and seed longevity. However, the physical properties of the lipid in vivo and aging rates are correlated.

The desiccation sensitivity of recalcitrant tissues can be reduced if they are dried rapidly, such that freezable water can be removed without causing death to the seed axis. Preliminary results suggest that these seeds now can be dried to levels where they can be cryopreserved without additions of cryoprotectants.

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* Copies or reprints available from:

Plant Germplasm Preservation Research Unit
USDA-ARS National Seed Storage Laboratory
Colorado State University Campus
Fort Collins, Colorado 80523

Hawaii Plant Materials Center
P. O. Box 236 Hoolehua, Hawaii 96729

NATURE OF RESEARCH: Development of new conservation plants for Hawaii and the Pacific Basin (includes Guam, the Northern Mariana Islands, the Federated States of Micronesia, the Republic of Palau, the Republic of the Marshall Islands and American Samoa).

PROGRESS TO DATE: PI-224980, glycine (G. wightii) is a legume that that has performed well in Hawaii's low rainfall zones for forage and erosion control. It is scheduled for release in 1991.

PI-213903, vetivergrass (V. zizanioides) is a deeply rooted long lived, perennial bunch grass that is doing exceptionally well and is currently being evaluated for contour hedgerow applications for the natural formation of terraces using vegetation.

PI-315868, pennisetum (P. flaccidum) and 9042665 pennisetum (P. orientale) are warm-season, strongly rhizomatous perennial grasses for forage and erosion control. Current evaluations are part of the inter-center trial to find their full range of adaptation.

9037942, 9037940 and 9037941 broadleaf carpet-grass (A. compressus) a low growing, shade tolerant perennial grass continues to be increased and tested for groundcover applications in orchards.

9037869, napiergrass (P. purpureum) a stiff growing grass has been crossed with a sterile pearl millet grass strain (P. glaucum) to produce a lower growing sterile napier/millet grass for applications as an alternate forage and erosion control plant for lower rainfall zones.

PI-421777, stargrass (Cynodon nlemfuensis) a vigorous, fast spreading grass, similar in appearance to "giant" bermudagrass continues to show promise as a forage and erosion control grass, for low rainfall zones and as an alternate grass for areas where pangola-grass (Digiteria decumbens) has been affected by droughty conditions.

Increase and testing continues with Desmodium heterophyllum HA-4704 and Desmodium triflorum HA-4706 as a low growing perennial legume for erosion control applications in orchards.

PUBLICATION: NONE

CULTIVAR RELEASES: NONE

Glenn S. Sakamoto
Manager, Hawaii Plant Materials Center

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Knox City, Texas Plant Materials Center

No plant introductions showed promise in 1990.

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Reports were not received from other plant materials centers, but I wanted to advise the SNTC Committee of the work that is being done in the area of water quality studies at the Centers.
H W Everett, Plant Materials Specialist, SCS

BROOKSVILLE, FLORIDA
Is cooperating with the Extension Service at Lake Okeechobee to evaluate plants for phosphorus uptake and forage production under irrigation with dairy waste water. The trials started in 1989; dairy waste water from a lagoon is being applied to the forages to determine those able to remove the phosphorus and those adapted to the increased soil moisture. Forage samples are to be analyzed by the Extension Service for nutrient content and yield. The SCS has provided plants and is taking notes on adaptation.

Is cooperating with the City of Ocala, Florida, where municipal waste water is being applied to many species in the rough area of a golf course. Determinations of those species adapted to the increased water and nutrients therein is the objective.

Has constructed small wetlands cells where many plants are being evaluated for adaptation to various levels of fertilizers added to the water in the cells. Most of the plant varieties released by the PMC are included.

AMERICUS, GEORGIA
Is cooperating with the Environmental Protection Administration (EPA), the Tennessee Valley Administration (TVA) and the Alabama Cooperative Extension Service to determine those wetland plants adapted to a constructed wetland using waste water from a swine operation at Sand Mountain, Alabama. SCS has supplied plant materials and is monitoring growth rates and production. Other agencies are doing the plant and water sample analysis.

Is cooperating with Auburn University and TVA to test plants in a waterway at Russellville, Al. Here chicken litter and waste water from a lagoon is applied to sweet corn production fields. The need is for plant species that are high in nutrient utilization and adapted to wet soils.

Is cooperating with the City of Ochlocknee, Georgia, to test plant adaptation in a constructed wetlands where municipal waste water is being treated in the constructed wetland. SCS provided plants and is collecting adaptation data.

Is doing initial evaluation with a cattail collection on two constructed wetland cells below a dairy waste water lagoon at Eatonton, Ga. The cooperators include University of Ga, EPA, Ga Environmental Protection Department, Ga Department of Natural Resources, ARS, ASCS, Ga Dairy Association and the Ga Experiment Station.

COFFEEVILLE, MISSISSIPPI
Is cooperating with the Corps of Engineers to determine those wetland plant species suitable for constructing new and improving existing wetlands sites. Constructed wetlands cells are being planned at the PMC and at offcenter sites. There wetlands plants will be established in the cells and flooded to different water depths. Response and growth will be monitored. Native plants are favored for the trials.

BOONEVILLE, ARKANSAS
This PMC is developing a trial to test plant species for establishment and growth under application of high rates of chicken litter. The test will also determine those grasses that have a high potential for use as filter strips between litter application fields and water courses.

KNOX CITY, TEXAS
This PMC is developing a constructed wetlands cell project to cooperate with local small towns, in the immediate area, that have inadequate municipal waste water disposal facilities.

EAST TEXAS PMC
Plans are being developed to study and to expand the plant species existing on a natural wetlands site at the Center.

SOUTH TEXAS PMC
No planned water quality project to date.

GOLDEN MEADOW, LOUISIANA
This PMC recently released 'Vermilion' smooth cordgrass for stabelization of saline marsh shorelines. Data is still being gathered on giant cutgrass for freshwater sites in the marsh.

Plans are incomplete but this PMC has the opportunity to collect and determine the commercial production techniques needed to use native iris and spiderlily species in constructed wetlands cells where municipal wastes are used. The iris and spiderlily will provide alternative and attractive flowering plant species for the cells.

SOUTHERN REGIONAL PLANT INTRODUCTION STATION
Report to S-9 Technical Committee
July 26, 1990

This report covers the primary activities of this plant introduction station for the period of July 1, 1989 through June 30, 1990.

Plant Introduction

Germplasm of 2,776 new Plant Introductions (PI's) were added to the S-9 Project plant germplasm collections. The crop groups received were sorghums, clovers, peanuts, squash, and pumpkins. The total collection is 62,524 PI's and is composed of 276 genera and 1,386 species from 170 countries.

Seed Distribution

A total of 43,862 seed samples were shipped in all categories of distribution. In direct response to 534 requests 27,979 seed samples were shipped within the S-9 Region, 4,711 to the other three regions, 4,463 to 43 foreign countries, and 976 legume cultivars for field trials in the southern states.

Shipments in other categories of distribution were: 2,335 PI's sent to the National Seed Storage Laboratory (NSSL) for long-term storage and 3,398 PI's distributed for seed increase and evaluation.

Seed Increase

A total of 3,774 PI's are included in the 1989 increase plantings. The major crop groups involved are sorghum, cowpeas, peanuts, sesame, peppers, squash, clovers, grasses and melons. The P.I. Station is increasing 1,070 new and old PI's. Cooperators in several states (Alabama, Arizona, California, Florida, Oklahoma, and Texas) are increasing 1,553 PI's of melons, peanuts, clovers, and tropical forage legumes. The Tropical Agriculture Research Station (TARS) at Mayaquez, P.R. increased and evaluated 875 PI's of Ethiopian Sorghums in two plantings during the Fall of 1989 and the Winter-Spring period of 1990.

Peanut Curator

Seed regeneration of seed samples free of peanut stripe virus is continuing. Forty-two new introductions from Peoples Republic of China were made available for distribution in the Spring of 1990.

Pathology Research

Current research efforts continues to involve development of methods and screening watermelon germplasm for watermelon mosaic virus to resistance. Also, field trials are in progress to study the spread of peanut stripe virus from peanuts to soybeans and to determine yield effects and possible seed transmission in soybean, lima bean and cowpea. In the 1989 growing season no seed transmission occurred in soybean or lima bean.

Sweet Potato Repository

Tissue culture techniques have been successful in maintaining sweet potato nodes in vitro for 2+ years in a state of "no growth". After transfer to hormone-free media, axillary bud development resumes and normal plantlets are obtained after three months. Also, construction of a genomic library for sweet potato has been completed.

Facilities

The new greenhouse complex was completed and released for operaton in September of 1989. The construction of the headhouse with research labs began in November 1989 and released for operation in June 1990. The design of an additional seed storage building was contracted. The construction should begin late in the FY 91.

APPENDIX I

Southern Regional Plant Introduction Station Budget

Source of Funds		FY-90	FY-91
Regional Research Funds (Pooled)		$233,815	$201,836
RRF (Committee of Nine Allocations)		0	0
	TOTAL	$233,815	$201,836
Expenditures			
Personal Services - Salaries		$125,607	$131,236
Personal Services - Benefits		35,675	44,067
Travel		500	500
Supplies & Operations		24,033	24,033
Equipment		38,000[1/]	2,000
	TOTAL	$223,815	$201,836
Source of Funds			
ARS Base (recurring Funds)		$1,409,873	$1,389,832[2/]
Expenditures			
Personal Services		$480,375	$589,009
Travel		36,000	22,000
Construction & Repairs		330,000[3/]	300,000[4/]
Supplies & Materials		127,213	39,823
Support Equipment		54,000	18,586
Operations		30,203	171,211
Cooperative Agreements		352,082	249,203
	TOTAL	$1,409,873	$1,389,832

1/ Includes a one-time allocation of $36,000 from the Southern Directors for purchase and installation of dehumidifiers for the seed storage rooms.

2/ The FY 91 figures (ARS) are close planning estimates only.

3/ Construction of Headhouse/Lab Building and renovations.

4/ Construction of additional Seed Storage Building.

1990

S-9 TECHNICAL COMMITTEE REPORT

Agency: U.S. Department of Agriculture, Subtropical Horticulture Research Station
Submitted by: R. J. Schnell
Address: 13601 Old Cutler Road, Miami, Florida 33158
Accession Users: R. J. Schnell and R. J. Knight
Address: U.S. Department of Agriculture, Subtropical Horticulture Research Station, 13601 Old Cutler Road, Miami, Florida 33158
Nature of Research: Introduction, preservation and evaluation of tropical and subtropical plants.

Progress to Date:

This station maintains as live plants 7925 accessions of tropical perennial economic plants. It and the Tropical Agricultural Research Station at Mayaguez, PR, together constitute the National Plant Germplasm Repository for avocado, mango, coffee, banana and plantain, and tropical species of Ziziphus. Other fruit crops well represented are annonas, carambola and lychee, and also numerous guava relatives (Psidium and Eugenia spp.) The Miami station serves as an intermediate quarantine facility for Theobroma cacao, which after clearing this facility is established permanently at Mayaguez. The U.S. replicate of the World Collection of sugarcane and related grasses (2405 accessions) is held at Miami.

Between June 1, 1989 and July 20, 1990, 759 new introductions were received at Miami. During this reporting period, 361 distributions left the station (Table 1). Most of the distributions were to people involved in research, education, public service, or private industry in the United States.

Germplasm Evaluation and Enhancement:

Mangifera: Estimates of frequencies of nucellar vs. zygotic embryos occurring in polyembryonic mango rootstock varieties were completed. Significant differences were found between rootstock varieties. These zygotic seedlings will be used to study the effect on scion productivity.

Palms: Isozyme systems were resolved for Cocos nucifera, coconut palm. These systems are now being used to systemically evaluate the diversity within this genus.

Tissue Culture: A banana tissue culture experiment on storage of germplasm at 15 C was completed. Results indicate that transfers can be reduced to 180 day cycles. This will allow a back up collection of Musa spp. to be maintained in the incubator. Genotype x temperature differences were significant. Some genotypes will not tolerate 15 C.

Field Evaluations:

Carambola: Two rootstock/scion interaction experiments were planted in May and June, 1990. These involve 10 treatments of commercial scions and rootstock cultivars.

Passion Fruit: One hundred sixty tetraploid seedlings of hybrid origin (Passiflora incarnata x P. edulis) planted summer, 1989, in Byron, Georgia, survived a winter temperature of 12 F and resumed growth in spring, 1990. They began to flower in May, and some fruit was set in summer, 1990. The plants are undergoing evaluation for fertility and pollination compatibilities, and evaluation of their potential as a new fruit crop for the warm temperate zone is planned.

Avocado: Unusually cold weather in December, 1989, severely injured all West Indian and many Guatemalan x West Indian hybrids so that they did not fruit in summer and fall, 1990. The cold did not adversely affect any Mexican race accessions or selections, and some Mexican x Guatemalan hybrids weathered it well, bearing normal crops. Among these are 'Ettinger' (P.I 218196), a commercial cultivar from Israel, 'Bacon' (M-20709), formerly of commercial importance in California, and 'Biscayne' (M-3335), an old seedling selection (never officially distributed) whose value has long been overlooked. 'Biscayne' bears medium-sized green fruit of good eating quality which justifies use in dooryard plantings and limited testing for commercial production in parts of Florida and southern Texas that are marginal for the crop.

Technology Transfer: In June, 1990, 21 mango cultivars were distributed to the Haitian Organization for Recovery of the Environment for trial in that country. Mangos are a cash crop important to many small farmers, and improved varieties are sought for Haiti.

Table 1. Distribution of Orders for CR-MIA, 01/01/89 to 07/20/90

Categories	Orders		Accessions	
	Freq.	Percent	Freq.	Percent
Miscellaneous	4	1.108	13	1.009
ARS	6	1.662	36	2.793
FCOM	2	0.554	4	0.310
FIND - Foreign Individual	5	1.385	13	1.009
FINT - International Center	5	1.385	42	3.258
FPRI - Foreign Private Center	5	1.385	50	3.879
FPRU	3	0.831	18	1.396
FPUB - Foreign Public Sector	29	8.033	295	22.886
INT	1	0.277	21	1.629
STA	7	1.939	7	0.543
UAID - U.S. Agency for Independent Development	4	1.108	5	0.388
UARS - U.S. Agricultural Research Service	32	8.864	195	15.128
UIND - U.S. Individual	195	54.017	416	32.273
UPRI - U.S. Private Institution	23	6.371	73	5.663
UPRU - U.S. Private University	7	1.939	7	0.543
USTI - U.S. State Institution	15	4.155	62	4.810
USTU - U.S. State University	18	4.986	32	2.482