

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

National Seed Storage Laboratory
Colorado State University
Fort Collins, Colorado

July 24, 1988

Submitted by

Phillip J. Ito, Secretary
S-9 Techical Committee 1987-1988

1. CALL TO ORDER

The S-9 Technical Committee meeting was called to order by chairman Teddy Morelock at 8:00 a.m., June 24, 1988.

2. INTRODUCTION OF ATTENDEES

| Name | Address | Phone |
|---------------------|--|--------------|
| David Andrews | Agronomy Dept. Univ. of Nebraska Lincoln, NE | |
| Gerald Arkin | GAES Griffin, GA 30212 | 404/228-7263 |
| David Battensperger | Agronomy Dept. Univ. of Florida Gainesville, FL 32611 | |
| Gene Bolten | Expt. Sta. Texas A & M Univ. College Station, TX 77843 | |
| * David W. Bradshaw | Dept. of Horticulture Clemson University Clemson, SC 29634-0375 | 803/656-4949 |
| * David L. Coffey | Dept.-Plant & Soil Sci. University of Tennessee 355 Ellington Plant Sci Bldg. Knoxville, TN 37996 | 615/974-8829 |
| Steve Eberhardt | NSSL Colorado State University Ft. Collins, CO 80523 | 303/484-0402 |
| Wayne Everett | USDA/SCS Ft. Worth, TX | |
| * Bill Fike | Crop Science Dept. North Carolina State Univ Raleigh, NC 27695-7620 | 919/737-3267 |
| Mark Hussey | Soil & Crop Science Texas A&M Univ. College Station, TX 77843 | |
| P.J. Ito | 461 W. Lanikaula St. Hilo, HI 96720 | 808/935-2885 |
| Robert Kleimair | USDA/ARS Northern Reg. Res. Ctr. Peoria, ID | |

| | | |
|---------------------|---|--------------|
| Stephan Krosovich | USDA/ARS Germplasm Res. Geneva, NY | |
| Maryann Loften | USDA/ARS PIO Beltsville, MD 20705 | |
| Gil Lovell | S. Reg. Plant Intro. Sta. USDA-ARS Georgia Experiment Sta. Experiment, GA 30212 | 404/228-7255 |
| Jim Mc Ferson | USDA/ARS Germplasm Res. Geneva, NY | |
| * Teddy E. Morelock | Dept. of Horticulture Univ. of Arkansas 316 Plant Science Fayetteville, AR 72701 | 501/575-2603 |
| * Forse Mosjidis | Dept. of Agronomy & Soils Auburn Univ. Auburn, AL 36849 | |
| * Gordon M. Prine | Agronomy Dept. Univ. of Florida 304 Newell Hall Gainesville, FL 32611 | 904/392-1811 |
| Raymond Schnell | USDA/ARS Southern Hort. Res. Sta. Miami, FL 33158 | 305/238-9321 |
| Henry L. Shands | Bldg. 005, Rm. 140 BARC-W Beltsville, MD 20705 | 301/344-3311 |
| Allan Stoner | USDA/ARS Beltsville, MD 20705 | |
| * Norman L. Taylor | Dept. of Agronomy Univ. of Kentucky Agri Sci Bldg North Lesington, KY 40540-0091 | 606/257-5785 |
| * Ann Marie Thro | Agronomy Dept. Louisiana State Univ. Baton Rouge, LA 70803-2110 | 504/388-1301 |
| Ruben Velez | Agri. Expt. Sta. HC02 Box 7115 Juana Diaz, PR 00665 | |

| | | |
|-------------------|---|--------------|
| Francisco Vasquez | USDA-ARS-TARS P.O. Box 70 Mayaguez, Puerto Rico 00709 | 809/834-2435 |
| George White | USDA/ARS Beltsville, MD 20705 | |
| S. C. Wiggins | USDA-CSRS 217 J.S. Morrill Hall Washington, DC 20251 | 202/447-4202 |
| Francis Zee | Waiakea Germplasm Rep. Hilo, HI 96720 | 808/959-5833 |

* Members of the S-9 Technical Committee

3. APPROVAL OF MINUTES

Gordon Prine moved that the 1987 minutes be approved as circulated. Bill Fike seconded and the minutes were approved.

4. APPROVAL OF AGENDA

There was no additions to the 1988 meeting agenda and it was approved as circulated.

5. APPOINTMENT OF COMMITTEES

| | |
|----------------------------|--|
| A. Nominations of Officers | Philip Ito, Chairman David Coffey |
| B. Time & Place | Ann Marie Thro, Chairman Gordon Prine |
| C. Resolution | Bill Fike, Chairman David Bradshaw |

6. REMARKS FROM ADMINISTRATIVE ADVISORS

A. Dr. Gerald Arkin commented on the following:

- There was an increase in the S-9 and National Repositories budget which nearly doubled in 3 years but that there is still a long way to go.
- At the Southern Directors meeting, many were new so had to explain the S-9 projects and it's benefits. Representative members of the S-9 committee should inform and influence their respective directors.
- Requested that reports be circulated prior to meeting so more time can be allotted to discuss important issues.

- Review of S-9 project by Southern Directors and CSRS.
- S-9 associated opportunities in research and communication.
- Nationalization of regional germplasm projects where research will be on competitive funding.

B. Dr. S. C. Wiggins added the following:

- Discussed the House and Senate FY '89 appropriations.
- Research accomplishments in plant science and plant introductions.
- Discussed inter-regional projects.
- Publication - "Legacy" a historical document which can be obtained, gratis, from Feenie Tolver, USDA-CRS, Washington, D.C. 20251.
- Encouraged members to attend other regional meetings.

7. STATE PROGRESS REPORTS AND RESEARCH PLANS

The following state representatives presented their annual reports. Due to time limitation, state reports were given minimum time everyone cooperated. Copies of the state reports are included in appendix I.

| <u>Representative</u> | <u>State</u> |
|-----------------------|----------------|
| (no report) | Alabama |
| T. E. Morelock | Arkansas |
| G. M. Prine | Florida |
| Carl S. Hoveland | Georgia |
| P. J. Ito | Hawaii |
| Norman L. Taylor | Kentucky |
| A. M. Thro | Louisiana |
| C. E. Watson, Jr. | Mississippi |
| W. T. Fike | North Carolina |
| James S. Kirby | Oklahoma |
| Guillermo J. Fornaris | Puerto Rico |
| D. W. Bradshaw | South Carolina |
| David L. Coffey | Tennessee |
| George G. McBee | Texas |
| Richard E. Veilleux | Virginia |

8. REVISION OF S-9 PROJECT

The S-9 project was approved by the committee of nine after minor revision. All members should send memo to Gil Lovell for the number of revised copy needed.

9. NATIONAL PROGRAM STAFF AND OTHER AGENCY REPORTS

Reports presented at our meeting were from the following and will be included in appendix II.

| <u>Representative</u> | <u>Agency</u> |
|-----------------------|------------------------------|
| G. Lovell | Southern Reg. Pl Intro. Sta. |
| F. Vasquez | P.R. Trop. Agric. Res. Sta. |
| R. Schnell | Miami Sub. Trop. Res. Sta. |
| H. Everett | Texas Soil Con. Serv. |

Most of the National Reports presented at the joint meetings and will be included in appendix II.

10. PLANT EXPLORATION PROPOSALS

Proposals to be reviewed by Crop Advisory Committee, S-9 Committee, Plant Germplasm Exploration Committee and Administration. Proposal format outline will be sent to all members.

Private collections of individuals will be registered to prevent loss of germplasm.

11. COMMITTEE REPORTS AND ACCEPTANCE

a. Nominations: The nominating committee presented the following candidates for consideration for Philip Ito as chairman and Francisco Vasquez as Secretary. Ann Marie Thro moved to accept and Ray Schnell seconded. The candidates were elected by acclamation.

b. Time and Place of Next Meeting: The location committee proposed that the 1989 meeting be held in Florida, depending on the sabbatical leave of Dr. Prine. Alternate locations were Georgia and Puerto Rico. The date was set for the third week in July. Dave Bradshaw moved to accept, Bill Fike seconded and was passed by acclamation.

c. Resolutions: The following resolutions were presented by the committee. Gordon Prine moved to accept and Ted Morelock seconded. All resolutions were accepted by acclamation as read.

RESOLUTIONS:

1. Be it resolved that the S-9 Technical Committee expresses its appreciation to Dr. Steve Eberhardt for his many efforts in making our stay in Colorado a happy and comfortable occasion.

2. Be it resolved that the S-9 Technical Committee expresses its appreciation to Dr. Vern Youngman for setting up the trip to Coors Brewery, and to Dr. Dorris Clark and staff of NSSL and Dr. Olaf Gamberg and staff at the Tissue Culture Center for sharing with us their research and insight into the future of germplasm storage worldwide.

3. Be it resolved that the S-9 Technical Committee expressed its thanks for a job well done to Gill Lovell for his work with the revision of our project (may he gently rest in peace for another five years).

4. Be it resolved that the S-9 Technical Committee welcome Gene Bolton, Ruben Colon, Jorge Mosjidis, and Ray Schnell as new members to our meeting and may our future associations be worthwhile for all.

5. Whereas the germplasm news magazine, DIVERSITY, provides an essential service in technology transfer to the national and international germplasm communities by publicizing and promoting germplasm issues and programs, the S-9 Technical Committee expresses strong support for the magazine and commends its editor, Deborah Strauss, for her untiring input. Because subscription fees and donations have not been sufficient to place DIVERSITY on a sound and sustained financial basis, we strongly recommend that the USDA obtain continuing federal funding to guarantee the long-term future of DIVERSITY.

12. UNFINISHED OR NEW BUSINESS

a. It was suggested that State reports be sent to Gil Lovell before the meeting so members could review the reports. Gil will send the notice to members setting the deadline date.

b. Copy of the S-9 Project was sent out to members and those who did not receive any should contact Gil Lovell.

13. ADJOURNMENT

The meeting was adjourned by Ted Morelock at 11:48 a.m., June 24, 1988. Moved to adjourn by Gerald Arkin and seconded by Ted Morelock. Adjourned by acclamation.

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 Program Staff

National Seed Storage Laboratory

Northern Regional Research Center

Soil Conservation Service

Southern Regional Plant Introduction Station

Subtropical Horticultural Research Station

Tropical Horticultural Research Station

S-9 Technical Committee Report
June 1988

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

Page 1 of 1

* * * * *

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

Nature of Research: Evaluation of Vicia sativa L. for agronomic and botanical characteristics and cold tolerance.

Progress to Date: Flowering date in 272 accessions was found to range from middle March to early May. Flower color was either white, purple, or deep purple Nitrogen content ranged from 1.74% to 4.84%. Winter temperatures have been mild in Alabama during the last two years, so we do not have any observations regarding cold tolerance. The following PI's were found not to be Vicia sativa: 179549, 206780, 220881, 232957, 249879, 251200, 284076, 284377. PI's 284054, 284061, and 284073 are mixed with other species.

Publications: None
Cultivar Releases: None

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 nine plant introductions of several Lespedeza species obtained from the Regional Plant Introduction station, Experiment, Georgia, will be evaluated for condensed tannins using the vanillin/HCl spot test. Seedlings will be evaluated in the greenhouse and fully developed plants will be evaluated in the field.

Publications: None
Cultivar Releases: None

1988
S-9 REPORT

Accession User: James McD. Stewart

Address: Agronomy Department, University of Arkansas, Fayetteville, AR
72701

Nature of Research: Acquisition, evaluation and enhancement of
Gossypium germplasm.

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. A few accessions were identified that gave only 20% as much larvae weight gain as a susceptible check. Twelve Asiatic cotton accessions were field tested for resistance or tolerance to thrips. Two were highly resistant and eight were moderately resistant compared to commercial check lines of upland cotton.

Twelve accessions representing 10 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.

Cytoplasm of wild Gossypium continue to be introgressed into the tetraploid nuclear background. Cytoplasmic male sterility has been identified in three of these cytoplasm. A male fertile line did not restore fertility to a sibling male sterile line in one of the cytoplasm tested. Several nuclear traits are being transferred from wild species accessions to cultivated cottons.

A collection of Gossypium germplasm was conducted in the Northeast part of Brazil (joint with A. E. Percival, USDA, ARS, Cotton Germplasm Collection). Approximately 100 accessions of G. hirsutum landrace Marie Galante were obtained. Locally these were known as "Moco" and are perennial types that are threatened by the boll weevil. Also, five accessions of the wild endemic Gossypium mustelinum were collected.

Publications: Oosterhuis, D. M., S. D. Wullschleger and J. M. Stewart. 1988. Diversity in cotton root anatomy. *Ark. Farm Res.* 37(3):19.
Stewart, J. M. 1988. Update on the taxonomy of Gossypium. *Proc. Beltwide Cotton Prod. Res. Conf.* Pp.95-97.
Stanton, M. A., J. M. Stewart and J. R. Phillips. 1988. Resistance of Asiatic cottons to bollworm. *Proc. Beltwide Cotton Prod. Res. Conf.* P. 100.

Cultivar Releases: None

1988

S-9 Technical Committee Report

Agency: Arkansas Agricultural Experiment Station
Submitted by: T. E. Morelock
Address: Dept. of Horticulture & Forestry
316 Plant Science Building
Fayetteville, AR 72701

* * * *

Accession User: T. E. Morelock
Address: Dept. of Horticulture & Forestry, 316 Plant Science
Building, Univ. of Arkansas, Fayetteville, AR 72701
Nature of Research: Breeding for Rhizoctonia root rot resistance
in green bean Phaseolus vulgaris L.
Progress to Date: High levels of resistance have been fixed in
white seeded bush type plants by crossing PI 165426 and
Venezuela 54 with commercial white seed cultivars.
Publications: None
Cultivar Releases: None

Accession User: S. J. Scott
Address: Dept. of Horticulture & Forestry, 316 Plant Science
Bldg., University of Arkansas, Fayetteville, AR 72701
Nature of Research: Breeding and genetics of resistance to
spotted wilt virus in tomato.
Progress to Date: Plants resistant to one Arkansas isolate of
TSWV have been identified in Lycopersicon peruvianum
and L. pimpinellifolium. Additional tests of
resistance are in progress.
Publications: None
Cultivars Released: None

1988 S-9 TECHNICAL REPORT

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

Submitted by: G. M. Prine

Address: Department of Agronomy
University of Florida
304 Newell Hall
Gainesville, FL 32611-0311

Accession User: David Knauft
Department of Agronomy
University of Florida
304 Newell Hall
Gainesville, FL 32611-0311
904-392-1811

Nature of Research: Genetics and breeding of peanuts (Arachis hypogaea L.). Objectives which utilize PIs include disease and insect resistance, earliness and large-seeded types.

Progress to Date: PIs were used this spring in crosses with large-seeded, bunch type, early lines to develop cultivars (including home garden types) with these traits. Material from PIs continues to be an important part of our disease resistance program.

Publications:

Knauft, D. A., A. J. Norden and D. W. Gorbet. 1986. The effect of three digging dates on oil quality, yield and grade of five peanut genotypes grown without leafspot control. Peanut Sci. 13:82-86.

Gorbet, D. W., A. J. Norden, F. M. Shokes and D. A. Knauft. 1987. Registration of Southern Runner peanut cultivar. Crop Sci. 27:817.

Iroume, R. N. and D. A. Knauft. 1987. Heritabilities and genetic, environmental, and phenotypic correlations for pod yield and leafspot severity in peanuts (Arachis hypogaea L.): Implications for early generation selection. Peanut Sci. 14:46-50.

Iroume, R. N. and D. A. Knauft. 1987. Selection indices for simultaneous selection for pod yield and leafspot resistance in peanuts (Arachis hypogaea L.). Peanut Sci. 14:51-54.

Norden, A. J., D. W. Gorbet, D. A. Knauft and C. T. Young. 1987. Variability in oil quality among peanut genotypes in the Florida breeding program. Peanut Sci. 14:7-11.

Knauft, D. A. 1987. Inheritance of rust resistance in groundnut. pp. 183-188 In: Groundnut rust disease. Proc. of discussion group meeting, 24-28 Sep. 1984. ICRISAT Center, India. Patancheru, A.P. 502324, India.

Knauft, D. A., D. W. Gorbet and A. J. Norden. 1988. Yield and market quality of seven peanut genotypes as affected by leafspot disease and harvest date. Peanut Sci. 15:(In press).

Chiteka, Z. A., D. W. Gorbet, F. M. Shokes, T. A. Kucharek and D. A. Knauft. 1988. Components of resistance to late leafspot in peanut. I. Levels and variability - implications for selection. Peanut Sci. 15:(In press).

Accession User: F. P. Gardner
Agronomy Department
University of Florida
304 Newell Hall
Gainesville, FL 32611-0311
904-392-1811

Nature of Research: Perennial peanut turf for home yard.

Progress to Date: Perennial peanut (Arachis glabrata PI 262840) continues to make an excellent quality, low-maintenance turf for the entire yard. Tolerance of shade has been surprisingly good -almost too good since it seems to creep into the shrubbery - even dense ones. It has been an excellent base for a ryegrass overseeding, which has given a near picture-perfect winter turf. Nitrogen fertilization of the ryegrass is not necessary, if one wishes to sacrifice some turf quality for a reduced mowing schedule. Perennial peanut appears to leave little residual N for ryegrass, despite fall leaf senescence and the return of all clippings. Mowing has been weekly or biweekly and clippings fall between shoots.

In this situation, this perennial peanut turf has received no fertilizer or supplemental water for at least two years. Recycling of mineral elements in return of clippings appears completely adequate and drought has not had much effect on appearance. Now that birds and squirrels graze the blossoms off, there may be enough nutrient export to make a difference in time, but this is doubtful. Recycling should be more than adequate.

In summary, perennial peanut makes a high quality low-maintenance turf, if one has the time, skill, and patience to get it established as a weed-free stand and, if traffic on it is minimal.

Publications:

None

Accession User: L. E. Sollenberger
Agronomy Department
University of Florida
IFAS 0681
Gainesville, FL 32611-0681
904-392-1924

Nature of Research: Forage grass and legume management and utilization

Progress to Date: Grazing trials are in progress comparing steer gains on N fertilized 'Floralta' limpograss (Hemarthria altissima (PI 364888)) at three levels of protein supplementation with those on an association of limpograss and aeschynomene (Aeschynomene americana). First year results showed higher daily gains on protein supplemented vs. unsupplemented steers, and gains on the association were similar to those on the supplementation treatments. In another grazing trial, mean steer gains on 'Florigraze' rhizoma peanut (Arachis glabrata) were 0.93 kg compared to 0.37 kg on 'Pensacola' bahiagrass (Paspalum notatum). Handplucked herbage of peanut averaged 18% crude protein and 70% in vitro digestibility. Establishment studies with Mott dwarf elephantgrass (Pennisetum purpureum) have been underway for two years. Results to date indicate improved establishment if vegetative material was well fertilized before being harvested for planting, and if leaves of vegetative material were not grazed or physically removed from the stems prior to planting.

Publications:

Rusland, G. A., L. E. Sollenberger, K. A. Albrecht, C. S. Jones, Jr. and L. V. Crowder. 1988. Animal performance on limpograss-aeschynomene and nitrogen-fertilized limpograss pastures. Agron. J. (In press).

Rusland, G. A., L. E. Sollenberger, C. S. Jones, Jr. and D. D. Johnson. 1988. Carcass characteristics of cattle grazing dwarf elephantgrass, rhizoma peanut, limpograss, and limpograss-aeschynomene pastures. Fla. Beef Cattle Res. Rep. pp. 33-42.

Sollenberger, L. E., G. M. Prine, W. R. Ocumpaugh, W. W. Hanna, C. S. Jones, Jr., S. C. Schank and R. S. Kalmbacher. 1988. 'Mott' dwarf elephantgrass: A high quality forage for the subtropics and tropics. Fla. Agric. Exp. Stn. Circ. S-356. Univ. of Florida, Gainesville.

Sollenberger, L. E., G. M. Prine, K. R. Woodard and C. S. Jones, Jr. 1988. Planting methodology for 'Mott' dwarf elephantgrass. International Conference on Livestock and Poultry in the tropics. Univ. of Florida, Gainesville. (In press).

Sollenberger, L. E., W. R. Ocumpaugh, V. P. B. Euclides, J. E. Moore, K. H. Quesenberry and C. S. Jones, Jr. 1988. Animal performance on continuously stocked 'Pensacola' bahiagrass and 'Floralta' limpograss pastures. J. Prod. Agric. (In press).

Sollenberger, L. E., G. M. Prine, W. R. Ocumpaugh, W. W. Hanna, C. S. Jones, Jr., S. C. Schank and R. S. Kalmbacher. 1988. Registration of 'Mott' dwarf elephantgrass. Crop Sci. (In press).

Cultivar Release:

'Mott' dwarf elephantgrass was released by the Florida Agricultural Experiment Stations and USDA in February 1988. (Circular in preparation and should come out in 1988).

Accession User: David D. Baltensperger
Agronomy Department
University of Florida
304 Newell Hall
Gainesville, FL 32611-0311
904-392-1811

Nature of Research: Breeding research has been conducted on cool and warm-season forage legumes. Adaptability to Florida with emphasis on specific viruses and nematodes and genetic markers have been the primary objectives.

Progress to Date: Have found significant interaction between genotype and virus infection in alyceclover (Alysicarpus vaginalis) and hairy indigo (Indigofera hirsuta L.). However, none of genotypes screened were adequately resistant for field use.

Genotype variation has been identified for edema in plant introduction hairy indigo. This has potential as a seedling marker.

One of primary emphasis is still work on root-knot nematodes. A release of a root-knot nematode - resistant alyceclover is planned for 1989.

Publications:

Zhao, G. S., D. D. Baltensperger, R. G. Christie, D. E. Purcifull and J. R. Edwardson. 1988. Some effects of a potyvirus on alyceclover and hairy indigo. Soil and Crop Sci. Soc. Fla. Proc. 47:(In press).

Accession User: O. C. Ruelke
Agronomy Department
University of Florida
2195 McCarty Hall
Gainesville, FL 32611-0311
904-392-1823

Nature of Research: Forage improvement from new germplasm under varied management.

Progress to Date: Evaluation of twelve bahiagrass (Paspalum notatum) germplasms indicated that Cycle 8 and 9 of Recurrent Restricted Phenotypic Selections from Pensacola bahiagrass initiated growth earlier, continued growth later, and produced a higher annual yield than Pensacola bahiagrass or any other bahiagrass tested, including PI 306779.

In a study of an established association of Mott dwarf elephantgrass (Pennisetum purpureum) and Florigraze rhizoma peanuts ((A. glabrata) a chance seedling from PI 118457), the total forage yields of the association, with no nitrogen applied, were more than 100% greater and crude protein yields were more than 200% greater, than in unfertilized pure elephantgrass. Growth and persistence of rhizoma peanuts in pure stands was not reduced by application of nitrogen. In the association, there was a linear decline in peanut dry matter yield with increasing nitrogen rates. By the third year (1987), botanical composition had changed and crude protein yield of the dwarf elephantgrass component increased as the nitrogen fertilizer rate increased while yield of the rhizoma peanut component decreased as the nitrogen fertilizer rate increased. The average crude protein in the peanuts exceeded 20% and percentage of IVOMD exceeded 70%.

Publications:

Valentim, J. F., O. C. Ruelke and G. M. Prine. 1988. Evaluation of forage yield, quality, and botanical composition of a dwarf elephantgrass rhizoma peanut association as affected by nitrogen fertilization. Soil & Crop Sci. Soc. Fla. Proc. 47:(In press).

Accession User: Paul Mislevy
Agricultural Research Center
Rt. 1 Box 62
Ona, FL 33865
813-735-1314

Nature of Research: Test perennial forage grasses (Cynodons) under grazing to determine daily gain/animal and live weight gain/acre.

Progress to Date: Following 13 years of clipping and grazing studies two stargrasses were selected, 'Florico' (Puerto Rico No. 2341) and 'Florona' (Cynodon nlemfuensis Vanderyst var. nlemfuensis). Both grasses are more persistent than 'Ona' stargrass (PI 224566 (Cynodon nlemfuensis Vanderyst var. nlemfuensis)), with dry matter yields of about 15 Mg ha⁻¹. Both Florico and Florona have contributed to average daily gains of 0.55 and 0.41 kg day⁻¹ with a live weight gain of 806 and 661 kg ha⁻¹ over a 205 day period and a stocking rate of 8 yearling steers ha⁻¹. Plans are to release both Florico and Florona to commercial growers in July of 1988.

Publications:

Brown, W. F., C. K. Piacitelli and P. Mislevy. 1987. Near infrared reflectance analysis of total nonstructural carbohydrate concentration in tropical grasses. *Crop Sci.* 27:786-788.

Mislevy, P., A. Larbi and M. B. Adjei. 1988. New stargrass varieties for south Florida. *Proc. 37th Annual Beef Cattle Short Course, IFAS, Univ. of Florida.*

Mislevy, P., M. B. Adjei and A. Larbi. 1988. Production and management of Puerto Rico and Cane Patch stargrass. IFAS, Univ. of Florida; AREC Ona Research Report RC-1988-4. 9 pp.

Accession User: Paul Mislevy
Agricultural Research Center
Rt. 1 Box 62
Ona, FL 33865
813-735-1314

Nature of Research: Study the performance of tall tropical grasses for biomass production when grown under one nematicide and two fertilizer treatments.

Progress to Date: This experiment was conducted over a 3-yr period in south Florida on a Ona fine sand (sandy, siliceous, hyperthermic, Typic Haplaquod) soil. Elephantgrass PI 300086 (*Pennisetum purpureum* L. Lam.) and Erianthus (*Erianthus arundinaceum* (Retz.) Jesw.) entry IK 76-110 produced highest dry matter yields averaging 52.2 Mg ha⁻¹ and 46.4 Mg ha⁻¹, respectively when harvested once per year and fertilized annually with 168-25-93 kg ha⁻¹ N-P-K. The application of a nematicide once yr⁻¹ plus the above fertilizer rate increased elephantgrass dry matter yield by only 11%. Harvesting elephantgrass twice compared with once annually resulted in a 65% decrease in dry matter yield.

Publications:

Mislevy, P., R. S. Kalmbacher, A. J. Overman and F. G. Martin. 1986. Effect of fertilizer and nematicide treatments on crops grown for biomass. *Biomass* 11:243-253.

Accession User: L. S. Dunavin
Agricultural Research & Education Center
Rt. 3 Box 575
Jay, FL 32565-9524
904-994-7373

Nature of Research: Evaluation of forage and biomass crops for Northwest Florida.

Progress to Date: The introduction, PI 300086, Pennisetum purpureum, is being evaluated for biomass (energy). In 1987, it produced 33.0 Mg ha⁻¹ of dry biomass. The following introductions of Giant Reed, Arundo donax, produced the indicated dry biomass yields (Mg ha⁻¹) in 1987: PI 432425 (40.3), PI 432427 (32.1), and PI 432432 (30.4).

The following introductions of rose clover have been crossed with a white-flowered rose clover and seed have been gathered in 1988:
PI 120124, 120125, 120131, 120135, 120137, 120146, 120162, 120179, 120188, 120192, 120198, 120230, 120231, 120247, 120248, 121232, 206761, 227256, 234050, 249846, 287972, 287973, 287974, 287975, 287996, 302969, 304274, 311482, 311483, 311484, 311485, 311486, 311487, 319134, 348886, 419341.

Publications:

None

Accession User: Edwin C. French
Agronomy Department
University of Florida
304 Newell Hall
Gainesville, FL 32611-0311
904-392-1811

Nature of Research: To select herb/spice species that can be field grown on a commercial scale under Florida environment. To develop field production techniques. Fresh and dry weight as well as essential oil content and quality will be determined.

Progress to Date: Beginning in 1987, work on seven herb varieties was initiated by screening for susceptibility to 4 root-knot nematodes Meloidogyne spp. M. arenaria race 1, M. javanica and M. incognita Races 1 and 3. Herbs presently under study include: Ocimum basilicum, Satureja hortensis, Satureja montana, Origanum majorana, Borago officinalis, Origanum heracleoticum, Salvia officinalis. Final results are pending. Various production oriented studies will begin in 1988-89.

Publications:

French, E. C., J. E. Moreno, F. le Grand and G. M. Prine. 1987. Herbs: An agronomic crop for Florida. Agronomy Abstracts. pp 92.

Moreno, J. E., E. C. French, F. le Grand, G. M. Prine, J. R. Rich and R. A. Dunn. 1988. Herb and spice screening for Florida. Florida Scientist Program Issue 51:7.

Cultivar Releases:

None

Accession User: S. C. Schank
Agronomy Department
University of Florida
2183 McCarty Hall
Gainesville, FL 32611-0311
904-392-1823

Nature of Research: Breeding and evaluation of Pennisetum sp. for biomass yield and quality for methane production.

Progress to Date: Two harvests were made from a replicated test of 12 tall elephantgrass (Pennisetum purpureum) and 8 semi-tall hybrids established in December 1986. The test included PI 300086, N-51, and various triploid and hexaploid selected plants from earlier nurseries. Only two of the hybrid lines outyielded PI 300086 and N-51. Both of the higher yielding hybrids had PI 300086 as one of the parents. Samples from the plants will be used in plant quality determinations, and in joint studies on bioconvertability to methane gas.

Accession User: Dan W. Gorbet
Agricultural Research Center
Rt 3 Box 383
Marianna, FL 32446
904-594-3241

Nature of Research: Peanut breeding

Progress to Date: We are still using PIs and progeny from PIs in our (Arachis hypogaea L.) peanut breeding program as indicated in our 1987 report. In addition to those we received the following PIs for testing in 1988:

- | | |
|--------------|--------------|
| 1. PI 405132 | 5. PI 390595 |
| 2. PI 350680 | 6. PI 270806 |
| 3. PI 341879 | 7. PI 215696 |
| 4. PI 381622 | 8. PI 393516 |

Publications:

Gorbet, D. W., A. J. Norden, F. M. Shokes and D. A. Knauft. 1987. Registration of 'Southern Runner' peanut. *Crop Sci.* 27:817.

Norden, A. J., D. W. Gorbet, D. A. Knauft and C. T. Young. 1987. Variability of oil quality among peanut genotypes in the Florida breeding program. *Peanut Sci.* 14:7-11.

Tappan, W. B. and G. W. Gorbet. 1987. Management of insects attacking peanuts in 1987. Univ. Florida, Quincy, NFREC Res. Rpt. 87-12, 20 pp.

Chiteka, Z. A., D. W. Gorbet, D. A. Knauft, F. M. Shokes, T. A. Kucharek and A. J. Norden. 1987. Components of resistance to late leafspot in peanut (A. hypogaea L.). Abstr. Proc. Amer. Peanut Res. & Ed. Soc. 19:25.

Knauft, D. A., A. J. Norden and D. W. Gorbet. 1986. The effect of three harvest dates on oil quality, yield, and grading data of five peanut genotypes grown without leafspot control. Abstr. Proc. Amer. Peanut Res. & Ed. Soc. 18:28.

Accession User: J. M. Crall
CFREC
Institute for Agricultural Sciences
University of Florida
Leesburg, FL 32748

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

Progress to Date: PI 189225, with purported resistance to gummy stem blight (GSB) (Plant Disease Repr. 46:883-885, 1962), was used in crosses with various breeding lines in 1981. Progenies in the F₃ after four backcrosses to our advanced breeding lines appear to have tolerance to GSB in the 1988 breeding field.

Publications:

None

Cultivar Releases:

None

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

Nature of Research: New crops and plant introductions, especially perennial plants, annual ryegrass, forage and grain legumes, and energy crops.

Progress to Date:

- 1) Arbrook rhizoma peanut (PI 262817) (Arachis glabrata Benth.) has been released as a named cultivar by IFAS and USDA, SCS. Rhizomes were furnished to commercial rhizome growers during January and February 1988. The commercial acreage of Florigraze and Arbrook rhizoma

peanut climbed to about 2,600 and 26 acres, respectively. New plantings of both Arbrook and Florigraze suffered severe plant loss during the dry springs of 1985, 1986, and 1987 but 1988 was a good establishment spring.

- 2) PI 300086 elephantgrass (Pennisetum purpureum) which had been leading the elephantgrass trials in biomass yields suffered considerable winter damage at Gainesville from the December 1983 and January 1985 record freezes, maintained excellent yields in 1987. Other elephantgrass accessions such as N-51, Merkeron, N-43, and N-13 also had high yields and do not winterkill as badly as PI 300086.
- 3) Pigeonpea (Cajanus cajan) cultivar development continues and one or both of lines 99W and 76W will be released as a cultivar probably later in 1988.
- 4) The fifth cycle of recurrent selection of a Marshall-maturity annual ryegrass (Lolium multiflorum) population for rust resistance was conducted at Gainesville during the 1986-87 winter season. Testing of plants from the fourth cycle of selection, FL 1986LR, indicated a high level of crown rust resistance has been obtained. This new ryegrass population will probably be released as a cultivar in 1988 if 1987-88 regional trial results are favorable.
- 5) A recurrent selection nursery of fababeans (Vicia faba) was conducted during the winter 1987-88. Seed were obtained from the best plants for next fall's nursery. Progress has been slow in developing disease resistance in the Fababean population.
- 6) The average oven dried biomass yield of stems of 12 Leucaena leucocephala introductions planted in duplicate 5 hill plots was 33.4 Mg ha⁻¹ in 1987. Annual harvesting of frosted Leucaena in subtropics offers much potential for this tropical shrub legume to become one of our first energy crops.

Publications:

Prine, G. M., L. S. Dunavin, B. J. Brecke, R. L. Stanley, P. Mislavy, R. S. Kalmbacher and D. R. Hensel. 1988. Model crop systems: Sorghum, Napiergrass. In: Methane from Biomass, A Systems Approach (W. H. Smith and J. R. Frank (eds.)) Elsevier Applied Science Publishers Ltd., Essex, England. pp. 83-102.

Accession User: Philip Busey
Ft. Lauderdale Res. Educ. Center
University of Florida
3205 College Ave.
Ft. Lauderdale, FL 33314
305-475-8890

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, dwarfness, and shade tolerance (not necessarily concurrently). Basic interests are mowing energy, sod production, establishment of new cultivars, stability of resistance, and taxonomy and preservation of germplasm.

Progress to Date: FX-33 St. Augustinegrass was discovered to be capable of being grown without irrigation, where relatively shallow (1.4 m deep) water table is present. FX-33 is a second generation hybrid of polyploid African introductions (PI 3000127 x 300130) x (293666 x 290888). When established plots underwent irrigation curtailment, FX-33 had 99% survival, compared with 36% for Floratam (a widely used cultivar). There was only 58 mm rain obtained in 58 days without irrigation. As a major bonus, FX-33 was discovered to be moderately resistant to the PDP cinch bug which kills Floratam. Introduced African germplasm (PI 365032) was involved in the pedigree of dwarf St. Augustinegrass FX-313, which is under consideration for cultivar release.

Introduced South American germplasm (PI 404637, from Paraguay) was involved in the pedigree of RCP-1 (Rapid Coverage Polycross) bahiagrass, which is under consideration for cultivar release.

Introduced African bermudagrass PI 291586 was discontinued for possible cultivar release, at the present time, because of high mowing energy requirement.

Publications:

Fluck, R. C. and P. Busey. 1988. Energy for mowing turfgrass. Trans. of the ASAE 31:(In press).

Reinert, J. A., P. Busey and F. G. Bilz. 1986. Old World St. Augustinegrasses resistant to the southern chinch bug (Heteroptera:Lygaeidae). J. Econ. Entomol. 79:1073-1075.

Cultivar Releases:

None

Accession User: K. H. Quesenberry
2183 McCarty Hall
University of Florida
Gainesville, FL 32611
904-392-1823

Nature of Research: Breeding and evaluation of cool and warm season forage legumes for production, persistence and perenniality in the lower South.

Progress to Date: Research with Aeschynomene americana germplasm in 1987-88 included the evaluation of F₆ lines from crosses of a glabrous stem, late flowering introduction with Florida common. Lines selected based on forage yield and date of flowering will be evaluated for seed production in 1988. Research with Desmodium heterocarpon and D. ovalifolium included the evaluation of F₁ and F₂ lines of hybrids among parents selected for variability in nematode response and flowering date. With a winter greenhouse generation, F₃ and F₄ lines will be evaluated in the field in 1988. Evaluation of 110 lines of perennial Arachis species (mostly A. glabrata) was initiated in 1987. Primary criteria for evaluation include rate of establishment, disease and root-knot nematode response, flowering frequency, and seed production.

Three populations of red clover selected for (1) production under Florida conditions, (2) very early flowering out of population 1, and (3) root-knot nematode tolerance out of population 1, were increased in the western U.S. and placed into regional evaluation trials in 1987-88. About 40% of the original base population came from selections out of an evaluation of 115 plant introduction lines of Trifolium pratense initiated in 1977.

Publications:

Deren, C. W. and K. H. Quesenberry. 1987. Glabrous stem: A seedling marker gene in Aeschynomene americana. Tropical Grasslands 21:188-191.

Gildersleeve, R. R., W. R. Ocumpaugh, K. H. Quesenberry and J. E. Moore. 1987. Mob-grazing of morphologically different Aeschynomene species. Tropical Grasslands 21:123-132.

Quesenberry, K. H. and R. A. Dunn. 1988. Variability among Desmodium species for response to root-knot nematodes. Crop Sci. 27:1234-1237.

Quesenberry, K. H., W. R. Ocumpaugh, O. C. Ruelke, L. S. Dunavin and P. Mislevy. 1988. Registration of 'Floralta' limpoglass. Crop Sci. 27:1087.

Quesenberry, K. H., D. D. Baltensperger and G. M. Prine. 1988. Developing red lover for the lower South. Proc. 10th Trifolium Conf. Corpus Christi, TX. pp. 6-8.

Quesenberry, K. H. and K. A. Albrecht. 1987. Variability of tannin level in Desmodium and other tropical legumes. Abst. Southern Branch ASA. p. 3.

1987 GEORGIA S-9 TECHNICAL COMMITTEE REPORT

Agency: University of Georgia

Submitted by: Carl S. Hoveland

Address: Department of Agronomy, University of Georgia, Athens, GA 30602

Page 1 of 6

Accession user: Wayne W. Hanna

Address: USDA/ARS
Coastal Plain Experiment Station
Tifton, GA 31793

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: Rust and Pyricularia resistance have been transferred from Pennisetum glaucum subspecies monodii to pearl millet. Progress is being made in transferring gene for apomixis from P. squamulatum (PI248534) to pearl millet. Midge resistance has been transferred from an African sorghum introduction (PI383856) to a dwarf cultivated sorghum.

Publication: Hanna, W.W., H.D. Wells, and G.W. Burton. 1987. Registration of pearl millet inbred parental lines, Tift 85D₂A₁ and Tift 85D₂B₁. Crop Sci. 27:1324-1325.

Hanna, W.W., H.D. Wells, and G.W. Burton. 1985. Dominant gene for rust resistance in pearl millet. Jour. Heredity 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.

Cultivar releases: Tifleaf 2 (PI518646)

Germplasm needs: Wild Pennisetum species in Africa, and South and Central America, and subspecies, monodii, in Africa.

Accession user: R. P. Lane

Address: Department of Horticulture
Georgia Station
Griffin, GA 30223-1797

Nature of research: PI lines were initially used as a source of Bacterial Spot and Tobacco Etch Virus resistance in a breeding program to improve disease resistance in bell pepper.

Progress to date: PI 163192 was used as a source of Bacterial Spot resistance in a cross with 'Jupiter' and PI 264281 was used for TEV resistance. We are now in the BC₄ generation and resistant, bell-type selections⁴ have been made. Further backcrossing is needed to recover additional desirable characteristics such as thick fruit walls and large pods.

Publication: None

Cultivar releases: None

Germplasm needs: None

Accession user: States M. McCarter

Address: Department of Plant Pathology
Miller Plant Sciences Bldg.
University of Georgia
Athens, GA 30602

Nature of research: Evaluation of 29 lines of Helianthus, primarily H. tuberosus, for resistance to several diseases with emphasis on rusts caused by Puccinia helianthi and Coleosporium helianthi.

Progress to date: The lines, which were received mostly in the form of tubers (one seed lot) from the North Central Regional PI Station, are currently growing on an experimental farm near Athens, Georgia. The two rust diseases have not yet appeared although one of the (P. helianthi) has been severe here in previous years. The plants will be held in the field until frost in hope that rust outbreaks will still occur. If not, tubers will be harvested so that the test can be repeated during a better rust year.

Publication: None

Cultivar releases: None

Germplasm needs: Jerusalem artichoke genotypes with resistance to P. helianthi would prove valuable should the crop ever become useful for fuel alcohol production as was proposed a few years ago. This rust can be a devastating disease in the southeastern USA during favorable years for rust epiphytotics.

Accession user: R. R. Duncan

Address: GAES - Agronomy
Griffin, GA 30223-1797

Nature of research: Germplasm evaluation for acid soil tolerance.

Progress to date: Evaluating over 1000 accessions annually. Most are photoperiod sensitive. Hope to start enhancement project in 1989.

Publication: Duncan, R.R. 1988. Sequential development of acid soil tolerant sorghum genotypes under field stress conditions. Commun. Soil Sci. Plant Anal. 19(7-12):1295-1305.

Cultivar releases: None

Germplasm needs: Sorghums from China.

Accession user: John Cardina

Address: USDA-ARS Coastal Plain Experiment Station
Tifton, GA 31793-0748

Nature of research: Screening numerous weed species for susceptibility to a fungal pathogen to determine a partial host range of this organism for biological control.

Progress to date: A host range study showed that a Desmodium tortuosum isolate of Colletotrichum truncatum was pathogenic only to a few other species of Desmodium.

Publication: Cardina, J., R.W. Littrell, and R.T. Hanlin. 1988. Anthracnose of Florida beggarweed (Desmodium tortuosum) caused by Colletotrichum truncatum. Weed Sci. 36:329-334.

Cultivar releases: None

Germplasm needs: None

Accession user: James H. Chalkley

Address: Department of Plant Pathology
Georgia Experiment Station
Griffin, GA 30223-1797

Nature of research: Screening of P.I. peanut (Arachis hypogaea L.) collection for resistance to peanut stripe virus (PStV). All P.I. lines will be planted, inoculated with peanut stripe, evaluated for resistance and grown to maturity to check for seed transmission of peanut stripe virus (PStV) using ELISA techniques.

Progress to date: Of the total peanut collection (7,526 P.I.'s) at the S-9 P.I. Station, 349 have been tested. Some delayed infection or partial resistance to peanut strip virus (PStV) has been observed but is not significant at this time. This research will continue as time and greenhouse space permits in order to continue testing the entire collection.

Publication: None

Cultivar releases: None

Germplasm needs: None

Accession user: Richard B. Chalfant

Address: Department of Entomology
Coastal Plain Experiment Station
Tifton, GA 31793-0748

Nature of research: Screening Cowpea, Vigna unguiculata for resistance to the cowpea curculio.

Progress to date: In 1987, thirty-six PI lines were evaluated in replicated plots. Although there were significant differences among lines with respect to resistance to the curculio, none was less damaged than the commercial standard, Pinkeye Purple Hull and Mississippi Silver. One hundred seventy-seven early maturing PI lines were screened in unreplicated plots. Although some lines had little or no curculio damage, they probably escaped infestation due to late maturity.

In 1988, thirty-six lines examined in the 1987 unreplicated plots were planted in replicated plots. Two hundred fifty-nine medium maturity lines were planted in unreplicated plots. Evaluation in progress.

Publication: None

Cultivar releases None

Germplasm needs: Need for foreign explorations: Vigna spp. from Mexico and central America, the origin of the cowpea curculio.

-
- Accession user: C. Corley Holbrook
- Address: Research Geneticist USDA-ARs
Coastal Plain Experiment Station
Tifton, GA 31793
- Nature of research: The primary objective of this research is to screen peanut germplasm for resistance to the peanut root-knot nematode (Meloidogyne arenaria). All currently available peanut cultivars are highly susceptible to this nematode. With the loss in recent years of fumigant nematicides, such as DBCP and EDP, peanut losses due to nematodes and cost of control have increased greatly. In Georgia alone, peanut yield losses due to nematodes was approximately \$14 million during the 1984 crop season and cost of control was \$12 million. The development of resistant varieties would greatly reduce production costs and yield losses for Georgia peanut growers.
- A secondary objective for this research is to screen peanut genotypes for resistance to late leafspot (Cercosporidium personatum). Because of the prevalence of leafspot diseases Georgia growers spend about \$30 million annually for fungicidal leafspot control. A few genotypes with moderate levels of resistance have been identified. However, there has been no systematic search of the germplasm for genotypes with resistance to late leafspot. Such a search is necessary in order to identify the most promising parent for development of high yielding peanut cultivars with a high level of resistance to late leafspot.
- Progress to date: Two thousand plant introductions have been screened in the greenhouse for resistance to the root-knot nematode. Although variability has been observed in levels of susceptibility, no high levels of resistance have been observed. Work is underway to screen additional plant introductions for resistance to the peanut root-knot nematode.
- Five hundred peanut plant introductions were field tested in 1987 for resistance to late leafspot. Thirty-nine entries which had moderate to high levels of resistance were selected. These entries are being field tested this year to define their components of resistance and evaluate their potential to serve as parents in cultivar development. Two thousand additional plant introductions are currently under field screening to determine their level of resistance to late leafspot. Results of this screening will not be available until the fall.
- Publication: None to date
- Cultivar releases: None to date
- Germplasm needs: Additional collection of both wild and cultivated peanut species in South and Central America is needed. We also need to obtain duplicate samples of the ICRISAT peanut germplasm collection.

Accession user: Dr. B. R. Wiseman

Address: USDA Insect Research Lab
P. O. Box 748
Tifton, GA 31793-0748

Nature of research: Breeding for sorghum midge resistance and screening for fall armyworm seedling resistance.

Progress to date: PI383856 is useful for sorghum midge resistance. None of the PI's screened for FAW seedling resistance are useful.

Publication: Wiseman, B.R. and G.R. Lovell. 1988. Resistance to the fall armyworm in sorghum seedlings from Ethiopia and Yemen. J. Agric. Entomol. 5:17-20.

Cultivar releases: SGIRL-MR-3 - PI510688
SGIRL-MR-4 - PI510689

Germplasm needs: Except for specifics. Resistance to insects and/or diseases

1988 S-9 Technical Committee Report for Hawaii

Agency: Hawaii Institute of Tropical Agriculture
and Human Resources

Submitted by: P. J. Ito

Address: 461 W. Lanikaula St.
Hilo, HI 96720

ACCESSION USER: Robert J. Joy

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

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

PROGRESS TO DATE: PI-9037868, Paspalum vaginatum, has been the best accession tested for stabilizing aquaculture pond banks. It was officially released in 1988 as cv. 'Tropic Shore.'

T-37919, Desmodium heterophyllum, in combination with a compatible grass shows promise as a low-maintenance legume for ground cover in orchards and other erosion prone areas.

T-37869, Pennisetum purpureum, is a stiff-growing napiergrass from Australia that shows promise for windbreak, biomass, forage, paper making and even for flour.

PI-224980, Neonotonia wightii, has been the best legume for erosion control and forage in low-rainfall (15"-20") areas. It is currently being compared to the Australian cultivars 'Tinaroo', 'Cooper' and 'Clarence' in a replicated trial.

PUBLICATION: 1

CULTIVAR RELEASES: 1

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

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

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

PROGRESS TO DATE: The project reported on extensively in last year's report has continued. Additional materials have been tested and those lines which appeared to have some resistance have been retested. No new source of effective resistance has been uncovered. There are still a fairly large number of lines which show a low level of resistance similar to that statistically established in 'Tinto' and 'Ancora', two independently detected resistant sources which subsequently were discovered to have both originated from the same Dutch seed company (Rijk Zwann) and to have the same parentage.

Efforts on this project have progressed to identification of plants/lines which have the resistance referred to above and commercial characters required. Most efforts so far have concentrated on transferring the resistance to the 'Green Mignonette' ('Manoa') cultivar which is widely grown at lower elevations in Hawaii, but efforts have also started with head and Romaine cultivars. Populations of F₂ plants were inoculated with the virus. Survivors were selected for plant type and saved for seed. Progeny of individual plants were then tested for virus reaction and the best from these tests were selected for making backcrosses to the recurrent parent. These backcrosses are being made now.

In the F₂ populations of crosses between 'Manoa' and either 'Tinto' or 'Ancora', usually about 1/4 to 2/3 of the plants would become infected with the virus. Of the progeny from F₂ individuals which were free of virus, about half showed the same range of infection as the F₂, but the others did not seem to have any resistance. Although these results are consistent with the hypothesis of control by one or a very few dominant genes, the high variability of the testing prevents such a conclusion from being confirmed.

PUBLICATION: O'Malley, P. J., and R. W. Hartmann. Inheritance of resistance to tomato spotted wilt virus in crosses between two partially resistant and one susceptible lettuce cultivar. HortScience: In press.

CULTIVAR RELEASE: None.

ACCESSION USER: Francis Zee

ADDRESS: National Clonal Germplasm Repository
c/o 461 W. Lanikaula St.
Hilo, Hawaii 96720
Tel. (808) 959-5833

NATURE OF RESEARCH: Germplasm collection and preservation

PROGRESS TO DATE:

Ananas

A total of 160 accessions of Ananas are being maintained at the

NCGR-Hilo field and greenhouse. Over 40 accessions have been initiated into Invitro culture since April, 1988. Many of the field-planted A. comosus are fruiting, description data will be compiled in the coming months. No foreign importation of Ananas were made in 1988. "Tainung #9", an introduction from Taiwan in 1987, has been released from the state quarantine after a one year observation period.

Artocarpus

Five clones of breadfruit are currently maintained at the NCGR-Hilo greenhouse. Materials collected by Ms. Diane Ragone in 1987 from the

South Pacific are being multiplied at the main campus greenhouse. Twenty of the most popular cultivars will be made available for the NCGR-Hilo later part of this year.

Carica

The NCGR-Hilo is systematically planting and regenerating seeds from the 207 accessions of Carica in our collection. Seeds from self-pollinated fruits are being harvested from over 25 accessions of hermaphrodite papayas; these trees were also evaluated for growth and qualities.

Seven foreign introductions were received in 1988. The more important ones included seeds of "Tainung #5" from Taiwan and "Yuennung #1" from China, both cultivars were reported to have high level of tolerance to the papaya ringspot virus.

Passiflora

Two important foreign introductions were made in 1988. Seeds of P. giberti from Brazil and a 'self-compatible' yellow passion fruit, P. edulis f. flavacarpa, from the Cook island. P. giberti reportedly is a root rot resistant rootstock. Seedling from these and 6 Florida introductions are currently serving a 1 year quarantine sentence at the state facility.

PUBLICATION: None.

CULTIVAR RELEASE: None.

ACCESSION USER: Brewbaker

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

NATURE OF RESEARCH: Tropical Agroforestry .

PROGRESS TO DATE: Introduced 80+ new accessions of Leucaena spp. collected in Guatemala and Honduras.

PUBLICATION: Brewbaker, J. L. 1987. Leucaena: A multipurpose tree genus for tropical agroforestry. International Council for Research in Agroforestry, Nairobi, Kenya

CULTIVAR RELEASE: Highland Leucaena - KX3

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

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

NATURE OF RESEARCH: Introduction, selection and testing of tropical fruits and nuts.

PROGRESS TO DATE: Forty one new introductions including rambutan, mango, durian and wax apple were made from Thailand, China and Taiwan.

PUBLICATION: None.

CULTIVAR RELEASE: None.

S-9 Technical Committee Report
June 1988

Agency: Kentucky Agricultural Experiment Station
Submitted By: N. L. Taylor
Address: Department of Agronomy
University of Kentucky
Lexington, KY 40546-00914

Accession user: N.L. Taylor
Address: Department of Agronomy
University of Kentucky
Lexington, KY 40546-00914

Nature of Research: Maintenance and evaluation of Trifolium species.

Progress to Date: The Trifolium world germplasm collection located at Kentucky was surveyed and 268 P.I. numbers were assigned, and added to the Germplasm Resources Information Network at Beltsville, Maryland. Donor of all accessions was N.L. Taylor. A considerable number of other accessions of approximately 233 species are available in the Kentucky Collection but they represent duplicate holdings of earlier assigned PI numbers. No new Trifolium species were added to the collection, but the site of an un-named Trifolium species was visited in Tennessee and seeds were collected (S-209-3). A site for the endangered species T. stoloniferum was located and visited in Boone Co. Kentucky, but seeds were not ripe, and seeds will be collected later. A recovery team was formed to consider re-establishment of T. stoloniferum. Trifolium stoloniferum was severely winter injured in the winter of 1987-88 but the unnamed Trifolium species survived. T. stoloniferum appears to be highly and the un-named species only slightly self fertile. Forty-eight accessions of T. medium have been germinated for cytological investigations. The Yugoslavia exploration proposal was funded and arrangements are being made to conduct the exploration in late August, 1988.

Publications: Taylor, N.L. 1988. The Native Trifolium species of eastern United States. Trifolium Conf. Proc. 10: 28-29.

Cultivar Releases: None

1988 LOUISIANA S-9 TECHNICAL COMMITTEE REPORT

Agency: Louisiana Agricultural Experiment Station, LSU Agricultural Center,
Louisiana State University

Submitted by: Ann Marie Thro

Address: Department of Agronomy, 104 M. B. Sturgis Hall, LSU Campus, Baton
Rouge, LA 70803-2110

-
1. Accession User: Ann Marie Thro
Department of Agronomy
Louisiana State University
Baton Rouge, LA 70803-2110
 2. Nature of Research: Development of summer pasture legumes.
 3. Progress to Date: Since 1983, five species out of 40 tested have been selected in this program: Aeschynomene americana, Arachis glabrata, Desmodium spp., Macroptilium lathyroides, and Stylosanthes spp. In 1987, herbicides were identified that will remove A. americana from soybean fields. This will reassure concerns that A. americana might become a problem for soybean farmers. A. glabrata and Stylosanthes were the outstanding species in the late summer/fall drought at several locations. An observation nursery of A. glabrata accessions (germplasm delivered by Dr. R. Pittman from the Oklahoma collection) has survived its first winter.
 4. Publications:
Thro, A. M., C. C. Shock, B. D. Nelson, F. J. Peterson, A. B. Coco, L. P. Brown, and A. T. Wier. 1987. Yield and quality of aeschynomene and other summer annual legumes. Louisiana Agriculture 30:6-8.

Thro, A. M., and C. C. Shock. 1987. Performance of subtropical forage legumes in southcentral USA. Tropical Agriculture 64:297-304.

Thro, A. M., A. T. Wier, F. G. Barker, and M. K. Johnson. 1987. Weed potential for the forage legume Aeschynomene americana in rice and soybean fields. Agron. Abs. 79:125.

Thro, A. M. Accepted 9 Dec 1987. Collection and characterisation of germplasm resources of the forage legume Aeschynomene americana in Louisiana. Tropical Grasslands 22(4).
 5. Cultivar Releases: None to date.

-
1. Accession User: William J. Blackmon
Dept. of Horticulture
137 Julian C. Miller Hall
LSU Campus

Baton Rouge, LA 70803-2120

2. Nature of Research: Domestication of Apios americana.
 3. Progress to Date: In vitro systems for regeneration and clonal multiplication have been developed for A americana and several accessions potentially useful as breeding lines have been identified.
 4. Publications:
None
 5. Cultivar Releases: None
-

1. Accession User: Christopher A. Clark
Dept. Plant Pathology & Crop Physiology
Louisiana Agricultural Experiment Station
Louisiana State University Agricultural Center
Baton Rouge, LA 70803-1720
 2. Nature of Research: Screening sweet potato heirloom cultivars, advanced breeding lines, and repository accessions for resistance to Streptomyces ipomoea, Fusarium solani, Erwinia chrysanthemi, and Diplodia gossypina.
 3. Progress to Date: A large number of genotypes were screened for resistance to all four pathogens during 1987. Several will be reevaluated for resistance of storage roots to F. solani, E. chrysanthemi and D. gossypina following harvest. Several new sources of resistance have been identified for each pathogen.
 4. Publications: None.
 5. Cultivar Releases: Not applicable.
-

1. Accession User: James F. Fontenot
Department of Horticulture
137 Julian C. Miller Hall
LSU Campus
Baton Rouge, LA 70803-2120
2. Nature of Research: Potato Breeding and Development.
3. Progress to Date: The potato introduction station at Sturgeon Bay, Wisconsin sent us 115 accessions from 49 Solanum species. These individuals are being screened for drought tolerance, air pollution tolerance, heat tolerance, frost tolerance, disease resistance, insect resistance, high solids, and improved culinary quality.
4. Publications: None
5. Cultivar Releases: None

-
1. Accession User: James F. Fontenot
Department of Horticulture
137 Julian C. Miller Hall
LSU Campus
Baton Rouge, LA 70803-2120
 2. Nature of Research: Okra Breeding and Production.
 3. Progress to Date: At this writing we have 71 lines which were derived from plant introductions. This diverse genetic stock possess genes of desired characters as spinelessness, wilt resistance, high yield, drought resistance, very green pod color and good culinary quality. These lines are being used in our breeding program which employs the pedigree, mass pedigree, and backcross methods of breeding.
 4. Publications: None
 5. Cultivar Releases: None

-
1. Accession User: James F. Fontenot
Department of Horticulture
137 Julian C. Miller Hall
LSU Campus
Baton Rouge, LA 70803-2120
 2. Nature of Research: Pepper Breeding and Production
 3. Progress to Date: Plant introductions are being used as parents to accomplish our objectives of high yield, ease of abscission, improved fruit type including shape, color, culinary quality, shipping, storage quality, disease resistance, insect resistance and stress tolerance.
 4. Publications:
Two manuscripts in preparation.
 5. Cultivar Releases: None

-
1. Accession User: Donald E. Groth
Rice Research Station
P. O. Box 1429
Crowley, LA 70527-1429
 2. Nature of Work: Resistance of rice to sheath blight, brown spot, narrow brown leaf spot, leaf smut, and blast.
 3. Progress to Date: Over 500 lines have been introduced into the U.S., screened for multiple disease resistance, and PI assigned. Resistance to sheath blight incorporated into U.S. germplasm from an exotic source was evaluated.

4. Publications: Two publications in final review process.
 5. Cultivar Releases: None
 6. Need for Explorations: Yes. Additional wild species.
-

1. Accession User: H. Y. Hanna
Citrus Research Station
Louisiana Agricultural Experiment Station
LSU Agricultural Center
Port Sulphur, LA 70083
 2. Nature of Research: Breeding Tomatoes Tolerant to Heat Stress.
 3. Progress to Date: Three inbred lines and 4 of their F₁ crosses including reciprocals were evaluated in a replicated trial for yield and other related traits. Results indicate that F₁ populations were always superior to their heat tolerant parents in fruit set and marketable yield. There were no significant differences in yield between these F₁ populations and their reciprocals, but using the breeding line with the stronger canopy as a female parent resulted in higher yields. The F₁ populations did not differ significantly in cracked fruits or percentage of culls from their reciprocals either.
 4. Publications: None
 5. Cultivar Release: None
-

1. Accession User: E. M. Nowick
LSU Rice Research Station
P. O. Box 1429
Crowley, LA 70527
 2. Nature of Research: Screening of Oryza species for resistance to the rice water weevil has continued, as well as efforts to incorporate tolerance into a commercially acceptable cultivar.
 3. Progress to Date: Thirty-six additional accessions of Oryza species were evaluated in 1987. None had better levels of resistance than the check variety. F₃'s of tolerant crosses are being evaluated in 1988.
 4. Publications: None
 5. Cultivar Release: None
-

1. Accession User: Ron Robbins
LAES-LSUAC
Sweet Potato Research Station
P. O. Box 120
Chase, LA 71324

2. Nature of Research: Breeding okra for improved horticultural characteristics.
 3. Progress to Date: Several breeding lines have been advanced for further evaluation.
 4. Publications: None
 5. Cultivar Releases: 'Burgundy' is a 1988 All-American Selection.
-

1. Accession User: Eldon Jupe/Elizabeth Zimmer
Dept. of Biochemistry
322 Choppin Hall
Louisiana State University
Baton Rouge, LA 70803
 2. Nature of Research: We are screening the genes coding for ribosomal RNA in maize and its progenitors to identify restriction enzyme polymorphisms which can serve as markers.
 3. Progress to Date: We have identified restriction enzyme polymorphisms for EcoRI, BstEII, and HindIII which are diagnostic for certain inbred lines of maize. These polymorphisms have been used as markers of germplasm in maize X teosinte hybrids to study the dynamics of ribosomal gene inheritance.
 4. Publications:
Zimmer, E.A., Jupe, E.R., and Walbot, V. 1988. Ribosomal Gene Structure, Variation, and Inheritance in Maize and Its Ancestors (submitted to Genetics).
 5. Cultivar Releases: Not applicable
 6. Need for Explorations: Not applicable
-

AMT8:s-9CommRpt1988

1988
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

* * * * *

ACCESSION USER: L. M. Gourley
ADDRESS: Department of Agronomy, Box 5248, Mississippi State, MS
39762

NATURE OF RESEARCH: Evaluation of sorghum (Sorghum bicolor L. Moench) Ethiopian collection germplasm for tolerance to aluminum toxic tropical acid soils

PROGRESS TO DATE: Sorghum germplasm (2500 PI accessions) has been screened for tolerance to aluminum toxicity (65% Al saturation) in field trials at Quilichao, Colombia. Lines were rated from 1 = tolerant to 4 = dead or severely stressed plant. Data are available on request.

PUBLICATIONS: None

CULTIVAR RELEASES: None

ACCESSION USER: W. P. Williams and F. M. Davis
ADDRESS: USDA-ARS Crop Science Research Laboratory, P. O. Box
5248, Mississippi State, MS 39762

NATURE OF RESEARCH: Evaluation of corn (Zea mays L.) germplasm for resistance to southwestern corn borer and fall armyworm

PROGRESS TO DATE: In a cooperative effort with the International Center for Maize and Wheat Improvement (CIMMYT) and other U. S. institutions, corn germplasm (200 families) from CIMMYT was evaluated in 1986 for reaction to southwestern corn borer and fall armyworm. Selected plants from the best families were self-pollinated and seed were returned to CIMMYT for recombination among selections and to produce a new group of families in 1987. In 1988, 200 families will be evaluated for fall armyworm and southwestern corn borer resistance at Mississippi State. These families will be evaluated for other insect pests in Mexico, Africa, and other U. S. locations.

PUBLICATIONS: None

CULTIVAR RELEASES: None

ACCESSION USER: C. E. Watson, Jr.
ADDRESS: Department of Agronomy, Box 5248, Mississippi State, MS
39762

NATURE OF RESEARCH: Evaluation of tall fescue (Festuca arundinacea Schreb.) for rust resistance

PROGRESS TO DATE: Evaluation of several tall fescue cultivars for stem rust (Puccinia graminis) and crown rust (P. coronata) resistance revealed that mediterranean types were sources of high levels of resistance to both rusts. These included 'Fortune' (derived from PI 231563 & PI 231564) and 'Oregon 1000' (derived from several Algerian introductions).

These two lines along with six other cultivars were subjected to two cycles of selection for improved crown rust resistance and a single cycle of selection for stem rust resistance. Selected plants were increased for seed during the 1985-86 season. The resulting populations will be evaluated in 1988 and be subjected to an additional cycle(s) of selection.

PUBLICATIONS: None

CULTIVAR RELEASES: None

S-9 TECHNICAL COMMITTEE REPORT

National Seed Storage Laboratory
Fort Collins, Colorado
June 23 and 24, 1988

Agency: NORTH CAROLINA STATE UNIVERSITY

Submitted By: William T. Fike

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

Ten cooperators from a pool of 22 cooperators received 434 PIs from 29 species of 12 genera. A fresh market tomato cultivar 'Mountain Delight' was released by Dr. Randy Gardner.

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

1. Accession Users - Drs. Bill Anderson and Johnny Wynne, 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 our program have been compiled. The material listed under large seed is being used in a 50-parent partial diallel program for a genetic study on the inheritance of the large seed character as well as for practical purposes. They are presently in early generation evaluation. The remainder of the PIs used are in crosses in advanced generation that have survived selection processes.

A list of peanut plant introduction used over recent years by the peanut breeding and genetics program at North Carolina State University are listed in the Appendix.

2. Accession User - Dr. Randy Gardner, Horticulture Department, Mountain Horticultural Crops Research Station and Extension Center, 2016 Fanning Bridge Road, Fletcher, North Carolina 28732-9628.

Nature of Research: Breeding tomato cultivars for North Carolina.

Progress to Date: A new fresh market tomato breeding line, NC 8288 and a new fresh market tomato cultivar 'Mountain Delight' were released last year. The news releases as for these two tomatoes are attached in the Appendix.

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

Nature of Research: Corn breeding; collection and maintenance of exotic germplasm

Progress to Date: I have many exotics in our breeding program, but none have PI numbers because they come through commercial sources. I do maintain some thousand or so accessions, perhaps 30% or so have PI numbers. We are converting 40 accessions to photoperiod "insensitivity", some of these have PI numbers (perhaps 10-15), but the PIs were assigned after I received them, so that I do not have PI records.

4. Accession User - Dr. Jim Moyer, Department of Plant Pathology, North Carolina State University, Raleigh, North Carolina 27695-7616.

Nature of Research: Coordinator of the Virus Program at North Carolina State University and for the National Sweet Potato Germplasm Repository at Experiment, Georgia.

Progress to Date: I have recently sent approximately 100 exotic sweet potato accessions to the National Sweet Potato Germplasm Repository in Experiment, Georgia. Our role was to place these accessions in in-vitro culture and to select those for release that were free of known viruses. The accessions originated in Central and South America and Taiwan.

5. 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 following Cucumis PI lines are being maintained in 1988.

Belly Rot Resistant

Good Fruit Keeping Ability (Cucumis sativus)

PI 220171
PI 279469
PI 321006
PI 211962
PI 422177

PI 109063
PI 109483
PI 165509
PI 105340
PI 414159
PI 105263
PI 197085
PI 197086
PI 197087
PI 197088
PI 357852
PI 280096
PI 271328

Good Combining Ability for Yield

PI 174172
PI 169397
PI 339250
PI 175696
PI 206425
PI 205995
PI 342950
PI 178888

Study of Nematode Resistance (Cucumis metuliferus)

PI 414716
PI 482435
PI 482439
PI 482441
PI 482443
PI 482446
PI 482448
PI 482450
PI 482451
PI 482452
PI 482453
PI 482454
PI 482456
PI 508300

Anthracoze Resistant

PI 163216
PI 163218
PI 167223
PI 164433

Gummy Stem Blight Resistant

PI 200818

APPENDIX I

The following is a list of plant introductions in peanut that have been used over recent years by the peanut breeding and genetics program at North Carolina State University:

Introductions in Continued Maintenance

| <u>PI no.</u> | <u>Reason of continued maintenance</u> |
|--------------------------|---|
| 261924 (C ₁) | Preliminary isozyme work on diverse germplasm |
| 262000 (C ₂) | " |
| 275751 (A ₁) | " |
| 262090 (B ₁) | " |
| 259649 | Large-seeded types |
| 262108 | " |
| 262109 | " |
| 270921 | " |
| 355287 | " |
| 372317 | " |
| 442602 | " |

PI's Used in Crosses

| <u>PI no.</u> | <u>Crosses made</u> | <u>Character transferred</u> |
|---------------|---|--|
| 162858 | (FG x Val.), NC 17165 | Parents in recurrent selection program for yield |
| 138870 | NC 5 | " |
| 170236 | Georgia 194R | " |
| 152122 | Frost resistant | " |
| 262090 | NC 4, NC 5 | " |
| 138870 | NC 7, NC 5 (FG x FR) | " |
| 121067 | NC Bunch | Insect resistance |
| 109839 | (NC 17921) ³ , NC 7, NC 6, Florigiant | Early leafspot resistance |
| 270806 | Florigiant, NC 6, NC 7 | " |
| 269685 | " | " |
| 350680 | PI 269685, PI 270806, PI 109839 | Late leafspot resistance |
| 341817 | ICGS-4 | " |
| 259747 | NC 17 | Biological nitrogen fixation |
| 337394F | NC 7 | Aflatoxin resistance |
| 337409 | " | " |
| 221068 | PI 282706, Jenkins Jumbo, S.A. Jumbo, Argentine, NC 17 | Large seed |
| 259861 | PI 221068, PI 288211, PI 315626, NC 17, Fla 393-8-1-1-1-2 | " |
| 268882 | PI 259681, PI 289620, PI 315629, NC-Fla 14, GP-NC 343, Jumbo Runner | " |

APPENDIX I (Continued)

| <u>PI no.</u> | <u>Crosses made</u> | <u>Characters transferred</u> |
|---------------|---|-------------------------------|
| 269080 | PI 268882, PI 315630, 4144, NC 9 | Large seed |
| 269081 | PI 269080, PI 291985, Japan. Jumbo, PI 315631, GK 3, NC 6, S.A. Jumbo, NC 9 | " |
| 269723 | Japan. Jumbo, PI 298845, PI 325079, Egyptian Giant, Holland Jumbo | " |
| 270818 | PI 343365, Jumbo 13, NC 18411, Jumbo Runner | " |
| 279953 | PI 372572, NC 18417, S.A. Jumbo, Fla 393-8-1-1-1-2 | " |
| 282706 | PI 279953, PI 315620, PI 442604, PI 221068, Rhod. Giant, Chico, NC 17, GK 3 | " |
| 288211 | PI 259861, PI 268882, PI 269080, PI 269081, PI 221068 | " |
| 289620 | PI 269723, PI 270818, PI 279953, PI 282706, Jumbo Runner, NC 9 | " |
| 290686 | PI 288211, PI 289620, PI 291985, PI 298845, NC 17, Jumbo, Rhod. Giant | " |
| 291985 | PI 314897, PI 315616, PI 315620, PI 315622, PI 315626, S.A. Jumbo, NC 6 | " |
| 296559 | PI 315629, PI 318740, PI 325079, Japan. Jumbo, Fla 393-8-1-1-1-2 | " |
| 298845 | PI 372572, PI 442604, NC 17, NC-Fla 14, NC 9 | " |
| 314897 | NC-Fla 14, 4144, GK 3, Jumbo Runner, Chalimbana, Egypt. Giant, NC 9 | " |
| 315616 | Jumbo 13, Jumbo Runner, Rhod. Giant, S.A. Jumbo, Fla 393-8-1-1-1-2 | " |
| 315620 | NC 9, Holland Jumbo, NC-Fla 14 | " |
| 315622 | GP-NC 343, NC 18411, NC 18417, Chico, Fla 393-8-1-1-1-2 | " |
| 315626 | PI 221068, PI 268882, PI 269081, PI 269723, PI 279953, Jumbo Runner | " |
| 315629 | PI 288211, PI 290686, PI 296559, PI 314897, PI 315620, NC-Fla 14, Rhod. Giant | " |
| 315630 | PI 315626, PI 315631, PI 325079, NC 6, PI 372572, Jenkins Jumbo, Egypt. Giant, S.A. Jumbo, Fla 393-8-1-1-1-2 | Large seed |
| 315631 | NC-Fla 14, GK 3, Egypt. Giant, Jumbo Runner, S.A. Jumbo | " |
| 318740 | GP-NC 343, NC 6, Holland Jumbo, NC-Fla 14, NC 18417, Argentine, Japan. Jumbo, NC 9 | " |
| 325079 | PI 259861, PI 269080, Japan. Jumbo, PI 270818, PI 282706, Holland Jumbo | " |
| 343365 | PI 289620, PI 291985, PI 298845, PI 315616, PI 315622, Egypt. Giant, NC 18411 | " |
| 372572 | PI 325079, PI 442604, NC 17, NC-Fla 14, NC 7 | " |
| 442604 | Jumbo 13, Rhod. Giant, Fla 393-8-1-1-1-2, NC 18417, Argentine | " |

APPENDIX II

NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE
NORTH CAROLINA STATE UNIVERSITY
RALEIGH, NORTH CAROLINA

NOTICE OF NAMING AND RELEASE OF 'MOUNTAIN DELIGHT' TOMATO

The North Carolina Agricultural Research Service announces the release of a new fresh market tomato cultivar, 'Mountain Delight'.

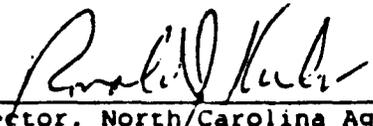
'Mountain Delight' is an F₁ hybrid resulting from the cross of 'Piedmont' x NC 8288. Both parents were developed in the North Carolina fresh market tomato breeding program. 'Piedmont' was released in 1984, and NC 8288 is being released concurrently with 'Mountain Delight'. 'Mountain Delight' has been tested in North Carolina and several other states since 1984 as NC 84100.

Fruit of 'Mountain Delight' are similar to 'Mountain Pride' and 'Piedmont' in shape, firmness, exterior and interior color, and flavor. Fruit have the uniform green (v gene) character and have a glossy finish. Fruit pedicels are jointed. Season of maturity is similar to 'Mountain Pride' and earlier than 'Piedmont'. Vine type is strong determinate, but is smaller than 'Mountain Pride' and 'Piedmont' when staked and pruned. Foliage is heavy, resembling that of 'Piedmont', with broad, dark green leaflets which provide good fruit coverage. 'Mountain Delight' is adapted to stake and ground culture for mature green and vine ripe harvest.

'Mountain Delight' is resistant to races 1 and 2 (I and I-2 genes) of Fusarium oxysporum f. sp. lycopersici (Fusarium wilt) and to race 1 (Ve gene) of Verticillium dahliae (Verticillium wilt). Fruit are highly resistant to all types of fruit cracking and are resistant to gray wall, blossom-end rot, puffiness, and angularity.

'Mountain Delight' produced total and U. S. Combination grade (U.S. No. 1 + U.S. No. 2) yields similar to 'Mountain Pride' in replicated ground and stake culture trials in North Carolina in 1984, 1985, and 1986. Fruit size of 'Mountain Delight' averaged 9.6 oz. per fruit compared to 9.0 oz. for 'Piedmont' and 8.6 oz. for 'Mountain Pride'. 'Mountain Delight' was grown in several grower trial plantings in North Carolina in 1986 and showed good grower and market acceptability. Growers have been especially interested in 'Mountain Delight' for vine ripe production because of its larger fruit size and shorter plant habit than 'Mountain Pride'.

Breeder seed of the parent lines will be maintained by the North Carolina Agricultural Research Service. Limited seed of 'Mountain Delight' is being produced by the North Carolina Foundation Seed Producers, Inc., P. O. Box 33245, Method Station, Raleigh, NC 27607-0245 to be made available for sale in 1988. 'Mountain Delight' will be released on an exclusive basis to one or more seed companies and should be available through commercial seed channels in 1989. Application is being made for a Plant Variety Protection Certificate for the male parent, NC 8288.



Director, North Carolina Agricultural
Research Service, Raleigh, N.C.

11/24/87

Date

NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE
 NORTH CAROLINA STATE UNIVERSITY
 RALEIGH, NORTH CAROLINA

NOTICE OF RELEASE OF NC 8288 TOMATO BREEDING LINE

The North Carolina Agricultural Research Service announces the release of a new fresh market tomato breeding line, NC 8288.

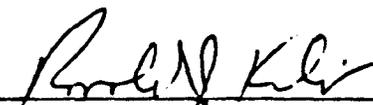
NC 8288 is an inbred line in the F₆ generation. It resulted from the cross of 'Piedmont' x 'Fla. 1B'. It has been tested in the Southern Tomato Exchange Program (STEP) trials since 1984 as STEP 689.

NC 8288 resembles 'Fla. 1B' in plant and fruit characteristics. Plants are short to medium determinate. Leaves have a characteristic marginal curl similar to 'Fla. 1B', but foliage is heavier and provides better fruit coverage than 'Fla. 1B'. NC 8288 has the nipples blossom trait (n gene) derived from 'Fla. 1B' and generally produces fruit with a smooth, pinpoint blossom scar. Non-ripe fruit of NC 8288 have uniform light green color (u gene), in contrast to the dark green shoulder color of 'Fla. 1B'. Fruit pedicels are jointed. Fruit shape of NC 8288 is deep oblate and generally symmetrical. Fruit remain very firm during ripening and have good uniform red external and internal color. NC 8288 is early in maturity. In trials in North Carolina, it has been comparable in maturity to the cultivar 'Pikred'.

NC 8288 is resistant to races 1 and 2 (I and I-2 genes) of Fusarium oxysporum f. sp. lycopersici (Fusarium wilt) and to race 1 (Ve gene) of Verticillium dahliae (Verticillium wilt). NC 8288 has moderate resistance to fruit cracking. Under conditions of high nitrogen fertility and wet soil, NC 8288 has shown some susceptibility to the fruit disorder of gray wall. Like 'Fla. 1B' and other early maturing cultivars with curled foliage, NC 8288 is more susceptible to early blight than cultivars lacking the curled foliage trait.

Total yields of NC 8288 have generally been slightly lower than those of mid and late season cultivars. However, because of its smooth blossom scar, NC 8288 has been equivalent in yield of U. S. Combination Grade (U.S. No. 1 + U.S. No. 2) fruit to later maturing cultivars. Fruit size of NC 8288 averaged 8.8 oz. in trials in North Carolina in 1984 and 1985.

NC 8288 is being released primarily for its use as the male parent of the F₁ hybrid 'Mountain Delight', which is being released concurrently with NC 8288. Breeder seed will be maintained by the North Carolina Agricultural Research Service. Small samples for trial and breeding purposes are available from R. G. Gardner, Mountain Horticultural Crops Research and Extension Center, Fletcher, NC 28732-9628. Application is being made for a Plant Variety Protection Certificate.


 Director, North Carolina Agricultural
 Research Service, Raleigh, N.C.

11/24/87
 Date

1988 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
Page 1 of 6

* * * * *

ACCESSION USERS: B.F. Carver, G.H. Morgan, and J.A. Webster
ADDRESS: Dept. of Agronomy, Oklahoma State Univ., and USDA-ARS, Plant
Science Laboratory, Stillwater, OK 74078-0507
NATURE OF RESEARCH: Release of greenbug-resistant vs. -susceptible near-
isolines of winter barley.
PROGRESS TO DATE: Four pairs of winter barley germplasm lines (PI 518635 -
PI 518642) were developed and registered in 1988 by the Crop Sci. Soc.
America. Each pair is near-isogenic except for the greenbug resistance
gene, Rsg1a, provided by an unadapted cultivar from Korea (Omugi). All
lines were derived from BC₁F₆ plant selections of the cross Rogers
*2/Omugi and released as BC₁F₁₃ lines. These lines should have utility
in research programs emphasizing gene identification, isolation, and
characterization. Germplasm release is pending final approval.
SELECTED PUBLICATIONS: Carver, B.F., G.H. Morgan, L.H. Edwards, and J.A.
Webster. 1988. Registration of four pairs of greenbug-resistant vs. -
susceptible near-isolines of winter barley. Crop Sci. 28: (In press).
CULTIVAR RELEASES: None

ACCESSIONS USERS: B.F. Carver and A.L. Rayburn
ADDRESS: Dept. of Agronomy, Oklahoma State Univ., Stillwater, OK 74078-
0507
NATURE OF RESEARCH: Genetic analysis and selection of photosynthetic
capacity in winter wheat.
PROGRESS TO DATE: Phenotypic distributions for CO₂-assimilation rate (A),
stomatal conductance (gs), and internal CO₂ concentration (Ci) in
segregating populations of T. dicoccoides indicated quantitative
inheritance with intermediate heritability. Variability in A was not
associated with chlorophyll content, leaf area, or CO₂ supply measured
as Ci. Genetic variability in A was also observed in the interspecific
backcross population TAM W-101*2/PI 428109, in which the PI is a high
photosynthetic accession of T. dicoccoides. Although the vast majority
of BC₁F₁ progenies had A values well below TAM W-101, some aneuploid
plants were identified with A values similar to the high photosynthetic
donor parent. The backcross breeding program will continue to select
for high A while restoring the D genome of T. aestivum.
SELECTED PUBLICATIONS: Johnson, R.C., B.F. Carver, D.W. Mornhinweg, H.
Kebede, D.M. Ferris, and A.L. Rayburn. 1988. Photosynthetic Variation
in Triticum dicoccoides accessions: Physiology and genetics. Plant
Physiol Biochem (In press).
Carver, B.F. and R.C. Johnson. 1987. Genetic variation of photo-
synthetic characters in winter wheat. Agron. Abst. p. 59.
CULTIVAR RELEASES: None

OK-2

ACCESSION USERS: B.F. Carver and E. Nevo

ADDRESS: Dept. of Agronomy, Oklahoma State Univ., and Institute of Evolution, Univ. Haifa, Mt. Carmel, Haifa 31999, Israel.

NATURE OF RESEARCH: Identification and utilization of genetic markers for photosynthetic selection in wild emmer wheat.

PROGRESS TO DATE: A diverse collection of wild emmer wheat (T. dicoccoides) accessions from a broad ecogeographical region of Israel has been typed for 42 allozyme gene loci and chloroplast DNA (chDNA) markers. We are currently evaluating a representative sample (27 populations) of these genotypes under controlled-environment conditions to estimate photosynthetic potential. Genetic associations between photosynthetic potential and the presence of certain chDNA or allozyme variants will be identified for developing a marker-facilitated selection program.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASES: None

ACCESSION USERS: B.F. Carver

ADDRESS: Dept. of Agronomy, Oklahoma State Univ., Stillwater, OK 74078-0507

NATURE OF RESEARCH: Identification and improvement of aluminum tolerance in hard red winter wheat.

PROGRESS TO DATE: Major and minor ancestors of hard red winter (HRW) wheat cultivars were evaluated for seedling tolerance to aluminum toxicity. Several HRW ancestors showed intermediate or tolerant responses including Kenya 58, Mediterranean, Purplestraw, and Red Fife. The predominant HRW ancestor, Turkey, was susceptible. Aluminum tolerance in HRW wheat could not be traced in a single lineage to any single ancestor or to a set of closely related lines. Utilization of the various sources present in commercial cultivars could lead to improved levels of tolerance than presently available in HRW wheat.

SELECTED PUBLICATIONS: Carver, B.F., W.P. Inskeep, N.P. Wilson, and R.L. Westerman. 1988. Seedling tolerance to aluminum toxicity in hard red winter wheat germplasm. *Crop Sci.* 28:463-467.

CULTIVAR RELEASES: None

ACCESSION USERS: R.M. Hunger and J.L. Sherwood

ADDRESS: Plant Pathology Department, Oklahoma State University, Stillwater, OK 74078-0285

NATURE OF RESEARCH: Determine the resistance to wheat leaf rust in entries selected from the 1986 International Winter Wheat Rust Nursery (86 IWWRN) and the 1987 Modified Winter Wheat Leaf Rust Program (87 MWLWRP), and combine this resistance into wheat lines adapted to Oklahoma that also are resistant to wheat soilborne mosaic virus.

PROGRESS TO DATE: Three entries from the 86 IWWRN (#82, 189, and 271) and 1 entry from the 87 MWLWRP (#111) expressed excellent resistance to 3 races of leaf rust (Puccinia recondita f. sp. tritici) when tested as seedlings in the greenhouse. In the field during spring 1988, these entries expressed adult plant resistance to leaf rust at 4 locations in Oklahoma. Three other 87 MWLWRP entries (#53, 54, and 68) were susceptible to the 3 races in seedling tests, but demonstrated excellent field resistance in the trap plots indicating the presence of adult plant resistance gene(s). Sixteen of 67 F1 lines obtained from crossed between the 86 IWWRN entries and cultivars resistant to WSBMV

were rated visually and with the enzyme-linked immunosorbent assay (ELISA) in greenhouse and field tests as having excellent resistance to leaf rust and WSBMV. From these F1 lines, individual F2 plants will be evaluated for resistance to leaf rust and WSBMV. Additional crosses have been made using these entries from the International Nurseries in order to continue to combine resistance to leaf rust with WSBMV.

- SELECTED PUBLICATIONS: Armitage, C.R., R.M. Hunger, and J.L. Sherwood. 1988. Determination of optimal sampling months to evaluate winter wheat with ELISA for resistance to wheat soilborne mosaic virus (WSBMV). *Phytopathology* 78:In press (Abstr).
- Bahrani, Z., J.L. Sherwood, M.R. Sanborn, and G.C. Keyser. 1988. The use of monoclonal antibodies to detect wheat soilborne mosaic virus. *J. Gen. Virol.* 69:In press.
- Hunger, R.M. and J.L. Sherwood. 1988. Reaction of winter wheat to wheat soilborne mosaic virus, 1987. *Biological and Cultural Tests for Control of Plant Diseases 3*:In press.
- Hunger, R.M. 1988. Reaction of hard red winter wheat to leaf rust, 1987. *Biological and Cultural Tests for Control of Plant Diseases 3*:In press.
- Hunger, R.M., E.L. Smith, and G.H. Morgan. 1988. Avirulence/virulence of single pustule isolates of leaf rust from Oklahoma, 1987. *Biological and Cultural Tests for Control of Plant Diseases 3*:In press.
- CULTIVAR RELEASES: None

ACCESSION USERS: J.A. Webster, R.L. Burton, O.G. Merkle, and S.D. Kindler
 ADDRESS: USDA-ARS, Plant Science Laboratory, P.O. Box 1029, Stillwater, OK 74076

NATURE OF RESEARCH: 1. Evaluation of sorghum [*Sorghum bicolor* (L.) Moench], and sorghum relatives for resistance to greenbugs, yellow sugarcane aphid, chinchbugs, sorghum midge and fall armyworms. 2. Evaluation of New Introduction small grain lines and wheat relatives for insect resistance, especially greenbugs, Russian wheat aphids and the yellow sugarcane aphid.

PROGRESS TO DATE: Follow-up studies are being conducted on three Ethiopian sorghum lines which appear to be resistant to the yellow sugarcane aphid. The Russian wheat aphid (RWA) is now in 15 states and losses and control costs added up to \$53 million in 1987. An intensive search is underway to locate resistance to the RWA in wheat and in barley. A few wheat species with sufficient RWA resistance to follow in a breeding program have been detected. In addition, all U.S. and Canadian wheats from the National Wheat Collection that have cultivar names or experiment station designations are being tested.

- SELECTED PUBLICATIONS: Tyler, J.M., J.A. Webster, and O.G. Merkle. 1988. Identification of rye genotypes resistant to biotypes B, C, E, and F of the greenbug. *Euphytica* 37:65-68.
- Webster, J.A. and K.J. Starks. 1987. Fecundity of *Schizaphis graminum* and *Diuraphis noxia* (Homoptera:Aphididae) at three temperature regimes. *J. Kansas Entomol. Soc.* 60:580-582.
- Webster, J.A., R.L. Burton, and K.J. Starks. 1987. *Diuraphis noxia*, a new U.S. aphid pest of small grains. *J. Kansas Entomol. Soc.* 60:483-484.
- Webster, J.A., K.J. Starks, and R.L. Burton. 1987. Plant resistance

OK-4

studies with Diuraphis noxia (Homoptera:Aphididae), a new United States wheat pest. J. Econ. Entomol. 80:944-949.

CULTIVAR RELEASES: None

ACCESSION USER: D.E. Weibel

ADDRESS: Dept. of Agronomy, Oklahoma State University, Stillwater, OK 74078

NATURE OF RESEARCH: Sorghum breeding and genetics

PROGRESS TO DATE: Seed was increased of the 32 lines of sorghum introduced from ICRISAT. Some of the lines appeared very promising for direct evaluation. We will be glad to share seed.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASES: None

ACCESSION USER: 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: Additional field and greenhouse increases were made of earlier PI accessions from South America. Maintenance of the wild Arachis nurseries at Weslaco, TX and Brooksville, FL continued with minimum losses. Additional selections, based on large seed size, early maturity, compact plant form, and improved seed production potential were made at Ft. Cobb, OK and at Isabela, PR. A few accessions of wild peanuts were established, on a trial basis, at Isabela, PR. Seeds of wild and cultivated peanut accessions and vegetative materials of wild peanuts were distributed to various investigators in support of their research.

SELECTED PUBLICATIONS: Banks, D.J. 1988. Inheritance of a lethal seedling trait in Arachis hypogaea L. Proc. Am. Peanut Res. Educ. Soc. 19:15. (Abstract).

Ahring, R.M., D.J. Banks, and T.L. Springer. 1988. Peanut seedling responses to root temperature controlled by a thermogradient sand box. Proc. Am. Peanut Res. Educ. Soc. 19:39. (Abstract).

Banks, D.J. 1988. Wild peanut resources in the U.S.A. Beltsville Symposia in Agricultural Research. XIII Biotic Diversity and Germplasm Preservation - Global Imperatives. (Abstract).

CULTIVAR RELEASES: None

ACCESSION USER: D.L. Ketring

ADDRESS: USDA-ARS, Plant Science and Water Conservation Laboratory, P.O. Box 1029, Stillwater, OK 74076

NATURE OF RESEARCH: Evaluate peanut germplasm for drought and heat resistant traits.

PROGRESS TO DATE: Peanut germplasm (plant introductions, breeding lines, and cultivars) are continuing to be evaluated for traits (root growth, leaf water potential components, water use) to escape and/or tolerate drought. They are also being evaluated for heat tolerance by leaf membrane thermostability. In 1987, eighteen genotypes were tested for water relations components across three irrigation regimes in a line source gradient system. Cultivar Pronto and breeding line OK-FH15 were tested for heat tolerance and growth and yield across irrigation

regimes. Yield data for all genotypes also were taken. Leafspot disease severity among genotypes was noted.

SELECTED PUBLICATIONS: Huang, Ming-teh and D.L. Ketring. 1987. Root growth characteristics of peanut genotypes. J. Agric. Res. China 36:41-52.

Ketring, D.L. 1986. Physiological response of groundnut to temperature and water deficits-breeding implications, pp. 135-143. In Agrometeorology of Groundnut. Proc. Int. Symp. 1985, ICRISAT Sahelian Center, Niamey, Niger.

CULTIVAR RELEASES: None

ACCESSION USER: James S. Kirby

ADDRESS: Dept. of Agronomy, Oklahoma State University, Stillwater, OK 74078

NATURE OF RESEARCH: Peanut Breeding

PROGRESS TO DATE: Many peanut introductions of all market types continue to be evaluated for adaptation to the growing season and conditions in Oklahoma. In 1988, 451 additional peanut P.I.'s have been planted for seed increase and preliminary evaluation.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASES: None

ACCESSION USERS: H.A. Melouk, C.N. Akem, and O.D. Smith

ADDRESS: USDA-ARS, Department of Plant Pathology, Oklahoma State University, Stillwater, OK 74076; and Department of Crop Science, Texas A&M University, College Station, TX 77843

NATURE OF RESEARCH: Peanut disease resistance

PROGRESS TO DATE: Several cultivated peanut genotypes were evaluated for their reaction to Sclerotinia blight, caused by Sclerotinia minor, in small field plots at Stillwater, Oklahoma. Four of these entries (TX804475, TX798683, TX798731, and TX798736) were identified to have a high level of resistance to Sclerotinia minor in field tests over the last three years, 1985-1987. Sclerotinia disease progress under field conditions was significantly lower on these entries as compared with the susceptible peanut cultivars Tamnut 74 and Florunner. Seed increase of these selections is in progress prior to agronomic evaluations.

SELECTED PUBLICATIONS: Akem, C.N., H.A. Melouk, and O.D. Smith. 1987. Resistance of Sclerotinia minor in cultivated peanuts. Proc. Am. Peanut Res. Educ. Soc. 19:32.

CULTIVAR RELEASES: None

ACCESSION USERS: J.L. Cadde1 and R.C. Berberet

ADDRESS: Department of Agronomy, Oklahoma State University, Stillwater, OK 74078

NATURE OF RESEARCH: Evaluations of alfalfa (Medicago spp.) introductions for resistance to the blue alfalfa aphid (Acyrtosiphon kondoi Shinji). This work is carried out as a cooperative effort with the USDA-ARS Plant Introduction Program to characterize traits of germplasm collected in various areas of the world.

PROGRESS TO DATE: Between 700 and 800 world collection accessions have been evaluated, with nearly 300 being tested during 1987-88. Although most accessions have little evidence of resistance to the blue aphid, some

OK-6

entries from southern Asia have up to 20% resistant plants. Some of these may have value as sources of resistance for incorporation into cultivars.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASES: None

ACCESSION USERS: James F. Henson and C.L. Dewald

ADDRESS: The Kerr Center for Sustainable Agriculture, Poteau, OK 74953, and Southern Plains Research Station, Woodward, OK 73801

NATURE OF RESEARCH: Evaluate eastern gamagrass [Tripsacum dactyloides (L.) L.] families for vigor, basal circumference, height, percentage seed set, resistance to leaf anthracnose [Colletotrichum graminicola (Ces.) G.W. Wils.] and resistance to common leaf rust of corn (Puccinia sorghi Schw.). The families were derived from crosses between a gynomonocious variant, used as the female parent, and accessions collected from OK, MO, TX, and KS.

PROGRESS TO DATE: Clones of randomly selected genotypes from each family were transplanted to Poteau, OK in spring, 1987. Significant differences between families were noted during 1987 for leaf anthracnose at each of five rating dates, and for leaf rust at each of three rating dates.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASES: None

ACCESSION USERS: Paul Threadgill and George Kuepper

ADDRESS: Kerr Center for Sustainable Agriculture, P.O. Box 588, Poteau, Oklahoma 74953

NATURE OF RESEARCH: Evaluation of 16 provenances of eastern black walnut (Juglans nigra). These were obtained from sites within the southeastern United States and will be planted in a common orchard in LeFlore County, Oklahoma. Our goal is to identify varieties which will perform well under the climatic conditions of the southeastern United States.

PROGRESS TO DATE: We are in the initial stages of the study. Nuts from the provenances are in a seed nursery at the Oklahoma State University Kiamichi Forest Research Station near Idabel, Oklahoma.

SELECTED PUBLICATIONS: None

CULTIVAR RELEASES: None

College of Agricultural Sciences
Agricultural Experiment Station
University of Puerto Rico

S-9 Technical Committee
Report
1988

June 21, 1988
Ft. Collins, Colorado

Submitted by: Rubén Vélez Colón
HC 02 Box 7115
Juana Díaz, PR 0665-9601

ACCESSION USER : Sonia L. Martínez, Octavio Colberg and Rubén Vélez

ADDRESS : Department of Horticulture
College of Agricultural Sciences
University of Puerto Rico
Mayaguez, PR 00708

NATURE OF RESEARCH : To obtain through plant introduction, evaluation and preservation better fruit crops (avocado-Persea americana Mill, Sapodilla-Manilkara zapota (L), guava-Psidium guajava L. and West Indian Cherry-Malpighia punicifolia) with high yielding ability, resistant to prevalent maladies and adapted to our climatic conditions.

PROGRESS TO DATE : A drip irrigation system was installed in the avocado 32 varieties experiment. An experiment of 7 avocado promising varieties (not included in the 32 varieties experiment) was established in order to evaluate their performance.

Pruning was done in the avocado 32 varieties experiment and the soursop eight clones experiment, to improve the aeration and management of the orchards. Renovation prune was done in the guava collection, recuperation and development of the trees is being recorded.

Data of production and yield recorded by three years in the Sapodilla 17 varieties experiment was analyzed. The results show that Larsen variety is one of the highest in yield and the Ponce variety is one of the lowest in yield. Chemical evaluation of sapodilla fruits from the 17 varieties experiment show a range of values: 15.2 to 24.3 in Brix, 4.76 to 5.39 in pH, 0.054 to 0.109% of acidity, 7.68 to 15.19% of reduced sugar and 11.50 to 21.81% of total sugar content. Sensorial evaluation of sapodilla fruits show that Russel variety has a constant tendency to be the best in appearance and Adelaide variety the worst. Related to the taste criterion, Larsen variety has the highest average and Bocksberg variety has the lowest taste average.

PUBLICATIONS : Cruz Castillo, J. G. and A. Cedeño Maldonado, 1987. Effect of Defoliation Treatments on Growth, Flowering and Fruit Production of Soursop (Annona muricata L.) Hort. Science. 22(5): 181.

CULTIVAR RELEASES : None.

H-94-C

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

ADDRESS : Corozal Agricultural Experiment Substation.
HC-02 Box 10322, Bo. Padilla, Corozal, PR 00643.

NATURE OF RESEARCH : Plantains and Bananas-their introduction, multiplication, evaluation and preservation.

PROGRESS TO DATE : The average bunch weight in the plant crop of four local banana selections was 16.76 kg compared with 16.96 kg for Grand Naine, with about the same number of fingers per bunch. Yield data in the plant crop of the four local banana selections show the production potential of these cvs., especially the 3A clon.

A guineo Niño and Manzano (small and sweet kind of banana) collection was started during 1987. The collection consisted of six Niño and three Manzano from different regions of the island, so far. Other 44 cvs. of banana and 12 cvs. of plantain still under preservation and evaluation.

PUBLICATION : None.

CULTIVAR RELEASES : None.

H-94-D

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

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

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

PROGRESS TO DATE : The yam cv. Binugus still shows resistance to antracnose disease. Also this cv. showed high production and percent of germination compared with the other varieties. Better germination of different yellow type of yams (D. cayenensis) was obtained by planting in May (72%) as compared to February (51%). The Guinea amarillo showed the highest yield in both planting seasons compared to P. I. 15719, P. I. 15711 and P. I. 15718 cvs.

Tremesiana cv. of cassava showed the highest production of marketable roots compared to Forastera, Llanera and Trinidad 1456, in a study comparing four different dates of harvesting. The yield of these four cassava cvs. increased as the time to harvest increased. Nevertheless, a smaller number of marketable roots was obtained in the last date of harvest (12 months).

The taniers collection manifested "Mal seco" (dry rot) susceptibility and a poor growth. Still under preservation and evaluation 27 sweet potato cvs.

PUBLICATIONS : None.

CULTIVAR RESEASES : The release of the cassava cvs. Forastera, Tremesiana, Llanera and Serrallés still in progress.

H-94-F

ACCESSION USER : Elvin G. Boneta and Félix Román

ADDRESS : Adjuntas Experiment Substation
HC-01 Box 4508
Adjuntas, PR 00601

NATURE OF RESEARCH : To introduce and evaluate cultivars of coffee, in order to find germoplasm with outstanding characteristics such as higher yield, superior quality and resistance to insects and diseases, under local conditions.

PROGRESS TO DATE : Coffee crop was 350,000 hwts. for a value of Sixty millions dollars (\$60,000,000.00) in 1986. High yielding varieties resistant to diseases and insect attack are required to secure a profitable operation. The commercial varieties in use are rust-susceptible which makes our coffee plantations liable to disappear if Hemileia vastatrix is accidentally introduced. Rust resistant cultivars were replicated at 4' x 6' and 6' x 6' in a split-plot design to evaluate their horticultural behaviour at different zones. Eight Catuai selections are compared in one experiment planted on July 1986. Seventeen Catimor and Icatu selections are under comparison at Ciales and Adjuntas. They were planted on November and December respectively. No yield data is available.

PUBLICATIONS :: None.

CULTIVAR RESEASES : None.

H-94-G

ACCESSION USER : Guillermo Fornaris and Elvin Caraballo

ADDRESS : Department of Horticulture, Agricultural Experiment Station, P. O. Box 21360, Río Piedras, PR 00928

NATURE OF RESEARCH : To introduce and evaluate cultivars of tomatoes (Lycopersicon esculentum) and peppers (Capsicum annuum), in order to find germplasm with outstanding characteristics such as higher yield, superior product quality and "resistance" to insects and diseases, under local conditions.

PROGRESS TO DATE : During our past vegetable crops main growing season (November, 1987 to May, 1988), preliminary cultivar trials on bell pepper and fresh market tomato took place at Juana Díaz Substation. On the same growing season, a replicated cultivar trial (4 plots/cv.) took place on cooking pepper. This trial included the best performing cultivars from the preliminary cooking pepper cultivar trial from last year, plus others.

PUBLICATIONS : None.

CULTIVAR RELEASES : None.

H-94-H

ACCESSION USER : Reinaldo del Valle and Agenol González

ADDRESS : Agricultural Experiment Station
P. O. Box 21360
Río Piedras, PR 00928

NATURE OF RESEARCH : Evaluation of arracacha (Arracacia xanthorrhiza Bancroft) introduced from Colombia and their performance and adaptation to our conditions.

PROGRESS TO DATE : Two cultivars of arracacha out of 12 introduced from Colombia have shown good potential in Puerto Rico. A brief and general description is as follows:
a) Cultivar I - purple foliage and yellow roots and
b) Cultivar A - light green foliage with red stripes extending from the base of the petioles to the middle portion of the same section and with yellow roots.

A series of small experiments using cultivars Criolla (the local yellow fleshed type), I and A from Colombia were planted in Barranquitas, Puerto Rico in a Humatas clay (Ultisol) in August 20 and December 4, 1986 and April 1 and June 30, 1987. For the August planting significant differences (1%) in total and marketable root yield were found between cultivar A and cultivars Criolla and I. Total root yield of 50.30 metric tons/ha was recorded for cv. A; however; the marketable root yield was only 69.6% of the total yield. In Puerto Rico marketable root yields above 11.21 mt/ha are considered good. Cultivar A outyielded significantly-as related to marketable roots produced-Criolla and I by 15 and 14 mt/ha respectively; however, it produced the highest non-marketable root yield.

In the December planting the yield of marketable roots was reduced for both cultivars I and A compared to the August planting, in contrast to cv. Criolla which outyielded the August planting by 7.28 mt/ha. A severe reduction was evidenced in marketable root yield for cvs. I and A, especially cv A where a difference of 22.75 mt/ha was observed.

Cultivar Criolla produced greater number of heads (total and marketable) than the other two cultivars. Fewer non-marketable heads were produced by cv. A (4.75) being significantly less than cv. Criolla. No results are available at present relative to the March and June 1987 plantings.

PUBLICATIONS : None.

CULTIVAR RELEASES : None.

H-94-M

ACCESSION USER : Rubén Vélez

ADDRESS : HC-o2 Box 7115, Juana Díaz, PR 00665-9601

NATURE OF RESEARCH : Selection and evaluation of table grape varieties suitable for the southern, arid coastal plains of Puerto Rico.

PROGRESS TO DATE : At the Fortuna Substation, Juana Díaz, Puerto Rico, research has been conducted with grapes under Project H-94-M, New Plants, their Introduction, Multiplication, Evaluation and Preservation. There are two gardens, the "Old Garden" and the "California Garden", which contain over thirty varieties, among which Rivier, Cardinal and Exotic stand out as table grapes, and Ruby Cabernet, Muscat of Alexandria, Carnelian, Centurion, California Hybrid 48 and California Hybrid 52 stand out as wine grapes.

H-94-R

ACCESSION USER : Gerardo Ruiz and Octavio Colberg

ADDRESS : Agricultural Experiment Station
P. O. Box 21360
Rio Piedras, PR 00928

NATURE OF RESEARCH : To obtain through plant introduction and selection, high yielding vegetable crops resistant to prevalent maladies and adapted to local conditions.

PROGRESS TO DATE : Three experiments were performed with cucurbits from December 1987 to March 1988. Two were replicated trials with 5 honey dew (Cucumis melo var. inodorus L.) cultivars and 5 cantaloupe (Cucumis melo var. reticulata L.) cultivars (the best from previous year preliminary trials). The other was a preliminary trial with 14 cucumber (Cucumis sativus L.) cultivars. On the honey dew trial, higher yields were obtained from cultivar Honey Dew Greenfleshed of Ferry Morse for the second year.

PUBLICATIONS : None.

CULTIVAR RELEASES : None.

H-94-E

ACCESSION USER : Gerardo Ruiz

ADDRESS : Agricultural Experiment Station
P. O. Box 21360
Rio Piedras, PR 00928

NATURE OF RESEARCH : To obtain through plant introduction and selection, high yielding ornamentals, resistant to prevalent maladies and adapted to local conditions.

PROGRESS TO DATE : Aglaonema "Silver Queen" and "María" were planted under 63, 80 and 92% saran shade to determine optimum light intensity levels for its production. "Silver Queen" and "María" number of offset consistently increase as shade decreased. The highest number of offsets were found under 63% saran shade (highest light intensity levels).

PUBLICATIONS : None.

CULTIVAR RELEASES : None.

At the Substation, the varieties are evaluated in relation to their agronomic performance, as well as to the quantity and quality of thier produce. This produce is sent to the Food Technology Laboratory in the case of the table grapes, or to the Rum Pilot Plant, in the case of the wine grapes.

As table grapes, the varieties Rivier, Cardinal and Muscat of Alexandria are the most promising. In fact, Rivier and Cardinal are being used commercially by a private farmer at Guánica, Puerto Rico, quite successfully.

As wine grapes, Ruby Cabernet is, among the good wine producers, the best adapted and the one which best responds to our environmental conditions. The varieties French Colombard and Cabernet Sauvignon also perform adequately when grafted onto appropriate rootstocks (so far, Lake Emerald and Tamiami seem to be adequate rootstocks), but do not perform well on their own feet. Muscat of Alexandria does well in agronomical terms, whether grafted or on its own feet, but is very susceptible to mildew. Carnelian and Centurion also produce good wines and respond adequately to our environmental conditions when grafted, but we do not know how they would respond on their own feet. California Hybrid 52 is very promising.

PUBLICATIONS : Evaluación de Variedades de Uva de Mesa (Vitis vinifera L.) cosechadas en la Subestación de Fortuna durante el año 1986, by Rubén Vélez and I. B. de Caloni. J. of Agriculture of the U.P.R., April 1988.

CULTIVAR RELEASES : None.

H-94-P

ACCESSION USER : Pedro Márquez

ADDRESS : Isabela Substation
P. O. Box 506
Isabela, PR 00662

NATURE OF RESEARCH : Pineapple germplasm - its introduction, evaluation and preservation.

PROGRESS TO DATE : The pineapple collection is now established at the Isabela Substation, where it can be evaluated and mantained more easily. We are still working on the process of describing the varieties on this collection.

H-94-T

ACCESSION USER : Gerardo Ruiz, Rubén Vélez and Pedro Márquez

ADDRESS : Agricultural Experiment Station
P. O. Box 21360
Río Piedras, PR 00928

NATURE OF RESEARCH : To obtain through plant introduction and selection, high yielding papaya trees, resistant to prevalent maladies and adapted to local conditions.

PROGRESS TO DATE : Carica papaya L. "Cariflora" was planted under drip irrigation at the Isabela and Fortuna Substations. The papaya plants in Isabela have been crosspollinated to increase the amount of seeds for further evaluation. Until now, no Papaya Ringspot Virus have been observed. Only a few trees have been found attacked by bunchy top disease. Cariflora papaya is an early high bearing variety.

PUBLICATIONS : None.

CULTIVAR RELEASES : None.

H-94-Q

ACCESSION USER : Gerardo Ruiz, Félix Román and Agenol González

ADDRESS : Agricultural Experiment Station
P. O. Box 21360
Río Piedras, PR 00928

NATURE OF RESEARCH : To obtain through plant introduction and selection, better high yielding citrus trees, resistant to the prevalent maladies and adapted to local conditions.

PROGRESS TO DATE :: For the second year, orange trees (Citrus sinensis L.) collection were evaluated in terms of number, size, weight and quality of fruit, at the Adjuntas Substation. Pietri 333 and 334 show better yielding potential than others. Oranges grafted on Cleopatra mandarine are better producers than those grafted on sour oranges, under Adjuntas conditions.

Chironja (Citrus sinensis X C. paradisi) and Valencia (Citrus sinensis L.) pruned trees look more vigorous than the unpruned trees.

PUBLICATIONS : None.

CULTIVAR RELEASES : None.

1988

S-9 Technical Committee Report

Agency: Clemson University

Submitted by: D.W. Bradshaw

Address: Department of Horticulture, Clemson University, Clemson, SC
29634-0375

Page 1 of 3

Accession User: Claude E. Thomas

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

Nature of Research: Evaluation of Brassica oleracea var. botrytis P.I.'s for reaction to downy mildew (Peronospora parasitica).

Progress to Date: 248 (all available) have been evaluated and data submitted for entry into GRIN.

Publications: Thomas, C.E. and E.L. Jourdan. 1987. Evaluation of Brassica oleracea var. botrytis plant introductions for resistance to Downy Mildew. Crucifer Genetics Workshop IV. University of Wisconsin, p. 35 (Abstract).

Cultivar Releases: None this period.

Accession User: Perry E. Nugent,

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

Nature of Research: The goals of this project are to develop germplasm that is resistant to several insects, diseases, and nematodes and environmental stresses and capable of producing a high yield of top quality fruit economically. Much of the best resistance is found in plant introductions.

Progress to Date: In some cases the plant introductions with resistance have just been located. In others, the resistance has been incorporated into advanced germplasm.

Publications: P.E. Nugent. 1987. C879-J₁ and -J₂ virescent mutant muskmelon breeding lines. HortScience 22(2):333-335.

Cultivar Releases: C879-J₁ and -J₂

Accession User: Alfred Jones

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

Nature of Research: Sweet Potato Breeding

Progress to Date: We are involved in long term Sweet Potato breeding programs and have 2 mass selection populations in which various plant introduction have been used over the years to widen our gene base. Open pollination procedures are used so no pedigree showing every specific P.I.'s contribution is possible. However, selections from these populations are being used in our cultivar development program.

Publications: None to date.

Cultivar Releases: None to date.

Accession User: B.B. Rhodes

Address: Edisto Research and Education Center, Blackville, SC 29817

Nature of Research: Watermelon cv development and genetic studies. Use resistant and P.I.'s as needed to introduce resistance.

Progress to Date: Resistance (tolerance) to anthracnose and Fusarium within watermelon. P.I. 189225 very important as source of Celletotrichum lagenarium resistance.

Publications: None to date.

Cultivar Releases: None to date.

Accession User: Richard L. Fery

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

Nature of Research: Screening of the complete collection of Vigna unguiculata and Capsicum spp. for tolerance to herbicide bentazon and to resistance to peanut root knot nematode Meloidogyne arenaria.

Progress to Date: Screening to begin summer 1988.

Publications: None to date.

Cultivar Releases: None to date.

Accession User: David W. Bradshaw

Address: Dept. of Horticulture, Clemson University, Clemson, SC 29634-0375

Nature of Research: Ornamental Plant Germplasm - Its introduction, Maintenance and Evaluation

Progress to Date: During the last year seed from nine Ilex selections were sent to the Mlynary Arboretum in Czechoslovakia in response to a request to assist them in expanding their Ilex collection. Also during the last year computer indexing of the entire collection in the Clemson University Botanical Garden was initiated. Over 1200 species and varieties have been indexed to date with columns of data recording a) Genus b) species c) variety d) common name e) year of acquisition f) leaf emmergence g) first bloom h) full bloom i) finish bloom j) rebloom if any k) fruit color and maturation l) fall leaf color and m) vigor for the year. Lotus 123 is the program used to index the information.

Publications: None to date.

Cultivar Releases: None to Date.

1988

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

Page 1 of 1.

* * * * *

Accession User: B. N. Duck

Address: School of Agriculture, University of Tennessee at Martin, Martin,
Tennessee 38238-5008

Nature of Research: Evaluation of Vicia spp. for agronomic adaptation.

Progress to Date: Seed of 107 selections of Vicia from 1987-88 field nurseries were planted in October, 1987 on 2.4 m centers. Species represented included villosa and ervilia, and 10 plants of each selection were established. Hairy vetch (V. villosa), varieties 'common' and 'Madison', were grown as standard for comparison, and observations were made on winter hardiness, vigor, maturity, and seed dehiscence. Considerable genetic variation was observed, both among and within families. Seed of about 300 individual plant selections were harvested and will be used to establish a field nursery in fall, 1988.

Publications: None

Cultivar Releases: None

Fiber, Nitrate, and Protein Content of *Amaranthus* Accessions as Affected by Soil Nitrogen Application and Harvest Date

Robert D. Walters, David L. Coffey, and Carl E. Sams
Department of Plant and Soil Science, University of Tennessee,
Knoxville, TN 37901

Additional index words. crude protein, neutral detergent fiber, grain, vegetable, ammonium nitrate, fertilization

Abstract. Six accessions of edible amaranths (*Amaranthus* spp. L.) of varied geographic and genotypic origin were grown in a soil enriched with 0, 50, or 100 kg·ha⁻¹N. Leaves were harvested at 25, 35, 45, 55, and 65 days after germination (DAG) and analyzed for crude protein (CP), neutral detergent fiber (NDF), and NO₃⁻ N. In grain-bearing accessions, leaf CP content increased with N application but declined linearly over harvest dates. In vegetable types, leaf CP levels tended to fluctuate over time. In both types, NDF content declined with N application, whereas response to harvest date varied. Leaf NO₃⁻ increased two-fold in plants from fertilized plots compared to plants from unfertilized plots, but declined rapidly with time. Leaf content of NO₃⁻ did not exceed 239 mmol·kg⁻¹ dry weight with any N fertilization treatment. Edible amaranth appeared to be adapted to soils and climate of the southeastern United States. *A. tricolor* was most susceptible to disease among the accessions evaluated.

Edible amaranths are protein-rich, annual, herbaceous dicotyledons of worldwide distribution (12, 14). Their use in tropical agriculture as a vegetable or as a grain has been well-documented (4, 6, 8, 11). Like many tropical C-4 monocotyledons, such as sorghum (*Sorghum bicolor* (L.) Moench [*S. vulgare* Pers.]) and sugarcane (*Saccharum officinarum* L.), amaranths flourish in warm, humid, sunny environments. Amaranth leaf dry matter is rich in protein and fiber (19). Interest in assessing selected amaranth accessions as a heat-tolerant greens crop for the temperate zones has expanded (2, 10).

The objective of this study was to evaluate several components of leaf dry matter in selected *Amaranthus* accessions from Latin America, Africa, and Southeast Asia. Accessions were selected to reflect the broad geographic and genotypic spectrum of cultivated members of the genus. Results describing the response of selected leaf nutrients to different levels of soil N enrichment and harvest date treatments are presented.

Six amaranth accessions were selected for this study. Three accessions, *A. tricolor* RRC no. 241 (Southeast Asia), *A. dubius* NCRPIS no. 2014 (Surniam), and *A. blitum* RRC no. 313 (Southeast Asia) were "smooth-leaved" vegetable types. *A. cruentus* NCRPIS no. 1964 (Nigeria), RRC no. 1011 (Mexico), and

A. paniculatus RCSC (Latin America) were relatives to the coarse-leaved New World grain types. Seeds were obtained from Rodale Research Center (RRC), Kutztown, Pa., North Central Regional Plant Introduction Station (NCRPIS), Ames, Iowa, and Redwood City Seed Co. (RCS), Redwood City, Calif.

The experiment was conducted at the Plant Science Field Laboratory in Knoxville, Tenn. in 1984. The experimental design was a randomized complete block with a split-split-plot factorial arrangement of treatments with four replications. Three N fertilizer rates (main plot factor) of 0, 50, and 100 kg·ha⁻¹N were applied as NH₄NO₃ to an Etowah silt loam (Fine-loamy, siliceous, thermic Typic Paleudult) of medium fertility. Whole-leaf tissue samples from six accessions (subplot factor) were obtained during the growing season at 25, 35, 45, 55, and 65 days after germination (DAG).

All plots received a preplant broadcast application of 60 kg·ha⁻¹P and K. Supplemental irrigation was provided as needed.

Amaranth transplants were grown in a greenhouse in 2.5-cm cellular, plasticfoam flats. Thirteen days after germination, seedlings were transferred to the field.

The experimental area was 28 × 40 m with individual blocks separated by a 1.8-m alley. Within row and between row spacings were 30 cm for all accessions. Five sets of four plants each were logged as sample plants. These four plant units comprised the sub-subplot fact. Harvests were randomized so that a different set of four plants were sampled at each of five harvest dates. First samples were taken 25 DAG, when plants were judged to be large enough to yield a sufficient quantity of leaf material for analyses.

Six mature, expanded leaves (excluding petiole) from the upper portion of the main stem were randomly sampled from each of four plants. For *A. blitum*, an accession with small leaves, 20 mature, fully expanded leaves were randomly sampled from each of four plants.

Leaf samples were dried at 70°C for 24 hr and ground in a Wiley mill to pass a 20-mesh screen. Total N concentration of 200-mg sub-samples was measured, after digestion in 18 M H₂SO₄ and 11.9 M H₂O₂, by the indophenol colorimetric method (18). Crude protein (CP) was estimated by multiplying total N by 6.25. Neutral detergent fiber (NDF) was used as an estimate of total cell wall constituents at 25, 45, and 65 DAG (5). Water soluble NO₃⁻ was extracted from two accessions, *A. cruentus* NCRPIS no. 1964 and *A. dubius* NCRPIS no. 2014. Extraction was by addition of 50 ml of boiling deionized H₂O to 500-mg sub-samples and placement on a mechanical shaker for 30 min. After filtering through no. 42 Whatman paper, the eluant was diluted to a constant volume. NO₃⁻ concentration of the eluant was measured by selective high performance liquid ion chromatography.

Data were processed by analysis of variance. Treatment effects on leaf nutrient content were partitioned by polynomial single degree of freedom contrasts. To maintain within-class variance homogeneity, each accession was analyzed separately.

Regression equations calculated to estimate leaf CP concentration as a function of the N fertilizer and harvest date treatment effects are given in Table 1. Overall, soil N enrichment increased leaf CP significantly ($P \leq 0.01$). Generally, leaf CP was enhanced linearly with soil N enrichment. In *A. dubius*, a significant ($P \leq 0.05$) quadratic effect was observed. Significance of the linear response varied, depending mainly on age of the plants at harvest. Analysis of partial regression coefficients (results not shown) demonstrated that leaf CP response to N rate was minimal at harvest dates ≤ 35 days after germination and increased with increasing age of the plant. Hence, differences in leaf CP concentration among the different N applications did not vary appreciably at the early harvest dates.

Among the six amaranth accessions evaluated, significantly ($P \leq 0.05$) different overall mean leaf CP levels were observed (Table 2). Averaged over accessions and harvest dates, the portion of the total variance in leaf CP resulting from the N treatments was 17%. Significant leaf CP increase was expected; however, the magnitude of the response to N among accessions varied. For example, the percentage of leaf CP variance resulting from the N treatments was greatest in *A. dubius* (26%), whereas the overall mean leaf CP level in this accession ranked lowest. The smallest overall percentages of leaf CP variance accounted for by the N treatments were observed in *A. paniculatus* and *A. blitum* (13% and 12%, respectively). On the other hand, overall mean CP levels in these accessions were exceeded

Received for publication 14 Oct. 1986. We thank William L. Sanders, Univ. of Tennessee Agricultural Experiment Station statistician and professor, for statistical assistance and counsel. 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.

1988

S-9 Technical Committee Report

Agency: The Texas Agricultural Experiment Station
Submitted By: George G. McBee
Address: Soil and Crop Sciences Department
Texas A&M University
College Station, Texas 77843
Phone: 409-845-8796

* * * * *

Accession User: Kenneth Hignight
Address: Department of Soil and Crop Sciences
Texas A&M University
College Station, TX 77840
Nature of Research: Forage Grasses
Progress to Date: Thirteen PI's of various forage
grasses, primarily of the genus Pennisetum were received.
Publications: none reported.
Cultivar Releases: None reported.

Accession User: Arthur G. Matches
Address: Dept of Plant and Soil Sciences
Texas Tech University
Lubbock, TX 79409
Nature of Research: Legume Evaluation.
Progress to Date: Seventeen PI's of alfalfa, 1 PI of
Crimson clover and 1 PI of Vetch were received for
evaluation.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: G. R. Smith
Address: Texas A&M Univ. Res. & Ext. Center
P. O. Drawer E, Overton TX 75684
Nature of Research: Legume & Grass Evaluation.
Progress to Date: Thirty eight PI's of Trifolium and PI's
from 9 genus of legumes ordered.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: Hugh Wilson
Address: Dept. of Biology
Texas A&M University
College Station, TX 77843
Nature of Research: Cucurbit evaluation.
Progress to Date: Two PI's of Cucurbita ordered.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: Dr. Ed Lumack
Address: University of Houston
Dept. of Biology
Houston, TX 77004
Nature of Research: Hibiscus cannabinus
Progress to Date: Seven PI's ordered.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: Dr. Dennis Walker
Address: Texas A&M University
The Texas Agricultural Experiment Station
17360 Coit Road
Dallas, Texas 75252
Nature of Research: Alfalfa
Progress to Date: Two PI's ordered.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: Dr. J. Craig
Address: USDA-ARS
P.O. Drawer DN
College Station, Texas 77840
Nature of Research: Sorghum bicolor
Progress to Date: One hundred & seventy one PI's ordered.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: Dr. Gerald W. Evers
Address: Texas A&M University Agr. Res. Station
P.O. Box 778
Angleton, Texas 77515
Nature of Research: Legumes.
Progress to Date: Ten PI's ordered.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: Ellen B. Peffley
Address: Assistant Professor, Veg. Crops
Texas Tech University
Dept. of Plant & Soil Sciences
Lubbock, TX 79409-4169
Nature of Research: Allium cepa
Progress to Date: One PI ordered.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: Robert Miller
Address: Cargill Hybrid Seed - UPRI
P.O. Box 2
Aiken, Texas 79221
Nature of Research: Sorghum bicolor
Progress to Date: One hundred & eighty one PI's ordered.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: Dr. E.N. Escobar
Address: Int. Dairy - Goat Res. Center
Prairie View A&M University
P.O. Box U
Prairie View, TX 77446-2886
Nature of Research: Leucaena Leucocephala
Progress to Date: Ten PI's ordered.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: Dr. William R. Ocumpaugh
Address: Texas A&M University System
Texas A&M University Agri. Research Station
HCR-2, Box 43-C
Beeville, TX 78102-9410
Nature of Research: Legumes.
Progress to Date: Forty five PI's ordered.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: Mr. Gary W. Lowe
Address: Botanical Seed Collector and Grower
10341 Desdemona Dr.
Dallas, Texas 75228
Nature of Research: Ipomea purpurea.
Progress to Date: Two PI's ordered.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: Dennis Walker
Address: Texas A&M Univeristy
The Texas Agr. Exp. Station
17360 Coit Road
Dallas, TX 75252
Nature of Research: Legumes
Progress to Date: Seventy eight PI's ordered.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: Lydia Francine
Address: 207 West Spring Dr.
Austin, TX 78746
Nature of Research: Allium
Progress to Date: Seven PI's ordered.
Publications: None reported.
Cultivar Releases: None reported.

Accession User: Sir S. Kidambi
Address: Department of Plants and Soils
Texas Tech University
Lubbock, Texas 79409-4169
Nature of Research: 'Onobrychis sp.
Progress to Date: Eighty four PI's ordered.
Publications: None reported.
Culitvar Releases: None reported.

Accession User: Dr. Gary C. Peterson
Address: Texas Agricultural Experiment Station
Texas A&M University
Rt. 3, Box 219
Lubbock, TX 79401-9757
Nature of Research: Sorghum bicolor
Progress to Date: Twenty four PI's ordered.
Publications: None reported.
Cultivar Releases: None reported.

1988

S-9 TECHNICAL COMMITTEE REPORT

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

Accession User: M. Rangappa
Address: Virginia State University
Petersburg, VA 23803

Nature of Research: Evaluation of bean germplasm for biological and environmental stress factors.

Progress to Date: Resistant bean lines which had less than 30% foliar injury after exposure to 0.6 ppm ozone (O₃) in phytotron evaluations are being further evaluated under ambient field conditions, in open-top field chambers and in growth chambers for field resistance to O₃ as well as biochemical and nutritional factors.

Publications:

Mebrahtu, T., M. Rangappa, A. H. Chappelka, E. Robbins, and P. S. Benepal. 1988. Generation mean analysis of beans, *Phaseolus vulgaris* L., to ozone (O₃) inheritance. *Bean Improvement Cooperative* 31:110-111.

Mebrahtu, T., M. Rangappa, and P. S. Benepal. 1988. Inheritance study of common bean, *Phaseolus vulgaris*, to ambient ozone (O₃) injury. *Bean Improvement Cooperative* 31:108-109.

Baker, D., M. Rangappa, and P. S. Benepal. 1988. Comparative leaf morphology of field beans resistant and susceptible to air pollutant ozone. *Bean Improvement Cooperative* 31:106-107.

Kraemer, M. E., M. Rangappa, and P. S. Benepal. 1988. Effect of ozone stressed soybean foliage on the fecundity of the Mexican bean beetle. *Bean Improvement Cooperative* 31:116-118.

Cultivar Releases: none

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: Ninety seven of the accessions have been evaluated for either prolamin (storage protein) size variation and immunological cross-reactivities or chloroplast DNA sequence variation. In some genera, like *Bromus*, *Eleusine*, *Triticum*, and *Avena*, both chloroplast DNA and protein and immunological studies were conducted.

Publications:

Hilu, K. W. 1988. Identification of the "A" genome of finger millet using chloroplast DNA. *Genetics* 118:163-167.

Hilu, K. W. and A. Esen. 1988. Prolamin size diversity in the Poaceae. *Biochemical Systematics and Ecology*: (in press).

Esen, A. and K. W. Hilu. 1988. Immunological affinities among subfamilies of the Poaceae. *Amer. J. Bot.*: (in press).

Cultivar Releases: none

Accession User: Jeff McCormack

Address: Southern Exposure Seed Exchange
P.O. Box 158
North Garden, VA 22959

Nature of Research: Evaluation of *Petroselinum crispum* .

Progress to Date: The accession is currently in frozen storage until a suitable growing area can be identified.

Publications: none

Cultivar Releases: none

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: none

Cultivar Releases: none

Accession User: D. Morris Porter

Address: Tidewater Research Center
P.O. Box 7099
Suffolk, VA 23437

Nature of Research: Lines of peanuts, *Arachis hypogaea*, obtained from China will be used in field screening research to determine levels of resistance to major peanut pathogens. Resistance to *Sclerotinia* blight (*Sclerotinia minor*) and early leafspot (*Cercospora arachidicola*) will be determined by growing peanuts in farmer fields having a history of this pathogen. Some of the Chinese lines are of particular importance since they are known to be early maturing as well as drought tolerant. Also, the oil content of Chinese peanuts is usually higher than that of domestic peanuts.

Publications: none

Cultivar Releases: none

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

June 1988

"History celebrates the battlefields whereon we meet our death, but seems to speak of the ploughed fields whereby we live; it knows the names of the king's bastards, but cannot tell us the origin of wheat."

Jean Henry Fabre
1823-1915

LABORATORY LEADER OFFICE

Allan K. Stoner

In 1987, the former Germplasm Introduction and Evaluation Laboratory and the Germplasm Resources Information Network (GRIN) Database Management Unit (DBMN) were merged to form the Germplasm Services Laboratory (GSL). This Laboratory now includes all of the activities at the Beltsville Agricultural Research Center that are directly involved with the National Plant Germplasm System except the National Plant Germplasm Quarantine Center (Glenn Dale), which operates as a separate management unit. The GSL includes the Plant Introduction Office, the GRIN DBMU, the Plant Exploration Office, the National Small Grain Germplasm Collection (scheduled to be transferred to Aberdeen, Idaho, in September 1988), the coordinator of small grain germplasm evaluation, the ecogeographic research unit, and the facilitator of Crop Advisory Committees.

In January 1988, an organizational change in the Beltsville Area merged all of the Beltsville laboratories involved in plant science research into a Plant Sciences Institute. This change only affected the management of the GSL. The Plant Genetics and Germplasm Institute - of which the GSL had been a part - was abolished.

Plant Exploration Office

The Plant Exploration Office (PEO) continues to respond to the needs of scientists planning plant explorations. It can help scientists develop the specific information required for a plant exploration proposal; review proposals for format and completeness; assist in making official contacts and/or obtaining necessary permits; provide maps or atlases; provide names of organizations or individuals who can provide information of value in planning plant explorations; and provide a list of do's and don'ts for germplasm collectors abroad. The PEO also assists in working out procedures for funding explorations after they are approved.

A listing of 1988 Plant Explorations funded by ARS follows:

| <u>Exploration for:</u> | <u>Country:</u> | <u>Principle Contact:</u> | <u>Funding:</u> |
|-------------------------|-----------------|--|-----------------|
| <u>Solanum</u> | Mexico | R.E. Hanneman, Jr., ARS Madison, WI | \$12,497 |
| Fruit & Nut | Pakistan | Maxine M. Thompson Oregon State University | \$31,274 |
| <u>Trifolium</u> | Yugoslavia | N.L. Taylor University of Kentucky | \$ 9,818 |
| Grasses | China | Richard Wang, ARS Logan, UT | \$ 5,000 |
| Small Fruits | USA | James L. Luby University of Minnesota | \$ 6,846 |
| <u>Gossypium</u> | Brazil | A. Edward Percival, ARS College Station, TX | \$10,758 |
| Grasses | USSR | Kay Asay, ARS Logan, UT | \$17,000 |
| <u>Arachis</u> | Bolivia | David Williams NY Botanic Garden | \$ 1,500 |
| TOTAL | | | <u>\$94,693</u> |

Using input from Crop Advisory Committees and various operational components of the National Plant Germplasm System, the PEO is now developing national priorities to help guide future plant explorations.

Dr. John Dille, Department of Biology, Winthrop College, Rock Hill, South Carolina is collecting wild Aegilops, Hordeum, and Avena in Greece. This activity is sponsored by the Office of International Cooperation and Development - USDA.

Crop Advisory Committees (Mark A. Bonning)

The National Plant Germplasm System (NPGS) is currently supported by 38 Crop Advisory Committees (CACs) which provide crop specific advice on plant genetic resources. The CACs 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.

Several crops important to U.S. agriculture are not currently represented by a CAC and these need to either be incorporated into an existing committee or a new committee. A Herbaceous Ornamental CAC is currently being established.

All of the CACs have been requested by the NPGS to develop a report addressing the status and needs of germplasm for their crop(s) with respect to: genetic vulnerability, collection, preservation, evaluation, and enhancement. These reports are being used to establish priorities for funding of germplasm activities. Summaries of the reports are prepared by the Germplasm Services Laboratory (GSL) to serve as a quick reference for the priority needs for each crop. Mark Bohning and Allan Stoner of the GSL also serve as facilitators of CAC activities.

A CAC Chairman's Workshop is scheduled for July 18-20, 1988, in Beltsville, Maryland. All Chairs (or representatives), along with the crop curators and other key members of the NPGS, will attend.

NATIONAL SMALL GRAIN COLLECTION (NSGC)

David H. Smith, Jr.

As of December 10, 1987, the National Small Grain Collection (NSGC) has responded to 370 requests for seeds of wheat, barley, oats, rice, rye, triticale, and Aegilops. Morpho-agronomic descriptor observations were made on approximately 3500 accessions of wheat, barley, oats, triticale, and rye at the Maricopa Agricultural Center in Arizona and 3600 wheat, barley, and oats were tested at Aberdeen, Idaho. Head samples were collected at each site for further analysis in the laboratory for additional descriptors. Seed of all materials was harvested, cleaned, and returned to the NSGC for inclusion in the collection. Over 100 imported rice lines have been grown in the greenhouse under quarantine at the Beltsville Agricultural Research Center. Research will directly benefit all scientists working with small grain germplasm and ultimately benefit grain producers and consumers.

The NSGC on June 6, 1988 per the GRIN database had the following composition:

| <u>Genus</u> | <u>No. of accessions</u> |
|------------------------|--------------------------|
| <u>Aegilops</u> | 766 |
| <u>Avena</u> | 20,366 |
| <u>Hordeum</u> | 25,712 |
| <u>Oryza</u> | 17,984 |
| <u>Secale</u> | 2,305 |
| <u>Triticum</u> | 41,028 |
| <u>X Triticosecale</u> | 934 |
| Miscellaneous | <u>19</u> |
| TOTAL | 109,114 |

The NSGC is to be moved to the new facility at Aberdeen Idaho in September 1988. Plans for the smooth transition and deposition of back up samples at NSSL are being implemented.

EVALUATION OF SMALL GRAIN GERMPLASM

L. W. Briggie

Systematic evaluation of accessions in the USDA-ARS National Small Grain Collection (NSGC) was initiated in 1983. Funding was obtained specifically for this purpose.

A set of descriptors appropriate for each of the principal small grain crop species - wheat, barley, oats, and rice - has been determined in collaboration with the appropriate Crop Advisory Committees (CAC's).

Data on field descriptors have been obtained on approximately 28,000 wheat accessions, 9,000 oat accessions, and 8,000 barley accessions during the 1983-87 period. All barley and oat data were collected at the Aberdeen, Idaho grow-out location. A total of 13,600 wheat accessions were evaluated at Aberdeen; field descriptor data were obtained at Mesa or Maricopa, Arizona on 14,500 wheat accessions. Field data were recorded on such descriptors as number of days from planting to anthesis, plant height, spike (or panicle) type, spike (or panicle) density, straw lodging, straw breakage, awn and glume characteristics. Spikes or panicles were collected from each accession at maturity. Seed and more precise spike data on all 1984 wheat accessions grown at Aberdeen were obtained during the winter of 1986-87. Similar data were collected on 3/4 of the 1984 oat accessions (panicles) during the same winter. The remaining oat panicle and barley and wheat spike data will be recorded as it can be scheduled. Grain from each plot each year was harvested and the weight recorded. Grain was (or will be) returned to Beltsville for storage and for use in further evaluation (for disease and insect resistance, quality factors, etc.)

During the 1988 season 3,000-5,000 NSGC accessions will be grown at Maricopa, Arizona to meet quarantine and propagation requirements. Field descriptor data will be obtained at the same time. Duplicate oats and wheat accessions (named varieties that appear two or more times in the NSGC) will be grown and studied for identification at Aberdeen, Idaho. True duplicates will be bulked. Purification nurseries for wheat, barley, and oats may also be grown in 1988. Numbers have not yet been determined.

Evaluation for disease and insect resistance was initiated in 1983 and expanded in 1984, 1985, 1986, and 1987. Accessions evaluated so far are as follows:

| | | | |
|-------------------------|---------|--|---|
| Barley Yellow Dwarf: | 1983-87 | <u>Davis, CA</u> 10,000 wheats 7,000 barleys 4,500 oats | <u>Urbana, IL</u> 10,000 wheats 10,000 oats |
| Soilborne Mosaic Virus: | 1985-87 | <u>Urbana, IL</u> 10,000 wheats | |
| Hessian Fly: | 1983-87 | <u>Lafayette, IN</u> 20,000 wheats | |

| | | | |
|--------------------------------|---------|---------------------------------------|------------------------------------|
| Crown Rust: | 1983-85 | <u>Ames, IA</u> 9,250 oats | |
| | 1986 | 2,000 <u>Avena sterilis</u> | |
| Leaf Rust: | 1983-87 | <u>Manhattan, KS</u> 25,000 wheats | |
| Spot Blotch: | 1985-87 | <u>Fargo, ND</u> 7,000 barleys | <u>Athens, GA</u> 2,000 barleys |
| Net Blotch: | 1987 | <u>Fargo, ND</u> 5,000 barleys | |
| Barley Stripe Mosaic Virus: | 1986-87 | <u>Aberdeen, ID</u> 5,000 barleys | |
| Common and Dwarf Bunt: | 1985-86 | <u>Pendleton, OR</u> 5,000 wheats | |
| Stripe Rust: | 1984-87 | <u>Pullman, WA</u> 20,000 wheats | |

Growth habit (winter, facultative, or spring type) determinations have been done primarily at Bozeman, Montana from a late spring planting made in June. Data were also recorded on plots at Aberdeen, Idaho and Maricopa, Arizona when growth habit was apparent. During 1985-86 15,000 wheat accessions, 2,000 oats, 400 non-shattering Avena species, and 4,000 barleys were tested at Bozeman. In 1987 this part of the evaluation program was shifted to Aberdeen, Idaho; 1,000 wheats, 1,000 barleys, and 1,000 oats were tested at Aberdeen or Teton, Idaho from a June planting.

Many wheat accessions and some Triticum species in the NSGC are misclassified. Some misclassification occurs in the oats and Avena species, but to a lesser extent. The problem is minor in the barleys and Hordeum species, but all accessions need to be carefully checked.

Mixtures occur in some accessions in all three crop species. Some accessions were actually heterogeneous populations when obtained, and will be retained as populations. Where appropriate, accessions are rogued and every effort made to clean them up, including establishment of special "Purity Nurseries" at Aberdeen, Idaho and Maricopa, Arizona in which mixed accessions are thinly planted and plots are separated by rows of strong straw borders of a different crop species.

An extremely valuable part of the National Small Grain Collection is that of the related species. About 250 accessions of Aegilops species were grown and classified in the greenhouse at Columbia, Missouri in 1983-84 and more in 1984-85. About 600 accessions of the Triticum species were grown and classified in the greenhouse at Beltsville in 1983-84 and another 1,200 in 1984-85. More were grown in 1985-86. When proper classification is difficult, chromosome counts are made at Columbia, Missouri. This procedure has proved to be very helpful. Approximately 700 ploidy analyses have been conducted. In 1986, Sandy Saufferer took charge of the Aegilops material in the NSGC. She has completed an inventory and has checked species

classification, or is in the process of doing so, for each Aegilops accession. She grew approximately 70 Aegilops accessions in the Beltsville greenhouse to obtain seed and reference samples and 100 additional accessions were planted at Aberdeen, Idaho in 1987. Another 400 Aegilops, including new collections from Turkey in 1985 and 1986, were increased in the Beltsville greenhouse.

A new metal storage and work space building (30' x 80') for germplasm was erected at Aberdeen, Idaho in 1985. A full-time technician position for germplasm evaluation is funded at Aberdeen by ARS. A similar metal building (40' x 75') was built at Maricopa, Arizona also in 1985, and it too is used for evaluation and propagation of the NSGC. An ARS technician position was established at Maricopa in January 1987.

About 400 Triticum, Aegilops, Secale, and Hordeum (mostly Triticum) samples collected in 1985 and 1986 in southeastern Turkey were checked for species classification in 1986. About 300 of those (wheat collections) were grown either in the Beltsville greenhouse (those with small amounts of seed) or in the field at Maricopa, Arizona in 1987. Those grown in the greenhouse will be increased at Maricopa in 1988, prior to field evaluation. About 50 of the wheat collections grown at Maricopa in 1986-87 will be tested for reaction to dwarf smut at Logan, Utah in 1988.

GERMPLASM RESOURCES INFORMATION NETWORK (GRIN)

J. D. Mowder

1. Keyentry contract developed between G & J Aquas Inc. to keyenter the backlog of NSGC evaluation data. The first 60,000 records have been keyentered and are scheduled for loading into GRIN in May 1988. The second batch of 60,000 records have been forwarded to G & J Aquas Inc. for keyentering.
2. Training sessions were given at the National Arboretum, the tobacco collection (Oxford, NC); National Clonal Germplasm Repositories (Riverside, CA; Miami, FL; Davis, CA; and Corvallis, OR), the National Small Grain Collection (Beltsville, Maryland), and the Northeastern Regional Plant Introduction Station, Geneva, NY.
3. Data recently entered into GRIN:
Miami - 7,500 records
Clover data - 274 records; approximately 119 species
Rice - 19,048 accessions loaded (16,000 PI'd and rest are non-PI'd)
(loaded late October)
Updated the Sugarcane data
Continue to work with the Pecan and Hickory Repository to get their data into GRIN. Data has been forwarded to PIO as of March 6, 1988.

DATA GENERAL

4. Currently working with Flax Collection Site, Fargo, North Dakota and Grasses at Logan, Utah to get their data all into GRIN. Some data already exists and this will complete the updating process.

Alternate Germplasm Database

Information for clonally propagated collections internationally are being considered as an alternate germplasm database. This information would be available to assist plant breeders in locating germplasm outside the NPGS. Some curators believe this information should be available to assist their user base even though they (the curators) are not responsible for the germplasm. It will assist the plant breeders in finding germplasm not maintained in the NPGS.

Genetic Stock Data

ARS is considering the capture and recording of genetic stock data. The data will be stored on the NPGS centralized computer at Beltsville, Maryland. Some progress has been made with corn and tomato data. Dr. Stoner will coordinate the development of the tomato data with Dr. Rick, Davis, California.

Patent Database

GRIN is developing a database for plant patent data that will be available on the NPGS computer sometime this year. We are currently designing the structure of the database and determining the data fields that are required to hold the information. We anticipate only 30 to 50 patent records initially with a few added annually.

GRIN Database Enhancement/Modification

- Add plant quarantine data fields
 - quarantine location
 - date in
 - date out
 - comment

Reduced the size of some extremely large data fields to make handling the data easier. This includes:

- pedigree
- locality/habitat
- local names

Add extra narrative space in the inventory record

Provide a batch option for order processing. This permits a collection site to prepare the data on a microcomputer and then update GRIN.

Added four new options to the Public procedures to make it easier and more versatile in selecting for taxonomy, cultivars, and observation data; also has a display feature that permits all information for an accession to be printed by just knowing the primary identifier, inventory ID, secondary ID, or cultivar name.

Currently modifying the database to include changes requested by the seed sites. This effort includes 8 major items:

- Orders module should look like all other maintenance modules
- Fast access into taxonomy and origin
- Fast access to cultivar data
- Add a 40 character alternate inventory ID
- Add 7 generic inventory data fields
- Change the date field in the previous name record (used to record changes in taxonomic nomenclature that was assigned to the accession upon being introduced) to a creation date instead of an update field.
- Add new data field in the range record:
 - city of acquisition
 - year PI assigned
 - plant inventory volume number
- Add counters to the batch loaders and also handle fatal errors better

Future Activities

Currently evaluating SAS and Oracle software for microcomputers and their appropriateness as alternative data preparation systems.

Install electronic balance and bar code equipment at NSGC, Beltsville, the provides a means of weighing and checking their inventory.

Computer Hardware

Purchased 16 of Primes 770 mb disk drives; installation will be completed in May 1988.

Purchased new intelligent communications controllers. This increases capability to state-of-the-art technology; increases the number of Telenet users; automatically adjusts to incoming data speed that ensures a phone line will always be available regardless of the baud rate of the user's equipment.

Evaluating 9600 bits per second (generally referred to as baud rate) dialup communication gear; this equipment has the capability to adjust the speed depending upon the noise level on the phone line.

Initiating an account with CGNET, a world-wide telecommunication service of Dialcom. Has a proven track record with file transfer (micro to host computer) and mail service among several of the international agricultural organizations such as IBPGR, IRRI, CIMMYT, etc. We may become a node within the network itself which would allow these centers to easily access GRIN. This would also be true in the U.S.

We are investigating several additional communication avenues for accessing the NPGS computers including satellite communications, Arpanet and Tymnet.

Purchased a microcomputer, video camera, special graphics board and software, and monitor to capture, digitize, and store images of plant material. We are going to investigate and demonstrate the capabilities of this equipment to store images of seeds, fruits, herbarium specimens, plants, etc.

Demos for GRIN

ASA meetings, Atlanta, Georgia, November 29 - December 4, 1987

Presented three papers as part of an invited symposium and gave "live" demonstrations for three days. Over 30 public users were added to the system.

Soybean Workshop, St. Louis, Missouri, February 1988

Presented a paper on GRIN and had three days of "live" demos. Over 30 new public users were added to the system.

Plan to present papers at the Beltsville Symposium

Conduct live demo at ASHS meeting in Lansing, Michigan

GRIN was requested to prepare plans and recommendations for developing an information system for the National Bureau of Plant Germplasm Resources, New Delhi, India. A three week cooperative effort resulted in a recommended approach in developing the system including the computer hardware.

PUBLIC

We are currently writing a totally new Public system. It will be completed by the end of the year, 1988. It will simplify the users access and permit more flexible searches.

We are currently adding 7 new public users per month.

ECOGEOGRAPHIC STUDIES/PLANT EXPLORATION

A. A. Atchley

In the summer of 1987 our efforts were redirected from ecogeographic studies in Turkey to exploration of ways to prioritize different crops with regard to germplasm collection needs. At first a straightforward rating system was envisioned. Accordingly, one was devised with ca. 15 independently-weighted factors. The work remaining on this approach falls into two categories, viz. uncovering information necessary to rate the "major" crops on each factor, and refinement and extension of the factor system. A questionnaire is being prepared to elicit suggestion for factors from a larger segment of the germplasm community. Beyond this rating system, applications of Artificial Intelligence techniques are being explored to escape some of its limitations. For example, certain critical factors exert so much influence on prioritization that simply weighting them heavily is not adequate. The kind of decision-making structure embodied in "expert" systems better reflects the logic of planning germplasm exploration. A prototype system which makes generalized recommendations has been developed and runs on microcomputers. Expanding this system to incorporate knowledge about specific crops and to search other databases such as GRIN will now proceed. It has become clear that, as system capabilities expand, larger programs and hardware will have to be used.

Two additional activities deserve mention: A survey of germplasm resources in China and the Soviet Union was initiated in the Spring of 1988, relying on hitherto-untranslated documentation to obtain a more detailed

profile of such resources. Also, at the suggestion of Dr. Henry Shands, certain techniques of data manipulation ("bootstrapping"; "jackknifing") are being investigated with an eye towards assessing the completeness of coverage of existing collections with regard to specific genetic traits.

C. R. Sperling

Since joining the laboratory on August 28, 1987, activities have been concentrated in the field of plant exploration. An attempt has been made to develop priorities for plant exploration, primarily for wild species. A gene pool concept has been employed to group wild species into degree of affinity with the cultivated crop. A rough estimate using dollar value to U.S. Agriculture of some 80 crops has been compared to the gene pool classification for each crop. Additional criteria are being incorporated into the prioritization process and a list of priorities developed. Priorities developed using this method are compared to those proposed by Crop Advisory committees. It is expected that a priority list will be dynamic as germplasm needs change and with refinement of techniques used in prioritization. Explorations will be proposed based on the developed priorities.

Additional activities included a trip to Israel in April, 1988 to undertake research on seed biology of wild wheat. An experiment was designed to study the longevity and germination of wild wheat and how this might affect population biology and in situ preservation of germplasm is being addressed and how this type of preservation might compliment ex situ gene banks.

PLANT INTRODUCTION OFFICE

George A. White

The Plant Introduction Office (PIO) provides coordination of germplasm exchange between the U.S. and other countries. This broad activity involves extensive interactions with domestic and foreign scientists, foreign and U.S. embassies, AID, FAS, APHIS, SCS, OICD, all NPGS locations, international institutes, etc. During 1987, a total of 62,615 items (7055 cereal disease nurseries) were distributed in 1450 shipments to 104 countries. This compares to 71,494 (46% cereal dis. nurseries), 1488, and 115 respectively for 1986. For 1987, 8,056 accessions were assigned PI numbers and 4286 imported accessions were either sent direct to U.S. scientists or held for lack of information/quarantine restrictions. Assignment of PI numbers to Crop Science registered plant materials started in 1987 and 323 items consisting of 29 crop groups were so documented. Publication of plant inventories is complet. No. 196 for 1987 consists of two parts. For 1988 as of June 1, 4542 PI numbers have been assigned. PIO and NSSL prepared 506 African sorghum samples for quarantine increase at the Fed. Exp. Station, St. Croix. The approval of St. Croix for quarantine increase of sorghum germplasm is a major breakthrough in handling quarantine-restricted materials. Mr. Jongseon Yoon of RDA, Korea received training and practical experience for a three-month period at BARC as part of the ARS-RDA agreement. Dr. White participates on the UJNR Project on seed production and biotechnology of forage grasses.

Conversion to the GRIN Database was completed. The quarantine center, Glenn Dale, and PIO were computer-linked and data about all quarantined items sent to Glenn Dale during 1988 have been computerized. The PIO Shipment Clerk assigns the Q numbers and enters skeletal information. The more detailed data then are added at the main PIO office.

Through cooperation by APHIS, PIO, U.S. scientists, and the South African Plant Improvement Organization (SAPO), limited Prunus germplasm was introduced under special quarantine permits.

One hundred seven shipments consisting of 518 items were provided to AID missions and their cooperators in 34 countries as part of the Plant and Seed Materials project. Requests continue to be more specialized and involve fewer numbers. Collaboration with the international centers has been emphasized. Dr. White visited IITA and Ilorin University in Nigeria and ILCA and the Plant Genetic Resources center, Ethiopia. Seminars about the AID project and the U.S. national program on plant germplasm were presented at IITA, Ilorin University, and ILCA. Exchanges of forage germplasm and data tapes are under way with ILCA. Exchanges with the national Ethiopian program are difficult at present. The three main recipients of germplasm through the Plant and Seed Materials project during 1987 were Haiti, the Philippines, and Pakistan. Quarantine restrictions continue to hamper the shipment of plant materials to Pakistan and more recently to Madagascar. An interesting collection of 244 items including 83 barleys and 126 lentils were introduced from Pakistan as a result of Dr. White's visit in 1985. Preparation of an article about the Plant and Seed Materials project for publication in Diversity has been completed.

A new program, PSITE, was developed by Q. Sinnott, GRIN, for entry of priority sites. After entry into the program, the taxon is entered followed by the new site. When resolution and designation of those species with accessions but no assigned sites, this program should facilitate entry into the database.

Increasingly, we are encountering difficulties in meeting the import requirements of various countries. Whenever the requirements cannot be met, APHIS will not issue a phytosanitary certificate. Fruit budwood, corn seed, and cotton seed are common problems. Whenever using the USDA Plant Germplasm Quarantine Center as the shipping channel for vegetative materials, check with APHIS or PIO staff about the importer's requirements.

Unless specifically asked to do otherwise, send all plant materials for overseas shipment to:

Mr. David Manning
USDA Plant Quarantine Center
Building 320, BARC-East
Beltsville, MD 20705
(301) 344-2048

Include two (2) copies of transmittal letters/forms with the plant materials. Send one (1) copy of the transmittal letters/forms to the main PIO office. Whenever David is out, calls to him are transferred to the main office.

Requests for information and assistance with importing or exporting plant materials should be addressed to:

Dr. George A. White
Building 001, Room 322
USDA Agricultural Research Center
Beltsville, MD 20705
(301) 344-3328

Some examples of PI assignments during 1987 and 1988 are given below.

| <u>Crops</u> | <u>Origin/Collector/Other</u> | <u>PI Range</u> |
|---|---|--------------------------------|
| <u>Prunus</u> (ornamental) | Japan, Korea, Taiwan R. Jefferson | 510764-510892 |
| <u>Sorghum</u> | Botswana IBPGR-sponsored | 510893-511023 |
| <u>Pennisetum</u> | Yemen | 511025-511052 |
| <u>Zea mays</u> | CIMMYT via Pioneer | 511391-511672 |
| <u>Amaranthus</u> & others | Latin America H. Hauptli | 511679-511784 |
| Cucurbits | Mexico L. Merrick | 511876-512031 512088-512236 |
| Vegetables | Spain F.V. Nuez, IBPGR-sponsored | 512339-513136 |
| <u>Lens</u> , <u>Hordeum</u> , <u>Cicer</u> | Pakistan | 513137-513380 |
| <u>Zea mays</u> | Peru | 514722-515134 |
| Forages (<u>Trifolium</u> , <u>Medicago</u>) | Ethiopia ILCA | 517195-517921 |
| <u>Carya</u> spp. | United States Accessions at Brownwood Clonal | 517975-518155 |
| <u>Beta</u> | England Doney Collection | 518298-518440 |
| <u>Triticum</u> | Various Entries from cereal disease nurseries | 1,730 items (pending) |

PUBLICATIONS

- Atchley, A.A. 1987. A new climate system (with climate classification and data for 66 developing countries), in: J.A. Duke (ed.), CRC Handbook of Agricultural Energy Potential of Developing Countries.
- Briggle, L.W. and B.E. Curtis. 1987. Wheat Worldwide. Chapter 1 In Wheat and Wheat Improvement, American Society of Agronomy Monograph No. 13, 2nd edition, Madison, WI. (Invited Book Chapter)
- Foy, C.D., D.H. Smith, Jr., and L.W. Briggle. 1987. Tolerances of Oat Cultivars to an Acid Soil High in Exchangeable Aluminum. Journal of Plant Nutrition 10:1163-1174.
- Perry, M.C. and M.A. Bohning. 1987. The Germplasm Resources Information Network: Easy Access to Wheat Germplasm Data. 1987 Wheat Newsl. 33:190.
- Perry, M.D. and M.A. Bohning. 1987. The Germplasm Resources Information Network: Easy Access to Soybean Germplasm Data. 1987 Soybean Newsl. 14:16.
- Perry, M.C., A.K. Stoner, and J.D. Mowder. 1988. A plant germplasm management system: Germplasm Resources Information Network. HortScience 23:57-60.
- Sharp, W.C., G.A. White, and J.A. Briggs. 1987. The plants that followed people. In: Our American Land, 1987 Yearbook of Agriculture. pp. 54-58.
- Siegenthaler, V.L., J.E. Stepanich, and L.W. Briggle. 1986. Distribution of the Varieties and Classes of Wheat in the United States, 1984. U.S. Department of Agriculture Statistical Bulletin 739, pp. 106.
- Stern, S. and G.A. White. 1987. USDA Plant Inventory No. 195, pp. 344.
- White, George A. 1987. Plant introduction and quarantine: a marriage of necessity. p. 116-125. Anales Simposio Recursos Fitogenetico (1984), UACH-IBPGR, Valdivia, Chile.
- White, George A., S.A. Eberhart, P.A. Miller, and J.D. Mowder. 1988. Plant materials registered by Crop Science incorporated into NPGS. Crop Sci. 28:(in press).

National Program Staff Report
June 23, 1988
Henry L. Shands

FY 1988 Budget: Congress approved the ARS budget increase for \$9.6 million. Of this, \$7.4 million was for plant germplasm. Almost \$2.4 million will go to regional plant introduction stations which have had to significantly expand their seed increase activities. The National Seed Storage Laboratory will also receive a large increase, much of which will go to preservation-related activities. Congress provided \$1 million in a separate construction budget for planning and design of the expansion for the NSSL. It is projected that the facility will be filled in FY89. Currently it contains 232,000 different seed samples. Significant funding increases for germplasm over the past three years have increased the ARS germplasm. Although most is from Congressional increases, there are additional re-coding and re-direction increases within ARS.

| <u>Activity</u> | <u>FY 1986</u> | <u>FY 1987</u> | <u>FY 1988</u> |
|-----------------|----------------|----------------|----------------|
| Acquisition | \$ 2,267,200 | \$ 2,212,800 | \$ 3,184,600 |
| Preservation | 6,717,700 | 6,641,800 | 9,496,700 |
| Evaluation | 4,088,500 | 5,627,800 | 8,141,700 |
| Enhancement | 843,500 | 4,303,600 | 5,633,000 |
| TOTALS: | 13,916,900 | 18,786,000 | 26,456,000 |

FY 1989 Funding: Germplasm activities are not scheduled to receive increases in the FY89 budget. Residues or toxins affecting food safety and ground water contamination will receive support with new programs. The incorporation of genetic disease and insect resistance into our nations's food and fiber crops must continue to be addressed by both public and private breeders which then has the multiple effect of reducing pesticide useage and subsequent improved food safety and decreased water contamination while decreasing genetic risk.

NSSL Planning and Design. The National Academy of Sciences Board on Agriculture was asked to provide technical guidance on issues related to the expansion. The select committee met at Ft. Collins in mid-January and has provided a letter report to ARS. Those recommendations will be highly considered in the development of the design specifications for the NSSL expansion. Merrick & Co. of Denver has been selected as the Architectural and Engineering firm to develop a cost estimate for the design of the NSSL expansion. The design portion contract is expected to be awarded in September.

Review of IR Projects. Concern was expressed in the 1987 meetings about a decision made earlier in the year by the Committee of Nine to terminate the IR-1 and IR-2 projects. The Committee on Interregional Projects reported in January that they had reviewed the philosophy of IR projects and reiterated that the regional research fund "continues to offer flexible approaches to regional and national research issues that should be exploited." However, they suggested replacing the present system with a national system with two major programs: (1) National Research Support Programs (i.e. IR-1,2, W-6,S-9,NC-7, and NE-9), and (2) National Research Programs. They suggest that these projects "be combined into a national germ plasm and plant introduction research support program which would be coordinated at the national level to allow for joint planning among the four regions on plant germ plasm activities." Formal action is to be taken upon these recommendations by the regional committees.

Dedication of NCGR-Riverside, CA. The National Clonal Germplasm Repository for Citrus and Citrus relatives at Riverside, CA was dedicated on April 15, 1988. In addition, the repository will be responsible for of the date collection at Brawley, CA. The repository is the last one to be constructed in the series (Corvallis, Davis, Geneva, Orlando, Hilo) which, along with Miami/Mayaguez and Brownwood, forms the NCGR network.

Joint Meeting of Regional Technical Committees. The joint meeting of the technical committees of NE-9, S-9, NC-7 and W-6 held at Fort Collins, Colorado, June 23-25 will also cover national topics and will feature guest speakers Don Plucknett, Curt Ribando, Tom Osborn, and Calvin Sperling. An overview of research being conducted at the RPIS was held June 21-22. Potato and Woody Ornamental CACs plan to convene during that time period.

CAC Chair Workshop. A workshop meeting of the CAC Chairs with members of the National Program Staff of ARS and curators throughout the NPGS will be held in Beltsville on July 18-20. The last meeting was held in July of 1986 and there has been an increase in number of CACs as well as turnover in Chairs and changes in the NPGS which has prompted the workshop. Detailed reports have been received from 27 CACs.

National Small Grains Collection. The construction of the National Small Grain Research Center facility at Aberdeen, Idaho proceeds on schedule with completion expected in mid-August. It is expected that the move of the NSGC from Beltsville, Maryland will begin in mid-September and should be completed within a month. Lee Urie transferred from Shafter, CA to Aberdeen and is the principle support scientist for the collection. None of the present NSGC staff will transfer from Beltsville. NSGC activity remaining at Beltsville will be the rice quarantine growout which will be placed under the NPGQC.

User Fee Update. The user fee initiative inserted into the FY88 budget was not approved by the Congress. However, we continue to monitor annually the distribution of germplasm from the NPGS repositories. During 1987, foreign distribution remained high at 25 percent; distribution to U.S. private industry remained low at 6.3 percent.

Rifkin Lawsuit on Germplasm. The Foundation on Economic Trends brought suit on October 27, 1987 against Secretary of Agriculture Lyng, Assistant Secretary Bentley, and Administrators Kinney and Jordan in their official capacities. The suit charges mismanagement of the germplasm program and that the department should be required to file an environmental impact statement. In its response, the USDA denied the charges and the docket was set for discovery, summary judgement filings and responses by both parties. The discovery phase terminated May 31 with USDA providing 1469 documents on 22 interrogatories at an estimated cost to germplasm of \$44,047. The plaintiffs agreed to generally limit the responses to the RPIS and NSSL except for four questions where answers were prepared by all repositories. Judge Hogan of the U.S. District Court in Washington, DC will decide the fate of the suit sometime after October 15, 1988.

New Personnel. Since the 1987 meetings we have welcomed several new people into the NPGS activities: Calvin Sperling (Plant Exploration, GSL, Beltsville); Mel Couey (RL, NCGR-Corvallis); Richard Johnson (Agronomist, Pullman); Tim Williams (Curator, NCGR-Riverside); James McFerson (RPIS Curator/Geneticist, Geneva). Curator positions are being processed at NCGR-Orlando, Woody Ornamentals at the National Arboretum and NSGC-Aberdeen.

TO: Regional Technical Committees on Plant Germplasm

FROM: Steve A. Eberhart, Director, National Seed Storage
Laboratory, Fort Collins, CO 80523

DATE: June 10, 1988

SUBJECT: Report for NSSL Seed Storage and Viability Research Unit

During 1987, the 14,041 accessions that were added included 12,614 new accessions and 1,429 accessions that were regenerated. These additions increased the Base Collection to 232,000 samples (Table 1). Many of the new items were duplicate samples of germplasm from the Working Collections at the RPIS not previously stored at NSSL. Of the 18,622 germination tests completed in 1987, 12,614 were for new accessions and 6,008 were retests. An additional 2,239 germinations tests were completed for the RPIS under contract with the CSU Seed Testing Laboratory. Quarantined wheat samples (283) were received from CIMMYT for back-up storage. Shipments of 149 accessions (from the Plant Virus Indicator Collection) were made to 13 scientists in the following countries: Brazil (4), England (2), Philippines (3), Canada (14), Israel (68), Trinidad (16), Colombia (22), Malaysia (4), and Turkey (16). Shipments to 47 USA scientists totaled 2,767 accessions. Seed of 506 sorghum accessions, including 55 from Zambia and 120 from Togo, was sent to St. Croix to obtain seed increases under a quarantine permit.

Because of space limitations, we plan to build a small temporary annex on the east side of the current NSSL building this year to provide space for storage of supplies, research growth chambers and additional cryotanks until the new expanded facility can be built.

The request for construction funds of \$11,000,000 for the expansion of the NSSL building has been included in the FY89 budget request. An architectural and engineering firm to design the building and seed vaults was selected in May from among 26 applicants, and negotiations are underway for the contract. NSSL staff members have developed a preliminary draft of functions and specifications for the building. A work group, headed by Dr. T. T. Chang, under the Subcommittee on Managing Plant Genetic Resources of the National Academy of Science, met at NSSL in January. Their recommendations concerning the NSSL building expansion have been received and will be incorporated into the specifications.

In order to monitor seed moisture nondestructively, meters for small sample sizes and rapid read-out are required. A Steinlite 400-G electronic tester was purchased for samples above 100g. A Trebor-99 near-infra red analyzer was also purchased. Whole seed samples can be analyzed for moisture, protein and oil content with this

instrument. Two dehumidifiers have been connected to a small storage vault to obtain 5°C and less than 10% relative humidity to replace the high temperature dryer. Maintenance problems with evaporators in three cold storage vaults resulted in replacement with more efficient units and a change from R12 to R502 refrigerant. The data records section has switched from terminals to personnel computers with a resultant increase in efficiency.

The greenhouse program now concentrates on rescue of materials with low germination. A research project to seek techniques to maximize recovery has been initiated.

The policy for registration of crop cultivars and germplasms in Crop Science has been revised and submitted for publication. These accessions will be included in both the Working and Base Collections. Total seed requested to supply both collections has been reduced to 7,500 for germplasms and cultivars and increased to 3,500 to 5,000 for parental inbred lines. Seed is normally supplied to requesting scientists by the developing organization and will be provided from the NPGS Working Collection only when no longer available from the developer. Experiment Station Directors need to be aware of the requirement for larger quantities of parental inbred lines so that they may assist in making the requested amounts of seed available to NPGS.

A draft of Policy Guidelines for the National Seed Storage Laboratory has been submitted for review as part of the Operations Manual for the NPGS. Seed accessions stored at NSSL comprise four general categories including the Base Collection, Quarantined Germplasm Samples, Genetic Stock and Special Collections, and Plant Variety Protection Voucher Samples. For cross-pollinated species and accessions involving a mixture of genotypes, 3,000 to 4,000 seeds are requested, and for pure line accessions and parental inbred lines 1,500 to 3,000 seeds are requested for the Base Collection. Seed will be dried to 5-7% moisture and stored at -20°C in moisture-tight containers.

A proposal was made at the NPGC September meeting (and also sent to the Wheat Crop Advisory Committee) that samples of wheat from the Base Collection be placed in cryogenic storage. The Wheat CAC responded with a recommendation that the wheat genetic stocks be placed in cryogenic storage. Hence, we placed only 100 accessions of the Base Collection of wheat in cryo tanks (with duplicate samples retained in conventional storage as requested by NPGC), and we have transferred the wheat genetic stocks maintained by Dr. Sears at the University of Missouri to cryotanks. The species shown in Table 2 have limited viability under conventional storage and several of these are difficult or expensive to regrow. Cryopreservation can be expected to greatly prolong viability, and a reduction in the frequency of regeneration will better preserve the genetic diversity found in the original collection. We propose to place these small seeded species in cryogenic storage with a back-up sample in conventional storage. This proposal has been sent to each of the Crop Advisory Committees for their recommendations prior to

any further action.

An increase of base operating funds of \$900,000 was provided to NSSL in the FY88 budget. The Seed Storage and Viability Research Unit increase of \$675,000 will be used primarily for the regeneration of sub-standard accessions and placing them in both the Base Collection and Working Collection. With the increase in processing of regenerated accessions from increased funding of RPIS in FY87 and the need to send duplicate samples of cultivars now only at NSSL to the working collections, additional temporary staff have been hired in the Germination Laboratory. A minor remodeling will be needed on the work stations to increase the effective work space. We plan to establish a Curator position to supervise the Seed Storage and Viability Research Unit. The Plant Germplasm Preservation Research Unit plans to use the increase of \$225,000 for equipment and staff to expand research to study seed deterioration (seed moisture interactions), to seek methods for early detection of viability decline, and to initiate research on pollen and bud preservation.

Table 1 Plant Germplasm at NSSL

| Genus | Species | Crop | Number |
|------------------|---------------|--------------------|--------|
| Triticum | aestivum | Wheat | 29082 |
| Triticum | durum | Durum wheat | 5463 |
| Sorghum | bicolor | Sorghum | 18971 |
| Zea | mays | Corn | 17070 |
| Glycine | max | Soybeans | 10802 |
| Oryza | sativa | Rice | 10762 |
| Avena | sativa | Oats | 9912 |
| Hordeum | vulgare | Barley | 9435 |
| Lycopersicon | esculentum | Tomato | 6439 |
| Arachis | hypogaea | Peanuts | 5234 |
| Phaseolus | vulgaris | Beans | 5018 |
| Solanum | tuberosum | Potato | 3398 |
| Cicer | arietinum | Chickpea | 2793 |
| Gossypium | hirsutum | Cotton | 2543 |
| Linum | usitatissimum | Flax | 2492 |
| Pisum | sativum | Peas | 2145 |
| Medicago | sativa | Alfalfa | 1545 |
| Carthamus | tinctorius | Safflower | 1499 |
| Secale | cereale | Rye | 1243 |
| Eleusine | coracana | Finger millet | 1212 |
| Cyamopsis | tetragonoloba | Guar | 1164 |
| Andropogon | gerardii | Big bluestem | 1068 |
| Cucumis | melo | Muskmelon | 1027 |
| Dactylis | glomerata | Orchardgrass | 1018 |
| Ricinus | communis | Castorbean | 997 |
| Sesamum | indicum | Sesame | 995 |
| Cucurbita | pepo | Squash | 939 |
| Lens | culinaris | Lentils | 884 |
| Lactuca | sativa | Lettuce | 869 |
| Citrullus | lanatus | Citron | 841 |
| Brassica | oleracea | Cabbage | 759 |
| Vigna | unquiculata | Cowpea | 742 |
| Trifolium | pratense | Red clover | 706 |
| Capsicum | annuum | Pepper | 666 |
| Eragrostis | curvula | Weeping lovegrass | 551 |
| Helianthus | annuus | Sunflower | 542 |
| Festuca | arundinacea | Tall fescue | 541 |
| Setaria | italica | Italian millet | 507 |
| Lolium | perenne | Perennial ryegrass | 438 |
| Miscellaneous | | | 69688 |
| Total accessions | | | 232000 |

April 27, 1988

TITLE: REPORT OF THE PLANT GERMPLASM PRESERVATION RESEARCH
UNIT FOR CY 1987

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

FROM: Eric E. Roos, Research Leader, PGPR, National Seed
Storage Laboratory, Fort Collins, CO 80523

INTRODUCTION

The year 1987 was a very productive one for the PGPR Unit. Some highlights of the past year include the following: Dr. Miller McDonald, Jr. from Ohio State Univ. spent a 6 mo. sabbatical at the NSSL conducting research on soybean seed imbibition. Dr. Y.L. Hor, from Malaysia, spent 1 mo. with us studying methods for cryopreservation of recalcitrant seeds. Mr. S. Ganeshan, from Bangalore, India, spent 2 wks with us discussing techniques for pollen preservation. Mr. Chen, from PRC finished his study tour at the NSSL and returned to China in March. As a result of a visit to the NSSL by representatives of RJR-Nabisco Co, a \$375,000 grant was given jointly to Colorado State Univ. and our research unit to fund a 3 yr project on "Promotion of vitrification as a means to cryopreserve plant germplasm". Dr. Stanwood organized a highly successful symposium on "Seed moisture" at the Agronomy Society annual meeting in Atlanta. Dr. Vertucci was an invited speaker at that symposium. Dr. Towill was elected to be the next Chairman of the Genetics and Germplasm WG of the Amer. Soc. Hort. Sci., which met at Orlando, FL. In October, Dr. Cecil Stushnoff, Hort. Dept. Chair. at the Univ. Saskatchewan, began a 10 mo. sabbatical at the NSSL working on cryopreservation of apple buds. A proposal to begin routine storage of some seed species in liquid nitrogen was presented to the NPGC. Adoption of this technology is underway for selected species and samples.

Yvonne Woods became the Research Unit secretary in August and is becoming well-known to many of you.

ACCOMPLISHMENTS 1987

Eric E. Roos - Supervisory Plant Physiologist.

Five forage species (Bromus inermis, Dactylis glomerata, Medicago sativa, Trifolium praetense, and T. repens) produced between 1959 and 1971 were used to compare the effects of year and location of production (Prosser, WA and Shafter and Tehachapi, CA) on seed germination following long-term subfreezing storage. Averaged over years and species there were essentially no differences in germination following storage (15 to 18 yrs) for locations. Year of production yielded significant differences with 1962 and 1963 yielding much lower germination values for all species.

Vegetable seed longevity. Germination tests were conducted on remnant seed of several vegetable species from a study published by Ed James et al. (1964). Longevity in excess of 50 yrs was found for the first time for seeds of beet, muskmelon, tomato and watermelon. After 52 yrs, one seed lot of tomato was still germinating at 92%. After 46 yrs Alaska peas germinated at 94%. Other notable longevities include cucumber (49 yrs, 50% germ.), eggplant (49 yrs, 28% germ.) and corn (45 yrs, 52% germ.). Surprisingly carrot and onion seeds, normally thought to have relatively short viability periods, germinated 48% and 36% after 42 and 43 yrs, respectively.

Storage of coated seeds. In 1974 coated (pelleted, taped and tableted) seeds of carrot, onion and lettuce were stored under different combinations of temperature and relative humidity using various packaging materials. This experiment was to run for only 3 yrs, however, seed from the 5°C and 10°C storage treatments was still available for testing after 14 yrs. In general, the carrot and onion seeds retained a higher viability and seeds stored at the lower temperature showed a higher germinability. Lettuce seeds were characterized by having a large number of abnormal.

Phil C. Stanwood - Research Agronomist.

Pilot project. Two species, sugarcane (Saccharum officinarum) and wheat (Triticum aestivum) were the first to be routinely preserved in LN₂ at the NSSL. Secale, Cucurbita, Petunia and Lycopersicon, representing several hundred selections, were added to the cryopreservation pilot project. All species survived short-term exposure without any damage.

High Performance Liquid Chromatography. Techniques were developed to detect low concentrations of ATP, ADP and AMP in seeds. Other unidentified, low concentrations of pure compounds were also detected using this procedure. It is suspected that these were different energy compounds such as NADPH. The methods required to extract these compounds from seeds were too extensive making the overall procedure unacceptable.

Seed Borne Pathogens - Lentils. Experiments extending into 4 yrs indicate that seed borne pathogens are preserved on seeds stored in LN₂. Infected and noninfected lentil seeds maintained the same germination stored at 20, 5, -18 and -196 C, although some "sloughing" of the seed coats were noted in -196 C exposed seed, both infected and noninfected.

Differential Thermal Analysis (DTA). DTA and associated thermal events leading to seed damage were determined for wild rice (Zizania sp.), cocoa (Theobroma cacao), coffee (Coffea liberica), oil palm (Elaeis guineensis), rambutan (Nephelium lappaceum), cempedak (Artocarpus cempeden), durian (Durio zibethinus), ciku (Achras sapota) and crambola (Averrhoa carambola), all suspected recalcitrant seeded species. Most species showed freezing events above 30% seed moisture content and temperatures below -10°C.

Sharon Sowa - Research Chemist.

Comparative biochemistry. Mitochondria were isolated from bovine heart muscle, yeast cells, A. castellanii cells, imbibed bean seed, etiolated bean, corn, and pea seedlings, and suspension cultures of S. pectinata. The preparations were characterized in terms of metal content, protein subunits, and cytochrome content (visible-Soret redox difference spectroscopy in the presence and absence of CO), as well as cytochrome c oxidase activity. The environments of the CcO oxygen binding sites were investigated using FT-IR spectroscopy. Comparisons of these biochemical parameters have been made between the species and tissues.

Purification. Attempts to improve the isolation of CcO from bean seed mitochondrial particles included utilization of different biochemical techniques. The modified (cholate extraction, ammonium sulfate fractionation) bovine heart procedure was the most successful.

Effectors. Effects of three known mitochondrial respiration-altering compounds: nitrous oxide, ethanol, and carbon monoxide were investigated for four types of mitochondrial preparations: bovine heart, bean seed, bean shoot, and 'spec' cell. The dose-dependent changes in mitochondrial oxidase activities were also tested for reversibility. The effects appear to be related to the anesthetic state in animals and chemical control of germination in plants. Applied experiments regarding germination of bean seed under different conditions (under N₂O and CO atmospheres, and in EtOH-solution) were conducted to correlate mitochondrial response to germination response. Artificial aging of bean seeds under air, N₂, and N₂O atmospheres was also explored. The germination of dormant A. fatua seeds under an atmosphere containing the anesthetic N₂O was also investigated.

Leigh E. Towill - Plant Physiologist.

Preservation of mint and potato. Studies with mint and potato species have examined how low temperature treated buds develop in vitro. Most treated shoot tips do not develop directly into shoots, but first form a small proliferation (callus) prior to the rather quick appearance of organized meristems on the surface. Some 1200 regenerants from control and low temperature-treated lines have been examined for qualitative traits such as leaf shape and color, leaf hairs, vine characteristics, flower inflorescence type, and flower morphology and color. No abnormal individuals have been observed.

Other species. Methods developed for other species were applied to shoot tips derived from sugarbeet and a diploid short-life-cycle crucifer. Plant regenerants were observed in both systems; however, as with most other species, shoot regeneration usually followed a brief callus or disorganized growth phase. Electroporation permitted successful permeation of normally impermeant molecules; however, the process itself was injurious to some

cells. Application to multicellular tissues may be difficult. This study will be continued after the permeation characteristics of control and temperature-treated cells are defined.

Bud preservation. Isolated shoot tips or buds from in vivo or in vitro grown materials may be used for cryopreservation. Most of the information derived has used in vitro buds because of the ease of bud isolation and the sterile system. In vivo materials from diverse species can also be used, and can be treated in similar manner. A system without the use of cryoprotectants and culturing could be used for preservation of certain species that possess the ability to cold acclimate to fairly low levels. Buds can be assessed for viability by grafting. This route utilizes the natural ability of the plant to resist cold and does not require cryoprotectants, although careful dehydration and controlled cooling and thawing are required to obtain survival at liquid nitrogen temperatures. Studies were begun in Nov. 1987 with apple to determine the extent of desiccation and proper acclimation stage necessary for survival. Conductivity of leachates from the buds is being used as a viability estimate. Preliminary experiments suggest that such a strategy will be useful for diverse genotypes from hardy species.

Christina W. Vertucci - Plant Physiologist.

Differential scanning calorimetry. Studies of the thermal transitions of soybean and pea tissue have revealed considerable differences between species, presumably because of differences in the lipid content of the seeds. Lipid transitions were observed in soybean cotyledons at about -50 to -30C at all moisture contents, however, the nature of the endotherms changed as the cotyledons were hydrated. Endotherms, presumably due to melting water were observable at about -20C at .27 g H₂O/g dw and .23 g/g in pea and soybean cotyledons respectively.

Seed viability. Viability assays showed that pea seeds were damaged by temperatures below -18C at .38 g/g while soybeans were damaged by temperatures between -18 and -30C when moistures were greater than .34 g/g but were damaged by temperatures lower than -50C when moistures were greater than .21 g/g. Seeds with high lipid content behaved similarly to soybean, having differential response to low temperatures depending on their moisture contents. Seeds with low lipid content behaved similarly to the pea, and were damaged at a similar moisture level, regardless of temperature.

Seed vigor. The nature of the endotherms changed with cooling rate as well as moisture content and suggested glass formation at about -90C when tissues were cooled very rapidly. Viability studies comparing seed vigor as a function of cooling rate demonstrated that seeds of different moisture levels had variable responses to the rate of cooling. When very dry seeds were cooled rapidly, such that a glass was formed, there was a reduction in vigor. In contrast, seeds with intermediate moisture

levels benefited from very rapid cooling rates. Seeds with high moisture levels were killed by the low temperature treatment, regardless of the cooling rate.

Seed deterioration. The rate of seed deterioration appeared to be enhanced under light from either incandescent or fluorescent sources in low moisture content seeds. Partial hydration of seeds was beneficial in improving seed vigor. Depending on the hydration level the imbibition temperature may or may not influence vigor levels.

PUBLICATIONS - 1987

1. Chin, H.F. and P.C. Stanwood. 1987. Seed moisture: Recalcitrant v. orthodox seeds. Agron. Abstr. p. 128.
2. Kingsolver, C.H.,..., E.E. Roos, et al. 1987. Pests of plants and animals: Their introduction and spread. Task Force Rep. 112, Council for Agric. Sci. & Technol., Madison, WI. 40p. (Technical report)
3. McDonald, M.B.Jr., C.W. Vertucci and E.E. Roos. 1987. Seed coat influence on soybean seed imbibition. Agron. Abstr. p.130.
4. Roos, E.E. 1987. Review: Seed aging: Implications for seed storage and persistence in the soil. D.A. Priestley. Cornell Univ. Press, Ithaca, NY (1986). 304p. HortScience 22:181. (Book review)
- *5. Roos, E.E. 1987. Maintaining purity of vegetable seeds. p. 38-40. In Proc. 1985 Seed Conf. Oct 4-6, St. Louis, MO. Nat'l Gardening Assoc., Burlington, VT. (Conference proceedings)
- *6. Roos, E.E. 1987. Report of the working group on effects of storage on genetic integrity (1983-1986). Seed Sci. Technol. 15:473-475. (Committee report)
7. Roos, E.E., P.C. Stanwood and C.M. Rincker. 1987. Effect of year and location of production on long-term storage of forage grass and legume seeds. Agron. Abstr. p. 130-131.
8. Roos, E.E. and K.D. Utterback. 1987. Seed longevity studies of tomato and other vegetable seeds. HortScience 22:1068. (Abstract)
9. Sowa, S., A. Dong, E.E. Roos and W.S. Caughey. 1987. The anesthetic nitrous oxide affects respiration of mitochondrial particles from bovine heart and bean seeds. Fed. Proc. 46(6):1942. (Abstract)
- *10. Sowa, S., A. Dong, E.E. Roos and W.S. Caughey. 1987. The anesthetic nitrous oxide affects dioxygen utilization by bovine heart and bean seed mitochondrial particles. BBRC 144:643-648.
11. Sowa, S., L.E. Towill, E.E. Roos and W.S. Caughey. 1987. The anesthetic nitrous oxide affects plant cell/mitochondrial respiration. Proc. Eighth Ann. Rocky Mtn. Regional Biochem. Conf., Pingree Park, CO. (Poster)

- *12. Stanwood, P.C. 1987. Survival of sesame seeds at the temperature (-196C) of liquid nitrogen. *Crop Sci.* 27:327-331.
- *13. Stanwood, P.C. 1987. Storage and viability of ornamental plant seeds. *Acta Hort.* 202:49-56.
- 14. Stanwood, P.C. and Y.L. Hor. 1987. Exothermic events in seeds of cacao (Theobroma cacao) associated with cool temperature damage. *HortScience* 22:1150. (Abstract)
- 15. Tao, K-L, R. Ellis, P. Stanwood and T.T. Chang. 1986. Genebank management and seed storage. IBPGR-CAAS, Beijing, China. 238p. (Training course)
- 16. Towill, L.E. 1987. Analysis of regenerants from low temperature-treated mint buds. *HortScience* 22:1072. (Abstract)
- *17. Towill, L.E. 1987. Preservation of potato pollen. p. 427-440. In Y.P.S. Bajaj (ed.). *Biotechnology in Agriculture and Forestry, Vol. 3. Potato.* Springer-Verlag, Berlin. (Book chapter)
- 18. Vertucci, C.W. 1987. The kinetics of seed imbibition: Controlling factors and relevance to seedling vigor. *Agron. Abstr.* p. 131.
- *19. Vertucci, C.W. and A.C. Leopold. 1987. Oxidative processes in soybean and pea seeds: Effect of light, temperature, and water content. *Plant Physiol.* 84:1038-1043.
- *20. Vertucci, C.W. and A.C. Leopold. 1987. Water binding in legume seeds. *Plant Physiol.* 85:224-231.
- *21. Vertucci, C.W. and A.C. Leopold. 1987. The relationship between water binding and desiccation tolerance in tissues. *Plant Physiol.* 85:232-238.
- 22. Vertucci, C.W., J. Sherbonne and A.C. Leopold. 1987. Lethal 'freezing' injury in soybean seeds may be due to lipid transitions. *Plant Physiol.* 83(4)supp. p.36. (Abstract)
- *23. Vertucci, C.W., F.A. Vertucci and A.C. Leopold. 1987. Water content and the conversion of phytochrome regulation of lettuce dormancy. *Plant Physiol.* 84:887-890.

* Reprints or copies available from:
 Plant Germplasm Preservation Research
 USDA, ARS National Seed Storage Laboratory
 Fort Collins, CO 80523



United States
Department of
Agriculture

Agricultural
Research
Service

South Atlantic Area

Regional Plant
Introduction Station
Experiment, GA 30212
404/228-7255

M E M O

DATE: August 8, 1988

TO: S-9 Technical Committee

SUBJECT: S-9 Reports

As you know, it is that time of year after our annual meeting, which was held in June at Ft. Collins, to send us your S-9 Report. Please send 200 copies, un-stapled, plain white paper, and print on both sides as needed. This year's meeting secretary will prepare a copy of the Agenda and Minutes for the report. As Coordinator of the S-9 it is my responsibility to process printing of the "Minutes of the S-9 Meeting" and distribute copies. I can not do this in a timely manner without your cooperation. I have already received some reports. This was greatly appreciated. Please save me a lot of time by doing this as soon as possible.

I am also in the final steps of producing the "5-Year Revision" (the "Project Outline"). If you haven't, please let me know how many copies you would like to have of this report.

I have enclosed a current copy of the "Members of the S-9 Committee" for you.

Reesa Castile
Act. Secy. for Mr. Lovell

Gilbert R. Lovell
Coordinator, S-9 Committee

GL:rc:rc
Enclosure

MEMBERS OF S-9 TECHNICAL COMMITTEE

Dr. Gerald F. Arkin, Adm. Advisor
Director, Georgia Experiment Station
1109 Experiment Street
Griffin, GA 30223-1797
(404) 228-7263

ALABAMA

* Dr. Jorge A. Mosjidis
Agronomy Department
Auburn University
Auburn, AL 36830
(205) 826-4100

ARKANSAS

* Dr. T. E. Morelock,
University of Arkansas
Dept. of Hort. & Forestry
Plant Sciences Bldg.
Fayetteville, AR 72701
(501) 575-2603

FLORIDA

* Dr. Gordon M. Prine
University of Florida
Dept. of Agronomy
304 Newell Hall
Gainesville, FL 32611
(904) 392-1811

GEORGIA

* Dr. Carl S. Hoveland
University of Georgia
Dept. of Agronomy
Miller Plant Sciences Bldg.
Athens, GA 30602
(404) 542-2461

HAWAII

* Dr. Phillip J. Ito
University of Hawaii
461 W. Lanikaula Street
College of Tropical Agric.
Hilo, HI 96720
(808) 935-2885

KENTUCKY

* Dr. Norman Taylor
University of Kentucky
Dept. of Agronomy
Lexington, KY 40506
(606) 257-2644 or 3144

Dr. E. L. Corley, Adm. Advisor
Area Director, USDA-ARS
S. Atlantic Area
RRC - P. O. Box 5677
Athens, GA 30613
(404) 546-3311

LOUISIANA

* Dr. Ann M. Thro
Louisiana State University
Dept. of Agronomy
104 M.B. Sturgis Hall
Baton Rouge, LA 70803
(504) 388-1301

MISSISSIPPI

* Dr. C. E. Watson,
Mississippi State University
Dept. of Agronomy
Mississippi State, MS 39762
(601) 325-2459

NORTH CAROLINA

* Dr. W. T. Fike
North Carolina State University
Dept. of Crop Science
Raleigh, NC 27650
(919) 737-3267

OKLAHOMA

* Dr. James S. Kirby
Oklahoma State University
Dept. of Agronomy
Stillwater, OK 74078
(405) 624-6417

PUERTO RICO

* Mr. Ruben Velez Colon
HC 02 Box 7115
Juana Diaz, PR 0665-9601

SOUTH CAROLINA

* Dr. D. W. Bradshaw
Clemson University
Dept. of Horticulture
Clemson, SC 29631
(803) 656-3404

TENNESSEE

* Dr. David L. Coffey
University of Tennessee
Dept. of Plant & Soil Science
P. O. Box 1071
Knoxville, TN 37901
(615) 974-7391

TEXAS

* Dr. George G. McBee
Texas A&M University
Dept. of Soil & Crop Science
College Station, TX 77843
(409) 845-5389

VIRGINIA

* Dr. Richard E. Veilleux
V.P.I. & S.U.
Dept. of Horticulture
Blacksburg, VA 24061
(703) 961-5441

USDA-SCS

* Mr. H. Wayne Everett
USDA, Soil Conservation Ser.
Fort Worth Federal Center
Bldg. 23, Room A-3
Ft. Worth, TX 76115

USDA-ARS

Dr. Raymond J. Schnell
Dr. Robert J. Knight, Jr.
Subtropical Hort. Res. Sta.
13601 Old Cutler Road
Miami, FL 33158
(305) 238-9321

Mr. Francisco Vazquez
Tropical Agric. Res. Sta.
P. O. Box 70
Mayaguez, PR 00709
(809) 834-2435

* Dr. George A. White
Plant Introduction Officer
Germplasm Resources Lab
Bldg. 001, Room 322
BARC-West
Beltsville, MD 20705
(301) 344-3328

Dr. Henry L. Shands
National Program Staff
BARC-West
Bldg. 005, Room 140
Beltsville, MD 20705
(301) 344-3311

Dr. Robert Kleiman
Northern Reg. Res. Center
1815 N. University Street
Peoria, IL 61604
(309) 685-4011

Dr. Steve Eberhardt
Laboratory Director
National Seed Storage Lab
Colorado State University
Ft. Collins, CO 80523
(303) 484-0402

Mr. Gilbert R. Lovell
Coordinator, Regional Project S-9
Georgia Experiment Station
Experiment, GA 30212
(404) 228-7255 or 7254

USDA-CSRS

Dr. Samuel G. Wiggans
CSRS/USDA
Washington, DC 20250
(202) 447-4202

Dr. David A. Sleper
CSRS Representative
Dept. of Agronomy
Univ. of Missouri
Columbia, MO 65211
(314) 882-2401

* Voting Members

(revised August 1988 / Wang Doc. #60A)

Report for 1988 Joint Meeting of the
NC-7, NE-9, S-9, and W-6 Technical Committees

Limnanthes (Meadowfoam)

Work is continuing in the agronomic and breeding aspects of meadowfoam at Oregon State University. New lines with increased yield potential will be planted this fall. Hopefully this material will produce enough seed per acre to lower costs. In NRRC's new crops program two scientists have been hired to work on applications research with meadowfoam oil. Congress has allocated \$250,000 towards Limnanthes development in this year's USDA budget. Much of these funds will be used at Oregon State University under a cooperative agreement.

Lesquerella

The Oil Chemical Research unit at NRRC is conducting research on Lesquerella species. Dr. Anson Thompson (ARS, U.S. Water Conservation Laboratory, Phoenix) provided NRRC with several hundred pounds of L. fendleri seed, and initial work focused on seed preparation, oil extraction, and hydroxy acid isolation. Dr. Alka Chaudhry (visiting scientist from India) and K. D. Carlson are pursuing research on developing new and novel lubricating greases from Lesquerella oil and its hydroxy acid components. Techniques for producing greases on a small scale were developed using castor-based ricinoleic and 12-hydroxy stearic acids. These techniques are now being used to prepare greases from lesquerolic and 14-hydroxy eicosanoic acids. The goal is to prepare superior lubricants from Lesquerella based materials and to decrease U.S. dependence on products from imported castor oil.

While isolating hydroxy acids for the grease work we isolated a number of minor but interesting lipid components. The most abundant of these is a diene epoxy acid found previously in only one other Cruciferae.

Cuphea

Breeding and agronomic research continues with a number of Cuphea species at Oregon State, Ames, Iowa, and Phoenix, Arizona. We are learning much about this crop but the seed shattering problem has not been adequately addressed as yet. Even so, Steve Knapp, at Corvallis, reports over a thousand kilograms per hectare harvested with conventional equipment from two species. The work done at NRRC this year with this genus has been primarily in monitoring oil content and fatty acid composition.

Jojoba

Our efforts with this crop has been primarily in the area of detoxification of the meal for use in cattle feed. Tom Abbott (NRRC) has approached this in two ways. One approach is through the use of fermentation in which the meal is incubated with additional water and ammonia. We believe that the inherent seed enzymes degrade the toxins. Mice feeding trials are underway with meal treated in this way. The other approach is steam denaturation and water extraction to eliminate toxins.

We have found that jojoba meal contains at least one major low molecular weight component. Research is under way to isolate this protein in kilogram quantities in order for its uses to be evaluated.

Crambe/Rapeseed

A High Erucic Acid Oils Management Committee was established about 2 years ago out of USDA's Office of Critical Materials headed by Dr. Richard Wheaton. Its purpose is to coordinate research, development, and technology transfer efforts related to high erucic acid oils in the U.S., and to promote crambe and high erucic acid rapeseed as alternative crops for U.S. agriculture. Project coordinator is Dr. Melvin Blase, Professor of Economic Development at the University of Missouri (Columbia). Currently, the states of Iowa (ISU), Missouri (UM), Kansas (KSU), Nebraska (UN), North Dakota (NDSU), Idaho (UI), and New Mexico (NMSU) are represented on the Committee by agricultural personnel from state experiment stations, offices of the Deans of Agriculture, and/or agricultural research departments (agronomy, engineering, economics, etc.). Dr. K. D. Carlson (NRRC, ARS, USDA) represents ARS, particularly in the areas of product and market development and chairs the Committee's Processing Subcommittee, which is researching ways of upgrading crambe (and rapeseed) meals for greater use in feeds, particularly nonruminant feeds. Other subcommittees currently active are Crambe Seed Production and Marketing/Economics. New subcommittees on Seed Policy and Rapeseed Production are being considered. These subcommittees are responsible for planning research, production and marketing activities, and for bringing these plans before the whole Committee on a bimonthly or quarterly basis. Drs. Wheaton, Blase, and Carlson have visited six companies since mid 1987 in search of potential new products from high erucic oils, and they have identified separate and distinct areas of interest with little overlap between companies. Two potential high-volume/high-value products currently are being researched for possible development. Approximately 60,000 pounds of foundation crambe seed is stored at Iowa State University. Another 500 acres was planted this spring in four states to renew and increase foundation seed supplies so that if one of the products under evaluation proves viable, then seed production could be scaled up quickly to supply a portion of needed oil. In the meantime, agronomic (e.g., weed and insect control, fertilizer and variety trials), oilseed processing, and product development research are proceeding at participating state locations. An extensive rapeseed breeding and development program exists at the University of Idaho, and several companies are heavily committed to rapeseed (canola and high erucic acid types), so the Committee's focus until recently has been heavily on crambe. Dr. Koert Lessman (NMSU) has brought five selections of crambe to the location trials stage, and he believes they hold potential for more oil (37%) and greater seed yields (+500 lb/acre) compared with Meyer variety, the previous best crambe seed. Through chemical mutation research, he is also attempting to identify induced variability that could lead to lowering seed glucosinolate levels and/or increasing oil erucic acid contents. The Committee also is proposing to support bioengineering research toward these goals. The Committee feels that crambe and rapeseed nicely complement each other, offering agronomics, crop rotation, double cropping, and regional production options.

Vernonia galamensis

Although NRRC has no formal research program on epoxy oils, Dr. K. D. Carlson is frequently consulted by researchers who do have active programs on this native African species. Dr. Robert E. Perdue, Jr. (ARS, Beltsville) currently works full time coordinating and promoting world-wide (Africa, Europe, U.S.) research and development on V. galamensis. While agronomic research is carried out primarily in Zimbabwe and Kenya, product development work is underway at several sites in the U.S. and England. Howard University (oil, meal, oil products research), Eastern Michigan University (coatings research), and Washington University (St. Louis, economic research) have or will have research programs on V. galamensis, and a number of major companies have had the opportunity to evaluate samples of oil provided by K. D. Carlson (NRRC). With currently available germplasm, flowering and seed set would likely occur only in the southernmost tier of states, if at all. However, since the native-habitat of V. galamensis is within 20° of the equator, little germplasm evaluation has been conducted in the U.S. Development of the species as a crop in Africa depends to an uncertain extent on oil markets in Europe, Asia, and the U.S. However, this could change if, as seems likely, significant applications for the oil are discovered, in which case domestic evaluation of germplasm would be more favorably viewed.

Guayule

The interrelationships between rubber quality, as measured by molecular weight, variety, and post-harvest handling and storage conditions were examined for 26 varieties of guayule. These studies showed that molecular weight, as previously assumed, cannot be used as the sole criterion for judging quality of guayule rubber. The anomalous behavior, in respect to molecular weight, exhibited by the various varieties as they were subjected to different post-harvest handling, tended to emphasize the need for alternative methods for measuring rubber quality. Although it was evident that sensitivity of the harvested shrub to degradation was influenced by both variety and post-harvest handling, the exact relationships could not be established. Accordingly, test equipment, designed to resolve some of these questions, has been installed and calibrated for use in planned, on-going studies on rubber quality. Also, cooperative research with ARS Field Stations, regarding guayule variety evaluations, continued. Approximately 3000 analyses were performed during the report period. The near infrared spectrophotometer, used in the analyses, was upgraded, recalibrated, and new equations established for each component (rubber, resin, and moisture) determined.

Plant Bioactive Compounds

Researchers at Purdue University and at NRRC have discovered and patented a new chemical class of natural pesticides from the plant family, Annonaceae. The natural pesticides are derived, for example, from the bark of the paw paw (Asimina triloba), a small tree native to the Eastern United States and Canada. Extracts of the paw paw have demonstrated promising pesticidal activity against Mexican bean beetles, striped cucumber beetles, melon aphids, pea aphids, cabbage loopers, two spotted spider mites, blowfly larvae, mosquito larvae, and nematodes.

The active pesticidal constituents have been determined to be tetrahydrofuranoid fatty acid lactones, known as annonaceous acetogenins. Annonaceous plants containing these compounds yield extracts which have potent pesticidal and feeding deterrent activity against a diverse variety of garden pests. The actions of the paw paw compounds have equaled or exceeded the activity and spectrum of pyrethrins and rotenone, two widely used natural insecticides. Commercial utilization of the paw paw bark extracts as an "all natural" garden insecticide is economically feasible and should pose little threat to the environment. The human toxicity of the paw paw extract has not yet been accessed; however, the fruit is edible, and the plant, itself, is not considered to be poisonous. The complexity of the chemistry of the active compounds should preclude chemical synthesis on an economic scale.

Structures of the compounds from Dithyrea wislizenii (Cruciferae) and Carapa procera (Meliaceae) that inhibit growth and decrease survival of fall armyworm larvae, have been determined. Dihydroquercetin was shown to be the main insect-active component of Tieghemella heckelii (Sapotaceae) seeds; four additional active compounds have been isolated, but their structures have not been determined. The major compound in Limnanthes alba seed that was toxic to insects was 3-methoxybenzyl isothiocyanate.

Certain furanocoumarins that were isolated for antigermination studies were found to arrest trichothecane toxin production at an early stage in a wild strain of Fusarium sporotrichioides, NRRL 3299. T-2 toxin synthesis was blocked in liquid cultures in concentrations substantially below those necessary to diminish fungal growth and a nontoxic precursor, trichodiene, accumulated. Studies with parsnip roots show that toxin production is necessary for pathogenesis but that the furanocoumarin phytoalexins do not accumulate enough to block fungal growth. The known pterocarpan medicarpin and 4-methoxymedicarpin were isolated from alfalfa foliage and were shown to inhibit alfalfa germination (60% at 1 mmolar and 55% at 1.7 mmolar, respectively). Thus, they may contribute to alfalfa autotoxicity. The preparation of four phenylpropanoids not known to occur in nature helped clarify structure/activity relationships of the natural phenylpropanoids extracted from species of the genus Pimpinella. One of the synthetic compounds was a much more potent germination inhibitor than any of the natural ones tested.

One-half ton (450 kilograms) of endophyte-infected tall fescue seed was extracted, and the concentrated extract will provide a source for further alkaloid isolation work. An HPLC procedure has been developed for the determination of ergopeptine alkaloids in extracts of tall fescue, and a capillary GC-MS procedure is being developed for the analysis of loline-type alkaloids. Analysis indicates that the extract of 450 kg of fescue seed could provide approximately 2 g of ergovaline and 800 g of a mixture of loline alkaloids. Progress was made on the isolation of several alkaloids of unknown structure; however, none were obtained in quantities sufficient for full characterization. N-formyl loline is more toxic to the milkweed bug than are ergopeptine alkaloids by one order of magnitude; ergopeptine alkaloids may occur in fescue seed at levels near 5 ppm while loline-type alkaloids may be present at levels near 2000 ppm. Thus, the lolines appear to be primarily responsible for insect toxicity.

References

- Rupprecht, J.K., C.-j. Chang, J.M. Cassady, J.L. McLaughlin, K.L. Mikolajczak, and D. Weisleder, "Asimicin, A New Cytotoxic and Pesticidal Acetogenin from the Paw Paw, Asimina triloba (Annonaceae)," *Heterocycles* 24:1197. 1986.
- Mikolajczak, K.L., J.L. McLaughlin, and J.K. Rupprecht, "Control of Pests with Annonaceous Acetogenins," U.S. Patent No. 4,721,727, issued Jan. 26, 1988.
- Andersen, J.F. Composition of the floral odor of Cucurbita maxima Duchesne (Cucurbitaceae). *J. Agric. Food Chem.* 35(1):60-62. 1987.
- Andersen, J.F., R.D. Plattner, and D. Weisleder. Metabolic transformations of cucurbitacins by Diabrotica virgifera virgifera Leconte and D. undecimpunctata. *Howardi Barber. Insect Biochem.* 18(1):71-77. 1987.
- Lampman, R.L., R.L. Metcalf, and J.F. Andersen. Semiochemical attractants of Diabrotica undecimpunctata howardi Barber, southern corn rootworm, & D. virgifera...western corn rootworm. *J. Chem. Ecol.* 13(4):959. 1987.
- Mikolajczak, K.L. and D.K. Reed. Extractives of seeds of the Meliaceae. Effects on Spodoptera frugiperda (J.D. Smith), Acalymma vittatum (F.) and Artemia salina Leach. *J. Chem. Ecol.* 13(1):99-111. 1987.
- Mikolajczak, K.L., B.W. Zilkowski, and R.J. Bartelt. Effect of melkiaceous extracts on growth and survival of Spodoptera frugiperda (J.E. Smith). *J. Chem. Ecol.* Accepted November 20, 1987.
- Powell, R.G., R. Bajaj, and J.L. McLaughlin. Bioactive stilbenes of Scirpus maritimus. *J. Nat. Prod.* 50(2):293-296. 1987.
- Reed, D.K., K.L. Mikolajczak, and C.R. Krause. Ovipositional behavior of the lesser peachtree borer in the presence of host-plant volatiles. *J. Chem. Ecol.* Accepted January 28, 1987.
- Tipping, P.W., K.L. Mikolajczak, J.G. Rodriguez, C.G. Poneleit, and D.E. Legg. Effects of whole corn kernels and extracts on behavior of maize weevil (Coleoptera:Curculionidae). *J. Econ. Entomol.* 80(5):1010-1013. 1987.
- Dejardins, A.E., R.D. Plattner, and G.F. Spencer. Inhibition of trichothecene toxin biosynthesis by naturally occurring shikimate aromatics. *Phytochemistry.* Accepted August 18, 1987.
- Graham, S.A. and R. Kleiman. Seed lipids of the lythraceae. *Biochem. System. Ecol.* 15(4):433-439. 1987.
- Miller, R.W., R. Kleiman, R.G. Powell, and A.R. Putnam. Germination and growth inhibitors of alfalfa. *J. Nat. Prod.* 51(2):328-330. 1988.
- Mounts, T.L., K. Warner, G.R. List, and R. Kleiman. Effect of altered fatty acid composition on soybean oil stability. *J. Am. Oil Chem. Soc.* Accepted September 15, 1987.

Nelson, R.L., P.J. Amdor, J.H. Orf, J.W. Lambert, J.F. Cavins, and R. Kleiman. Evaluation of the USDA soybean germplasm collection: Maturity groups 000 to IV (PI 273.483 to PI 427.107). USDA Techn. Bull. No. 1718, pp. 1-267. 1987.

Powell, R.G. and G.F. Spencer. Phytochemical inhibitors of velvetleaf (Abutilon theophrasti) germination as models for new biorational herbicides. ACS Symp. Ser. Accepted October 8, 1987.

Spencer, G.F., L.W. Tjarks, and R.G. Powell. Analysis of linear and angular furanocoumarins by dual column high-performance liquid chromatography. J. Agric. Food Chem. 35(5):803-805. 1987.

Jackson, J.A., R.W. Hemken, L.P. Bush, M.R. Boling, M.R. Seigel, P.M. Zavos, and S.G. Yates. Physiological responses in rats fed extracts of endophyte-infected tall fescue seed. Drug Chem. Toxicol. 10(3&4):369-379. 1987.

Yates, S.G. and R.G. Powell. Analysis of ergopeptine alkaloids in endophyte-infected tall fescue. J. Agric. Food Chem. Accepted December 9, 1987.

Submitted by R. Kleiman
Northern Regional Research Center
1815 North University Street
Peoria, IL 61604

1987 S-9 Technical Committee Report

Agency: Soil Conservation Service
Submitted by: H. Wayne Everett
Address: Fort Worth Federal Center
P.O. Box 6567
Fort Worth, Texas 76115

Page 1 of 8

Accession user: Brooksville Plant Materials Center
Address: 14119 Broad Street, Brooksville, Florida 33512
Nature of research: Development of new conservation plants for MLRA 138, 151-155, and 270-273 (emphasis on cropland erosion control).
Progress to date: In 1985 and 1986, selected species were collected or assembled that had potential as cover crops in citrus groves during the summer rainy season. Sufficient material of Indigofera hirsuta, Cassia fasciculata, and Crotalaria lanceolata were collected to begin evaluation in 1987. A naturalized collection of Arundo donax (Mediterranean in origin) has been narrowed to six from fifty accessions collected in 1983 for gully erosion control in north Florida, southern Georgia, and southern Alabama. Field evaluation of PI-299648, Digitaria macroglossa, for coastal dune stabilization, is continuing to evaluate its potential as a weed. Several released plants introduced through the PI system, released or studied extensively outside of Florida, but never evaluated in Florida, are showing promise: Paspalum nicorae PI 202044, 310131, 490363, 490364; Eragrostis lehmanniana PI-106088 'Puhuima'; Eragrostis lehmanniana x trichodes PI-276033 'Cochise'; Eragrostis chloromelas PI-469222 'A-84'; Eragrostis superba PI-469254, PI-276055 'Palar'; and Panicum coloratum PI-166400 'Selection 75' all for critically eroding areas throughout Florida.
Publications: 1
Cultivar releases: None

Accession user: Americus Plant Materials Center

Address: Route 6, Box 417 Morris Drive, Americus, Georgia 31709

Nature of research: Development of conservation plants for MLRA's 128-130, 133, 136, and 137.

Progress to date: PI-490363, PI-490364, PI-310131, and PI-202044, Paspalum nicorae, continue to be evaluated for forage and critical area planting purposes, particularly peach orchard cover and grassed waterways. While it establishes more quickly from seed when planted in grassed waterways than 'Pensacola' bahiagrass, seed production problems and potentials need to be worked out before a release can be planned. The following are being increased for use in advanced evaluation: PI-222177, PI-383803 Vicia villosa; PI-199258, PI-289311 Medicago orbicularis. These legumes will be used in a conservation tillage study. PI-166400, 'Selection 75', Panicum coloratum, and PI-301477, 'WW-477', Bothriochloa ischaemum, field plantings are adapted and continue to perform well in the Black Belt area (MLRA 135) of Alabama for marginal cropland conversion, forage, and critical areas.

PI-286452, Lespedeza cuneata, 'Appalow' sericea lespedeza. The full range of adaptation and performance have not been determined for Alabama and Georgia. Field plantings of Appalow appear to be adapted and have potential as a warm-season pasture legume in addition to being a good plant for critical area stabilization.

PI-434285, Salix X cottetii, 'Bankers' dwarf willow. Field plantings have been established in Alabama and Georgia to determine the adaptation and performance for streambank stabilization.

PI-218004, Lespedeza virgata, 'Ambro' virgata lespedeza. Ambro has never been fully evaluated as a warm-season legume for pastures. It grows well in a bahiagrass mixture at Americus, and with tall fescue, lovegrass, and common bermuda at other locations. Wildlife biologists are now interested in the plant as a source of food and cover for quail, turkey, and geese. Field plantings are under way to evaluate the adaptation and performance of Ambro for wildlife.

PI-267817, Arachis glabrata, 'Arbrook' perennial peanut. Field plantings are being established in Alabama and Georgia to determine its range of adaptation and performance as a warm-season forage.

Publications: 1

Cultivar releases: 1

Accession user: Quicksand Plant Materials Center

Address: Quicksand, Kentucky 41363

Nature of research: Development of conservation plants for the Appalachian Region

Progress to date: The initial evaluation of 46 narrowleaf trefoil, Lotus tenuis, introductions were completed in the fall of 1985. Five accessions were selected in 1986 for further testing, to begin in 1987. PI-246734 originated from Spain. PI-316269, which came from Hungary via Australia, was noted for its excellent spread and early spring growth. It stayed greener and free of disease longer into the summer than most other accessions, and put on good fall growth. 'Los Banos' (PI-G2252B), a strain selected by the California Plant Materials Center, did not perform well. It had been placed into the commercial trade several years ago, but was dropped due to difficulty in seed production.

The evaluation of 120 introductions of tall oatgrass, Arrhenatherum elatius, and 38 Dactylis glomerata introductions was completed in 1986, with selections being made in 1987 for further testing and small scale seed increase. These two grasses are being evaluated as potential forage plants in the region, for use on shallow, droughty, low-fertility hillside pastures.

PI-168939, Quercus acutissima, was released in March 1986 as 'Gobbler' sawtooth oak for wildlife food purposes and mitigation plantings on surface-mined lands. It is a small-fruited strain of sawtooth oak (150 acorns per pound), that has wildlife potential in the eastern United States. A number of wildlife agencies are interested in it because of its early acorn production, beginning at 6-8 years of age. PI-325489 kura clover, Trifolium ambiguum, will be released in 1988 as a pasture legume. Its strongly rhizomatous character helps to keep it in pastures with grasses. The plant appears to have a wide tolerance to soil drainage conditions and to be adapted to diverse climatic conditions across the United States. It originated from the Caucasus Region of the Soviet Union. About five acres have been established at Quicksand over the past couple years for breeder and foundation seed production.

Commercial production for 'Appalow' sericea lespedeza, Lespedeza cuneata, (PI-286452), which was released in 1978, is starting to accelerate. In 1986, 20,000 pounds of certified seed were produced. 'Appalow' sericea lespedeza is a dense, low-growing, low-maintenance ground cover used to prevent erosion and stabilize soil on roadbanks, surface-mined land, logging roads, and other disturbed sites. In recent studies, it has also shown promise as a pasture legume, and can be successfully established by no-till methods on shallow low-fertility hillside pastures. In 1986, 70,000 plants (cuttings, rooted cuttings, whips and potted plants) of 'Bankers' dwarf willow, Salix X cottetii (PI-434285), were produced by about a dozen commercial nurseries. Most of these plants were sold out early in the spring of 1987. 'Bankers' dwarf willow is used for streambank stabilization and reduction of upstream flood damage. The bulk of the plants produced in 1986 were planted in upper reaches of the Potomac River Watershed in Virginia and West Virginia, to vegetate restabilized streambank areas which had sustained much flooding damage in the fall of 1985. 'Bankers' willow had been released in 1983.

Publications: 1

Cultivar releases: 1

Accession user: Coffeerville Plant Materials Center

Address: Route 3, Box 215-A, Coffeerville, Mississippi 38922

Nature of research: Development of conservation plants for MLRA's 118, 131, and 133-135.

Progress to date: PI-163453, Glycine soja, 'Quail Haven', is in foundation quality seed production status at the Coffeerville Plant Materials Center. Commercial production of seed was in short supply and demand was good.

PI-220584, Calamagrostis pseudophragmites, is in an increase and field testing status. It showed good potential for use on an overland flow sewage treatment situation near Alma, Arkansas. Fertilizer requirement trials continued at the Coffeerville PMC.

Publications: 1

Cultivar releases: 1

Accession user: East Texas Plant Materials Center

Address: Agriculture Building, SFASU
P.O. Box 13000, SFA Station
Nacogdoches, Texas 75962

Nature of research: Development of conservation plants for east Texas.

Progress to date: The Center was moved this past year so several plantings have been abandoned at the old location. The only materials that are plant introductions are in our miscellaneous block for adaptability and observation purposes. These include Pennisetum orientale 'Cowboy' and P. flaccidum (PI-220606 and 9042664); Paspalum nicorae, (PI-404860 and PI-310131); Paspalum notatum, 'Argentine' and 'Paraguay'; Bothriochloa ischaemum - 'King Ranch', 'Ganada'; Dichanthium spp. 'T-587'; Panicum coloratum, 'Selection-75' and 'Verde'; Lespedeza serpens, (PI-297385); L. stipulacea, (9002016); L. capitata, (9004336); L. bicolor, 'Natob' (9017522) Clitoria ternata, (PI-283234, PI-283233 and PI-213498); Alysicarpus vaginalis, 9038315.

Publications: None

Cultivar releases: None

Accession user: Knox City Plant Materials Center

Address: Route 1, Box 155, Knox City, Texas 79529-9752

Nature of research: Development of conservation plants for MLRA's 42, 77, 78, 80-87, 112, 118, 119, 133B, 150A, and 150B of Texas and Oklahoma.

Progress to date: Several accessions of Pinus eldarica, Pinus sylvestris, and Pinus nigra are being evaluated at Knox City and four off-Center sites for use in windbreaks. Evaluations will continue for 4-5 more years before any selections are made.

PI-469254, Eragrostis superba, is still being evaluated and may be released for range, pasture, and critical area plantings. There are several field plantings of PI-469254 in Texas as well as an initial evaluation at Knox City comparing PI-469254 with 'Palar' and a variety commercially available in Texas.

Two accessions of Pennisetum flaccidum, 9042664 from North Carolina and PI-315868 from Los Lunas, are being evaluated for adaptation at Knox City.

Twenty-four accessions of Thuja orientalis are being evaluated at Knox City in cooperation with the Manhattan PMC.

Publications 1

Cultivar release: 1

Accession user: South Texas Plant Materials Center

Address: Caesar Kleberg Wildlife Research Institute
Texas A&I University
P.O. Box 218
Kingsville, Texas 78363-8202

Nature of research: Development of wildlife, pasture and rangeland plants for southern Texas.

Progress to date: Major grasses and legumes of foreign origin are being evaluated for adaptation purposes. No selections have been made. In addition, common buffelgrass (Cenchrus ciliaris), Wilman lovegrass (Eragrostis superba), and 'Selection-75' kleingrass (Panicum coloratum) have been planted to act as base grass for interseeding different cool and warm season forbs and legumes this fall.

In the spring of 1987, a major assembly of Panicum maximum was planted that included 13 accessions of local origin and 41 of foreign origin. They are to be evaluated for pasture improvement.

Approximately 40 accessions of buffelgrass (Cenchrus ciliaris) were planted in 1983 as a cooperative study with ARS (Dr. E. C. Bashaw). These are still being evaluated.

'Corto,' australian saltbush Atriplex semibaccata and Atriplex glauca are still being evaluated for adaptation.

Other materials of foreign origin being evaluated include: Three Sesbania species (S. acculaeata, S. aegyptica, S. grandiflora); one accession each of Digitaria decumbens Natalgrass - Rhynchelytrum repens, 'Catalina' boer lovegrass, and 'Palar' wilman lovegrass; and three accessions of Paspalum nicorae PI-490363, PI-496364, and PI-310131.

Publications: 1

Cultivar releases: 0

Accession user: Hawaii Plant Materials Center

Address: P.O. Box 236, Hoolehua, Hawaii 96729

Nature of research: No report received.

Assession user: Texas Plant Materials Program - Field Evaluations

Address: 101 South Main
Temple, Texas 76501-7682

Nature of research: Development of conservation plants for the 24 MLRAs represented in Texas

Progress to date: Several introduced species are in the final stages of field evaluations: Eragrostis superba, (PI-469254); Wilman lovegrass along with the only released variety 'Palar' are being compared in 14 field plantings representing 10 MLRAs. We have extended the E. superba area of adaptation into the sandy textured soils of north central portions of Texas.

Eragrostis lehmanniana x E. trichophora, (PI-276033), 'Cochise' lovegrass is being field evaluated in 8 field planting locations representing 4 MLRAs in Texas. It appears that it will be approved for use in Texas.

Pennisetum orientale (9042665) 'Cowboy' (commonly called laurisagrass in Texas) has shown potential adaptation. Several centers throughout Southern U.S. are looking at this cultivar and a release from North Carolina, Pennisetum flaccidum (PI-220606).

Field planting of Bothriochloa ischaemum var ischaemum 'Spar' is a major evaluation thrust in the state. 'Plains', 'Ganada' and 'King Ranch' have already been accepted for certain ranges of adaptability but the newer Spar is being tested to ascertain its range.

Several lespedezas and one indigo are being field tested on a limited basis, L. cuneata, 'Appalow' L. virgata 'Ambro' and Indigofera pseudotinctoria (PI-198015) have been planted at approximately 5 locations in eastern Texas but none have shown a great deal of promise. We did gain an excellent stand of false anil indigo at the East Texas Plant Materials Center.

Publication: 1

Cultivar releases: 0

SOUTHERN REGIONAL PLANT INTRODUCTION STATION
Report to S-9 Technical Committee
June 24, 1988

This report covers the primary activities of this plant introduction station for the period of July 1, 1987 through May 31, 1988.

Plant Introduction

Germplasm of 837 new Plant Introductions (PI's) were added to the S-9 Project plant germplasm collections. This total included 31 genera and 58 species from 47 countries. The crop groups received were sorghum, clovers, peanuts, eggplant, sesame, and forage grasses. The total collection is 57,000 PI's and is composed of 259 genera and 1,127 species from 170 countries.

Seed Distribution

A total of 26,182 seed samples were shipped in all categories of distribution. In direct response to 309 requests 12,276 seed packets were shipped within the S-9 Region, 835 to the other three regions (NC-7, NE-9, and W-6), 6,793 to 35 foreign countries, and 1,192 cultivar samples.

Shipments in other categories of distribution were: 705 PI's sent to the National Seed Storage Laboratory (NSSL) for long-term storage; 109 to the other three regions for consolidation of genus collections; 4,272 PI's distributed for seed increase and evaluation.

Seed Increase

A total of 4,272 PI's are included in the 1987 increase plantings. The major crop groups involved are sorghum, cowpeas, peanuts, sesame, peppers, squash, grasses and melons. The P.I. Station is increasing 1,343 new and old PI's which include 29 genera and 90 species from 81 countries. Cooperators in several states (Alabama, Arizona, California, Florida, Oklahoma, and Texas) are increasing 1,929 PI's of melons, peanuts, and tropical forage legumes. The Tropical Agriculture Research Station (TARS) at Mayaguez, P.R. increased and evaluated 900 PI's of Ethiopian Sorghums in two plantings during the Fall of 1987 and the Winter-Spring period of 1988.

Peanut Curator

Dr. Roy Pittman transferred from Stillwater, Oklahoma and assumed the duties of Peanut Curator in August 1987. Christopher Jones was hired as a field technician in May 1988. Peanut germplasm in cold storage is currently being re-evaluated as to available status. A thousand one hundred accessions were

also evaluated for PStV and seed free of the virus were distributed to Georgia, Oklahoma, Texas, and Virginia to be increased. PStV free seeds were also distributed from forty-two new introductions from the People's Republic of China. Design plans for construction are to be finalized in July 1988 and construction set to begin in the fall 1988 on the greenhouses to maintain the wild peanuts.

Sweet Potato Repository

The sweet potato repository officially opened in September of 1987. The repository is now maintaining 450+ accessions of clonally propagated Ipomoea batatas L. Approximately 150 of these are pathogen-tested and are being distributed internationally. The clonal collection is expected to expand to a total of 600 accessions in the next few months as new materials are received from the US Vegetable Laboratory in Charleston, SC. In addition, 200 accessions of seed-fertile Ipomoea species have been acquired in cooperation with The International Potato Center. The quarantine screenhouse for seed increase and virus indexing is 90% complete. A new technician has been hired to assist with the introduction of new materials to in vitro culture and to direct the virus indexing activities.

Pathology Research

Current research efforts 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. Germplasm accessions are being indexed surveyed to determine presence of pathogens especially in forage grasses and the germplasm increases plants.

Facilities

The screenhouse and metal building for the Sweet Potato Repository are near completion.

The greenhouse/headhouse complex for peanut germplasm maintenance and for germplasm research is currently in the design phase and the contract for construction of the first greenhouse (2 - 32 x 100' houses joined by a 10' wide corridor) should be let by September 30. A second greenhouse contract will be let in FY 89 and the headhouse in FY 90.

APPENDIX I

Southern Regional Plant Introduction Station Budget

| <u>Source of Funds</u> | <u>FY-88</u> | <u>FY-89</u> |
|-------------------------------------|--------------|--------------|
| Regional Research Funds (Pooled) | \$139,003 | \$157,036 |
| RRF (Committee of Nine Allocations) | ? | 0 |
| TOTAL | \$139,003 | \$157,036 |

Expenditures

| | | |
|-----------------------|-----------|------------------------------|
| Personal Services | \$102,538 | \$109,233 |
| Travel | 500 | 500 |
| Supplies & Operations | 33,965 | 45,303 |
| Equipment | 2,000 | 2,000 |
| TOTAL | \$139,003 | \$157,036 ^{145,698} |

Source of Funds

| | | |
|-------------------------------------|---------------------------|---------------------------|
| ARS Base (recurring Funds) | \$1,391,886 ^{1/} | \$1,391,886 ^{1/} |
| Special Allocations (Non-Recurring) | 188,219 | 120,000 |
| TOTAL | \$1,580,105 | \$1,511,886 |

Expenditures

| | | |
|--|-------------|-------------|
| Personal Services | \$403,101 | \$436,705 |
| Travel | 32,000 | 32,000 |
| Construction & Repairs | 640,000 | 500,000 |
| Supplies & Materials | 119,603 | 38,885 |
| Support Equipment | 52,000 | 75,000 |
| Vehicle Operations | 4,000 | 4,000 |
| Extramural Services (Research, Evaluation, Increase) | 326,936 | 425,296 |
| Plant Explorations | 2,465 | -0- |
| TOTAL | \$1,580,105 | \$1,511,886 |

^{1/}

The FY 89 figures are close planning estimates only.

APPENDIX II

Plant Exploration Proposal Approved
for FY 89 Funding

Proposal Title: Plant Exploration in Asia [Australia, Taiwan & SRI Lanka] to Collect Germplasm of Wild Species Allied to Sweet Potato for Examination in Crop Improvement.

Objectives: To collect following taxa *Ipomoea batatas*, *I. gracilis*, *I. littoralis*, *I. trifida*, *I. trilola*. Germplasm collected will be incorporated into phylogenetic studies and will be used to support crop improvement research in the United States and abroad.

Participants: Dr. Robert Jarret, Curator, Sweet Potato Clonal Repository, Experiment, GA and Dr. Daniel Austin, Curator of Herbarium, Florida Atlantic University, Boca Raton, FL.

Dates of Travel: September/November, 1989.

Funding Requested: \$21,924.

1988

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

Page 1 of 5

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 5,665 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 (3,298 accessions) is held at Miami.

Between June 1, 1987 and May 31, 1988, 155 new introductions were received at Miami (Table I). Fruit crops represented over 45% of all accessions, and cacao (Theobroma cacao) was next in importance, comprising over 41% (Table 1). The 64 new accessions will be indexed and when found to be free of Cacao Swollen Shoot Virus will be sent to Mayaguez to be planted. During this reporting period, 1,975 distributions left the station (Table II). A little under half went to people involved in research, education, and public service or private industry in the United States (Table III).

Genuine progress in facilities improvement continues. In 1987 construction began on a new lab/headhouse for Plant Science with an estimated completion date of September 1, 1988. The new building will add three modern labs, a tissue culture facility, and office space for the two plant scientists and their technical staff. In addition to the new lab building, substantial funds were provided for new lab equipment for use in the new facility. Twenty-five acres of forested land were cleared of Casuarina weed trees in 1987 to allow consolidation of the mango and avocado germplasm.

Research Projects:

Isozyme Analysis. The use of isozyme data to estimate genetic diversity and population structure has been successful with many plant species. Knowledge of the amount of genetic diversity within a germplasm collection allows the formulation of optimum sampling strategies for genetic conservation as well as helping in making decisions on which accessions to maintain when resources are limited. Isozymes can also be useful for clonal identification and can help remove ambiguities in cases where misidentification has occurred. An isozyme screening lab has been established and we are currently characterizing the collections at Miami.

Tissue Culture. In vitro preservation of germplasm has been proposed as an alternative method of storing genotypes. Tissue culture techniques need to be developed or modified to eliminate the potential problems associated with somaclonal variation and the need for frequent transfer of cultures. We are currently working on the regeneration system for Passiflora and cacao. When the regeneration system is available, investigations of in vitro storage at cold temperatures can proceed.

Germplasm evaluation and enhancement:

Sugarcane. Characterization of sugarcane and its relatives is proceeding along two lines, classical taxonomy by Dr. Ed Terrell, and biochemical analysis, using isozymes, by Dr. Betty Wood. Results will be utilized to estimate the genetic diversity within the collection.

Mango. A rootstock experiment is currently in progress. Six rootstocks, Madoe, Golek, Sabre, 13-1 and Turpentine, all polyembryonic, and Tommy Atkins, monoembryonic, were used with two scions, Keitt and Tommy Atkins, the two leading commercial cultivars in Florida. These are being evaluated to determine the effect of rootstocks and also to investigate rootstock/scion interactions.

Five Israeli cultivars under evaluation show some promise in the field. Among these are Magshimim (M-24058) which produces bright red fruit in abundance even after cold weather during flowering, but is not currently important in Israel; Zrifin selection 1-1 (M-27760) which, with red-blushed yellow fruit and the best taste is still under test in Israel; Zrifin 3-3 (M-27759) which has good taste but poor color; Zrifin 5-4 (M-27761), a Palmer seedling; and Zrifin 6-6 (M-27757), with a large (600 g) dull purple (considered good color) fruit, which is still undergoing testing in Israel.

Avocado. The cooperative evaluation effort with Texas continues, aimed at obtaining cold-tolerant germplasm of enhanced quality. Clones under test include 25 named cultivars and 7 numbered selections. A relatively mild winter resulted in no cold damage to any of the young trees in the field at Weslaco.

Passiflora. Backcross (BC-2) seed of diploid P. incarnata x P. edulis were obtained through pollinating first-generation backcross (BC-1) plants with selected P. edulis pollen. None of the BC-1 plants appears to produce viable pollen, which is one goal of the recurrent selection work, along with cold hardiness, fruit quality and productivity. Tetraploid (P. incarnata x P. edulis and reciprocal) selections continued to show strong self-incompatibility. Considerable numbers of fruit from hand pollination produced seed to use in carrying the work forward.

Ten diploid populations of Passiflora edulis planted by a cooperator in south Florida are entering production this season. A few selections from this group show promise in that they fruit well from open pollination and produce fruit of acceptable or superior quality. The most outstanding to date is M-32025, a seedling from M-30709 x M-17236 breeding that yields large yellow fruit that is sweet flavored and appealingly aromatic, with high juice content.

Carambola. The Demak cultivar (P.I. 354130), from Indonesia, a long-styled, sweet cultivar, was found to show the same kind of partial loss of self-incompatibility that was earlier found in the long-styled, tart Golden Star. This trait enables economic production in solid block plantings, without the need to ensure cross-pollination. The effort continues to find a short-styled clone with loss of self-incompatibility.

The cultivar Sri Kembangan from Hawaii (M-25962) entered full production. Fruit of this tree has a flavor superior to other carambolas now in Florida. If firmness and breadth of ribs prove to be adequate, the clone can become commercially important.

Publications:

Knight, R. J., Jr. 1987. Achieving effective expansion of fruit production in the tropics and nearby regions. In The Role of Horticulture in Meeting the Food Demands of AD 2000 (Ed. H. D. Tindall). Acta Hort. 211: 17-21.

Knight, R. J. 1987. New tropical fruit crops of 1887 -- a blueprint for today, and a sweepstakes. Proc. Fla. State Hort. Soc. 100: 265-268.

Stange, L. A. and Knight, R. J., Jr. 1987. Fig pollinating wasps of Florida. Entom. Cir. No. 296, Fla. Dept. Agric. & Consumer Serv., Div. Plant Industry. 4 p.

Wilson, W., III, Shaw P. E. and Knight, R. J., Jr. 1988. Importance of selected volatile compounds to mango (Mangifera indica L.) flavor. p. 283-294 In Flavors and Fragrances: a World Perspective (Proc. 10th International Cong. Essential Oils. Eds. B. M. Lawrence, B. D. Mookherjee, B. J. Willis). Elsevier, Amsterdam. 1104 p.

Table 1. Germplasm Receipts at USDA/ARS Miami, Florida from June 1, 1987 through May 31, 1988

| <u>Material</u> | <u>Introductions received</u> | |
|--|-------------------------------|-------------|
| | No. | % |
| Miscellaneous Ornamentals and Shade Trees (includes orchids and ferns) | 10 | 6.45 |
| Tropical and Subtropical Fruits | 70 | 45.16 |
| Cacao | 64 | 41.29 |
| Coffee | 1 | .65 |
| Medicinal, Chemurgic, Tropical Vegetables ^{z/} | <u>10</u> | <u>6.45</u> |
| | Total 155 | 100.00 |

z/ Includes edible palms, spices, industrial crops

Table II. Germplasm Distributions from USDA/ARS, Miami, Florida from June 1 1987 through May 31, 1988

| <u>Material</u> | <u>Distributions</u> | |
|--|----------------------|--------------|
| | No. | % |
| Miscellaneous Ornamentals and Shade Trees (includes Orchids and Ferns) | 180 | 9.11 |
| Tropical and Subtropical Fruits | 242 | 12.25 |
| Cacao | 63 | 3.19 |
| Coffee | 11 | .55 |
| Medicinal, Chemurgic, Spices and others ^{y/} | <u>1479</u> | <u>74.90</u> |
| | Total 1975 | 100.00 |

y/ Includes edible palms, nuts, rubber, sugarcane, tropical vegetables, industrial crops.

Table III. Distributions of Plant Introductions from USDA/ARS, Miami, Florida from June 1, 1987 through May 31, 1988

| <u>Destination</u> | <u>Plants sent to each destination</u> | |
|---|--|------------|
| | <u>No.</u> | <u>%</u> |
| Florida | 82 | 49.10 |
| California | 10 | 5.99 |
| Rest of Continental U.S., Hawaii and Canada | 57 | 34.13 |
| Caribbean Region ^{z/} | 11 | 6.59 |
| Mexico, Central America and Panama | 3 | 1.79 |
| South America | 3 | 1.79 |
| Europe | 2 | 1.20 |
| Asia ^{y/} | 1 | .60 |
| Africa | <u>1</u> | <u>.60</u> |
| Total | 159 | 100.00 |

z/ Includes Puerto Rico and the Virgin Islands

y/ Includes Malaysia and Guam

Table IV. Distributions of Plant Introductions by Type of User from USDA/ARS, Miami, Florida from June 1, 1987 through May 31, 1988

| | <u>Total</u> | <u>USP</u> | <u>UXT</u> | <u>ARS</u> | <u>AID</u> | <u>FPR</u> | <u>FPU</u> | <u>ICT</u> |
|--------|--------------|------------|------------|------------|------------|------------|------------|------------|
| Number | 159 | 55 | 53 | 36 | 1 | 4 | 9 | 1 |

Definitions of user codes: USP=United States private persons or industry. UXT=U.S. Education, research, parks. ARS=Agricultural Research Service. AID=U.S. Agency for International Development. FPR=Foreign private people or industry. FPU=Foreign public or education. ICT=International Centers such as CIMMYT (Mexico), CATIE (Costa Rica), et al.

1988

S-9 TECHNICAL COMMITTEE REPORT

Agency: USDA, ARS
Tropical Agriculture Research Station
Submitted by: Francisco Vázquez, Agronomist
Address: P.O. Box 70,
Mayaguez, Puerto Rico 00709

Accession Users: F. Vázquez and P. Hepperly
Address: Tropical Agriculture Research Station, P.O. Box 70,
Mayaguez, Puerto Rico 00709
Nature of Research: Evaluation of tropical plant germplasm.
Progress to Date: Yam Collection (Dioscorea alata, D. esculenta, D. bulbifera, D. trifida and D. rotundata)

The yam collection (5 species, 19 varieties) was evaluated at two locations for horticultural characteristics and disease reaction.

In 1987-88 two new diseases were discovered: Water yam chlorosis (a devastating viral disease) and leaf blotch (Pseudocercospora cylindrata) both attacks foliage during senescence. Root rot (Pythium sp. and Fusarium oxysporum) were severe under irregular rainfalls in virus-infected plants. Under optimum rainfall plants appeared to tolerate water yam chlorosis and reduced root rot was noted.

In the last season, yam plots were split to determine the extent of anthracnose losses and if fungicide usage could be minimized by applying controls only when anthracnose was found increasing. Benomyl was only applied when foliar necrosis from anthracnose exceeded 5% increases for any month from May to October. Using this criterion, 3 sprays were applied in Isabela and none in Mayaguez. In Isabela, 7 of 10 varieties of D. alata showed over 15% yield increases after anthracnose control treatments. Mean response over all cultivars was 35%. Gunung, the most anthracnose resistant variety did not respond to the treatment nor two anthracnose susceptible varieties (Florida and Gemelos) which died prematurely from virus and root rot. Root-knot nematode, Meloidogyne incognita was severe for the first time in our trials. Nematode nodules severely reduced the quality and appearance of potato yams (D. esculenta) and moderately affected D. rotundata but did not attack D. alata, D. trifida, or D. bulbifera.

In this year's plantings over 94% emergence was found for D. alata seed-pieces where less than 82% of the other species emerged in our tests. Storage losses were low for D. alata and highest from D. trifida and D. esculenta which are very susceptible to bruising and fungal and nematode decay. D. rotundata gave an intermediate storage reaction.

Publications: Hepperly, P. R. and Vázquez, F. 1988. Tropical Yam (Dioscorea spp.) performance in Western Puerto Rico (submitted for publication)

Accession user: Francisco Vázquez and Wilfredo Colón-Guasp

Nature of Research: Evaluation of tropical plant germplasm

Progress to Date: Two trials of the Solo papaya cv.

Sunrise were performed in an Oxisol in Puerto Rico.

The first planting consisted of trees obtained from seeds introduced from Hawaii. The second planting consisted of trees from seeds obtained from a local commercial grower. Plants were spaced 6' x 10'.

Harvest started 9 and 8 months after planting dates for the first and second trial, respectively.

The ratio of hermaphrodites to females was 2:1 and 2.5:1, respectively. Thirteen percent of the trees in the first planting were eliminated 13 months after flowering due to viruses and mycoplasmas. Sixteen months after planting, 32.6% were discarded. In the second planting, 14.7% were eliminated before 12 months. Female trees in both planting produced larger fruits but less fruits per trees. In the first planting the number of hermaphrodite fruits was 65 with a mean of 0.85 lbs, and female fruits were 35 with a mean of 1.11 lbs. After 7 months of weekly harvesting the first planting yielded 34,480 lbs/acre of marketable fruit.

Publications: Vázquez, F. and Colón-Guasp, W.

Performance of the Solo papaya (Carica papaya L.) cv. Sunrise in an Oxisol in Puerto Rico. 1988.

Ann. Meeting. Carib. Food Crops Soc.

Jamaica, W. J. 1988

Accession User: F. Vázquez

Address: Tropical Agriculture Research Station, P. O. Box 70, Mayaguez, Puerto Rico 00709

Nature of Research: Evaluation of tropical plant germplasm

Progress to Date: Fifteen soybean (Glycine max (L.) Merr.) cultivars provided by Dr. K. H. Hinson of USDA, ARS, Gainesville, FL were grown in 3 sites in Puerto Rico. Santa Isabel and Lajas are semi-arid southcoast with a fertile montmorillonitic clay and Isabela is a sub-humid northwest with a poor kaolinitic clay. No major differences for yield between sites were found; however, reactions of varieties among sites were different genotype x location. (significant interaction). The variety

response was not similar at the three locations. For instance, variety 2 (Jupiter R.) had the highest yield at Lajas (2,739 kg/ha) while variety 3 (Cristilina) in Lajas and 5 (F85-7137) had the highest yields at Isabela with 3,588 and 3,341 kg/ha, respectively. The two varieties were among the lowest producers at Lajas and Santa Isabel.

Germplasm Collections:

Fruit trees, vines, and shrubs - Over 518 accessions of 407 species of tropical and subtropical fruits and nuts, ornamental shrubs, and trees are maintained at the TARS grounds. Only 142 of these accessions have their PI numbers.

Dioscorea spp. - Eleven selections of Dioscorea alata, 5 selections of D. esculenta, 2 selections of D. trifida and 1 of D. bulbifera have been grown in replicated plots in two different locations (Mayaguez and Isabela) for evaluation. Requests for plant material were processed during the months of February and March, 1987.

Musa spp. - Forty four (44) banana and 24 plantain selections are maintained at TARS for evaluation and distribution.

Legume seed - Seeds of various species of legumes are available in small amounts for distribution.

Canavalia ensiformis - Jack bean
Lablab purpureus - (Dolichos lablab) - Hyacinth bean
Pachyrhizus erosus - Yam bean
Phaseolus vulgaris - Common bean
Psophocarpus tetragonolobus - Winged bean
Vigna unguiculata - Cowpea

Theobroma cacao - In cooperation with the American Cocoa Research Institute (ACRI), TARS maintains a disease-free collection of selected cacao clones which serves as a permanent source of budwood for worldwide distribution. The collection consists of 372 clones with three mature plants representing each clone. The cacao collection provides plant material for continued breeding research, serving also as a source of moderate or large-scale distributions to scientists, cacao breeders, and institutions in U.S. and throughout the world. New clones are added to the collection once these are grafted and achieve the proper size for transplanting.

TARS, in cooperation with the American Cocoa Research Institute (ACRI) is providing technical support to the Agricultural Experiment Station of the University of Puerto Rico in a newly created program of cacao hybrid seed production. A total of 645 grafted trees of 8 selected clones have been provided to the Agricultural Experiment Station.

Germplasm Distribution:

TARS is directed to answering local, national, and foreign needs for plant germplasm. Requests for vegetable seeds, tubers, yams, rhizomes, cuttings, seedlings, fruits, nuts, etc., have been handled throughout Puerto Rico, the Virgin Islands, Continental United States and foreign countries. A summary of these distributions follows:

| <u>Germplasm</u> | <u>Packets</u> | <u>No. of Persons</u> | <u>Countries</u> |
|---|----------------|-----------------------|------------------|
| Vegetable seeds | 39 | 7 | 6 |
| Tubers, yams, leaves stems, cuttings, etc. | 294 | 35 | 22 |
| Seedlings, fruits and nuts | 15 | 15 | 10 |
| Cacao budwood | 59 | 4 | 1 |
| Cacao pods | 22 | 3 | 1 |
| Cacao seeds | 1 | 1 | 1 |
| Cacao leaves and flower buds | 28 | 4 | 1 |
| Grafted cacao trees | 645 | 1 | 1 |
| Other seeds | 56 | 19 | 16 |
| Rhizomes | 25 | 4 | 2 |

Plant Introductions:

Xanthosoma spp. - A breeding program on taniens (Xanthosoma spp.) was begun in TARS during the year 1987. A collection of 69 varieties was introduced from the Tropical Research and Education Center, Homestead, Florida. Five more accessions were added to the collection. It was increased, planted in replicated plots at two locations for evaluation (yield) and the root-rot syndrome (mal seco).

Glycine max (L.) Merr. - Fifteen (15) lines of soybeans were introduced from the University of Florida to be evaluated in Puerto Rico. These were planted in replicated plots at three locations, and will be evaluated for disease reaction, yield and other agronomic characteristics.

The following accessions (310), grasses and legumes were introduced from CIAT-Colombia for increase and evaluation in Puerto Rico:

| | <u>accessions</u> |
|-----------------------------|-------------------|
| 1. <u>Stylosanthes</u> spp. | 223 |
| 2. <u>Centrosema</u> spp. | 53 |
| 3. <u>Brachiaria</u> spp. | 4 |
| 4. <u>Panicum</u> spp. | 2 |
| 5. <u>Desmodium</u> spp. | 11 |
| 6. <u>Arachis</u> spp. | 1 |
| 7. <u>Dichanthium</u> spp. | 1 |
| 8. <u>Hyparrhemia</u> spp. | 1 |
| 9. <u>Melinis</u> spp. | 1 |
| 10. <u>Andropogon</u> spp. | 2 |
| 11. <u>Neotonia</u> spp. | 2 |
| 12. <u>Pueraria</u> spp. | 1 |
| 13. <u>Flemingia</u> spp. | 2 |
| 14. <u>Leucaena</u> spp. | 3 |
| 15. <u>Zornia</u> spp. | 4 |

A collection of 45 different Cassava cultivars - Manihot esculenta Crantz was introduced from the University of Puerto Rico Experiment Station, for increase and evaluation.

Selected bamboo germplasm (41 accessions) was transferred from Byron, Georgia to TARS in Mayaguez, Puerto Rico, where it will be established in the clonal repository for increase, evaluation and distribution.

Five Arachis spp. (wild species) were transferred from Stillwater, OK to TARS. These were planted for evaluation and seed production at the Isabela Experiment and Farm. Four of them have survived.

Budwood materials of 33 different cacao clones (Theobroma cacao L) were received from the Miami Station. These were grafted and will become part of the permanent cacao clonal collection.

Two papaya cultivars (Waimanalo and Kapoho) introduced from Hawaii were planted and will be evaluated as part of a new project.

Accession User: A. Sotomayor-Ríos
Address : Tropical Agriculture Research Station, Box 70,
Mayaguez, Puerto Rico
Nature of Research: Evaluation of grain sorghum lines and
hybrids for midge resistance.
Progress to Date: A group of grain sorghum hybrids were
evaluated and studied at Isabela, Puerto Rico. The best
performers were ATx398 x RTx435 and ATx399 x RTx430.
The male parent RTx430 appeared to be highly resistant
to midge.

Accession User: A. Sotomayor-Ríos
Address : Tropical Agriculture Research Station, Box 70,
Mayaguez, Puerto Rico
Nature of Research: Agronomic evaluation of forage sorghum
Millo Blanco and Pennisetum americanum x P. purpureum
for yield and in vitro dry matter digestibility.
Progress to Date: These genotypes are being evaluated at three
cutting intervals at two locations. From the first
ratoon and successive harvests, the hybrid (Pennisetum)
appears to be superior than forage sorghum in terms of
dry forage yield and other traits.
Publications: "Agronomic comparison between Millo Blanco and a
Merker Grass Hybrid". Abstract. In: XXXIV Annual
Meeting, PCCMCA, Costa Rica, 1988.

Accession User: A. Sotomayor-Ríos
Address : Tropical Agriculture Research Station, Box 70,
Mayaguez, Puerto Rico
Nature of Research: Response of forage sorghum to five cutting
intervals during two years.
Progress to Date: The effect of cutting intervals on the
agronomic performance of a sorghum-sudan and
sorghum-sorghum hybrid was determined. The dry forage,
crude protein yield and dry matter content of both
genotypes increased as cutting interval increased, while
crude protein content and in vitro dry matter
digestibility diminished as cutting interval increased.

Accession User: A. Sotomayor-Ríos
Address: Tropical Agriculture Research Station, Box 70,
Mayaguez, Puerto Rico
Nature of Research: Agronomic evaluation of two temperate and
two local corn populations in comparison with Pioneer
Brand Hybrid X304C.
Progress to Date: Five corn genotypes were planted on four
planting dates at two locations during two years in
Puerto Rico. The overall response of the five genotypes
was higher at Mayaguez during the first year and at
Isabela during the second year. Most traits including

grain yield showed a quadratic response for planting dates at both locations. Pioneer Brand Hybrid X304C produced the highest grain yields (over 5,500 kg/ha) at both locations during the two years.

Accession User: A. Sotomayor-Ríos
 Address: Tropical Agriculture Research Station, Box 70,
 Mayaguez, Puerto Rico
 Nature of Research: Increase and evaluation of sorghum
 collections.
 Progress to Date: Part of the Ethiopian Collection (900
 accessions) was planted, selfed and classified. Most of
 the selfed seed was returned to the coordinator of the
 Regional Plant Introduction Station.

Accession User: A. Sotomayor-Ríos
 Address: Tropical Agriculture Research Station, Box 70,
 Mayaguez, Puerto Rico
 Nature of Research: Increase and evaluation for daylength
 sensitivity of sorghum collections.
 Progress to Date: Part of the old Ethiopian Collection (500
 items) was planted, selfed and classified for daylength
 sensitivity in comparison with five checked varieties in
 St. Croix. Most of the selfed seed was returned to the
 Coordinator of the Regional Plant Introduction Stations.

Accession user: K. D. Ritchey, R. Goenaga, and A. Sotomayor-Ríos
 Address: Tropical Agriculture Research Station, P. O. Box 70,
 Mayaguez, Puerto Rico, 00709
 Nature of Progress: Screening sorghum for acid soil tolerance.
 Progress to Date: Six sorghums were evaluated for acid soil
 tolerance using a 4-day seedling root growth method
 proposed for rapid non-destructive screening of
 germplasm. The same materials were grown in the field
 in subplots with soil pH (1:2 soil:water) ranging from
 3.9 to 6.7. Leaf area was measured at 57 days. The
 ratio of leaf area in subplots with pH less than 4.88 to
 leaf area of subplots with pH greater than 4.88 was used
 as an index of field tolerance to soil acidity. Ranking
 of 4-day root growth of the seedlings in soil with
 varying levels of acidity correlated well with field
 performance. The most tolerant materials were Millo
 Blanco and ATx6234 Millo Blanco. The least tolerant
 materials were FS25A, a commercial forage sorghum
 hybrid, and Greenleaf, a sudangrass variety. These
 results, along with solution culture studies, indicate
 that the poor field performance of the acid-sensitive
 sorghum varieties was due to their inability to grow
 roots into soils with high levels of aluminum.
 Publications: K. D. Ritchey and R. Goenaga. 1987.
 Quick-screening of Sorghum for Tolerance to Soil
 Acidity. Agron. Abstracts. p.215.