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

Colorado State University
Ft. Collins, Colorado

August 2-3, 1979

FILE COPY

Respectfully submitted,

David W. Bradshaw
Secretary, S-9 Technical Committee

1. CALL TO ORDER

The meeting of the S-9 Technical Committee was called to order by Chairman, Clarence E. Watson, Jr. (MS), at 8:00 AM August 2, 1979 in the ASCSU Senate Chambers, Colorado State University, Ft. Collins, Colorado.

2. INTRODUCTION OF ATTENDEES

Name	Address	Phone
*Oliver E. Smith	P. O. Box 415 College Station, TX 77840	(713) 845-5322
Eli L. Whiteley	Dept. of Soil & Crop Science College Station, TX 77840	(713) 845-5322
*Bill Fike	Crop Science Dept. North Carolina State University Raleigh, NC 27650	(919) 737-3267
Roy E. Sigafus	Agronomy Dept. Univeristy of Kentucky Lexington, KY 40546	(606) 257-2644
*Jim S. Kirby	Agronomy Dept. Oklahoma State University Stillwater, OK 74074	(405) 624-6417
Clarence O. Grogan	6440-S SEA/CR Washington, DC 20250	(202) 447-6195
Wendell G. Hassell	P. O. Box 17107 Denver, CO 80207	(303) 837-5651
*Oscar D. Ramirez	Dept. of Horticulture Agri. Exp. Station Rio Piedras, Puerto Rico 00928	(809) 767-9705
*L. N. Skold	Dept. of Plant & Soil Science University of Tennessee P. O. Box 1071 Knoxville, TN 37919	(605) 974-7391

Name	Address	Phone
*Richard J. Stadtherr	Dept. of Horticulture Louisiana State University Baton Rouge, LA 70803	(504) 388-2729
*Phillip J. Ito	Dept. of Horticulture 461 W. Lanikaula Street Hilo, Hawaii 96720	(808) 935-2885
P. K. Soderholm	Subtropical Horticulture Res. Unit 13601 Old Cutler Road Miami, FL 33158	(305) 238-9321
George A. White	Plant Introduction Office Germplasm Resources Laboratory Bldg. 001 Room 322 Beltsville, MD 20705	(301) 344-3328
Kanti Rawal	Lab for Info. Science in Agric. Colorado State University Ft. Collins, CO	(303) 491-6551
Joe Higgins	Plant Variety Protection Office AMS Natl' Agricultural Library Beltsville, MD 20705	(301) 344-2518
Osman Tosun	Ankara University Ankara, Turkey	
Quentin Jones	National Program Staff Beltsville, MD 20705	(301) 344-3311
*Gordon M. Prine	314 Newell Hall University of Florida Gainesville, FL 32611	(904) 392-1811
Louis N. Bass	Natl' Seed Storage Lab Fort Collins, CO 80523	(303) 484-0402
Thom Davidson	USDA, SEA, CDSD, NAL Bldg Room 408 Beltsville, MD 20705	(301) 344-2840
*C. E. Watson	Dept. of Agronomy Box 5248 Mississippi State, MS 39762	(601) 325-4181

Name	Address	Phone
Phil Stanwood	USDA-Natl' Seed Storage Lab Colorado State University Ft. Collins, CO 80523	(303) 484-0402
*Grover Sowell, Jr.	Acting Coordinator Regional Plant Intro. Station Experiment, GA 30212	(404) 228-7255
*John L. Bowers	Dept. of Hort. & Forestry University of Arkansas Fayetteville, AR 72701	(501) 575-2605
*David W. Bradshaw	Dept. of Horticulture Clemson University Clemson, SC 29631	(803) 656-3404

*Members of the S-9 Technical Committee.

3. OFFICIAL WELCOME FROM CSU

The S-9 Technical Committee members and visitors were welcomed to Colorado State University by Dr. J. P. Jordon, Colorado AES. Dr. Jordon pointed out the importance of making our administrators, collegues and congressmen aware of the purpose of Plant Introductions and the S-9 Technical Committee. Needed are publications to bring visibility on a national scale. Dr. Jordon gave an informative and entertaining overview of the budgetary situation with respect to inflation, closing with an optimistic view.

The S-9 Technical Committee was also welcomed to the National Seed Storage Laboratory by Dr. L. N. Bass, SEA-AR.

4. APPROVAL OF MINUTES

Dr. Richard Stadtherr moved approval of the minutes of the 1978 meeting. The motion was seconded and approved.

5. APPROVAL OF AGENDA

The tentative agenda was slightly modified and the agenda as presented in these minutes was approved.

6. APPOINTMENT OF COMMITTEES

Chairman Watson appointed the following Committees:

A. Nominations:	R. E. Sigafus, Chairman J. L. Bowers W. Fike
B. Time and Place of Next Meeting:	J. S. Kirby, Chairman R. J. Stadtherr P. J. Ito
C. Resolutions:	G. M. Prine, Chairman O. D. Ramirez L. N. Skold

7. STATE PROGRESS REPORTS AND RESEARCH PLANS

The following state representatives presented their annual reports. Copies of the reports are contained in Appendix A.

Representative	State
J. L. Bowers	Arkansas
G. M. Prine	Florida
G. Sowell, Jr.	Georgia
P. J. Ito	Hawaii
R. E. Sigafus	Kentucky
R. J. Stadtherr	Louisiana
C. E. Watson, Jr.	Mississippi
W. T. Fike	North Carolina
J. S. Kirby	Oklahoma
O. D. Ramirez	Puerto Rico
D. W. Bradshaw	South Carolina
L. N. Skold	Tennessee
E. L. Whiteley	Texas

8. REPORT FROM NATIONAL PROGRAM STAFF

Dr. Quentin Jones raised the question whether members of the S-9 Committee had received proposals from other regions for review. He reported that $33,900 are available annually for the purpose of explorations. Dr. Jones urged all members who propose foreign explorations to contact the Agricultural attachet well in advance. It is the responsibility of the Regional Coordinator to see that proper channels are followed.

Dr. Jones noted that the exchange of germplasm and germplasm teams with the Peoples Republic of China has been approved. A germplasm team from the United States was to visit The Peoples Republic of China in August 1979.

Dr. Jones also reported that $200,000 has been set aside to encourage grower-producer willingness to try new crops. He noted that there is renewed interest in crops for arid lands and crops useful for alcohol production.

9. REPORT FROM GERMPLASM RESOURCES LABORATORY

Dr. G. A. White outlined the computerization of Plant Introduction information. He described the translation of computer information and pointed out the high percentage of duplication required. Dr. White also noted that there are some Plant Introductions prohibited in the United States.

10. REPORT FROM THE NATIONAL SEED STORAGE LABORATORY

Dr. L. N. Bass deferred most of his comments on the National Seed Storage Laboratory for the tour of the facilities scheduled later in the agenda. He brought to our attention the National Conference for Animal, Plant and Microbial Gene Resource Conservation.

11. REPORT FROM GERMPLASM RESOURCES INFORMATION PROJECT (GRIP)

Dr. K. M. Rawal reported that the Germplasm Resources Information Project is now permanently located at Colorado State University. He stated that the information system being developed would increase the number of Plant Introductions incorporated into breeding programs. The prototype for the system was developed from the system of computerizing Plant Introduction information reported on by Dr. White. The similarity of systems will make possible an information exchange for anyone needing access to Plant Introduction germplasm information.

12. REPORT FROM SOUTHERN REGION PLANT INTRODUCTION STATION

Dr. Grover Sowell, Acting Coordinator, made availabel packets of 'Mainstream' cantaloupes recently released from South Carolina and asked for comments and recommendations for use in field plantings.

Dr. Sowell showed slides of work in screening for resistance to anthracnose in watermelons.

Dr. Sowell presented the Southern Regional Station Budget for 1980. Dr. L. N. Skold moved for approval. The motion was seconded and approved.

Dr. Sowell reported that a search for a Southern Region Coordinator continues and that he is hopeful that the position will be filled by the new year.

13. REPORTS ON GERMPLASM COLLECTIONS AND PROGRAMS AT:

A. Subtropical Horticultural Research Station

Dr. P. K. Soderholm reported that two 1939 Plant Introductions of coconut have proven to be resistant to coconut yellows and that there

is renewed interest in incorporating this germplasm into coconut breeding programs. He also reported on some of the inherent problems in maintaining an extensive collection of Sansevaria plant introductions.

B. Soil Conservation Service

Dr. Wendel Hassel discussed plant material centers and funding from the Soil Conservation Service. He discussed the budgets fro plant materials centers and cost:return ratios.

14. REPORT FROM USDA, SEA/CR

Dr. C. O. Grogan reported that $291,000 went into genetic vulnerability studies of soybeans, potatoes and corn last year. He advised that researchers should not overlook the grant possibility in biomass and alcohol production. He also pointed out that the Competitive Research Grants Office be tapped for proposals. The National Science Foundation might also be a further source of funds. Dr. Grogan stated the outlook for 1980-81 appears good. He pointed out that the National Plant Genetics Research Board have formulated goals which fit well with our program. The Users Advisory Board have expressed an interest in how our work fits into their program so that they can in turn take our message to Washington.

15. REPORT FROM PLANT VARIETY PROTECTION OFFICE

Dr. Joe Wiggins reported on changes in the Plant Varieyt Protection Act. The legal protection has been extended to 18 years instead of 17 years. He also stated that all new varieties are now described by the Plant Variety Protection Office, not just those protected by the Plant Protection Act, in order to better decide whether or not a particular variety qualifies to be protected. Dr. Wiggins stated that a total cost of $750 is needed for a new plant to be protected by the Plant Variety Protection Act and that approximately 75% of all applications result in protection.

16. COMMITTEE REPORTS

A. Nominations: Dr. R. J. Stadtherr moved the nominations of Dr. D. W. Bradshaw as Chairman and J. S. Kirby as Secretary. The motion was seconded and approved.

B. Time and Place of Next Meeting: Dr. O. E. Smith moved the acceptance of the University of Hawaii, Honolulu Hawaii as the site of the next meeting with meeting dates of July 31 and August 1, 1980. The motion was seconded and approved.

C. Resolutions: Dr. R. J. Stadtherr moved the acceptance of the following resolutions:

Resolution A.

Be it resolved that the S-9 Regional Technical Committee expresses its appreciation to Dr. W. R. (Bob) Langford, retired Regional Coordinator, for his faithful service to this committee and to his furtherance of plant introductions in the United States, particularly in the Southern Region.

Resolution B.

Be it resolved that the S-9 Regional Technical Committee expresses its appreciation to Dr. Grover Sowell for his excellent filling-in as Regional Coordinator of the S-9 Regional Technical Committee following the retirement of Dr. W. R. Langford.

Resolution C.

Be it resolved that the S-9 Regional Technical Committee expresses its appreciation to Dr. L. N. Bass and his staff for making

the arrangments for the meeting at Colorado State University and for giving a constructive tour of the facilities of the National Seed Storage Laboratory.

Resolution D.

Be it resolved that the S-9 Regional Technical Committee expresses its appreciation for the inspiring and revealing welcome by Dr. J. P. Jordon of Colorado State University Agricultural Experiment Station and to all faculty and staff of Colorado State University who made our meeting successful and enjoyable. Particularly appreciated was the aid of members of the Germplasm Resources Information Project team.

Resolution E.

Be it resolved that the S-9 Regional Technical Committee expresses its appreciation to Dr. Charles Lewis for his many contributions to this committee and to furtherance of Plant Introductions in the United States.

17. OLD OR UNFINISHED BUSINESS

There was no old or unfinished business.

18. NEW BUSINESS

Dr. Bill Fike moved approval of the proposed plant exploration trip to Yugoslavia by Dr. R. L. Haaland as outlined in the submitted proposal. The motion was seconded and approved.

Dr. Quentin Jones recommended that a memorandum be sent to all members outlining the procedure for clearance of foreign exploration proposals.

19. ADJOURNMENT

Chairman Watson adjourned the meeting of the S-9 Technical Committee at 5:20 PM August 2, 1979.

20. TOURS, AUGUST 3, 1979

The S-9 Technical Committee reconvened at 8:00 AM August 3, 1979 at the National Seed Storage Laboratory. Dr. K. M. Rawal and staff demonstrated the Germplasm Resources Information Project retrieval system. Dr. L. N. Bass also explained the storage and retrieval of information on Plant Introductions. Dr. Bass presented a thorough and informative tour of the National Seed Storage Laboratory facilities. Coffee and donuts were enjoyed by all. At 11:40 AM the S-9 Technical Committee was again adjourned.

APPENDIX A

STATE AND FEDERAL AGENCY REPORTS

Progress reports presented at
the meeting are attached
in the following order

ALABAMA
ARKANSAS
FLORIDA
GEORGIA
HAWAII
KENTUCKY
LOUISIANA
MISSISSIPPI
NORTH CAROLINA
OKLAHOMA
PUERTO RICO
SOUTH CAROLINA
TENNESSEE
TEXAS
VIRGINIA

NATIONAL PROGRAM STAFF

GERMPLASM RESOURCES LABORATORY

NATIONAL SEED STORAGE LABORATORY

NORTHERN REGIONAL RESEARCH CENTER

SOUTHERN REGIONAL PLANT INTRODUCTION STATION

MAYAGUEZ INSTITUTE OF TROPICAL AGRICULTURE**

SUBTROPICAL HORTICULTURE RESEARCH STATION

SOIL CONSERVATION SERVICE

** No written report provided for minutes.

ALA-1

ALABAMA S-9 PLANT INTRODUCTION ACTIVITIES

July 1978-June 1979

Carl S. Hoveland, Agronomy & Soils Dept.
Auburn University, Auburn, Alabama 36830

Plant introductions ordered in 1978-79 included 52 vigna, 33 trifolium, 100 citruluus and 101 cucumis.

HORTICULTURAL CROPS

Tomato and Peppers (W. H. Greenleaf, Auburn) W.H. Greenleaf

I am currently using several foreign plant introductions (P.I.'s) of wild species or of primitive cultivars (cv.) of tomatoes and peppers to breed disease, insect and virus resistant varieties of these 2 crops.

In tomatoes I have crossed the wild species Lycopersicon hirsutum f. glabratum P.I. 134417 with L. esculentum, the cultivated tomato. This wild species has been reported to be resistant to the tomato fruitworm Heliothis zeae, to the tomato hornworm, to spider mites and to the tomato leafminer Liriomyza munda. I have personally observed resistance also to early blight and to tobacco mosaic virus. Recently I have been attempting to transfer the leaf miner resistance to L. esculentum with some success.

Other P.I.'s that have entered my breeding program are the primitive cv. L. esculentum P.I. 272735 from San Salvador, for fruit flavor, high soluble solids and heat tolerance; the L. esculentum X L. pimpinellifolium derivative P.I. 204998 for superior heat tolerance and L. cheesemanii P.I. 379039 for earliness, soluble solids and hear and salt tolerance.

'Auburn 76' FMN tomato developed by Greenleaf and released by the Alabama Agricultural Experiment Station in 1977 incorporates the 3 dominant gene pairs I/I from L. pimpinellifolium Acc. 160, Mi/Mi from L. peruvianum P.I. 128657 and Tm_2^a/Tm_2^a from L. peruvianum P.I. 128650.

In peppers we have a high level source of resistance to ripe rot of the fruit in the species Capsicum chinense, Accession 1555 originally collected by Dr. Paul G. Smith, U. C. Davis, California. Two important causal fungi that are now limiting pepper production in Alabama are Colletotrichum nigrum and C. capsici. I am currently transferring the genes that determine this resistance from Accession 1555 to C. annuum cv. pimiento.

In 1970 the Alabama Agricultural Experiment Station released 'Greenleaf Tabasco'. This variety of tabasco is resistant to two important viruses, the tobacco etch virus (TEV) and pepper mottle virus (PMV). TEV, transmitted by the peach aphid Myzus persicae causes a serious wilt disease of the original tabasco variety, threatening the survival of the hot pepper industry in Louisiana based on this pepper. The 'Greenleaf Tabasco' has saved this industry. I used 2 TEV resistant sources of Capsicum chinense P.I. 152225 and P.I. 159236 to develop 'Greenleaf Tabasco'.

The collection and conservation of germ plasm worldwide and its periodic renewal should have top priority in American agriculture. This effort should be securely funded by the U.S. Congress. Only in this way can we safeguard our food crops in the future from destruction by disease and disaster.

Cantaloupe (J. D. Norton, Auburn)

P.I. 140471 (Cucumis melo) is being used in the development of breeding lines that are resistant to Gummy Stem Blight (Didymella bryoniae) (=Mycosphaerella citrullina), pickle worm (Diaphania nitidalis), and Fusarium wilt Races 1 & 2. P.I.'s of C. metuliferus and C. anguria are being utilized in efforts to make interspecific crosses with C. melo to incorporate resistance to the root knot nematode (Meloidogyne incognita acrita) into breeding lines.

P.I. 140471 - resistance to Gummy Stem Blight (Mycosphaerella citrullina). New multiple disease resistant cantaloupe varieties, 'Gulfcoast' and 'Chilton', permit the development of a commercial melon industry in the southeastern U.S. and other humid areas. Home gardeners may enjoy excellent melons comparable to Western grown fruit.

Watermelon (J. D. Norton, Auburn)

P.I. 271778 and P.I. 189225 (Cucumis lanatus) are being used in the development of breeding lines that are resistant to Gummy Stem Blight in watermelon.

These two P.I.'s and P.I.'s 271775, 299379, 326515 and 203551 are being used in the development of breeding lines that are resistant to Anthracnose (Collotrichum laginarium) Races 1 & 2.

Tall Fescue (R. L. Haaland, Auburn)

Research on tall fescue originating from Mediterranean P.I.'s has shown great diversity for root size and number. Selections are being evaluated for root growth rates and root morphology. Fescue gene pools with known root characteristics will be developed. Fescue selections originating from P.I.'s have also shown variation in mineral uptake.

Trefoil (R. L. Haaland and C. S. Hoveland, Auburn)

A semiprostrate experimental trefoil was developed from P.I.'s from Mediterranean regions. The material showed some tendency towards stoloniferous growth. This material has been established in North Alabama in replicated grazing paddocks. The trefoil was established in combination with both tall fescue and orchardgrass.

Annual Legumes (C. S. Hoveland and R. L. Haaland, Auburn)

Three winter annual legumes continue to look promising. Trifolium mutabili has growth habits similar to arrowleaf clover. It seems to have better disease tolerance. In observational grazing paddocks it withstood grazing very well.

Trifolium purpureum looks promising in high pH calcareous soils such as Black Belt soils. It does not show iron chlorosis and has excellent spring growth. A major problem with T. purpureum is poor seed production. It is not known what contributes to this poor seed production.

Several Trifolium alexandrinum P.I.'s have shown good cold tolerance in central and southern Alabama.

PUBLICATIONS CONCERNING PLANT INTRODUCTIONS

1. Norton, Joseph D. 1978. Cantaloupe: Breeding for Resistance to Mycosphaerella citrullina, Meloidogyne incognita acrita, and Diaphania nitidalis. Cucurbit Genetics Cooperative. No. 1:19.

2. Norton, Joseph D. 1978. Interspecific crosses of Cucumis species. Hort Science. 13(3):355.

3. Norton, Joseph D. 1978. Watermelon: Breeding for Resistance to Mycosphaerella citrullina and Colletotrichum laginarium. Cucurbit Genetics Cooperative. No. 1:24.

4. Norton, Joseph D. 1978. Watermelon Disease Resistance. Progressive Farmer. March p. 96A.

5. Norton, Joseph D. 1979. Inheritance of Resistance to Gummy Stem Blight in Watermelon. HortScience 14(5):630-632.

6. Norton, Joseph D. 1979. Cantaloupe: Breeding for Resistance to Didymella bryoniae (=Mycosphaerrella citrullina, Meloidogyne incognita acrita, and Diaphania nitidalis. Biennial Report of Veg. Breeding in Southern U.S., Hi., and Puerto Rico. 1979:9.

7. Norton, Joseph D. 1979. Watermelon: Breeding for Resistance to Didymella bryoniae (=Mycosphaerella citrullina) and Colletotrichum laginarium. Biennial Report of Veg. Breeding in Southern U.S., Hi., and Puerto Rico. 1979:57-58.

8. Sowell, Grover Jr., B. B. Rhodes, and J. D. Norton. 1979. New Sources of Resistance to Watermelon Anthracnose. J. Amer. Soc. Hort. Sci. (JMS 1342). Accepted for publication.

9. Norton, Joseph D. and D. M. Granberry. 1979. Characteristics of Progeny from a Cross of Cucumis melo L. X Cucumis metuliferus E. Mey. J. Amer. Soc. Hort. Sci. JMS 957 (Accepted for publication).

10. Granberry, Darbie M. 1979. Response of progeny from Interspecific cross of Cucumis melo L. X C. metuliferus E. Mey. to Meloidogyne incognita acrita. J. Amer. Soc. Hort. Sci. JMS 958 (Accepted for publication).

11. Elkins, C. B., R. L. Haaland, R. Rodriguez-Kabana, and C. S. Hoveland. 1979. Nematode effects on water use and nutrient uptake of a small and a large rooted tall fescue genotype. Agron. J. 71:497-500.

S-9 TECHNICAL COMMITTEE REPORT

Arkansas Agriculture Experiment Station
Fayetteville, AR 72701

Period of July 1, 1978 to July 1, 1979

Chick Peas: A planting of chick peas was made in August on the Main Experiment Station at Fayetteville in 1978. Pod setting was excellent on each of the 13 different accessions, but a field infestation of mice practically destroyed the entire pod crop. A very severe drought in the fall may have contributed to our problem because there was a lack of natural foods for these rodents. We are again attempting fall production of this crop and planting dates will be involved in the current study. The first planting was made on June 29, and the second was recently made on July 13. One more planting date will be made just prior to our meetings in Fort Collins.

Spinach: The stations advanced breeding lines which possess resistance to white rust were tested on a limited basis in the over-wintered crop by spinach growers. These two lines: Ark. 120 and Ar 200 x 202 derived their resistance to white rust from the original source possessed in P.I. 165560. A large seed increased is being made of these two lines in the west and we anticipate these will be released in the Spring of 1980.

Our efforts on this program are now being directed towards the incorporation of fusarium wilt resistance into the material possessing white rust and downy mildew resistance.

Southern Peas: We are still maintaining some of the blight resistant accessions in our breeding program, even though we have found comparable levels of resistance in some material obtained from Dr. A. P. Lorz of Florida before he retired. We believe our field screening for bacterial blight resistance program involving many susceptible check rows of (Bush Purple Hull) and many resistant check rows of (Ar 77-197), will afford us a higher level of precision in reading bacterial blight resistance in our segregating progenies.

Green beans (*Phaseolus vulgaris*): Drs. T. E. Morelock and M. J. Goode are using P.I. 165426 as the resistant check in a field screening program for *Rhizoctonia solani* resistance. P.I. 165426, P.I. 203598 and P.I. 307760 have been crossed with adapted genotypes and the progeny of these crosses are being evaluated for Rhizoctonia root rot resistance.

Okra: Dr. Joe McFerran and Dr. M. J. Goode are continuing to use the P.I. 278999 accession in their breeding program because the progenies derived from its parentage develops straight sided pods possessing good color.

Germ Plasm Needs: We are still very muchly interested in the program on screening of *Cucumis sativus* accessions for rhizoctonia fruit rot resistance. Our limited funds and space will not permit us to screen the plant accessions at this time. We will strongly endorse any proposed plant exploration initiated in other regions for the search of new germ plasm in this species.

WHAT CAN BE DONE TO MAKE PLANT INTRODUCTION SYSTEM MORE EFFECTIVE?

When I asked my fellow scientists this question, I get the impression that the accessions are not used more because we do not have enough information about the disease resistance level to certain specific diseases. If more information was available, then the breeder would be definitely interested.

This problem might be partly alleviated if we could get or find cooperators within the region which would be willing to field screen the accessions if financial assistance were available. I strongly believe we need to search out this "avenue" and see if we can improve on this aspect of our over-all program. Undoubtedly within our own region the climate is variable enough so as to provide a good location for field screening of several diseases. For example, my conversations and communications with Dr. William Mulkey in Mississippi would indicate his location would be desirable for the screening of Rhizoctonia fruit rot resistance in *Cucumis sativus*. I bring this question up in my report and hope we can have discussion on this topic at our regional meeting. The question was not raised to level criticism at the regional stations, I believe they are doing a good job. I have raised this issue to see if we can make a more effective program by farming out some of the screening programs and thereby make greater use of the germ plasm now maintained by the stations.

1979 Florida Report to S-9 Regional Technical Committee

Prepared by G. M. Prine

Scientists from many disciplines in Florida continue to receive and evaluate plant introductions obtained from or through the Southern Regional Plant Introduction Station. Test plantings of various introductions are widely scattered throughout the state. In this report the investigator and where he is located in the state will be given along with information about promising introductions.

Dr. V. E. Green, Jr., Professor, Agronomy Department, Gainesville is testing PI numbers 432510, 432521, and 432523 sunflower, Helianthus annuus, received from collections among the Southwestern US Indians, against the leaf and stem fungus: Alternaria spp. They have not been evaluated by the cooperating plant pathologist yet as they are just coming into flower which is when the disease usually strikes. The accessions were sent to Dr. Green by Dr. Charles B. Heiser, Jr., Indiana University, Bloomington, from his vast sunflower germplasm collection.

Dr. Paul Mislevy, Agronomist, Ona Agricultural Research Center, conducted a grazing intensity experiment to compare cattle stocking rate (3, 4 and 6 cattle/A) on UF-5 stargrass (PI 225957) Cynodon aethiopicus Clayton et Harlan and Pensacola bahiagrass. Results indicate 4 cattle/A grazing bahiagrass and UF-5 stargrass produced 363 and 572 lb/A beef yield, respectively.

He is also conducting a mobgrazing study at Ona over a 3 year period to determine the productivity, quality and persistance of 16 tropical grasses. The following two Cynodon numbered introductions appeared superior in productivity and persistance when compared with digitgrass and bahiagrass: Puerto Rico stargrass (PR 2341), Cynodon nlemfuensis Vandersyst var. nlemfuensis and UF-5 (PI 225957), Cynodon aethiopicus Clayton et Harlan. Both entries produced high dry matter yields, high percentage in vitro organic matter digestion and were very competative with weeds like common bermudagrass Cynodon dactylon.

In another study he is monitoring the HCN content of 9 Cynodon species. Preliminary research indicates that UF-5 stargrass (PI 225957) Cynodon aethiopicus Clayton et Harlan contains an average of 20% of the HCN % content found in Puerto Rico (PR 2341) Cynodon nlemfuensis Vanderyst var. nlemfuensis. HCN content was monitored on a weekly basis in all grasses by sampling plant tips (tips severed between first and second expanded leaf blade). Both high and low concentrations of HCN in plant tips tended to decrease with time after nitrogen application during the summer, however, HCN concentrations decreased much slower during the cool fall season.

Dr. Ronald M. Sonoda, Associate Plant Pathologist, Ft. Pierce Agricultural Research Center, reported:

We (Jimmy Augustine and Ray Volin and I) are in the process of crossing and selecting tomato lines resistant to tomato bacterial wilt caused by Pseudomonas solancearum. Presently we are at the F_3 and F_4 with some of the lines. So far we do not have any highly resistant progeny with large enough fruit. Selections from PI 126408 was used as a parent in some of the crosses.

We are still looking for sources of resistance in Macroptilium atropurpureum to a mosaic virus; rust caused by Uromyces appendiculatus; and Rhizoctonia solani foliar blight. We are also looking for Stylosanthes spp. with resistance or tolerance to anthracnose caused by Colletotrichum gloeosporioides and C. dematium f. sp. truncata.

Dr. John B. Brolmann, Forage Breeder, Ft. Pierce Agricultural Research Center, is breeding Stylosanthes. He reported that most of his Stylosanthes accessions have CPI numbers or CIAT numbers. All the native species are Ft. Pierce ARC numbers. He has some selections which were derived from original PI numbers. Among them is a promising type S. quianensis PI 401506, a early flowering stylo, which also regenerated from seed at the BRU in Gainesville. Other useful types are S. quianensis PI 401504 and 401505, which are very cold tolerant. He is selecting in this material for more vigor and has several good lines available of high yielding types. Another stylo which seems to do very well and is persistant, is Stylosanthes sp., PI number 422556 from British Honduras. He has a similar type from Ecuador. This accession is very persistant, erect with good branching habit and has good cold tolerance.

Dr. Al Kretschmer, Agronomist, Ft. Pierce Agricultural Research Center, reported release of carpon desmodium PI 217910 (Desmodium heterocarpon (L.) DC) as the named cultivar, 'Florida.' Al grew out over a 1000 forage legume accessions to produce seed for Southern Regional Plant Introduction Station in 1978. Florida carpon desmodium is adapted to south and central portions of Florida peninsular. It is not adapted to soils which flood and is susceptible to root knot nematodes.

Dr. Leonard S. Dunavin, Associate Agronomist, Jay Agricultural Research Center, stated that:

1. Arachis benthamii, PI 338282 grew well following setting on 11 Aug. 78. Winter survival was excellent, and plants have been placed in a replicated trial along with Florigraze and Arbrook.

2. Twenty-one introductions of winged beans (Psophocarpus tetragonolobus) are under observation in the field in 1979.

3. Hemarthria altissima introductions PI 349752, PI 364863, and PI 364888 have looked rather good in various trials and observations.

Two introductions of Ornithopus sativus were observed in 1978-79 with more being very impressive.

Three introductions of Trifolium ambiguum, two of Astragalus cicer and one each of Trifolium nigrescens and Trifolium rubrum have been observed.

Dr. O. C. Ruelke, Professor, Agronomy Department, Gainesville, FL has the following report:

1. Eighteen alfalfa selections; including one introduction from India, NDRI-1, (from D. Sundaresan, Director, National Dairy Res. Inst. ICAR, Karnal, (Haryana), India); were planted October 13, 1978.

Due to an eratic but severe infestation of nematodes, the variety trial had to be terminated, but basic information on nematode response is being gathered from this area.

2. Thirteen promising Cynodons are being evaluated including PI 225957 (UF-5) and PI 224966 (UF-4) which are at advanced stages of evaluation and up for release as commercial varieties.

3. Out of 53 selections of Limpograss (Hemarthria altissima), 10 plant introductions have been selected for advanced physiology and management research. Of these ten; three, PI 299993, PI 299995, and PI 364888 have been studied in an establishment study. Higher yields of dry matter and digested organic matter were obtained from PI 364888 in the year following establishment than PI 299993 or 299995.

Dr. G. M. Prine, Plant Introduction and New Crops Specialist, Agronomy Department, Gainesville, announces the joint release with SCS of 'Florigraze' perennial peanut (Arachis glabrata Bentham) which is probably a seedling from PI 118457. The first public distribution of Florigraze rhizomes was made in February and March, 1979. Florigraze rhizomes will be distributed again in January and February 1980. Other perennial peanuts PI 262817 (Arbrook) and PI 338282, gave excellent growth during 1978.

Dr. Prine is making selections in (Cajanus cajan) segregating populations received from ICRISAT in India. Selection criteria include high seed yield, early maturity, short plants, large seed and large numbers of seed per pod. He is also continuing to evaluate accessions of the cool season grain legumes: Chickpea (Cicer arietimum), lentils (Lens esculenta), peas (Pisum sativum), and faba beans (Vicia faba). Plant selections of Vicia faba have been made that show some resistance to devastating diseases that attacks this crop.

During winter of 1978-79 some 90 of 400 sub clover (T. subterraneum) accessions evaluated in 1977-78 winter were further evaluated and seed harvested. Where seed was available these sub clovers were planted in a pasture where their reseeding habits could be studied. A number of commercial sub clover cultivars and a serradella cultivar from Australia were evaluated in replicated trials. Sub clover and serradella both look promising as reseeding winter annual forage legumes in north Florida.

'Florida Reseeding' annual ryegrass has been released as a cultivar. Principal sources of germplasm in this new cultivar are Kinderlou, Florida Rust Resistant, Gulf and Magnolia ryegrasses. This ryegrass can be used any way other annual ryegrass is used. This cultivar reseeds very well under pasture conditions when grazing is deferred so seed can be produced. When grown for its reseeding characteristic, Florida Reseeding ryegrass should be planted in mixture with reseeding winter legumes such as red, white, crimson, arrowleaf, sub and rose clovers and vetches.

Dr. Stanley C. Schank, Professor, Agronomy Department, Gainesville, says the release of digitgrass cross 46-2 as a cultivar has been delayed for a year for further testing. The hybrid 46-2 is a cross between Digitaria valida PI 299850 and Digitaria sp. PI 299892, both from South Africa.

Dr. Elver Hodges, Professor of Agronomy at Ona ARC, reports that animal performance is being measured in a replicated trial which includes:

1. 'Ona' stargrass (UF4, PI 224566) as check.
2. U-5 stargrass (PI 225957).
3. 'Sarasota' stargrass, this is one of Steven's collections.
4. 'Bigalta' limpograss (PI 299995).
5. 'Callie' bermudagrass (PI 290814).

Ona stargrass is currently released as a productive perennial with outstanding, persistence under rotational grazing. Bigalta has been released for cool season growth and feeding value of mature herbage and has special adaptation to slightly water-logging sites with higher organic content. Plots of twenty seven grass entries consisting of varieties, hybrids, and several PI accessions are being established for forage production measurement. In nursery plots, fifty accessions of Hemanthria and 70 of Cynodon, plus several Digitaria and other genera are under evaluation of persistance, season of growth, and total yield. The digitgrass have been least persistant while early spring growth has been superior in the Hemarthria group.

Dr. Dan Gorbet, Associate Professor of Agronomy at Marianna ARC reports that he has 51 PI numbered accessions of Arachis hypogaea under field observations and evaluation. From the peanut breeding programs of A. J. Norden, Professor of Agronomy, Gainesville, and Dan Gorbet comes the following report by T. F. Monasterios, Graduate Student, on breeding for resistant to Cerocospora leafspot diseases in peanut (A. hypogaea):

Twenty seven genotypes were tested at two locations in 1977 and 1978 for Cercospora leafspot disease resistance. In addition, advanced lines (F_6 generation) from crosses between resistant and susceptible genotypes were also evaluated. Six disease assessments were used: number of lesions for C. personatum, size of lesions for both pathogens, total defoliation and total disease incidence. Disease epidemics were monitored during the growing seasons at both the Gainesville and Marianna locations. X values (disease plus defoliation) and logit values were obtained and infection rates calculated.

Disease progress curves were obtained by plotting logit values with time. Observations on the lesions caused by each pathogen were made at about two-week intervals from 50 days after planting to harvest. Ranking of genotypes was made on the basis of x values and number of lesions of C. arachidicola and of C. personatum. The following genotypes were selected as being comparatively resistant to C. arachidicola: PI's 306230, 300947, 196652, 196604 and 109839; and F_6 - 30, F_6 - 96 and F_6 - 67. The following genotypes were selected as being relatively resistant to C. personatum: PI's 261893, 261906, 262090, 203397, 196658, 203395 and 162539; and F_2-3525 and FESR-5.

Statistical analysis of the data showed that from 25 to 35% of the observed variation was due to genetic causes. No significant genotype-location interactions were obtained. High genetic correlation values were obtained between number of lesions of C. arachidicola and total defoliation and visual observation; but low correlation values in the case of C. personatum. Two types of resistance seem to be present in Arachis hypogaea genotypes. One type reduces the initial disease, and the other type provides resistance late in the season.

INTRODUCTION-RELATED LITERATURE

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2. Quesenberry, K. H., L. S. Dunavin, Jr., E. M. Hodges, G. B. Killinger, A. E. Kretschmer, Jr., W. R. Ocumpaugh, R. D. Roush, O. C. Ruelke, S. C. Schank, D. C. Smith, G. H. Snyder and R. L. Stanley. 1978. Redlata, Greenalta and Bigalta limpograss, Hemarthria altissima, promising forages for Florida. Univ. of Fla., IFAS, Agr. Exp. Sta. Bul. 802. 18 p.

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7. Brolmann, John B. 1978. Recent developments in breeding and selections of tropical legumes (Stylosantes) for the deep south. Proc. 35th Southern Pasture and Forage Crop Improvement Conf. 156-157.

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9. Ruelke, O. C., K. H. Quesenberry and W. R. Ocumpaugh. 1979. Planting technique effects an establishment, ground cover, production and digestion of Hemarthria altissima (Prior) Stapf et C. E. Hubb. Soil & Crop Sci. Soc. of Fla. Proc. 38 in press.

Georgia Report to S-9 Technical Committee

August 2-3, 1979

The following are reports received from scientists who are utilizing plant introductions in their research and breeding.

I. Dr. Charles Adamson, USDA, SEA-AR, U. S. Plant Introduction Station, Savannah, GA

The establishment of the bamboo collection at Byron is about 80% complete. Two additional bamboo species have been found at Savannah, Sasa tessalata and an unidentified probable Sinobambusa species. An additional Phyllostachys nidularia accession has also been found.

In the roselle breeding program, F_2s and F_3s derived from crosses of highly divergent roselle types are yielding new and interesting combinations of characters. The "entire" leaf type, good germination, and photoinsensitivity are characters of considerable interest which could result in improvement of both food and fiber types of roselle.

In the study of roselle ancestry, we were able to cross Hibiscus sabdariffa (roselle) with H. mechowi, a possible Y genome donor. This is one of the key crosses needed for the study. We also crossed the H. cannabinus-sabdariffa hexaploid with H. cannabinus (kenaf) for the first time.

As a sideline of the Hibiscus crossing program, we have recovered plantlets from H. hiernianus callus that developed from embryos.

II. Dr. R. O. Hammons, Supervisory Research Geneticist, USDA, SEA-AR, and Dr. W. D. Branch, Assistant Geneticist, University Georgia Coastal Plain Station, Tifton, GA

Contribution to Regional Project S-9 from cooperating federal (7702-20080-002) and state (GEO 00204) projects.

1. EVALUATION:

Agronomic performance was evaluated for 15 introduced peanuts in replicated tests in comparison with standard commercial cultivars. Although none of the 15 appeared superior to the checks, PI 422241, 'Delhi' from Canada, was advanced to the Uniform Peanut Performance Test for Spanish peanuts, and three others (PI 408725 'Red Beauty', PI 386349 'Colorado Irradiado' and PI 386350 'M 66 X M 6') were sent to New Mexico for evaluation in David Hsi's Valencia tests.

2. MULTIPLICATION:

PI 288160, a white-testa genotype with considerable promise for end-use in food supplementation was multiplied in 1978 to provide seed for more extensive tests by interested manufacturers. Further increase is in progress. Another 250 PI's were increased in one replicate plots at Tifton and seed returned to RPIS for distribution and preservation. This procedure forms part of the initial evaluation process for all newly introduced Arachis hypogaea L.

3. UTILIZATION:

A continuing breeding and genetic thrust established 57 F_2, 87 F_3, 8 F_4 and 10 F_5 populations involving peanut introductions. Production records for single plant selections were made within the early generation progeny. The populations came from crosses between parents with high yield potential, levels of resistance to diseases, performance stability, growth configurations, shelling grade and organoleptic quality traits desirable in peanut agricultural production and end-use manufacturing. Parents included these introductions -- A. hypogaea: 109839, 341879, 371965 and 274191 in numerous 2-way, 3-way and 4-way combinations, and A. batizogaea (2n = 40) PI 405082.

USDA-SEA-AR and the Georgia AES plan a joint release in 1979 of PI 109839 as leafspot (Cercospora arachidicola Hori) resistant germplasm.

Peanut rust (agent: Puccinia arachidis Speg.) resistant germplasm were scored in the USDA-SEA Winter Nursery at Isabella, Puerto Rico. Individual plant selections were made and bulked from 26 entries, of which 17 exhibited resistances. Resistant accessions include: PI's 407454, 393517, 414331-332, 341879, 314817, 215696, 390593, 393531, 350608, 259747, 315608, 393526, 393527A and B, 381622 and 298115. The most promising of these rust resistant entries are being distributed globally and will be released. Additional resistant material includes Arachis villosulicarpa PI 336985 and the unnamed Arachis sp. Col. 408/410 HLK, PI 338279/280.

Rust occurred only at harvest in the Georgia nurseries (at Plains) and discrete scoring for resistance could not be made here.

A convergent hybridization program was initiated in 1978 with the aim of incorporating known resistances to disease and insect pests into a genotype with agronomic acceptability. Ten of 16 parents in the 1st crossing cycle are PI's: 337394F, 109839, 403723, 267771, 393646, 280688, 343413, 362143, 196613 and 360859.

The unnamed diploid Arachis species Col. 408/410 (Hammons-Langford-Krapovickas) PI 338279/280 was used in a road-side beautification and stabilization study conducted by the Transportation Dept., State of Georgia, in cooperation with the Coastal Plain Station and the SCS Plant Material Center, Americus, Georgia.

Work was initiated to use A. glabrata (PI not recorded) as legume component with bermuda or bahia grass forages. 770 peanut sprigs (rhizomes) per bushel basket were dug with a bermuda-grass digger from our plot in March 1979 and interplanted with the grass species in nurseries testing herbicides as an aid in plant establishment (cooperative investigation: G. W. Burton and Ray O. Hammons).

Cylindrocladium black rot (CBR) resistance. Research at the Coastal Plain Station indicates that resistance to this important disease is present in a small percentage of the available germplasm and that this resistance could be incorporated into an acceptable commercial variety of peanuts. Among 1339 lines (mostly PI's) screened for resistance under artifically-infested conditions, some 13 lines have exhibited resistance through several generations of repeated testing. Seed are being multiplied in 1979 for prospective release. (Research cooperative between E. L. Sobers, Plant Pathologist, Coastal Plain Station and Ray O. Hammons).

4. PRESERVATION:

Limited seed were produced from several Arachis species accessions:

PI 378181	A. villosulicarpa 4n = 40
PI 336985	A. villosulicarpa 2n = 20 (Also, a glabrous-podded form)
PI 405082	A. batizogaea
PI 405933	A. monticola

References

1. Conkerton, E. J., E. D. Blanchet, R. L. Ory and R. O. Hammons. Evaluation of white-testa peanut genotypes for potential use as food supplements. Peanut Science 5(2): 75-77. Fall 1978.

2. Sowell, G., Jr., and R. O. Hammons. Practices in growing new plant introductions at the Southern Regional Plant Introduction Station. (Abst.). Proceedings Amer. Peanut Res. Educ. Assoc. 10(1):68. Oct. 1978.

III. Dr. Aubrey C. Mixon, Research Agronomist, USDA-SEA-AR, Tifton, GA

In the peanut project, 7702-20080-001, "Breeding Peanuts for Aflatoxin Resistance", we have utilized peanut introductions as part of the breeding program.

In our 1979 peanut nursery we are increasing 26 lines selected from 17 peanut introductions with various infection levels to aflatoxin-producing strains of A. flavus in repeated laboratory evaluations. Also, we are currently growing 81 peanut lines that have a peanut introduction as part of their ancestory. These lines are a result of selecting within successive generations from crosses with agronomic adapted genotypes using modification of the pure line procedure. These lines are in various generations of selection. Nine lines are included in a performance test for evaluation of their yield and quality performance.

IV. Dr. J. H. Bouton, Dept. of Agronomy, University of Georgia, Athens, GA

One hundred, eighty one (181) plant introductions of tall fescue, Festuca arundinacea were obtained from the Regional Plant Introduction Station, Pullman, Washington. These plant introductions were established in drilled row nurseries at the Plant Sciences Farm, Athens, Ga., and the Americus Plant Materials Center, Americus, GA. These genetic source nurseries will be screened for persistence and yield.

Seven plant introductions of alfalfa, Medicago sativa L., were obtained from Regional Plant Introduction Station, Ames, IA by T. E. Starkey, Pathology Dept., and J. H. Bouton. These have been established at experiment stations in Plains and Eatonton, GA and will be screened for production on disease resistance. The entire collection of Medicago sativa L. has recently been requested. Plans are to use these plant introductions in the alfalfa breeding program for selection of persistent, grazing types.

V. Turner S. Davis, Georgia Experiment Station, Experiment, GA

A number of introductions continue to do well in research or demonstration areas. Seven plants are still in the Lath House and will soon be transferred to the field for observation.

a) Pistachia chinensis continues to be one of the favorites for pest resistance, hardiness and beautiful fall color. Some trees had to be removed after 10 years due to overcrowding from crown spread. Seed is now available for distribution.

b) Metasequoia glyptostroboides is a nice tree after 10 years but growth has slowed considerably after reaching about 20 ft. Taxodium distichum may be confused with this tree, but it grows much faster in this area.

c) Cryptomeria japonica varies greatly in its ability to remain green through the winter in middle Georgia. One strain (NA-13454-C) has remained green.

d) Pinus thunbergii (PI 342930 & 317258) grew fast for about 8 years, then started to die back and has a crooked, shaggy appearance.

e) Cunninghamia lanceolata (PI 324969) is 23.8 ft. tall with a spread of 15 ft., but is damaged by cold weather. It may do better if protected from north winds.

f) Betula platyphylla var. japonica (PI 235128) is over 20 ft. in 7 years. The bark is white and beautiful and trees are approximately 4 inches in diameter.

g) Acer rubrum var. tridens (NA 31022) is 19 ft. tall with an 11 ft. crown spread after 10 years. This tree is doing fairly well.

h) Acer ginnala var. semenovii cannot be recommended for this area. Performance is poor, only 6 ft. tall in 10 years.

i) Magnolia virginiana var. australis has grown to 9.5 ft. with a crown spread of up to 4.7 ft. in 10 years. Growth was extremely slow for the first few years.

j) Quercus chenii (NA-827-S or PI 102653) is 21 ft. tall with a 20 ft. crown spread after 10 years. This tree could be used as a border or shield where plenty of space is available.

Several recently acquired introductions have been planted in the greenhouse for future trials. Two plants (NA 263 and 264) have recently died in the greenhouse.

S-9 Technical Committee Report
Colorado State University, Ft. Collins, Colorado

August 2-3, 1979

A. Forage, Grains and Ground Cover

1. Reported by Robert Joy, SCS Plant Materials Center, Molokai.

Desmodium cinerascens - PI-282691 (Mexico) - This is a very tall, erect perennial legume. It appears to have promise as a wildlife food and browse plant for domestic animals.

Digitaria valida - PI-299877 (Transvaal, South Africa) - This is a perennial grass with an attractive blue color. It is being tested for erosion control and beautification along highways.

Glycine wightii - PI-244980 (South Africa) - This plant is a perennial legume well adapted for erosion control and pasture use in low rainfall areas. Excellent results have been obtained from plantings in areas with less than 30 inches of rain per year.

Hemarthria altissima - PI-299994 and PI-299995 (East Transvaal, South Africa) - Both of these accessions show promise as forage plants in Hawaii. PI-299994 grows well in association with Desmodium aparines (syn. D. intortum) and, of the two accessions, is better adapted to elevations above 2,000 feet. PI-299995 is the highest producing and most palatable accession.

Panicum maximum - PI-156074 (Matlabas, northern Transvaal) - This is a palatable guineagrass with fine leaves. It has good recovery after clipping and is preferred by cattle over the common. Poor seed production is its main limitation.

Paspalum hieronymii - PI-310109 (Brazil) - A low-growing, wear-resistant perennial grass. When clipped about every 2 months, this grass forms a tight mat and appears very promising as a ground cover in orchards, heavily used areas and waterways.

Vigna luteola - PI-280131 (British Guiana) - A trailing legume similar in growth habit to cowpea. This plant is a perennial. It may have promise as a ground cover on critical areas, as wildlife food and for pasture in association with grass.

2. Reported by A. Sheldon Whitney, Agronomy and Soil Science, Kula Maui.

Forty-three accessions of Eragrostis superba were planted in late March in single-row observation plots alternated with E. superba cv. Palar. The plants are still rather small, indicating rather poor seedling vigor on this soil and climate regime (Typic Eutrandopt, 3,000 elevation). However, one accession (PI-364833) had excellent seedling vigor and is already flowering. It does not appear to belong

to the E. superba species.

B. Ornamentals

1. Reported by Haruyuki Kamemoto, Horticulture, Honolulu.

Small seedlings of Anthurium tetragonium, PI-424686, and Anthurium sp., PI-424687, were received in August, 1978 and have survived. They have not reached flowering size as yet.

C. Vegetables

1. Reported by George Silva and Richard Hartman, Horticulture, Honolulu.

Investigations are being conducted on the inheritance of resistance to Rhizoctonia solani diseases in snap beans (Phaseolus vulgaria L.), using 4 resistant lines, PI-165426 (Mexico), PI-226895 (France), Cornell 2114-12, B 4096, and 3 susceptible cultivars, Harvester, Hawaiian Wonder, and Manoa Wonder. Resistance was found to be quantitatively inherited with a range from high susceptibility to high resistance in the F2. The F2 mean scores for crosses between Harvester or Hawaiian Wonder and PI-165426, PI-226895, and Cornell 2114-12 were intermediate but closer to that of the susceptible parent. The F2 mean scores of crosses with Manoa Wonder; however, were closer to the resistance parents. B 4096 appears to be segregating for resistance. Resistant lines appear to have identical genes for resistance since there was no segregation in progenies of crosses among them. The number of genes responsible for resistance appears to be small and simple tests suggest the number to be three.

D. Fruits and Nuts

1. Reported by R. A. Hamilton and P. J. Ito, Horticulture, Honolulu and Hilo.

Persea americana - Seventeen introduction from Mexico of good quality fruits. Bertholletia excelsa - Six introduction from Brazil of small to large nuts.

Carica papaya - Three introduction from Australia for long peduncle and ripe fruit rot resistance. Two from Brazil.

Psidium spp. - Three species from Brazil.

Psidium guajava - Three introduction from Brazil.

Myrciaria paraensis - Two introduction from Brazil.

Guilielma gasipaes - Nine introduction from Brazil of good commercial quality.

Thanks to all the research personnel involved in plant introduction in Hawaii and their cooperation, this report is submitted by P. J. Ito.

Annual Report to S-9 Technical Committee

by Roy E. Sigafus, Agronomy Department, University of Kentucky
Fort Collins, August 2-3, 1979

Since the last reporting period, Kentucky workers have received several hundred plant accessions from Plant Introduction Stations and other sources. A majority of accessions were for chemical analysis studies, not for germplasm use. Those working with corn, small grains, soybeans and tobacco obtain their materials mainly through germplasm bsnks other than introduction stations.

Legume seed for amino acid analysis: A biologist at Lexington has requested hundreds of legume accessions for protein and non-protein amino acid analysis. No requests have been made recently as he is on sabbatic leave, but requests will resume soon. Agronomy has been contacted about the possibility of multiplying some accessions. A question is raised as to whether requests for seed for chemical analysis should be handled the same way as for seed where germplasm is maintained or multiplied.

Tall fescue breeding: *Festuca gigantea* obtained as early as 1969 is still being used to hybridize with tall fescue. Selections from segregating populations look very promising.

Tissue culture from corn anthers: Papers from Germany and China have initiated requests for corn seed. Complications include need for either growing seed in quarantine or in obtaining the four inbreds needed to produce the hybrid used for anther culture. Tissue culture is a "hot" subject now and such requests from foreign sources may increase.

Fraction I protein in peppers: Dr. John Snyder in Horticulture, has received 77 accessions of 8 species of *Capsicum*. He will grow out plants and analyze for Fraction I protein. This enzyme, ribulose-1, 5-bisphosphate carboxylase, will be studied as one measurement for genetic selection. (A paper by R. H. Lowe, Crystallization of Fraction I Protein from Tobacco by a Simplified Procedure, in Federation of European Biochemical Societies Letters, Elsevier Press, 1977, presents a practical method for crystallizing Fraction I protein for use as a food source, or for medical or industrial uses.)

Landscape plant response to two severe winters: Dr. R. E. McNeil presented a report on woody plant response to the Winter of 1976-77 at the Southern Nurserymen's Research Conference in 1977. He also has reported in a Kentucky Extension Publication, GREEN THUMB, observations of woody species in the severe winter of 1977-78. Several PI woody plants are included. This useful information is not available in a permanent publication available in libraries.

Kentucky experience with an endangered plant species -- Ginseng. The Endangered Species Scientific Authority (ESSA) declared wild ginseng an endangered plant species with imports to be prohibited after 1977. Ginseng root export, worth about $5 million per year to diggers in Kentucky, was permitted in 1978 after considerable effort on the part of Dr. C. R. Roberts of the U.K. Horticultural Department and others. Associated activities resulted in a SPECIALLY CROPS IN KENTUCKY bulletin, a GINSENG IN KENTUCKY booklet, and the First National Ginseng Conference held in Lexington May 1-2, 1979.

Agronomy and Horticulture staff at Lexington have requested Korean, Japanese, Chinese and Russian ginseng seed with the idea of possibly trying to improve American ginseng through hybridization. It now appears that American ginseng is unique and that the use of foreign germplasm would probably not be the way to go. Although considerable domestic ginseng is grown in Wisconsin and in other states, little scientific research has been done in this country on a plant harvested almost exclusively for export.

Publications:

G. W. Schneider, R. G. Lockard, and P. L. Cornelius. Growth controlling Properties of apple Stem Callus in Vitro. J. American Hort. Soc. 103 (5) 634-638. 1978.

LOUISIANA S-9 REPORT
August 1979

Richard J. Stadtherr
Horticulture Department
Louisiana State University

In 1978 Dr. Kit Ling Chin, Horticulture Department, Southern University received 14 Cicer arietinum, and 24 Vigna unquiculata accessions. Leigh Simmons working on tobacco mosaic virus received 1077 Capsicum annum, 2 Capsicum chinense and 1 Capsicum pendulum accessions. Dr. W. A. Young received scions of five Malus varieties.

In the ornamentals, 28 accessions were received from the Miami Station. The five Arachis accessions received from Experiment arrived in very bad condition and failed to root. The three accessions of Hirado azaleas from the National Arboretum rooted but were lost due to bark splitting after the first frost to 17°F in early December. We would like to receive the perennial peanuts and Hirado azaleas again.

In 1974 many scions were received from the Chico Station; however, obtaining understocks was very difficult. In this case it would have been advantageous to know in advance what materials would be available so that understocks were available to do the grafting. All of the camellias received were growing well up to July 1977 when we lost the area. The golden raintrees were lost in a grass fire which burned through the area in the fall of 1976. None of the cotoneasters did well. All had poor root systems due to poor soil aeration. All are very weak with few leaves. All the impatiens succumbed outdoors in beds in the lath house during the hot and humid days in August each year. They were carried over in the greenhouse and tried outdoors in three successive summers.

Magnolia grandiflora 'Little Gem' is outstanding. We have propagated plants from cuttings. This is a very dwarf variety and extremely precocious. Although Passiflora x 'Incense' kills to the ground each year, they come back and flower beautifully. This is an outstanding vine. Photinia sp. PI 325010 has attractive, clean foliage without sprayings to control diseases. We have increased our stock of Shibatea Kumasasa and Sasa pygmaea which we consider excellent, low-maintenance groundcovers.

Name	P.I. or N.A. Nos.	No. Plants Rec'd	No. Plants Living	Height Width Average	Comments
Received 3/14/74:					
Brunfelsia australis	NA 35727	2	2		Weak plants; carried over in containers in Lath house. Planted out in 1979.
Camellia x 'Daisy Eagleson'	NA 33704-c	1	0		All were doing well up to time
Camellia japonica 'Barbara Morgan'	NA 12403-c	1	0		area was lost and all plants were
Camellia japonica 'Hasumi-Shiro'	NA 21157-c	1	0		destroyed in summer of 1977.
Camellia japonica 'Shiro-botan'	NA 21170-c	1	0		" " "
Camellia japonica rusticana	NA 26829-c	1	0		
Carpinus betulus	NA 35087	1	0		Listed but not received.
Carpinus betulus	NA 35092	1	1	40" tall by 36" wide	Nice dark green foliage, upright.
Edgeworthia chrysantha	NA 34647	3	0		Died last winter.
Koelreuteria elegans	NA 35209	3	0		Lost in grass fire of 1976.
Koelreuteria elegans	NA 35210	3	0		" " " " " "
Koelreuteria elegans	NA 35211	3	0		" " " " " "
Koelreuteria elegans	NA 35212	3	0		" " " " " "
Petteria ramentacea	NA 33975	2	0		dead
Pieris phillyreaefolius	NA 35288	4	0		dead
Pinus peuce	NA 33280	2	0		dead
Tetracentron sinense	NA 34779	3	0		dead
Received 4/9/74:					
Cotoneaster microphylla 'Emerald Spray'	PI 362103	5	3	28" tall by 36" wide	weak - few leaves
Cotoneaster lucida	PI 384451	3	3	42" x 36"	weak - unthrifty
Cotoneaster sp.	PI 358790	1	0		dead
Peristrophe speciosa	PI 384452	2	0		dead
Photinia sp.	PI 325010	3	1	55" x 40"	
Pinus mugo	PI 377847	9	0		dead
Rhododendron arboreum	PI 358796	1	0		dead
Rhododendron sp.	PI 358797	2	0		dead
Rhododendron sp.	PI 358799	3	0		dead
Rosa rugosa	PI 384453	1	1	48" x 40"	destroy, leggy-few flowers.

Name	P.I. or N.A. Nos.	No. Plants Rec'd	No. Plants Living	Height/ Width Average	Comments
Received 4/9/74 continued:					
Viburnum dilatatum "Catskill"	PI 316677	2	0		dead
Received 4/16/74:					
Impatiens hawkeri 'New Guinea Giants'	PI 354251	1	0		Held over in greenhouse 2 years.
Impatiens hawkeri 'New Guinea Giants'	PI 354252-A	1	0		Planted out each summer for 3
Impatiens hawkeri 'New Guinea Giants'	PI 354252-B	1	0		years. They died in the hot
Impatiens hawkeri 'New Guinea Giants'	PI 354252-D	1	0		humid days of August.
Impatiens hawkeri 'New Guinea Giants'	PI 354252-E	1	0		" " " "
Impatiens linearifolia "Liklik Susa"	PI 354267	1	0		" " " "
Impatiens platypetala "Tjibodas"	PI 349629-B	1	0		" " " "
Imaptiens schlechteri "Pikinini"	PI 354258	1	0		" " " "
Impatiens schlechteri "Naispela"	PI 354259	1	0		" " " "
Impatiens schlechteri Luluai	PI 354262	1	0		" " " "
Impatiens sp. 'Aiyura'	PI 349582-A	1	0		" " " "
Impatiens sp. 'Aiyura'	PI 349582-B	1	0		" " " "
Impatiens sp. "Mt. Kum"	PI 354255	1	0		" " " "
Impatiens sp. "Redpela"	PI 354257	1	0		" " " "
Received 5/16/74:					
Impatiens platypetala	PI 349629-C	1	0		" " " "
Impatiens flaccida	PI 366028	1	0		" " " "
Impatiens platypetala	PI 349629-A	1	0		" " " "
Impatiens platypetala	PI 349629-D	1	0		" " " "
Impatiens sp.	PI 354256	1	0		" " " "
Impatiens sp.	M 21897	1	0		" " " "
Impatiens sp.	PI 349586	1	0		" " " "
Impatiens hookeriana	M 22170	1	0		" " " "
Passiflora x 'Incense'	PI 384497	2	2		Lath - well-adapted. Kills back to ground each year.
Received 6/29/74:					
Begonia serrati petala	PI 351480	2	+		Have maintained cuttings in greenhouse.

Name	P. I. or N. A. Nos.	No. Plants Rec'd	No. Plants Living	Height/ Width Average	Comments
Received 8/30/74:					
Magnolia grandiflora 'Little Gem'	NA 29649-c	1	1	38" x 28"	Well adapted; very dwarf
Indigofera incarnata alba	NA 27542-c	2	0		dead
Shibatea Kumasasa	NA 27566-d	1	+		Well adapted; have many propagated.
Disporum sessile variegatum	NA 27394-d	1	0		dead
Potentilla tridentata	NA 25335	3	+		Have in lath house-propagated but not vigorous.
Received 12/9/74:					
Paspalum minus, Dwarf bahia	MS 3263	100	0		Lost but would like to try again.
Sasa pygmaea, Dwarf bamboo	MS 839	50	+		Have propagated many well adapted but did not tolerate the drought in June 1979.

Mississippi S-9 Progress Report, 1978-1979

C. E. Watson, Jr.
Department of Agronomy
Mississippi State University

During 1978-79 Mississippi cooperators received 120 accessions representing 18 genera from the Plant Introduction Station. The following reports from cooperators were received.

Tall Fescue (C. E. Watson)

158 introductions of Festuca arundinacea Schreb. were planted in the Fall of 1977. These lines are currently being evaluated for their forage potential. Characteristics being evaluated include yield, winter growth, growth habit, leafiness. heat tolerance, cold tolerance, seed yield, and disease resistance.

We are continuing to screen plant introductions for crown rust resistance. Studies currently underway indicate that Mediterranean type fescues are a good source of resistance, but many of these lines lack winter hardiness. Our best source of resistance has been 'Fortune' tall fescue (derived from PI 231563 and 231564). PIs with high levels of resistance are 208681, 221927, 231552, 231559, 231562-3, 232879, 234881, 237516, 253438, 255875, 260245, 261029, 265360, 283278, 283285, 283299, 292602-4, 295669, 297908, 315430-1, 315433-4, 316244, 318986, 325324.

Gramineae (E. E. Rosenkranz)

A large number of plant introductions of several grass species are being screened to determine the host ranges of maize dwarf mosaic virus strains A & B (MDMV-A and MDMV-B) and sugarcane mosaic virus.

Forages (C. H. Hovermale)

Plant introductions of several tropical grasses and legumes have been planted at Poplarville, MS in 1979. These will be evaluated for their forage potential in south Mississippi.

Subterranean Clover (W. E. Knight)

Plant accessions of subterranean clover, Trifolium subterraneum L. were evaluated in the field and greenhouse in 1978. Eighty-six accessions were grown in replicated rows and rated for vigor, incidence of disease and spread. Accessions with promise will be increased for evaluation in plots. In addition, 106 accessions were grown in the greenhouse for seed increase and evaluated for vigor, disease and plant type. These accessions were evaluated in the field in seeded rows in 1978-79. Seven accessions evaluated earlier were increased and evaluated with named cultivars in field plots. PIs 184962, 291917 and 311499 performed as well as cvs Mt. Barker and Tallarook. PIs 311498, 319415, 168638 and 319145 were superior to 8 of the named cultivars. These introductions appear to be well adapted in the Southeast and have outstanding agronomic traits.

Recently, I visited Badajoz, Spain and Elvas, Portugal. This visit was part of project review under the U.S. - Spanish Cooperative program. We need to pursue two possible areas of cooperation at Badajoz. First, Alvaro Ramos and Carlos Gomez are interested in increasing our subterranean clover selections. This would provide adequate seed for animal evaluation and testing for regional adaptation. This would entail 5-6 kg of each selection shipped to them and they indicate an increase to 200-300 kg of seed would be no problem. These selections are late maturing and may have no value to the Spanish.

The second area that needs development is obtaining seed of the 1200 subterranean clover accessions in the Spanish collection. Many of these have been evaluated and classified as "early" or "late". There are several hundred late accessions that have not been threshed since the late accessions do not fit the Spanish environment. The late accessions would be of greatest value for the Southeast. Some of the other accessions might be adapted to more arid areas of the U.S. The late accessions are supposed to be threshed and made available to us. This was the main justification for transfer of funds from the U.S. budget to the Spanish budget.

The mechanics of sending seed to Spain and receiving the increased seed back into the U.S. have been explored with George White. There is apparently no problem in sending 5-6 kg of accessions to Spain. However, the mechanics of returning the larger quantities of seed to the U.S. will have to be investigated.

At Elvas, Portugal, Dr. David Crespo has a large collection of subterranean clovers (650 accessions) and a large collection of strawberry clovers (*Trifolium fragiferum*). Dr. Crespo is very cooperative. Hopefully, we can obtain these accessions for evaluation in the U.S.

North Carolina - Crop Germplasm Report
Report of W. T. Fike for S-9 Technical Committee Meeting
at Ft. Collins, Colorado, August 2-3, 1979.

The 30 campus research personnel who receive P.I. catalogues and information through my office, and others who received information direct, only ordered 25 P.I.'s during the 1978-79 season. Many hundreds of accessions are being screened and are in various stages of testing. Many new plant breeders are just assuming new positions and are just now becoming acquainted with the P.I. System.

A. Plant Introductions of Special Interest:

1. Dave Timothy reports that advanced grazing trials on PI 220606 *Pennisetum flaccidum* and PI 271596 *Pennisetum orientale* show good potential as forage species. Rate of gain per day is greater but duration of grazing is slightly less than adapted species.

2. George Kennedy reports that PI 134417 *Lycopersicum hirsutum* is resistant to hornworm, see attached reprint.

3. Warren Henderson reports that Barksdale found PI's 205001 and 272636, *L. hirsutum*, resistant to fruit rot of tomato.

4. Wanda Collins reports that a new sweet potato variety Caramex has jointly been released with New Mexico. Nugget (Tinnian background) was a parent. This variety is noted for high yield and quality.

B. Other Comments:

1. Dave Timothy is the curator for Tripsicum.

2. Jim Ballington reports that the blueberry collection is being screened and many promising lines are among those collected. Many have been incorporated into the breeding program. Seed is available but a list of PI's is not yet available.

3. Todd Wehrner is interested in obtaining *Cucumus hardwickii* introductions from India.

4. Bill Nesbitt is using root stocks of the Russian verniferous grapes for their resistance to root knot nematodes and phyloria.

C. Evaluation of New Crops:

1. Kenaf is still being grown under contract as a source of fiber for fine quality paper.

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A Laboratory Assay for Resistance to the Tobacco Hornworm in *Lycopersicon* and *Solanum* spp.[1]

G. G. Kennedy and W. R. Henderson[2]
North Carolina State University, Raleigh, NC 27607

Additional index words. *Manduca sexta*, tomato

Abstract. **A laboratory procedure for assaying *Lycopersicon* spp. for resistance to the tobacco hornworm *Manduca sexta* (L.) is described. Results from this procedure, which employed excised foliage from greenhouse grown plants and first instar hornworm larvae from a colony maintained in the laboratory on artificial diet, were similar to those obtained with intact plants, with field collected hornworm larvae, and with field grown resistant plants. The *Lycopersicon hirsutum* f. *glabratum* accessions PI 134417 and LA 407 were highly resistant to *M. sexta*. Resistance was manifest as a significant reduction in larval survival and in weight gained by survivors over a 72 hour period. The interplant variation in larval weight gains within accessions was highly significant, suggesting that most of the accessions tested were segregating for resistance to *M. sexta*.**

The tobacco hornworm commonly attacks tomato, *Lycopersicon esculentum* Mill., feeding on both the foliage and fruit. In commercial tomato plantings it is usually kept under control by the insecticide programs directed against the tomato fruitworm, *Heliothis zea* (Boddie). In home gardens, where insecticide usage on tomatoes is less intense, the tobacco hornworm can be a serious pest. The availability of tomato cultivars highly resistant to the tobacco hornworm would eliminate this widespread problem in home garden tomatoes.

Resistance to a number of important insect pests of tomato has been reported in *Lycopersicon hirsutum* Humb. and Bonpl., *L. hirsutum* f. *glabratum* C. H. Mull and *Solanum pennellii* Correll (5, 6, 7, 8, 9, 10, 11, 12). The present study was undertaken to determine if resistance to *M. sexta* is present in these species and to develop a laboratory procedure to assay for this resistance.

Materials and Methods

Unless otherwise stated, *M. sexta* larvae were obtained from a stock colony which had been maintained on artificial diet for 10 years. All experiments employed newly-hatched, first instar larvae. Plants were grown in a greenhouse in 15.2 cm clay pots containing Promix B soil mixture and were fertilized every 3 weeks to maintain vigorous growth.

With the exception of the initial screening for resistance, all experiments comparing resistance in *L. hirsutum* f. *glabratum* PI 134417 and 'Stakeless' tomato employed a clone of PI 134417 propagated by cuttings from a single plant selected as highly resistant to *M. sexta* in the initial screening experiment. All laboratory experiments employed a completely randomized experimental design and were conducted in a walk-in, insect-rearing room under conditions of 27°C and 50% relative humidity with a 16 hr photophase and an 8 hr scotophase.

Screening for resistance. Accessions of the following species were evaluated for resistance to *M. sexta* using excised foliage: *L. hirsutum*, PI 127826; *L. hirsutum* f. *glabratum*, LA 1266, LA 407, PI 134417, and PI 199381; *Solanum pennellii*, PI 365972; and *L. esculentum* cv. 'Stakeless' (susceptible standard). All plants were evaluated for resistance by confining 3 first instar hornworm larvae on a fully expanded leaflet held in a snap-cap plastic vial (diam 37mm × ht 62 mm). A damp strip of paper towel was included to provide moisture. Leaflets were replaced after 48 hr and the survivors were counted and weighed after 72 hr. There were 4 replicates for each plant evaluated; the no. of plants evaluated for each accession is given in Table 1.

Data on larval survival from all plants of each accession were pooled for each replicate to obtain the mean percentage survival. These values were transformed to arcsin $\sqrt{\%}$ and subjected to analysis of variance with mean separation by Duncan's multiple range test at $P \leq 5\%$. Data on larval wt were analyzed using a nested analysis of variance to determine if both the weight differences observed between accessions and those observed between plants within accessions were significant.

Field collected vs. laboratory reared hornworms. To verify that the plants found to be resistant in the screening study were also resistant to natural populations of *M. sexta*, an experiment was conducted to compare the survival and weight gain of field collected and laboratory reared hornworms on excised foliage of *L. hirsutum* f. *glabratum* (PI 134417, identified as resistant in the preceding experiment) and 'Stakeless' tomato. Hornworm eggs were collected from a tobacco field at Clayton, N.C., removed from the foliage, placed in a Petri dish with a plug of agar + sucrose diet and held at 27°C until hatching. Newly hatched larvae from the field and laboratory were weighed prior to confining them as described previously at a density of 3 per leaflet on excised foliage from resistant and susceptible plants. After 72 hr survivors were weighed, counted and weight gain by the survivors determined. The entire experiment was replicated 10 times.

Survival data from all replicates were pooled and analyzed using the Chi square test for independence. Weight data were

Table 1. Survival of *M. sexta* larvae after 72 hr on excised foliage of *Lycopersicon* and *Solanum* spp.

Entry	No. plants	Mean % larval survival
L. esculentum cv. Stakeless	26	89a[z]
L. hirsutum, PI 127826	21	79a
L. hirsutum f. *glabratum*, LA 1226	10	89 a
L. hirsutum f. *glabratum*, PI 199381	29	81 a
L. hirsutum f. *glabratum*, PI 134417	30	56 b
L. hirsutum f. *glabratum*, LA 407	3	19 c
S. pennellii, PI 365972	18	77 a

[z]Mean separation by Duncan's multiple range test using transformed data (Arcsin $\sqrt{\%}$); $P \leq 5\%$.

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[2]Departments of Entomology and Horticultural Science, respectively. We thank Drs. A. K. Stoner, USDA, ARS, Agricultural Research Center, Beltsville, Maryland; C. M. Rick, Department of Vegetable Crops, University of California, Davis; and Willis Skrdla, USDA Plant Introduction Station, Ames, Iowa for supplying seed of the accessions used in this study.

Table 2. Mean wt of *M. sexta* larvae after 72 hr on excised foliage of *Lycopersicon* and *Solanum* spp.

Entry	Plants	Mean wt (mg)/ larvae (+/- SD)	Range	CV (%)
L. esculentum				
cv. Stakeless	26	9.9 (± 1.58)	7.0-12.3	15.96
L. hirsutum				
PI 127826	21	6.2 (± 1.48)	3.3-8.3	24.06
L. hirsutum f. *glabratum*				
LA 1266	10	8.8 (± 1.87)	6.3-11.3	21.38
PI 199381	29	6.4 (± 1.52)	4.3-9.7	23.78
PI 134417	30	4.0 (± 0.95)	3.0-6.7	23.52
LA 407	1	5.3	–	–
S. pennellii				
PI 365972	18	4.4 (± 1.08)	2.8-6.5	24.94

not pooled, but were subjected to analysis of variance with mean separation by Duncan's multiple range test at $P \leqslant 5\%$.

Field vs. greenhouse grown plants. To insure that resistance observed in greenhouse grown plants was also present in those grown in the field, hornworm larvae from the laboratory colony were reared on excised foliage from greenhouse and field grown plants of PI 134417 and greenhouse grown 'Stakeless plants.' Newly-hatched first instar larvae were placed in lots of 7 in rearing vessels which consisted of plastic Petri dishes (150 mm diam × 25 mm ht) containing the appropriate excised foliage on a piece of moist filter paper. Fresh foliage was supplied every second day for the first 6 days and daily thereafter. Larval survival was recorded after 5 and 10 days; those surviving for 10 days were weighed. The experiment was replicated 6 times.

Intact plants vs. excised foliage. To verify that the use of excised leaves provided a reliable index of resistance in intact plants and excised leaves of PI 134417 and 'Stakeless,' 6 larvae were confined to each intact plant using glass lamp chimneys which were closed at the top with a piece of cotton organdy. These plants were about 15 cm tall at the start of the experiment. Larvae were confined in lots of 6 to excised foliage using the rearing vessels described previously. Larval mortality was recorded after 4 days. The experiment was replicated 5 times.

Results and Discussion

Screening for resistance. High levels of resistance to *M. sexta* were apparent in *L. hirsutum* f. *glabratum*, PI 134417 and LA 407. Larval mortality on these entries was greater than on all other entries (Table 1). Larval development among the survivors on PI 134417 and LA 407 was apparently retarded, since the mean wt of survivors on the former was only 40% and on the latter only 54% of that of survivors on 'Stakeless' (Table 2). Although mortality on *S. pennillii*, PI 365972, during the 72 hr experiment did not differ from that on 'Stakeless,' larvae on *S. pennillii* attained only 44% of the final wt of those on 'Stakeless.'

Analysis of variance indicated the difference in larval wt observed between accessions was highly significant as were the differences between plants within accessions. The differences in larval wt on different plants of the same accession are in agreement with differences in larval survival observed between plants of certain entries (e. g. PI 134417 and LA 407), and suggest that most of the accessions tested are still segregating for resistance to *M. sexta*. The coefficient of variation for larval wt is less for 'Stakeless' than for the other accessions (Table 2). Segregation for insect resistance within PI's is not unique since Stoner (11) observed segregation with *Lycopersicon* spp. for carmine spider mite resistance.

Field collected vs. laboratory reared hornworms. Resistance of PI 134417 first observed in assays with *M. sexta* larvae from a laboratory colony was confirmed by assays using larvae from field collected eggs (Table 3). Both percent survival and wt gained by survivors were less on PI 134417 than on 'Stakeless' for both field collected and laboratory reared larvae. While there was no difference in wt gained by larvae from the field or laboratory on PI 134417, mortality among field collected larvae was significantly greater than among those from the colony. These data indicate that *M. sexta* larvae from a colony maintained on artificial diet for 10 years can be used effectively to assay for the resistance found in PI 134417. This situation is unlike that of the European corn borer which could not be used to study resistance in corn after it had been reared on artificial diet for 34 generations (4).

Field vs. greenhouse grown plants. Both field and greenhouse grown plants PI 134417 were resistant to *M. sexta* (Table 4). However, plants raised in the greenhouse were more resistant than those from the field since mortality after 5 days was greater on the former. After 10 days, there was no difference between survival on greenhouse and field grown PI 134417. The few larvae that survived for 10 days on the field grown plants were extremely small, compared to those reared on 'Stakeless,' and died before reaching the pupal stage.

From a practical perspective field grown plants of PI 134417 are still highly resistant to *M. sexta*. The difference in the level of resistance of greenhouse and field grown plants may be related to the amount of glandular hair exudate present on the leaf surface. Such exudate from other *L. hirsutum* accessions has been shown to be important in resistance to spider mites (1, 8). Plants raised in the greenhouse had a much greater abundance of this exudate on their leaf surfaces than did those raised in the field.

Excised vs. intact foliage. Survival of *M. sexta* larvae after

Table 3. Response of field and laboratory populations of *M. sexta* after 72 hr on excised foliage of resistant and susceptable *Lycopersicon* spp.

Entry	Mean % larval survival	Mean larval wt gain (mg)
L. esculentum cv. Stakeless		
Lab	100	19.9 a[z]
Field	100	24.2 a
	Chi Square = 0 (NS)	
L. hirsutum f. *glabratum*, PI 134417		
Lab	40	3.3 b
Field	23	1.9 b
	Chi Square = 9.09 ($P \leqslant 0.05$)	
Stakeless vs. PI 134417		
	Chi Square = 26.67 ($P \leqslant 0.001$)	

[z]Mean separation by Duncan's multiple range test; $P \leqslant 5\%$.

Table 4. Survival and wt of *M. sexta* larvae reared on excised foliage of field and greenhouse grown plants of *L. hirsutum* f. *glabratum*, PI 134417 and *L. esculentum*, cv. Stakeless.[z]

Entry	Mean % larval survival		Mean wt of 10 day old survivors (g)
	5 day	10 day	
L. esculentum, Stakeless			
Greenhouse	88 a	76 a	1.269 a
L. hirsutum f. *glabratum*, PI 134417			
Greenhouse	0 b	0 b	–
Field	24 c	5 b	0.053 b

[z]Mean separation in columns by Duncan's multiple range tests; $P \leq 5\%$.

7 days on excised foliage and intact plants of PI 134417 was 50% and 27%, respectively. These values were not different ($P > 5\%$), but both were less than the survival on excised foliage and intact plants of 'Stakeless' tomato, the susceptible standard. Survival on these latter averaged 90% and 93%, respectively.

Although the resistance of PI 134417 may have been slightly reduced in excised foliage, these data indicate that excised foliage can be used in assays for resistance to *M. sexta* derived from this accession.

The resistance of *L. hirsutum* f. *glabratum* to *M. sexta* is not surprising since numerous accessions have been previously reported to be resistant to various insect pests of tomato. Of the accessions included in the present study, both *L. hirsutum* PI 127826 which was susceptible and *L. hirsutum* f. *glabratum* PI 134417 which was resistant to *M. sexta*, have been reported as having resistance to tomato fruitworm (5), tobacco flea beetle (6), the carmine and twospotted spider mites (8, 11), leafminer (12) and the tomato pinworm (10). PI 134417 was reported resistant and PI 127826 susceptible to the Colorado potato beetle (9) while the former was reported susceptible and the latter resistant to the greenhouse whitefly (7). Presently, it is not known what relationship, if any, exists between resistance to hornworm and resistance to these other pests.

Since *L. hirsutum* f. *glabratum* can be used as a pollen parent in crosses with *L. esculentum*, PI 134417 and LA 407 should be of value in breeding tomato cultivars resistant to the tobacco hornworm. PI 134417 should be of value as a source of resistance to various important insect pests as well as diseases (2, 3) of tomato. Progress in breeding for hornworm resistance can be facilitated by assaying for resistance under laboratory conditions using excised foliage.

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1979 Report to S-9
from the
Oklahoma Agricultural Experiment Station

Peanut Germplasm Resources - D. J. Banks

Initial increases in Oklahoma of 140 accessions and selections of the Arachis hypogaea L. collections made in Brazil, Argentina, Bolivia, and Paraguay during the 1976-77 Gregory, Krapovickas, and others expeditions were sent to the Southern Regional Plant Introduction Station at Experiment, Georgia in Jan. 1979. Additional materials of both wild and cultivated accessions from South America that were increased in Oklahoma (Banks) and Texas (Simpson) are being processed at Stillwater, Oklahoma for shipment to Experiment, Ga. and to ICRISAT India. Plant Introduction (P.I.) numbers are being assigned to these accessions through the U. S. Plant Introduction Office, Beltsville, Md.

In addition 7 accessions of wild peanuts and 25 accessions of cultivated peanuts from the spring 1979 South American (Santa Cruz and northward into the Beni including Trinidad and Guayaramerin, Bolivia.) expedition of Gregory, Krapovickas, Simpson, and others are being increased at Stillwater, Oklahoma and in Texas.

On July 13-14, 1979 several scientists toured the peanut germplasm resources laboratory at Stillwater to review the research conducted by Oklahoma State University cooperatively with the U.S.D.A. The scientists included Phil Moss, ICRISAT, India, Tom Stalker, N.C. State University, Charles Simpson, Texas A&M University, Stephenville, Texas, Don Banks, O.S.U. and Roy Pittman, O.S.U. Stillwater, OK. On July 15 a field tour was made of the Agronomy Research Station, Perkins, OK., where peanut germplasm is being increased and where breeding lines are being developed and evaluated for earliness, leafspot resistance and drought tolerance. Included in the tour were M.S.H. Serry, Egypt, Ray Shorter, Australia, Charles Simpson, Texas A&M, Hassan Melouk, Darold Ketring, Jim Kirby, and Don Banks, Oklahoma State University, Stillwater.

The Oklahoma Agricultural Experiment Station and the U.S.D.A. are in the process of preparing data and peanut germplasm for possible release. The germplasm consists of several breeding lines and one or more varieties resulting from a hybridization program involving Chico x Comet genotypes. Chico is a very early spanish peanut with small pods and seeds which came to the U.S. originally from Krasnodar Territory, U.S.S.R., as P.I. 268661 and later as P.I. 370149. It combines very well, genetically, with Comet (an Oklahoma selection from Starr) to give earliness, good yield and large pod and seed size in segregating F_2 populations.

Peanut and Mungbean P. I. Increase - J. S. Kirby

In 1976 and 1977 we cooperated with Dr. W. R. Langford in trying to grow several peanut plant introductions for rejuvenation of seed. We experienced extremely dry seasons both years which resulted in many of the introductions failing to produce good quality mature seed. In 1978 we took many of the PI's to Ft. Cobb, Oklahoma where we could grow them under full season irrigation. We got much better seed increases on those lines where we had not already lost the germination. We are still attempting to get a supply of certain of these indroductions by attempting an increase again this year at Ft. Cobb.

Because of Oklahoma's interest in Mungbeans, a new collection of 1,247 Mungbean plant introductions were sent to Oklahoma in the spring of 1978 for the initial seed increase and for our observation. We were able to get a good increase on most of the accessions. However, there were several that did not mature seed under our season. A list of these was furnished to Dr. Langford in late summer and he was going to try for a winter increase in Puerto Rico.

Sorghum Research - D. E. Weibel

The Oklahoma sorghum research program has more than 800 of 1500 pedigree rows that come from crosses involving 27 plant introductions, or derivatives of introductions, or lines from the conversion program of tropical introductions. Four of these lines are being used directly as pollinators in experimental hybrids.

SURVIVAL OF TALL FESCUE AND HARDINGRASS SEEDLING STANDS FOLLOWING SEVERE WINTER STRESS AT STILLWATER, OK.

Charles Taliaferro

Eighty-seven introductions of tall fescue (Festuca arundinaceae) and 68 introductions of hardingrass (Phalaris tuberosa), obtained from the W-6 Regional Plant Introduction Station at Pullman, Washington, were planted in single rod-row plots on the Agronomy Research Station Stillwater, Oklahoma, October 18, 1979. Following emergence, limited rainfall coupled with an unusually severe winter, resulted in the complete winter-kill of many of the tall fescue introductions and all but one of the hardingrass introductions. Phalaris tuberosa P.I. 294268 from Israel survived with a 100 percent stand, better than the tall fescue introductions. Tall fescue introductions having 50 percent or better seedling survival included the following P.I.'s: 251122 (Yugoslavia) 269376 (Afghanistan) 283301 (Tunisia) 297900 (Australia) 297902 (Australia) 325322 (USSR) 325323 (USSR) and 325324 (USSR). The tall fescue varieties KY-31, I-96 and Kenhy all had around 60 to 70 percent seedling survival and none of the tall fescue introductions proved to have better survival or more vigorous spring growth than did the standard varieties.

NEW CROPS RESEARCH IN PUERTO RICO
July 1978-1979

Oscar D. Ramírez
Horticulture Department
Agricultural Experiment Station
College of Agriculture
University of Puerto Rico
Río Piedras, Puerto Rico 00928

This past year a total of 38 introductions were received at our Experiment Station. These are grouped as grains, 9; ornamentals, 3; forages, 17; and okra, 9.

Grains: These includes 9 cultivars of rice (*Oriza sativa*) received from Spain. They were planted in the quarantine greenhouse for observation. No diseases were observed. Now they are growing in the field and no data are available as yet.

Ornamentals: The growth on the ornamentals received from the National Aboretum is very slow.

Legumes: Eleven stylothanthes, two desmodiums and four leucaenas were received. These were planted for a preliminary evaluation.

Results of previous introductions, such as alfalfa and forage grasses, are presented in tables 1, 2 and 3.

In the variety trial of alfalfa the best performance (dry forage and crude protein yields) were obtained with Venezuela, Florida 99, Moapa, Peruvian, Certified Mesa Sirsa, and Hayden PX-1 cultivars. There were six cuttings. A lack of stand persistence was observed after the fifth harvest, due to *Phythopthora* root rot. Of the cultivars tested those showing the greatest persistence after the sixth cutting were Venezuela, Moapa, Florida 66 and Hayden PX-1.

As to forage grasses, cultivar 291047 (Panicum maximum) was the highest yielder with 171,896 kg/ha/yr of green forage and 39,499 kg/ha/yr of dry forage, followed by cultivar 349676 (Panicum maximum) 152,292 kg/ha/yr of green forage and 37,533 kg/ha/yr of dry forage. This cultivar has to be observed more carefully because its yield was the highest during the short days of the year. See table 2.

Coffee: The evaluation of a semi dwarf coffee introduction from El Salvador, C.A., known as "Pacas" continued. This cultivar has demonstrated good adaptability, vigor, healthy vegetative growth and a heavy crop, managed under intensive culture, in full sunlight.

In its first crop, an average of 2.40 kilograms (5.25 lb) of ripe bearies per tree were obtained.

This is equivalent to more than 454 kg (1,000 lb.) of market coffee per acre.

This yield indicates that this variety can be considered with a very promising future.

The material under evaluation is presented in the attached tabulations.

Material under evaluation

Legumes:

Species	U.S.D.A.P.I.NO.
Stylosanthes humilis cv. Gordon	
" " cv. Paterson	
" tuberculata	
" simpodialis	
" scabra cv. seca	
" gracilis	197559
" guianensis	348951
" hamata	348953
" hamata	348954
" humilis	356018
" scabra	348957
Desmodium ovalifolium	237955
" "	338595
Leucaena leucocephala	237147
" "	281606
" "	282404
" "	282458

Ornamentals:

Species	
Ilex mutchgara	NA 40735
Pinus hwangshanensis	NA 39157
Sedum spurium cv. Royal Pink	NA 41643

Rice:

Species	
Oriza sativa cv. Frances	
" " cv. Colino	
" " Liso	
" " Niva	
" " Pegonil	
" " Nano	
" " Balilla x Sollana	
" " Jucar	
" " Matusaka	

Grasses under preliminary evaluation

Species	U.S.D.A.P.I.NO.
Cynodon plectostachyus	403998
" "	403999
" "	409742
" "	409743
" "	409744
" "	409745
" "	409746
" "	409747
" "	409748
" "	409749
" "	409750
Hemarthria altissima	299039
" "	349753
" "	379617
" "	364866
" "	364872
" "	364873
" "	364876
" "	364877
" "	364878
" "	364884
" "	364888
" "	364890
" "	400989
Digitaria milanjiana	106663
	133403
Panicum coloratum	364947
Cynodon plectostachyus	11436
Chloris gayana	263506

Table 1- Performance of 18 alfalfa cultivars in a 232 days period at the Lajas Valley, Puerto Rico

Cultivar	Green forage Yield	Dry forage Yield
	kg/ha	kg/ha
Venezuela	45,063	11,675
Florida 66	40,202	11,231
Certified Mesa Sirsa	38,709	10,277
Moapa	34,431	9,454
Hayden PX-1	34,392	8,976
Peruvian	34,294	9,099
UC-76-E	31,894	8,357
Sonora -70	31,584	8,710
Certified Hayden	31,270	8,477
AZ-Mexon	30,774	8,495
Mesa Sirsa (Lateral Branch)	30,665	7,908
UC-Salton	30,367	8,273
UC-Cargo	30,186	7,988
CUF-101	29,854	8,068
WL-311	24,718	6,978
Liberty (NCW-20	22,772	6,209
Thor	21,631	5,733
Tanverde	16,523	4,673

Table 2- Performance of 10 tropical grasses harvested every 42 days from October 27, 1976 to March 2, 1977

Species	U.S.D.A. P.I.NO.	Green forage yield	Dry forage yield
Panicum maximum	291047	48,473	10,122
Panicum maximum	349676	48,383	11,061
Panicum maximum	284765	43,665	9,798
Panicum maximum "commom"		37,332	6,924
Cenchrus ciliaris	284837	42,940	10,742
Cenchrus ciliaris	263509	48,849	11,371
Cenchrus ciliaris	210693	38,001	9,264
Cenchrus ciliaris	275102	36,034	9,335
Cenchrus ciliaris (T-4464)		24,881	6,924
Cenchrus ciliaris (Comercial) U. S. A.		23,715	6,831

Table 3- Forage and crude protein yield of 10 grasses cut at 45 days intervals for a period of two years.

Species	U.S.D.A. P.I.NO.	Green forage yield	Dry forage yield	Crude protein yield
		kg/ha	kg/ha	kg/ha
Panicum maximum	291047	171,896	39,448	3,182
" "	349676	152,292	37,533	2,817
" "	284765	144,296	34,347	2,771
" " cv. Common		143,399	33,753	2,724
Cenchrus ciliaris	263509	97,182	27,729	2,221
" "	284837	96,982	24,992	2,071
" "	210693	89,966	23,580	1,872
" "	275102	82,323	22,025	1,710
" " (Texas 4464)		65,496	18,589	1,529
" " (USA)		62,790	17,270	1,462

South Carolina Agricultural Research
Service Report to S-9 Technical Committee
August 2-3, 1979
David W. Bradshaw

A total of fifty-six P.I. accessions were distributed to cooperators in South Carolina in 1978. These included 1 Cassia, 1 Centrosema, 7 Citrullus, 2 Cucurbita and 45 Desmodium. Most cooperators reported that accessions were being screened for their breeding programs with no reports available at this time.

Mr. Ben L. Norwood, Norwood Farms, McBee, South Carolina.

Species of Desmodium, Cassia, Galactia, and an erroneously identified species labeled Centrosema virginianum (PI 322350) received from USDA were planted in an observation nursery in 1978. Species that appeared promising for conservation and wildlife food were established from seed of 1978 plant selections. Entries which merit my further consideration are Cassia fasciculata, Desmodium perplexum, Desmodium sandwicense, and Galactia jussiaena. Several annual species of Desmodium provide excellent cover and good seed yields; however, I am concentrating my efforts on Desmodium perplexum and Desmodium sandwicense.

The genus Desmodium has several characteristics which must be modified before we begin commercial production. The uncinate pubscence causes seed to cling and pack together. Some species have crown-rot-complexes. Desmodium sandwicense is indeterminate and begins setting seed in May. Also, the tannin content must be considered. Apparently the tannin content is uniform in Desmodium perplexum (PI 322465), and consideratly higher than in my grouping of similar annuals which I call the "sweet group". The "sweet" Desmodium species include Desmodium distortum, Desmodium hassleri, Desmodium pabulare, Desmodium purpureum, Desmodium racemosum, Desmodium rigidum, Desmodium tortuosum, and Desmodium uncinatum. I doubt that these merit classification as species. I would rather think they are varieties of Desmodium tortuosum.

The Cassia fasciculata accession (PI 6975-50) has been in bloom since early spring. Since it dehisces seeds elastically, other accessions exibiting uniform maturity are preferable. Only one other accession (collected in Sulfolk Co., Virginia) has bloomed to date. Hard seed are a problem with Cassia fasciculata. Scarification is difficult because the seeds crack easily.

Galactia jussiaena (PI 322541) looks good and is a good seed producer. It is much more vigorous than the native species G. volubilis and G. regularis. I regret that Galactia jussiaena performs as an annual in South Carolina. Is it an annual in Brazil? Could root rot problems cause it to perform as an annual?

The following plant introductions have been grown for a number of years in the Clemson Horticultural Gardens Arboretum:

Acer ginnala, P.I. 262710 - outplanted as a rooted cutting in 1967. 6' tall, 6' wide, has good open irregular form with multiple trunk, interesting slow growing specimen plant with good color however, there are indications of dieback which have been pruned out, growing in full sun.

Betula platyphylla 'japonica', P.I. 317211 - outplanted as rooted cutting in 1968. 8' tall, 3' wide, double trunk, has grown 4' in last two growing seasons and appears to be just getting started well, good color contrast of leaves against the light brown papery bark, growing in full sun.

Cryptomeria japonica, P.I. 239487 - outplanted as a rooted cutting in 1958. 30' tall, 10' wide, excellent upright form holds limbs well to the ground, good rich green year round but may yellow slightly during very hot dry summers. Recommend for specimen plant or as tall screen, growing in full sun.

Metasequoia glyptostroboides 'National', P.I. 286608 - outplanted as a rooted cutting in 1963. 35' tall, good form and color, somewhat open, growing right on an irrigation pond after being transplanted twice, is forming distinct bottle-necked trunk characteristic of Taxodium growing near water.

Myrsine semiserrata, P.I. 285468 - outplanted as rooted cutting in 1964. 10' tall, 12' wide, very open irregular form but interesting specimen plant, unusual flowers and fruit, growing in full sun.

Quercus phyllyraeoides, P.I. 261217 - outplanted as cutting in 1961. 10' tall, 6' wide, trunk diameter 6", dark green foliage. Shrubby habit, full sun.

Ulmus carpinfolia, P.I. 313550 - outplanted as rooted cutting in 1967. 20' tall, 8" diameter, vase-shaped light green, some beetle damage in June, full sun.

Ulmus hollandica, P.I. 313551 - outplanted as a rooted cutting in 1967. 20' tall, 8" diameter trunk, double trunk, distinct vase-shaped light green, slight beetle damage, full sun.

Ulmus hollandica 'Beau Swartz', P.I. 313983 - outplanted as a rooted cutting in 1967. 18' tall, 8" diameter trunk, extremely fastigiate, good early color but heavy beetle damage in June and July, full sun.

Ulmus laeves, P.I. 260883 - outplanted as a rooted cutting in 1963, 30' tall, 12" daimeter trunk, good form, vase-shaped, good color, no beetle damage, full sun.

Spirea salicifolia, P.I. 317288 - outplanted in 1969 as a rooted cutting, 4' tall, 3' wide, very attractive light rose colored flowers in July but some dieback and yellowing foliage, full sun.

TENNESSEE S-9 PROGRESS REPORT FOR 1978-79

L. N. SKOLD
DEPARTMENT OF PLANT AND SOIL SCIENCE
UNIVERSITY OF TENNESSEE

Gossypium: Dr. J. M. Stewart has received accessions of G. mustilinum from Mexico and G. pilosum, G. populafolium, and G. nelsonii from Australia. He is attempting to cross these with other species, primarily by using the excised ovule technique, first to establish genome relationships, and second, to provide a pool of exotic germplasm in various cytoplasmic backgrounds as a source of breeding material for cotton improvement.

Dactylis glomerata: Dr. B. V. Conger is continuing evaluation of 73 accessions received from the NE-9 Regional Plant Introduction Station.

Tripsacum dactyloides and Pennisetum americanum: Commercial plant breeders in West Tennessee continued evaluation of 234 accessions received from the S-9 Regional Plant Introduction Station.

Zea mays and Glycine max: Dr. L. M. Josephson and Dr. F. L. Allen continue incorporation of germplasm from the World Collection into their breeding programs. Dr. Josephson's main interest in introduced material is as a source of resistance to corn earwarm.

ANNUAL REPORT ON NEW CROPS RESEARCH IN TEXAS CONTRIBUTING TO SOUTHERN REGIONAL PROJECT S-9

Prepared by

Eli L. Whiteley and Oliver E. Smith

August 2-3, 1979

The 1978-79 Crop year began with a dry fall followed by a wet, cold winter and an extremely wet and cold spring. The planting of warm season crops was delayed as much as a month throughout the State.

Industrial Crops

Sweet Sorghum

The United States Department of Agriculture, Science and Education Administration, The Mississippi Agricultural and Forestry Experiment Station, and The Texas Agricultural Experiment Station, working co-operatively to improve sweet sorghum varieties, have jointly evaluated and hereby announce the release of P.I. 152857 (MN960), P.I. 152959 (MN1048), P.I. 152965 (MN1054), P.I. 152967 (MN1056), P.I. 152971 (MN1060), and P.I. 154844 (MN1500) germplasm lines.

These germplasm lines are highly resistant to moderately resistant to downey mildew (*Sclerospara sorgi* Weston and Upptal), leaf anthrancnose

(Colletotrichum graminicolum Ces G.W. Wils.) and rust (Puccinia purpurea Cke.) and Possess genes for acceptable agronomic and juice quality characters.

These germplasm lines were selected for release because of their contribution to the development of released commercial sorghum cultivars for syrup and/or sugar production. The released commercial cultivars are Brandes, Dale, and Theis for syrup production and Ramada Rio and Roma for sugar production.

The United States Department of Agriculture Science and Education Administration, The Louisiana Agricultural Experiment Station, The Mississippi Agricultural and Forestry Experiment Station and The Texas Agricultural Experiment Station working cooperatively to improve sweet sorghum varieties, have jointly evaluated and hereby announce the release of Keller sweet sorghum for potential sugar production.

Keller, evaluated as 'Mer. 68-2', was named in honor of the late Dr. Arthur G. Keller, former consulting engineer and renowned sugar processing engineer, Louisiana State University, Baton Rouge, Louisiana.

Keller is a mid-season, high sucrose and high percentage millable stalk sweet sorghum cultivar. It is resistant to leaf anthracnose and stalk red rot (Colletotrichum graminicolum (Ces) G.W. Wils.), moderately resistant to downey mildew (Sclerospera sorghi (Kulk) (Weston and Uppal), susceptible to rust Puccinia purpurea (Cke.) and mosaic viruses and moderately susceptible to methyl parathion insecticide.

Soybeans

Dr. Julian P. Craigmiles and Dr. E. H. Paschal II report the following plant introductions in the soybean breeding program at The Texas A&M University Research, Teaching and Extension Center at Beaumont, Texas.

1. Seed quality - P.I. 219653, P.I. 279088 and P.I. 205908.
2. Resistance to foliage feeding insects - P.I. 229358, P.I. 171451 and P.I. 227687.
3. Resistance to seed transmission of soybean mosaic virus - P.I. 325779, P.I. 240664 and P.I. 203406.
4. Source of impermeable seed coat - P.I. 323566 and P.I. 327568.

Sunflowers

Dr. R. D. Brigham reports that P.I. 175728 has resistance to chaffy head.

Plants Released

"Toalson" Peanut was developed from the cross, 673-A and "Starr", made in June 1965. Line 673-A was derived from a cross between P.I. 221057 (a small-seeded Spanish) and Selection 26 (a sister line of "Spantex"). Toalson was designated as TP-1025 during its development and testing period.

Sugarcane

Dr. Sim A. Reeves, Jr. of The Texas A&M University Teaching, Research and Extension Center at Weslaco, reports that a hard freeze in December and January caused considerable damage to sugarcane in the lower Rio Grande Valley. He reports that NCo 310 is still the leading variety. Harvest was to have been completed by April 5, 1979.

Sugarcane at the Brazos River Valley plantings at College Station underwent severe winter killing during the extended cold winter during 1978-79.

Melons and Cucurbits

The "Persian" type cantaloupes planted in the greenhouses at The Texas A&M University Weslaco Teaching, Research and Extension Center segregated into five to six different group types according to breeders at that Station. Two well netted fruits have been found in the early plantings.

Several European type cucumbers were planted on station and in the greenhouse. Only two varieties did not indicate powdery mildew infection; these were the Fembaby and the plant introduction which originated in Egypt. Egyptian plant introductions planted outside the greenhouse on trellis also did not show any mildew infection as compared to the European type cucumber varieties which have severe downy mildew infection. The purpose of this research effort is to develop cucumber varieties resistant to mildew infection.

Sesame

Sesame research was continued during the 1978-79 crop season. These studies include row spacing, fertility, variety, and adaptation of plant introductions. Several varieties produced over 2,000 pounds per acre. The highest yielding varieties are listed in Table 1.

Table 1. Sesame variety yields 1977-78.

Variety	Yield in pounds per acre
Gilroy Calinda	2782
Eva	2714
UCR-3, RA-12	2448
Oro	2215
Margo	2001
Rennec-2	1801
UCR-4, RM-RH	1796
Blanco	1789
UCR-1, RA-10	1768

Several selections and plant introductions produced high yields. These are presented in Table 2.

Table 2. Yields of sesame selections

Line or P.I.	Yield in pounds per acre
SW-4	2988
SW-5	2255
SW-16	1855
SW-14	1764
SW-2	1690
SW-9	1422
SW-10	1212
SW-17	1125
P.I. 265523 (Rennec-2)	2364
P.I. 158038	2222
P.I. 194238	1474
P.I. 170711	1272

A number of varieties were received from Mexico. The best of these varieties was Ambia I which produced 1583 lbs/a.

Seed increases were made of several varieties and several hundred acres of sesame were planted in Texas this year.

Work Planned for Next Year

Research in 1979-80 will include sesame, sugarcane, sweet sorghum, and soybeans.

Publications

Raymond D. Brigham. "Inheritance of "Chaffy Head" in Sunflower." July - August 1979. P.I. 175728 was the source of the Chaffy head gene in Helianthus annuns.

Charles E. Simpson, Olin D. Smith and Thurman Boswell. "Toalson". T.A.E.S. Leaflet No. L-1711. January 1979.

E. H. Paschal II and M. A. Ellis. "Variation in Seed Quality Characteristics of Tropically Grown Soybeans". Crop Science. Sept. - Oct. issue, 1978.

Robert M. Goodman, Glenn R. Bowers, Jr. and E. H. Paschal II. "Identification of Soybean Germplasm Lines and Cultivars with Low Incidence of Soybean Mosaic Virus Transmission Through Seeds". Crop Science. March - April, 1979.

1979 S-9 Technical Committee Report
Virginia Agricultural Experiment Station

A. J. Lewis III
Virginia Representative

The following report summarizes current research in Virginia involving plant introductions.

Dr. P. S. Benepal, Department of Life Sciences, Virginia State College, Petersburg, VA 23803.

Evaluation of Bean (*Phaseolus vulgaris* L.) Germplasm for Resistance to Mexican Bean Beetle

P. S. Benepal and M. Rangappa

Bean germplasm (5,988 P.I. accessions, and commercial varieties) were screened for resistance to Mexican bean beetle under field conditions of natural infestation. During some seasons, 30 Mexican bean beetle adults per plant on certain cultivars were not uncommon. P.I.'s 169718, 171746, 226875, 268110, 352754, 281976, 339485, 339380, 320971, 207179, 304120, 20133, 226876, 169850 along with 78 other cultivars were observed to be comparatively tolerant to Mexican bean beetle. These selected cultivars are being evaluated again under controlled environmental conditions in plant growth chambers by no choice test by caging adult Mexican bean beetles on intact plants. There are significant differences in feeding damage by female, male, and unsexed adult Mexican bean beetles. The Mexican bean beetle damage on caged leaves appears to be more than double under controlled environmental conditions as compared with field conditions.

Screening Cabbage for Resistance to Cabbage Looper and Imported Cabbage Worm

P. S. Benepal and M. Rangappa

Cabbage germplasm (698 P.I. accessions, and commercial varieties) were screened for resistance to cabbage looper and imported cabbage worm under field conditions of natural infestation. The insect infestations were very heavy to cause a total damage to majority of the cultivars. P.I.'s 324069, 343488, along with 22 other cultivars were selected and appeared to be comparatively tolerant. These selections are being grown for seed increase and another test under field and controlled conditions.

Screening Beans for Resistance to Air Pollutants

P. S. Benepal, J. A. Dunning, and M. Rangappa

Three hundred eighty accessions (Plant Introductions and commercial varieties) of beans (*Phaseolus vulgaris* L.) selected for insect, disease, heat, and water logging resistance and other superior horticultural characteristics, out of world germplasm of about 10,000 accessions, were screened for resistance to ozone. Visual estimates of leaf injury were made three days after exposure on a 0-100 scale. Plants with less than 10% injury were selected for seed increase and further studies. About 98% of the accessions screened showed more than 10% leaf damage when 80 pphm concentration of ozone was used. The plants with less than 5% leaf damage were considered highly resistant and with more than 95% damage as highly susceptible. The highly resistant plants had almost no damage when low concentration (40 pphm) of ozone was used, whereas highly susceptible plants showed heavy injury even with the lower concentration.

Table 1. Showing resistant and susceptible accessions of beans to ozone (80 pphm) out of 380 selected accessions screened.

Accession or Line	Resistance Rating
PI 169778	Highly Resistant
VS-12A	Highly Resistant
VS-332C	Resistant
PI 368752	Resistant
CC-31	Resistant
CC-40	Resistant
VS-141	Resistant
VS-89C	Highly Susceptible
Bonita-1	Highly Susceptible
Bonita-8	Highly Susceptible
VS-121A	Highly Susceptible
VS-128A	Highly Susceptible
VS-208	Highly Susceptible

R. L. Boman, Southern Piedmont Research and Continuing Education Center, P. O. Box 148, Blackstone, VA 23824.

Work at the Southern Piedmont Research Center is underway to identify and evaluate new and potentially productive forages for this drought-prone region of Virginia. Subterranean Clover has promise for this area as a reseeding winter annual. It makes most of its growth during the cool and moist portions of the year. The seed are dormant in the hot and dry summers, but germinate in the fall with moist and cool contitions. Thus, Subterranean Clover should augment forage quality and quantity in this area of Virginia.

Two varieties of Subterranean Clover (obtained from the plant introduction stations), Mt. Barker and Clare, were seeded October 5, 1977, at Blackstone. Mt. Barker survived fairly well, but Clare suffered severe winter injury. Reseeding of Mt. Barker occurred in late August and early September.

Thirteen Subterranean Clovers, Berseem Clover, and Crimson Clover were seeded October 12, 1978. This was probably later than the optimal seeding date. Yarloop and Dinninup were adversely affected by winter temperatures. Table 1 is self-explanatory; the varieties not harvested either sustained severe winter injury or were diseased or so weed infested that harvesting data would have been meaningless. The plots that were harvested were cut at a height of 1" above ground level. Only one harvest was taken and yield would obviously be increased by earlier and repeated harvesting.

Other accessions evaluated include Meechee and Yuchi Arrowleaf Clovers, Abon Persian Clover, Ball Clover (common), Dixie, Chief, and Talledega Crimson Clovers, along with Clare and Mt. Barker Subterranean Clovers.

The above accessions were seeded along or in combination with annual ryegrass. Unfortunately, these plantings were not successful this year. They were seeded late (October 9, 1978). A three week dry period followed seeding and it was then too late for optimum establishment.

Subjective rating:
1. Meechee Arrowleaf Clover superior to Yuchi
2. Abon Persian not adapted
3. Ball Clover too late, low productivity
4. Dixie Crimson Clover superior to Chief and Chief superior to Talledega
5. Mt. Barker Subterranean Clover far superior to Clare

Table 1. Subterranean Clovers, Crimson Clover and Berseem Clover Comparisons

Plant Accession	Harvest Date	Dry Matter Kg/Ha	Comments 5-9-79
Berseem Clover	6-08-79	5330	Tall, erect
Crimson Clover	5-04-79	4460	Already harvested
Subterranean Clovers	6-21-79		
Clare		--	3 plants/m^2
Daliak		--	Yellowing, 1/3 stand, weedy
Dinninup		--	3 plants/2 m^2
Dwalganup		--	1/4 stand, weedy
Geraldton		--	Short, small leaves, 1/2 stand
Howard		1095	85% stand, some weeds

(Continued)

Table 1. Continued

Miss. ecotype	1888	Short & green, 65% stand, weedy
Mt. Barker	2313	99% stand, no weeds
Nangeela	2073	95% stand, 1 or 2 weeds
Seaton Park	--	2 plants/m^2
Tallarook	2713	98% stand, large leaves, no weeds
Woogenellup	1423	90% stand, 1 or 2 weeds
Yarloop	--	1 plant/m^2

G. B. Briggs, Department of Horticulture, VPI & SU, Blacksburg, VA 24061.

Five NA accessions were received this year (NA 40059, NA 40000, NA 40241, NA 36019, and NA 40382) for evaluation of their landscape potential, hardiness, and disease and insect resistance.

A. J. Lewis, Department of Horticulture, VPI & SU, Blacksburg, VA 24061.

Four hundred varieties are included in this year's Variety Flower Trials. Although no P.I.'s are represented, many new varieties from 18 foreign and domestic sources are included.

REPORT FROM THE NATIONAL PROGRAM STAFF

to

THE REGIONAL TECHNICAL COMMITTEES, 1979

Quentin Jones

A. Plant Explorations - FY 1979

The SEA/AR Plant Explorations Fund is $33,900 p.a. We have been averaging about six explorations per year on these funds. This is possible because we usually have several domestic explorations.

This year there were seven explorations scheduled:

1. Small Grains - Chile - Craddock & Barclay (Completed)

2. Forage Grasses & Legumes - Yugoslavia - R. L. Haaland, Auburn University (Aborted)

3. Cucurbits - Mexico - Sowell & Whitaker (probably will be Barclay & Whitaker) (Postponed)

4. Paspalums - Argentina and Brazil - Burson (Completed)

5. Azaleas & Rhododendrons - Northeast U.S. = Pellett (Continuing)

6. Sunflower & Devil's Claw - Southwest U.S. - Nabhan (Underway)

7. Tomatoes - Mexico & Guatemala - Winters & Clark (Completed)

Added: Wheat - East Turkey - Hoffman & Metzger (in jeopardy because collecting permit requirement was not properly pursued)

B. Plant Explorations - FY 1980 Proposals

1. Cucurbits - Mexico (W-6) (Rescheduled)

2. Petunias - Brazil - Sink, MSU (NC-7)

3. Potatoes - Northwest Argentina & Bolivia - Okada (INTA) (IR-1)

4. Ornamentals - Japan - Kawase (NC-7)

5. Alfalfa - Turkey - Elgin & Ratcliff (NE-9).....(or '81)

6. Alfalfa - Peru & Bolivia - Kehr & Rumbaugh (NC-7)

7. Forage Grasses & Legumes - Yugoslavia - Haaland (S-9)....(rescheduled?)

C. National Clonal Repositories

SEA/AR: $1.0 million, recurring
SEA/CR: $1.5 million, would be recurring but has not yet been appropriated.

The basic plan was that AR would construct facilities and States (CR) would staff. Then the recurring total of $2.5 million would be the annual operating budget when the entire System was in place. Because CR has not gotten its funds, the System is behind schedule and AR has to construct and staff.

D. Germplasm and New Crops

We are getting involved, and will to an increasing extent, in procurement and management of germplasm of a "new" set of new crops:

1. Guayule (*Parthenium argentatum*) - source of natural rubber

2. Jojoba (*Simmondsia californica*) - source of an oil like sperm whale oil

3. New crops for arid and tropical regions

4. Energy crops - biomass, mostly for conversion to alcohol

Two Regional Solar Energy Centers are being established: Tifton, Georgia, for the South, and Peoria, Illinois, for the North. Solar energy in this context is presently formed energy from the sun through plants. May want to use the Regional Technical Committees, and their State and Federal contacts, for growing a rather wide range of potential biomass crops. Most of the alcohol conversion work will likely be at the Peoria laboratory. Possibility is fairly good that this effort will be well supported with funds.

E. Exchange of Plant Germplasm Teams with the Peoples Republic of China (PRC)

Through agreements developed between the US and the PRC during Secretary Bergland's Team visit to the PRC last November, the two countries are exchanging three teams of scientists this year. One of these teams is concerned with plant germplasm. The other two are on animal science and health and biocontrol. The Chinese germplasm team is in the US now (July 9 - August 5) and our team will be going to the PRC on August 14. The Chinese team is interested in how our National Germplasm System is organized and how it gets the job done of maintaining germplasm. Our team is specifically interested in soybeans, vegetables, sorghum, and millet. Our team will not be collecting from the wild but will be selecting desirable types from PRC germplasm increase and evaluation plots.

F. SEA/AR Plant Germplasm Coordinating Committee

The Committee had no regular meeting last year. W-6 met in October and the PRC trip came in November. We did have a telephone meeting to finalize plant exploration recommendations. Travel restrictions make it very difficult to get together unless we schedule the PGCC meeting around a national meeting of some kind. What about having it following the Agronomy meetings in Fort Collins in August?

G. Narcotics Program

This program is moving right along, especially in crop substitution work in Thailand. We now have at least ten crops which singly, or in combinations, can more than replace income lost from not growing illicit opium poppy. Marihuana threatens to replace heroin as our number one drug problem and cocaine is not far behind. We are beginning a promising research project to determine how we might manipulate biosynthesis systems in narcotic plants so that they no longer produce the narcotic principles. We are closing out work on *Papaver bracteatum*. Productive lines are now available and we know how to grow them. We can pull this new crop off the shelf when and if circumstances so dictate.

June 1979

Report of
Germplasm Resources Laboratory
to the
Regional Technical Committees on Plant Germplasm

Laboratory Personnel

Several changes in personnel and research programs have taken place during the past year. On October 1, 1978, R. A. Kilpatrick and John G. Moseman were transferred to the Field Crops Laboratory of PGGI. Dr. Kilpatrick's research is concerned with screening the small grains collection for rust resistance, largely through the International Rust Resistance Nurseries. In his personal research, Dr. Moseman screens the barley collection for disease resistance and interacts closely with geneticists in the Field Crops Laboratory. At Beltsville, institute chairmen are members of one of the laboratories in their institute.

At the beginning of FY 1979, also, the positions of Germplasm Resources Laboratory Chief and Plant Introduction Officer were separated. Harold F. Winters became Laboratory Chief, and George A. White retained the position as Plant Introduction Officer for the Laboratory. Dr. White had carried the responsibility for both positions since the retirement of Howard L. Hyland on April 30, 1977.

Muriel J. O'Brien presented a paper, "Recent Trends in Late Blight Forecasting," at the International Seminar on Approaches Towards Increasing the Potato Production in Developing Countries held at Jullundur, India, on November 20-22, 1978.

Harold F. Winters and Raymond L. Clark collected germplasm of tomatoes, squash, peppers and other vegetable crops in southern Mexico and Guatemala during late January, February and early March. This was the final exploration for tomatoes, started in South America during 1974.

Effective March 5, 1979, the U.S. Plant Introduction Station, Glenn Dale, Maryland, was transferred from the National Arboretum to the Beltsville Agricultural Research Center. Administrative supervision of the station was assigned to the Germplasm Resources Laboratory. This change seems appropriate since quarantinable plant introductions are maintained at Glenn Dale.

Joseph C. Craddock and Arthur S. Barclay collected small grains in Chile from January 31 through March 2. Their total collections of 520 cereals included 330 *Triticum*, 128 *Avena*, 30 *Hordeum* and 29 *Secale*.

Harold F. Winters attended the second meeting of the Phaseolus Germplasm Advisory Committee of the International Board for Plant Genetic Resources held at Cambridge University, Cambridge, England, on July 26-27, 1978. Bean descriptors were selected and locations for primary and backup seed collections were discussed.

Joseph C. Craddock attended the second meeting of the International Board for Plant Genetic Resources Wheat Advisory Committee meeting in Rome, Italy, on September 25-27, 1978. The committee decided on a basic list of descriptors for wheat and Aegilops.

George A. White presented a paper entitled "The Plant Introduction Inventory" at the Tropical and Subtropical Plant Germplasm Seminar held at Miami, Florida, on December 11-13, 1978.

Notable PI's

Longwood Gardens added six new cultivars to their releases of New Guinea Impatiens bred from the collection introduced in 1970 by H. F. Winters and J. J. Higgins. The new releases are named 'Carnival', 'Headliner', 'Majorette', 'Rainbow', 'Ringmaster Improved' and 'Skyrocket'.

The 'Oregon Cherry' tomato, a highly determinate, compact, fruitful and early maturing cultivar, was released by Oregon State University. Its parentage traces to PI's 213189, 298633 and possibly to the cultivars 'Farthest North' and 'Immuna Prior Beta' used as parents which have PI numbers also.

The National Arboretum released 'Nakada' holly, a staminate cultivar of *Ilex crenata* collected in 1957 from Japan as PI 236233 by John L. Creech. In growth, 'Nakada' is a stiff, erect, few-stemmed, densely foliaged evergreen shrub.

Two red-fruited, evergreen holly cultivars were released by the National Arboretum - 'September Gem', PI 378148, and 'Clusterberry', PI 422216. Staminate parent of the latter was *Ilex leucoclada*, PI 227174.

In addition, 'Sparkleberry', a red-fruited deciduous holly, was released with its staminate counterpart, 'Apollo'. Both cultivars have PI 235509 as one parent.

An introduction of *Callisia repens*, PI 406942, collected at Guinote, Honduras, by H. F. Winters and R. L. Clark in February, 1976, has rapidly become a popular item in the foliage plant trade. It has been renamed "Bolivian Jew" by the trade because of its resemblance to a miniature Wandering Jew.

Plant Introduction and Exchange

During 1978, documentation of 10,656 plant introductions was completed. Important collections or groups of crop germplasm included sugarcane from Indonesia, forages from Mediterranean countries; soybeans from Japan and Korea; fruits, ornamentals, and palms from Brazil; Triticum species from the Mid East; University of North Wales collections of barley and wheat from Nepal and Northern India; triticale from Canada; mung beans from Taiwan; and rice from Pakistan. Germplasm exchanges involved 2,262 shipments consisting of 221,976 items to 120 countries. These totals include more than 37,000 samples for cereal and cotton nursery programs.

Sixty-one shipments to 32 countries included 12,662 samples as part of the Plant and Seed Materials RSSA. Most of the samples were cereals for Korea and Egypt. Germplasm needs were identified through two on-site AID mission visits and also resulted in the introduction of cereal cultivars and a few miscellaneous species into the U.S.

The documentation of plant introductions has now been converted from word processing to a computer system.

Exchanges of plant germplasm with People's Republic of China have picked up considerably. Dr. W. H. Gabelman, University of Wisconsin, initiated a two-way exchange that resulted in the introduction of 500 vegetable accessions (PI 432713-433212). Of these, 300 are tomatoes. There is a continuous incoming trickle of tree and nut seeds, peanuts, soybeans, cotton, and other crop species. Our shipments to China are made through William Davis, Agriculture Attache, American Embassy, Beijing (Peking). Recently, a procedural change in processing plant materials has been implemented. The embassy must now have the Chinese Plant Quarantine Station, Ministry of Agriculture, inspect the materials, issue a certificate, and return the materials to the embassy for posting. The post office will not accept the materials without the certificate.

Arrangements are being made to complete the introduction of two large sorghum collections: 1. Ethiopia - 2788 samples. Because of quarantine restrictions, the collection is to be grown in Mexico by CIMMYT. Harvested seed will be returned to the U.S. for PI documentation and distribution to the germplasm collection. 2. Yemen - 4467 samples. To be grown during the winter of 1979-80 in Puerto Rico. Information is being organized by Dr. Robert Voigt, University of Arizona, who while on AID assignment in Yemen, arranged to have the collection sent to the U.S.

Dr. B. L. Burson, Temple, Texas, collected about 650 accessions, mainly Paspalum, in Argentina, Brazil, and Bolivia earlier this year. The proposed exploration by Dr. Ron Haaland, Auburn University, to Yugoslavia for Dactylis, Festuca and Trifolium was cancelled but hopefully can be rescheduled for 1980.

Forwarding plant materials to foreign countries. Recent, strict interpretation of an international agreement whereby all participating countries agree to adhere to quarantine import requirements of all signees for plant materials has created several problems and considerable delays in forwarding some shipments. In the past, shipments of experimental materials were not required to conform rigidly to these regulations. Now, however, all shipments must meet all requirements of the importing country or a phytosanitary certificate will not be issued by APHIS. Requirements for an import permit, additional declarations that a particular disease organism does not occur in the state or country of origin or a field inspection of the plants by a federal quarantine inspector often cannot be met. We are working out arrangements with several countries to allow exceptions for experimental shipments. For many countries, however, the shipments must be handled on a case by case basis. If you have questions about the import requirements for a certain shipment, contact the Plant Introduction Office. Awareness of the importing country's requirements is especially important for vegetative materials.

Receipt of foreign plant materials. When plant materials of foreign origin are sent direct through the mail, presented by foreign visitors, or sent to the Regional Stations or NSSL by U.S. scientists, please forward the seed to the Plant Germplasm Quarantine Center, Building 320, BARC-East, Beltsville, Maryland 20705, Att: H. R. Hanes. Include all associated information and, if appropriate, request PI number assignment. After quarantine inspection, the samples will be sent to the Plant Introduction Office for documentation and distribution.

A Seed is a Promise.

Agronomic Crop Germplasm

New accessions added to the Small Grains Collection totaled 2,285 (foreign - 2,151; domestic - 134). In the seed increase nursery at Mesa, Arizona, 9,108 rows were fall-sown (1,226 for International Rust Nursery; 1,274 in the detention nursery of new foreign introductions and 6,608 to increase and replenish seed stocks. The Aberdeen, Idaho, nursery consisted of 7,667 one-row plots (2,100 fall-sown and 5,567 spring-sown). In the greenhouse at Beltsville, Maryland, 1,176 introductions were increased. New introductions are classified for a standard list of descriptors that includes the color of awns, chaff, straw, and kernel; length and type of awns, type of spike or panicle, plant height and any unique character. Entries being grown to replenish seed stocks are checked for integrity, variables are rogued.

Small grain accessions totaling 204,436 (145,836 foreign and 58,600 domestic) were sent to plant scientists in response to 449 requests (226 foreign and 223 domestic).

Research has continued on the development of a system for data entry and retrieval in the computer file of the small grains collection. The system now allows up to 11 times as much data to be punched in the same amount of time as previously by using a computer generated nursery form. Work has commenced on the design of a computer file to efficiently store this information as well as an edit-update program to maintain the file.

To identify wheat germplasm with multi-useful characteristics, the selection of accessions with both long ear-filling period and short maturation time was chosen by aid of the computer to test the effectiveness of one set of data. This is a cooperative study with P. S. Baenziger, Field Crops Laboratory.

Foreign exchange of rice germplasm was continued as was the transfer of stocks to NSSL. Exotic germplasm received during 1978 consisted of 240 accessions from 16 countries. Approximately 400 accessions were grown in greenhouse quarantine at Beltsville for seed increase. Germplasm of 3,000 rice accessions was increased at El Centro, California, in cooperation with the University of California. Agronomic data, from 7 field stations for several of the years, 1969-78, have been automated and placed in the Rice Data Bank of the Washington Computer Center (WCC). Work is continuing on the collation and automation of rice pathological data.

Characterization of the *Hemarthria* collection is being continued including genome composition (chromosome counts) and determination of leafiness. The acquisition and evaluation of ornamental grasses was continued. The screening of 250 accessions of *Lolium perenne*, grown at two locations, for winter hardiness and leaf disease resistance was completed.

An elite set of 114 wheat selections resistant to powderly mildew was developed and released. Over 12,000 wheat selections in the USDA wheat collection maintained at BARC were tested for their reactions to a composite of cultures of *Erysiphe graminis tritici* which incites the disease powdery mildew. The resistant selections were evaluated by cooperators for their field reactions to the pathogen. Selections resistant in all field tests were tested again with additional cultures. The 114 selections are those which were resistant in all tests. They have been distributed and are being utilized by plant scientists in many countries to develop improved wheat varieties.

Seed of three international and five uniform wheat and oat nurseries consisting of 1,091 entries were sent to cooperators at 140 locations in 45 countries for determining reactions to different biotypes of disease producing organisms. Seven progress reports on reactions of wheat and oat entries in the 1977 international and uniform rust and 1978 mildew nurseries were prepared and distributed to cooperators of the USDA cereal disease nursery programs.

Hordeum spontaneum accessions introduced from Israel have been evaluated for reactions to cultures of pathogens inciting powdery mildew, leaf rust, scale and net blotch. Seed of resistant accessions have been sent to other scientists for greenhouse and field evaluation.

Horticulture Germplasm

Evaluation of seedling progenies of rosemallow hibiscus for flower color, durability of flower and stem strength was continued. The inheritance of white flowers has received particular emphasis. Two outstanding pink-flowered clones were selected for release.

Introductions of New Guinea Impatiens with non-branched pedicels crossed with seedling selections showing branched pedicels gave a low percentage of plants showing this characteristic.

About 500 plants of the more promising anti-cancer genera, Putterlickia, Maytenus, Brucea, Baccharis, Colchicum, Tripterygium and Cephalotaxus were grown at Glenn Dale in 1978. About 200 plants were distributed to U.S. researchers.

The first data has been collected on the cold hardiness of Tripterygium. Ninety-five of 100 plants survived the cold winter of 1977-78. Although they were killed to the ground, buds from their crowns grew into four-foot plants during the summer of 1978.

Several hundred plant introductions were received at Glenn Dale, established, propagated to large numbers, inspected and/or tested for all manner of insects, eggs, and disease agents during 1978. Many arrived as a result of SEA-AR collection trips to Eastern Europe and to Central and South America. They include 266 pears, 78 bulb items, 80 potatoes, 45 camellias, 47 other deciduous fruits, and 83 miscellaneous grasses, ornamentals, brambles, etc.

Distributions of germplasm from Glenn Dale included 800 scions and 95 plants of pome fruits on 53 orders; 740 scions of the new "Whitehouse" ornamental pear on 21 orders, 324 bulbs on 20 orders; 213 scions or plants of camellias on 19 orders; 472 plants or cuttings of other woody ornamentals on 23 orders; 180 plants of coffee, 219 of potato, 18 of sweet potato on 10 orders; 177 seed or plant items of medicinal crops on 36 orders, and about 50 miscellaneous distributions of older germplasm from the several repositories.

New-crops Germplasm

Sixteen cultivars and introductions of kenaf were evaluated for reaction to Botrytis cinerea in the growth chamber and field. The cultivar, Everglades-71, and the introductions, 329184, 329187 and 405044, were consistently resistant in the growth chamber and field. Reaction to

thirty-two herbicides was evaluated in the greenhouse and the 9 most promising herbicides were evaluated in the field at Beltsville, Maryland, and Savannah, Georgia. Trifluralin or profluralin treatments resulted in the best yields at Beltsville, and trifloralin or profluralin-prometryn tank mix resulted in the best yield at Savannah. Responses at both locations indicated sensitivity to bifenox. Sensitivity to prometryn, methazole and to fluometuron was also noted at Beltsville. Sixteen kenaf cultivars and introductions demonstrating differential cold tolerance in the growth chamber were evaluated for cold tolerance in the field. Field reactions and growth chamber reactions were generally consistent.

Reaction of the most promising introduction of Stokesia laevis (PI 346981) to 23 herbicides was studied in the greenhouse. Sensitivity to prometryn, alachlor, linuron, chlorobromuron, naptalam, and propachlor was noted. Attempts to establish a herbicide study and fertility level study with PI 346981 by direct seeding resulted in very poor stands. Results indicate the necessity of breeding and seedling vigor in this species. A row width X plant population study was established using transplants. Seed production from polycrosses was delayed because lengthy vernalization is needed to induce flowering. Nurseries will be established by fall, 1979.

Seed yields of Limnanthes alba were low in Oregon due to poor weather conditions. The selection, ORL77-83, had the highest yield with 1034 kg/ha. Ammonium sulfate reduced seed yields whereas boron and copper increased yields. Date of planting did not affect seed yield. Ranrod and hoelon controlled annual ryegrass without reducing Limnanthes seed yields. Seed production of Crambe spp. was poor.

A strain of Lesquerella fendleri was developed which exhibited non-dormancy and good plant type. However, no resistance to seed shattering was found. A mutation program was begun in an attempt to induce a mutation for non-shattering.

Pathology, New Crops and Horticultural Crop Germplasm

A new soft-rot disease of Cucumis melo, cantaloupe, was reported. This constitutes the first report of a Phomopsis sp. on cantaloupe fruits. Tests demonstrated the virulence of this species and several other Phomopsis and Diaporthe spp. on selected members of the Cucurbitaceae and defined the influence of temperature on the conidial germination, germtube development, and linear growth of the cantaloupe Phomopsis. The Diaporthe state of the fungus was induced to form in vitro on stems of Glottidium sp. This in vitro technique aids the rapid identification of the decay in cantaloupe fruits, and the perfect state also can provide a test organism for evaluating other members of the Cucurbitaceae for

resistance to soft-rot decay. The perithecia, asci, and ascospores of the cantaloupe Diaporthe are distinct from all other Diaporthes, and therefore a new species, D. melonis Beraha & O'Brien, was described.

Fusarium oxysporum was demonstrated to be seedborne in Spinacia oleracea, spinach. The presence of the fungus in excised embryos indicates that infected seeds can serve as a potential inoculum source in spinach-growing fields.

Two hundred twelve PI accessions of Solanum melongena (eggplant) were evaluated for resistance to Verticillium albo-atrum, wilt, in replicated tests under controlled environmental conditions. Ten lines from India and one from Burma possessed high levels of resistance. Tests indicate that useful levels of resistance to Verticillium wilt can be found in the PI eggplant accessions. Preliminary tests indicate that, using adjusted inoculum levels, more lines exhibiting resistance and possibly a field-type immunity would be found.

At Glenn Dale, indexing tests for latent viruses were performed on 30 woody and herbaceous ornamental introductions by mechanical transmission to herbaceous indicators, or by electron microscopy. Virus was detected in Peperomia, Stenomesson, Amaryllis, and orchids. Virus was also detected in 10 of 211 grass introductions, 21 or 45 potatoes, 10 of 16 pome fruits, 21 of 50 grapes, and in 5 of 90 miscellaneous species. The viruses were identified in about 80% of the cases. All virus-free introductions were distributed within the U.S.A. to one or more scientists. Infected PI's were either released with some restrictions, destroyed or grown under heat therapy to eliminate the virus, depending on its importance, quarantine regulations, and policy. About 180 new three-year tests were begun this year on recent introductions of the above genera.

In the field, the long-range studies on variability in symptoms caused by cultures of two apple viruses continue. At the moment, we do not know which viruses cause which diseases in some varieties of apples. Other field experiments deal with our search for resistance to virus infection, evaluation of new cultivars as virus sensitive indicators, etiology of 2 pear viruses (PLV and Red vein), and effects of antibiotics on two apple diseases of unknown cause.

In the greenhouse, we've isolated, purified, and produced antiserum in rabbits to a virus from potatoes from the USSR. It was identified as cabbage black ring virus. Much effort was spent on a virus from Peperomia identified as cucumber mosaic, on a virus from aspen which may be a cucumovirus and on trying to purify a latent virus from pear but without much success. Some effort was made to characterize a virus from a Brazilian dahlia PI and from a South American Stenomesson PI. This effort continues.

Our primary research effort has been on a new phenomenon in plant virology - an infectious ribonucleic acid that is associated with but not part of cucumber mosaic virus. Some very significant observations were made during 1978 - primarily that this RNA is able to regulate disease expression in several important crops. This RNA is produced only when CMV is in the plant with it. In some crops it permits the CMV to kill the crop (tomato). CMV alone does not ordinarily kill tomatoes. In other cases, it protects the crop from the usual disease that CMV causes, and we see essentially healthy plants resulting (tabasco pepper). We now know that this CARNA 5 decreases or increases the usual affects of CMV in several other crops - cucumber, pumpkin, corn, lima beans, etc.

In spite of many experiments, the question on the origin of CARNA 5 remains unanswered. We know it, like CMV, is aphid transmissible. We also know that cultures of CMV from 10 places in the U.S. support CARNA 5. Interest in this research is high among colleagues. Details are described in two Science reports. All of this work has been in cooperation with H. E. Waterworth and J. M, Kaper, USDA Virology Laboratory.

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1979 Report of the
National Seed Storage Laboratory
to the
National Plant Germplasm Committee
and to the
Regional Technical Committees on Plant Germplasm
by
Louis N. Bass, Director

The National Seed Storage Laboratory experienced a very busy year with the receipt and distribution of numerous seed samples, many requests for tours of the Laboratory and talks by members of the professional staff. Over 735 visitors from 32 states and 26 foreign countries toured the National Seed Storage Laboratory. This includes several grade, high school, and college classes.

The past year's activities are summarized as follows:

Germplasm Preservation

The 4,261 seed samples added during 1978 brought the total seed lots in storage on September 30, 1978, to 100,059. During 1978, 2,269 germplasm samples, including 1,072 virus indicator samples, were distributed to 164 scientists in 23 countries.

Arrangements were made for seed increases of approximately 3,000 accessions that were either low in germination or in number of seeds. Seed increase samples received totaled 2,055. Approximately 26,400 germination tests were made on stored and incoming seed samples.

Computer records were proofread and updated. Inventory requests were filled with computer printout seed lists for the specified crops.

Viability and Storage Research

Heat-sealable packaging materials which contain a foil layer continued to provide good moisture protection. Seeds stored at temperatures below freezing continued to retain their viability.

Seeds of 65 flower species were tested for possible damage by cooling to -196 C; 54 species showed no damage and results were variable for 11 species. Seed of 180 selections of 34 species were placed at -196 C for indefinite storage.

A cooperative study with BLM and the FS was initiated to investigate the possibility of storing seeds of 30 tree species in liquid nitrogen.

Damage to sesame seeds caused by immersion in liquid nitrogen and subsequent rewarming was minimized by reducing seed moisture to less than 10% before cooling at -1 C/min or to between 4 and 8% before cooling at -200 C/min. Maximum safe seed moisture content for sesame seeds was found to be 10%.

Maximum safe moisture content for sorghum seeds subjected to storage in liquid nitrogen was found to be between 17 and 18%. Seeds of 5 lettuce cultivars at 3.9 to 19.2% moisture, subjected to temperatures from 5 to -196 C, showed no loss in viability at 5 and -18 C, severe damage at -70C at moistures above 13%, and variable damage at -196 C.

Three of 22 chlorophyll deficient isolines showed a significant decrease in storage life of the homozygous recessive genotypes as compared to the normal phenotypes. Studies with isolines for various nonlethal dominant and recessive genes also showed significant differences in rate of deterioration among isolines. Studies comparing sib-mated and self-pollinated seeds were initiated.

Using data from a 3-year study of alternating cycles of deterioration and regrowing of an artificial mixture of snap bean cultivars, a mathematical model can be constructed that will predict the performance of a mixture at various deterioration levels. Days to flowering provided a good indicator of genotypic differences within individual P.I. bean seed samples.

Artificial aging of pea seeds delayed the onset of first mitosis in root meristems when the seeds were germinated. Root lengths at which first mitosis occurred were longer (6-10 mm) in aged seeds than in the control (4 mm). The number of dividing cells also decreased with increased deterioration. Artificial aging of barley seeds increased the number of aberrant anaphase cells at first mitosis. Most aberrations were single fragments or single bridges which appeared to be eliminated with successive cell divisions.

About 100 barley genetic stocks were grown and the characteristics were recorded. Twenty-three genetic stocks were received from Canada, Finland, Germany, and Italy. Some 50 genetic stocks were sent out to barley workers. Eleven multiple genetic marker stocks were produced.

Cooperation with IBPGR

The National Seed Storage Laboratory is cooperating with the International Board of Plant Genetic Resources. During the past year, 913 samples of sorghum and millet from Kenya and 63 Ethiopian wheat samples from Bari, Italy have been received.

Facility Needs

With the increase in rate of acquisition of additional accessions generated by cooperation with the International Board of Plant Genetic Resources, it appears likely that available storage space will be fully utilized within the next five to eight years. Therefore, a request for planning funds for an addition to the National Seed Storage Laboratory has been submitted.

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6-8-79

Report for 1979 Meetings of the
W-6, NC-7, and S-9 Technical Committees

Northern Regional Research Center

General Developments at NRRC--Budgetary and staffing problems during the past few years have forced consolidation of the Horticultural and Special Crops Laboratory's Annual Fibers Research Group and the Paper Research Group in the Cereal Products Laboratory. Although kenaf research funds were restored in the FY 1979 budget, we do not expect this to happen again in the upcoming budget for FY 1980. However, with the increased interest in biomass-energy research, the high yields of kenaf make it a front runner among prospective candidates for this new purpose. It is expected that research emphasis will shift from pulping and paper production research to studies on converting lignin and cellulose to desirable forms of energy and chemical intermediates.

Staffing restrictions also have produced problems in highly ranked projects, such as the chemical analyses for the USDA soybean breeding program. Analysts who have left the laboratory can only be replaced with student help and part-time or temporary employees. One scientist retired after a long, distinguished career in agricultural research. Another left to pursue a new career in industry. Consequently, several projects had to be curtailed or terminated to consolidate and augment other research areas. Despite these pressures, progress has been excellent on many fronts during the past year.

New Crops Screening--Over 400 seed samples were collected from the wild from Illinois and an additional 108 samples were received from abroad. Of these, 156 were screened for unusual chemical properties. Many exhibited unusual results from TLC, GLC, IR, and UV analyses. Of the 112 oils converted to methyl esters and analyzed by gas chromatography, *Prunus cerasoides* showed 44% conjugated trienoic fatty acids, *Portulaca quadrifida* had 93% cyclopentenyl fatty acid (first time these acids have been found outside the Flacourtiaceae family), and a number of Compositae showed *trans*-3 unsaturation. Glass capillary gas chromatography has pointed to a number of heretofore unobserved unusual constituents in the methyl esters from seed oils, particularly to large amounts of *cis*-vaccenic acid in the Meliaceae (30% in *Entandrophragma utile*). Lactobacillic acid (13%) has been found for the first time as a constituent of seed oils in *Byrsocarpus coccineus*.

For precise organization and easy accessibility, the total seed inventory and a good part of the associated chemical data have now been entered in the laboratory computer. This library of information provides data on 14,079 accessions of approximately 7000 plant species, including plant name with authority, family, name of collector and

location; quantity received and balance on hand; NU numbers, cross-referenced with other collection numbers; seed weight; percent moisture, percent nitrogen, percent oil; HBr titration, TLC, IR, UV, refractive index, and iodine value for the oil; and fatty acid composition as derived from GC. The following is an example of one accession of Lesquerella:

```
SAMPLE NO.? 46428

46428   GRC --       BAL 12200   LCC 7 5 1
LESQUERELLA GORDONII (GRAY) WATS.  CRUCIFERAE  BARCLAY, ARIZONA 1911
--  GRC--45000 GRAMS
 CRAN: SEED  WT/M: .300  %H2O: 6.6    %N : 3.7    %O : 27.1  STCH: -
 HBPS: .9    TLC : NH  IRED:  2.6    UVCD: C
  IV O: 92.7    IV C: 89.2     RI : 1.4714
   12:0= TR  13:0= TR  15:0= TR  15:1= TR  17:0=  .1%  17:1=  .1%
   14:0=  .1%  14:1= TR  16:0= 2.0%  16:1= 1.4%  18:0= 1.6%
   18:1=23.6%  18:2= 6.4%  18:3= 5.1%  20:0=  .1%  20:1= 2.1%
   20:2= TR  22:0=  .1%  22:1= 1.2%  24:0=  .7%  21.4(27.1)= 1.8%
   19.4(24.5)=  .6%  21.4(26.5)=53.3%
    53% LESQUEROLIC ACID
```

Search programs have been written to retrieve data in almost any desired format. Printouts can be generated on single accessions or species, on all accessions in a particular genus or family, or even on all plant species from Kenya that have seed oils with high oleic acid content.

Chemical Analyses and Methods Development--Gas chromatography/mass spectrometry was used to delineate the complex combinations of acids and alcohols making up the wax esters of sperm whale oil. By using the unsaponifiables of olive oil, a gas chromatographic method for detecting adulteration of virgin olive oil with residue-B olive oil was developed. An HPLC method was developed for analysis of multi-acyl triglycerides.

Chemical composition was provided on 351 samples for plant breeders. This includes oil percentage, fatty acid composition, and glucosinolate amounts for 139 Brassica samples for Oregon State University; oil percentage and fatty acid composition on 100 Limnanthes samples for Oregon State University; and oil and protein content in 76 Luffa samples for SEA-AR, Puerto Rico.

Over 12,000 samples were received from public soybean breeders throughout the United States and Canada. These samples were examined for their oil and protein content. In addition, more than 1180 soybean samples from the 1978 harvest were analyzed in cooperation with the Federal Grain Inspection Service. Work was started, in cooperation with Charles Brim, SEA-AR, North Carolina State University, on the analysis of 3000 soybean plant samples for nitrogen content.

Over 700 soybean samples of the southern germplasm collection were analyzed by gas chromatography for fatty acid composition. In general, most samples had the usual linolenic acid content (5-10%). However, a few samples were found with linolenic acid content as low as 3.9%. In a cooperative effort with Karl Norris, SEA-AR, BARC, fatty acid compositions were determined on 30 additional samples for a study on feasibility of using reflectance infrared for fatty acid determination. Chemical characterization of the northern germplasm collection has also been started in cooperation with Dr. R. L. Bernard of SEA-AR, Champaign-Urbana.

A rapid procedure for methionine analysis, involving reaction of methionine in soybeans with cyanogen bromide to produce methyl thiocyanate for analysis by gas chromatography, was evaluated. The results for this amino acid are consistently 40% lower than the standard oxidation procedure, and further study is necessary.

A rapid Kjeldahl nitrogen procedure was developed which can be used on samples unsuitable for the standard reflectance infrared method. A block digester and air scrubber were designed and constructed specifically for this method. The procedure, utilizing a single-channel Technicon autoanalyzer, was used for soybeans and soybean plant parts. The reflectance infrared procedure has also been improved. The number of samples ground per unit time has been doubled by placing six grinders in a wrist shaker and controlling the grinding time automatically. The reflectance infrared analyzer has been interfaced to a micro-computer. The computer prompts the technician, compares the data, and transmits valid data to the larger laboratory computer for permanent storage and report generation. These reports are sent to the cooperating breeders.

New Oilseed Crops Development--Several new crop prospects have progressed well during the past year:

Crambe: In cooperation with Murray State University, 45 acres of crambe are being grown (9 acres each on 5 different farms) to evaluate fertilizer and herbicide requirements. These agronomic studies will be expanded next year. USDA is developing a 3-year demonstration program for 1981-1983, in which 2000 to 4000 acres of crambe will be grown in cooperation with universities, processors, and end-use industries. During the last year, oil production will be over 2,000,000 pounds, and it is believed that thereafter crambe will either be established as a crop or will be abondoned completely as an object of further research and development.

Crambe is also being grown, together with kenaf, on sewage sludge-augmented stripmine land in cooperation with the Metropolitan Sanitary District of Greater Chicago. There are worries by the District and the coal industry that EPA may prohibit production of

of food and feed crops on stripmined lands in the future. Therefore, there appears to be increased interest in industrial and biomass crops.

Progress toward FDA approval for feeding crambe meal to cattle seems to be in its final stages. Four years of feeding trials have been published in the Journal of Animal Science 48(4), 758 (1979).

Cuphea: Short-chain fatty acids (C_8 and C_{10}) are apparently in great demand, short supply, and high priced. A German industry became aware of our early publications on Cuphea as a potential source of these fatty acids, sent a botanist to Mexico and Brazil to collect 50 species from this genus for evaluation, and is now growing some species in hectare quantities with good success. Recently, American companies have also expressed great interest in Cuphea. The market for these acids is between 20 and 60 million pounds and the price of these acids is above 80 cents per pound.

Vernonia galamensis: Formerly this East African ironweed species was known as V. pauciflora. Some British organizations have displayed great interest in this plant as a source of epoxy fatty acids. Fifty grams of seed, provided by NRRC, were increased to 200 kg in 2 years in Kenya without the problems so often displayed by V. anthelmintica in our early attempts. Additional agronomic tests in Puerto Rico and Costa Rica look even better.

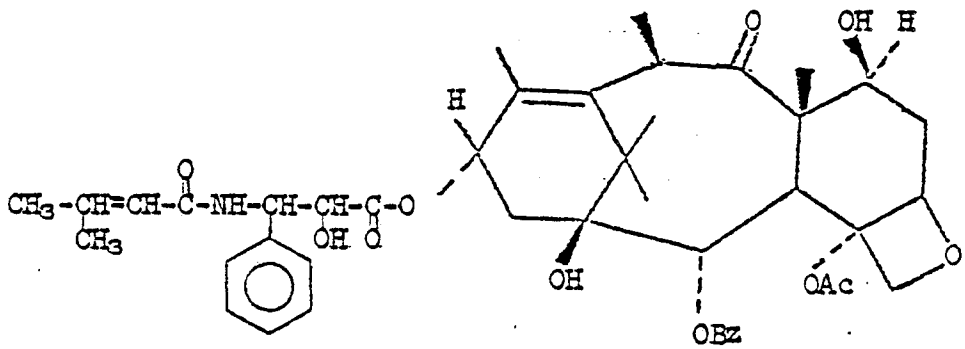
We were provided with 100 kg of the Kenya seed for processing studies and product evaluation. Oil extraction presented no problems after enzyme deactivation in the whole seed. The seed contained 40% oil and the decolorized oil contained 75% epoxy acid. The oil has been evaluated as a binder for baked coatings with enormous success. Acid, alkali, detergent, and solvent resistance are as high or better than traditional materials. Conical mandrel, direct and reverse impact, adhesion, and color tests are also equal or superior to existing products. Pigmented formulations will be tested next.

Jojoba: Plantations are increasing in size and number. Planted acreage is now estimated at 4000. Interest in the oil continues to be high, especially in the cosmetics industry. NRRC research centers on solvent and solid compatibilities of the oil in various types of formulations, determination of germplasm variations in oil composition and seed germination, and sex determination of young and mature plants by chemical and physical means.

Biological Activities--Our screening and characterization work on antitumor agents has been expanded to include an assortment of other activities. Cephalotaxus harringtonia continues to receive much attention, especially since mainland China's clinical studies have now included 200 human patients with excellent success. Although still plagued with low overall yields, we are now able to synthesize

harringtonine, and homoharringtonine. Tissue culture studies with C. harringtonia have centered around nutrient requirements and biosynthetic pathways of secondary metabolites.

Structural work on a new antitumor alkaloid from Cephalotaxus mannii, cephalomannine, has been completed; it has the following structure:



A new simple and cheap bioassay has been developed to identify and monitor antitumor and other biological activities by means of crown gall tumor on potato slices in lieu of expensive animal tests. This work was carried out in cooperation with Dr. Alan Galsky of Bradley University in Peoria.

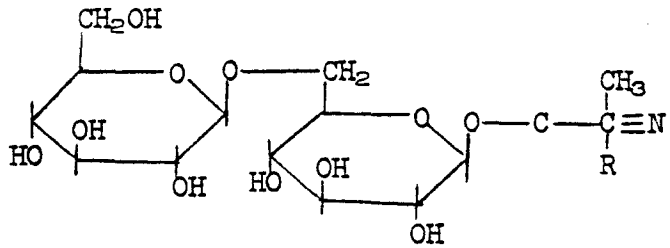
Ethanol extraction of 27 kg of Trewia nudiflora seed yielded 670 g of material with both insecticidal and antitumor properties. The active principles of this extract have now been enriched approximately 27-fold.

From tomatoes resistant to the fungus Rhizoctonia solanii, a stable extract has been prepared containing the resistance factor. Partial characterization of the extract indicates probable presence of active compounds other than tomatine. A stable extract of diseased peach tree wood has been isolated which attracts female peach tree borer moths in the absence of the wood. Fractionation of the fat-soluble extract of Apium sellowianum reveals that although two well-known furocoumarins (xanthotoxin and impellatoxin) are present, these are probably not the most active compounds as judged by our assay based on treatment of European corn borer larvae.

In cooperation with Dr. David Reed, SEA, Vincennes, Indiana, we are isolating and characterizing the principles that attract peach borer moths to diseased peach wood.

In cooperation with Dr. Wendell Burkholder, SEA, at the University of Wisconsin, we are evaluating essential oils, mainly from the Umbelliferae to control stored grain insects.

In cooperation with Dr. Ivan Palmer, South Dakota State University, we have isolated and characterized the compounds found in linseed meal that are responsible for protection against selenium toxicity in farm animals. The compounds are linustatin and neolinustatin:



R = CH_3 : linustatin
R = CH_2-CH_3 : neolinustatin

Botanochemical Producing Plants--In the on-going program for screening native wild plants, a few additional species have been identified as having some potential for development as botanochemical crops. Perhaps the most interesting new additions to the list of about 40 species with good potential are three woody shrubs, *Lonicera tatarica*, *Elaeagnus multiflora*, and *Xylococcus bicolor*. The *Lonicera* and *Elaeagnus* are fast growing, widely adapted mesophytes, and the *Xylococcus* is a xerophyte; all three contain more than 1% natural rubber and up to 5% oil, dry weight basis.

A statistically designed and analyzed yield-stimulation experiment with goldenrod *Solidago altissima*) and Canadian wild rye (*Elymus canadensis*) failed to give positive results using a chemical that stimulates rubber production in guayule (*Parthenium argentatum*), and another chemical designed to stimulate gutta production. Possibly, the failure of the chemical to stimulate rubber production in goldenrod relates to differences between goldenrod and guayule in biosynthetic pathways and rubber storage mechanisms.

Cooperative breeding studies have been implemented with USDA plant scientists at Beltsville and a private corporation. Agronomists are assessing wild populations of several species for genetic variations and growing plants in small test plots preparatory to making final selections of species for development. Also, at Beltsville, a breeding program has begun with poinsettia (*Euphorbia pulcherrima*) as a potential mutli-use botanochemical crop.

Processing studies preliminary to pilot-plant scale-up are continuing. Initial studies emphasize guayule processing, but cooperative arrangements have been made to process Utah-grown milkweed (*Asclepias speciosa*) for oil and fiber, and some Florida-grown Edison's goldenrod (*Solidago leavenworthii*) for resin and rubber.

Kenaf--One ton of kenaf soda pulp was prepared from 2 ton of kenaf by a hired industrial cooperator. About 100 kg was removed for evaluation and the remainder was bleached to 78% brightness with a three-stage sequence, chlorine-chlorine dioxide, alkali extraction, sodium hypochlorite. To enhance storability, the bleached pulp was dry-lapped on the NRRC pilot papermachine. A second industrial cooperator was identified and hired to defiber kenaf under several high-yield pulping conditions, to seek preferred conditions, and to produce sufficient quantities at the best conditions to allow pilot papermachine tests. American Newspaper Publishers Association, a consumer association cooperator, grew and harvested 30 acres of kenaf with SEA-AR technical assistance. The material will be used in future papermaking trials. Kenaf can be readily harvested and cut into 30-cm billets with an Australian sugarcane harvester. In cooperation with SEA-AR soil scientists and agronomists, kenaf salinity tolerance and the influence of salinity on fiber and chemical characteristics are being determined. Chopped kenaf stored 1 year in 12- to 15-ton stacks under cover at 70% solids suffered little loss; however, that stored at 30% solids lost 30% or more solids. Chemical preservatives, such as borax and sodium bi-sulfite, offered some improvement over untreated material.

Guayule (*Parthenum argentatum*) was processed to soda pulp. Liberated fibers were short and were obtained in about 30% yield.

Glucosinolates in Cruciferous Vegetables--Glucosinolates that yield thiocyanate ion are very important in cabbage. They comprise 68% of all glucosinolates in Savoy cabbage and 45% in white cabbage. A summary of all the domestic cabbage varieties available (63) plus a number of experimental strains is now complete. This establishes the current levels and patterns of glucosinolates available in U.S. germplasm. Most of this work was carried out in close cooperation with Dr. Paul Williams of the University of Wisconsin.

During the fermentation of cabbage to sauerkraut, all glucosinolates are hydrolyzed. Two major products appearing in kraut are thiocyanate ion (9-17 ppm) and 1-cyano-3-methylsulfinylpropane (16-25 ppm). This is the first documentation of a glucosinolate nitrile being present in processed food (see comment under Toxicology).

A novel glucosinolate, 3-hydroxypropyl glucosinolate, has been isolated and characterized from the wild plant *Erysimum hieracifolium*.

Toxicology of Glucosinolate Aglucons--(2S)-1-cyano-2-hydroxy-3,4-epithiobutanes from epi-progoitrin are hepato- and nephrotoxic to the rat. Feeding these compounds for 90 days at a level of 75 ppm or higher caused lesions similar to those caused by aflatoxin and pyrrolizidine alkaloid toxicosis. These are pre-tumor lesions and are not known to lead to tumor development.

In pregnant rats, the above compounds cause resorption of embryos or decreased fetal weight but were not teratogenic. Most toxic in this pregnancy test was 3-methylsulfinylpropyl isothiocyanate, followed by 1-cyano-3,4-epithiobutane and 1-cyano-2-hydroxy-3-butene. 1-Cyano-3-methylsulfinylpropane (in sauerkraut) is not teratogenic but causes minimal decrease in fetal weight at a dosage of 200 mg/kg on eighth and ninth days of pregnancy.

Other Related Developments--NRRC is contacted at an increased pace by representatives of governments, industries and academia, who want to learn about our past and present research on new crops and energy. We are closely cooperating on DOE and NSF funded programs executed at such organizations as Battelle, A. D. Little, and SaLUT. It is unfortunate that USDA does not play a lead role in these agriculturally oriented programs, although it is used so heavily to provide the expertise that has been gained in the recent past.

L. H. Princen, Chief
Horticultural and Special Crops Laboratory

SOUTHERN REGIONAL PLANT INTRODUCTION STATION
Report to S-9 Technical Committee
August 2-3, 1979

Plant Introduction and Seed Production

Seed or plants of 702 new introductions have been received since July 1, 1978. A total of 1930 introductions were planted at the Regional Station for seed increase and preliminary evaluation. Dr. R. R. Duncan of the Agronomy Department, Georgia Experiment Station supervised the growing of 1000 Sorghum bicolor PI's at the Regional Station. Dr. J. D. Norton, Auburn University is growing 200 PI's of watermelon and cantaloupe under a broad form cooperative agreement. Dr. D. E. McCloud, University of Florida, is growing 1000 peanuts for seed increase under a cooperative agreement. The $12,000 designated for seed increase of short-day plants in Puerto Rico was used to grow more than 2000 PI's: Sorghum, Vigna, Euchleana mexicana and Pennisetum americanum at the Institute of Tropical Agriculture, Mayaguez, PR.

Cataloguing and Distribution of Seed

Nine seed catalogs have now been printed in the new series by USDA, SEA. The number of seed packets distributed to the states in the region during the past year is as follows: Alabama, 549; Arkansas, 77; Florida, 1533; Georgia, 2008; Hawaii, 16; Kentucky, 173; Louisiana, 704; Mississippi, 251; North Carolina, 63; Oklahoma, 86; Puerto Rico, 2091; South Carolina, 427; Tennessee, 5; Texas, 630; and Virginia, 37. The number of packets distributed in other regions, overseas and to the National Seed Storage Laboratory is as follows: NC-7, 2464; NE-9, 3601; W-6, 1284; Foreign, 2099; and NSSL, 1254. The new seed packaging machine was used to package three small collections, Cicer arientinum, Solanum melongena, and Brassica species and sample orders were processed utilizing the computer. This was the first step of a feasibility study of the new system for processing new introductions, seed inventory control, seed increase, and seed distribution developed by Dr. Langford and Mr. Walden.

Screening for Disease Resistance

Watermelon Anthracnose: The cooperative tests with Dr. Rhodes of South Carolina and Dr. Norton of Alabama confirmed the resistance of PI's 189225, 271775, 271778 and 299379. Also resistant but significantly less resistant in at least one location were PI's 203551, 270550 and 271779.

Plant breeders frequently raise questions about the uniformity of the resistant reaction within PI's. A field experiment to test the accuracy of greenhouse screening for resistance to anthracnose showed that five highly resistant PI's were not detected in greenhouse tests and that the resistance of these PI's with the exception of PI 255136 was very uniform (Table 1) in the field test.

Table 1: Frequency of disease indicies on individual seedlings of six PI's resistant to watermelon anthracnose.

PI Number	Disease Index[a] 0	1	2	3	4	5
PI 244019	13	4				
PI 255136	10	4	5	1		
PI 255137	15	5				
PI 266015	1	6				
PI 270563	14	2				
PI 295842	8	10				

[a]Disease index on a 0-5 scale of increasing severity when 1 = trace - 20% leaf area affected and 5 = 81 - 100% leaf area affected.

In this test the entire collection of over 900 PI's was screened for resistance in six weeks. A minimum of six months is required to complete the same amount of screening in the greenhouse.

Cantaloupe Gummy Stem Blight: PI 266935, PI 296345 and G 22842 (PI number to be assigned) were equal in resistance to PI 140471, the standard gummy stem blight resistant PI. These new sources of resistance are being tested currently in several field tests.

Pepper, Tobacco Mosaic Virus: The entire collection of approximately 1800 pepper PI's has been screened for resistance to two distinct isolates of TMV. Resistance to both isolates was found in several species including *Capsicum annuum* PI's 224418, 224419, 224421, 224439, 244668, 246123, 257047, 281416, 286419, 288933 and 288941 and *Capsicum frutescens* PI's 159233, 159234, 159236, 159261, 241650 and 257118. A number of these PI's showed no infected seedlings out of 24-60 inoculated seedlings. The other resistant PI's showed 1 to 5 infected seedlings in tests with California Wonder 300 showing 90% or more infected seedlings. Almost all PI's of *Capsicum pendulum* and *Capsicum pubescens* were resistant to the pepper isolate, PV1.

Cantaloupe, watermelon bacterium: *Pseudomonas pseudoalcaligenes* subsp. *citrulli* caused serious damage to cantaloupes in the 1978 nursery. The seed produced in this nursery will not be distributed since greenhouse tests indicate that a few seedlings were infected when seeds of certain heavily-infected PI's were planted in the greenhouse.

Budget

Funds for operating the Regional Station during FY-79 and the proposed budget for FY-80 are shown in the following table:

Regional Station Budget

Source of Funds	FY-79	FY-80
Regional Research Funds (Pooled)	$ 64,740	$ 73,740
Regional Research Funds (Georgia Station)	28,737	21,686
USDA - SEA-AR	170,100	236,000
TOTAL	$263,577	$331,426
Expenditures		
Personal Services	$194,920	$236,379
Equipment	10,000	10,000
Seasonal Labor	12,000	12,000
Operating Expenses	20,157	38,047
Travel	4,500	3,000
Seed Increase at Other Locations	22,000	32,000
TOTAL	$263,577	$331,426

New Facilities and Equipment

The new seed processing building is scheduled for completion by the end of this month. This facility will provide adequate space for the efficient processing of seed, record keeping and movement of seed into the adjacent seed storage building. Major equipment purchased during the year was as follows:

1. Seed blower for cleaning seed
2. Tractor-mounted herbicide sprayer
3. Scorepad data processor for taking field notes
4. Sickle-bar mower

S-9 Technical Committee Report
Subtropical Horticulture Research Station
Miami, Florida
August 2, 1979

P. K. Soderholm and R. J. Knight

INTRODUCTIONS AND DISTRIBUTIONS, GENERAL One major distribution consisting of 92 species was made in September 1978. Altogether for the period June 1, 1978 through May 31, 1979 over three thousand individual introductions were distributed to cooperators (Table 1). Many of these were plants collected by Knight and Winters in South America in 1978.

During the same period 627 introductions were received bringing the total number of Station accessions to 25,755.

Other distributions of note were 18 tropical and subtropical fruit species sent to Guam to help rebuild the island's fruit crops that were destroyed in a severe hurricane, *Momordica charantia* fruit sent to medical researchers in Florida and Washington D.C. for anti-cancer investigations, *Hevea brasilliensis* (rubber) latex to Washington University, St. Louis for rubber production research.

COFFEE Seeds of rust resistant coffee varieties were distributed to Bolivia and seeds of 33 varieties found to be cold tolerant in our evaluation were sent to Argentina to be tested in their southernmost coffee growing area. In return, seeds of six cold tolerant selections were received from Argentine plantations at latitude 23°S. These will be included in our outdoor plantings. As a result of Mr. Soderholm's visit to CATIE, Turrialba, Costa Rica in September 1978, 133 varieties of coffee have been sent to Glenn Dale Plant Introduction Station and will eventually be added to our germplasm at Miami. Included in this group are types that are rust resistant, high yeilding, and hybrids of these as well as wild types collected by Meyer in Ethiopia, in the 1960's.

CACAO Transfer of cacao (*Theobroma cacao*) to the Mayaguez Institute of Tropical Agriculture, Mayaguez, Puerto Rico continues with 63 clones having been sent there during this year. Cacao collected in the wild in the Orients Province of Ecuador is being transfered to Miami at present.

Mr. Soderholm participated in a cacao collecting trip into the upper Amazon Basin in Acre Province, Brazil during April and May 1979. Sixty-three collections of wild cacao were made, many from trees showing no symptoms of witches' broom (*Crinipellis perniciosus*). This material will be screened at Brazil's Belem Experiment Station for disease resistance as well as desirable cropping characteristics. Vegetative

propagation of any desirable material will be included in the Miami and Mayaguez collections.

Forty-one species of ornamental potential were collected in the wild on this trip. These were mainly in the families Araceae, Marantaceae, Bromeliaceae, and Rubiaceae.

CITRUS VIRUS-INDEXING Indexing the collection of tropical species of Citrus and relatives at Miami is now nearly complete. At this writing, 16 of 18 introductions that were derived from asexual propagation have been indexed and demonstrated free of Tristeza and Exocortis viruses. This group includes the 'Mateira' mandarin, a small cold-tolerant tree, bearing a sweet, tangerine-like fruit, that has potential for dooryard planting. Approximately half-a-dozen more introductions remain under test. Two introductions, 'Thornless' key lime (M-19338) and 'Wainwright' pummelo (M-24345, possibly identical with 'Nakorn', a Thai cultivar) were found free of Tristeza but infected with Exocortis. Florida's Division of Plant Industry is currently making an effort to free 'Wainright', a fine-quality fruit that resembles a mild-flavored juicy grapefruit, so that it will be available for general distribution.

COLD-TOLERANT AVOCADOS Thirty-two trees are fruiting this season of 125 surviving members of a second-generation population of seedlings derived from M-18686, a cold-tolerant introduction of the Mexican ecological race. Originally, 176 seedling trees were planted. The great majority of the fruiting seedlings bear black or dark-colored fruit, suggesting that fruit color is controlled by more than one gene and that genes for dark fruit color are dominant to those for green color. Also most seedlings bear small (100 - 150 grams) or medium-sized (200 - 325 grams) fruit, but 2 trees of the group are bearing large fruit (over 400 gm), and one of these has borne bright green fruit for the past 2 seasons. Thus it is possible to select individuals combining cold tolerance with large fruit size and green color in the F_2 generation of hybrids between Mexican avocados and those of the other races (Guatemalan and Antillean), but such desirable individuals are in a definite minority.

The influence of the January 1977 freeze continues to affect this avocado population. Of the trees presently alive, 58 (almost half) were frozen to the ground but have recovered and grown back up, and 11 showed no evidence of injury to leaves or wood. Slight to moderate injury occurred in 23 trees, and the remaining 33 trees while not frozen to the ground experienced severe injury but recovered. Many trees frozen to the ground or severely injured are now growing vigorously but have not yet begun to bear fruit.

MANGO M-25776, a seedling of selection S-10 (M-4329) open-pollinated,

is of interest to growers to test for the export trade to Europe. Fruit weight of this selection (average 330 gm) is lower than that of standard commercial cultivars (cf. 'Tommy Atkins', average 520 gm), but the fruit is very firm, somewhat disease-resistant, and a very bright red in color.

M-19448, a seedling of M-1007, remains a selection of the finest quality that ripens in late-midseason. Efforts are continuing to cross it with 'Keitt' for improved late-season and 'Tommy Atkins' for superior mid-season cultivars.

LYCHEE Few lychee trees in experimental or commercial plantings in southern Florida bore satisfactory crops in the spring of 1979. A need exists to combine the genes for regular flowering in 'Amboina' (M-18243) with those for fruit of high quality that are present in 'Brewster' (P.I. 21204), 'Bengal' (P.I. 94066), and other introductions.

LONGAN In 1979 as in 1978 a longan introduction from Thailand (M-25274) promises to mature its crop later than those selections derived from 'Black Ball' (P.I. 89409), a Chinese introduction. In this manner the longan season in Florida can be extended from 3 weeks to a month over its previous duration. M-25274 bore fruit of good flavor last year, but seed size was larger than desired. Its regularity of production is a much-needed trait.

SELF-POLLINATING YELLOW PASSION FRUIT By mid-summer 1979 approximately 200 seedlings derived from self-pollinating 5 different introductions (collected in Brazil, Florida, and Colombia) were growing, as were another 75 derived through crossing self-compatible plants from different lines. Evaluation remains to determine the vigor and degree of self-compatibility in these groups of seedlings.

PINEAPPLE GERMPLASM Recent field plantings at Miami include 13 cultivars plus 2 distinct seedling populations. In addition, 3 new accessions await planting in the field. One seedling population of 90 plants derived from Ecuadorean stock includes a high percentage of completely spineless plants. These appear to have the Mendalian dominant "piping" gene which, unlike the gene that produces the partial spinelessness of 'Cayenne' pineapples, causes all leaves to be totally spineless (and thus relatively easy to handle). 'Rondon', collected last year in Brazil, appears to carry the same gene.

SUGARCANE The collection of sugarcane and related grasses now has 1,200 entries occupying 10 acres of station land. Rust, which is now found in some of the commercial plantings in Florida has been found on variety B-4362 but on no others in the germplasm collections.

ORNAMENTALS Thirty-two species and hybrids of *Sansevieria* were distributed to each of three cooperators during this period. The collection, which came to the station from the old Cotton and Cordage Fibers Branch in 1965 is down to about one-half its original 88 accessions.

Loss has been mainly due to difficulty in maintaining these vigorously growing plants whether in containers or in the ground. Identity of many of the accessions has been lost.

A third generation of African Tulip trees (Spathodea campanulata) have been planted. These are from controlled pollinations of yellow flowered F_2's and should be all yellow. If so, we will begin seed production of the yellow form to be distributed to nurseries.

Two plants of Cocos nucifera cv. Nino, P.I. 133135 have been growing in our field plots since 1939. Both trees have survived lethal yellowing disease that has ravaged most of the coconuts on the station. They are well-formed trees, bear an abundance of green fruit and are esthetically more suitable than the other resistant types. We are growing seedlings of Nino to be planted for further evaluation. This variety originated in the Philippines.

RECORDS Computerization of our inventory is more than 75% completed as of this date and should be completed by the end of the calender year. Entries are by genus and species with all pertinent information included such as P.I. and Miami numbers, family names, field locations, description, and collection information. Information can be retrieved in any of these categories.

The September 1978 distribution of 92 items was done by computer, which printed mailing labels, plant orders, and kept inventory of stock, greatly speeding up the whole operation.

We are now working on a program to assist in gathering information via Form S-138, Plant Introduction Evaluation Report.

VISITORS On May 11, 1979 the station was host to five botanists from the People's Republic of China. They expressed interest in establishing an exchange of plant material and information between their Institutes and our Station.

Table I. Distributions of Plant Introductions from USDA/SEA/AR, Miami, Florida, from June 1, 1978 through May 31, 1979

Destination	Number	Percent of total
Florida	2219	73.6
California	16	0.5
Rest of Continental U.S. and Canada	381	12.7
Hawaii, Puerto Rico and Virgin Islands	162	5.4
Rest of Antilles, Bahamas, Bermuda	32	1.1
Mexico and Central America	40	1.3
South America	51	1.7
Europe	69	2.3
Asia	5	0.2
Africa	5	0.2
Pacific Basin[1]	31	1.0
Total:	3,011	

[1] Australia, Guam, New Zealand, Philippines, Pacific Islands

Table II. Introductions Received at USDA/SEA/AR, Miami, Florida, from June 1, 1978 through May 31, 1979

Material	Number of Introductions received
Miscellaneous ornamentals and shade trees (includes orchids and ferns)	194
Tropical and subtropical fruits	346
Oil palms	2
Cacao	15
Coffee	31
Medicinal, chemurgic, and tropical vegetables	39
	627

Table III. Major Germplasm Collections at the Subtropical Horticulture Research Station, Miami, Florida as of January, 1979.

Name	Number of Species or Varieties
Acacia	15
Avocado	133
Bamboo	21
Bauhinia	20
Bougainvillea	28
Cacao	271
Cassia	17
Coffee	236
Cordia	16
Dombeya	14
Erythrina	18
Eucalyptus	29
Ficus	62
Mango	98
Palms	115
Passiflora	15
Rubber	3
Sansevieria	32
Sugarcane & related species	1200
Tabebuia	12
Terminalia	17

S-9 TECHNICAL COMMITTEE MEETING
REPORT OF THE SOIL CONSERVATION SERVICE
AUGUST 2-3, 1979

The following report of Soil Conservation Service studies with introduced plants is a condensed summary of the major genera established at the Florida, Georgia, Kentucky, Mississippi, and Texas Plant Materials Centers. These plants are in some stage of evaluation at the centers.

Some plants have evolved from the Soil Conservation Service plant selection processes and are in seed or plant increase fields for further study away from the Plant Materials Centers. These plants having promise for solving a conservation need are listed in the second part of the report. We have also summarized progress with acceptance of several released plants.

Summary of foreign plant introductions at the Soil Conservation Service Plant Materials Centers:

Brooksville, Florida Plant Materials Center - 292 foreign plant introductions are being evaluated at the center. The major genera and number of accessions being studied include: Acroceras 11, Cenchrus 26, Digitania 18, Glycine 50, Hemarthria 45, Paspalum 54.

Americus, Georgia Plant Materials Center - 266 foreign plant introductions are being evaluated. The major genera and number of accessions include: Hemarthria 31, Coronilla 31, Glycine 51, Lotus 15, Paspalum 35, Brackypodium 14, Arachis 30.

Knox City, Texas Plant Materials Center - 214 foreign plant introductions are being evaluated. Major genera and number of accessions include: Dichanthuim 27, Pennisetum 33, Cenchrus 84.

Coffeeville, Mississippi Plant Materials Center - 135 foreign plant introductions are being evaluated. Major genera and number of accessions include: Panicum 24, Paspalum 13, Viburnum 5, Agropyron 5.

Quicksand, Kentucky Plant Materials Center - 23 foreign plant introductions are being evaluated with major emphasis being placed on Festuca and Bothriochloa.

In addition to the foreign plant introductions, major emphasis has been placed on collecting and evaluating large assembles of native plants. These assemblies are being studied for potential to solve the high priority problems identified throughout the south. Genotypes are collected from a wide geographic area usually including several states and major land resource areas.

Foreign plant introductions that have been selected at the plant materials centers as superior germplasm are increased and tested under diverse conditions away from the centers. Some of the most promising plants in this category include:

Andropogon caucasicus, caucasian bluestem, PI-78758. Continues to strengthen in popularity in the north-central portion of Texas, shows to be more cold tolerant, has less rust problems, and is comparable in palatability to K.R. bluestem. It shows to be much more reliable in the north-central part of Texas than other old world bluestem types. Heizer, Texas PMS.

Andropogon caucasicus, caucasian bluestem PI-78758. Being increased at the Quicksand PMC, is included in three different studies conducted at the center and one off center, advanced study. It has been in field plantings for at least 5 years. It appears to be a good grass for stabilizing mine spoil. On a western Kentucky mine spoil study caucasian bluestem consistently gave a greater percent ground cover than tall fescue-sericea lespedeza mixture. From plots harvested in 1978 on the west Kentucky project, caucasian bluestem seeded alone and in a mixture with 'Appalow' sericea was among the highest yielding in the study. Henry, Kentucky PMS.

Arachis benthamii, PI-338282 - Is a stoloniferous perennial peanut from Brazil. The leaves are shorter and wider than the Arbrook peanut. The leaves are 3.5 - 4.5 cm long and 1.5 - 2.5 cm wide. The large stems support a generally erect growth habit (50 - 60 cm high).

PI-338282, like the Arbrook, possesses a deeply penetrating system of tap roots. This characteristic gives this legume a high potential for use on well-drained soils.

This variety has excellent hay and forage potential. It also has been observed to have high potential as a wildlife food (especially for deer).

As with many of the perennial peanuts (the Arbrook and Florigraze included) the Arben produces dark green vigorous growth. It produces a few bright yellow blooms. Roush, Florida PMC.

Arachis glabrata, Arbrook, PI-262817 - "Arbrook" is a rhizomatous, perennial peanut introduced from Brazil. The leaves and stems are larger than the recently released Florigraze (PI-421707) perennial peanut. They are approximately 4.0 - 5.0 cm long, 1.5 - 2 cm wide. The larger stems give it a more erect habit, with heights to 50 cm. Arbrook perennial peanut is very drought resistant with tap roots penetrating downward in the soil more than 100 cm. This characteristic gives it high potential for use on well drained soils. This variety is resistant to attack by insects and diseases including "leaf spot" which often affects peanuts. Roush, Florida PMC.

PI-262839, perennial peanut has done well on plantings where attention has been given on fertility needs of the site. Future plantings will have "Florigraze" used as standard. Smith, Florida PMS.

Arachis monticola, PI-263393 - This annual peanut spreads widely and makes good seed crops. It is difficult to harvest due to its seeding over such a long growing season. A strong point for this as well as the peanuts listed above is its high rating as a wildlife plant. Powell, Georgia PMC.

Arachis sp., PI-338279 & PI-338280. This annual spreading peanut shows promise for use on banks and highway shoulders. It has showy flowers. Seed produced in the Center are being used in tests on Georgia highways. Powell, Georgia PMC.

Calamagrostis pseudophragmites, PI-220584. This accession has good vigor and spreads rapidly by rhizomes. It produces abundant seedheads but seed production is very poor. Forage quality is unknown, but probably is rather poor. Presently it is being considered for use on mined areas, droughty sodium soil areas, shorelines, and other eroding areas. Billingsley, Mississippi PMC.

Afyan reedgrass is extremely vigorous and seems to be adapted to a wide range of soils, and in any climate that Arkansas, Louisiana, and Mississippi have to offer. Blan, Mississippi PMS.

Coronilla varia, crown vetch, PI-204871, PI-274040, PI-325260, PI-346776. These four show promise but need further testing. Powell, Georgia, PMC.

Cynodon dactylon, Tufcote, PI-142278. A 5000 square foot production plot is established at Coffeeville. This turf grass has proven to be a very good plant for high foot traffic areas which receive full sunlight. Billingsley, Mississippi PMC.

Digitaria macroglossa, long fingergrass, PI-299648. This digitgrass is a perennial bunch type with only moderate forage potential. Little seed is produced and propagation is accomplished by separation into tillers. This salt-tolerant grass has some application on coastal dune areas. However, this introduction may be passed by in favor of the native species. It has demonstrated quick, responsive growth in beach area plantings on droughty soils. Long fingergrass is not cold hardy. Because of the means required for reproduction, it is not being considered for forage use. Some moderate insect damage has been observed by army worms and other leaf eating larvae. Roush, Florida PMC.

Digitaria macroglossa, PI-299648, has demonstrated ability to persist under adverse conditions on the beach sands. Plant survival has been good where some native plants have not done well. This plant is not cold hardy in Plant Hardiness Zone 9, but does well in Plant Hardiness Zone 10. At present propagation has been by rooted cuttings as the plant has produced very few viable seed. Smith, Florida PMS.

Glycine ussuriensis, PI-163453, is an excellent reseeding, small seeded soybean that has promise as a wildlife plant. Powell, Georgia PMC and Billingsley, Mississippi PMC.

It is a hard seeded viney legume which produces heavy crops of small beans. The seeds are excellent quail and dove food. Blan, Mississippi PMS.

Hemarthria altissima, limpograss, PI-364875, is an "unnamed" cultivar from South Africa. This cultivar is a stoloniferous, perennial grass of the tribe Andropogoneae. To date three limpograsses have been released. They are Redalta, Greenalta and Bigalta.

The abundant green leaves of PI-364875 are broader and longer than those of Redalta. This cultivar is more competitive than the currently released varieties. Cold tolerance compares favorably with Redalta. This limpograss has an excellent forage potential and produces well on wetland flatwoods as well as some of the drier soils. Roush, Florida PMC.

Hemarthria altissima, PI-299993 - A fairly cold hardy forage grass that appears to have many of the attributes of bermudagrass. Powell, Georgia PMC.

Hemarthria altissima, PI-364344. This accession is considerably more cold hardy than any other Hemarthria evaluated at Coffeeville. Forage production and apparent quality are good. Rapid spread is by means of stolons. Billingsley, Mississippi PMC.

Indigofera pseudotinctoria, false Anil Indigo, PI-197015 - A large rooted legume that will grow well in deep sands. It is being tested for forage quality. Difficulty of harvesting seed and low seedling vigor are drawbacks. Powell, Georgia PMC.

It has withstood mowing and has spread from seed in field plantings on highway banks. McDonald, PMS, North Carolina.

Lespedeza virgata, ambro virgata lespedeza, PI-218004. A spreading type of growth that makes it valuable as a highway shoulder cover. Its low height makes it safe to grow on the insides of curves. We are growing this as foundation seed. Powell, Georgia PMC.

Additional certified seed production fields were established to supply seed for the Georgia Highway Department seedlings. Haynsworth, PMS, Georgia.

Lespedeza virgata shows promise as a legume for minespoil revegetation. New plantings are being made for information on the use of this plant on mined land renovation. Smith, Florida PMS.

Panicum coloratum, 'Selection 75' kleingrass, PI-166400 - Released in 1968, seed has quickly taken a prominent position in importance to other leading Texas forage grasses. 'Selection 75' has established well as far north as Vernon, Texas, with mixed results north of this area. Production was more than one million pounds of certified seed in 1978. A few problems have been encountered in the western part of the state with young sheep that graze kleingrass exclusively. The extraordinary winter of 1978-79 was the first time since the grasses introduction that established stands showed a significant amount of winterkill. Heizer, Texas PMS.

Panicum bulbosum, bulb panicum, PI-338655. This accession is an extremely good forage producer. Forage appears to be of a very high quality, also. This accession is not winterhardy at Knox City, but volunteers well from seed. Lorenz, Texas PMC.

Panicum miliaceum, dove proso millet, PI-196292. The superior selection from around 35 accessions grown on the Center selected for seed yield and vigorous growth. This has become extremely popular across the southern states as a wildlife plant. We grow foundation seed. Powell, Georgia PMC.

Extensive certified seed production fields will yield a considerable quantity of seed for the commercial market in 1980. Haynsworth, Georgia PMS.

Paspalum nicorae, PI-202044. This accession has good possibilities as a forage plant for well drained areas. It shows considerable cold injury at Coffeeville. The plants are very leafy, blue-green in color, and produce good amounts of seed. Fungus on seed is somewhat of a problem. Billingsley, Mississippi PMC.

Paspalum nicorae, PI-304004 & PI-310131. These two accessions, while not as hardy as Pensacola bahiagrass, have many of its good points. It spreads by rhizomes which makes it useful in certain situations. Powell, Georgia PMC.

Pennisetum purpureum, PI-300086. This tall growing grass has had very limited field data but trials have impressed cooperators with its production capacity once established. It seems to do best on moderately well drained sites and has been planted on a well drained soil where it has continued to produce a large forage yield. Smith, Florida PMS.

Pennisetum sp., buffelgrass, PI-315868. This accession of buffelgrass is very rhizomatous and produces ample seed. While not being as leafy as some accessions, forage production is adequate. It has survived two winters at Knox City with temperatures as low as 4°F. Lorenz, Texas PMC.

Pistachia chinensis, PI-21970. A shade tree with beautiful fall foliage that is eaten some by birds. Powell, Georgia PMC.

Pinus brutia, Afghanistan pine, PI-362153. Afghanistan pine (Mondel pine) is adapted to hot, arid conditions where rain is usually received only in the winter months. The tree's shape, color, and rapid growth rate give it potential for use in landscaping, windbreaks, shelterbelts, and Christmas tree production. Lorenz, Texas PMC.

Lespedeza cuneata, 'Appalow' sericea lespedeza has been in advanced studies on and off the center. It performs well alone and in mixture with caucasian bluestem and tall fescue, especially on mine spoil and roadside plantings. Yield from 'Appalow' is understandably lower than the taller growing sericea but percent ground cover is much greater. 'Appalow' was released jointly by SCS and the University of Kentucky in January 1978. Seven acres of foundation seed is being increased by the Kentucky Seed Improvement Association. Henry, Kentucky PMS.

Trifolium ambiguum, Kura clover, PI-325489, was a selection of a perennial clover for poorly drained soils. It spreads by rhizomes, and has filled in between the rows of an increase field at the Quicksand PMC. The plant probably will produce seed that is easier to harvest if seeds are broadcast rather than seeded in rows. Where the plant is not held up in the erect position, it has a tendency to drop the seed head to the ground. Kura clover is in a study at Quicksand with several grasses to hold the seed head up from ground level. Henry, Kentucky PMS.

Trifolium vesiculosum, Amclo arrowleaf clover, PI-234310. Compared with the old standard for the area, Crimson clover, this appears to be superior in all ways except earliness of fall growth and is not too far behind there. We are growing it under certification. Powell, Georgia PMC.

Trifolium vesiculosum, PI-233782. The variety 'Meechee' is a very large and late maturing clover. Foundation seed are produced at Coffeeville.