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

Oklahoma State University
Stillwater, Oklahoma

18-19 August 1977

Respectfully submitted,

Gordon M. Prine, Secretary

AGENDA

S-9 Regional Technical Committee Meeting
Oklahoma State University Union
Stillwater, Oklahoma 33126
18-19 August 1977

1. Call to order. 8:00 a.m. August 18, 1977
2. Introduction of Attendees
3. Official Welcome - Dr. Jay Murray
4. Approval of minutes, 1976 Meeting
5. Approval of Agenda, 1977 Meeting
6. Appointment of Committees
   a. Nominations
   b. Time and Place of Next Meeting
   c. Resolutions
7. Progress Reports and Research Plans
   Representatives of participating State and Federal Agencies
8. Remarks from Administrative Advisor - Dr. C. R. Jackson
9. Report from National Program Staff - Dr. Charles Lewis
10. Report from Germplasm Resources Laboratory - George A. White
11. Tours to Ornamental Research Unit under direction of C. Whitcomb and to Agronomy Unit under direction of James Kirby beginning 3:30 p.m. August 18.
12. Informal Meetings of Interest Groups (Evening 8/18/77)
13. National Seed Laboratory Report - L. N. Bass
14. Report on recent plant explorations - Arnold Davis and W. R. Langford
15. Feasibility of National Germplasm Information Service - Dr. Kanti Rawal and Charles Gerhardt
16. Germplasm Collections and Programs at:
   a. Mayaguez Institute of Tropical Agriculture - Dr. Franklin W. Martin
   b. Subtropical Horticultural Research Station - Dr. Bob Knight
17. Regional Plant Introduction Station Activities and Budget - W. R. Langford
18. Committee Reports
   a. Nominations
   b. Time and Place of Next Meeting
   c. Resolutions
19. Unfinished or New Business
20. Adjournment

1. CALL TO ORDER

The meeting of the S-9 Technical Committee was called to order by the Chairman, Richard J. Stadtherr (LA), at 0800 AM August 18 in Case B Room, Student Union Building, Oklahoma State University, Stillwater, Oklahoma.

2. MEMBERS AND VISITORS PRESENT

Name and Interest	Addresses	Phone Number
*David W. Bradshaw (Horticulture)	Clemson University Horticulture Dept. Clemson, S.C.	(803)656-3404
*Bill Fike (Agronomy)	North Carolina State Univ. Crops Raleigh, N.C.	(919)737-3267
*Arnold G. Davis (SCS)	Soil Conservation Service Technical Service Center Ft. Worth, Texas	(817)334-5408
Ernest C. Snook (SCS)	Soil Conservation Service State Office Stillwater, Okla. 74074	(405)624-4437
Charles F. Lewis (Genetics & Breeding)	Room 317, Bldg. 005 BARC - West Beltsville, MD. 20705	(301)344-3884
*Roy E. Sigafus	Agronomy Department University of Kentucky Lexington, KY	(606)257-2644
*Laurence N. Skold	Dept. of Plant and Soil Science University of Tennessee Knoxville, TN 37916	(605)974-7391
Don Peters (Entomology)	Department of Entomology Oklahoma State University Stillwater, OK 74074	(405)624-5527
R. V. Connin (Entomology)	Plant Introduction Station Experiment, GA 30212	(404)228-7255
John L. Caddel (Alfalfa Breeding)	Alfalfa Breeding Department of Agronomy Oklahoma State University Stillwater, OK 74074	(405)624-6410
*Richard A. Hamilton (Horticulture)	Tropical & Subtropical Fruit Breeding Department of Horticulture University of Hawaii 3190 Maile Way #117 Honolulu, Hawaii 96822	(808)948-7934

Name and Interest	Adresses	Phone Number
Franklin W. Martin (Horticulture)	Mayaguez Institute of Tropical Horticulture Box 70 Mayaguez, Puerto Rico 00708	(809)832-2435
*Clarence E. Watson, Jr. (Agronomy)	Forage Breeding Department of Agronomy Box 5248 Mississippi State, MS 39762	(601)325-4181
*John L. Bowers (Plant Breeder)	Dept. of Horticulture & Forage University of Arkansas Fayetteville, AR 72701	(501)515-2605
Carl Whitcomb (Ornamental Horticulture)	Department of Horticulture 360 Ag. Hall Oklahoma State University Stillwater, OK 74074	
*Richard J. Stadherr (Horticulture)	Dept. of Horticulture 235 Agron. Hort. Bldg. Louisianna State University Baton Rouge, LA 70808	(504)388-2729
*Gordon M. Prine (Agronomy)	University of Florida 314 Newell Hall Gainesville, FL 32611	(904)392-1811
* W. R. Langford Coordinator Regional Project S-9	Regional Plant Introduction Station Experiment, GA 30212	(404)228-7255
*C. R. Jackson	Administrative Advisor S-9 Georgia Experiment Station Experiment, GA 30212	(404)228-0982
George A. White	Chief & Plant Introduction Officer Germplasm Resources Lab, ARS Beltsville, Md.	(301)344-3228
L. H. (Bert) Princen (Chemistry - New Crops)	Chief, Horticulture and Special Crops Laboratory Northern Regional Research Cen. ARS Peoria, Illinois	(309)685-4011 Ext. 232 or 270
*Jim S. Kirby (Agronomy)	Agronomy Department Oklahoma State University Stillwater, OK 74074	(405)624-6417
Don Banks (Peanut Breeding)	Agronomy Department ARS Oklahoma State University Stillwater, OK 74074	(405)624-6417
Wayne Everett	Soil Conservation Service 101 S. Main Street Temple, Texas	

Name and Interest	Adresses	Phone Number
*A. J. Lewis (Horticulture)	Horticulture Department VPI & S.N. Blacksburg, VA 24061	(703)951-5019
David G. McHaffey	Acting Area Director Ga. - S.C. Area USDA/ARS, SR Tifton, Ga.	382-8245
Kanti Rawal	IS/GR Program 1229, University Avenue University of Colorado Boulder, CO 80309	(303)492-5056
*Oscar D. Ramirez (Horticulture)	Horticulture Agricultural Experiment Station College of Agriculture University of Perto Rico Rio Piedras, Puerto Rico 00928	767-9705
*Harold F. Winter (Horticulture)	Horticulturist Germplasm Resources Lab, P.G.G.I. Agricultural Research Center Beltsville, Md. 20705	(301)344-2020
Robert J. Knight, Jr. (Horticulture)	Research Horticulturist Subtropical Horticulture Res. Station, ARS/USDA 13601 Old Cutler Road Miami, FL 33158	(305)238-9321
Charles L. Gerhardt (Data Systems)	ARS Data Systems Applications Div. NAL Building Beltsville, Md. 20705	(301)344-3817
*Eli L. Whiteley (Agronomy)	Texas Ag. Exp. Station Dept. Soil and Crop Sciences College Station, TX 77843	(713)845-1426

3. OFFICIAL WELCOME - DR. JAN MURRAY

All S-9 Members and visitors were welcomed to Oklahoma State University by Dr. Jay Murray, Associate Director, Oklahoma Experiment Stations. Dr. Murray gave a brief overview of Oklahoma Agriculture and use of plant introductions in research in the State.

4. APPROVAL OF MINUTES

Dr. Bob Langford moved approval of the Minutes of the 1976 annual meeting. This motion was seconded and passed without opposition.

5. APPROVAL OF AGENDA

The tentative Agenda was modified slightly and the Agenda as shown in these minutes was approved by all present.

6. APPOINTMENT OF COMMITTEES

Chairman Stadtherr appointed the following Committees:

A. Nominations:	W. T. Fike, Chairman R. A. Hamilton R. E. Sigafus
B. Time and Place of Next Meeting:	R. J. Knight, Chairman J. L. Bowers J. S. Kirby
C. Resolutions:	E. L. Whiteley, Chairman O. D. Ramierz A. J. Lewis

7. PROGRESS REPORTS AND RESEARCH PLANS

A. State: Each State Representative gave his annual report. Copies of the reports are shown in Appendix A. The following persons and States Reported:

Representative	State
E. L. Whiteley	Texas
A. J. Lewis	Virginia
L. N. Skold	Tennessee
D. W. Bradshaw	South Carolina
O. D. Ramirez	Puerto Rico
J. S. Kirby	Oklahoma
C. E. Watson	Mississippi
W. T. Fike	North Carolina
R. E. Sigafus	Kentucky
R. A. Hamilton	Hawaii
W. R. Langford	Georgia
G. M. Prine	Florida
J. L. Bowers	Arkansas
R. J. Stadtherr	Louisianna

B. Federal

Most Federal Units made special reports as called for on Agenda. However, the following reports were made under this section of Agenda:

1. L. H. (Bert) Princen reported on activities of Northern Regional Research Center at Peoria, IL. His complete Report is given in Appendix B. Noteworthy was his news that Kenaf was looking promising as a crop for making newsprint and Crambe seed were being increased to extent that 5½ million pounds of seed were expected to be harvested in 1977.

2. Dr. Arnold Davis gave the activities report for Soil Conservation Service. His complete report is given in Appendix B.

8. REMARKS FROM ADMINISTRATIVE ADVISOR

Dr. Curtis Jackson, S-9 Administrative advisor distributed the new S-9 Project Outline. The new project has been approved by the Southern Directors and is scheduled for approval by the Committee-of-Nine during their September 1977 meeting. The new project will not become effective until such approval is obtained. Dr. Jackson discussed how each State contributes Regional Research funds toward support of the Southern Regional Plant Introduction Station.

9. REPORT FROM NATIONAL PROGRAM STAFF

Dr. Charles Lewis gave an overview of National Program work. He pointed out that the National Plant Genetics Board had made an excellent contribution but was abolished when its 2 year charter expired in July 1977. However, great effort is being made to get the Board reinstated on a more continuing basis than before.

One million dollars was appropriated for developing clonal repositories for fruits and nuts. Additional monies are expected from this Congress to further finanace the original planned repositories.

10. GERMPLASM RESOURCES LABORATORY REPORT

Dr. George White gave a report on activities of the Germplasm Resources Laboratory group. His complete report is given in Appendix B.

11. TOURS ON AUGUST 18

About half the attendees went on a tour of Ornamental Horticulture Plots and Facilities under guidence of Charles Whitcomb beginning at 3:30 p.m. The remainder of the attendees went on a tour of Perkins farm where they were shown mung bean, soybean, cotton, peanut and other research by Jim Kirby.

12. INFORMAL MEETINGS ON EVENING OF AUGUST 18

Dr. Don Banks gave an excellent slide show of the recent peanut expeditions to South America. Following the slide show several groups having special interests met together informally.

13. NATIONAL SEED LABORATORY REPORT

A written report prepared by L. N. Bass was distributed and is included in Appendix B.

14. REPORT ON RECENT PLANT INTRODUCTIONS

Arnold Davis stepped down as a member of the Plant Expedition Committee. Chairman Stadtherr appointed Dr. John L. Bowers (Ark) to take his seat on the committee.

Arnold Davis reported that all official requests for plant explorations are either completed or were scheduled for completion. The need for new requests for plant exploration was emphasized. Procedure for requesting Plant Explorations through Regional Project S-9 is given in the minutes for 1976 Meeting at Miami, Fla.

Bob Langford reported on his recent exploration trip to Greece, Crete and Italy. He collected several hundred accessions in the genus Trifolium, particularly red and white clovers and related species, as well as some other forage legume and grass species.

A brief summary of the recent peanut exploration to South America was given by Don Banks in Oklahoma report (Appendix A). Much of the recent introduction activity is presented in the Germplasm Resources Laboratory report (Appendix B).

15. FEASIBILITY OF NATIONAL GERMPLASM INFORMATION SERVICE

Dr. Charles Lewis introduced Dr. Kanti Rawal who with coworkers will decide what data to record, schedule the assembly of data and then carry out assembly of data on germplasm. The idea is to get all data on introductions into computers in a form that it can be used by everyone. Dr. Rawal discussed the decisions which must be answered as one starts such a data collection service. Chuck Gearhardt showed the group samples of prototypes of data base and plant germplasm data.

16. GERMPLASM COLLECTIONS AND PROGRAM

A. Mayaguez Institute of Tropical Agriculture. Dr. Franklin Martin gave a report on the activities of the Mayaguez Institute. His report is included in Appendix B.

B. Subtropical Horticultural Research Station. Dr. Bob Knight gave a report on the Subtropical Horticultural Research Station at Miami. His report is included in Appendix B.

17. REGIONAL PLANT INTRODUCTION STATION

Dr. Bob Langford presented the annual report and proposed budget for the Regional Plant Introduction Station. He moved the S-9 Committee approve the Budget as written in his report (See in Appendix B). Eli Whiteley seconded the motion and the motion passed without opposition.

18. COMMITTEE REPORTS

A. Nominations: Bill Fike, Chairman, moved the nominations of Clarence E. Watson, Jr. (Miss) as Secretary and G. M. Prine to move from Secretary to Chairman. The motion was seconded and passed with unanimous vote.

B. Time and Place: Dr. Bob Knight, Chairman, reported his committee had selected Baton Rouge, Louisiana as next place and the time to be Mid-June 1978, the exact time* to be determined by Secretary and Chairman. He moved the acceptance of his report, which was seconded and passed with unanimous vote.

C. Resolutions: Dr. Eli Whiteley read the following three resolutions:

Resolution A.

Be it resolved that the S-9 Technical Committee express its deep regret at the untimely death of Dr. Ralph S. Matlock who was a very active member of the committee for many years. S-9 will miss his enthusiastic and effective work on behalf of germplasm introduction, maintenace, and evaluation.

Resolution B.

Being aware that Executive Order No. 11987 of May 24, 1977 as published in the Federal Register, Vol. 42, No. 101, May 25, 1977 is subject to interpretations that could lead to restrictions on the use of exotic species in agriculture and forestry, and recognizing the fact that over 98% of crop production in the United States is based on exotic species be it therefore resolved that the S-9 Technical Committee request its Administrative Advisor to present this matter before the Southern Directors and the National Plant Germplasm Committee urging that all agricultural and forestry scientists be made aware of this Executive Order, be kept informed of all deliberations and actions concerning development of guidelines, definitions, and plans for implimentation of this Order or any resulting legislations which may be contemplated.

Resolution C.

Be it resolved that the S-9 Technical Committee express their appreciation to the local arrangements committee of Drs. Kirby, Banks, and Whitcomb for making arrangements for the meeting at Oklahoma State University and the Tours. And express its appreciation for the tour of the Perkins Farm.

Be it resolved that the S-9 Technical Committee express its appreciation for the excellent slide presentation on the peanut collection made in South America by Dr. Donald J. Banks.

Be it resolved that the S-9 Technical Committee express its appreciation for the excellent tour of the Ornamental facilities given by Dr. C. Whitcomb and of Perkins farm by Dr. Jim Kirby.

Dr. Whiteley moved acceptance of the report of Resolutions Committee and it was seconded. After discussion the resolutions were passed by unanimous vote.

*Subsequently, June 22-23, 1978 has been selected as date for next S-9 Meeting.

19. UNFINISHED AND NEW BUSINESS

Dr. Bob Knight reported that he would like to have his budget for an upcoming exploration trip for horticultural plants adjusted from $2657 to $3170, so that Dr. H. F. Winters could be included as a member and to cover increased expenses. It was moved, seconded and passed that Dr. Knight's budget be amended to a total of $3170 so Dr. Winters could accompany him on the trip.

20. AJOURNMENT

Chairman Stadtherr ajourned the meeting at 11:30 a.m. August 19.

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

Subtropical Horticultural Research Station

Germplasm Resources Laboratory

Northern Regional Research Center

National Seed Storage Laboratory

Soil Conservation Service

Regional Station Report

ALABAMA S-9 PLANT INTRODUCTION ACTIVITIES
August 1976-August 1977

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

A total of 1231 recorded introductions were received from the Plant Introduction Station by Alabama Cooperators this past year. They included 962 cowpeas, 80 clovers, 80 trefoils, 80 cantaloupe and watermelons, 16 grasses plus miscellaneous species.

HORTICULTURAL CROPS

Cantaloupe (J. D. Norton, Auburn)

P.I. 140471 (C. melo) is being used in the development of breeding lines that are resistant to Gummy Stem Blight (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.

New multiple disease resistant cantaloupe varieties, 'Gulfcoast' and 'Chilton', from P.I. 140471, permit the development of a commercial melon industry in the southeastern U.S. and other humid areas. Home gardners may enjoy excellent melons comparable to Western grown fruit.

Watermelon (J. D. Norton, Auburn)

P.I. 271778 and P.I. 189225 (C. 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. 203551 are being used in the development of breeding lines that are resistant to Anthracnose (Collatotrichum laginarium) Races 1 & 2.

Tomato (W. H. Greenleaf, Auburn)

Auburn 76 was released as a new tomato variety with resistance to Fusarium wilt race 1, tobacco mosaic virus, and to root knot nematodes. Nematode resistance comes originally from L. peruvianum P.I. 128657 and mosaic virus resistance from L. peruvianum P.I. 128650.

Cowpeas (O. L. Chambliss, Auburn)

P.I. 189099 and P.I. 182316 were used in an inheritance study to determine the inheritance of crude protein in Vigna unguiculata (L.) Walp. P.I. 189099 was the high protein parent which had been shown to be as high as 37% crude protein on a dry weight basis, and the low protein parent P.I. 182316 had been shown to be approximately 19.3% on a dry weight basis. The results indicate that based on heritability and the type of genetic variance involved, progress can be made in breeding for improved protein. Briefly, results were as follows: broad-sense heritability was calculated to be 43%; narrow-sense heritability was 21%; and additive genetic effects were of most importance, although some partial dominance was evident.

Cowpeas (P. L. Brown, Ala. A&M, Normal)

A large number of cowpea accessions are being screened for phosphorus utilization efficiency. Sensitivity to aluminum toxicity is also being checked.

Cucurbitaceae (G. C. Sharma, Ala. A&M, Normal)

Wild species of the Cucurbitaceae are being screened for their content of cucurbitacins, the bitter principle which is a tetracyclic triterpenoid. They are being studied for possible use of these bitter substances in insect management.

AGRONOMIC CROPS

Tall Fescue (R. L. Haaland, Auburn)

A number of tall fescue P.I.s are being evaluated for possible inclusion into winter-productive synthetic varieties.

A small-rooted tall fescue genotype has been isolated from P.I. 231562 and a large-rooted genotype from P.I. 231560. These genotypes are being utilized to study water and mineral uptake in relation to soil hardpan interference and with plant parasitic nematodes. The genotype with small diameter roots can apparently compensate for nematode damage better than the large-rooted genotype. However, the large-rooted genotype readily penetrates hardpans that row crops such as cotton or soybeans cannot penetrate.

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

A select group of trefoil introductions were screened in space plant nurseries. In spite of the cold winter and very dry spring, good seed production was obtained for further work. A number of trefoils from southern Brazil and Uruguay were semi-prostrate and had stolons that rooted at intervals, indicating good pasture potential. In a northern Alabama yield trial, 2nd year San Gabriel trefoil from Brazil (probably the same as P.I. 296318) yielded over 5 tons of dry forage per acre. Third-year stands and production also are excellent. A selection of this introduction has been made for improved seedling vigor and disease resistance which now will be put into small yield trials and one grazing experiment.

Cool Season Annual Legumes (C. S. Hoveland, Auburn)

Several Trifolium alexandrinum accessions survival a very cold winter and show promise for early fall and winter production. Further selection and seed increase of superior plants of several other clover species was done. Forage yield trials at 8 locations will be continued in 1977-78 to further evaluate a number of promising clovers.

REQUESTS FOR ADDITIONAL GERMPLASM

Species	Characteristic needed	Location
Cucumis melo	Resistance to root knot nematode	-
Festuca arundinacea & Dactylis glomerata	Superior seed production, resistance to stubby root, stunt, and lance nematodes.	Mediterranean area

PUBLICATIONS CONCERNING PLANT INTRODUCTIONS

1. Elkins, C. B., R. L. Haaland, and C. S. Hoveland. 1977. Tetany potential of forage species as affected by soil oxygen. Proc. XIII Int. Grassland Cong. Sect. 10:588-594. Leipzig, German Democratic Republic.
2. Greenleaf, W. H., J. L. Turner, and K. S. Rymal. 1977. Auburn 76 FMN, a fusarium wilt, tobacco mosaic virus, and root knot nematode resistant tomato variety. Auburn Univ. Agr. Exp. Sta. Cir. 235.
3. Hoveland, C. S. 1977. Foreign plant immigrants make good Alabama citizens. Auburn Univ. Agr. Exp. Sta. Highlights of Agr. Res. Vol. 24, No. 1.
4. Norton, J. D. 1976. Breeding for resistance to Mycosphaerella citrullina in watermelon. Hort. Sci. 11:227.
5. Norton, J. D., H. M. Bryce, C. C. Carlton, K. C. Short, J. E. Barrett, M. H. Hollingsworth, and C. A. Brogden. 1976. New cantaloupes suited for commercial production. Auburn Univ. Agr. Exp. Sta. Highlights of Agr. Res. Vol. 23, No. 4.

S-9 TECHNICAL COMMITTEE REPORT

Arkansas Agricultural Experiment Station
Fayetteville, AR 72701

Period of July 1, 1976 to July 1, 1977

Rape: The rape yield trial of the four most promising plant accessions was repeated at the Southeast Branch Experiment Station in the fall-winter-spring seasons of 1976-77 but we have not received the data. Plantings of this oil seed crop have been carried out over a period of 3 to 4 years at two different locations in Arkansas. One test site has been in the upper Arkansas River Valley area near Ft. Smith and the other in the lower Delta area at Rohwer, Arkansas. Seed yields from the best adapted plant accession (PI 305278) have been around 1000 pounds per acre. Another new crop which has shown promise in the testing program over a period of 3 years has been the chick pea. The trials on this crop have been carried out on a Lintonia silt loam soil at Fayetteville. At the time of preparation of the last report we had not harvested our 1976 trials. In this trial thirteen plant accessions were planted in a replicated planting. Most of the entries produced around 800 pounds of shelled peas per acre. These yields were slightly lower than the yields in 1974 but better than the yields in 1975 when Thielaviopsis root rot reduced our stands. The crop appears to be well adapted in our area when grown as a spring crop and harvested in either late July or in August.

Snap Beans: The major emphasis of this program is Rhizoctonia root rot resistance. P.I. 165426 (black seed) is used as the resistant check in field screening. To date seven plant introductions have been used in crosses. The F_3 populations from these crosses are currently being screened for Rhizoctonia resistance.

Southern Peas: (Vigna ungiucalata) Sixteen different plant accessions obtained in 1975 were grown in the field in 1976 and inoculated with Xanthomonas vignicola. These were related on the basis of field screening to possess a good level of resistance to common blight. Crosses have been made between several resistant P.I. accessions and the stations dwarf desirable horticultural types which are susceptible to bacterial blight. The F_1's of these crosses were grown out in the greenhouse this summer. Selections were made in the F_3 generation from crosses between Puerto Rican lines and station breeding lines and the F_4's are being grown this summer. Climatic conditions were favorable for the development of Xanthomonas vignicola this summer and we have noted a good level of resistance to bacterial blight in AR-77-197 (Fla. 574). The latter is a non-vining cream crowder type possessing the erect pot character.

Spinach: A very good level of white rust resistance is now present in several station lines. This resistance was derived in part from the USDA material and it was originally found in plant accession 165560. The resistance to Fusarium oxysporum spinaceae was also found in the USDA material and in two Japanese cultivars Jiromaru and Hayo.

Plant accessions received in 1976-77 were two accessions of Spinaceae oleraceae, four accessions of Cucumis representing four different species, two of Cucurbita represented by two species; two of Lagenaria and two of Luffa. Thirteen accessions of Lycopersicon and one accession of Cucumis sativus were obtained through the National Seed Laboratory for Mr. Steven L. Grisham, Department of Botany and Bacteriology, University of Arkansas.

Germ Plasm Needs: Several plant breeders working on pickling cucumbers especially those in the Southeastern region have indicated a need for the screening of present germ plasm at the North Central Plant Introduction for rhizoctonia fruit rot resistance. If this operatinn can be carried out then we would be in a better position in making a decision as to the need of a plant exploration for germ plasm of the genus Cucumis.

1977 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 are widely scattered throughout the state. In this report the investigator and where he is located in the state will be given.

Dr. Ronald M. Sonoda, Plant Pathologist at Fort Pierce ARC is screening *Macroptilium atropurpureum* against a mosaic virus. So far he has not found any resistant lines. He has screened several introductions by A. E. Kretschmer, Jr. that have no PI numbers. The PI's that we have screened include PI 296959, 316463, 307599. These PI's were found to be resistant to a strain of bean common mosaic virus at the New York Agricultural Experiment State in Geneva. But he has found these PI's to be susceptible to the strain that he is working with. Dr. Sonoda is very interested in receiving collections of *Macroptilium atropurpureum* for screening against this virus, which although currently localized, reduces yield of forage by about 50%.

Dr. Paul Mislevy, Assistant Agronomist, Ona ARC reports four experiments in which he has planted introduction material. They are as follows:

1. Grazing intensity study - Two introductions U. F. 4 PI 224566 and U. F. 5 PI 225957 are being evaluated under three cattle stocking rates in central Florida. Variables being measured are forage production, forage quality, average daily gain, beef production per acre and total nonstructural carbohydrates in the stubble and crown. Preliminary results indicate highest dry matter production was obtained at high (6 cattle/A) stocking rate averaging 11.0 and 10.0 T/A for U. F. 5 PI 225957 and U. F. 4 PI 224566 respectively. Total beef production per acre during the 6 months growing season for the 2 grasses at the best treatment averaged 540 lb. Specie persistance for both grasses under all stocking rates was excellent.

2. In another study 16 perennial grasses including U. F. 4 PI 224566, U. F. 5 (PI 225957) and Callie are being studied to determine the effect of the grazing animal on specie persistance. Forage yield and quality are being determined on each entry following 2, 3, 4, 5 and 7 week rest periods.

3. The performance of 16 perennial grasses including U. F. 4 (PI 224566), U. F. 5 (PI 225957) and Callie, grown at 3 nitrogen (150, 300 and 450 lb/A) rates is being monitored. Variables recorded were forage yield and forage quality under warm and cool conditions. Hydrocyanic acid is also monitored on selected introductions.

4. Two introductions U. F. 4 PI 224566 and Callie are being used in phosphate spoil bank reclamation studies in central Florida. Preliminary indications are both entries establish very rapidly and contain a strong, deep root system. The dense sward and strongly stoloniferous characteristics of both entries aid in the revegetation spoil areas.

Dr. Kevin McVeigh, Assistant Agronomist and coworkers at Quincy AREC are using PI material from several genera of forage grasses in forage breeding programs. He has been screening PI's of several ryegrass species (Lolium spp.) for resistance to crown rust (Puccinia coronata Cda var lolii). Native rescuegrasses and PI's have been screened for powdery mildew reaction (Erysiphe graminis f. sp.?) and head smut (Ustilago bullata). He has been looking at all the PI collection of subterranean clover (Trifolium subterraneum L.) for use in Florida. Selections have been made for early productivity and powdery mildew resistance. Again,a lot of this is in a very preliminary stage of development.

Dr. John Brolmann, Legume Breeder, Fort Pierce ARC, reports that last year he finished some studies on the persistence of Stylosanthes species. This work will be published in the Proceeding of Florida Crops and Soils Society, Vol 36. His findings indicate that greatest persistance, as measured by survial of plants and regeneration from seedlings, was shown for Stylosanthes erecta Beauv. (PI 358375). This species will regenerate from roots after frost kills top vegetation. Also, S. erecta will tolerate a high water table. Dr. Mott probably will mention to you the survival of S. macrocarpa (CPI 33832) at Gainesville.

Dr. Leonard S. Dunavin, Associate Agronomist, Jay ARC reports the following:

1. Twenty-three introductions of red clover have been observed for two summers and PI 315538 has been the best with regard to yield and stand maintenance.

2. Thirty-seven introductions of birdsfoot trefoil have been observed and PI 260011, PI 260013, and PI 260013 look rather good with the latter being best.

3. Six introductions of milkvetch are under observation.

4. Hemarthria altissima PI 365509, PI 364891, and PI 349752 have been placed into a replicated trial.

Dr. Ken Quesenberry, Forage Breeder, Agronomy Department, Gainesville, gives the following report on Hemarthria and Paspalum introductions he has breeding programs started on:

1. A mob grazing study and a clipping trial is in first year of grazing/harvest at BRU. All Hemarthrias survived winter of 1976-77 at Gainesville (BRU) where there were three consecutive nights of 19°F temperatures. The Hemarthrias have shown better early spring regrowth after cold winter than either Cynodons or Digitarias. The objective of the above study is to compare the effects of grazing vs. clipping on Hemarthria yield and persistence. A list of PI's in these studies can be obtained from Dr. Quesenberry.

2. An experiment conducted during fall and winter 1976-77 on PI 299993, 299994, and 299995 has shown at that although 93 and 94 yield more during late summer-fall, 95 declines less in IVOMD and remained above 45% digestibility until March 11. The results suggest that 95 could be used as a conserved forage in field.

3. An experiment was initiated in July 1977 to evaluate 3 methods of establishment on PI 299993, 299995, and 364888 of Hemarthria. Slow rate of establishment of limpograss is a problem and the objective is to determine best method of planting. Earlier work has shown that 364888 is one of most rapid clones to establish.

4. During 1976-77 it was determined that two PI's of H. uncinata (400272, and 401712) are rhizomatous. Neither PI appears to be useful agronomic type but may be used in future hybridizations with H. altissima.

5. A number of Paspalum species evaluated as spaced plants during 1976-77 showed good winter survival. Other Paspalum introductions are being evaluated this year. These are primatily of three species, P. notatum, P. plicatulum and P. guenocrum.

Dr. Stan Schank, Grass Breeder, Agronomy Department, Gainesville is using many introductions in his Digiteria Breeding program. He has one promising hybrid between two Digitaria accessions which may be released in near future. Dr. Rex Smith, Grass Breeder, Agronomy Department, Gainesville is using pearlmillets and guineagrass (Panicum maxum) in his studies on nitrogen-fixation.

Drs. Quesenberry, Schank and Smith are all devoting a large portion of their time to study of N-fixation by grasses. They are part of a large team at the University of Florida working on N-fixation by grasses.

Dr. Elver Hodges, Agronomist at Ona ARC, reports that they have Bigalta Limpograss (PI 299995), U. F. 4 Stargrass, (PI 224566) and U. F. 5 Stargrass (PI 225957) under evaluation in grazing trials. He reports that they have 300 to 400 accessions of Hemarthria, Digitaria, Cynodon, and Chloris in their nursery blocks. They also have one pasture of Callie bermudagrass.

Dr. O. C. Ruelke, Agronomy Department, Gainesville, is studying the preformance of selected bermudagrass (Cynodon) introductions and named cultivars. A several season report of his findings should be available later this season. Dr. Ruelke and G. M. Prine are studying cool-season annual clovers on upland and flatwood soils at Gainesville. Dr. Ruelke and Dr. Quesenberry have studied the productivity and forage quality of 53 limpograss introductions in greenhouse and field.

Dr. G. M. Prine, Agronomy Department, Gainesville, is evaluating a number of perennial peanut (Arachis sp.) for their forage production. PI 262817 named Arbrook by SCS has shown especially good drought tolerance during the 1977 drought. GS-1, Arachis glabrata, which is probably a chance seedling from Arb (PI 118457), will probably be released as a named cultivar later in 1977. A rust-resistant, reseeding annual ryegrass which Dr. Prine is developing by mass selection is under consideration for release as a named cultivar. Dr. Prine has examined several hundred accessions of annual ryegrass. He has typed notes from one to three years on production and other characteristics of these ryegrass which he can furnish to interested persons on request. He has similar information on the total rescuegrass collection during the 1975-76 growing season.

Dr. A. E. Kretschmer, Agronomist at Fort Pierce ARC has many tropical legumes and grasses under observation. He is in process of releasing Desmodium heterocarpon (PI 217910) as a named cultivar to be called 'Carpon.' This legume is a long-lived perennial under South Florida conditions.

Dr. A. E. Dudeck, Turf Specialist, Ornamental Horticulture Department, Gainesville, has a number of turf introductions under study but has little new to report this year.

Dr. J. M. Crall, Watermelon Breeder at Leesburg ARC is still working with tolerance to watermelon mosaic virus derived from PI 255137. Several lines are being carried in our breeding stocks, but none are close to varietal release and the degree of tolerance retained has not been determined. The value of this introduction as a source of WMV resistance is still being investigated.

Dr. J. A. Mortensen, Grape Breeder at Leesburg ARC found the following PI Nos. of Vitis species to be useful in breeding of scion types:

PI 360749 'Muska' (crack-resistant)

PI 360750 'Pirobella' (early ripening, crack resistant)

PI 354108 'PQ 7' (very early ripening)

PI 341823 'Anab-E-Shahi' from India

PI 341824 'Bharat Early' from India

PIM 18902 Large black grape productive in Cuba and South Florida

The following PI Nos. of Vitis have promise in breeding of rootstock types:

PI 279898 'Malegue 44-53'

Other PI numbers are likely to be useful, such as Argentina numbers PI 391446, 391448, and 391449 in breeding for seedlessness and earliness of ripening. As yet they have not come into bloom.

Dr. David J. Schuster, Assistant Entomologist at the Bradenton AREC screened seedlings of 235 plant introductions of Lycopersicon for resistance to the tomato pinworm, Keiferia lycopersicella (Walsingham) in greenhouse. In initial screenings, accessions of Lycopersicon pimpinellifolium (Jusl.) Mill. and L. esculentum x L. pimpineilifolium were more susceptible while those of L. peruvianum (L.) Mill., L. peruvianum var. humifusum Mull., L. esculentum x L. peruvianum, L. cheesmanii f. minor (Hook F.) Mull., and L. glandulosum Mull. were less susceptible than the commercial tomato cultivar 'Walter' (L. esculentum Mill.). Selections of L. hirsutum Humb. and Bonpl. and L. hirsutum f. glabratum Mull. were most resistant having 25-50% less damage and 50-75% fewer larvae than Walter. In secondary screening, accessions of L. cheesmanii f. minor, L. glandulosum, L. hirsutum and L. hirsutum f. glabratum had less damage and fewer larvae per plant than Walter. In a laboratory study with excised leaflets, larval survival and weight were less PI 127826 (L. hirsutum) and PI 126449 (L. hirsutum f. glabratum) than on Walter.

Dr. A. A. Cook, Plant Pathology, Gainesville, been using PI 260435

(Capsicum chacoense) in a breeding project because it has shown resistance to one pathotype of Xanthomonas vesicatoria. This species (C. chacoense) has been reported to be incompatible with the more popular species, C. annuum, but we have obtained a few seeds (and plants) from F_1 plants and are hopeful that we have passed the F_2 generation, also.

Dr. A. H. Krezdorn, Fruit Crops Department, Gainesville is not using any PI numbered introductions at present. However he recently introduced a red-fleshed navel orange from Venezuela. This is an apparent mutation and unique because it is the only orange that will develop red flesh color in a hot climate, such as Florida's. The pigment is apparently lycopene, such as is in red grapefruit, rather than anthocyanin, found in the 'blood' oranges of cool climates such as Italy's. The material is under quarantine at the DPI of the State Department of Agriculture of Florida. It will take at least a year to screen it for release.

Dr. D. W. Gorbet, Associate Agronomist at the Marianna ARC who has breeding programs with peanuts and sorghum made this report:

A. Peanuts

Forty-three new plant introductions from Thailand were grown and evaluated for several traits in 1976. Seed of these new introductions were sent to Dr. Langford at the Regional Plant Introduction Station at Experiment, Georgia.

Selection has been continued in segregating material from crosses made with various PIs indicated in previous reports. Some material from prior crosses are in yield tests for the first time this year. New crosses were made this spring with PIs 383423, 383424, 306230, 269114, and 274191, with emphasis on Cercospora resistance.

B. Sorghum (S. bicolor)

Plant introductions which are still in our program include PI 217721, 229838, 229841, 217708, Dobbs, AF 28, Mn 960, and a number of lines from Purdue (protein quality) and Texas (disease resistance), which may have PI numbers but were not indicated on the identifications transmitted with the seed.

In general our main emphasis has been on disease resistance (especially anthracnose), chemical quality (starch type and amino acid content), and midge resistance. The material we are working with have reported value in one of these areas.

Dr. A. J. Norden, Peanut Breeder, Agronomy Department, Gainesville, reported that a total of 50 Plant Introductions of Arachis hypogaea L were listed in the March 1976 Catalogue of seed available at the Southern Regional Plant Introduction Station as being highly resistant to Cercospora leafspot disease. Seed of 39 of these PI's were received in April 1977 and are currently being screened in the field to determine levels of Cercospora resistance in this area. They will be further screened in the greenhouse this winter prior to their use as parents in crosses. This work is being done with the assistance of Graduate student, Mr. Teddy Monasterios, and in cooperation with Plant Pathologists, Drs. R. D. Berger and Lee Jackson. Dr. Norden re-emphasized the need for continued Arachis germplasm collection in South America (Bolivia, Peru, Brazil, Argentina, Paraguay, and Uraguay).

Dr. R. J. Varnell, Agronomy Department, Gainesville, reports that the International Peanut Program at the University of Florida is increasing 1007 accessions of peanut germplasm from the Project S-9 collection. A portion of the seed produced from this increase will be sent to the National Seed Storage Laboratory at Fort Collins, Colorado, with other seed being sent to Experiment, Georgia. Some evaluation activities are being carried out on these accessions to varify and extend the documentation published in the 1976 catalog from Project S-9.

Dr. R. D. Barnett, Small Grains Breeder, Quincy AREC is using some PI numbered material in his wheat, barley and oat breeding program. He has made a number of crosses involving PI lines mainly for rust resistance and high protein characteristics. He has not released any as yet although some of his lines which have PI's for parents show some promise. All the PI's were obtained from the cereal collection at Beltsville which is handled by Dr. J. C. Craddock.

Dr. L. C. Hannah, Vegetable Crops Department, Gainesville, has screened over 1000 lines and accessions of cowpea (Vigna unguiculata) seeds for methionine content. Some high methionine types were found. (See list of publications for papers by Dr. Hannah and coworkers on methionine content of cowpeas.)

Dr. M. J. Bassett, Vegetable Breeder, Vegetable Crops Department, Gainesville, is breeding Phaseolus vulgaris and has observed numerous Phaseolus introductions.

Dr. G. M. Prine, Agronomist, Gainesville, has been looking at pigeon-pea Cajanus cajan introductions for several seasons. After deciding that none of introductions studied were potential cultivars for lower South USA he got 4000 F_2 seed of two crosses from ICRISAT in India. In 1976, he selected 95 plants from which seed was saved for spaced plant rows in 1977. A composite made of equal numbers of seed from the 20 best plants in 1976 was sent to Bob Langford for distribution on request. The 20 plants were all relatively early and short in height. Seed sizes were on large side and some plants had up to 6 seed per pod. Seed yield per plant was excellent.

Crops Where Researchers Indicate Need Greater Diversity of Germplasm.

1. Alyceclover Alysicarpus sp. needed by G. E. Dean and K. J. McVeigh
2. Macroptilium atropurpureum requested by R. N. Sonoda
3. Arachis collection on South America needs to be continued. Requested by A. J. Norden, R. J. Varnell and G. M. Prine (Forage types).

Some Publications Where Plant Introductions Played a Role.

1. Adjei, M. B. and G. M. Prine. 1976. Establishment of perennial peanuts (Arachis glabrata Benth) Soil and Crop Sci. Soc. Fla. Proc. 35:50-53.
2. Barnett, J. C. Jr. 1977. The effect of amendments applied to quartz sand tailings from phosphate mining on forage and grain production. Masters Thesis University of Florida.
3. Evans, I. M., J. E. Ford and L. C. Hannah. 1976. Comparison of chemical and microbiological methods in the estimation of methionine in cowpea (Vigna unguiculata) seeds. British Jour. Nutr. 36:289-293.
4. Hannah, L. C., B. B. Rhodes and I. M. Evans. 1977. Examination and modification of the use of Leuconostoc Mesenteroides for measurements of the sulfurs - containing amino seeds from Vigna unguiculata. Agric. and Food Chem. 25:620-623.
5. Hannah, L. C., J. Ferrero and D. W. Dessauer. 1976. High methionine lines of cowpea. Trop. Grain Leg. Bul. 4:9-10.
6. Mislevy, P. and P. H. Everett. 1976. The response of fifteen tropical grasses to stubble height and irrigation. Agronomy Abstracts November 28-Dec. 3, 1976.
7. Prine, G. M. and O. C. Ruelke. Winter Forage Legumes Trials at Gainesville, Fla. during 1976-76 Growing Season. Univ. of Fla. IFAS

Agronomy Department Research Report AY 77-2. 12p.

8. Ruelke, O. C. 1976. Bermudagrass Variety Evaluations in Florida. Univ. of Fla. IFAS Agronomy Department Research Report AY 77-1. 6 p.

9. Schuster, D. W. 1977. Resistance in Tomato Accessions to the Tomato Pinworm. Offered for publication in J. Econ. Entomology.

GEORGIA AGRICULTURAL EXPERIMENT STATIONS

REPORT TO S-9 TECHNICAL COMMITTEE

August 18 - 19, 1977

Following are comments received from some of the people reporting on the use of material received in recent years.

I. Turner S. Davis, Department of Horticulture, Georgia Station, Experiment, Georgia. Evaluation of Woody Ornamental Introductions. There has been no great change in our evaluations of one year ago. Following is a brief summary on some of the ornamental trees being tested:

1. (Pistachia chinensis). Ten trees planted 1969. Removed 3 in 1977 due to overcrowding on a 10 foot spacing. Seed from 1976 crop have been germinated. Over 20 feet tall, spreading, good full color, pest resistant, excellent specimen tree.

2. (Quercus myrsinaefolia). Four of 10 trees planted in 1969 removed due to overcrowding. Evergreen, very spreading form. Slow initial growth but now about 20 feet. A few seed in 1976. Could be a nice specimen tree for green color in winter.

3. (Cryptomeria japonica). Only one tree (NA-13454-C) planted in 1971, has maintained green color through winter. Height over 15 feet. Another tree (NA-29008), planted 1969, has good growth but poor color in winter.

4. (Quercus chenii). P.I. 102653. Five trees planted in 1969. Two removed in 1977 due to excessive spreading. Takes up a lot of space, irregular shape, over 25 feet tall. Could possibly be used to screen large areas.

5. (Metasequoia glyptostroboides). P.I. 286608. One tree planted 1969. About 22 feet. Branches sweep upward, otherwise looks similar to Taxodium distichum. A good specimen tree, deciduous.

6. (Quercus robur salicifolia). NA-15313-1-5. One tree, planted 1970, over 15 feet. Abundance of mildew on foliage.

7. (Cunninghamia lanceolata). P.I. 324969. Three trees, planted 1969. Two of the trees are damaged by cold each winter, some die-back each year and sprouting.

8. (Magnolia virginiana var. Australis). NA-31021. Three trees, planted 1969. About 8 feet tall, sparse foliage.

9. (Betula platyphylla var. japonica). P.I. 235128. Five trees planted 1972. Good growth, heights to 21 feet, white bark. Grown from seed collected in Washington, D. C. by H. H. Fisher.

10. (Acer ginnala var. Semenovii). One tree, planted 1969. Very spreading 6 feet tall, small leaves, sparse foliage, unhealthy appearance.

11. (Pinus thunbergii). One tree (P.I. 342930), planted 1971 and 4 trees (P.I. 317258) planted 1969. Spreading, irregular, fast growth at early age, some die-back on P.I. 317258.

12. (Pinus densiflora). One tree (P.I. 319315) and 1 tree (P.I. 317254), planted in 1969. Good growth, spreading form, some die-back at tips of branches. New growth reddish in color. About 11 feet tall.

Note: The following plants were received this year and have either been outplanted or potted and left temporarily in the greenhouse or lath house until winter.

a. (Acer semenovii). NA-39938, 1 plant.
b. (Betula chinensis). NA-39942, 1 plant.
c. (Betula costata). NA-39939, 1 plant.
d. (Cupressus abramsiana). NA-37671, 2 plants.
e. (Cupressus arizonica). NA-37862, 1 plant.
f. (Fraxinus oxycarpa). NA-38378. 1 plant.
g. (Juniperus communis). NA-39943, 1 plant.
h. (Morus alba). NA-36742, 1 plant.
i. (Paulownia forlunei). NA-39017, 2 plants.
j. (Pinus heldreichii). NA-35925, 2 plants.
k. (Pinus mugo). NA-39935, 2 plants.

II. Dr. C. W. Kuhn, Department of Plant Pathology and Plant Genetics, University of Georgia, Athens, Georgia.

Tolerance of peanut mottle virus (PMV) was found in several peanut introductions. By using the necrosis strain of PMV in a screening test, a variety of disease reactions were observed, and a disease index system was developed. Eleven of 63 peanut introductions developed mild leaf symptoms with little or no stunting. When yield studies were conducted with a mild strain of PMV, two introductions had no loss of seed yield (highly tolerant) and two had a 20% loss (moderately tolerant) as compared to a 30% loss for susceptible cultivars. Although yield was not reduced in the highly tolerant introductions, 2 to 4 times more virus was produced in them than in susceptible cultivars. With no other type of resistance to PMV available, highly tolerant peanut lines should be considered in breeding programs.

III. Dr. Harold Brown, Department of Agronomy, University of Georgia, Athens, Georgia.

In response to your request for a report of my use of P.I. material during the past year, I submit the following. We have continued to evaluate Panicum species in the Laxa group for their photosynthetic characteristics. Seeds of Panicum maximum, P. milioides and P. bisulcatum have been received from Plant Introduction for comparison with the Laxa species which I collected in 1975. I will be happy to share seeds of the species I collected with Plant Introduction in case other research workers have need for these species. Your continued help in our research is appreciated.

IV. Dr. Aubrey Mixon, ARS, Coastal Plain Station, Tifton, Georgia.

In 1976, 50 newly acquired peanut introductions were grown and seed evaluated for resistance to seed infection by Aspergillus flavus. Single plant selections were saved from four of these introductions, since they showed some promise as having resistance to seed penetration by the fungus. Thirty-seven selections obtained from prior evaluations of peanut introductions were increased for use in the A. flavus resistance breeding program. Resistant peanut introductions were utilized in 15 new crosses with more productive commercial peanut lines and varieties, and several introductions were parents of 24 advanced generation hybrids from crosses currently under investigation for developing an A. flavus resistant peanut variety.

V. Dr. Ray O. Hammons, Supervisory Research Geneticist and Technical Advisor NRP 20080, SR-ARS-USDA, Tifton, Georgia.

As part of the Georgia contribution to Regional Project S-9.

1. Agronomic evaluation of Arachis hypogaea L. introductions.

a) In 1976, eight peanut P.I.'s were evaluated in replicated agrotype trials at one or two research locations in Georgia and two (24%) were retained for additional evaluation. One, a reselection from PI 268689, was entered in the National Uniform Peanut Performance trials for early-maturity type in 7 states and was retained. Another, the white-testa genotype PI 288160, is of special interest as a prospective source of peanut flour.

b) More than 30 P.I.'s grown in a Genetic Stocks nursery were retained for use as parental germplasm and to supply seed requests.

c) Another 126 newly introduced peanut P.I.'s were evaluated for agronomic and genetic potential and seed of each genotype returned to the RPIS repository.

d) Five other P.I. genotypes grown in border plots were also harvested to replenish seed available at RPIS.

2. Special Seed Multiplication.

a) In crop year 1976, seed for 500 Arachis hypogaea introductions were grown at Tifton in one-replicate field plots, arranged by maturities and growth type, and viable increased seed (fruits) were provided to RPIS for long-term seed storage at the National Seed Storage Laboratory, Fort Collins, Colorado.

b) 24 of these entries, with one-rep yields above 4400 lb/a were retained for agrotype testing against commercial checks in 1977.

c) Ten low-yielding genotypes are in re-multiplication plots at Tifton in 1977.

d) 11 entries of special interest (genetic, cytoplasm, testa or flower color etc.), were kept for field study in 1977.

3. Rust resistant germplasm,

Rust, incited by *Puccinia arachidis* Speg., poses a serious world-wide threat to peanut production. ARS scientists have identified three primary sources of resistant germplasm:

(a) 'Tarapoto' (P.I.'s 259747, 341879, 350680, 381622, 405132)
(b) 'Israel Line 136' (P.I.'s 298115 and 315608)
(c) 'DHT 200' (PI 341817)

The resistance is physiologic, apparently bigenic and recessive. Variation in reaction to different isolates suggests that races of rust occur. Rust-resistant lines with acceptable agronomic traits are under development. (Hammons, R.O. 1977. In press. PANS 23. 1977).

New sources of rust resistance were identified by the writer at Tifton and in the ARS-USDA winter nursery in Puerto Rico among the peanut introductions collected by Dr. L. D. Tripp in Peru. When the specifically resistant genotypes have been fully documented, their identification will be provided to the germplasm coordinator and the peanut scientific community.

4. Winter Nursery Generation Advance.

Twenty-five peanut P.I.'s were increased in the ARS winter nursery 1976-77 in Puerto Rico to provide (a) epidemic rust incidence to facilitate screening for resistance and (b) to obtain ample seed for replicated trials in CY 1977 at Tifton.

Among these 25 were two varieties, newly acquired in Nov. 1976 by R. O. Hammons from J. Romero of Honduras with resistance to both leafspot and rust.

5. Arachis species germplasm.

Two *Arachis* species accessions appear highly resistant or immune to leafspot and one of these is apparently immune to rust:

A. villosulicarpa PI 336985
A. species PIs 338279-280 (Hammons-Langford-Krapovickas Col. 408-410).

6. Leafspot resistant breeding.

A number of two-way and four-way cross combinations involving two peanuts with resistance-tolerance to early leafspot and/or to leaf-rust (PI's 109839 and 259747 or 341879) have been made and F_1 or F_2 populations will be grown in CY 1977.

7. Cylindrocladium black rot (CBR) resistance.

More than 1000 peanut P.I. accessions, advanced or early generation breeding lines, and/or commercial varieties have been screened in the laboratory for resistance to CBR inoculum in studies cooperative with CPES scientists E. Sobers, D. K. Bell and P. Tai. A small number of these, including several P.I.'s exhibit significant resistance to this serious disease. Efforts are underway to intensify the resistance by selection and retesting. Documentation for the P.I. accessions will be made as the study continues.

S-9 Progress Report for 1976-77

R. A. Hamilton
Horticulture Department, University of Hawaii

Extensive and intensive use is presently being made of P.I. numbered plant material by the University of Hawaii Agricultural Experiment Station, soil conservation agencies, The Department of Forestry and various botanical gardens in the State. Plant breeding projects dealing with fruits, vegetables, forage crops and pasture plants are particularly dependent on and make good use of P.I. material from countries where temperatures and day lengths are more comparable with Hawaii than those of other states in the U.S. Because of its close proximity to the equator (18-20° N), Hawaii has the most uniform temperatures and consistently short days of any state in the U.S. This results in a problem in that many of the most desirable cultivars from other states are simply not adapted to day length and temperature conditions in Hawaii. Because of short day length and lack of frost and chilling temperatures, germplasm tolerant to these conditions is generally not found in the other 49 states. This increases dependence of plant breeding programs and activities on P.I. numbered introductions originating between 15 and 25° N. & S. latitude.

Hawaii has no important indigenous crop plants. Hawaii crop plants are exotic in origin rather than native. All have been either brought in from other areas or developed by plant breeders in Hawaii using introduced germplasm. Of the hundreds of cultivars now grown in the state, it is conservatively estimated that up to half of the germplasm has been contributed by P.I. numbered accessions.

P.I. material is being used directly and indirectly to attain important objectives in many crops in Hawaii. These include the following:

1. day-length tolerance in beans and soybeans;
2. anthracnose resistance in mangos;
3. early and late blight resistance in potatoes;
4. improved production and palatability of <u>Trifolium</u> spp.for forage;
5. downy mildew resistance in cucumbers;
6. immunity to bacterial wilt and virus resistance in bell peppers;
7. improved table quality and nematode resistance in tomatoes;
8. corn ear worm resistance in sweet corn;
9. extended season of maturity and improved productivity of lychees;
10. resistance to Panama wilt in bananas.

Substantial progress is being made or has already been achieved in most of these objectives as well as many others too numerous to mention here.

Table 1 provides a summary of the species and number of P.I. accessions presently being used in plant breeding activities and cultivars screening activities at the University of Hawaii Agricultural Experiment Station.

Table 1. Numbered P.I. accessions presently utilized in plant breeding and variety testing projects at the University of Hawaii Agricultural Experiment Station.

Scientific Name	Common Name	No. of Accessions	Project Leader
Agronomy and Soils Dept.			
Trifolium ambiguum	trifolium	3	A. S. Whitney
Trifolium repens	"	3	" " "
Trifolium arvense	"	8	" " "
Arachis hypogea	peanut	10	" " "
Cajanus cajan	pigeon pea	1	" " "
Dilochos lablab	lablab bean	1	" " "
Phaseolus lunatus	lima bean	1	" " "
Phaseolus lathyroides	mungong bean	1	" " "
Phaseolus vulgaris	bean	1	" " "
Vigna mungo	mung bean	3	" " "
Voandzeia subterranea	bambarra groundnut	1	" " "
Sorghum bicolor	sorghum	200*	P. P. Rotar
Manihot esculenta	cassava	6	D. L. Plucknett
Xanthosoma spp.	yautia	5	" " "
Digitaria pentzii	digitaria	79*	U. Urata
Digitaria smutsii	digitaria	81*	" "
Horticulture Dept.			
Psophocarpus tetragonolobus	winged bean	10	R. W. Hartmann
Phaseolus vulgaris	bean	23	" " "
Cucurbita moschata	pumpkin	1	" " "
Solanum tuberosum	potato	3	T. Sekioka
Capsicum annuum	bell pepper	18	J. S. Tanaka
Zea mays	corn	29*	J. L. Brewbaker
Leucaena leucocephella	koa haole	32*	" " "
Lycopersicon esculentum	tomato	18*	J. C. Gilbert
Glycine max	soybean	25*	" " "
Mangifera indica	mango	8	R. A. Hamilton
Litchi chinensis	lychee	11	" " "
Persea americana	avocado	6	" " "
Citrus grandis	pummelo	5	" " "
Musa spp.	banana	8	" " "

* Estimated No. of P.I. accessions in screening programs.

KENTUCKY ANNUAL REPORT TO S-9 (NEW CROPS) TECHNICAL COMMITTEE
STILLWATER, OKLAHOMA, AUGUST 18-19, 1977

ROY E. SIGAFUS, AGRONOMY DEPARTMENT, UNIVERSITY OF KENTUCKY

Grass breeders at Lexington ran into a fertility problem with some giant fescue (Festuca gigantea) accessions. The large majority of plants from several accessions received from Washington state were male sterile. It is believed that the male sterile condition resulted when the giant fescue was grown near tall fescues or ryegrasses (Lolium spp.). In tall fescue it has been well documented that there are male sterile plants formed when tall fescues from different areas are crossed. (See reference by P.P. Jauhar at the end of this report). Fertilization is normal and an excellent seed crop is formed and seed are viable but the plants produced will be male sterile.

Poor seed increase is a problem that workers in Horticulture at Lexington hope to overcome in case of the wild tomato species Lycopersicon hirsutum PI 251303. In November 1975 we wrote to the Iowa station for seed of this PI but were informed that there was no seed available for distribution. We wrote again a year later and informed Dr. Skrdla that we would try several different methods to make plants produce fruits and seed. He sent a few seeds to Dr. Dean Knavel at Lexington, who has a Ph.D. candidate working on this problem.

PI 251303 had shown mite resistance. Oregon 58R was a bush bean also found to have mite resistance in screening trials by Dr. Knavel and Dr. J. G. Rodriquez. Seed could not be located at Colorado, Oregon or Washington. Only through the International Department of the Ferry Morse Seed Company was seed available. The variety had been discarded because of poor plant habit.

Plant introduction stations and others will be receiving additional requests for legume seed from Dr. G. A. Rosenthal of Lexington. As can be seen by the references at the end of this report, he has been working on chemical composition of legume seeds for years. Dr. Rosenthal has obtained hundreds of accessions of legumes and has several publications in press, mainly on L-Canavanine, a non-protein amino acid similar to arginine. He has said he will run analyses of these legume seeds for their protein amino acid contents.

Several accessions of Pisum sativum have been received for plant tumor studies. Under special conditions of low light and high humidity, tumors of pods were frequently found. This species may not be widely used in tumor studies as the plants are large and take several weeks to reach the age for tumor formation. A tobacco hybrid has shown tumors in young seedlings and a bioassay can be run in about 20 days. (Reference by R. A. Andersen).

The bush watermelons shown at Lexington in 1973 are coming on the market. 'Kengarden' has been registered under the Plant Protection Act and has been turned over to the Park Seed Company for marketing. This melon is intended only for the home garden trade. Dr. H. C. Mohr is working on commercial types. He is looking for powdery mildew resistance in Cucurbita pepo.

Kentucky workers have asked to join the NC-7 Regional Trial Plantings of Ornamentals. First materials were received in 1977. Dr. R. E. McNeil gave a report on 76 woody species as to: "Plant Responses to the Winter of 1976-77 in USDA Plant Hardiness Zone 6." This meeting was the 22nd Annual Meeting of the Southern Nurseyman's Association held in Atlanta July 30 - Aug. 1, 1977. Dr. McNiel hopes to have a summary of this information to be distributed through the local county agent office. Some of the woody species included in this report were PI accessions.

A request was received for Cistus villosus. This plant is a member of the Rockrose or Sunrose family. It has been tested in California for soil erosion control and as a plant to reduce brush fire hazard on steep slopes. This plant species had been reported to show resistance to some tobacco virus. If the plant had resistance to the particular virus the plant would have been a useful tool in further virus studies. Several letters had to be written by plant introduction people in order to locate the species. It was finally located in the Arboreta and Botanic Gardens of the County of Los Angeles. Materials were sent to Kentucky workers who ran tests. The plant was found to be susceptible to the virus but no report will be made by the researcher as he feels the plant is of no further value in virus studies.

Publications and other references

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LOUISIANA S-9 REPORT

August 1977

Richard J. Stadtherr
Horticulture Department
Louisiana State University

The following accessions were obtained in 1976: Trifolium repens - 149; various ornamentals - 79; Zea mays - 44; Lycopersicon - 42; various other clovers - 23; Lotus corniculatus - 17; Vigna unguiculata - 15; Trifolium subterraneum - 11; Dolichos spp. - 7; Desmodium uncinatum - 4; and Indigofera tinctoria - 2.

In the forage crops, many are being increased to be used in future replicated trials. Screening of accessions has continued for materials to be used in breeding experiments. Notably here were white clover, tomato, potato, okra, and azaleas. The entire camellia collection was discontinued in July to make way for a new rose planting. The coleus collection was repeated since many varieties were mislabeled. The various species and varieties of Impatiens were so susceptible to root rots that few still remain. Hybrids were obtained from the USDA, Longwood Gardens, and Iowa State University. Impatiens platypetala, P.I. 349629A, reseeds prolifically. It and an orange flowered USDA selection are the only two which do not wilt during high temperatures in the lathhouse. All others tend to die from root rots when temperatures reach 90^{O}F or above and relative humidity is 80% or higher.

Plants showing the best adaptability and recommended for this area include: Juniperus conferta 'Emerald Sea' PI 323932, Magnolia x'Maryland'

NA 33938-c and *Quercus mysinaefolia* NA 1939-s. *Buxus microphylla* japonica 'Morris Midget', NA 7027-c, and 'Morris Dwarf', NA 7026-c, as well as *Chamaecyparis obtusa* 'Sanderi' NA 29129-c and *Thuja occidentalis*, 'Hoseri', NA 29748-c, are all exceedingly slow in growth; thus, might have a place as bonsai plants.

Forage Quality Evaluation of Some Limpo Grasses
(Hermarthria altissima), 1976*

Marvin Allen, C. R. Montgomery, and B. D. Nelson

A small amount of vegetative material of eight limpo grasses were obtained from the Regional Plant Introduction Station, Experiment, Georgia, in 1975. Each grass, identified by its Plant Introduction number, was sprigged in single plots approximately 144 square feet in area. These grasses were allowed to cover their respective plot areas in 1975.

All grasses received an application of fertilizer in March, 1976, at a rate of 100 pounds each of N, P_2O_5, and K_2O per acre. A top-dressing of 50 pounds per acre of N was made in mid-August.

The grasses were clipped to a stubble height of 3 inches on each of four dates, beginning May 20 and ending September 23. All grasses had over-wintered well and all withstood the clipping frequency in 1976. Yields were not estimated because the plots were not replicated.

Quality component values for each introduction by harvest date are presented in Table 1. Cell wall constituent (CWC) values were erratic among grasses within harvest dates. There was a tendency for CWC to increase with season until September. Acid-detergent fiber (ADF) was highest with greatest variability among grasses on the August 10 harvest. Generally ADF accounted for approximately one-half of the CWC.

In vitro digestible dry matter (DDM), averaged over all grasses, decreased with season until the September harvest. The relationships between both CWC and ADF and DDM were inverse. That is, as CWC or ADF increased, DDM decreased.

Crude protein (CP) contents were highest for most grasses in May and June and lowest in August and September.

None of the quality components measured were consistently favorable for any one grass throughout the season.

*Taken from Annual Progress Report, Southeast Louisiana Dairy and Pasture Experiment Station, 1976, pp. 152-154.

Table 1. Quality components of forages of some limpo grasses (*Hermarthria altissima*), 1976

Plant introduction number	Harvest date and % CWC[1] 5-20	6-25	8-10	9-23	Av	Harvest date and % ADF[2] 5-20	6-25	8-10	9-23	Av
299993	74.0	72.7	75.7	69.5	73.0	39.4	37.3	65.5	35.8	44.5
349748	74.2	74.5	75.0	67.7	72.8	38.2	35.5	53.5	35.4	40.6
349749	71.3	72.3	69.8	66.9	70.1	34.3	35.4	38.8	34.7	35.8
364891	65.4	70.4	74.7	63.7	68.8	30.9	33.4	53.5	31.6	37.3
349752	----	74.0	73.8	69.9	72.6	----	37.2	42.2	37.6	39.0
364344	69.8	65.8	74.4	69.1	69.8	36.1	38.0	37.0	36.5	36.9
364863	73.1	75.1	79.6	67.8	73.9	36.5	37.7	65.4	35.4	43.7
365509	64.4	65.7	68.8	64.7	65.9	32.4	37.1	43.2	41.1	38.4
Av	70.3	71.3	74.1	67.4		35.4	36.4	49.9	36.0	
	% DDM[3]					% CP[4]				
299993	54.9	54.3	42.2	54.2	51.4	11.3	12.2	6.0	9.3	9.7
349748	55.0	56.4	55.6	54.0	55.2	10.4	12.7	8.7	9.0	10.2
349749	56.7	58.2	53.9	55.3	56.0	11.4	10.7	12.1	8.7	10.7
364891	60.2	55.3	54.0	59.4	57.2	14.8	15.0	9.6	9.8	12.3
349752	----	55.7	55.4	55.6	55.6	----	11.7	9.8	8.7	10.1
364344	57.1	54.7	53.8	56.4	55.5	10.5	13.8	8.6	8.0	10.2
364863	57.3	53.8	57.5	57.4	56.5	8.6	11.3	9.4	10.0	9.8
365509	54.1	44.5	57.4	56.9	53.2	11.4	10.9	9.8	9.0	10.3
Av	56.5	54.1	53.7	56.1		11.2	12.3	9.2	9.1	

[1]CWC, cell wall constituents

[2]ADF, acid-detergent fiber

[3]DDM, in vitro digestible dry matter

[4]CP, determined by Udy process

Trifolium repens Trials

Bobby G. Harville
Agronomy Department

The following P.I. white clover lines which were grown as single plants replicated five times showed definite possibilities for use in a breeding program. Those which showed good drought resistance and remained virus free were: 195531, 195532, 195533, 208567, 214207, 257808, and 291837. Those which showed these characteristics early in the season but declined during the hot weather were: 231786, 294544, 300156, 303835, and 326144. All of the other 113 accessions showed no promise.

Additional plant introductions for planting next September are wanted. Genetic variability is needed in this crop.

Algal Disease Survey

Gordon E. Holcomb
Plant Pathology Department

Trial plantings at the Burden Research Center contain many new plant materials. These plants were surveyed for algal leafspot and stem infections, caused by *Cephaleuros virescens* Kunze, during the past few years. Below is a list of susceptible plants:

Alnus japonica, *Castanea mollissima*, *Cladrastis lutea*, *Franklinia alatamaha*, *Gordonia axillaris*, *Halesia diptera*, *Idesia polycarpa*, *Ilex* X "Elegance" NA 28261-C, *Ilex* X Fosters, *Ilex montana*, *Ilex opaca*, *Ilex* X "Albert Close" PI 331202, *Ilex* X "William Cowgill" PI 334203, *Ilex vomitoria*, *Magnolia tripetala*, *Pyracantha coccinea*, *Pyracantha fortuneana*, *Quercus chenii* PI 102653, *Quercus myrsinaefolia* NA 1939-S, and *Sapindus utilis*.

Vegetable Crop Trials

James F. Fontenot
Department of Horticulture

Potato Breeding and Development

Research objectives are wide adaptability; high yield; frost, heat and drought resistance; insect and disease resistance; and improved culinary quality. In order to attain these objectives wide genetic diversity is required, thus we are making good use of plant introductions. In 1974 a total of 24 clones were selected that were related to plant introductions; 59 clones of 261 selected in 1975 were from plant introduction parents; and 54 of 225 were selected in 1976.

Pepper Breeding

Of the 79 pepper accessions grown and evaluated in 1976, many were discarded; however, some of these lines were so heterozygous we now have 88 lines from plant introductions which we are selfing.

Okra Breeding

Twenty-seven introductions were observed in 1976 and 9 were discarded. Many of the lines saved were heterozygous and we are now selfing these and screening them further.

Evaluation of Tomato Lines for Leafminer Resistance in 1977

Teme P. Hernandez
Horticulture Department

Plant Introduction Nos. 302463, 140412, 124036, 167103, 140412, and L262 were grown in a replicated test in a plastic greenhouse in 1977. Each tomato line was grown in 5 plant plots and replicated 3 times. A severe leafminer infestation occurred and a count of leafminers emerging from ten leaves in each replication was made. The mean number of leafminers emerging from each 10 leaves were as follows: P.I.302463 - 18; P.I.140412 - 22; P.I.124036 - 22.7; P.I.167103 - 23; P.I.140412 - 46.3, and L262- 18.7. The plant introductions were no more resistant than L262, a susceptible line.

Louisiana State University

Annual Report-August, 1977 - S-9 Committee

Ornamentals, R. J. Stadtherr

NAME	P.I. OR N.A. NOS.	NO. PLANTS REC'D.	NO. PLANTS LIVING	AVERAGE HEIGHT & WIDTH	COMMENTS
Received 1/28/72					
Viburnum sargentii "Onondaga"	NA 28870-c	1	0		Dead 2/72.
Received 3/7/72					
Rhododendron sp.	PI 368122	4	0		Dead 6/73.
Rhododendron sp.	PI 368145	4	0		" "
Received 3/8/72					
Impatiens hawkeri 'New Guinea Giants'	PI 354251	Cuttings	0		All have
Impatiens hawkeri 'New Guinea Giants'	PI 354252	(Same for all)			died during
Impatiens hawkeri 'New Guinea Giants'	PI 354253				the summer.
Impatiens herzogii 'Danlo Pass'	PI 349584				
Impatiens linearifolia 'Longpela Lip'	PI 354263				
Impatiens linearifolia 'Liklik Susa'	PI 354266				
Impatiens linearifolia 'Liklik Susa'	PI 354267				
Impatiens schlechteri 'Pikinini'	PI 354258				
Impatiens schlechteri 'Naispela'	PI 354259				
Impatiens schlechteri 'Luluai'	PI 354262				
Impatiens sp. 'Aujura'	PI 349582				
Impatiens sp. 'Kassam'	PI 349583				
Impatiens sp. 'Patep II'	PI 349586				
Impatiens sp. 'Mindik'	PI 349588				
Impatiens sp. 'Kundiawa'	PI 354254				
Impatiens sp. 'Mt. Kum'	PI 354255				
Impatiens sp. 'Korn Farm'	PI 354256				
Impatiens sp. 'Korn Farm'	PI 354260				
Impatiens sp. 'Redpela'	PI 354257				
Impatiens sp. 'Mt. Hagen'	PI 354261				
Impatiens sp. 'Masta Mausgras'	PI 354264				
Impatiens sp. 'Plausa Misis'	PI 354265				
Impatiens platypetala 'Tjibodas'	PI 349629				

NAME	P.I. OR N.A. NOS.	NO. PLANTS REC'D	NO. PLANTS LIVING	AVERAGE HEIGHT & WIDTH	COMMENTS
Received 3/13/72					
Dombeya 'Rosemound'	PI 205654	2	0		Dead 2/73.
Dombeya 'Pinwheel'	M 20667	1	0		Dead 2/73.
Coleus blumei var. Verschaffeltii:					
Afterglow	PI 249769	Cuttings			Numbers
Autumn	PI 249770				mixed up
Beauty	PI 249771				new group
Beckwith's Gem	PI 249772				received.
Campfire	PI 249775				Greenhouse.
Crimson Velvet	PI 249777				
Cristata	PI 249778				
Poris	PI 249780				
Etna	PI 249781				
Excellent	PI 249782				
Freckles	PI 249783				
Glitter	PI 249784				
Glory of Luxenborg	PI 249785				
Harlequin	PI 249786				
Laing's Croton	PI 249787				
Coleus (continued)					
Received 3/17/72					
Lord Falmouth	PI 249788				
Paisley Shawl	PI 249790				
Pagasus	PI 249791				
Picturatum	PI 249792				
Pineapple Beauty	PI 249793				
Rust	PI 249796				
Russet	PI 249797				
Salmon Croton	PI 249798				
Skylark	PI 249799				
Sunbeam	PI 249800				
Tapestry	PI 249803				
Torch	PI 249804				
Vesuvius	PI 249806				
White Gem	PI 249807				
Scarlet Ribbon	PI 251601				

NAME	P.I. OR N.A. NOS.	NO. PLANTS REC'D.	NO. PLANTS LIVING	AVERAGE HEIGHT & WIDTH	COMMENTS
<u>Received 3/17/72</u>					
Abies pinsapo	NA 32238	1	0		Lived 3 years
Abies pinsapo	NA 32239	1	0		but Shoot tip
Abies pinsapo	NA 32240	1	0		die back bad every year.
Buxus microphylla japonica "Morris Dwarf"	NA 7027-c	2	2	9"x7"	Very slow
Buxus microphylla japonica "Morris Midget"	NA 7026-c	2	2	8"x7"	in growth.
Camellia 'Taro-Kaja'	NA 7158-c	1	1	6'x3'	Destroyed 7/77.
Chamaecyparis obtusa 'Sanderi'	NA 29129-c	1	1	21"x12"	Slow growth.
Chamaecyparis pisifera 'Tsukuma'	NA 30001-c	1	0		
Clethra barbinervis	NA 35758	1	0		
Cotoneaster microphylla 'Emerald Spray'	NA 33597-c	1	1		Relocated - have cuttings.
Pinus brutia	NA 33031	2	0		Tip moth-dead 7/76.
Pinus koraiensis	NA 31740	1	0		Borer-dead 6/73.
Quercus myrsinaefolia	NA 1939-s	3	3	1-6'x7'	2 relocated.
Rhododendron austrinum	NA 31298	1	0		
Salix fragilis 'Bullata'	NA 16245-c	1	0		Kills back annually-dead 7/76.
Thuja occidentalis 'Hoseri'	NA 29748-c	1	0		Spray damage-dead 7/76 - Have rooted cuttings.
<u>Received 3/20/72</u>					
Camellia japonica:					
Duchess D'Orleans	PI 308992	1			Discontinued
Fire Ball	PI 308993	1			plot - 7/77
Jenny Lind	PI 308997	1			for all
Jubile	PI 308998	1			<u>Camellia</u>
Mariana Gaete	PI 309010	1			<u>japonica</u> and
Storyi	PI 309017	1			other species.
Triomphant	PI 309018	1			
Yamato Nishiki	PI 319162	1			
Hino Maru	PI 319164	1			
Hagoromo	PI 320891	1			

NAME	P.I. OR N.A. NOS.	NO. PLANTS REC'D.	NO. PLANTS LIVING	AVERAGE HEIGHT & WIDTH	COMMENTS
Camellia japonica (continued)					
Received 3/20/72					
Hakutsura	PI 320892	1			Discontinued
Frost Queen	PI 352669	3			plot - 7/77
Daisy Eagleson	PI 365627	3			for these.
Received 4/25/72					
Prunus sp.	G-21597	1	0		Cultivation casulty.
Received 5/30/72					
Rhododendron aurigeranum	PI 354292	6	0		Root rots
Rhododendron macgregoriae	PI 354329	6	0		for all of
Rhododendron zoelleri	PI 354364	6	0		these.
Rhododendron zoelleri	PI 354369	6	0		
Rhododendron sp.	PI 354374	1	0		
Received 6/29/72					
Juniperus conferta 'Emerald Sea'	PI 323932	2	2	5"x19"	One of best, dwarf & compact.
Received 8/2/72					
Magnolia x 'Maryland'	NA 33938-c	1	1		Moved-Burden.
Received 9/6/72					
Viburnum dilatatum 'Catskill'	NA 28866-c	1	0	Dead	Insufficient winter chilling.

Mississippi Representative's Report
S-9 Technical Committee
August 18-19, 1977
Stillwater, Oklahoma

C. E. Watson, Jr. and R. G. Creech

Forages

Over 100 accessions of subterranean clover have been evaluated at Mississippi State, Mississippi. The last group tested were 19 accessions collected in 1974 and presented by G. Jaritz, Institut National de la Recherche Agronomique de Tunisie, Ariana (PI-401556-574). Accessions tested to date offer a wide range in plant type including morphology, maturity, and insect and disease resistance. This material should provide a valuable source of germplasm in developing superior subclover varieties for Mississippi and the Southeast.

During the past year 132 introductions of tall fescue (*Festuca arundinacea* Schreb.) were artificially inoculated and evaluated for resistance to an isolate of crown rust (*Puccinia coronata*) found in Mississippi in 1976. 20 accessions demonstrated high levels of resistance. Studies are planned for the coming year to check for resistance to other isolates of the rust fungus to determine the nature of the resistance in each accession.

Cotton

We have about 125 introductions of wild races of cotton of the species *hirsutum* which are being utilized in our breeding program for pest resistance.

We have a long range program which has as its objective to breed day neutral genes into as many entries in the wild *Gossypium hirsutum* race collection as possible. We are presently working with F_4 material from 69 accessions, BC_1F_2 material from 50 accessions and F_2 material 150 accessions.

Corn

Host-plant resistance is the major concern of the Cooperative ARS-State Corn Improvement Program at Mississippi State University. In our endeavor to find corn genotypes with resistance to feeding by southwestern corn borers, *Diatraea grandiosella*, we have obtained seed of over 100 populations or selections within these populations from CIMMYT. Utilizing our techniques of artificially infesting the corn plants with corn borer eggs, we were able to identify and select some genotypes with resistance to southwestern corn borer. We have made selections from crosses among these resistant genotypes and saved the most resistant. To date, we have released four genotypes which have resistance to southwestern corn borer. This material also has resistance to other pests. For instance, one of the inbreds released has resistance to at least four diseases (corn stunt, maize dwarf mosaic, downy mildew, and southern corn rust) and to two other insects (fall armyworms and European corn borers). We anticipate more valuable genotypes being extracted from this material as we are able to evaluate it more completely.

Sorghum

Sorghum introductions have become an integral part of the silage and grain sorghum breeding program at Mississippi State University. Releases from the Texas A&M University - USDA sorghum conversion program provide much of the disease and insect resistant germplasm in this program. A 6-line diallel cross including 5 partially converted lines from the World Collection of Sorghum is being evaluated to determine the inheritance of sorghum midge resistance. An additional 25 conversions are being screened for resistance to the sorghum midge. In a 2 year study 560 plant introductions were screened for resistance to MDMV. Seventeen of the lines were highly tolerant to this virus but they were not as resistant as the Krish source, a plant introduction from Australia. In the sorghum breeding nursery 18 plant introductions are currently used to broaden the germplasm base.

Report of W. T. Fike to S-9 Technical Committee, Stillwater, Oklahoma, August 18-19, 1977.

Of the 28 campus research personnel who receive P.I. catalogues and information through my office, and others who receive information direct, twelve cooperators received a total of 1093 lines consisting of 48 species of 11 plant genera. These are just a very small part of the total number of plant introductions under test in North Carolina as many hundreds of accessions are in various stages of advanced testing.

A. New Cultivars and Breeding Lines Released

1. NC-6 Peanut Cultivar: A large-seeded Virginia-type variety with excellent seed quality and flavor released in 1976 by Drs. Campbell, Wynne and Emery. Its resistance to the southern corn rootworm and to thrips and leafhoppers will allow this variety to be widely grown in both Virginia and North Carolina. With the common chemical method of controlling these insects deteriorating, it is felt that NC-6 has great potential to eliminate the use of insecticides. It is the first peanut variety developed in the United States with multiple insect resistance. (P.I. 121067 was part of this hybrid combination. See Germplasm Registration of GP-NC 343 Peanut Germplasm. Crop Sci. 1971 11:605).

2. NC-3033 Peanut Germplasm: This line developed by Dr. W. E. Cooper has high resistance to *Cylindrocladium* black rot and good resistance to southern stem rot. Released in 1976 by Drs. Beute, Wynne and Emery.

B. Plant Introductions of Special Interest

1. Dr. J. C. Wynne is maintaining almost 2500 peanut PI's as resource material for his breeding program. PI's 269062, 270853, 269006 and 269049 have been identified as having high resistance to the potato leafhopper. All PI's are systematically screened for resistance to tobacco thrips, southern corn rootworm, potato leafhoppers and lesser cornstalk borers.

2. Seed of the high yielding kenaf variety "Tainung No. 1", *Hibiscus cannabinus* (P.I. 365441) is being increased for commercial release. Seed increase plots of 50 acres in South Texas during 1976 were failures due to an early freeze during November. Some seed was obtained from a 10± acre increase plot in Haiti. Seed increase plots are again planted in Texas. Smaller experimental plots are being evaluated in Upper Volta. Any commercial production of kenaf must be based on a strong quality seed program.

C. Evaluation of Potential New Crops

Kenaf is being grown commercially on 1200 contracted acres in North Carolina this year. When mature the kenaf is harvested with a mower-conditioner, baled, stacked, then decorticated. The bast fiber is used as a source of pulp in the production of fine quality paper products. The potential acreage for this crop is in the range of from 5000 to 10,000 acres. Kenaf would then be the third leading crop in the three county area of the Tidewater where it is adapted.

D. Gleanings from Cooperators.

1. Dr. W. B. Nesbitt - Grape breeder. "We are maintaining all the introductions that survive here. The most important characteristics we hope to incorporate in our selections is quality from V. vinifera. All our bunch grape selections include some V. vinifera or French hybrids in their background. Originally, all this material came through plant introduction and before plant introduction was established, it came through private growers and government agencies. Our better parents have been the French hybrids and selections from eastern grape breeding projects. We have not introduced any cultivars from this program to date. We are testing some interesting selections. The introduction that may be of some value as cultivars are: SV 12-375, Foch, Baco Noir, Seibel 10.878 and 10.868, etc. We are also testing some of the rootstocks for use with bunch grapes."

2. Dr. D. H. Timothy - Grass breeder. "I would be interested in receiving additional introductions of Pennisetum flaccidum. I believe this same request was made several years ago. It exists in diploid (2n = 18) and tetraploid forms (2n = 36). The tetraploid seems better in North Carolina than the diploids, which are devastated by diseases and produce no seed. P. flaccidum is found at 1,600 to 4,300 m elevation from western Nepal, Tibet, and China through the Kashmir to Afghanistan. If any explorations will be in those areas, I would be anxious to receive seed of the species."

3. Dr. J. C. Raulston - Ornamentals. "It was ironic to receive your letter Tuesday on the S-9 project as I had just spent Monday at Clemson discussing it with David Bradshaw in relation to the ornamental collection in their arboretum. I have no reports for you as no records have been kept when and/or if any woody ornamentals were ever received and tried at Method Farm. However, I am spending considerable time collecting new materials and I would appreciate your forwarding any distribution lists with ornamentals you may receive as coordinator of this program. We've already received materials from the National Arboretum list you sent this spring. Thank you for keeping me informed on the program and I'll look forward to continued work with you."

E. Transfers

Dr. Gene J. Galletta, a close cooperator with S-9 in the blueberry program has resigned his position at North Carolina State University to take a position as Research Geneticist (Blueberry) with the United States Department of Agriculture at Beltsville, Maryland. Dr. Jim Ballington, our peach breeder, is presently looking after the blueberry's program.

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REGISTRATION OF NC 6 PEANUTS[1]

(Reg. No. 20)

W. V. Campbell, J. C. Wynne, D. A. Emery, and R. W. Mozingo[2]

'NC 6' is a large-seeded Virginia-type peanut (*Arachis hypogaea* L.) cultivar released in 1976 by the North Carolina Agric. Exp. Stn. It was selected for resistance to the southern corn rootworm (*Diabrotica undecimpunctata howardi* Barber) in the fourth generation following a cross of 'GP-NC 343' (2) and 'Va 61R' (1). NC 6 was designated NC Ac 17167 during development and testing. The cross was made in 1966 and the first three generations were grown in the greenhouse using a single seed descent breeding method.

NC 6 has a runner growth habit similar to that of 'Florigiant' (the predominant cultivar in North Carolina and Virginia), although it tends to be intermediate in growth habit on sandy soils. It is comparable in maturity to Florigiant in North Carolina and Virginia requiring approximately 150 days to mature.

NC 6 yielded 15 to 20% more than Florigiant in soils with a high infestation of southern corn rootworm that were not chemically treated for insect control. It averaged 85% less rootworm damaged pegs and pods than Florigiant in similar studies. NC 6 has shown moderate resistance to the potato leafhopper (*Empoasca fabae* Harris) and is less susceptible to tobacco thrips (*Frankliniella fusca* Hinds) than any other commercial cultivar tested in the Virginia-Carolina peanut belt.

Yields and value per unit area were slightly less than Florigiant but greater than 'NC 5' for the 1973-75 growing seasons in the Virginia-North Carolina Peanut Variety and Quality Evaluation Program (3). NC 6 has larger fruit and seed sizes than either Florigiant or NC 5. The mill outturn and the percentage of extra large kernels are higher for NC 6 than for Florigiant. NC 6 also has fewer no. 1 size kernels than Florigiant. NC 6 had 10% jumbo pods compared to 2% for Florigiant. These jumbo pods had fewer cracks and total defects than pods of Florigiant. Commercial blanching of medium grade kernels indicated that NC 6 had fewer split seeds after blanching but was harder to blanch than Florigiant. NC 6 compares favorably with Florigiant in flavor, shelf-life, protein content, and oil content.

The North Carolina Agric. Exp. Stn. maintains breeder seed.

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[1] Registered by the Crop Sci. Soc. of Am. Accepted 17 Dec. 1976.

[2] Professor of entomology, assistant professor of crop science, and professor of crop science, North Carolina State Univ., Raleigh; and assistant professor of agronomy, Virginia Polytechnic Institute and State Univ., Suffolk, respectively.

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REPORT TO S-9

from the

Oklahoma Agricultural Experiment Station

PEANUT COLLECTIONS FROM SOUTH AMERICA

During late March to early May, 1977 a peanut collecting trip was made in northern Argentina and Bolivia. Co-leaders for the expedition were W. C. Gregory, North Carolina State University, and Antonio Krapovickas, Corrientes, Argentina. Other participants were Donald Banks, USDA, ARS, Oklahoma State University; Charles Simpson, Texas A & M University; José Pietrarelli, Cordoba, Argentina; and Aurelio Schininini, Corrientes, Argentina. Hebert Zurita, Saavedra, Bolivia participated in the Santa Cruz-La Paz phase. The trip was financed by the International Board for Plant Genetic Resources (IBPGR), FAO, Rome, Italy and the participants' parent organizations.

Seed collections were made of 118 cultivated peanuts and 43 accessions of wild species as well as Rhizobium collections from 91 legumes, primarily Arachis species. In addition, 110 seed collections were made of other plants including forage grasses (particularly Paspalum) and legumes, castors and peppers.

The peanuts are being increased at Stillwater for distribution later to various peanut breeding programs. These collections add greatly to our germ plasm resources and to our understanding of the evolution of the peanut and its wild relatives.

PEANUT RESEARCH

Several peanut plant introductions are being utilized in the peanut breeding program. Some are being evaluated in performance tests directly while others have undergone selection before testing. In the last three or four years, several P.I. numbers have been evaluated for resistance to verticilium wilt and some have been screened for their tolerance to cold temperatures during germination.

In 1976 we attempted to increase 500 peanut lines for the Regional Center and for the NSSL. The 1976 season at Perkins was extremely dry and resulted in some 300 of the accessions being grown again this year for additional increase. We also obtained 201 new lines this year for a similar increase.

SORGHUM BREEDING

Dale Weibel is utilizing about 12 lines from the sorghum conversion program in his breeding program. Segregating populations involving these converted lines are now growing in the field. At least 12 more lines converted from the world collection of sorghums are scheduled for evaluation.

Our USDA entomologist, Ken Starks, is screening the Georgia Regional Sorghum collection for resistance to the yellow sugarcane aphid.

Dale Weibel obtained 15 or 20 pearl millet collections from the regional laboratory a year ago and is comparing these to random mating populations of pearl millet obtained from Dr. Casady in Kansas.

WOODY ORNAMENTALS

Carl E. Whitcomb, Department of Horticulture

Betula platyphylla 'Japonica', japanese white birch. NA 33520. The specimens at the Arboretum were obtained from the National Arboretum which, in turn, came from seed collected in Japan. These test plants, now five years old, are growing very well in the Arboretum and appear to be well established. These have shown considerable drought resistance and apparently are well adapted to Oklahoma. We have observed no insect or disease injury to these plants to date. One specimen produced a tremendous quantity of seed this summer but numerous attempts to germinate that seed were unsuccessful. As the plant gets larger, we anticipate trying to propagate it from cuttings to make this plant more widely available for use in Oklahoma landscapes. The bark on the young tree is a rather grayish white. However, this past season as the tree has developed larger stem diameter, the bark has become more and more white. A white bark birch with at least moderate resistance to the bronze birch borer would have a definite place in Oklahoma landscapes.

The American elm, *Ulmus americana*, has been a mainstay among shade trees in Oklahoma for many years. Dutch elm disease is ravaging the state making further planting of the American elm or any susceptible elm highly questionable. The Siberian elm, *U. pumila*, widely planted during the "dust bowl days" of the thirties, although resistant to dutch elm disease, is highly susceptible to the elm leaf beetle.

The Urban elm, a hybrid released by the National Tree Laboratory, Delaware, Ohio, has *U. pumila* parentage and is severely defoliated by elm leaf beetle in Stillwater. 'Sappors Autumn Gold', released by the University of Wisconsin, also has *U. pumila* parentage and is equally beetle susceptible.

Two elm hybrids, NA 36526, _U. parvifolia_ x _U. thomasii_ and NA 36528 _U. parvifolia_ x _U. wallichiana_, and NA 36533, an _U. parvifolia_ seedling, have been grown at the Oklahoma State University Nursery for the past year adjacent to selections highly susceptible to the elm leaf beetle with _no_ injury. All three selections are highly resistant to dutch elm disease and appear to hold much potential for all of Oklahoma and the central and southern great plains.

Pinus brutia NA 33064 continues to perform well. No injury could be detected on any of the three specimens following a long cold and dry winter with temperatures reaching $-5^{o}F$. Pine tip moth injury has been minimal and to date no pine needle blight has been observed. These are the two major problems with pines in Oklahoma at the present time.

NEW CROPS RESEARCH IN PUERTO RICO

Annual Report August 1976 - July 1977

Oscar D. Ramirez
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Agricultural Experiment Station
College of Agriculture
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Rio Piedras, Puerto Rico 00928

During the period covered by this report 57 new accessions were received. These were grouped as fruits, 5; root crops, 6; ornamentals, 29; vegetables, 1; and forages, 16.

Fruits: Evaluation of avocado (Persea americana) varieties continued. One new variety (Catalina) from Florida was incorporated to the collection. This will be increased and evaluated.

Also, two new varieties of mango (Mangifera indica), Momi-K and Gouveia were reintroduced from Florida.

Grape (Vitis sp.) varieties Exotic and Ribier continued to be the most promising. They seem to do very well when grafted on Lake Emerald and Tamiami rootstocks.

Root crops: Seven varieties of yam (Dioscorea alata) are being evaluated in an experiment. Six other cultivars of potatoe yam (Dioscorea esculenta) are being increased.

Coffee: The coffee variety Pacas, received from El Salvador, is maintained under intensive culture. Fundamental data as to blooming stage, disease resistance, yield and other information will be recorded.

Ornamentals: Various ornamentals were received from the National Arboretum. Among the most promising there are three varieties of Impatients, Sweet Sue, Pele, and Aloha; and three conifers, Cryptomeria japonica var. Globosa Nana (NA 18295-C), X Cupressocyparis leylandii var. Leighton Green (NA-4464-C) and X Cupressocyparis leylandii var. Silver Dust (NA-38186).

The ornamentals received were:

Cultivar	P.I.	Plants Received	Plants Living
Cryptomeria japonica var. Globosa nana	NA 18295-C	10	6
Cryptomeria japonica var. Bandai-Sugi	NA 9367-C	10	0
X Cupressocyparis leylandii var. Leighton Green	NA 4464-C	10	6
X Cupressocyparis leylandii var. Silver Dust	NA 38186	2	2
Taxus X hummewelliana var. Richard Horsey	NA 38052	1	1
Eurya japonica var. Witer Wine	NA 38185	1	1

Cultivar	P.I.	Plants Received	Plants Living
Abeliophyllum distichum	NA 38447-C	1	1
Argyroxiphium virescens	NA 37864	1	1
Buddleia globosa	NA 38624	1	1
" "	NA 38625	2	2
" "	NA 38626	2	1
" "	NA 38627	2	0
Ceanothus integerrimus	NA 37770	4	0
Cupressus abramsiana	NA 37671	2	2
Cupressus arizonica	NA 37862	1	1
Hypericum beanii	NA 38305	3	3
Ilex opaca var. Maryland Dwarf	NA 36139-C	1	1
Itea chinensis	NA 37383-C	2	2
Juniperus communis	NA 39943	1	1
Juniperus conferta var. Emerald	NA 30616-C	2	2
Poulownia fortunei	NA 37017	2	2
Petteria ramentacea	NA 38394	1	0
" "	NA 38395	1	1
Pinus heldreichii	NA 35925	2	2
" "	NA 35926	2	2
Pinus mugo	NA 39935	2	2

Forages: A series of 52 accessions of the genera Festuca, Dactylis, Lolium and Phalaris were planted. These species grew less than other tropical grasses. It seems they are not well adapted to our conditions. Thirty seven cultivars of Hemarthria altissima were planted to run a screening trial, also Cynodon plectostachyus cv. Callie. The series of Hemarthrias and cv. Callie appeared to be outstanding grasses based on their aggressive aspect.

Table 1 presents preliminary results of a field experiment where two Hemarthria altissima (299994, 299995), two Digitaria decumbens (299752, 111110) and Cynodon nlemfuensis var. nlemfuensis (Star grass) were harvested at three intervals (30, 45, 60 days), at three levels of nitrogen (220, 440, 880 Lbs N/A/year). H. altissima (299994) was the higher yielder at the 30 day intervals. Star grass was the best yielder at 45 day intervals, when 880 Lbs. of nitrogen were applied. At 60 days harvest, H. altissima (299994) was the best yielder at 440 and 880 pounds level of nitrogen.

Tables 2 and 3 present performance of various grasses introduced in Puerto Rico through this program.

In the 26 variety alfalfa screen trial the outstanding were: Florida-66, AZ Mesa sirsa, Mesa sirsa, NC-MP, Hayden I, NC-W-20, Hayden, Tanverde, Mexon and NC-W-18 with a green forage weight varying from 25,400.0 to 19,043.1 K/h. Table 4 presents preliminary results.

Table 1. Dry forage and crude protein yields (K/h) of five tropical grasses at three rate of fertilization[1/]

Species and Identification	Kilograms of Nitrogen Applied per Hectare Yearly					
	220		440		880	
	DF	CP	DF	CP	DF	CP
Hemarthia altissima (299994)	27,009 a	2,940 ab	35,379 a	3,381 ab	43,785 a	2,951 b
" " (299995)	22,127 b	2,521 b	29,579 a	2,877 b	35,921 b	2,735 b
Digitaria decumbens (299752)	28,439 a	3,453 a	30,677 b	3,377 ab	35,983 b	3,117 b
Cynodon nlemfuensis var. nlemfuensis (2341)	25,133 ab	3,365 a	31,348 ab	3,688 a	40,668 a	3,730 a
Digitaria decumbens (111110)	27,718 b	2,879 ab	23,746 c	2,983 b	27,921 c	2,657 b

Table 2. Yields and crude protein content of seven Napier grasses cut every 30, 45 and 60 days over a 2-year period at Corozal.

	PRPI Number	Green forage yields[1/]	Dry matter content	Dry forage yields	Crude protein content	Crude protein yield
		T/h	%	T/h	%	T/h
			30 Days			
P. purpureum	Hybdrid #3	125.77 a	13.41 bc	18.34 a	14.67 c	2.68 a
	13,079	120.06 ab	14.99 a	18.39 a	14.23 c	2.62 a
	13,078	115.53 ab	14.32 ab	16.81 a	14.16 c	2.40 ab
	Hybrid #4	111.04 ab	14.00 ab	16.18 a	15.80 b	2.56 a
	Common	91.52 abc	14.30 ab	13.31 ab	16.73 ab	2.21 abc
	11,720	70.90 bc	12.92 c	9.61 b	17.42 a	1.65 bc
	I-12	57.77 c	13.55 bc	8.28 b	17.86 a	1.48 c
			45 Days			
P. purpureum	13,079	207.33 a	15.13 a	32.12 a	11.36 b	3.66 ab
	Hybrid #4	200.37 a	14.43 ab	29.24 abc	13.12 a	3.84 a
	13,078	199.01 a	13.79 ab	29.76 abc	11.47 b	3.41 ab
	Hybrid #3	179.80 ab	13.48 b	25.48 abcd	11.42 b	2.90 bc
	I-12	177.09 ab	13.46 b	25.29 abc	13.01 a	3.30 abc
	11,720	163.61 ab	13.59 b	22.82 cd	12.67 a	2.89 bc
	Common	133.07 b	14.21 ab	19.76	12.90 a	2.56 c
			60 Days			
P. purpureum	13,078	320.90 a	17.13 cd	56.14 a	8.09 bc	4.50 ab
	13,079	298.57 a	17.63 cd	52.33 a	7.76 c	4.08 ab
	Hybrid #3	289.07 a	18.74 ab	53.78 a	7.99 bc	4.33 ab
	Hybrid #4	270.27 ab	19.40 a	50.97 a	9.12 ab	4.68 a
	Commom	235.00 b	17.66 abc	41.42 b	9.39 a	3.89 ab
	I-12	230.65 b	18.28 abc	42.83 b	8.84 abc	3.78 b
	11,270	230.36 b	16.90 d	39.33 b	9.48 a	3.72 b

1/ Means in the same column followed by different lower case letters are significantly different in the 5% level according to DMRT.

Table 3. Green tonnage yields of various Hermathrias under evaluation from October 1st, 1976 to July 5th, 1977.

USDA PI	Number of cuts at 35 days 1	2	3	4	5	6	7	8	TOTAL
364882									
364871									
364145									
349797									
347238	6.7	11.0	7.2	4.7	6.2	.9	15.8	12.5	65.0
299993									
349749	8.9	17.4	7.6	9.6	3.6	3.9	11.6	14.5	77.1
349754	10.8	12.7	8.5	5.9	7.5	1.1	14.0	11.6	72.1
349750	8.7	16.2	7.9	5.9	4.5	1.7	18.7	10.0	73.6
364861	14.1	17.2	12.6	9.5	7.5	2.5	25.6	14.3	103.3
364865	13.5	5.5	5.2	2.6	10.1	11.9			48.8
349751	8.3	11.6	13.2	4.9	5.1	1.4	10.0	7.4	61.9
364874	6.3	13.8	10.4	10.9	5.3	5.1	22.8	16.5	91.1
364344	11.4	7.2	2.2	1.3	1.4	6.9			30.4
364862									
249796	11.7	4.8	4.4	.7	7.6	4.2			33.4
364875	11.6	20.0	9.2	3.2	6.9	1.9	17.2	21.1	91.1
364863									
364875	11.2	3.8	6.3	3.2	16.4	5.4			46.3
364884	9.2	3.0	3.9	.9	11.4	5.5			33.9
364881	12.8	3.7	5.5	1.1	11.6	18.2			52.9
364880	7.8	13.4	8.7	4.3	6.2	2.4	11.6	9.0	63.4
364889	10.9	4.4	6.0	2.0	16.3	9.5			49.1
364885	17.3	10.2	7.6	4.4	15.7	11.6			66.8
364887	12.7	13.8	10.4	6.7	7.5	2.2	14.2	13.2	80.7
364891									
365509	6.4	17.2	9.6	11.3	7.0	4.9	11.2	18.5	86.1
367897	16.7	9.4	14.0	10.6	6.7	1.4	10.2	5.2	74.2
367897	8.2	16.2	6.8	4.0	7.0	2.4	8.1	18.0	70.7
299994	10.4	19.2	9.2	6.7	5.0	1.8	11.3	9.8	73.4
299995	8.6	8.9	11.4	5.0	5.2	1.4	10.4	5.8	56.7

Table 4. Green forage yield of 26 varieties of alfalfa cut at 1/10 bloom.

Variety	Date of Cut 9-30-76	11-26-76	1-25-77	2-28-77	3-28-77	5-17-77	6-3-77	Total/plot (Lbs)	Total K/h
Florida-66	12.8	11.0	10.7	9.7	15.3	17.3	9.1	85.9	25,400.6
AZ Mesa Sirsa	17.5	12.5	13.3	8.1	11.7	12.1	7.1	82.3	24,336.1
Mesa Sirsa	18.4	9.4	8.4	8.5	11.0	16.9	8.4	81.0	23,951.7
NC. M.P	11.1	9.1	11.0	7.7	12.7	13.7	6.7	72.0	21,290.4
Hayden I	15.6	8.7	8.2	8.1	9.7	14.7	7.0	72.0	21,290.4
NC-W-20	9.4	7.6	15.7	6.6	14.3	10.5	6.3	70.4	20,817.3
Tanverde	10.0	8.3	11.0	6.9	14.3	9.9	6.2	66.6	19,693.6
Mexon	11.4	8.6	8.7	7.6	11.7	11.7	6.7	66.4	19,634.5
NC-W-18	9.9	8.2	7.6	6.9	13.2	11.2	7.4	64.4	19,043.1
Lew	10.7	10.0	11.3	6.4	9.6	9.2	5.6	62.8	18,570.0
El Unico	18.2	7.7	8.5	6.6	9.5	11.8	5.8	62.7	18,540.4
Sonora 70	14.1	8.2	8.2	8.0	8.1	9.5	5.9	62.0	18,333.4
UC-62-Syn-2	13.6	8.4	9.3	6.6	6.6	9.6	5.9	60.0	17,742.0
Hayden	13.2	8.7	8.4	8.4	10.8	12.0	6.7	68.4	20,225.9
UC-76-C	11.6	7.4	9.4	5.4	8.0	9.6	5.6	57.5	17,002.8
Caliverde 65	11.7	8.3	7.6	5.4	7.6	10.2	6.3	57.1	16,884.5
UC-Salton	15.8	6.3	6.5	6.4	7.4	8.4	4.3	55.1	16,293.1
A R C	10.2	5.9	8.7	4.6	10.5	8.2	5.8	53.9	15,938.2
Apalache Phyto 2	6.8	4.3	6.0	4.5	12.8	8.2	6.4	48.9	14,459.7
AZ Ron	8.8	5.6	5.5	5.1	9.3	9.1	5.1	48.5	14,341.5
Apalache	7.9	3.9	5.2	5.3	11.0	8.3	5.6	47.2	13,957.0
Tanhuato	8.1	4.4	5.7	4.3	10.6	7.6	5.1	45.8	13,543.1
Hayden Comp.	8.5	6.0	7.2	6.8	6.0	7.1	2.9	44.5	13,158.7
Apalache(AN-2)	3.9	3.2	6.8	3.3	8.7	8.5	5.1	39.5	11,680.2

Table 4. cont.

Variety	9-30-76	11-26-76	1-25-77	2-28-77	3-28-77	5-17-77	6-3-77	Total/plot (Lbs)	Total K/h
Zia	6.4	3.4	3.9	2.7	8.3	6.1	4.3	35.1	10,379.1
El Unico Comp.	5.6	3.6	6.4	3.8	4.7	4.9	2.2	31.2	9,225.8

List of *Hemarthrias* under evaluation in Puerto Rico.

Cultivar	P.I.
Hemarthria altissima	299993
	299994
	299995
	347228
	349749
	349750
	349751
	349752
	349754
	349796
	349797
	349798
	364344
	364961
	364862
	364863
	364865
	364867
	364868
	364869
	364870
	364871
	364874
	364875
	364880
	364881
	364882
	368448
	364885
	364887
	364889
	364891
	365145
	365509
	367897

Cultivar	P.I.
<u>Hemarthria altissima</u>	378086
	379613
	383331
<u>Hemarthria uncinata</u>	400272
	400276
	401712
	401713
<u>Hemarthria compressa</u>	404117
	404118

South Carolina Agricultural Research
Service Report to S-9 Technical Committee
August 18-19, 1977
David W. Bradshaw

In the fall of 1975 several Plant Introductions of Phaseolus vulgaris were evaluated for resistance to bean rust at the U.S. Vegetable Laboratory, Charleston, S.C. Severe infections occurred that year in both spring and fall crops. The following P.I.'s were classified as moderately to highly resistant to bean rust:

PI 164752	180754	226523	165008	175830
172029	180755	136684	165427	175832
176683	186492	136686	165441	175843
180739	190072	136737	166031	176696
180740	197445	136749	169765	176703
180742	195377	146765	169903	176709
180752	207408	150141	169906	177502

The following PI's were moderately to highly susceptible to bean rust:

PI 169848	199044	151039	173024
177761	146777	151041	180750
180748	151023	165085	

In the fall of 1976, several PI's were planted to confirm 1975 observations. There were no rust pustules in the planting until September 28 and the level of infection was never sufficient to make an evaluation for rust. However, powdery mildew infection was severe and notes on resistance of the PI's were made.

The following PI's were rated as moderately to highly resistant to powdery mildew:

PI 165426	195377	136684
180742	164752	282057
180748	165078	136695

The following PI's were rated as moderately to highly susceptible to powdery mildew:

PI 180740	197445	176683	207138
180752	199044	177760	282084
180754	207138	177761	
180755	169848	226523	
186492	172029	152208	

The following PI's were susceptible to the tropical root-knot nematode, Meloidogyne javanica, in a greenhouse test:

PI 136695	180748	165426
207138	195377	282057
164752	282084	180742

Above research by Jim Wyatt, Research Geneticist, U.S. Vegetable Laboratory, Charleston, S.C.

Richard L. Fery, Research Geneticist, U.S. Vegetable Laboratory recently completed three years of field evaluations of approximately 450 Vigna unguiculata introductions for resistance to the cowpea curculio (Chalcodermus aeneus). Although these data have not been analyzed, initial evaluations indicated that none of the introductions have higher levels of resistance than lines previously identified.

Dr. P.D. Dukes, Plant Pathologist, U.S. Vegetable Laboratory, identified the following V. unguiculata introductions as having appreciable levels of resistance to root-knot nematode Meloidogyne incognita:

PI 293535
354718
354468
353383

Enclosed are two reprints of recently published work that list several Lycopersicon introductions that have potential value as sources of resistance to tomato fruitworm Heliothis zea.

Resistance of Tomato Cultivars to the Fruitworm, *Heliothis zea* (Boddie)[1]

Richard L. Fery and Frank P. Cuthbert, Jr.[2]
U.S. Department of Agriculture, Charleston, South Carolina

Abstract. A collection of 1,030 accessions of tomato (*Lycopersicon esculentum* Mill.), mostly cultivars and assumed cultivars, was evaluated for resistance to the tomato fruitworm. Although no immunity was found, there were significant differences in the degree of susceptibility. The most resistant cultivar, 'Tiny Tim', was 83.1 and 57.6% less damaged than the susceptible and resistant controls, respectively. Even though the data were possibly confounded by vine-size effects, indications are that much of the variability can be used to develop less susceptible cultivars.

The tomato fruitworm is the major pest of tomatoes in several important U.S. production areas. Multiple applications of insecticides are often required at present to control this pest. This dependence upon insecticides is undesirable for both economic and environmental reasons. The high costs of insecticide control have long been recognized as an economic problem. The adverse effect of chemical insecticides on the predators and parasites of economic pests is also often a serious problem. Both of these problems could be alleviated by the development and use of resistant cultivars.

The literature on fruitworm resistance in the tomato is limited. Although there have been reports on such aspects of resistance as the differential susceptibility of fresh market vs. processing cultivars and the relationships between damage and such factors as earliness, fruit no., vine size, and plant density (1, 2, 3), no large-scale effort to locate sources of resistance has been reported. Because of this general lack of information and the availability of a large no. of tomato cultivars, the initial phase of such an effort should be a search for high levels of resistance within cultivar germplasm. We report here the results of such a program conducted over a 2-year period, using all available tomato cultivars.

The data reported here are from fall tests conducted at the U.S. Vegetable Laboratory, Charleston, S.C., in fields naturally infested by the tomato fruitworm. All plants were grown from seed in the greenhouse and transplanted to the field. Routine cultural practices were followed. Early-season insect pests were controlled with a nonpersistent insecticide.

An attempt was made to screen all available cultivars. Sources of the 945 cultivars and assumed cultivars evaluated included the Old Varieties Collection of the National Seed Storage Laboratory, Plant Introductions, and commercial seed houses. Apparent duplicate or closely related accessions from a "cultivar family" and previously evaluated cultivars were not included. Also evaluated were 85 *L. esculentum*-type Plant Introductions that had been observed to have low levels of fruitworm damage in previous screening trials[3].

All 1,030 accessions were evaluated in a non-replicated test in 1972. Each plot consisted of a single row of 5 plants spaced 76 cm apart on beds 2 m apart. A total of 341 of the accessions were discarded before harvest as being obviously highly susceptible to the fruitworm. We evaluated the remainder of the accessions by grading for fruitworm damage the total fruit yield from 1 or 2 randomly chosen plants. Because accessions differed in maturity, the entries were evaluated in 2 groups or time periods. The first group of 464 accessions included all the entries that contained mature fruit during the first sampling period. The second group of 225 accessions was evaluated 10 days later. Immediately after these evaluations had been completed, 124 of the most promising accessions were reevaluated by a second sampling of additional plants. A fruit was classified as damaged if it possessed any sign of larval feeding.

In 1973, the 36 accessions that showed apparent resistance in the 1972 planting were evaluated, along with 3 controls, in a randomized complete-block with 4 replications. Each plot consisted of 1 row of 10 plants, spaced 76 cm apart on beds 2 m apart. The controls included the susceptible 'Parker', a resistant selection TF-2, and 'Walter', a commercial cultivar. TF-2 had previously demonstrated a significant level of resistance to the fruitworm (2). Each entry was evaluated for fruitworm damage by grading all the fruit obtained by 2 preharvest collections of ripe and rotten fruit and an early single harvest of the mature green, ripe, and rotten fruit.

The distributions within the 2 maturity groups evaluated by grading during the 1972 test were skewed toward the lower ratings (Fig. 1). The skewed distributions probably resulted from the preharvest elimination of more than 1/3 of the accessions. Had this data been collected, it would probably have "filled in" the right sides of the distributions. The damage ratings ranged from 0 to 100%. The mean ratings for the early and late sampling periods were 36.5 and 23.5%, respectively. We also noted this apparent earliness effect in a previous study, in which fruitworm damage was inversely correlated with vine size (2). In that study, a negative correlation between earliness and vine size rather than earliness *per se* was shown to be the major explanation for the association between earliness and damage.

Fruitworm damage for the accessions in the 1973 test ranged from 13.1 to 77.3% of the fruitload (Table 1). Although not all the selected accessions were resistant, several were at least equal to the resistant control, and one, 'Tiny Tim', was significantly better. 'Tiny Tim' was 83.1% less damaged than 'Parker', the susceptible control, and 57.6% less damaged than the resistant control TF-2.

In our previous study, we found that differences in observed resistance among 22 accessions disappeared when the data were adjusted for vine size (2). The earlier data, for example, indicated that much of the resistance in TF-2 was caused by its large vine size. Because data on vine size were not taken in the present study, the potential usefulness of the cultivars in the low-damage group cannot be fully determined. However, the variation of vine size within both the low- and high-damage groups suggested that other factors were also

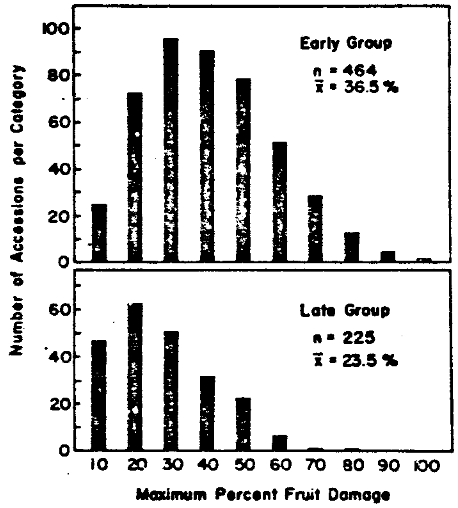

Fig. 1. Frequency distributions of tomato accessions, based on % fruits damaged by the fruitworm for the early- and late-maturity groups, 1972.

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[2]Research Geneticist and Research Entomologist, respectively, U.S. Vegetable Laboratory, Agricultural Research Service.

[3]F. P. Cuthbert, Jr. and O. L. Chambliss, unpublished data.

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Table 1. Fruitworm damage ratings for the tomato accessions in the lowest and highest damage groups, 1973.

Accession[z]	% Fruits damaged[y]
Lowest damage	
Tiny Tim	13.1 a
P. I. 128230 (Species type)	21.1 ab
N. S. S. L. 27260 (Watanabes)	27.1 ab
P. I. 97538 (Species type)	28.0 ab
P. I. 193415 (Pennorange E160A)	29.7 b
TF-2[x]	30.9 b
P. I. 120272 (Species type)	31.7 b
P. I. 102717 (Species type)	32.7 b
P. I. 303787 (Santa Catalina)	34.8 bh
N. S. S. L. 26876 (Abundance)	35.2 bh
Yellow Pear	36.2 bh
Highest damage	
Walter[w]	52.4 hl
KC 146	52.6 hl
P. I. 258481 (Rick LA 405)	53.6 hl
Marion	54.0 hl
N. S. S. L. 27381 (Livingston's Magnus)	56.8 l
P. I. 209974 (Peron)	57.0 l
P. I. 128293 (Assumed cultivar)	58.2 l
P. I. 270177 (Comet)	62.2 lm
N. S. S. L. 27243 (Thick Skinned)	64.1 lm
N. S. S. L. 26979 (E. Z. Peeling Salad)	70.6 lm
Parker[v]	77.3 m

[z]Names of cultivars with Plant Introduction (P. I.) or National Seed Storage Laboratory (N. S. S. L.) numbers enclosed in parentheses. Non-cultivar accessions are classified as either species type or assumed cultivar.

[y]Mean separation by Duncan's multiple-range test, 5% level (only letters pertinent to the extracted means shown).

[x]Resistant control (selection from STEP 494).

[w]Commercial control.

[v]Susceptible control.

operating. 'Tiny Tim', the most resistant accession, is a small-vined dwarf cultivar. The favorable rating of this cultivar obviously was not caused by a vine-size factor.

Though our data are possibly confounded by vine-size effects, 2 general conclusions with reference to fruitworm resistance in the tomato are possible. First, there is no immunity to the tomato fruitworm within the tomato cultivar germplasm searched. If immunity to this pest exists within the genus *Lycopersicon*, it must be found in unadapted *L. esculentum*-type material or in the related species. Second, there is a large amount of variability in fruitworm resistance within cultivar germplasm, and much of it may have potential usefulness in developing less susceptible cultivars. A tomato cultivar with even partial resistance to the fruitworm would be of considerable value in an integrated control program.

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Antibiosis in *Lycopersicon* to the Tomato Fruitworm (*Heliothis zea*)[1]

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Abstract. Leaves of *Lycopersicon hirsutum* Humb. & Bonpl. and *L. hirsutum* f. *glabratum* C. H. Mull. contained a factor highly antibiotic to tomato fruitworm, *Heliothis zea* (Boddie), larvae. The factor was extractable with ethanol and lethal to larvae fed on an artifical diet containing the extract. The antibiotic factor appeared to be inherited recessively. Because the early instars of *H. zea* larvae on tomato, *L. esculentum* Mill., plants depend on leaf tissue rather than fruit as a primary food source, this antibiotic factor may be a valuable source of resistance for commercial cultivars.

The tomato, *Lycopersicon esculentum* Mill., is subject to infestation by the fruitworm, *Heliothis zea* (Boddie), in several major North American production areas. At present, insecticides are the only effective control measures available. As tomato culture shifts toward an agronomic-type system, losses (including control costs) caused by the fruitworm become increasingly important. This economic consideration and the recent concern over the potential dangers of insecticide residues have heightened interest in development of resistant cultivars. Fery and Cuthbert (3, 5) reported on such aspects of resistance as the relationships between damage and earliness, fruit number, fruit size, vine size, and plant density. Canerday et al. (2) observed that small-fruited processing cultivars were less susceptible than fresh-market cultivars. Fery and Cuthbert (4) screened a world-wide collection of cultivars and found a wide range in susceptibility to fruitworm damage.

Observation of fruitworm infestations of tomatoes indicate that moths deposit their eggs on foliage, and the early instar larvae feed almost exclusively on leaf tissue. This early larval dependence on leaf tissue might be utilized in development of fruitworm resistant cultivars. The objectives of the present study were to determine the variability present within the genus *Lycopersicon* with respect to larval survival on leaf tissue and to assess antibiosis as a resistance mechanism.

Materials and Methods

Test I. Five-week-old plants of 4 *L. esculentum* accessions that had previously been selected as having moderate levels of fruitworm resistance, 2 susceptible *L. esculentum* cultivars, and single accessions of *L. pimpinellifolum* (L.) Mill., *L. peruvianum* (L.) Mill., and *L. hirsutum* f. *glabratum* C. H. Mull. were bioassayed for antibiosis against the tomato fruitworm[3]. The experiment was conducted on greenhouse ground beds, in a randomized complete-block design with 8 replications. Each plot consisted of 2 plants, surrounded by a greased aluminum lawn-edging barrier to prevent interplot larval movement. Plots in the first 2 replications were infested with 40 newly hatched larvae each, whereas plots in the remaining 6 replications were infested with 20 larvae each. The *H. zea* larvae used in this test, as well as in the other tests reported here, were obtained from a laboratory culture maintained on a pinto-bean diet introduced by Shorey and Hale (7) and modified by Burton (1). The test was terminated after 16 days, and the surviving larvae were collected.

Test II. Excised foliage of *L. hirsutum* Humb. & Bonpl. accessions, *L. hirsutum* f. *glabratum* accessions, *L. esculentum* cv. Floradel, the interspecific hybrid between 'Floradel' and *L. hirsutum* f. *glabratum* (P.I. 126449), and *L. pimpinellifolium* (P.I. 205009) was bioassayed for an antibiotic factor. Two or 3 young leaves from flowering greenhouse-grown plants were placed in 1-oz (30 cm^3) clear plastic cups with paper lids and infested with a single 1-day-old larva. Every other day, the leaves were exchanged for fresh ones, and the number of dead larvae were recorded. The experimental design was a randomized complete block with 4 replications in time of 20 cups per treatment. The average test lasted 13.2 days.

Test III. Excised foliage of *L. hirsutum* f. *glabratum* (P.I. 126449) and *L. esculentum* cv. Homestead-24 was bioassayed for an antibiotic factor by use of third- and fourth-instar larvae. The larvae were reared on the standard laboratory diet, grouped according to size, and starved for 4 hr before the test began. Leaves were exchanged for fresh ones, and larval survival was recorded daily. The experimental design was a randomized complete block, with 10 replications of 5 cups per treatment. This test was repeated. The means of the pooled data are reported here. On the average, each of these 2 tests lasted 6 days.

Test IV. The relative preference of *H. zea* larvae for fresh leaf tissue of *L. hirsutum* f. *glabratum* (P.I. 126449) and *L. esculentum* cv. Homestead-24 plants was determined by use of third- and fourth-instar larvae. Three or 4 young leaves were weighed and placed on moist filter paper in petri dishes. Each dish was infested with a single larva that had been reared on the standard diet, starved for 4 hr, and assigned to replication according to size. The experimental design was a randomized complete block, with 8 replications of 5 dishes per treatment. To adjust for differential rates of moisture loss, one uninfested dish per treatment was included in each replication. After the larvae had fed for 18 hr, the test was terminated and the remaining leaf tissue was weighed.

Test V. Extracts of leaf tissue from greenhouse-grown, flowering *L. hirsutum* f. *glabratum* (P.I. 126449) and *L. esculentum* cv. Homestead-24 plants were bioassayed for antibiosis factors. Young leaves were dried, pulverized, divided into 2 samples each, and extracted in a soxhlet extraction apparatus. The first sample was extracted with

[1] Received for publication July 28, 1974.
[2] Research Geneticist and Research Entomologist, respectively.
[3] The resistant and susceptible *L. esculentum* accessions were selected on the basis of fruit damage by F. P. Cuthbert, Jr., and O. L. Chambliss (unpublished data).

water, and the second was serially extracted with hexane and ethanol. The tissue residue from each extraction was saved. Cellulose powder was impregnated with appropriate amounts of the extracts, dried, and reground to a fine powder. The impregnated powder and tissue residues mixed with fresh cellulose powder were blended into a freshly mixed pinto-bean diet (1). The final mixture contained 1.96% cellulose and 654-mg equivalents of extract or tissue residue (based on fresh leaf wt) per g of diet. To prepare the control, only fresh cellulose powder was blended into the diet. The diet was poured into 1-oz (30 cm^3) clear plastic cups with paper lids. After the diet had cooled, each cup was infested with a single, newly hatched larva. The experimental design was a randomized complete-block, with 5 replications of 10 cups per treatment. The test was terminated after 14 days, and the number of survivors was recorded.

Results and Discussion

Test I. Survival rates of larvae fed on the intact plants ranged from 0.62 to 19.75% (Table 1). The survival rate of larvae on *L. hirsutum* f. *glabratum* plants (P.I. 126449) was only 3.3% of that of larvae on *L. esulentum* cv. Homestead-24 plants, and it was significantly lower than the survival rates of larvae on plants of any other accession. This high larval mortality on P.I. 126449 plants indicates the presence of an antibiotic factor that is either not present or present at a lower level in the *L. esculentum*, *L. pimpinellifolium*, and *L. peruvianum* accessions. Our failure to demonstrate significant differences in larval survival between plants of the *L. esculentum* accessions selected for moderate field resistance and the susceptible 'Chico Grande' indicated that antibiosis was not responsible for the observed resistances. Subsequent work showed that much of the resistance of these accessions may have been caused by some unknown factor associated with their large vine size (5).

Test II. Low survival rates on excised foliage with first-instar larvae confirmed the presence of an antibiotic factor in all the *L. hirsutum* and *L. hirsutum* f. *glabratum* accessions tested (Table 1). Survival rates on the *L. hirsutum* f. *glabratum* accessions, for example, ranged from 0 to 5.00%; the mean survival rate on these accessions was 2.08%, compared to the 28.75% on 'Floradel'. Analysis of the data failed to separate the *L. hirsutum* from the *L. hirsutum* f. *glabratum* means. Nevertheless, the average survival rates (2.08 vs 10.83%) differed in magnitude and all the *L. hirsutum* means were greater than the highest *L. hirsutum* f. *glabratum* mean. This suggests that the concentration of the antibiotic factor was greater in *L. hirsutum* f. *glabratum* than in *L. hirsutum* accessions.

Thirty-five percent of the larvae survived on foliage from plants of the interspecific hybrid, compared to 28.75 and 2.50% survival on the parents 'Floradel' and P.I. 126449, respectively. The antibiotic factor appeared to be lacking in the F_1 and is probably inherited in a recessive manner.

The high survival rate (46.25%) on P.I. 205009 shows that the field resistance previously observed in this *L. pimpinellifolium* accession was not caused by an antibiotic mechanism. Therefore, the moderate resistance of this entry to the fruitworm may be caused by other factors associated with its large vine size. Fery and Cuthbert (5) reported a high negative correlation between vine size and fruitworm damage.

Test III. Results of the excised-foliage test with third- and fourth-instar larvae showed that the antibiotic factor in P.I. 126449 was effective also against larger, more mature larvae (Table 1). Although the survival rates of the older larvae were considerably greater than those of the first-instar larvae in the earlier tests, larval survival on the *L. hirsutum* f. *glabratum* foliage was less than ⅙ of the survival rate on 'Homestead-24' foliage (12 vs 85%).

Test IV. Third- and fourth-instar larvae of *H. zea* differed significantly in preference for excised leaf tissue of 'Homestead-24' and *L. hirsutum* f. *glabratum* (P.I. 126449) (Table 2). Larvae feeding on leaf tissue of P.I. 126449 consumed 2.6 times as much tissue as larvae feeding on 'Homestead-24' leaf tissue. These data agree with our observations that first-instar larvae fed more when placed on *L. hirsutum* f. *glabratum* plants than when placed on *L. esculentum* plants. Preference for the *L. hirsutum* f. *glabratum* tissue rules out the presence of a feeding deterrent or the lack of a feeding stimulant to explain the antibiotic effect of the *L. hirsutum* and *L. hirsutum* f. *glabratum* accessions.

Test V. Larval survival on diets with the water and hexane extracts did not differ from the control (Table 3). However, the ethanol extract of both entries reduced larval survival. Survival on media containing the ethanol extracts of 'Homestead-24' and P.I. 126449 was 26 and 0% respectively, the difference being significant. Comparison of larval survival on diets with the tissue residues showed that the antibiotic factor in the residue from the water extract of P.I. 126449 was completely extracted by ethanol.

Assuming that the active material was not an extraction artifact, the success in extracting a factor from P.I. 126449 that resulted in 100% larval mortality when the factor was added to an artificial diet

Table 1. Average percent survival of *Heliothis zea* larvae fed on intact plants and excised foliage of various *Lycopersicon* species.

Treatment	% Survival[z]		
	Intact plants	Excised foliage	
	1st instar (Test I)	1st instar (Test II)	3rd-4th instar (Test III)
L. esculentum			
'Floradel'	—	28.75b	—
'Homestead-24'	18.75c	—	85.00b
'Chico Grande'	14.06bc	—	—
TF-1[y]	6.88b	—	—
TF-2[y]	14.06bc	—	—
TF-4[x]	7.50b	—	—
TF-5[w]	6.88b	—	—
Average	11.36	—	—
Interspecific Cross			
F_1 ('Floradel' × P.I. 126449)	—	35.00b	—
L. pimpinellifolium			
P.I. 126938	13.12bc	—	—
P.I. 205009	—	46.25b	—
L. peruvianum			
P.I. 126431	14.38bc	—	—
L. hirsutum			
P.I. 126445	—	15.00a	—
P.I. 127826	—	7.50a	—
P.I. 127827	—	10.00a	—
Average	—	10.83	—
L. hirsutum f. *glabratum*			
P.I. 126449	0.62a	2.50a	12.00a
P.I. 129157	—	0.00a	—
P.I. 134417	—	1.25a	—
P.I. 134418	—	1.25a	—
P.I. 251304	—	2.50a	—
P.I. 251305	—	5.00a	—
Average	—	2.08	—

[z] Arcsin $\sqrt{\%}$ transformation used in all analyses. Means in same column followed by same letter do not differ significantly, as determined by Duncan's multiple-range test, at the 5% level.
[y] Fruitworm-resistant selection from STEP 494.
[x] Fruitworm-resistant selection from P.I. 128214.
[w] Fruitworm-resistant selection from P.I. 128258.

Table 2. Relative preference of third- and fourth-instar larvae of *Heliothis zea* for *Lycopersicon esculentum* and *L. hirsutum* f. *glabratum* as determined by their feeding response to fresh excised leaf tissue (Test IV).

Treatment	Tissue consumed (g)[z]
L. esculentum cv. Homestead-24	0.05
L. hirsutum f. *glabratum* (P.I. 126449)	0.13

[z] Means significantly different, as determined by the F-test, at the 5% level.

Table 3. Average percent survival of *Heliothis zea* larvae fed for 14 days on diets with leaf extracts and tissue residue (Test V).

Treatment	% Survival[z]				
	Water		Hexane-ethanol		
	Water	Residue	Hexane	Ethanol	Residue
L. esculentum cv. Homestead-24	54	48a	48	26b	54
L. hirsutum f. *glabratum* (P.I. 126449)	44	22b	50	0c	54
Control[y]	56	56a	56	56a	56

[z] Arcsin $\sqrt{\%}$ transformation used in all analyses. Means within columns followed by the same letter do not differ significantly, as determined by Duncan's multiple-range test, at the 5% level.
[y] Standard diet plus cellulose.

confirms that the resistance in *L. hirsutum* f. *glabratum* was caused by an antibiotic mechanism and that it is chemical in nature. An ethanol-soluble antibiotic factor was present in both *L. esculentum* and *L. hirsutum* f. *glabratum* plants. Thus, the antibiotic effect of the *L. hirsutum* and *L. hirsutum* f. *glabratum* accessions noted in the intact plant and excised foliage tests may be caused, not by a compound unique to this species, but instead by a higher concentration of a compound also present in *L. esculentum*. This is not surprising, in light of our observations that the tomato is a relatively poor host of *H. zea*, as compared to some of its other host crops.

Conclusions

Because the early instars of *H. zea* larvae on the tomato plant depend on leaf tissue as a primary food source, any increase in the antibiotic effect of this tissue should increase resistance measurably. Thus, the *L. hirsutum*-*L. hirsutum* f. *glabratum* antibiotic factor reported here is potentially a valuable source of fruitworm resistance for *L. esculentum* cultivars, especially since these 2 species are cross-compatible. Because *L. hirsutum* f. *glabratum* accessions have been reported to be resistant also to the carmine spider mite and the tobacco flea beetle (6, 8), this antibiotic factor might confer resistance to more than one insect species.

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Tennessee Report on Plant Introductions to S-9 Technical Committee

July 1976 to July 1977

L. N. Skold

Dactylis glomerata: In March the NE-9 Regional Plant Introduction Station, Geneva, New York, sent 63 introductions and 10 breeding lines or cultivars to B. V. Conger, for incorporation into his forage breeding program. These are under evaluation.

Glycine max: N. S. Hall and L. N. Skold continue selection work with mutant lines of P.I. 88788 a black seeded, viny, indetermine line with resistance to race 4 of the soybean cyst nematode, Heterodera glycines. The objective is a bushy, strong-stemmed, yellow seeded type retaining resistance to race 4, for use in a breeding program.

F. S. Allen is observing several hundred entries from the world collection.

Zea mays: L. M. Josephson continues work on transferring the corn earworm resistance of Zapalote Chico, P.I. 217413, into inbred lines adapted to Tennessee.

Dolichos lablab: H. A. Fribourg is conducting grazing studies with Tifton Experimental No. 1, received from Ian Forbes of the Georgia Coastal Plains Experiment Station.

ANNUAL REPORT ON NEW CROPS RESEARCH IN TEXAS

Contributing to Southern Regional Project S-9

Prepared by Eli L. Whiteley

August 18 and 19, 1977

The 1976-77 crop year was near normal except for some extremely dry parts of the state. Winter temperatures were above normal and summer temperatures were about normal. Rainfall followed the usual winter pattern; however, summer rainfall patterns were not normal. Some areas of the state received above average rainfall, while others received below average rainfall.

Industrial Crops

Sweet sorghum continues to look promising as a source of sugar. Date of planting and date of harvesting studies are being continued in the Rio Grande Valley. Yields are very good and sugar content is high. The nursery and variety tests at College Station are progressing adequately. Yields of 15 to 20 tons of stripped stalks per acre are expected this year. Brix readings of 16 to 18% should be obtained this year.

The sugarcane nursery has been increased in size with about 210 clones planted. About 50 clones were lost in the 1976-77 winter due to very low temperatures occurring while the cane was emerging.

The regional sunflower test at College Station was a complete failure. The head moth destroyed the test. Due to its location we were unable to spray for moth control.

Dr. R. D. Brigham reports that he is using three P. I.'s in his breeding program at Lubbock.

Helianthus annus	P.I. 343765	Short statue, early
	P.I. 228345	"Y" branching, two heads (genetic study)
	P.I. 175724	Vegetative head, sterile (genetic study)

Research on sesame is progressing at a satisfactory rate. Several P. I.'s and varieties were obtained from the National Seed Storage Laboratory. These were established in May and some look promising.

Field Crops

Soybean research at College Station was started in 1976 and continued in 1977. Yields in 1976 were not as high as desired; they ranged from 20 to 32 bushels per acre. Seed of seven varieties from China were increased and sent to Dr. Brigham at Lubbock.

Dr. Brigham is using two P. I.'s in his breeding program--P. I. 227555 and P. I. 200503. These plants are resistant to SMV.

Dr. Charles E. Simpson, located at Stephenville, reports that he is using a number of P. I.'s in his breeding program. He reports that P. I. 109839 has a high level of resistance ot Cercospora leaf spot. It is a Virginia botanical type.

Dr. Gerald W. Evers reports that the subterranean clovers were destroyed by geese in January and February 1977. These will be evaluated next year.

Dr. E. C. Holt is evaluating a large number of grasses and legumes at several locations in the state. Information is inadequate at this time for a report.

Plants Released

Drs. Simpson and Smith released a Spanish peanut--Tamnut 74. It has a wild peanut in its pedegree--Arachis monticola, P. I. 263393. The new variety yields 5 to 7% more than Starr and has good seedling vigor.

Dr. Paul Voigt released a new weeping lovegrass designated "OTA-S". It is from a bulk harvest of 4 sexual tetraploid (2n = 40) clones. Three of the clones were from P. I. 299929 and one from what was apparently a hybrid between P. I. 299928 and P. I. 299929. This material was released in 1976.

1977 S-9 Technical Committee Report

Virginia Agricultural Experiment Station

A.J. Lewis III

Virginia Representative

The following is a summary of the activity of research workers throughout Virginia who have requested plant introduction accessions during 1976-77.

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

OBJECTIVES: To compare winter legume plant introduction accessions with currently grown winter annuals in order to locate new and improved forages for animal agriculture in Southeast Virginia.

STATUS REPORT: The 1976 comparative plantings were seeded November 9; this was later than planned. The 1976-77 winter was extremely harsh on the late seeded plantings. The new introductions that survived to any extent were the 1) *Medicago scutellata* - #295606 from Turkey, 2) *Trifolium subterraneum* - #311498 from Spain, 3) *Vicia dasycarpa* - #206391 from Cyprus, and 4) *Vicia villosa* - #201882 from Iran. Yield was poor and no measurements were taken. The *Medicago* did set seed and may have a place in Virginia if planted in September. *Vicia villosa* did as well as the U.S. grown hairy vetch. The 12 entrees of commonly grown winter annuals did yield fair amounts and did not completely winter kill like the majority of the new introductions.

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

OBJECTIVES: To compare and screen commercial varieties and plant introduction accessions of bean and cabbage for resistance to insects and diseases.

STATUS REPORT: Three hundred and forty-seven (347) bean selections were made from those screened. PI's 20748, 317349, 318702, 183463, 202833, 209480, 336872, 269206, 291005, 31051, 313686, 318696, and CC141 and 251 were selected by 3 independent observations to be comparatively resistant to mexican bean beetle. Of the 161 commercial varities of beans studied, 'Regal' was the most resistant to mexican bean beetle. Single plant selections of bean PI's 164897, 166066, 169790, 169906, 171767, 171785, 282073, 299382 were observed to be resistant to a complex of diseases and mexican bean beetle. Of 138 commercial varieties of beans screened for Rhizoctonia root rot, 'Romano 14', 'French Horticultural', 'H-9', and 'Contender' were observed to be the most resistant.

Forty-nine (49) single plant selections of cabbage were made for resistance to cabbage looper and imported cabbage worm. Two cultivars of cabbage were also observed to be resistant to diamond back moth. Seven single plant selections were made for resistance to various insect-pest complex of cabbage. Sixteen commercial varieties and 22 PI's of cabbage were completely free from alternaria leaf spot (*Alternaria brassicicola*) and 35 commercial varieties of cabbage were free from soft root.

Amino acid profiles of 54 selected cultivars of beans and 28 cultivars of cabbage were prepared. All of the bean samples analyzed were high in lysine, threonine, valine, isoleucine, leucine and phenylalanine but were deficient in methionine and tryptophan. 'Kentucky Wonder Wax' and 'Burpee Golden' were comparatively high in methionine. There were no distinct qualitative or quantitative differences in amino acid content among comparatively resistant and susceptible cultivars of beans.

J.D. Miller, Agronomy Department, Virginia Polytechnic Institute and State University, Blacksburg, VA. 24061.

OBJECTIVES: To isolate superior clones of white clover with disease and insect resistance as well as improved yield and persistence.

STATUS REPORT: Evaluation is still in progress, but several of the 70 plant introductions appear promising for one or more attributes. Plantings of about 47 red clover and 42 white clover introductions were made early this summer and will be evaluated according to the above objectives.

S-9 TECHNICAL COMMITTEE REPORT
Subtropical Horticulture Research Station
Miami, Florida 33158

R. J. Knight, Jr. and P. K. Soderholm

Germplasm Distributions. Since distribution records began at Miami nearly 45 years ago, more than 64,000 distributions have been made throughout the world (Table I). This amounts to an average for the entire period of approximately 1,439 distributions per year. In the recent past because of other expanding workloads and lack of adequate personnel, the amount of material shipped has declined. For example, in the 13-month period from 1 June 1976 - 31 July 1977 a total of 759 introductions were shipped.

Table I. Distribution of Plant material from ARS/USDA, Miami, Florida

Destination	January 1933 to July 1977		June 1976 to July 1977	
	No.	%	No.	%
Florida	47,877	74.8	422	55.6
California	1,395	2.2	7	0.9
Rest of Continental U.S. and Canada	5,514	8.6	112	14.8
Hawaii, Puerto Rico and Virgin Islands	2,000	3.1	15	2.0
Rest of Antilles, Bahamas, Bermuda	1,411	2.2	2	0.3
Mexico and Central America	1,276	2.0	27	3.6
South America	1,166	1.8	126	16.6
Europe	1,113	1.7	5	0.7
Asia	964	1.5	19	2.5
Africa	735	1.1	24	3.2
Pacific Basin[z]	571	0.9	0	0.0
Total:	64,022		759	

[z]/ Australia, New Zealand, Philippines, Pacific Islands

Because distributions to a given area may fluctuate widely from year to year, it is difficult to generalize from the figures for a single year, but those for 1976-77 do show some marked differences when compared with the 44-year record. For example, Florida cooperators have received an average of nearly 75 percent of the distributions made over the entire period, but the most recent figures show Floridians receiving only 55.6 percent of the available distributions, a drop of 19.2 percent. On the other hand, distributions to South America are much greater percentage-wise at present (16.6 percent of all shipments) than the 1.8 percent that they averaged for the entire period, and shipments to the Continental U. S. (except California and Florida) currently amount to 14.8 percent versus an average for the entire period of 8.6 percent. Shipments to Mexico and Central America, to Asia, and to Africa are also slightly greater at present than they have been in the past. Without question shipments to these areas could be greatly expanded if personnel were available to handle the backlog of requests for germplasm.

An examination of the type of material shipped (Table II) shows that most germplasm is shipped from Miami (32.5 percent of the total) as fresh seeds. Special problems involve seed distributions because of the perishable nature of many tropical seeds and the limited amount of information available on storing and shipping such material.

About one quarter of the germplasm currently distributed from Miami is shipped as living plants, and 17.8 percent as unrooted cuttings or scions. One quarter of the material shipped goes in the form of fruit or specimens of one kind or another, for use in educational or research work.

Table II. Distribution of plant material from ARS/USDA, Miami, June 1976 through May 1977.

Material	Number	Percent of total
Seeds	232	32.5
Plants	176	24.7
Cuttings and scions	127	17.8
Other materials y/	178	25.0
Total:	713	

y/ Fruit, flowers, stems, leaves, histological material, etc.

Germplasm Receipts. During the period from June 1976 through May 1977, 495 plant accessions were received at Miami (Table III). Among these the largest number (176) were miscellaneous ornamentals and shade trees, and the next largest group comprised 153 cacao clones which completed the 300 brought from Trinidad. Tropical and subtropical fruits were third in order with a total of 119 received during the period. Only 36 cultivars of coffee were received during the period under discussion.

Table III. Germplasm Receipts at ARS/USDA, Miami, 1 June 1976 through 31 May 1977.

Material	Number of introductions received	Percent of total
Miscellaneous ornamentals and shade trees (includes palms, orchids, and ferns)	176	35.6
Tropical and subtropical fruits	119	24.0
Cacao	153	31.0
Coffee	36	7.2
Medicinal, chemurgic, and tropical vegetables	11	2.2
Total:	495	

Fruit Crops. The cold of January 19 and 20, 1977, gave tropical plant material in southeastern Florida the most severe test it had received in perhaps 60 years, with Fahrenheit temperature lows in the mid-twenties. Severe injury resulted in fruit crops such as mango and lychee, although overhead irrigation saved the commercial crop in even these sensitive fruits.

One seedling mango unprotected by overhead irrigation appears to have been unusually cold-tolerant, and we are keeping it under observation. An Israeli hybrid annona introduction, 'Bernitski' (M-21323) also showed significantly greater hardiness when exposed to temperature conditions that killed other Israeli atemoyas ('Kaller' [African Pride], 'Kabri' [Gefner], and 'Malali') to the ground. 'Bernitski' though injured recovered rapidly and at this writing (August 1977) is in bloom.

Avocado germplasm showed marked variation: West Indian cultivars were fully as sensitive as most mangos, and in open situations were killed to the ground. A few Mexican cultivars showed such resistance that they fruited reasonably well even in the tops, but some Mexican avocados were disappointingly low in flower bud hardiness despite the fact that most leaves were unhurt. Thus field testing of fruiting performance after cold obviously must supplement machine testing, which has given a fair estimate of resistance of leaves and twigs to sudden low temperatures. Those avocados which flowered and fruited after the January 1977 cold obviously are above average in hardiness, and seeds from 38 such plants (from our collection of approximately 800 in the field) have been planted for further selection work. A number of these fruiting trees combine genes from Mexican and larger-fruited commercial varieties.

Of commercial avocado cultivars, the Israeli introduction 'Ettinger' (P.I. 218196) is outstanding for producing a full crop, without protection from overhead irrigation, where neighboring avocados bore light crops or none whatever. Although 'Ettinger' has not succeeded commercially in southern Florida, it deserves testing elsewhere and use in breeding, since it can take occasional severe cold without significant injury.

The 'Mateira' mandarin (P.I. 226740), a citrus introduction from Okinawa that bears a sweet fruit about half the size of a tangerine, also stood the cold uninjured and bore a good crop. This graceful shrubby tree deserves trial in warm regions as a dual-purpose ornamental that bears edible, appealing fruit.

Passiflora "Incense' (P.I. 384497), a hybrid of Passiflora incarnata from Tennessee pollinated by P. cincinnata (P.I. 298883) from Argentina, is being propagated for eventual distribution by a large commercial nursery in California.

Coffee. Of a total of 300 coffee clones alive at Miami before the freeze, 10 percent were lost. Most of the plants that succumbed were immature specimens that had been set in the field 8 months before the January freeze. Seeds of 25 cold-tolerant coffee varieties were distributed to the Coffee Research Program, Agronomic Institute of Parana, at Curitiba, Parana, Brazil.

Cacao. The transfer of approximately 300 clones of cacao to Miami from the Cocoa Unit, University of the West Indies, Trinidad, was completed this year. At Miami these clones are being indexed for swollen shoot virus in cacao holding facilities. When released, propagations will be sent to Mayaguez to be maintained in outdoor plots. This material will also be distributed to cacao researchers in Brazil, Costa Rica, Ecuador, and elsewhere.

Sugar. Transfer of the national sugarcane germplasm collection from greenhouses in Beltsville to the Miami station began in June 1977. The climate and environment at Miami will make it easier to retain these P.I.'s in the field. These were collected at considerable expense from many warm parts of the world, and approximately 10 per cent of the collection has been lost every winter at Beltsville.

Germplasm Collections and Program at the Mayaguez Institute of Tropical Agriculture

Box 70
Mayaguez, Puerto Rico 00708

by

Franklin W. Martin

The Mayaguez Institute of Tropical Agriculture (formerly, Federal Experiment Station), is located in the western extreme of Puerto Rico where climate is similar to that of extensive parts of the hot, humid tropics. Facilities include a principal office and well-equipped laboratory building with space for an optimum of 12 scientists, and a maximum of 20. These facilities are supplemented by greenhouses, seed processing and storage facilities, shops, and other specialized buildings. The Institute is surrounded by about 180 acres of land, but only 40 acres are suitable for intensive agriculture. In addition, the Institute includes an experimental farm at Isabela, Puerto Rico, about 40 minutes drive from Mayaguez.

MITA is funded chiefly through the Agricultural Research Service, Southern Region, Florida Area. Funds are also provided by the Commonwealth of Puerto Rico. A small proportion of funds comes from other sources. Total budget for 1977-78 is about $800,000. The staff includes 6 scientists and 57 support personnel.

Almost all of our projects are related to the concepts of germplasm acquisition, evaluation, selection, improvement, and distribution. The projects include agricultural problems related to U.S. needs in the temperate zone and in the tropics. Because of its unique location it is often possible at MITA to accomplish a task for U.S. agriculture that could not be accomplished economically in the continental United States.

The tropical projects are related to broader needs of the United States as defined (in part) by the new Tropical Agriculture Program (section 406 funds) and needs of USAID.

MITA invites visitors interested in its programs, and provides generous facilities for scientists, who wish to spend their sabbatical leaves in the tropics. A great opportunity exists at MITA for learning about tropical agriculture while still within the U.S. Now, I would like to tell you about some of the projects of the Institute.

Winter nurseries. Plant breeding in the temperate zone is a slow process requiring years of development and testing under field conditions. The time can be greatly shortened by growing materials during the winter in Puerto Rico. In addition seed increases of new introductions make possible more rapid dissemination of such materials. Therefore, winter nursery activities are normally carried out with sorghum, soybeans, corn, peanuts, millet, and other miscellaneous crops.

With corn, sorghum, and millet, a great need exists for winter nursery activities. These include multiplication of seed, breeding, and establishment and furtherance of populations. Several populations have been developed as sources of special characteristics, and seeds for improvement programs have been distributed to more than 25 countries. Corn and millet have been grown for stateside breeding now for 8 years.

Soybeans and peanuts have been grown in the winter nursery for a number of years. Soybeans in artificially lighted areas are grown one generation in Puerto Rico. This delays flowering and produces more seed. Soybeans in unlighted areas are grown one or two generations depending upon the needs of the respective breeders. Peanuts are grown one generation in Puerto Rico and often are screened for peanut rust.

Rust testing. The severe epidemic of wheat stem rust which occurred in the United States in 1950, focused attention on the need for field testing of wheats to determine varietal reaction to virulent biotypes of wheat stem rust. Such studies are hazardous when done in the commercial crop area. Puerto Rico was found to be a suitable location because it is isolated, the use of virulent races of rust does not endanger the North American crop, and because wheat and oats grow well but are not grown commercially in Puerto Rico, rust is not naturally present, the alternate hosts are not present, and climatic conditions are favorable for severe epiphytotics.

Wheat has been grown experimentally since 1950, and oats since 1954 in Puerto Rico to determine reaction to cereal rust fungi. Reactions with 13 races and 4 biotypes of stem rust affecting wheat, 11 races and 2 biotypes of crown rust, and 2 races of stem rust affecting oats have been determined at the rate of 2 to 5 cultures per year on more than 60,000 wheats and 70,000 oats. Resistances to the virulent cultures of rust have been identified, and have been incorporated into desirable agronomic selections of wheat and oats now in use in the continental U.S. and Canada.

Sorghum conversion. Sorghum used in the United States represents only a tiny fraction of the richness of sorghum throughout the tropics. Nevertheless, the existing richness cannot be easily used because tropical sorghums flower only during short days. Tropical types can be changed to temperate types by plant breeding. This can best be done in Puerto Rico where the climate is favorable throughout the year for both tropical and temperate zone types.

Newly collected sorghums from the tropics are screened for value for the continental U.S. Selected types are grown in Puerto Rico during the winter and hybridized with short, early types of the U.S. The F_1 generation is grown in Puerto Rico and the F_2 in Texas where the appropriate types desired are selected. Four or more cycles of this type are needed to complete the conversion.

The world sorghum collection has been screened for the most promising materials. About 1,200 items were selected for conversion to temperate zone types. About 150 types have been converted and released to breeders and experiment stations.

Grain legumes. Deficiencies in the diet, especially protein quality and quantity, are one of the major problems affecting the younger generation in developing countries. Grain legumes are the best plant sources of proteins, but disease and insect problems limit production. Developing resistance to diseases and insects and incorporating it into commercial varieties can increase production of these important good plants of the tropics.

The grain legume program consists of a survey of the food legume problems in the tropics and determination of the priorities, and how they can be most effectively resolved. Short-term assistance is provided by searching for sources of resistance, provision of seed of these sources to the scientists and areas where they are most needed, and cooperation in testing them under local conditions. Long-term assistance is provided by plant breeding for multiple resistance, and for combining multiple resistance with other desirable traits, such as high yield and wide adaptability.

A comprehensive survey was made and published of diseases of legumes in the Caribbean and tropical America. Over 5,000 varieties of beans were collected and tested for disease and insect resistance under tropical conditions. Fourteen superior rust resistant beans, a superior bean variety "La Vega", 9 superior disease resistant cowpeas and 3 multiple virus resistant beans were distributed to the areas of principal need and to the major bean programs worldwide.

Tropical sorghum and corn. Grain sorghums as well as corn are excellent sources of protein and calories. Because Puerto Rico has climates and soils representing the vast tropics, it is an ideal location to develop and test outstanding new sources of food for human utilization. The Conversion Program, the many collections under evaluation of sorghum as well as the large number of corn lines, varieties and hybrid available offer excellent sources to breeders to improve these crops for the tropics.

Forage sorghums are also excellent sources of dry matter and protein for animal feed. They can compete well with tropical forages in many areas. New forage varieties and hybrids with better resistances to foliar diseases and pests could make a great contribution to the grassland economy of many sectors of Puerto Rico and the tropics.

Outstanding corn and grain sorghum varieties alone or in hybrid combinations are under evaluation for yield, quality, disease and insect reaction, and a series of agronomic factors. Superior forage sorghums as possible sources of protein and dry matter have been selected and are also under evaluation under different management systems.

Soybeans. Proteins for food and feed, and oils for domestic and industrial uses are needed for Puerto Rico and other tropical areas. Soybeans are an excellent source of food proteins which has been minimally exploited in most tropical areas. Soybeans can be readily substituted for other grain legumes in the diet. Soybeans have the potential of being at least a minor crop in Puerto Rico and a major crop elsewhere in the tropics.

Several hundred selections have been made in breeding lines from Florida and North Carolina for late flowering and potential high yield. Crosses have been made between late flowering selections, introductions and U.S. varieties. Preliminary yield tests have been planted on several dates. Several lines show promise of being adapted and of producing high yields. These will be further tested for disease and insect resistance, and seed quality, especially during the rainy season.

Fruits. Many of the best fruits of the tropics have never been introduced and acclimated to the western world. Others have not been developed as superior varieties, or have not been distributed widely. The better fruits of the tropics can serve as valuable supplements to the diet, as well as sources of agricultural income. Fruits and spices are introduced from worldwide sources and are grown in several locations. Information on production is obtained. Selections of superior varieties are made from seedling populations. Suitable bulletins are developed and propagating materials are distributed widely.

A wide variety of fruits and spices have been introduced. Spices and information on their culture have been widely distributed throughout the tropics. Recently comprehensive bulletins have been prepared on the best and most neglected tropical fruits. Select fruits are now being distributed.

The fruits currently of most interest to MITA are mangosteen, lanson, rambutan, durian, pummelo, mamey sapote, and canistel. In addition to these MITA maintains specimen trees of 100 or more species of tropical fruits.

Vegetables. In the hot, humid tropics torrential rains during the monsoon season create special hazards for agriculture. Lands are flooded or muddied, entrance to plantings is restricted, weeds grow vigorously, chemicals applied are washed from the plants, fertilizer is leached from the soil. High water tables drive oxygen from the soils, diseases above and within the soil are promoted, and many plants are therefore unthrifty. These conditions make production of food difficult, and agricultural skills imperative.

As people cannot hibernate during tropical rainy seasons, the problem of producing highly nourishing food must still be faced. For the most part this consists of having the appropriate species and varieties, and knowing how to grow them and to utilize them in both conventional and unconventional ways. The aim of the vegetable program is to acquire this knowledge.

The aims of the program are pursued through the introduction of a wide variety of vegetable species and varieties, their evaluation during the difficult conditions of the tropical rainy season, and selection of appropriate types. Selected species are improved by breeding. Suitable vegetables are treated in a series of bulletins. An annual newsletter is printed and sent internationally to 500 readers. Seeds and vegetative propagation materials are distributed on request.

Cacao. The Mayaguez Institute of Tropical Agriculture in Puerto Rico in cooperation with the American Cacao Research Institute established and maintains a disease-free collection of cacao. This plantation serves as a permanent source of certified budwood for widespread distribution. This not only enables growers to start with disease-free material, but also permits the free movement of selected clones from area to area with a minimum danger.

Bud material of high yielding selections of cacao with other desirable qualities is imported. New trees are indexed for viruses and screened for other diseases under carefully controlled conditions. Those selections that have passed the rigid disease inspection and quarantine period are established in a permanent location on 8 acres of gently sloping land near MITA. Maintenance procedures such as fertilization, weeding, pruning, irrigation, and control of insect and diseases are continued during the year.

The cacao collection consists now of more than 600 trees representing about 200 introduced clones. The field is in good healthy conditions and no disease or insect damage has been observed. Plant materials have been distributed to many countries interested in the growing and study of cacao.

Thus, programs of MITA are varied, but almost all concern germplasm getting it, and using it, or making it better.

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

Highlights

Two retirements commanded considerable attention and concern for future Laboratory operations. Dr. E. E. Leppik officially retired at the end of December but continues his work on genetic diversity, centers of origin and species distribution, and floral evolution. Because of the high priority need for coordinating the evaluation and computerization of data for the Small Grains Collection (over 70,000 accessions), a position is being established in this area in lieu of Dr. Leppik's vacancy. We hope to have a research agronomist on board in late summer to begin this important work.

Howard Hyland retired on April 30, 1977. A reception was held on April 28 to honor him and Betty. Several associates, family, friends, and representatives from three foreign embassies gathered to wish them well and to present them some gifts. On March 30, a very nice plaque with many names engraved on it was presented to Howard during the Workshop on the National Plant Germplasm System, Boulder, Colorado. This was a means of expressing appreciation to Howard for his many contribution in the area of plant introduction and germplasm. Since Howard's retirement, we have been trying to keep on the back slope side of the mountain of work that accumulates daily.

Dr. Craddock's group has completed the Oat Cultivar Handbook (not yet available) and updated its wheat counterpart. Joe participated as a member of the Wheat Advisory Committee, IBPGR, Rome, Italy.

Harold Winters and Lee Hudson (W-6) are members of the Phaseolus Advisory Committee, IBPGR which held its first meeting at Cali, Colombia in September, 1976.

Several shifts in personnel, room and phone numbers, etc., have or will soon be made. George White is the Principal Plant Introduction Officer. Two other persons figure prominently in handling germplasm requests, operational activities, and related problems. Sharon Kenworthy, a support geneticist, is already handling a high volume of correspondence relative to germplasm procurement for both foreign exchange and domestic needs and is involved in budgetary and research progress reporting matters for the Laboratory. John Bear, a support agronomist, handles germplasm requests for our AID project, helps us with peanut inquiries, and coordinates the seed distribution aspects of the Plant Germplasm Quarantine Center. We also have a very capable clerical staff in plant introduction. Phone numbers are provided below (area code 301);

Plant Introduction

344-3328 Dr. George White
Cathy Mayo, Head Plant Introduction Secretary
Linda Lilly

-3329 Sharon Kenworthy

-3654 John Bear and Dr. E. E. Leppik

-2048 H. Riley Hanes, Phyllis Gulick, and Sandy Anderson
Plant Germplasm Quarantine Center

-3141 Gene Golsen, Walter Denny, Robert Brittingham
APHIS, Plant Germplasm Quarantine Center

Germplasm Resources Laboratory Office

-3637 Lee Stearns, Laboratory Secretary

New Crops

-3638 Austin Campbell (move pending)

Jack Oakes and Harold Winters' phone numbers remain the same; i.e., 344-3639 and 344-2020, respectively. Efficiently answering these two extension numbers will most generally be Carolyn Burke.

The Plant Germplasm Quarantine Center moved to Beltsville in February. The proper address is as follows:

USDA Plant Germplasm Quarantine Center
Building 320, BARC-East
Beltsville, Maryland 20705
Att: H. R. Hanes

A computerized inventory of U.S. fruit and tree nut germplasm resources by Harold W. Fogle and Harold F. Winters was published in June 1977. It is intended as an aid to commercial growers and researchers of all disciplines in locating clones of fruits and tree nuts. The inventory also should serve as an indication of the capacity needed in the proposed national clonal fruit repositories. The inventory is organized by clonal or specific designation. It includes source data and identity codes, P.I. numbers where available, and as much descriptive information as possible. It was acknowledged that some worthy collections are missing. Hopefully, these can be included in an early revision. Coverage depended upon the cooperation of many individuals in filling out the data sheets. This help was gratefully acknowledged by the authors. A limited number of copies are available from Dr. Harold W. Fogle, ARS-NER-BARC-West, Fruit Laboratory, Bldg. 004, RM 113, Beltsville, Maryland 20705.

George White met with the Joint Panel of the United States-Japan National Resources Project on forage crop germplasm exchange and evaluation at Tsukuba, Japan, in March. The Japanese materials are pending P.I. number assignment. Dr. White had the opportunity to visit four experiment stations, including the National Seed Storage Laboratory at Hiratsuka.

Jack Oakes, at the request of AID, will provide consultative guidance in the Bahamas for production of warm-season grass and legume species in July.

The kenaf acreage (495 acres) in New Jersey in 1976 was harvested over a long period because of heavy snow and adverse field conditions. Results varied but some fields gave good yields. Drought conditions did reduce overall yields. This year, about 800 acres have been planted in New Jersey and an estimated 1,200 acres in North Carolina.

Plant Introduction and Exchange

Scientists wishing to send plant materials abroad or request foreign germplasm for research purposes are encouraged to have all materials sent through the Plant Germplasm Quarantine Center (formerly Plant Inspection Station). The initiating scientist or institution should send a copy of the letter of submittal to H. R. Hanes with the seed or other plant materials and a copy to Dr. White's office. This procedure permits proper inspection, conformance to domestic and foreign quarantine requirements, documentation of pertinent information, and minimizes duplication. Since there is no mechanism for shipment cost reimbursement, we request that outgoing air shipments do not exceed five pounds. Larger shipments are sent either by surface mail or on a collect basis for the shipping charges.

Various collecting activities have been completed, are under way, or are immediately pending. Please help keep us informed of persons going abroad on sabbaticals, special assignments, etc., that might collect or arrange for germplasm to be sent to the U.S.

Dr. William A. Ackerman, National Arboretum - Collected camellias and other ornamental species in Japan this spring. The collections totaled 340 accessions. Of the 14 species of Camellia, four were introduced for the first time and one repeated a single earlier introduction that failed to survive. There were also 14 species of six related genera that included one genus and two species not previously introduced. A portion of the collection consists of representatives of 16 other ornamental genera.

Dr. Paul Fryxell, Texas A&M and Dr. William Cross, Mississippi State University - Collected 40 accessions of primitive cottons from Honduras, Mexico, and Nicaragua. Ask Paul to tell you about his collecting activites while Dr. Cross was trying to get repairs for their lightweight airplane.

Sugarcane - Collection activities of Dr. H. Koike, Houma, Louisiana, and others, have resulted in approximately 700 new accessions of sugarcane clones. A major portion of this collection is now being held in Australia.

Other explorations - Explorations in progress on July 1 include Dr. and Mrs. Wayne Fogg - Foxtail millet (Setaria italica) in Taiwan; Drs. W. R. Langford and R. R. Smith - Trifolium in Greece, Yugoslavia, and Italy; and Drs. D. R. Dewey and A. P. Plummer (to begin July 15) - forage grass and forbs in USSR.

Dr. A. E. Kehr, NPS, at Beltsville, Dr. Warren Gabelman, University of Wisconsin (active in NC-7), and other vegetable specialists are traveling this summer in the Peoples Republic of China. We anticipate receiving some valuable vegetable and other crop germplasm from this team's visit. They took exchange materials with them.

Two significant write-ups, a large group of soybeans collected in Japan by Dr. R. L. Bernard and the O. W. Norvell bean collection from Central and South America, have been completed and P.I. assignments should be done before mid-July.

SCS has adopted the P.I. numbers for use in their ADP program for the various Plant Material Centers. As a result, a fairly large group of accessions, mainly of domestic origin, will be assigned P.I. numbers. A form is being developed for computerizing data on each accession. We have now received one group of data on materials for P.I. assignments. Seed of some accessions will be provided to RPIS as crop priorities.

8,846 plants and seed accessions including 3,531 small grain cereals, 1,642 forages, 1,477 oilseeds and 1,055 vegetables were inventoried for 1976. Among these, 1,320 forages from direct exploration in South Africa, 67 citrus from South Pacific countries, 25 species of Vigna from Nigeria, 10 species of native U.S. wild sunflowers, and 60 clones of disease-resistant coffee from Portugal were especially significant. One hundred seventy accessions of cereal, forage, and vegetable germplasm received indirectly from the People's Republic of China provide a working basis to enlarge and encourage future direct exchange. Steady progress in exchanging germplasm with USSR is being made as attested by the receipt of 160 samples of various crops.

105 countries received 180,035 items. This total includes uniform small grain nurseries sent to cooperators in 42 countries. In addition, 3,345 experimental crop samples were sent to 23 countries in 53 shipments as part of our support to AID missions. Most activity occurred for Nepel, Bolivia, and Yemen.

Agronomic Crop Germplasm

New small grain accessions totaled 2,653 of which 2,484 were foreign and 169 domestic. Plant scientists received 287,826 packets of seed including 108,089 sent in 201 foreign shipments and 179,737 sent in 292 domestic shipments. Seed stocks were increased at Mesa, Arizona, (9,108 rows), and Aberdeen, Idaho, (7,400 rows and 1,556 hills of Avena sterilis). Seed is stored at Beltsville. Descriptive notes for seven characteristics for each entry were recorded in the field and data computerized through DSAD (Data Systems Application Division).

Concurrence has been achieved among rice researchers in the standardization of rating codes for agronomic, chemical, entomological, pathological, and quality data, and the mechanics of transferring and storing the information in the rice data bank. Seed stocks of 2,400 accessions were increased at El Centro, California, in cooperation with the University of California.

Five international, four uniform, and two special nurseries for Puerto Rico (wheat and oat) were prepared and distributed to cooperators. Fifty-four percent of the cooperators returned disease data. The number of wheat introductions evaluated in the greenhouse for reaction to different diseases was as follows: stem rust - 5,000; Helminthosporium rostratum - 6,000; and powdery mildew - 2,300. H. rostratum produced a toxin which kills susceptible wheat plants within 96 hours but surviving plants appear to have resistance to the fungus. Resistant selections for all three diseases will be increased and the best ones included in future international and uniform nurseries.

Horticultural Crop Germplasm

Mr. Winters aided in planning a citrus exploration in Australia and Papua New Guinea by making contacts and supplying data from previous introductions. New Impatiens introductions were obtained for the Florist and Nursery Crops Laboratory through cooperation with the sugarcane exploration (Dr. Koike).

Rosemallow hibiscus: Continued evaluation of seedling progenies for stem strength, flower durability, and flower color, and selected outstanding individuals for further observation. Fertility in artifically induced tetraploids was greatly reduced. The best selections are being propagated for possible release. The first cross pollinations were made to study a genetic lethal factor. New Guinea Impatiens: The branched-pedicel character is one of low penetrance, not always expressed. Those selections expressing this trait in greatest frequency have been self- and cross-pollinated where possible. A high degree of self-incompatability was encountered. Progenies of successful crosses have not flowered.

A functional laboratory for pathological research by Muriel O'Brien was designed, furnished, and made totally operational. Agriculture Handbook 474, "Potato Diseases," was distributed. Resistance in spinach to Fusarium oxysporum f. sp. spinaciae was demonstrated for several P.I. accessions from Japan and Turkey under tank test procedures. Data were also collected on plant type, leaf savoying, and sex expression. Research results show that a strain of Bacillus subtilis can be used in the biological control of Macrophomina phaseolina in potatoes, especially where charcoal rot is endemic, and where the whole tuber is used for planting. Two fungi are implicated as causal agents of charcoal rot of potato. The second fungus, previously considered a mature stage of M. phaseolina and placed in the genus Botryodiploida, is actually a separate fungus and has been described and named B. solani-tuberosi Thirum & O'Brien species novum. The above results have been documented in four research papers.

Phoma cryptomeriae, needle blight, was successfully isolated from established Cryptomeria japonica plants at the National Arboretum. This is the first record of this organism in the U.S. Because P. cryptomeriae is host-specific to Cryptomeria spp., further efforts are needed to determine if it would be pathogenic to Taiwania cryptomerioides, a tree growing next to C. japonica, and if the commonly found saprophytic fungi, Pestalotia spp., can mask or override the pathogenicity of P. sryptomeriae.

New Crops

Austin Campbell, a research agronomist, is now responsible for research on new crops. Of five planting dates, the earliest seeding (May 5) resulted in the greatest dry-matter production in the two kenaf cultivars (Tainung #1 and Cuba 2032) and in sunn hemp (P.I. 248291) with yields of 6.25, 5.56, and 3.86 mt/ha, respectively. In a test of nitrogen response of Tainung #1 and Cuba 2032, a pre-emergence and post-emergence application of 84 kg/ha of N resulted in the highest dry-matter yields. Tainung #1 outyielded Cuba 2032 (9.05 vs 7.68 mt/ha). Population level in narrow rows had no statistically significant effect on the yield of Tainung #1, Everglades 41, and Guatemala 4; whereas the yields of Cuba 2032, sunn hemp, and Guatemala 45 were significantly higher at the highest population level. Approximately 250 kenaf accessions have been increased in Australia and Haiti.

Seed yields of 14 accessions of Stokesia laevis ranged from 290 to 836 kg/ha. Nitrogen application did not significantly increase yield of either an early or late maturing accession. Selections for seed retention, productivity and ornamental type were made. Germination tests were completed for two genetically different accessions. The most favorable germination conditions in plastic dishes and soil for both accessions were 30° for 8 hours with light and 20° for 16 hours without light, and constant 20° with 12 hours of light. The sequence of leaf and stem diseases was studied. Alternaria species comprised nearly half of the 22 fungi isolated. 1813 seeds were also plated. 97 percent yielded fungus of essentially the same kind isolated from leaf and stem lesions.

Detached leaves of Crambe spp. were placed in benzimidizole solution and inoculated with Alternaria brassicicola. Results showed: 1) difference between species; and 2) spore concentration of inoculum and severity of infection were directly related.

Cooperative research through agreements is in progress at the University of Maryland (Limnanthes), University of Arizona (Lesquerella), and Oregon State University (Limnanthes and other species).

A weed is a plant for which a use has not yet been found.

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Report for 1977 Meetings of the S-9, NC-7, and W-6 Technical Committees

Northern Regional Research Center

General Developments at NRRC--The reorganization of the Horticultural and Special Crops Laboratory has been completed. The Laboratory is divided into five research groups, presented below with their leaders and main responsibilities:

Composition and Characterization. . . . . Dr. Cecil R. Smith
Screening for antitumor and pesticide activities in plant extracts, characterization of new botanical compounds

Fibrous Products. Mr. Marvin O. Bagby
Development of new fiber crops for paper and board products, scanning and transmission electron microscopy, microanalysis

Horticultural and Special Crops Evaluation. . . . . Dr. John A. Rothfus
Tissue culture, triglyceride interactions with other biological compounds, nematode-host interactions, pasture grass evaluations

Instrumental Analysis . . . . Mr. Robert Kleiman
Gas chromatography, liquid chromatography, mass spectrometry, nuclear magnetic resonance (C_{13} and proton), amino acid analysis, chemical evaluation of uncultivated germplasm and analysis for plant breeders and crop development

Natural Toxicants . . . . Dr. Harvey L. Tookey
Toxicants in food crops and seed meals, such as glucosinolates in Cruciferae, and myristicin and other toxins in Umbelliferae

The major new activity for the HSC Laboratory will be providing chemical analyses to soybean breeders, a service that was provided earlier by the U.S. Regional Soybean Laboratory at Urbana, Illinois.

Anticancer Drugs and Pesticides--New approaches are being tried for partial synthesis of harringtonine. One promising approach involves attachment of an α-keto acid side chain which will be modified by a Reformatskii reaction. Isolation of the highly active antileukemic principle of *Sesbania drummondii* from half a ton of seed is at an advanced stage, the active substance having been narrowed to three or four components by HPLC. Isolation of the antileukemic principle of Cephalotaxus mannii from plant material is also at an advanced stage. Fractionation of several new confirmed actives is in a preliminary stage, including Anona glauca, Anthrosomanea polyantha, Daphne pontica, Datisca cannabina, Erythrophleum guineense, Nerium indicum, Tephrosia nyikensis, Thevetia thevetioides.

Many of the extracts are being screened both for antitumor and pesticidal activities. Entomologists at several ARS laboratories are cooperating with HSC in this effort, including those at Savannah, Georgia; Kerrville, Texas; Manhattan, Kansas; Madison, Wisconsin; Vincennes, Indiana.

In-house screening against the European corn borer has been established under guidance of Dr. W. Guthrie, ARS Corn Insects Laboratory, Ankeny, Iowa. Pesticidal activities have been tentatively detected in seeds of the following plants: Tragia incana, Zanthoxylum acanthopium, and Malva aegyptia (repellent activity against confused flour beetle); Trevia nudiflora (active against poultry lice); Bassia hyssopifolium, Antidesma nigricans, Apium sellowianum, Asparagus racemosus, Asphodelus albus, Berrya ammonilla, Bonjeania recta, Bupleurum fontansii, Butea frondosa, and Clarkia amoena (active against European corn borer).

Kenaf--Kenaf solids removed from 15- to 18-ton stacks are being evaluated to determine the influence of stack size, moisture (75 and 25%), and chemical preservatives (borax and sodium bisulfite). Temperatures were monitored throughout the test period. Qualitatively, chopped field-dried kenaf stored at 25% moisture under a tarpaulin cover remained essentially unchanged.

Kenaf was grown on Illinois strip-mined land. During early growth, weeds were controlled by herbicides. Kenaf was harvested 1 month after a killing frost to give 4500, 4100, 3800, and 2700 pounds/acre, respectively, from plots having treatment variables of two levels of activated sludge, commercial fertilizer, and unfertilized control. Soil samples were collected for analyses. All tests are continuing during 1977. Kenaf variety Everglades 71, grown in Indiana, Maryland, and Georgia, had bark thickness proportional to stalk diameter (11 to 35 mm). Since density and bulk of kenaf is about one-third those of typical papermaking wood species, compaction was studied. Kenaf bulk density increased sixfold by high-density baling. Cubes formed in commercial equipment had bulk density 3-1/2 times that of chopped kenaf.

A bleachable grade of kenaf soda pulp was bleached in the laboratory in high yield (93-98%) by one, two, and three stage hypochlorite techniques. Work has progressed toward the preparation of kenaf newsprint web using thermal mechanical pulp (TMP). One-half ton of TMP was produced in industrial equipment. Comparison webs of commercial newsprint arranged for by memorandum, and experimental thermal mechanical newsprint produced from loblolly pine by Finnish industry were tested. The NRRC pilot paper machine was modified to provide a 15-inch trimmed web. The eventual formation of kenaf newsprint will occur during the summer.

New Crops Screening--With receipt of 86 new samples, chemical analysis continues on seeds of uncultivated plants. Gas chromatographic data (often corroborated by mass spectrometry) revealed many interesting fatty acid compositions, particularly the presence of lesquerolic acid (30%) in Heliophila amplexicaulis, 38% erucic and 22% nervonic acid in Heleophila longifolia, and 59% hydroxy acid in Wrightia tinctoria. Several species collected in Africa had unusually high amounts of saturated acids. A recollection of Vernonia pauciflora again showed a high percentage of vernolic acid; and analysis of seed from an annual variety of Lunaria, developed in the Netherlands, had a fatty acid composition consistent with the biannual type.

A large part of the resources of the new crops group was again expended on analysis of samples produced in plant breeding work. Analysis of 931 samples of Brassica for oil content, fatty acid composition, and glucosinolate content were made. The University of Oregon and the University of Maryland sent a total of 541 samples of Limnanthes for analysis.

Hydrocarbon and Rubber-Producing Plants--In a screening program, 200 species (representing 141 genera and 57 families) of native and introduced plants have now been evaluated as possible future sources of hydrocarbons and rubber. Several species offer promise as multi-use crops. Their products would include fiber, protein, oil, hydrocarbons, and rubber in combinations and yields depending on the species.

Cacalia atriplicifolia and Pycnanthemum incanum were newly identified as promising species for rubber production. Euphorbia dentata and other Euphorbiaceae offer promise for combined production of hydrocarbons, protein, and fiber. Sassafras abbidium is a rapid growing species possibly suited for hydrocarbon and fiber production by short-rotation forestry.

Studies on chemical yield-stimulation of four representative species have been initiated cooperatively with another research organization.

Products development research has also been initiated for the hydrocarbon and rubber products from several species. Rubber plasticizers, extenders and processing aids have been prepared from Asclepias syriaca, and Silphium species are being evaluated.

Limnanthes--Evaluations of potential sperm whale oil replacements and extreme-pressure lubricants derived from new crops oils demonstrated the quality of diene wax esters made from the enriched monoenoic oils of Limnanthes oil. Corresponding tetraene wax esters and intact

Limnanthes oil were unsuitable, however, because they tended to polymerize during sulfurization. These studies, which established a prospective lubricant use for the monoene acids, also produced an efficient resin-catalyzed method for hydrolyzing *Limnanthes* oil and a technique for low-temperature fractionation of the constituent acids.

Subsequent studies have sought uses for which the whole oil or the novel C_{22}-dienoic acid of *Limnanthes* might be preferred or provide unique advantage. *Limnanthes* acids possess little or no polyunsaturation of the type commonly found in acids from established agricultural oils; they should be less susceptible to the type of oxidative instability often associated with methylene-interrupted double bonds. Multiple sites for chemical reactivity are, nevertheless, provided by widely separated double bonds, a feature which the Limnantheaceae share with relatively few other plant families. The $\Delta 5,13$-acid, which contributes these sites for multiple reactivity, is prominent as one that could soon reach commercial scale production. This same acid could impart unusual chemical properties to the whole oil if present at higher-than-current levels.

In response to general interest in epoxy acids and proceeding on evidence that levels of polyunsaturation in *Limnanthes* oil can be raised substantially, we are examining epoxidation products for prospective utility as stabilizers, plasticizers, and film-forming resin monomers. Conditions have been developed for the facile epoxidation of oil and other derived compounds from *L. alba*, and we are now assembling quantities suitable for evaluation of plastics additives uses.

Glucosinolates in Cruciferous Vegetables--An improved method for measuring intact glucosinolates (GS's) in vegetables has been devised. Intact GS's from blanched vegetable extracts are adsorbed on an anion exchange column. Washing the resin then separates the GS's from 90% of other material in the plant extract. Enzymatic hydrolysis of GS's while retained on the ion exchange resin releases the aglucon products and glucose to the aqueous solution. Glucose measured by glucose oxidase technique is equivalent to total GS. The aglucons are extracted into dichloromethane and quantitated by GLC. The GLC method has also been improved to identify more aglucon products.

In autolyzed fresh cabbage (analogous to cole slaw), the GS's form organic nitriles instead of goitrin and R-NCS. These nitriles from several accessions of cabbage range from 130 to 450 ppm (calc. as GS). Total GS's in cabbage range from 275 to 1290 ppm. Further studies are in progress: (1) a survey of GS content in Chinese cabbages, (2) a study of the changes in GS content occurring as cabbage is converted by fermentation into sauerkraut, and (3) a survey of other crucifer vegetables.

Because the physiological activity of many of the aglucon products are unknown, these substances are being prepared for biological testing. 1-Cyano-3,4-epithiobutanes have been tested in the Ames' Salmonella assay and found to be a weak mutagen. Other aglucon products from crucifers have been submitted (to M. Gumbman, WRRC) for the mutagen test: 1-cyano-2-hydroxy-3-butene, 1-cyano-2-hydroxy-3,4-epithiobutanes, and goitrin. Several aglucons and epi-progoitrin have been submitted for testing as teratogens in the rat (to K. Nishie, SERRC).

Crambe Meal--A new cattle feeding trial was completed at Purdue, using crambe meal processed at Culbertson, Montana, in 1975. The meal was previously described as being acceptable regarding GS's and their products, but somewhat lower in solubility of protein than soybean meal. Calves (initial weight, 216 kg) were divided into three treatments and fed 153 days on (a) a basal ration containing 9.0% protein, (b) the basal ration plus crambe so as to contain 10.3% protein, or (c) the basal ration plus soybean meal also at 10.3% protein. All three groups gained a respectable 1 kg/day (range 0.97 to 1.05) and consumed 6.9-7.2 kg feed/kg gain. There were no significant differences between treatments. Plans for growing crambe in Montana this year have been dropped because of a severe drought continuing through normal planting season.

Toxicants from Umbelliferae--Preliminary results from 100 carrot samples indicates that myristicin, a hallucinogen, is present in some carrots. Although myristicin constituted more than 0.5% of the volatile oil from several samples, this amount translates to a few ppm of the fresh carrot root. Current emphasis is on improved methodology to quantitate myristicin and other toxicants from carrot root oil.

REPORT OF THE NATIONAL SEED STORAGE LABORATORY

Accessions held in permanent storage on July 1, 1977 totaled 95,171. Between August 3, 1976 and July 1, 1977 the Laboratory received 2,840 new accessions and 1,661 second samples.

During the period August 3, 1976 to July 1, 1977 shipments from the National Seed Storage Laboratory, in response to requests for seed, totaled 1,608 accessions, including: 1,565 field crop accessions sent to scientists at 4 seed companies and 37 institutions and government agencies in United States, England, India, and Korea; 43 vegetable crop accessions sent to scientists at 6 seed companies and 14 institutions and government agencies in United States, Holland, and South Africa.

Besides the regular germplasm collection, the National Seed Storage Laboratory holds and distributes seed of the Plant Virus Indicator collection which presently contains 94 accessions. The seed for this collection are provided by various scientists in cooperation with the Seed Bank for Plant Virus Indicators, Subcommittee of the Virology Committee of the Phytopathological Society. Distribution from this collection totaled 1,363 accessions sent to 58 scientists in United States, Brazil, Canada, Columbia, Denmark, Democratic Republic of Germany, Hungary, Iraq, Jordan, Kenya, Malaysia, Mexico, Morocco, Philippine Islands, Republic of China, Thailand, and Turkey. The Laboratory has arranged for seed increase for 1,400 accessions and has provided financial assistance to the Regional Stations for seed increase on several hundred additional accessions.

The Laboratory staff has been increased to 18 permanent employees plus several part-time students, including one graduate assistant working on a Ph.D. in Cytogenetics.

Visitors during the year included 216 people who signed the Laboratory guest book and several others who did not. Registered visitors included people from 18 foreign countries, as follows: Australia 8; Belgium 1; Brazil 6; Canada 1; Columbia 1; England 4; Germany 2; Iran 1; Israel 1; Japan 1; Korea 2; Nassau 1; New Zealand 1; Nigeria 3; Peru 1; Philippine Islands 4; Puerto Rico 1; Scotland 1. Nonregistered groups included 25 members of the Men's Garden Club of America, 88 members of the National Association of Retired People, and several college and school classes ranging from 15 to 71 persons per class.

Meetings attended by the professional staff of NSSL included:

August 17 - August 18, 1976. NE-9 Technical Committee Meeting, Geneva, NY (Clark)

August 19 - August 20, 1976. S-9 Technical Committee Meeting, Miami, FL (Clark)

September 13 - September 16, 1976. National Plant Germplasm Committee Meeting, Fort Collins, CO (Bass. Other staff members part-time.)

October 16, 1976. American Biology Teachers Meeting, Denver, CO (Clark)

October 27, 1976. Pickling Cucumber Improvement Committee Meeting. Denver CO (Bass)

October 18 - October 20, 1976. ARS Plant Germplasm Coordinating Committee Meeting, Kansas City, MO (Bass)

November 28 - December 3, 1976. American Society of Agronomy, Houston, TX (Bass, Roos, Stanwood)

January 5, 1977. Sertoma Club, Fort Collins, CO (Bass)

March 29 - March 30, 1977. ARS Workshop - National Plant Germplasm System. Boulder, CO (Clark, Bass, Roos, Stanwood)

April 4 - April 8, 1977. Conference with Data Systems Personnel, Washington, DC (Clark)

May 6 - May 20, 1977. International Seed Testing Association 18th Congress, Madrid, Spain (Bass)

June 17 - June 23, 1977. Association of Official Seed Analysts Annual Meeting, Amherst, MA (Bass, Stanwood)

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE
South Technical Service Center

Report to S-9 Committee
Introduction, Multiplication and Evaluation of New Plants for Agricultural and Industrial Uses and the Preservation of Valuable Germplasm
1977

Arnold G. Davis, Plant Materials Specialist, SCS
Fort Worth, Texas

This report is assembled from information submitted by the four Plant Materials Center Managers and seven Plant Materials Specialist serving the states in the south technical service center area, Soil Conservation Service.

Major emphasis is being placed on the evaluation of grasses, legumes, trees shrubs and forbs for:

<u>Erosion Control</u> Critical erosion prone areas, including mine spoils roadsides, gullied areas, rural and urban disturbed areas are receiving primary attention.

<u>Shoreline Erosion Control</u> Shoreline erosion control along streambanks and wave action and wind erosion control along tidal estauries, inland and oceanic waterfronts.

<u>Wildlife</u> Plants are being evaluated for wildlife food and cover in areas where bird and animal populations have either depleted the food supply or where food is not available in critical periods.

<u>Forage</u> Plants having potential to supply forage for livestock in problem soil areas, energy conservation and in seasons of short supply.

<u>Environment</u> Screening, windbreaks and attractiveness of foliage or flower are evaluation criteria for plants.

Initial sudies are conducted at the plant materials centers, selections are made here and proof of performance is obtained through field studies in the potential area of use and in cooperative studies with other agencies. Many native plant assemblies are being evaluated in addition to plant introductions.

Over 500 plantings of promising plant introductions have been made and are being evaluated in field conditions.

A summary of the total number of accessions in some stage of evaluation or increase follows:

Plant Materials Centers
Summary of all PI Accessions
1977

Evaluation or Increase Status	Americus Georgia	Brooksville Florida	Coffeeville Mississippi	Knox City Texas	TOTAL
Initial Evaluation	173	319	178	63	733
Advanced and Cultural Evaluations	88	2	7	12	109
Increase for Evaluation off Center	17	11	8	2	38
Breeder or Foundation Fields or Orchards	3	0	1	1	5
Seed Orchard, holding block or other	1	32	19	1	53
	282	364	213	79	938

Field Plantings

Locations & PMS	No. Accessions	No. Plantings
Tx. - H. Wayne Everett	15	83
Ark.,Ms.,La. - Kenneth Blan	17	178
Ga.,Ala. - Harry Haynsworth	8	148
Fla., P.R. - Don Smith	53	17
No. & So. Carolina - Sheridan Dronen	8	106
Ky., Tenn. - Donald S. Henry	3	9
Total	104	541

HIGHLIGHTS
S-9 Technical Committee
Introduction, Multipilication and Evaluation of New
Plants for Agricultural and Industrial Uses and
the Preservation of Valuable Germplasm
1977

Andropogon caucasicus - PI-78758 (PMT-588 Caucasian bluestem) - Caucasian bluestem is a warm season perennial bunchgrass. It is well adapted to areas receiving 18 inches or more annual rainfall. It has good forage production and is resistant to leaf rust. It is one of the most cold tolerant introduced bluestems. It orginated in the USSR. David Lorenz

Caucasian bluestem - PI-78758 - 2 plantings in Kentucky - 1 for wildlife cover looked good in spring 1976 for stand. 1 planting on critical area site, has a good stand. W. Everett

Arachis benthamii - PI-338282 - The "Arben" perennial forage peanut is a generally erect growing (50-60 cm high by 70-90 cm wide), deep green, vigorous, bunch type, dense, tender legume palatable to livestock and especially so to deer. It produces a few low growing stems which root if covered with moist soil. This plant is not rhizomatous and should not be considered as truly stoloniferous. However, stem cuttings of this plant have rooted and survived the most readily of all the perennial peanuts tested in this manner at the Brooksville Plant Materials Center. This variety has excellent hay or grazing potential. Growth is continuous throughout the frost free period if moisture and fertility are both available. Bob Roush

Arachis glabrata - PI-262839 - "Arblick" perennial forage peanuts are dense-growing, deep-green, rhizomatous peanuts of excellent forage potential on well drained soils. Annual forage production is usually 6.75 - 9.0 metric tons per hectare/year. Yields of 13.4 metric tons/hectare year have been obtained. This variety is very resistant to attack by insects and diseases. The growing period is from the onset of the summer rainy season until killed to ground level by autumn frost. These meterials continue to grow well at Brooksville, Lowell, Gainesville and Tallahassee, Florida Bob Roush

PI-262817 - "Arbrook" perennial forage peanuts are dense-growing, strongly vigorous, rhizomatous peanuts of excellent forage potential on well drained soils. Annual forage produciton is comparable to the Arblick. This variety is resistant to attack by insects and diseases. The growing period is from last frost of spring to first killing autumn frost. Extremely drought resistant because of the good quality of deep penetrating secondary taproots produced by the coarse rhizomes. This variety continues to grow well at Brooksville and Gainesville, Florida. Bob Roush

Calamagrostis pseudophragmites - PI-220584, MS-3361; PI-222041 - Two accessions - Both accessions exhibit a very good rate of spread from rhizomes. Stands are dense and disease and insect free. No cold, heat, or drought injury has been noted. Plant height is about 2 feet with seed heads to 3 feet. This could be a good erosion control plant; however, seed production is very poor at this location. B.B. Billingsley

Castanea mollissima - PI-70314 - Attractive tree with much branching and good nut production. Nuts have a good flavor and provide food for deer and other wildlife species. H.J. Haynsworth

Desmodium cinerascens - PI-282691 - Spike tickclover - This is a perennial, erect, very leafy, woody stemmed legume that grows to 3.35 - 4.00 m tall. This leafy plant can provide abundant forage for cattle. The seed volunteer and develop well under overhanging competition from weeds and grasses. Seed is produced in the late spring and early summer period with a second and larger seed crop in mid to late autumn. The foliage has very good browsing potential with cattle. The stems are too woody for hay. This plant is well adapted at Brooksville and is resistant to locally available insects and diseases. Bob Roush

Dichanthium sp. - Multiple PI- Numbers (PMT-587) Old World bluestem - is a warm season perennial bunchgrass. It is a composit of 60 accessions from the near east. It is adapted to a wide variety of soil and climatic zones and does not suffer leaf rust. David Lorenz

Digitaria macrosglossa - PI-299648 - This grass has had a high rate of survival when planted on the first dune in Florida. It is bunch grass so it has not spread from the original planting, it has grown where some of the native plants have had poor survival and have not done well even though started as potted plants. These natives are found growing near the site. Don Smith

PI-299648 - This is a perennial, dense, bunch type, digitgrass with only moderate forage potential. It is tolerant to salt spray and has grown well on the coastal dunes in plantings made in southeastern Florida. Growth response is good on the dunes and its initial growth exceeds that of some of the native dune species. The plant is propagated by separating into tillers for planting. No seed of this grass had been observed. The grass is heavily damaged by frost at 24° F (-4.5° C) and use of the plant in Florida should be limited to the more southernly coastal areas. Bob Roush

Eragrostis atherstonei - PI-276033 - A small field planting was made in the Odessa area. This accession looks promising in the drier sections of Texas on gravelly or sandy soil. It appears to have good potential for increasing forage production. David Lorenz

Eragrostis curvula - PI-295689 (PMT-718) - Higher forage production and cattle preference over common weeping lovegrass continue to be reported. Good to excellent survival and good growth have been reported where plantings were made in rather wet areas. David Lorenz

PI-295703 (PMT-729) - This wide-leaf, blue-green weeping lovegrass is preferred by cattle over 'Ermelo' or common weeping lovegrass. Plantings show good initial establishment and quick initial growth. Winterkill was again reported. David Lorenz

Eragrostis lehmanniana - PI-295698 (PMT-732 Lehmann lovegrass) - Is a perennial warm season bunchgrass with the ability to root at the nodes. It is a drought resistant species suited for Western conditions. It originated in South Africa and tends to be a good seed producer.

This accession continues to look promising in the drier parts of Texas on gravelly or sandy soil. It appears to have good potential for increasing forage production in those areas where common lehmann lovegrass is used. No winterkill was reported. David Lorenz

Glycine ussuriensis - PI-163453 (MS-128) - This trailing soybean has good seed production and is a good reseeder. It's greatest use seems to be as a food for quail, doves, and other wildlife. Seed shatters soon after ripening (late October-November at Coffeeville). B.B. Billingsley

Hemarthria altissima - PI-299993 - Redalta - This plant has been widely evaluated in Florida. It has been found to be cold hardy in this state. It is earlier to start regrowth in the spring and stays green after the first frost. While best adapted to wet sites, it will grow on upland drier sites. While not officially released, it is estimated there are 5,000 acres growing in Florida. Don Smith

PI-299995 - 'Bigalta' limpograss - This is a larger, coarser leaved and stemmed limpograss which is both highly palatable and digestible. It produces dense, leafy, stoloniferous stands of perennial grass highly adapted to the organic soils of Florida. The grass can be planted directly into 10-15 cm of water as cuttings, root and resume excellent growth. The grass produces excellent ground cover and withstands periods of flooding of 90-100 cm. It is currently receiving strong farmer and rancher acceptance and utilization in Central and South Florida. This grass is the most easily frost damaged of the three limpograsses currently being field tested in Florida. Bob Roush

This grass from Southern Rhodesia is a strong perennial, stoloniferous plant with fine abundant stems and leaves. it can stand to 1.0-1.3 m in height and produces stolons 1.5-2.75 m in length in one growing season. It is highly palatable to cattle and horses. The grass grows well on poorly drained soils. 40-44 metric tons per hectare per year of air dry forage have been produced. This is the most cold hardy of the three accessions currently being field tested in Florida. Frost at 4°C have usually resulted in 15-20 cm of apical leaf and stem damage. Produces excellent ground cover and readily withstands grazing. An excellent grass for extending the grazing period in Florida. Has gained rather wide user acceptance within the State and is being successfully used in other Southeastern coastal states. Bob Roush

PI-299994 - 'Greenalta' limpograss - An excellent grass of similar characteristics and adaptation as Redalta limpograss. It is preferred in some locations in Florida where wet, acid soils predominate. It is somewhat less productive, is less stoloniferous and produces ground cover inferior to that produced by the Redalta. Bob Roush

PI-299993, 299994, 299995 - Several small field plantings (1-5 acres) of one or more of the above three accessions have been planted. These plantings and the original plantings at Prairie View A&M University indicate a good potential for the use of one or more of these accessions for pasture improvement in southeast Texas. Plants of all three accessions have made good growth, but PI-299995 is again the most vigorous and has produced the most growth. D. Lorenz

PI-299995 - Bigalta - This grass has been widely accepted in south and central Florida. It is a big stem grass that is highly palatable. It goes dormant with the first frost and is later coming back in the spring. It is well adapted to wet soils. These are approximately 10,000 acres established in Florida. Don Smith

PI-364344 (MS-3647)-This plant has shown no disease or insect problems. Some cold injury occurs during severe winters, but this accession is definitely the single most cold hardy one. Spread is rapid by means of stolons. Forage quantity is good. This is a fine stemmed form of Hemarthria altissima. B.B. Billingsley

Indigofera pseudotinctoria - PI-197015 - Recent tests of feeding ground forage of this accession to baby chicks failed to show evidence of toxins. This probably means that the plant will be increased for general use in roadside and disturbed area plantings on very light soils. Its vigor, large root system, and ability to take heavy mowing while still furnishing ground cover indicate that this is a plant of much promise. John Powell

Perennial, deep-rooted, semi-decumbent legume with potential for providing cover on critical areas and controlling soil erosion. It can be established from seed. H.J. Haynsworth

False anil indigo - PI-197015 - It is being field tested in the Carolinas for suitability as an erosion control plant in the sandhills. Both direct seeding and transplanting seedlings have been successful. Sid Dronen

Juniperus conferta - PI-323932 - 'Emerald' seashore juniper - This plant is showing promise as a ground cover plant when transplanted as potted plants in Florida. Bareroot plantings for the most part have been unsuccessful as the plants needed shade and watering while they were becoming established. Don Smith

'Emerald' seashore juniper is a ground hugging, evergreen plant that roots readily along the stems. We produce some potted material for coastal trials in the states we serve. John Powell

Lespedeza virgata - PI-218004 (MS-126) - 'Ambro' virgata lespedeza appears to be best suited for erosion control on roadbanks and similar areas. It reaches about 18" in height and produces a dense cover. On areas of good soil, other plants invade this lespedeza rather quickly. On poor graded off areas or eroded spots, this competition is less a problem.

Other possible uses are as forage and as wildlife food plant. B.B. Billingsley

An attractive, low growing perennial that is effective in helping control erosion on roadbanks, and other critical areas. H.J. Haynsworth

PI-218004 - 'Ambro' virgata lespedeza - is attractive in appearance, bronze coloration, and deciduous leaves make it a desirable stabilization plant for urban sites. It is being evaluated to determine if it is adaptable to as wide variety of sites as is sericea lespedeza. Preliminary findings are that it requires a higher pH and fertility level. Sid Dronen

Malus hupehensis - PI-122586 - (MS-150) - This crabapple produces seedlings uniformly similar to parent plants. Production from seed has generally been easy, although difficulty with germination has been experienced on occasion.

Fruit production is good, with the 1/4" - 1/2" diameter apples ripening in November. Fruit is often held until Begruary, but birds sometimes quickly strip the fruit soon after the first freeze. B.B. Billingsley

An attractive tree with columnar form. Moderate production of small fruits which provide food for birds and other wildlife species. H.J. Haynsworth

'Meechee' Arrowleaf Clover - PI-233782 (MS-329) - 'Meechee' was released by the Coffeeville PMC and the Mississippi Agricultural Extension Service as a new variety. It reaches 3 feet in height, and is a good forage and seed producer. Forage quality is good according to reports. Seed maturity usually occurs in July at Coffeeville.

There are reports of root disease in 'Meechee' in some areas. B.B. Billingsley

Panicum coloratum - 'Selection 75' kleingrass, a warm season perennial bunchgrass, was introduced from Africa. It is fine stemmed, leafy, spreads by seed or rhizomes and is adapted to a wide range of Southern soils and moisture conditions. It is one of the earliest greening species at the Knox City PMC and produces forage throughout the summer until heavy frost in the fall.

PI-166400 - 'Selection 75' kleingrass - Released in 1968 as 'Selection 75' seed of this grass continues to be much in demand. As a result of conference on "Developing Pilot Programs for Small Farm Land Owners and Operators" and assistance and cooperation of the Texas Department of Agriculture Seed Certification Program and SCS, two farmers have established plantings of 'Selection 75' kleingrass for the production of certified seed. Seed production from certified and non-certified fields is readily available in the market and the price remains firm. David Lorenz

Paspalum nicorae - PI-202044 (MS-906) - 'Amcorae' brunswichgrass - This sod forming, perennial grass is very leafy, produces adequate seed, and is blue-green in color. Forage quality and quanity is good - some sources say better than for 'Pensacola' bahiagrass. There is some problem with winter injury at Coffeeville and seed are somewhat diseased by fungus. B.B. Billingsley

A perennial grass that spreads by short rhizomes forming a good sod on sandy soils. Responds favorably to close clipping or grazing. Potential forage and critical area cover plant. H.J. Haynsworth

PI-304004 and PI-310131 - Paspalum nicorae - Both of these are being increased in a very small way, both having suffered severe cold damage. They have out yielded PI-202044 'Amcorae'. PI-304004 combined high forage yields with the highest yield of seed but was a little less hardy than PI-310131. The latter combined good forage and seed yields with a little more winter hardiness than PI-304004. The severe winter has caused us to reevaluate these two along with 'Amcorae' and PI-31035. John Powell

Pennisetum purpureum - PI-300086 - Napiergrass - This large, strong, very vigorous, perennial, leafy, slow spreading bunch type grass grows to 3-4 m in height. It is adapted to soils having a broad drainage range. Deep rooting makes this grass exceptionally well adapted to deep droughty sands. The material is well structured for use as a field windbreak and is climatically adapted throughout Florida. It is an excellent producer of forage and is well adapted for use as green chop feed or silage. Yields of 135-157 metric tons per hectare have been obtained. Bob Roush

A tall growing grass, where fertilized, shows some promise as a field strip windbreak plant and as a possible forage plant with management. It seems better adapted on moderately well drained sites. Don Smith

Phalaris arundinacea - PI-236525 (MS-2931) - This could be a good cool season forage plant. This plant is rated best overall among the Phalaris accessions from the standpoint of forage and seed production. It is one of the later maturing forms. B.B. Billingsley

Pistacia chinensis - PI-21970 - This tree with the beautiful fall foliage has received wide distribution from our Center and there is still some demand each year for planting stock for small trials. John Powell

A tree of good form and attractive fall color. It produces small fruit that are eaten by various bird species. H.J. Haynsworth

Pterocarya stenoptera - PI-61938 - This accession showed such exceptional growth from seed that it was thought of as possibly being a good pulp producing plant. However, on this Center when the seedlings were space planted, they divided into so many trunks that it will not likely be considered for furnishing pulp material. John Powell

Sawtooth oak - 6 plantings range in age up to 15 years. Good plant for wildlife food production due to fruiting at age 4-5 years. Must be palnted on better soils and have shading competition controlled. We really are not evaluating this species much any more since it is in technical guides and in the trade. Wayne Everett

Report of Regional Station Activities
to
S-9 Technical Committee
July 1, 1976 to June 30, 1977

Plant Introduction

Seed or plants of 463 new introductions were received during the year ending June 30, 1977. The new material consists of 250 warm season grasses, 60 peanuts and 153 accessions representing numerous other species. These new additions increased the inventory of seedstocks held at the Regional Station to 34,160 accessions. Some of the larger collections are:

Arachis spp. (peanuts)	4,360
Sorghum spp.	3,700
Cajanus cajan (pigeonpea)	4,150
Capsicum spp. (pepper)	2,200
Vigna spp. (cowpea, mungbean)	3,600
Warm season grasses	6,050
Cucumis spp. (cantaloupe)	1,700
Citrullus spp. (watermelon)	650
Winter legumes	1,900
Others (sesame, guar, castors, okra, eggplant, summer legumes)	5,850
TOTAL	34,160

An exploration was conducted in Greece and Italy from June 20 to August 5, 1977 for Trifolium, specifically for species closely related to white clover and red clover. 360 samples of seed were collected.

Production of Seed

3447 introductions are being grown at the Regional Station for seed increase and preliminary evaluation. With financial support from the National Seed Storage Laboratory arrangements were made with Dr. Varnell, University of Florida, to increase 1,004 peanuts and with Dr. Kirby, Oklahoma State University, to increase 500 peanut introductions. Two hundred two cantaloupe and watermelon introductions are being increased by the U. S. Vegetable Breeding Laboratory, Charleston, South Carolina; and 539 old world bluestems by Mr. Chester DeWald, U. S. Southern Great Plains Field Station, Woodward, Oklahoma. 573 vetch introductions, 37 okra introductions, 232 cowpea introductions, and 467 mungbean introductions are being increased at the Plant Introduction Station, Savannah, Georgia. Six hundred and seventeen tropical accessions of numerous species are being increased at the Institute of Tropical Agriculture, Mayaguez, Puerto Rico. Following is a summary of material planted at the Regional Station this season:

Peanuts	185
Sesame	690
Cantaloupes	343
Sorghum	543
Gourds	90
Eggplant	18
Castorbeans	120
Summer legumes	210
Watermelon	73
Cicer	157
Peppers	103
Summer grasses	537
Clover	378
TOTAL	3,447

Cataloguing and Distribution of Seed

Catalogues of <u>Cajanus cajan</u>, Warm Season Grasses, <u>Capsicum</u> spp., and Vine Crops have been updated and are currently at the printers.

Distribution of seed and plants in the Southern Region during 1976-77 is summarized in the following table:

Packets of seed and plants distributed in Southern Region FY-77

State	S-9	NE-9	NC-7	W-6	Other	Total
Alabama	1181	88	35	12	13	1329
Arkansas	0	0	18	0	0	18
Florida	1978	1338	26	669	372	4383
Georgia	3361	10	2589	52	96	6108
Hawaii	182	0	0	0	0	182
Kentucky	166	48	40	128	0	382
Louisiana	152	125	14	0	39	330
Mississippi	76	0	4	503	1	584
North Carolina	526	11	693	0	35	1265
Oklahoma	3353	7	13	178	1	3552
Puerto Rico	1331	0	54	0	0	1385
South Carolina	574	1	1	545	5	1126
Tennessee	9	74	99	0	0	182
Texas	4139	13	683	426	5	5266
Virginia	72	9	0	1393	0	1474
NE-9	495				27	522
NC-7	2146					2146
W-6	1619				2	1621
Foreign	2143				176	2319
NSSL	778					778
TOTAL	24,281	1724	4269	3906	772	34,952

Screening for Disease Resistance

Anthracnose of Watermelon: Fourteen watermelon introductions out of 450 screened for resistance to race 2 anthracnose were resistant in preliminary greenhouse tests. In the replicated field test conducted this summer the following introductions had the most resistance.

Table 1: Severity of anthracnose in 1977 field test

Entry	Disease Index	Leafspot Count
PI 271775	2.5	5.6
PI 271778	2.2	5.0
PI 271779	2.0	6.8
PI 203551	1.8	7.8
PI 299379	2.2	19.2
PI 364460	2.5	25 +
Florida Giant	3.5	25 +

Watermelon Mosaic Virus 2: The watermelon introductions which were not screened previously (Plant Disease Reporter 54:880-881. 1970.) were screened for resistance to this virus. In the preliminary greenhouse tests 24 introductions out of 260 screened had 20% or less of the seedlings infected. In the replicated greenhouse test none of the 24 promising introductions were significantly superior to Charleston Gray.

Gummy Stem Blight of Cantaloupe: Out of 206 of the newer introductions screened 11 were equally resistant to PI 140471 in preliminary tests. The promising introductions will be screened in a replicated greenhouse test.

Peppers Resistant to Tobacco Mosaic Virus: All introductions which were previously reported as resistant to TMV were inoculated with a common strain (PV 135, ATCC). Numbers in parentheses indicate number of inoculated pepper plants from which the virus was recovered: PI 152225 (1), PI 159241 (2), PI 183441 (5), PI 264281 (4), PI 163201 (9), PI 152222 (20), PI 152234 (13). Seed was harvested from virus-free plants following two inoculations to provide breeders with stocks which should be uniform in resistance. In the future all pepper introductions which have been reported as resistant will be increased in the greenhouse.

Fungi on Seed of Sorghum Introductions: The blotter method of seed health testing was used to determine the fungi associated with seed of 450 sorghum introductions. Germination was poor (20% or less) for 53 of this group. A *Fusarium* sp. usually was present on poorly germinating seed. This fungus was not pathogenic on germinating seed or seedlings which were inoculated with it. A morphologically similar or identical *Fusarium* sp. isolated from diseased plants invaded healthy sorghum flowers and could be isolated from 80-100% of the mature seed. Although this fungus had no effect on germination of seed soon after harvest the investigation is continuing to determine its possible effect on germination and emergence after storage.

Colletotrichum graminicola was very infrequent, being observed on only one seed of a single introduction out of the 450 samples. *Helminthosporium* sp. was observed on from 2-8% of the seed of 7 introductions. All other fungi observed on the seed were miscellaneous saprophytes (*Rhizopus*, *Aspergillus*, *Curvularia*, etc.).

Pathogens on Seed of Plant Introductions of *Indigofera* spp.: In 1976 the Division of Plant Introduction of the Indian Agricultural Research Institute informed us that several *Indigofera* PI's were rejected by their Mycology Unit of Plant Quarantine because they were infected with certain fungi including a *Colletotrichum* sp. Previously, in 1963, I had isolated a pathogenic fungus, apparently *Colletotrichum dematium* f. sp. *truncata* (Schw.) v. Arx from *Indigofera* spp. in our seed increase nursery. Subsequently the introductions which were severely infected in the field were grown in the greenhouse to produce pathogen-clean seed. This year we determined the frequency of *Colletotrichum dematium* f. sp. *truncata* on seed using the blotter method of seed health testing (Table 2).

Table 2: Seed infection of *Indigofera* spp. introductions by *Colletotrichum dematium* f. sp. *truncata*

Host	PI Number	% Infection
Indigofera subulata	PI 243476	2.0
Indigofera suffruticosa	PI 331110	2.0
Indigofera endecaphylla	PI 185532	4.0
Indigofera endecaphylla	PI 199343	2.0
Indigofera microcarpa	PI 337538	2.0
Indigofera microcarpa	PI 337540	6.0
Indigofera mucronata	PI 308518	12.0
Indigofera sp.	PI 300003	6.0

Eight introductions out of 56 available in the collection were infected. Infection ranged from 2 to 12 percent of the seed of infected introductions.

Screening for Insect Resistance

Cowpea aphid - Eight hundred *Vigna* accessions have been given preliminary greenhouse screening for resistance to the cowpea aphid, *Aphis craccivora*. No outstanding resistance has been found but fair levels of tolerance were observed in some accessions. Accessions not definitely susceptible will be retested for a more quantitative evaluation. Field evaluations of the *Vigna* spp. planted at Savannah, Georgia will be made throughout the summer.

Melon aphid - Three hundred *Cucumis* accessions have been given preliminary greenhouse screening for resistance to the melon aphid, *Aphis gossypii*. This is in response to a request from R. T. Correa, Weslaco, Texas for a source of resistance superior to that of 'Smith's Perfect'. None of the P.I. accessions tested have a high level of resistance. However, two other cantaloupes, Georgia 47 and a selection received by Dr. Sowell from Dr. G. W. Bohn, Berkley, California (90234 - his number) appear to be equal to'Smith's Perfect' in preliminary tests.

Budget

Funds for operating the Regional Station during FY-77 and the proposed budget for FY-78 are shown in the following table:

Regional Station Budget

Source of Funds	FY-77	FY-78
Regional Research Funds (Pooled)	$64,740	$64,740
Regional Research Funds (Georgia Station)	14,821	21,850
ARS-USDA	150,800	156,900
TOTAL	$230,361	$243,490
Expenditures		
Personal Services	$170,904	$176,418
Equipment	4,883	9,000
Seasonal Labor	9,237	10,000
Operating Expenses	25,337	27,572
Travel	3,200	3,500
Seed Increase at other Locations	16,800	17,000
TOTAL	$230,361	$243,490

New Facilities and Equipment

1. Two greenhouse sections, each 20' x 25'; as additions to the current Station greenhouse facility. These will be occupied in the fall.

2. Seed storage building. Ninety-nine percent completed and will be occupied in the fall.

3. New three-bottom flip plow and disc harrow.

4. New tractor mounted sprayer for pesticide application.

5. Electronic seed counter and Mettler balance for weighing seed.

6. Cone planter.

APPENDIX B

REGIONAL RESEARCH PROJECT S-9 OUTLINE

1977 Revision

REGIONAL RESEARCH PROJECT S-9

Cooperative among
THE STATE AGRICULTURAL EXPERIMENT STATIONS
of the
SOUTHERN REGION
and the
AGRICULTURAL RESEARCH SERVICE
and
SOIL CONSERVATION SERVICE
of the
UNITED STATES DEPARTMENT OF AGRICULTURE

I. PROJECT NUMBER: S-9

II. DURATION: October 1, 1977 to September 30, 1982. Original Project approved 1949. Revised 1955, 1962, 1967, 1972. This revision prepared 1976.

III. TITLE: S-9 Plant Germplasm - Its Introduction, Maintenance and Evaluation

IV. OBJECTIVES:

1. To introduce useful plant germplasm through foreign and domestic plant exploration for agricultural, industrial, and urban-rural uses.

2. To multiply, catalogue, distribute, and preserve germplasm of introduced plant materials for the Southern Region.

3. To evaluate introduced plant materials and to maintain and publish records of their performance and use in the Southern Region.

4. To assay plant and seed materials for their chemical and physical properties and to determine cultural requirements of species having new crop potential.

V. PROCEDURES:

A. Methods of attaining the stated objectives

1. Plant Exploration and Introduction

The Agricultural Research Service (ARS), in close cooperation with State Agricultural Experiment Stations and private (seed) companies, has the major responsibility for this objective. It is the official agency of the United States Department of Agriculture (USDA) for conducting plant explorations, both foreign and domestic. Plans for an exploration, including new plant materials to be obtained and areas to be explored, are initiated by crop specialists. The proposed exploration must be of interest to and supported by two or more states. The exploration proposal should be submitted to the S-9 Technical Committee following a prescribed format. If approved, the request is submitted to the ARS Plant Germplasm Coordinating Committee for consideration in view of other plant exploration proposals and national needs for plant germplasm. If approved by the ARS Plant Germplasm Committee, the proposal is assigned a priority and forwarded to the administrator of ARS for funding. Crop specialists from state experiment stations or other agencies may participate in foreign and domestic explorations when feasible.

It is recommended that individuals and other agencies making plant collections utilize the identification, inspection, numbering and quarantine facilities of the Germplasm Resources Laboratory, ARS-NER; and that plant materials obtained in this manner be catalogued and tested in the same manner as plant material obtained through the regular procedure by the Department of Agriculture.

Individual requests for a small number of specific items should be referred to the coordinator of Regional Project S-9.

2. Preliminary Evaluation, Multiplication and Maintenance of Materials

The Southern Regional Plant Introduction Station at the University of Georgia Station, Experiment, Georgia is responsible for this phase of Objective 2. It is the receiving center for introduced seed or vegetable stocks of new plants coming into the region. It is responsible for their propagation, evaluation, and maintenance to insure against loss of the materials. Propagation and preliminary evaluation of most stocks will be undertaken through facilities and personnel of the regional station. However, when introductions are better adapted to other states because of climate, interest, or specializing personnel, arrangements may be made by the regional station with cooperating state experiment stations for their propagation and evaluation. Seed of incoming materials that are propagated successfully will be maintained under controlled temperature and humidity conditions at the Regional Station.

Cataloguing

The Regional Station will be responsible for this phase of work. Inventories of available plant introductions will be prepared annually or at intervals based on current needs. These lists will be distributed within the region through the technical committee to agronomists, horticulturists, and other plant scientists interested in testing and using the new materials. They will be distributed to research workers in the other three regions through the regional coordinator. These lists contain the source, descriptions, and records of performance of available plant introductions.

Availability of Germplasm

Seeds or vegetative stocks of all accessions on the seed lists will be available to research workers with the restriction that the PI number must be acknowledged by the recipient in any publications or other communications on the utilization of the genetic stocks. It is also the obligation of individuals receiving introductions to report their performance and use to their technical committee member or to the regional coordinator. In accordance with the policy statement of the National Coordinating Committee, approved February 28, 1950, no seeds or plant materials shall be distributed to any private agency for exclusive use.

Germplasm Preservation

The preservation of valuable germplasm of economic plants in the Southern Region will be closely integrated with similar programs in the other three regions and with that of the National Seed Storage Laboratory. A central seed storage room equipped with temperature and humidity controls is maintained at the Regional Station, wherein seed of all introductions entering the S-9 regional program are held in viable condition as working stocks. The Regional Station will cooperate with the National Seed Storage Laboratory by placing reserve stocks of valuable introductions at the laboratory for long-term storage. Plant breeders and others will be encouraged to store reserve seed supplies of established varieties and valuable breeding lines in the National Seed Storage Laboratory to insure preservation of these stocks.

On a curatorship basis, certain state experiment stations or federal agencies may undertake the preservation of collections of horticultural and field crops having special value and genetic significance to research workers. These collections may cover a wide array of plant species and may be an integral part of the Regional New Crops Program being maintained with some degree of permanence at certain experiment stations under the administrative guidance of the sponsoring station. Stocks from these centers are made available to research workers of the region upon request. Such collections cannot be unilaterally terminated without mutual agreement between the sponsoring station or agency and the Regional Station.

3. Advanced Evaluation and Use

Further evaluation of new plant materials to determine their potential value is the responsibility of all participating states and the Soil Conservation Service. All plant introductions maintained at the Regional Station will be available for distribution to plant scientists at state stations who have a need for them. Evaluations made at state stations will involve many disciplines, but the greatest effort will be directed toward locating superior germplasm useful in plant breeding. Germplasm that will be searched for includes genes for higher yield, superior quality, resistance to insects and diseases, and other genetic characters that lead to more efficient production of higher quality products. Certain species will be evaluated to determine their use for conservation of soil, water, and wildlife. Ornamental species will be evaluated for specific uses in landscaping homes, industrial sites, parks, and other public areas. Some introductions will be used in basic research, in studies of physiological characteristics such as rate of photosenthesis, as tester plants for plant viruses and for studies of the host range of crop pests.

Records

Evaluation reports on the performance and use of introductions within the region will be maintained by the Regional Station. Information about valuable or promising accessions will be summarized and disseminated through annual reports, minutes of technical committee meetings, and seed lists. Cooperators who contribute to the reports will receive full credit in these summaries.

Publications

Results from studies in this project are to be published by the state agricultural experiment stations and/or federal agencies involved. State and regional publications are to be in accord with the directives as stated in the Manual of Procedures for Cooperative Regional Research (CSRS-OD-1082).

4. Chemical and Cultural Studies of New Plants for Industry

The Northern Regional Research Center; the Germplasm Resources Laboratory; the Regional Station; and the State Experiment Stations will be responsible for objective 4. The Northern Regional Research Center will determine the chemical and physical properties of plant and seed materials which may possess unique components of value to industry. These materials will be provided by the Germplasm Resources Laboratory, state experiment stations, and other cooperative agencies. As analyses indicate plant species that have components of potential value, such information will be given to the S-9 Technical Committee. This information will be used as a basis to determine which species merit field evaluation.

Materials to be evaluated in the Southern Region will be forwarded to the regional station for seed increase and preliminary evaluation. The industrial crops sub-committee will determine and recommend to the S-9 Technical Committee which plants merit further cultural studies and the types and extent of such studies. The S-9 Technical Committee, at its annual meetings, will assign responsibility for each study to specific states. Field experiments for each location will complement results from other locations.

B. Contributions by Cooperators

Listed below are state and federal projects that contribute to S-9. Although plant introductions are evaluated and used by all state experiment stations in the region and by many private agencies, only formal contributing projects are listed below:

(1) Alabama

Number: ALA 357
Title: New Plants - Their Introduction, Multiplication, Evaluation, and Preservation.
Leader: C. S. Hoveland
Objectives: Evaluate introduced plant materials and to maintain and publish records of their performance and use in Alabama and the Southeast.

(2) Arkansas

Number: ARK 687
Title: New Plants - Their Introduction, Multiplication, Evaluation and Preservation.
Leader: J. L. Bowers
Objectives: Evaluate introduced plant materials and to maintain and publish records of their performance and use.

(3) Florida

Number: FLA-AY-01622
Title: New Plants - Their Introduction, Multiplication, Evaluation, and Preservation.
Leader: G. M. Prine
Objectives: Evaluate introduced plant materials and to maintain and publish records of their performance and use.

(4) Georgia

Number: GA - Hatch 171
Title: New Plants - Their Introduction, Multiplication, Evaluation, and Preservation.
Leader: W. R. Langford
Objectives: Introduce new plant germplasm, multiply, catalogue, distribute, and preserve germplasm of introduced plant materials, and to evaluate introduced plant materials and to maintain and publish records of their performance and use.

(5) Hawaii

Number: HAW 00820
Title: New Plants - Their Introduction, Multiplication, Evaluation, and Preservation.
Leader: R. A. Hamilton
Objectives: Introduction, breeding, and testing of all fruit crops not included under other specific projects.

(6) Kentucky

Number: KY 166
Title: New Plants - Their Introduction, Multiplication, Evaluation, and Preservation.
Leader: Roy E. Sigafus
Objectives: Evaluate introduced plant materials and to maintain and publish records of their performance and use.

(7) Louisiana

Number: LA 1133
Title: Nursery Crop Investigations
Leader: R. J. Stadtherr
Objectives: Evaluate introduced plant materials and to maintain and publish records of their performance and use.

(8) Mississippi

Number: 1410
Title: New Plants - Their Introduction, Multiplication, Evaluation, and Preservation.
Leader: R. G. Creech
Objectives: Evaluate introduced plant materials and to maintain and publish records of their performance and use.

(9) North Carolina

Number: NC 1009
Title: New Plants - Their Introduction, Multiplication, Evaluation, and Preservation.
Leader: W. T. Fike
Objectives: Evaluate introduced plant materials and to maintain and publish records of their performance and use, and to determine cultural requirements of plant species having industrial use potential.

(10) Oklahoma

Number:
Title: No Formal Project
Leader: J. S. Kirby
Objectives: Evaluate introduced plant materials and to maintain and publish records of their performance and use.

(11) Puerto Rico

Number: H-94
Title: New Plants - Their Introduction, Multiplication, Evaluation, and Preservation.
Leader: O. D. Ramirez
Objectives: Introduce new plants for agricultural, industrial and other uses. To multiply, evaluate and preserve germplasm of introduced and native plant materials for Puerto Rico and the Southern Region. To investigate the chemical and physical properties and industrial use potentials of new crops that may become economically important in Puerto Rico, and to study the agronomic practices for commercial production or for use as germplasm.

(12) South Carolina

Number:
Title: New Plants - Their Introduction, Multiplication, Evaluation, and Preservation.
Leader: D. W. Bradshaw
Objectives: Evaluate introduced plant materials and to maintain and publish records of their performance.

(13) Tennessee

Number: TEN 00369
Title: New Plants - Their Introduction, Multiplication, Evaluation, and Preservation.
Leader: L. N. Skold
Objectives: Evaluate introduced plant materials and to maintain and publish records of their performance.

(14) Texas

Number: H-2091
Title: New Plants - Their Introduction, Multiplication, Evaluation, and Preservation.
Leader: Eli L. Whiteley
Objectives: Evaluate introduced plant materials and to maintain and publish records of their performance, and encourage research workers in the evaluation and utilization of new introductions.

(15) Virginia

Number:
Title: New Plants - Their Introduction, Multiplication, Evaluation, and Preservation.
Leader: A. J. Lewis, III
Objectives: Evaluate new varieties and introduce plant materials and to maintain and publish records of their performance and use in Virginia.

(16) Plant Germplasm Resources Laboratory, PGGI - ARS - NER

CRIS No. 1108-20162-001
Title: Introduction, Evaluation, and Maintenance of Agronomic Crop Germplasm.
Leader: Albert J. Oakes
Objectives: Provide coordination for the efficient use of the U. S. rice collection. Evaluate selected germplasm, especially forage collections, for useful traits. Assist in the determination of need and acquisition of agronomic crop germplasm. Recommend to the Laboratory and implement improved automation procedures for documenting germplasm information.

(17) Plant Germplasm Resources Laboratory - PGGI - ARS - NER

CRIS No.: 1108-20162-002
Title: Introduction, Documentation, Distribution, and Preservation of Plant Germplasm
Leaders: H. L. Hyland
G. A. White
Objectives: Introduce plant germplasm to meet needs of plant researchers. Document information on name, source, locality, and characteristics for all accessions. Provide coordination to exploration and preservation activities.

(18) Plant Germplasm Resources Laboratory - PGGI - ARS - NER

CRIS No.: 1108-20162-005
Title: Developing New Chemurgic Grops
Leader: T. A. Campbell
Objectives: Develop new crops for American agriculture. As appropriate, conduct and coordinate agronomic research on potential new crops. Cooperate with other agencies on production aspects and foster commercial production.

(19) Plant Germplasm Resources Laboratory - PGGI - ARS - NER

CRIS No.: 1108-20162-007
Title: Introduction, Evaluation, and Distribution of Horticultural Crop Germplasm
Leader: H. F. Winters
Objectives: Determine needs for horticultural crop germplasm. Assist principal plant introduction officer in locating foreign sources of collection. Collect and introduce the species needed through foreign exploration. Provide technical direction for the distribution, maintenance and documentation of evaluation information. Identify genetically useful characteristics in selected collections.

(20) Plant Germplasm Resources Laboratory - PGGI - ARS - NER

CRIS No.: 1108-20162-009
Title: Identification of Disease Resistance and Pathological Studies on Horticultural and Other Plant Germplasm
Leader: M. J. O'Brien
Objectives: Identify and document resistances and obtain information on mode of disease transmission, host-pathogen interactions, and other important factors for specific disease organisms on selected plant germplasm.

(21) National Seed Storage Laboratory - ARS - WR

CRIS No.: 5602-20160-001
Title: Plant Germplasm Bank - National Seed Storage Laboratory
Leader: L. N. Bass
Objectives: Acquire and preserve valuable plant germplasm for future generations of plant breeders, geneticists, and other plant scientists.

(22) National Seed Storage Laboratory - ARS - WR

CRIS No.: 5602-20160-002
Title: Environmental and Other Factor Effects Upon Seed Viability and Storage.
Leader: L. N. Bass
Objectives: Identify factors that promote long-term storage of a wide variety of kinds of seeds.

(23) National Seed Storage Laboratory - ARS - WR

CRIS No.: 5602-20160-003
Title: Genetic Changes in Seeds During Storage
Leader: E. E. Roos
Objectives: Determine the nature and frequency of genetic changes occurring during long-term storage of seeds. Compare such changes with changes resulting from frequent regrowing. Develop methods for detecting genetic shifts. Develop criteria for determining when to regrow seed stocks to maintain genetic uniformity.

(24) Soil Conservation Service - USDA

CRIS No.:
Title: New Plants - Their Introduction, Evaluation, and Preservation.
Leader: Arnold Davis
Objectives: Introduction, Evaluation, and Mulitplication of New Plants for erosion control, agricultural use and the preservation of valuable germplasm.

(25) Subtropical Horticultural Research Unit - USDA

CRIS No.: 7616-20161-001 and 7616-20161-002
Title: Evaluation of Introduced Tropical and Subtropical Ornamental Plants.
Leaders: R. J. Knight, Jr.
P. K. Soderholm
Objectives: Introduction, evaluation, breeding, preservation, and distribution of certain species of plants of interest to tropical agricultural development.

(26) Mayaguez Institute of Tropical Agriculture - USDA

Number: 7617-20161-002
Title: Evaluate and Maintain Introduced Germplasm of Tropical Crop Plants.
Leader: F. W. Martin
Objectives: Evaluate, improve, maintain, and distribute introduced germplasm of tropical plants with potential to the United States and Puerto Rico.

VI. JUSTIFICATION:

With few exceptions our established crops are of foreign origin. Although we lead the world in agricultural production, growers continue to demand varieties that will further increase efficiency of production and consumers ask for even better quality products. A great diversity of germplasm is needed by plant scientists to develop varieties that will meet these ever increasing demands of the producer and consumer. Centers of origin of these crops have proven to be the richest sources of germplasm for their further improvement. The introduction and exchange of breeding lines and varieties from other countries have also been important sources of valuable germplasm. There continues to be a need for the maintenance of a permanent reservoir of germplasm, providing not only the resistance and quality factors needed now but those of the future concerning mechanical harvesting, pest resistance, and consumer preferences.

The increase of planned sub-divisions, greater pride in home ownership and beautification, and changes in architecture have increased the need for new ornamental plants. Development of parks, industrial sites, and roadside plantings have further increased this need. Recent emphasis on improving environmental conditions places new emphasis on sand dune stabilization and on the prevention of beach erosion through the use of plant species. Ground covers adapted to soil banks, highway right-of way and eroded abandoned fields are needed to restore and preserve the beauty of the American countryside. Trees and ornamental shrubs should be evaluated as sound barriers, odor traps, or light barriers to protect the urban population from the pollution of industrial plants and super-highways. There is also a continuing need for the introduction, evaluation, and development of new plant species which would be useful in agricultural diversification, including crops for new uses in industry. The Research and Marketing Act of 1946, Public Law 733, especially emphasizes the introduction and evaluation of plants for potential industrial end uses. Researchers and studies on industrial uses were on the Increased Uses of Agricultural Products. One section of this report relates especially to New and Special Crops and outlines six interrelated steps involved in a comprehensive program of location, characterizing, producing and utilizing plants having potential industrial values.

The Agricultural Research Service, USDA, has the responsibility for introduction and exchange of plant materials and has sent special expeditions to foreign countries to obtain plants of potential value. New plant germplasm is also obtained by international exchange and through Public Law 480 Contract.

The USDA maintains three federal plant introduction stations: (1) Glenn Dale, Maryland; (2) Savannah, Georgia; and (3) Miami, Florida. The station at Glenn Dale serves as the plant quarantine station. Work at the other two federal stations is concentrated on the study of special problems of a limited number of species.

Hence, a station was established in the Southern Region through Federal - State cooperation to implement plant exploration and introduction, to encourage screening and testing plants of potential value for the Region by Experiment Station research workers, to provide long-term seed storage facilities and to distribute seed to interested crops workers. This station was established at Experiment, Georgia in November 1949.

All of the state agricultural experiment stations in the Southern Region and Hawaii of the Western Region cooperate with the Regional Station through contributing projects or on an informal basis in evaluation of new germplasm. Since establishment of the Southern Regional Plant Introduction Station in 1949, the states have tested over 190,000 seed lots selected from the 43,000 introductions received to date. Numerous reports from cooperating states have shown that the wide distribution and evaluation of plant introductions results in the detection of characters such as growth responses, disease resistance, winter hardiness, drought tolerance, chemical composition, and others of economic value.

This revision provides an opportunity for documenting the accomplishments of the S-9 project and for rewriting the project outline in accordance with the new procedures as set forth in CSRS-OD-1082, USDA, Manual of Procedures for Cooperative Regional Research, U. S. Department of Agriculture.

VII. RELATED CURRENT RESEARCH

Similar regional stations are located at (1) Ames, Iowa (Project NC-7), (2) Geneva, New York (Project NE-9) and (3) Pullman, Washington (Project W-6). They serve states in the Northcentral, Northeastern and Western regions, respectively.

The objectives for these three projects are similar to those of S-9 but through a crop maintenance responsibility system, each regional station is responsible for the maintenance and preservation of a certain portion of crops that are being maintained in the total plant introduction program. Crop maintenance responsibilities are determined on the basis of (1) ecological adaptation, (2) crop interest in the respective regions and (3) general agreement among the four coordinators and the Germplasm Resources Laboratory for crops that are of general interest in more than one region.

The research of all four regional projects is coordinated through the activities of the ARS Plant Germplasm Coordinating Committee and the National Plant Germplasm Committee which consist of representatives from all four regions and cooperating federal agencies.

The National Seed Storage Laboratory also is a facility for preservation of seed stocks but it accepts a broader scope of seed, like breeding stocks, genetic stocks, synthetic lines, newly released cultivars, and other seed not usually preserved at the regional stations. The regional stations are primarily concerned with preservation of foreign and domestic plant introductions.

The National Seed Storage Laboratory is a long-term repository and will not furnish seed if it is available from some other source in the United States. The regional stations, on the other hand, maintain and distribute the day-to-day working stocks of seeds.

VIII. PREVIOUS WORK

Close coordination between this program and research workers with specific crops since 1949, has resulted in greater effectiveness in the utilization of new germplasm for crop improvement and industrial purposes. Many new sources of disease resistance, winter hardiness and other characteristics desired in plant improvement and utilization have been found in plant introductions and utilized by crop workers for public benefit. Many of these desired characteristics can be secured only by the introduction of wild species, cultivars, and breeding stocks from centers of origin of species or from other countries doing plant improvement work. These introductions may themselves be poorly adapted to the United States, but may serve as valuable parental material for cultivar improvement through hybridization and selection.

Examples of a few characteristics found in plant introductions follow:

(a) Sorghum:	(1) Resistance to greenbug, (2) Resistance to Anthracnose.
(b) Peanuts:	(1) Resistance to Cercospora leafspot, (2) Resistance to rust, (3) Resistance to Aspergillus flavus, (4) Genes for high yield.
(c) Pepper:	(1) Resistance to bacterial spot, (2) Resistance to tobacco etch virus.
(d) Cantaloupe:	(1) Resistance to gummy-stem-blight, (2) Resistance to powdery mildew, (3) Resistance to downy mildew.
(e) Watermelon:	(1) Resistance to gummy-stem-blight, (2) Resistance to Anthracnose.
(f) Digitgrass:	(1) Cold tolerance, (2) Drought tolerance, (3) Resistance to yellow sugarcane aphid.
(g) Vicia sativa:	(1) Hard seed characteristic.
(h) Arrowleaf Clover:	(1) High forage yield, three cultivars of this species were released. They are: 'Amclo', 'Yuchi', and 'Meechee'.
(i) Lupine:	(1) Cold tolerance (2) Low alkaloid content, (3) Resistance to gray leafspot, (4) White marker gene.

These are only a few of many traits found in various stages of crop development. Some have contributed to released cultivars and hybrids, some are being further evaluated in breeding programs, while others are recent findings.

More than 200 species have been evaluated as potential new crops for having industrial uses. Kenaf shows good potential for becoming a crop in the South. Presently the pulp industry is keenly interested in this species as a source of bast fiber for use in the manufacture of high quality paper.

Three regional bulletins summarizing the progress made under Project S-9 have been published. Southern Cooperative Series Bulletin 27, entitled "Progress and Potentials in Plant Introductions for the South", was published as a five-year report of progress in 1955. Southern Cooperative Series Bulletin 79, entitled "New Plants for the South", was published in 1961 as a ten-year report. Southern Cooperative Series Bulletin 161, entitled "Plant Introduction and Development of New Crops in the South", was published in 1971 as a ten-year report. These and other publications resulting from the evaluation and use of plant introductions in the Southern Region are listed in the appendix.

IX. ORGANIZATION

This organization conforms with the Manual of Procedures for Cooperative Regional Research CSRS-OD-1082, USDA, January 1970.

Membership of Technical Committee:

A regional technical committee is responsible for the technical guidance of this project. The committee consists of an administrative advisor selected by experiment station directors in the Southern Region, a co-administrative advisor designated by the Deputy Administrator, ARS, SR, the coordinator of the Southern Regional New Plants Project, at least one technical representative from each of the cooperating states, and a representative from each of the following: National Programs Staff, ARS: the Germplasm Resources Laboratory, ARS, NER; Soil Conservation Service; and the Cooperative State Research Service.

Function of Individual Committee Members:

The S-9 project is organized to serve the interest of practically all groups of plant scientists in each of the state stations of the Southern Region. Consequently, each state should be represented by a committee member, who, encouraged by his director can and does accept the opportunity and responsibility of keeping all interested plant scientists in his state informed of the availability and methods of evaluation and utilization of plant materials which are being introduced through the Southern Regional Plant Introduction Station at Experiment, Georgia. This station in turn has access to all plant materials introduced into the other three regions through the programs of ARS.

The committee member from each state station can serve effectively as a liaison and local coordinator of "New Plants" activities. It is his responsibility to disseminate all correspondence from the regional station to his station cooperators and summarize annually the progress of new plants research in his state and report it to the technical committee and regional coordinator. The S-9 project is most effective where the state representative is concerned with the needs and use of the available plant materials by all interested scientists within his state.

General Functions of Technical Committee:

The technical committee elects a chairman who convenes a meeting with the approval of the administrative advisor once each year or as often as the progress of the project requires. The committee formulates general plans for conducting the research program and designates portions of the program to be conducted by each of the cooperators within the region to assure the most effective use of available resources. The committee makes budget recommendations relative to the needs for funds and facilities for the research program. In addition, it reviews and evaluates the accomplishments of this regional program periodically and makes suggestions for the revision of the project outline as seems desirable during the progress of the work. An annual report on the progress of work is prepared by the committee chairman and the coordinator. Travel expenses for members of the technical committee to attend approved meetings of the committee are paid by the respective states or agencies.

Executive Committee:

The executive committee of the S-9 Technical Committee consists of the Administrative Advisor, chairman of the Technical Committee, secretary of the Technical Committee, and the Coordinator. The executive committee acts on matters that require attention between regular meetings of the technical committee.

Coordinator:

A coordinator, who is employed by the GA-SC area, ARS, USDA, SR, is directly responsible for the propagation, evaluation, distribution, and maintenance of introductions received in the region either through facilities of the regional station or through arrangements with participating states or agencies. The coordinator and other professional staff of the regional station shall undertake research with specific plant introductions to promote their acceptance as breeding stocks by cooperating states and other agencies. Visits, as conditions justify, are made to the cooperating states or agencies to advise cooperators on developments in the introduction program and to determine the performance of introductions in the states. On the basis of information obtained through such visits, and through reports by cooperators, the coordinator prepares reports on outstanding developments in evaluation work and potential uses of new plant materials. To be of greater service to the region, he meets with various crop interest groups which use introductions in their programs. The coordinator maintains records of all introductions used in the region and prepares and distributes to all cooperators catalogues of introductions as they are currently increased and evaluated. Each region has a similar project and all are integrated by the National Plant Germplasm Committee* and the ARS Plant Germplasm Coordinating Committee.

Coordination at National Level:

There is an ARS Plant Germplasm Coordinating Committee which is an ARS in-house committee organized for coordinating the plant introduction program as a national program within ARS. Representation, as designated by ARS, on this committee for the Southern Region consists of the regional coordinator and one ARS plant scientist in the Southern Region.

The National Plant Germplasm Committee (NPGC) replaced the former National Coordinating Committee. Representation on this committee for the Southern Region consists of the Administrative Advisor and the Coordinator.

X. SIGNATURES:

Date	Administrative Advisor
Date	Chairman, Southern Directors
Date	Chairman, Committee of Nine
Date	Administrator, CSRS

* The National Plant Germplasm Committee as approved by the Administrator of ARS and the State Agricultural Experiment Station Directors of all four regions in 1974 replaced the National Coordinating Committee. Committee membership currently consists of 13 members; the four Regional Administrative Advisors; two representatives from the ARS National Program Staff; the four Regional Coordinators; the USDA-ARS Principal Plant Introduction Officer; one representative from the Cooperative State Research Service; and one representative from private industry designated by the National Council of Commercial Plant Breeders.

XI. ATTACHMENTS:

A. Project Leaders; Approximately 150 plant scientists representing both public and private institutions in the South cooperate with S-9 through their technical committee member. Those representatives and their areas of specialization follow:

C. R. Jackson	Administrative Advisor	Georgia
W. R. Langford	Coordinator	Georgia
C. S. Hoveland	Forage Crops	Alabama
J. L. Bowers	Vegetable Crops	Arkansas
G. M. Prine	Forage Crops	Florida
R. A. Hamilton	Tropical Fruits	Hawaii
R. E. Sigafus	Field Crops	Kentucky
R. J. Stadtherr	Ornamentals	Louisiana
R. G. Creech	Field Crops	Mississippi
W. T. Fike	Field Crops	North Carolina
J. S. Kirby	Field Crops	Oklahoma
O. D. Ramirez	Field & Vegetable Crops	Puerto Rico
D. W. Bradshaw	Ornamentals	South Carolina
L. N. Skold	Field Crops	Tennessee
E. L. Whiteley	Field Crops	Texas
A. J. Lewis III	Ornamentals	Virginia
Quentin Jones	NPS, ARS	Beltsville, MD
Arnold Davis	SCS	Fort Worth, TX
C. O. Grogan	CSRS	Washington, DC
George A. White	GRL, ARS	Beltsville, MD
L. N. Bass	NSSL, ARS	Ft. Collins, CO
F. W. Martin	MITA, ARS	Mayaguez, PR
P. K. Soderholm	Ornamentals, ARS	Miami, FL
R. J. Knight, Jr.	Subtropical Fruits, ARS	Miami, FL

SRRC Form 1
November 1976

PARTICIPATION IN SOUTHERN REGIONAL RESEARCH PROJECT

Title of Proposed Regional Research Project: S-9 Plant Germplasm - Its Introduction, Maintenance and Evaluation

Area of Work Code:

Administrative Adviser: C. R. Jackson

CSRS Representative: C. O. Grogan

Planned scientific manpower commitment for participating agencies:

SAES	Personnel Involved in Project: Leader (L) or Co-Worker (C)	Professional Discipline	Scientist Year Input (SY)
Ala.	C. S. Hoveland (L)	Agronomy	0.2
Ark.	J. L. Bowers (L)	Horticulture	0.1
Fla.	G. M. Prine (L) Various Staff(C)	Agronomy	2.0
Ga.	TBA		0.1
Hawaii	R. A. Hamilton (L)	Horticulture	0.3
Kentucky	R. E. Sigafus (L)	Agronomy	0.15
La.	R. J. Stadtherr (L)	Horticulture	0.2
Miss.	R. G. Creech (L)	Agronomy	0.1
N.C.	W. T. Fike (L)	Agronomy	0.3
Okla.	J. S. Kirby (L)	Agronomy	0.1
P.R.	O. D. Ramirez (L) Various Staff (C)	Agronomy	4.3
S.C.	D. W. Bradshaw (L)	Horticulture	0.5
Tenn.	L. N. Skold (L)	Agronomy	0.3
Texas	E. L. Whiteley (L)	Agronomy	0.5
Va.	A. J. Lewis III (L)	Horticulture	0.1
		Sub-total	9.25
USDA			
SCS	Arnold Davis (L) Various Staff(C) Fort Worth, TX	Agronomy	8.75
GA-SC Area, USDA-ARS-SR	W. R. Langford (L)	Agronomy	1.0
	G. Sowell (C)	Plant Pathology	1.0
	R. V. Connin (C) Experiment, GA	Entomology	1.0
Germplasm Res.Lab.	George A. White (L) Beltsville, MD	Agronomy	1.0
NSSL,ARS	L. N. Bass (L) Various Staff (C) Ft. Collins, CO		3.9
Subtropical Hort. Res. Unit, USDA	P. K. Soderholm (L)	Horticulture	2.0
	R. J. Knight, Jr. (L) Miami, FL	Horticulture	
MITA	F. W. Martin (L) Mayaguez, PR	Horticulture	1.0
		Sub-total	19.65
		TOTAL	28.90

C. Critical Review: Progress has been made toward achieving all objectives of Regional Project S-9. However, the objectives are of a continuing nature because the germplasm needs of plant scientists are constantly changing to meet the demands of the grower, processor, and consumer. The major accomplishments under each objective and areas needing further investigation are summarized below:

1. During the last 5 years 9 foreign plant explorations were completed. Other new materials were obtained during this period through P.L. 480 Projects, especially from Yugoslavia. 8100 new accessions were added to the regional seedstocks inventory. Some of the major germplasm collections obtained during this period are 4100 accessions of pigeonpeas from Iran, 700 forage grasses and legumes from Brazil, Paraguay, and Uruguay, 750 accessions of pepper, cantaloupe and watermelon from Yugoslavia, and a large collection of wild relatives of cowpea from Nigeria. Since the beginning of this project in 1949 the Regional Station has accumulated 33,700 seed lots of vegetable clones representing 255 plant genera and 1300 species. In this reservoir of germplasm there are 4300 accessions of peanuts, 3600 sorghums, 2300 peppers, 3600 accessions of *Vigna* spp., 5800 warm season grasses, 4100 pigeonpeas, and sizeable collections of other southern crops.

   These collections should be maintained as a source of genes to meet the changing needs of the grower, processor, and consumer. Moreover, the collections should be enlarged by further plant exploration and introduction to obtain the greatest range of genetic diversity of each crop species. Each year cooperators' requests for new germplasm from foreign countries have increased in number, but little of it has been collected. During the last two years new procedures have been established for initiating and funding plant explorations. Under the new procedure the prospect of obtaining materials through plant exploration appears brighter.

2. Multiplication, Evaluation, and Preservation of Germplasm: Approximately 3000 accessions have been grown annually at the Regional Station for seed increase and for preliminary evaluation of agronomic and horticultural characters and disease reactions. Some materials, because of climate or specializing personnel have been propagated and evaluated on a preliminary basis at state stations. Funds were made available in FY-76 on a continuing basis by the Southern Directors to expand this phase of work. Arrangements have been made with the Mayaguez Institute of Tropical Agriculture to grow 2 acres of assorted tropical plant introductions for seed increase. In disease screening studies at the Regional Station resistance to early leafspot of peanut was found in seven introductions. A very high level of

resistance to watermelon mosaic virus-1 was found in a cantaloupe introduction. A control for a seed-transmitted bacterial disease was developed and pathogen-free seed of more than 100 introductions were grown.

New varieties developed from introduced germplasm during the first twenty-two years of this project are documented in Southern Cooperative Series Bulletin 27, 79, and 161 and in the 1972 revision of this project. Those released since 1972 are summarized below:

Variety	Released by	Year	P.I. No.	Origin
Gulfcoast cantaloupe	Alabama	1972	140471	U.S.A.
Chilton cantaloupe	Alabama	1972	140471	U.S.A.
Transvala digitgrass	Florida	1973	299601	S. Africa
Altika peanut	Florida	1972		
Jupiter soybean	Florida	1972	240644	Philippines
TAMU TexSel (*Brassica carinata*)	Texas	1973	243913	Ethiopia
Sorghum				
TAM Bulk 42	Texas	1974	264453	Spain
TAM Bulk	Texas	1974	276842	Ethiopia
TAM Bulk 45	Texas	1974	257599	Ethiopia
TAM Bulk 46	Texas	1974	276837	Ethiopia
TAM Bulk 47	Texas	1974	276837	Ethiopia
TAM Bulk 48	Texas	1974	276840	Ethiopia
TAM 428	Texas	1974	257599	Ethiopia
Peanuts				
Tamnut 74	Texas	1974	161317	Argentina
Oats				
TAMO 301	Texas	1974	295919	Israel
TAMO 312	Texas	1974	296244	Israel
Guar				
Kinman	Texas	1974	263875	India
Esser	Texas	1974	263875	India
Grass				
TAM Wintergreen	Texas	1974	(193056	Australia
			(196338	Australia

Seed storage rooms at the Regional Station are almost full, but during FY-76 the Southern Directors made $72,000 available for constructing a new seed storage building. This facility should be available for use within the next year.

Seeds of plant introductions held at the Regional Station are stored at a temperature of 45° F. with 40 to 45 percent relative humidity. These are maintained as working stocks for distribution to plant scientists. A small portion of the material has been deposited in the National Seed Storage Laboratory for permanent storage, but the demand for seed by plant scientists has delayed placing of stocks in NSSL, as rapidly as desirable. As a safeguard against loss by fire or other hazards small seed samples of some collections have been placed in the NSSL as a temporary measure until larger samples can be deposited there for permanent storage. With increased financial support arrangements have been made with a number of cooperators for increasing certain seedstocks to the extent that adequate samples can be placed in NSSL.

3. Cataloguing and Distribution of Plants and Maintenance of Records: A catalogue of plant materials held at the Regional Station has been prepared periodically and distributed through the S-9 committee and other Regional Stations to plant scientists in all 50 states. In exchange, seed lists were received from the other three stations for distribution in the Southern Region. Materials held at any of the 4 Regional Stations have been readily available to plant scientists in all 50 states and the Commonwealth of Puerto Rico.

   The Regional Station, with assistance of the S-9 committee, has maintained a record of the performance and use on introduced plant materials distributed in the South. Three Southern Cooperative Series Bulletins (Nos. 27, 79, and 161) reporting the progress made with plant introductions have been published. Other publications that resulted from the evaluation and use of plant introductions during the period 1972-1976 are listed in Appendix 1.

4. Development of New Crops for Industry: The Northern Regional Research Center, ARS-NCR has assayed a wide array of plant materials representing many families, genera, and species in search of new seed oils, gums, and other components of value to industry. At least 120 species that were found to contain useful constituents were forwarded to the Regional Station for seed increase and preliminary evaluation. The most promising species have been evaluated at stations in Florida, Georgia, North Carolina, Oklahoma, South Carolina, and Texas. A few have shown some potential for becoming new crops. Others will require modification

of plant type by breeding. Presently, kenaf shows the most promise of becoming an established crop. The pulping industry is showing renewed interest in this species as a source of bast fiber for use in the manufacture of high quality paper. Field studies should be continued to determine the best cultural practices for maximum yield, especially for high yield of bast fiber.

APPENDIX I

PUBLICATIONS

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