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MINUTES OF THE MEETING OF THE S-9 TECHNICAL COMMITTEE ON

THE INTRODUCTION, MULTIPLICATION, AND EVALUATION OF NEW PLANTS FOR AGRICULTURAL AND INDUSTRIAL USES AND THE PRESERVATION OF VALUABLE GERMPLASM

Holiday Inn
Griffin, Georgia

21-22 August 1975

Respectfully submitted,

M. J. Constantin, Secretary

AGENDA

1. Call to Order (8:30 a.m., August 21, 1975)

2. Introduction of Members and Visitors

3. Welcome - A. L. Shewfelt

4. Approval of Minutes of 1974 Meeting

5. Additions to and Approval of Agenda

6. Appointment of Committees:
   (a) Nominations
   (b) Time and place of next meeting
   (c) Resolutions

7. Remarks from Administrative Advisor - C. R. Jackson and W. M. Bruce

8. Remarks from CSRS Representative

9. Progress Reports by Participating States and Federal Agencies and Research Plans for 1976

10. Review of Procedures for Requesting and Initiating Plant Explorations - R. G. Creech and Quentin Jones

11. Requests for Plant Explorations - W. R. Langford

12. Report on Plant Exploration to Uruguay, Paraguay, and Southern Brazil - W. R. Langford

13. Clonal Repositories and Germplasm Curators - Quentin Jones and W. R. Langford

14. Report on Meeting of National Plant Germplasm Committee - C. R. Jackson and Quentin Jones

15. Status of S-9 Project - C. R. Jackson and W. R. Langford

16. Status of S-9 Publications - R. J. Stadtherr and W. T. Fike

17. Report on New Crops and Minor Oilseeds Task Force Report - R. G. Creech

18. Status Report on Exotic Weeds and Toxic Plants - Quentin Jones

19. Status Report on Research on Chinese Water Chestnuts - A. K. Williams

20. Tour of Regional Station Nursery and Greenhouses - W. R. Langford

21. Committee Reports

22. Adjourn

CALL TO ORDER

The meeting of the S-9 Technical Committee was called to order by Roy G. Creech, Chairman, at 8:30 a.m., 21 August 1975, in the Holiday Inn Conference Room, Griffin, Georgia.

INTRODUCTION OF MEMBERS AND VISITORS

Each member of the S-9 Technical Committee and visitors introduced himself, stated his organizational affiliation, and provided a brief description of his current research interests. Those in attendance were:

S-9 Committee Members

A. L. Shewfelt	(representing C. R. Jackson, Administrative Advisor) University of Georgia, Agricultural Experiment Station Experiment, Georgia 30212
W. M. Bruce	(USDA-ARS: Administrative Advisor) Coastal Plains Experiment Station Tifton, Georgia 31794
W. R. Langford	Regional Coordinator Regional Plant Introduction Station Experiment, Georgia 30212
T. E. Morelock	(representing J. L. Bowers) University of Arkansas Fayetteville, Arkansas 72701
S. C. Schank	University of Florida Gainesville, Florida 32601
R. A. Hamilton	University of Hawaii Honolulu, Hawaii 96822
R. E. Sigafus	University of Kentucky Lexington, Kentucky 40506
R. J. Stadtherr	Louisiana State University Baton Rouge, Louisiana 70803
R. G. Creech	Mississippi State University Mississippi State, Mississippi 39762
W. T. Fike	North Carolina State University Raleigh, North Carolina 27607
R. S. Matlock	Oklahoma State University Stillwater, Oklahoma 74074

O. D. Ramirez	University of Puerto Rico Rio Piedras, Puerto Rico 00708
J. Floyd, Jr.	Clemson University Clemson, South Carolina 29631
M. J. Constantin	Comparative Animal Research Laboratory Oak Ridge, Tennessee 37830
R. D. Wright	Virginia Polytechnic Institute Blacksburg, Virginia 24601
L. H. Princen	Northern Regional Research Laboratory Peoria, Illinois 61604
A. G. Davis	USDA-Soil Conservation Service Fort Worth, Texas 76115
H. L. Hyland	Germplasm Resources Laboratory Beltsville, Maryland 20705

Others in Attendance

L. W. Larson	USDA-ARS, Box 14565, Gainesville, Florida 32604
R. J. Mirivalle	USDA-ARS, Southern Regional Office, New Orleans, Louisiana
A. K. Williams	USDA-ARS, Russell Research Center, Athens, Georgia 30604
G. Leeper	Russell Research Center, Athens, Georgia 30604
H. J. Haynsworth	USDA-SCS, P. O. Box 832, Athens, Georgia 30604
G. R. Lovell	National Plant Materials Center, Beltsville, Maryland 20705
J. D. Powell	USDA-SCS, Plant Materials Center, Americus, Georgia 31709
A. J. Oakes	Germplasm Resources Laboratory, Beltsville, Maryland 20705
G. Sowell, Jr.	Regional Plant Introduction Station, Experiment, Georgia 30212
J. T. Strickland	Regional Plant Introduction Station, Experiment, Georgia 30212
C. Walker	Regional Plant Introduction Station, Experiment, Georgia 30212

APPROVAL OF MINUTES OF 1974 MEETING

Chairman R. G. Creech called for any necessary revisions of the 1974 minutes. H. L. Hyland called attention to a mistake in his agency affiliation as shown on the list of attendees. A. G. Davis moved, and W. R. Langford seconded, that the 1974 minutes be approved. The motion was carried unanimously by voice vote.

ADDITIONS TO AND APPROVAL OF AGENDA

Items 18 and 19 as shown on the agenda (page 2) were added to the proposed agenda mailed to the S-9 Committee members prior to the meeting. The motion to approve the revised agenda was made by R. J. Stadtherr, seconded by John Floyd, and the motion carried unanimously by voice vote.

APPOINTMENT OF COMMITTEES

Chairman R. G. Creech appointed the following individuals to serve on committees listed below:

Nominations

R. S. Matlock, Chairman
R. E. Sigafus
A. G. Davis

Time and Place of Next Meeting

R. J. Stadtherr, Chairman
R. A. Hamilton
M. J. Constantin

Resolutions

W. T. Fike, Chairman
R. D. Wright
O. D. Ramirez

REMARKS FROM ADMINISTRATIVE ADVISORS

C. R. Jackson, S-9 Administrative Advisor, was unable to attend the meeting because of foreign travel. W. M. Bruce, USDA-ARS Administrative Advisor, remarked about a reorientation of research effort that has affected the station at Savannah, Georgia. He mentioned that W. O. Hawley has accepted early retirement and is currently remaining at the station as a collaborator.

An increase in funding has permitted the construction of a small building at the Regional Plant Introduction Station, Experiment, Georgia. He mentioned, also, that R. V. Connin, an entomologist, has been hired and will report in September for duty at the Regional Plant Introduction Station at Experiment, Georgia.

REMARKS FROM CSRS REPRESENTATIVE

A formal representative from CSRS was not in attendance at the meeting. R. J. Mirivalle from the Southern Regional office of USDA-ARS expressed his appreciation to the S-9 Committee for being able to attend and participate in the meeting.

PROGRESS REPORTS BY PARTICIPATING STATES AND FEDERAL AGENCIES AND RESEARCH PLANS FOR 1976

Reports by states (presented in alphabetical order) and by the federal agencies present appear in Appendix I.

In addition, H. L. Hyland called attention to a report on the status of fruit breeding in China. The report titled "China - 16 Years After" by S. A. Pieniazek appeared in the International Fruit World for 1973, published in Basel, Switzerland. A copy of this report can be obtained by writing to H. L. Hyland.

REVIEW OF PROCEDURES FOR REQUESTING AND INITIATING PLANT EXPLORATIONS

Quentin Jones explained the current philosophy toward plant explorations, and he detailed the procedures to be followed in submitting a proposal for funding for foreign plant exploration (a copy of this report appears as Appendix II). He also reported on the USDA Secretary's memorandum number 1875 which established the National Plant Genetics Resources Board (a copy of this memo appears as Appendix II).

REQUESTS FOR PLANT EXPLORATIONS

W. R. Langford presented proposals for plant explorations involving forage grasses (Cenchrus, Panicum, Eragrostis, etc.), citrus (Eremocitrus and Microcitrus), Trifolium species, cotton (Gossypium hirsutum), sugar cane (Saccharum and closely related genera). and avocado (Persea species). Copies of these proposals appear as Appendix Iv.

The S-9 Subcommittee on Plant Explorations evaluated the five proposals mentioned above, and the following order of priority was assigned:

1. Equal priority for the Trifolium and forage grasses explorations
2. Sugar cane
3. Citrus
4. Avocado
5. Cotton

A number of points were emphasized during the course of the discussion that ensued. Quentin Jones pointed out the need to consult herbarium collections for proper reference to species at particular geographic locations. This should be noted in the request. He also expressed doubt about access to Turkey, Iran, the USSR, etc., for the Trifolium exploration. The questions of alternate sites and additional genera were discussed. A. G. Davis emphasized that priority could shift if for any reason an exploration with a higher priority cannot be conducted as planned. Hyland questioned whether Florida, California, and Puerto Rico had been consulted concerning the proposed exploration for avocado germplasm; they had not. Jones inquired about the use of 406 funds for tropical agriculture to cover part of the exploration costs. It was suggested that individual explorers be encouraged to cooperate fully with USDA-ARS, USDA-SCS, and USDA-PI programs for the introduction of collected plant materials through proper channels, including cataloging, etc.

The discussion generated two motions. The first motion (to accept the order of priority for the proposed explorations as assigned by the S-9 Subcommittee for Plant Exploration) was made by W. T. Fike, seconded by John

Floyd, and carried unanimously by voice vote. The second motion was as follows: ((a) that the format used by Texas for the proposed forage grass exploration be required for all future exploration requests; (b) that the initial request for plant exploration funds be done informally; and (c) that the final request must be submitted using the formal format. This motion was made by R. G. Matlock, seconded by W. T. Fike, and carried unanimously by voice vote.

R. G. Creech, Chairman, appointed the following individuals to serve on the S-9 Plant Exploration Subcommittee: A. G. Davis (chairman), W. T. Fike, and C. S. Hoveland.

REPORT ON PLANT EXPLORATION TO URUGUAY, PARAGUAY, AND SOUTHERN BRAZIL

W. R. Langford showed slides of plant materials and of the general landscape that he and B. L. Burson encountered during their recent plant exploration to Uruguay, Paraguay, and Southern Brazil. Some of the material that they collected was seen at the Regional Plant Introduction Station.

CLONAL REPOSITORIES AND GERMPLASM CURATORS

Quentin Jones discussed the number of curators of plant germplasm in the four regions of the United States. He mentioned also that seven clonal repository committees have been established, and these are to submit reports by 10 October 1975. The committees cover pome fruits, stone fruits, small fruits, Vitis, citrus, nuts, and subtropical fruits.

REPORT ON MEETING OF NATIONAL PLANT GERMPLASM COMMITTEE

Quentin Jones reported that he would function as the liaison individual with the FAO International Committee on Plant Germplasm, which has funds to support explorations.

STATUS OF S-9 PROJECT

W. R. Langford presented a report on the status of the S-9 Project with particular reference to the Regional Plant Introduction Station. A copy of this report constitutes Appendix V. A copy of the budget report constitutes Appendix VI.

Grover Sowell presented the pahtologist's report which constitutes Appendix VII.

A committee to revise the S-9 Project was appointed by R. G. Creech, Chairman. This committee is to submit a report by the time of the next meeting. R. S. Matlock is chairman, and W. T. Fike and W. R. Langford are the other members.

STATUS OF S-9 PUBLICATIONS

W. T. Fike reported that a publication on kenaf will be available by the time of the next meeting. R. J. Stadtherr stated that perhaps within the next two to three years reports from cooperating states about ornamental plants might justify a publication on the subject.

REPORT ON NEW CROPS AND MINOR OILSEEDS TASK-FORCE REPORT

R. G. Creech will make available upon request the remaining copies of the report by the task force.

STATUS REPORT ON EXOTIC WEEDS AND TOXIC PLANTS

Quentin Jones brought to the attention of the S-9 Committee members the fact that weed researchers are concerned over the inadvertent introduction of exotic weeds and noxious plants into the United States. They recommend that utmost care be exercised to avoid such incidences.

STATUS REPORT ON RESEARCH ON CHINESE WATER CHESTNUTS

A. K. Williams of the USDA-ARS discussed their project on Chinese water chestnuts - an aquatic sedge. The prepared product is generally imported from

Taiwan, where the plant is grown in water culture in home gardens. There is a farm and industry interest in the United States for a projected market of approximately 8 million pounds per year. Williams and Leeper have developed a mechanical peeling process that facilitates the preparation of the product.

TOUR OF REGIONAL STATION NURSERY AND GREENHOUSES

W. R. Langford and his associates conducted a tour of the Regional Station nursery and greenhouse and a visit to the Peanut Biochemistry Laboratory.

COMMITTEE REPORTS

The Nominations Committee submitted the following for consideration for the 1975-76 Technical Committee S-9 officers: Chairman - M. J. Constantin, Secretary - R. J. Stadtherr. The motion to accept the nomination was made by W. T. Fike, seconded by John Floyd, and carried unanimously by voice vote.

The Time and Place of Next Meeting Committee recommended the Miami, Florida area during the month of August. The motion to accept the recommendation of the committee was made by W. R. Langford, seconded by John Floyd, and carried unanimously by voice vote.

The Resolution Committee drafted the following resolutions: (1) Be it resolved that the S-9 Technical Committee expresses its appreciation to acting director A. L. Shewfelt for his welcome to the Georgia Experiment Station at Griffin. (2) Be it resolved that the S-9 Technical Committee expresses its appreciation to Bob Langford and Grover Sowell for their services in making arrangements for these meetings. (3) Be it resolved that the S-9 Technical Committee welcomes as new members Teddie Morelock, Bert Princen, Oscar Ramirez, Stan Schank, and Robert Wright. (4) Be it resolved that the S-9 Technical Committee expresses its appreciation to Clyde Young, Turner Davis, Mrs. Mildred Evans and Lebus Kilgore for their assistance in making the tour of the station very worthwhile and educational. (5) Be it resolved that the S-9

Technical Committee appreciated the special comments of Bill Bruce, Gil Lovell, A. K. Williams, George Leeper, Bob Mirivalle, Quentin Jones, Jack Oakes, John Powell, Harry Haynsworth, and L. W. Larson. (6) Be it resolved that the S-9 Technical Committee gives special recognition and thanks to administrative advisor, Curtis Jackson, for his efforts in obtaining additional funds for the Plant Introduction Station from the southern directors. (7) Be it resolved from the S-9 Technical Committee that a special thanks goes to James Strickland and Charles Walker, transportation specialists, extraordinary. The motion to accept these resolutions was made by R. J. Stadtherr, seconded by A. G. Davis, and carried unanimously by voice vote.

ADJOURNMENT

Chairman R. G. Creech adjourned the meeting at noon on 22 August 1975.

APPENDICES

Appendix I Progress Reports by Cooperating States (Alphabetical Order) and Federal Agencies

Appendix II Report by Q. Jones on Philosophy Towards and Procedures to Apply for Plant Explorations

Appendix III USDA Secretary's Memo Number 1875

Appendix IV Proposals for Plant Explorations

Appendix V Regional Station Report

Appendix A

Regional Station Report

Report of Regional Station Activities
to S-9 Technical Committee
July 1, 1974 to June 30, 1975

Plant Introduction

Seeds or plants of 964 new introductions were received during the year ending June 30, 1975. 631 accessions of grasses and legumes wereobtained through plant exploration in Southern Brazil, Paraguay, and Uruguay. The other material consists largely of Cucumis from Spain, Arachis from Peru and Nigeria, and Vicia from Canada. A Summary of plant materials collected in Brazil, Paraguay, and Uruguay is attached as Appendix A.

Production of Seed

3140 introductions were grown at the Regional Station for seed increase and preliminary evaluation. These plantings included 492 clover introductions, many of which had been held by the Forage and Range Research Branch prior to reorganization of ARS. Some of these were introduced 35 to 40 years ago and only remnants of the original seed had been saved. The viability of this collection was low but good seed increases were obtained from more than 300 of the clover introductions. In addition to the material grown at the Regional Station Dr. R. O. Hammons, ARS, Tifton, Georgia, supplied the Regional Station with increase seed of 63 peanut introductions; and Dr. Franklin W. Martin, Mayaguez Institute of Tropical Agriculture supplied increase seed of 52 Dolichos accessions.

Following is a list of collections grown during the past year at the Regional Station:

Plant name	No. of accessions
Peanuts	285
Pepper	41
Eggplant	122
Pumpkins	72
Gourds	70
Cantaloupes	194
Watermelons	182
Grasses	487
Summer legumes & misc. spp.	140
Winter legumes	492
Sorghum	515
Mung beans	356
Cowpeas	184
TOTAL	3140

Cataloguing and Distribution of Seed

Catalogues of okra, Brassica, and summer forage legumes were updated to include materials increased through 1974. The catalogue of winter forage legumes will be revised this fall to include all of the new clovers and medics that were increased last winter.

Following is a summary of the distribution of seeds and plants in the Southern Region.

Packets of seeds and plants distributed in Souther Region
FY-75

State	S-9	NE-9	NC-7	W-6	Other	Total
Alabama	371	174	23	1151	0	1719
Arkansas	16	0	0	0	46	66
Florida	445	0	142	973	1272	2832
Georgia	1026	38	0	0	0	1064
Hawaii	0	0	60	0	0	60
Kentucky	10	19	41	0	0	70
Louisiana	68	0	15	0	7	90
Mississippi	82	49	14	27	0	172
N. Carolina	62	0	253	0	8	323
Oklahoma	415	0	0	168	0	583
Puerto Rico	345	0	0	0	4187	4532
S. Carolina	30	40	0	99	8	177
Tennessee	0	198	0	0	5	203
Texas	668	444	0	45	32	1189
Virginia	5	74	0	3108	4	3191
NE Region	463					463
NC Region	2147					2147
Western Region	1000					1000
Foreign	3519					3519
National Seed Storage Lab.	309					309
TOTAL	10,981	1036	552	5571	5569	23,709

Evaluation of Plant Introductions for Disease Resistance

Confirmation of Resistance of Peanuts to Cercospora Leafspot: The tests at Tifton in cooperation with Dr. Hammons and the test at Experiment confirmed the resistance of the seven most promising introductions to Cercospora arachidicola. All of the resistant introductions had less than 20% of the total plant area discolored by the fungus as compared to more than 60% for Argentine. The resistant introductions varied in yield from one-half that of Argentine to a yield equal to that of Argentine. Maturity of the introductions varied from 133 - 160 days from planting at both locations but at Experiment P.I. 259639 and PI 259747

were only 4 days later than Argentine. This summer the seven superior introductions were planted at different times so that they would all mature at approximately the same time as Starr. This will permit the evaluation of resistance at comparable stages of maturity.

Factors Affecting Infection of Peanuts by Cercospora in Greenhouse Screening Tests: Plant age within the range of 2 - 6 weeks apparently has no effect on susceptibility to peanut leafspot. Incubation of the plants for 24 hours following inoculation is adequate to produce maximum infection, but 48 hours incubation in the moist chamber resulted in as much infection as did 75 hours. A spore concentration of 20,000 conidia per ml produced about half the number of leafspots on the resistant cultivar Tarapoto (P.I. 350680) as were produced on Starr by the same concentration while higher concentrations masked differences in susceptibility.

New Sources of Bacterial Spot Resistance in Pepper: Bacterial spot was severe enough to cause defoliation of more than 80% of the leaves of the susceptible cultivar Yolo Wonder B last summer. In a replicated test conducted in cooperation with Dr. A. H. Dempsey representative introductions from the first group of resistant introductions from India, and the only resistant Capsicum annum found in the second series of screening tests (P.I. 271322) were compared. P.I. 322719 which had not been previously tested in replicated field tests, was also included in this test. All introductions showed less than 20% defoliation in at least three replications.

This test combined with observations made in the plots containing Dr. Dempsey's breeding lines and some of the original sources of resistance over the past 15 years indicate that resistance to bacterial spot may be effective in protecting new varieties containing these sources of resistance for at least 10 - 15 years following the release of new varieties containing genes from the resistant introductions from India.

The undescribed Seed Transmitted Bacterium on Watermelon Introductions: In 1965 Webb and Goth described a disease of watermelon seedlings in the greenhouse associated with the seed of two introductions. The seed concerned were grown more than 15 years ago in the plant introductions nursery at Experiment, Georgia. Cooperative research conducted with Dr. Schaad and Dr. Goth on the identity of the bacterium indicate that it is a previously undescribed species. In spite of regular observations of watermelon diseases and isolations from all unidentified foliage diseases a pathogenic bacterium has not been isolated from diseased plants in our nursery until this summer. Apparently the disease is characterized by very severe necrosis of the cotyledons in the seedling stage and very inconspicuous or no obvious symptoms in the later stages of plant growth.

The disease was first observed on the cotyledons of P. I. 164475 about 14 days after planting this summer. The disease killed some seedlings resulting in a significant reduction of the stand, but not enough to prevent establishment of a normal stand with a heavy seeding rate. The cotyledon lesions did not spread and the plants were soon free of obvious symptoms except for the dead areas on the cotyledons.

Similar results were obtained in another planting of bacteria-free commercial seed in which the seedlings were inoculated with a pure culture of the pathogan. It appears that this disease is not likely to cause serious damage to commercial plantings in the watermelon growing areas of the southern U. S. The fact that it has occurred in our nursery over a period of more than 15 years and has caused no obvious damage to watermelon plantings supports this. Nevertheless we are not distributing watermelon seed until we can produce seed that is free of the bacterium or a seed treatment is developed to eliminate the bacterium from infected seed. The seed of all introductions in the 1975 seed increase nursery were treated with Clorox and Arasan before planting and the disease has not appeared on these plants. This seed treatment has not been effective in all greenhouse tests but it may be adequate for the production of bacteria-free seed when combined with rogueing and other sanitation practices and a schedule of applications of a low-soluble-copper fungicide. If greenhouse tests this winter indicate that the seed harvested in 1975 is free of the pathogenic bacterium these introductions will be distributed.

The collection of watermelon introductions was surveyed for seed-borne pathogens by planting approximately 25 seed of each introduction in single rows in flats of fumigated soil in the greenhouse. About two weeks later the cotyledons of some introductions showed water soaking and necrosis characteristic of the watermelon bacterial disease. Circular spots bearing picnidia were occasionally observed on scattered, isolated seedlings. Bacteria were isolated from representative seedlings of heavily infected introductions by streaking on Kings medium B and the pathogenicity of both flourescent and non-flourescent colonies was determined. A pathogenic non-flourescent bacterium was isolated from many infected introductions. None of the non-flourescent colonies were pathogenic. Some seed increased in the early sixties especially 1960 and 1962 were heavily infected (50 - 100% of seedlings showing symptoms). Seed increased in the late 60's and early 70's produced seedlings which showed a very low incident (5 - 10% of seedlings) on a few introductions. After seedlings affected by the disease and total seedlings emerging were counted, the seedlings were inoculated with a pure culture of isolate CB-9, of the pathogen. Only a portion of the collection was tested. P.I. 295843 was highly resistant in preliminary and replicated tests.

<u>Endemic Diseases in the P.I. Nursery</u>: Since conditions in the southeastern U. S. are so favorable to plant diseases, disease control in the plant introduction nursery is difficult and diseases present serious problems for seed increase, evaluation and in the utilization of plant

introductions by the recipients of the increased seed. Of the major crop groups the cucurbits are probably the most seriously affected. Downy mildew anthracnose and gummy stem blight damage the plants severely and in some cases destroy individual introductions before seed increase. Both anthracnose and gummy stem blight are seed borne to the extent of furnishing seed borne inoculum of the diseases but not to the extent of seriously interfering with greenhouse screening tests. This year for the first time we have had labor available to do an adequate job of applying pesticides to nursery plantings and disease control is significantly improved on the cucurbits. The unusually high rainfall, however, has resulted in severe infection of some hills of watermelon by anthracnose in spite of an improved fungicide schedule.

The second most serious disease control problem in our nursery is probably seed transmitted viruses in the Vigan unguiculata collection. About five years ago we grew the entire collection, applied a systemic insecticide, rogued the plants to eliminate those infected with virus and harvested virus-clean seed. The severe virus infection on Vigna introductions in the nursery this summer makes it obvious that systemic insecticide applications and rogueing should be routine practices in all Vigna spp. plantings and possibly for all summer legumes.

Downy mildew of sorghum has developed into the third serious disease control problem in the last two years. Although downy mildew had been found in Georgia several years previously the disease first appeared in our nursery two years ago. The seed from the infected planting were not distributed but were treated with Vitavax and planted early this summer. Downy mildew has not developed in the planting to date. If the planting remains free of the disease the seed from this planting will be distributed. The Animal and Plant Health Inspection Service requires that all new sorghum introductions from countries in which downy mildew occurs be grown in the greenhouse during the winter before planting in the field. This policy will probably continue for a number of years. The likelyhood that this will happen combined with the continuing need to grow seed of small numbers of introduction under conditions of strict quarantine indicate that plans should be made to construct a small quarantine greenhouse.

Germplasm Curators

In addition to the plant germplasm held at the Regional Station, a number of collections are held at other locations in the Southern Region. An effort was made to locate all collections, contact the curator of each, and determine the conditions under which the collections are maintained. Using the following definition of a curator of germplasm, the original list of possible curators was shortened considerably.

> "A Curator is a keeper of germplasm who agrees to maintain the collection(s) under reasonably good storage conditions and by

seed rejuvenation plantings as indicated, or by protected, well managed plant repositories in the case of clonally propogated species. He maintains a current inventory of accessions in the collection. He agrees to make reasonable amounts of the germplasm under his care available at no charge to bona fide research scientists and institutions. He does not have the option of discarding elements of the collection on his own volition. When changes in program, personnel, physical facilities, or administrative policy place the collection in jeopardy, it is his responsibility to notify the Coordinator of his Regional Plant Introduction Station."

A summary of plant germplasm collections held at other locations is shown in Appendix B.

Budget

Funds available for operating the Regional Station during FY-76 and the proposed expenditures are summarized in Appendix C. Regional Research Funds provided by the Southern Directors, SAES, were increased from $36,500 to $64,740 annually. $12,000 of this increase is for contractual arrangements for increasing seed of plant introductions that cannot be increased satisfactorily at Experiment, Georgia. The other $16,240 is for additional personnel. In addition to this increase the Southern Directors budgeted $72,000, non-recurring, for construction of a seed storage facility.

Funds available from the Agricultural Research Service were increased from $64,300 to $86,500 for additional personnel and equipment.

Improvements

(a) Facilities

The open shed used for storing tractors and other nursery equipment was enclosed to protect equipment from vandals and rain.

The Southern Directors of SAES provided Regional Research Funds to construct a new seed storage facility. This will be a one-story building designed entirely for seed storage and enough work space to package seed.

(b) Mr. Richard V. Connin Entomologist, is being transferred from East Lansing, Michigan to Experiment, Georgia to evaluate plant introductions for resistance to insects.

APPENDIX A

Plant Materials collected in Paraguay, Uruguay, and Southern Brazil during January and February 1975

Genus	Accession	Genus	Accession
GRASSES			
Paspalum (48*)	413	Aeschynomene (2)	2
Andropogon (3)	4	Adesmia (3)	9
Agropyron (1)	1	Canavalia (1)	1
Aristida (1)	1	Cassia (2)	3
Axonopus (4)	12	Clitoria (2)	2
Bothriochloa (2)	3	Collaea (2)	2
Bouteloua (1)	1	Desmanthus (4)	8
Brachiaria (3)	4	Desmodium (9)	28
Briza (3)	3	Eriosema (2)	6
Bromus (3)	8	Erythrina (1)	1
Calamagrostis (1)	1	Galactia (3)	4
Cenchrus (1)	1	Indigofera (2)	2
Chloris (11)	19	Lathyrus (1)	1
Coelorachis (1)	1	Lotus (2)	7
Cynodon (1)	2	Lupinus (1)	8
Digitaria (1)	1	Medicago (5)	6
Echinochloa (2)	2	Melilotus (2)	3
Eragrostis (1)	1	Mimosa (1)	1
Erianthus (1)	1	Phaseolus (3)	9
Eriochloa (1)	3	Poiretia (1)	1
Hemarthria (1)	3	Rhynchosia (4)	10
Holcus (1)	1	Sesbania (1)	1
Imperata (1)	1	Stylosanthes (6)	20
Ischaemum (1)	2	Tephrosia (2)	2
Leersia (1)	1	Trifolium (2)	6
Melica (1)	2	Zornia (4)	10
Oryza (2)	17		
Panicum (7)	9	OTHER	
Pennisetum (1)	1	Begonia (1)	1
Phalaris (1)	1	Danthonia (1)	1
		Ipomoea (2)	5
Piptochaetium (3)	4	Vernonia (2)	2
Polypogon (1)	1	Undetermined (1)	1
Poa (3)	3		
Rottboellia (1)	8	28 samples of soil from	
Schizachyrium (1)	1	grass roots and 34 samp	
		of nodules from legumes were	
Setaria (3)	3	collected in Uruguay and Brazil for	
Sorgastrum (1)	2	nitrogen fixation studies.	
Sporobolus (2)			
Stenotaphrum (1)			
Trichachne (1)			

Appendix A (Continued)

Trichloris (1)	1
Tridens (1)	1

* Number in parenthesis indicate number of species.

PLANT GERMPLASM COLLECTIONS HELD IN THE SOUTHERN REGION

APPENDIX B

CROP	CURATOR & LOCATION	NUMBER OF ACCESSIONS	REMARKS
Citrus	C. Jack Hearn-ARS-USDA Hort. Res.Lab. Orlando, Fla.	422	Growing on Foundation Farm near Leesburg. Most of these trees are of bearing age. Probably virus free except for Tristeza. Land is under long term lease
"	"	68	On fringe area of Foundation Farm near Leesburg. Nearly all trees are bearing seedlings. Probably virus free except for Tristeza. All of these are named varieties.
"	"	187	On Hiawassee Farm near Orlando. These are young trees recently propagated by graft from old trees at the same location. Virus content is unknown. Land leased until 1987.
"	"	196	Variety collection near Lake Placid. Trees are young but most are bearing. They are grafts from old trees at Hiawassee. All are on rough lemon rootstock. Virus content is unknown. Lease agreement is subject to cancellation at any time.
Sweet Pot. & related spp.	Alfred Jones ARS- USDA Veg. Breed. Lab.Charleston,S.C.	562	This collection contains 255 clones of sweet potato and 307 accessions of related spp. Sweet potatoes are maintained vegetatively. Related species are kept mainly as true seed. Additional labor needed to propagate this material.
Soybeans	E.E.Hartwig ARS,USDA-Delta Br., Exp.Sta. Stoneville, Miss.	1074	These are of maturity groups V, VI, VII, and VIII. and IV are held at Urbana, Ill. These are maintained as seed.
Sweet Sorghum	Kelley C. Freeman ARS-USDA Meridian, Miss.	4617	Seed are stored in an air conditioned room at 68° to 70° F. Additional labor is needed to propagate this material. Viability of some accessions is questionable. Need better storage.

APPENDIX B

PLANT GERMPLASM COLLECTIONS HELD IN THE SOUTHERN REGION

CROP	CURATOR & LOCATION	NUMBER OF ACCESSIONS	REMARKS
Tobacco	James F. Chaplin ARS-USDA-Tobacco Res. Laboratory Oxford, N. C.	1515	1109 tobacco introductions and 406 cultivars in this collection. Fresh seed of entire collection was obtained in 1969. Stored at 50° F and 50%RH. Duplicate samples are in NSSL
Nicotiana spp.	L.G. Burk ARS-USDA-Tobacco Research Lab. Oxford, N. C	97	62 of the known species are in this collection. Stored at 50° F and 50% RH.
Sugar-cane	Norman James ARS-USDA Canal Point, Fla	1441	Entire collection is maintained vegetatively in the field. Some clones are duplicated.
Cotton	Robert R.Bridge Delta Branch Experiment Sta. Stoneville,Miss.	792	This is a collection of old cultivars maintained as seed. 250 accessions are renewed annually. Seed are stored at 40° F. Many entries have been placed in NSSL
Cotton	Paul Fryxell ARS,Texas A&M University College Sta.,Tex.	690	A new inventory of cotton germplasm has been prepared.
Trip-sacum spp	David H.Timothy Dept.of Crop Sc. N.C.State Univ.	50	Maintained vegetatively in the greenhouse.
Clovers	Norman Taylor Dept. of Agron. Univ. of Ky. Lexington, Ky.	650	Contains all known species of Trifolium except some that are native to North America. Needs increasing.
Cacao	F. W. Martin ARS-USDA, Mayaguez Inst. of Trop. Agric. Mayaguez,P.R.	257	Trees are maintained under shade of a taller growing species. Most are bearing age. Maintenance has been supported by American Cacoa Res. Institute. Continuation of this support seems doubtful. Many of these clones are also at Miami.
Cacao	P.K. Soderholm ARS-USDA-Sub.Trop Hort.Res.Unit Miami,Florida	300	Plants maintained in concrete trenches below ground level. These are outside the Cacao growing area. All clones are Mayaguez are at Miami.

PLANT GERMPLASM COLLECTIONS HELD IN THE SOUTHERN REGION

CROP	CURATOR & LOCATION	NUMBER OF ACCESSIONS	REMARKS
Coffee	P.K.Soderholm ARS-USDA-Sub.Trop Hort.Res. Unit Miami,Florida	220	Most of these are C. arabica, but 5 other spp. are represented. These are trees of bearing age growing under artificial shade which also gives some protection from cold. This collection is a source of disease free material.
AVOCADO	Robert Knight ARS-USDA-Sub.Trop Hort.Res.Unit Miami,Florida	174	Trees of bearing age.
Mango	Robert Knight ARS-USDA-Sub.Trop Hort. Res. Unit Miami, Fla.	114	Trees of bearing age.
Pome Fruits	J.M. Thompson ARS-USDA-SE Fruit & Tree Nut Sta. Byron, Ga.	623	Collection contains 488 apples and 135 pears It consists of all ages of trees from seedlings in greenhouse to old trees in field. Some are at Byron, others are at Ga. Mountain Experiment Station at Blairsville, Georgia
Pecans	George Madden ARS-USDA-U.S.Pecan Field Sta. Brownwood,Texas		Has 85% of all known cultivars. 15000 - 20000 seedlings from controlled pollinations under observation. Trees are maintained under optimum growing conditions. They are irrigated, sprayed for disease and insects, and well fertilized.
Sorghum	Franklin W.Martin ARS-USDA-Mayaguez Inst.of Trop.Agric Mayaguez,P.R.	16,676	These are being increased for NSSL. These should be catalogued for distribution to plant breeders.
Ornamentals	P.K.Soderholm ARS-USDA-Sub.Trop Hort.Res.Unit Miami,Fla.	3,000 +	These are now being inventoried. Noteworthy are the collections of Acacia (15 spp.), Bauchinia (20 spp.), Cordia (13 spp.) Dombeya (14 spp.) Eucalyptus (29 spp.), Ficus (67 spp.), Bamboo (21 spp.), Palms (115 spp.)
Ornamentals	W. O. Hartley ARS-USDA Plant Int. Sta. Savannah, Ga.		Temperate zone bamboos, waterchestnuts, woody ornamentals. No complete inventory.

CROP	CURATOR & LOCATION	NUMBER OF ACCESSIONS	REMARKS
Prunus	Victor Prince ARS-USDA-SE Fruit & Tree Nut R.Sta. Byorn, Ga.		No inventory. Collection includes peaches and plums.
Ornamentals	E. H. McIlvain Woodward, Okla.		No inventory. Collection includes woody spp. from Southern Plains. Inventory is being prepared.
Vaccinium Spp.	G. J. Galletta Dept. of Hort. N. C. State Univ. Raleigh, N. C.	332	

APPENDIX C

Regional Station Budget

Source of Funds	1974-75	1975-76
Regional Research Funds (Pooled)	$ 36.500	$136,740*
Regional Research Funds (Ga. Sta.)	5,534	13,730
Hatch	4,042	3,000
State Appropriations	6,158	3,160
Agricultural Research Service	79,700	86,500
TOTAL	$131,934	$243.130

Expenditures		
Personal Services	$ 97,015	$130,230
Equipment	1,887**	72,000
Operating Expenses	14,161	33,900
Travel	6,650***	
Seasonal Labor	12,221	7,000
TOTAL	$131,934	$243,130

* $72,000 of this is a non-recurring allotment of Regional Research Funds for the construction of a seed storage building.

** Material to enclose machinery shed

*** Plant exploration

Appendix B

Reports by State Agricultural Experiment Stations

ALABAMA S-9 PLANT INTRODUCTION ACTIVITIES
October 1974 - August 1975

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

A total of 509 recorded introductions were received from the Plant Introduction Station by Alabama cooperators this year. They included 297 vetch, 131 tall fescue, 43 reed canarygrass, and 28 lespedeza.

HORTICULTURAL CROPS

Cantaloupes and Watermelon (J. D. Norton)

In cantaloupe breeding, P.I. 140471 has been used in breeding to incorporate resistance to *Mycosphaerella citrullina* (Gummy Stem Blight) into commercial types and varieties. This P.I. is the only known source of resistance to the organism.

Progeny from the interspecific hybridization of *Cucumis metuliferus*, P.I. 292190, with P.I. 140471, *C. melo* were investigated for rootknot nematode resistance and other characteristics.

Investigations are in progress on the mode of inheritance of resistance to *Diaphania mitidalis* (pickle or melon worm). Source of the resistance is P.I. 140471.

The major objective of watermelon breeding is to incorporate resistance to *M. citrullina* into commercial types and varieties. The sources of resistance are P.I. 189225 for high level and P.I. 271778 for moderate level of resistance.

Cowpeas and Cucumbers (O. L. Chambliss)

a. Inheritance of crude protein in *Vigna unguiculata*

As a result of cooperative work with Dr. Strength in the Animal Science Dept., we chose the PI's with the highest and lowest protein as parents for an inheritance study. They were: PI 189099, containing approximately 36% protein and PI 182316, containing approximately 19% protein. Data are in the process of analysis now.

b. Chemical characterization of *Cucumis sativus* seedlings resistant and susceptible to cucumber beetles. This research is related to our knowledge that certain members of a group of triterpenoid bitter principles in Cucurbitaceae act as feeding stimulants for cucumber beetles. Non-bitter seedlings are generally resistant to cucumber beetles, and bitter seedlings are susceptible. However, we had previously observed that PI 173889 was resistant to banded cucumber even though it had bitter seedlings.

The objective of this research was to determine the chemical difference in the bitter principle in PI 173889 and in a bitter cultivar which was susceptible. This research is incomplete, but should be finished in time to report next year.

Peppers and Tomatoes (W. H. Greenleaf)

Current work involves searching for resistance to cucumber mosaic virus in pepper introductions. *Capsicum chinense* P.I. 159236 and 152225 were used in breeding a tabasco pepper resistant to tobacco etch virus. Breeding of nematode and tobacco mosaic resistant tomatoes is based on *Lycopersicon peruvianum* P.I. 128657 and P.I. 28650.

AGRONOMIC CROPS

Phalaris and Tall Fescue (R. L. Haaland)

Tall fescue and phalaris introductions are being screened for winter hardiness and winter forage production. Elite selections are incorporated into a recurrent selection program.

Summer Legumes (C. S. Hoveland)

Seed was harvested from promising *Desmodium sandwicense* P.I. 322468, 335746, and 319469 that had survived winters at Auburn for two years. Yield trial plantings made during the past two years failed to become established because of poor competition with summer weeds such as Florida pusley. The poor competitive ability of these introductions are a serious handicap.

Winter Annual Legumes (C. S. Hoveland)

Forage yield trials with a number of introductions of *Trifolium pallidum*, *T. petrisavii*, *T. spumosum*, and *Ornithopus sativus* showed only the latter to have much promise on sandy soils. None of the introductions equalled Yuchi arrowleaf clover in length of season or total production. Several accessions of *Trifolium purpureum* made outstanding growth on Black Belt soil where most winter annual legumes fail.

REQUESTS FOR ADDITIONAL GERMPLASM

Species	Characteristic Needed	Possible Location
Cucumis melo	*Mycosphaerella citrulliina* (Gummy Stem Blight)	S. E. Asia
" "	Diaphania mitidalis (Pickle worm)	" " "
" "	Meloidogyne incognita acrita (Rootknot nematode)	" " "

Citrulus lanatus	*Mycosphaerella citrullina*	Central Africa
Dactylis glomerata	Winter productivity and nematode resistance	Mediterranean area
Phalaris arundinacea	Winter productivity and nematode resistance for interspecific hybridization with *Phalaris aquatica*	Mediterranean area
Lathyrus and *Trifoliums*	Tolerant of wet soils with good winter productivity	Mediterranean area

PUBLICATIONS

1. Greenleaf, W. H. 1975. The tabasco story. Hort. Science 10(2):98.

S-9 TECHNICAL COMMITTEE REPORT

Arkansas Agricultural Experiment Station
Fayetteville, Arkansas 72701

Period of July 1, 1974 to July 1, 1975

J. L. Bowers

Rape: Four plant accessions which had performed well at the Southeast Branch Experiment Station, Rohwer, Arkansas were planted in late October, 1974 in a replicated trial and harvested on June 16, 1975. The yield data on these entries are presented in Table 1.

Table 1. Yield performance of four plant accessions.

	Yield in grams of seed per plot					
Plant accession #	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Average yield	Pounds per acre
P.I. 311731	497	315	183	434	357.3	516
P.I. 250135	141	362	226	319	262.0	379
P.I. 251236	286	303	337	352	319.5	457
P.I. 305278	397	305	250	401	338.3	490

These yields are approaching those reported for a rape planting in 1972 but slightly lower. These same four accessions were planted in a non-replicated test on the Vegetable Substation at Van Buren and the yield and composition is presented in table form below.

Entry	Yield in #/A	% Protein	% Oil	% Glucosinulate
P.I. 251236	340	30.6	31.7	7.8
P.I. 250135	968	30.5	37.7	8.0
P.I. 311731	227	28.3	42.7	8.6
P.I. 305278	1199	27.4	40.8	7.7

In the trial at Van Buren, there was no lodging in these accessions: P.I. 311731 and P.I. 305278, whereas the plants in the other two accessions were lodged at time of seed harvest. In this planting, a few plants in accessions: P.I. 251236 and P.I. 250135 were lost to low temperatures during the winter months but there was no apparent damages in the other two accessions.

Snap Beans: (Dr. T. E. Morelock) A snap bean breeding program emphasizing resistance to Rhizoctonia root rot was initiated at the Arkansas Agricultural Experiment Station in the spring of 1974. Some 110 plant introductions were screened for Rhizoctonia resistance and local adaptation. Several lines showed promise.

P.I. 165426 was the most promising line and has been used to make several crosses. Other lines showing promise were: P.I. 165435 and P.I. 203598. Progeny from crosses with these

Plant introductions are currently being screened for Rhizoctonia resistance.

Southern Peas: Sixteen plant accessions, which had been reported to possess resistance to *Xanthomonas vignicola*, were obtained and are being field screened to use in the southern pea breeding program.

The F_2 generation of crosses with material obtained from Mayaguez, P.R. are being field screened this summer for *Xanthomonas vignicola*.

Spinach: Several of the station's breeding lines which were derived from a plant accession source (P.I. 165560) are not only showing good levels of white rust resistance but also show promise from the standpoint of resistance to *Fusarium oxysporum spinaceae*.

Cantaloupes: Progeny of the dwarf lines which have been derived from crosses with P.I. 321005 are growing in the field and appear to be highly resistant to powdery mildew. This type of resistance has held up in a season when powdery mildew has wiped out most other cataloupe varieties and entries in the Southern Cooperative Trials.

Chick Pea: The same thirteen plant accessions covered in our 1973-74 report were planted this pring at Fayetteville. This planting became severly infested with Thielaviopsis root rot and also a foliage rust fungus which drastically affected pod set and yield. These two diseases developed when we were incurring extremely heavy amounts of rainfall and high humidity. We are in the process of getting yield data on this crop at the time this report is being prepared.

FLORIDA S-9 "NEW PLANTS" REPORT

August 21 - 22, 1975

Experiment, Georgia

S. C. Schank

Scientists from many disciplines in Florida continued to receive and evaluate introductions from the Southern Regional Plant Introduction Station. This service of the regional station is of inestimable value as it provides breeders, physiologists and other scientists with a continuous flow of selected germ plasm.

Drs. B. B. Rhodes, and L. Curtis Hannah, Vegetable Crops at Gainesville, report that during the past year they have obtained approximately 1200 introductions of Vigna unguiculata. Most of these have been analyzed for methionine and cysteine. Those which appear to contain high levels of methionine are: 293516, 353166, 353076, 293519, 293516, 353086, 352995. High cysteine (cystine) lines are undergoing final screening and include 115679, 165941, 180355, 189374, 227826, 269666, 270067, 292902, 292911, 352973, 352995, 353064, 353067, 353076, 353081, 353086,353099, 353139, 353157, 353171. Some of these selected lines are now being grown and will be used for genetic and biochemical studies.

Dr. James M. Crall from the Agricultural Research Center at Leesburg is investigating watermelon mosaic virus resistance in P.I. 255137. Although several lines are being carried in his breeding stocks, none are close to varietal release. Dr. J. A. Mortensen, also at Leesburg reports that the following Vitis introductions have been useful in breeding, primarily for early ripening: 360750 "Pirobella" (early ripening, crack resistant), 354108 "PQ 7" (very early ripening). Promising introductions for breeding that have not yet been used are: 341824 "Bharat Early", PIM 18902 V. vinifera (a large black grape productive in Cuba and South Florida). More introductions of high quality from southern India are needed (Vitus vinifera or other Vitis species).

Ralph H. Sharpe, Fruit Crops at Gainesville reports that three peach introductions of many years ago are parents of rootstock selection FI. 4-117, which is the first to show homozygosity for resistance to the three rootknot-nematodes that severely limit peach production in Florida. The parents are P.I. 65821 "Shau Thai", P. davidiana Chico - 26712, and "Okinawa" introduced by the Fla. Exp. Sta. from the Ryuku Islands.

P. L. Neel, Ornamental Horticulturist at Fort Lauderdale Agricultural Research Center reports work on Dombeya "Seminole" M 21597, Euphorbia vigueri M 19412, Juniperus conferta P.I. 323932, and Camellia japonica P.I.'s 308992, 308993, 308997, 309017, 309018, 309162, 309164, 320891, 320892, 352669.

Dr. Dan Gorbet at the Agricultural Research Center, Marianna, reports on both Sorghum and Peanuts. With Sorghum, the following P.I.'s were grown in order to evaluate them for reported disease resistance: 217708, 217710, 217721, 217722, 217803, 221656, 229838, 229841, 248268, 248271, and 248299. In Peanuts, crosses were made in 1974 with P.I. 298115 and selections from this line for rust resistance.

An F_1 nursery is being grown from these crosses in 1975 for evaluation Additional crosses were made in 1975 with selections from P.I. 298115 to provide material from which rust resistant varieties can be obtained. Other P.I.'s used previously as parents include: Cercospora resistance ; 268894, 306230, and 262090. Seed coat traits; 200444, 261906, 262090, 274191, and 268883. Miscellaneous; 121067, 145681, 203396, 259785, 261911, 269063, 269114. As yet, it is too early to determine success with these introductions.

Dr. Elver Hodges at the Agricultural Research Center, Ona, has used many P.I.'s of tropical forage grasses in the past year. One of the new Florida releases is "McCaleb" stargrass, originating from 224152. Another forage grass is being proposed for release from P.I. 224566. Hodges reports that one of the components of Dr. Glenn W. Burton's crosses, 225957, has been vigorous at Ona. All three of these were in Steven's bermudagrass collection. The forage group at Ona is still looking at 299993, 299994, 299995, and other newer Hemarthria introductions, as well as Digitaria introductions for winter hardiness.

Also on forage species, Dr. Leonard S. Dunavin reports from the 1974-75 season that the four highest yielding entries in a trial of thirty introductions of Bromus willdenowii were 304864, 185500, 189612, and 197849. In Lolium perenne 340108 and 340110 were best among eight introductions, but neither appears to perenniate at his location at the Agricultural Research Center, Jay. The highest yielding introduction of Lolium multiflorum tested was P.I. 343156 which outyielded "Gulf", "Florida Rust Resistant" and "Magnolia" cultivars. Trifolium alexandrinum, P.I.'s 378129 and 383769 looked good during the relatively warm winter of 74-75 in unclipped observation rows.

Rex L. Smith, S. C. Schank, Murray Gaskins, D. H. Hubbell, Ken Quesenberry and J. R. Milam at Gainesville are using introductions of various grasses to test nitrogen fixation after inoculation with Spirillum lipoferum in field trials. Sixty three lines of corn, 45 of sorghum, 7 of millet, 250 of Panicum maximum, 153 of Chloris, 82 of Cenchrus ciliarus, 55 of Hemarthria altissima, 15 of Paspalum notatum and 60 of Digitaria were inoculated during summer 1975. Results of the tests and P.I.'s used will be reported next year.

PUBLICATIONS

Boyd, F.T. and D.A. Sleper. 1974. Chloris guyana: a promising forage species for Florida pastures. Sunshine State Agric. Res. Report. July 6-7.

Hodges, E.M., F.T. Boyd, L.S. Dunavin, A.E. Kretschmer, Jr., P. Mislevy, and R.L. Stanley, Jr. 1975. "McCaleb" Stargrass. Florida Agricultural Experiment Station Circular S-231, 10 pp.

Howard, C.M. and E.E. Albregts. 1975. "Florida Belle" an anthracnose resistant strawberry for Florida. Florida Agricultural Experiment Station Circular S-233, 6 pp.

Hunkar, A.E.S., A. Tjong-A-Hung, I.G. Dulder, S.C. Schank, N. Holder and C. Edwards. 1975. Assessment of field resistance to Pangola stunt virus (PSV) of Digitaria introductions in Surinam and Guyana. Trop. Agric. 52: 75-83.

Sleper, D.A. and M.H. Gaskins. 1974. Cold storage of digitgrass germplasm. Crop Science 14: 900-901.

GEORGIA AGRICULTURAL EXPERIMENT STATIONS

REPORT TO S-9 TECHNICAL COMMITTEE

August 21 - 22, 1975

W. R. LANGFORD

1064 samples of seed and plants were distributed to plant scientists in Georgia during the last year. Most of this material is still under evaluation. Following are reports of progress on evaluation and use of some plant introductions distributed in Georgia in recent years.

I. Turner Davis, Department of Horticulture, Ga. Station, Experiment Georgia. With reference to your letter of July 22, I have checked the following introductions:

1. PI 317258 (Pinus thunbergii) Japanese black pine, 4 trees planted in 1969. Seven feet to 14' high, 10' to 12' crown spread, up to 2' new growth in 1975, irregular trunk, could be used as specimen ornamental, good green color, bearing cones.

2. PI 319315 (P. densiflora) Japanese red pine, 1 tree planted 1969, 8' high, 7' spread, healthy green color.

3. PI 317254 (P. densiflora) Japanese red pine, 1 tree planted 1969, 8' high, 7' spread, good color.

4. (Quercus myrsinaefolia) Japanese evergreen oak, planted March, 1969, 10 trees, up to 20 feet tall, 10' spread, fast growth past 2 years, good green winter color. Some were slow growing first two years in field. Nice ornamental.

5. PI 324969 (Cunninghamia lanceolata) China fir, 3 trees planted 1969 5' to 20' high, 8' spread, two with some cold damage.

6. PI 102653 or NA827-S (Quercus chenii) China oak. Five trees planted 1969 up to 23" high, spreading up to 14', very fast growth past year, form irregular.

7. NA 29008 (Cryptomeria japonica) Japenese cedar, 1 tree, planted 1969, 20' high, 6' spread, single stem.

8. NA 31022 (Acer rubrum var. tridens) Trident red maple, 1 tree, planted 1969, 18' tall, small leaves.

9. NA 31021 (Magnolia virginiana var. Australis). Sweet bay magnolia. Three trees planted 1969, 7' high, foliage not very dense.

10. PI 286608 (Metasequoia glyptostroboides). Dawn redwood tree, planted 1969, 20' high, 10' spread, branches sweeping upward, pretty tree.

11. (Acer ginnala var. Semenovii). USSR, 1 tree planted 1969, 5' tall, 5' spread, small leaves, sparse and unhealthy looking foliage.

12. NA 15313-1-s, 1 tree, planted 1970, 15' high, 8' spread, lot of mildew on foliage.

13. PI 342930 (Pinus thunbergii). Japanese black pine, 1 tree, planted April 1971, 5' tall, 4' spread, good growth in 1975.

14. PI235128 (Betula platyphylla var. japonica). Five trees field planted April 1972, 1972, 14' to 20' high, 7' spread, good growth and fruit on tree in 1975.

15. (Pistachia chinensis). Ten trees, planted 1969, good growth, 18' high, 14' spread, fruit on some for first time in 1975. Beautiful fall color.

16. PI324993 (Keteleeria davidiana). One plant, placed in lath house in 1972, 7' tall, 3' spread.

II. 1. Agronomic evaluation of Arachis hypogaea L. introductions.

a) In 1974, 86 peanut PI's were grown in the cooperative agrotype trials at Tifton, Georgia, and 24 entries (=28%) were retained for further evaluation. Entries retained generally are those with pod yields equal to or exceeding standard commercial cultivars for each market type in the particular trials.

b) Twenty-one PI's, grown in the 1974 genetic stocks (GS) nursery in one-replicate plots, were retained for further seed multiplication, for use as parents in a new series of genetic research and breeding improvement crosses, and for reserve seed stock to be distributed to interested peanut researchers at SAES or ARS locations and in other countries. An additional 25 lines were entered in the 1975 GS nursery. A representative seed sample for each PI genetic stock will be returned to RPIS to replenish reserve supplies.

c) Thirty-two newly acquired peanut PI's are under culture in the 1975 seed increase and evaluation nursery where agronomic characteristics and botanical traits are being recorded. Promising lines will be placed in the 1976 agrotype trials.

d) Seed stocks for 63 peanuts PI's grown in 1974 were returned to the RPIS to augment material there.

The CHICO peanut germplasm, developed by selection from PI 268661, and named and released in Aug. 1973 by the ARS, USDA, and the Georgia

Virginia and Oklahoma Agr. Exp. Stations, was registered in Crop Science (vol.15, no. 1, Jan-Feb. 1975, p. 105). Since its release, Chico has been widely distributed (100-seed samples) to peanut researchers. Chico matures 20 - 30 days earlier than present commercial cultivars and has comparatively longer pegs which penetrate deeper into the soil. Because of these characteristics, Chico is being employed in breeding research and genetic studies at several U. S. locations.

3. Rust resistant germplasm.

With its relatively recent occurrence in India (1970) and Africa (1973), peanut rust, *Puccinnia arachidis* Speg., poses a serious world-wide threat to peanut production. The Virginia AES and the MITA in Puerto Rico and ARS cooperated in the development and release of 14 low-generation lines derived from a chance natural cross involving rust=resistant PI 298115, as female parent, and an unknown susceptible pollen donor.

The prime sources of resistance to peanut rust, however, are seven U. S. plant introductions which trace to three original sources. These 7 PI's were winter-increased in 1975 at the Mayaguez Institute of Tropical Agriculture, PR (with the cooperation of Eric Stone), and limited seed-stocks are being distributed from Tifton through the Plant Introduction office, to researchers in East central Africa, India, various South-eastern U. S. stations, and elsewhere as the effort intensifies to develop high-yielding cultivars with rust resistance.

The resistant lines and their associated PI numbers are:

a) 'Tarapoto' lines

PI 259747, 'Tarapoto', introduced in 1959 from Venezuela, where it was received in 1954 from the Tingo Maria Exp. Sta., Peru.

Subsequently sent from U. S. to Israel and a short-podded selection, 'Tarapoto 63-1556' made by Z. Frank, was introduced into U. S. as PI 341879.

Two 'Tarapoto' accessions, PI 350680 and PI 381622, received from J. Romero in Honduras, derive from material obtained through Nicaragua (probably from the Venezuela collection).

b) Israel Line 136.

Both PI 298115 and PI 315608 derive from Israel line No. 136, a selection in Israel from a "U. S. introduction" whose origin was unrecorded.

c) D. H. Timothy Collection.

P.I. 314817 was obtained by Timothy from a small storekeeper in the village of Juanjui, Prov. Mariscal Caceres, San Martin, Peru, who purchased the seed from a farmer along the banks of the Rio Guayabamba.

4. Winter Nursery Generation Advance.

ARS has operated a small-scale winter nursery program since 1968 in cooperation with personnel at the Mayaguez Institute of Tropical Agriculture, Mayaguez, PR. A. C. Mixon is current coordinator for the peanut research which is carried out under the local supervision of Eric Stone.

690 peanut breeding lines, including certain P. I. introductions in short seed supply, have been included in the generation advance program in this frost free environment during 1968-75 inclusive. For 1975-76 more than 130 recent peanut lines, with original sample comprising 10 seed, are scheduled for seed multiplication to permit earlier testing of these genotypes for resistance to *Aspergillus flavus* contamination and aflatoxin elaboration.

5. Newly introduced peanuts.

Through personal contact with peanut researchers in other countries a number of peanut accessions have been acquired. Among these are (a) 131 Valencia-type peanuts from INTA-Manfredi, Argentina; (b) 31 rosette-resistant and 10 advanced agronomic types from the Inst. for Agric. Res., Nigeria; and (c) the rare autotetraploid (4n=40) form of Arachis villosulicarpa, obtained from the Tamil Nadu Agric. Univ., India.

Arachis villosulicarpa (2n=20) is of special interest. Among 343 entries screened at Tifton in 1967, *A. Villosulicarpa* was resistant (untouched) to thrips. It appears highly resistant to the Cercospora leafspots.

6. Screening Arachis hypogea germplasm for biochemical attributes.

Last year, we reported that ca. 2100 peanut plant introductions were screened in one-replicate field trials at Tifton in 1972 for host plant resistance to leaf ragging by the larval insect complex (coop. res. L. W. Morgan, D. B. Leuck). A unique feature of this research is that morphological characteristics of plants, fruits, and seeds were documented on movie film. Pictures are being processed on microfiche for reference. After harvest, pod (fruit) samples were cold-stored for investigation of maturity by the Arginine Maturity Index and biochemical determinations of oil and protein contents. Chemical compositional data for the genotypes are to be published in the USDA Plant Introduction Seed Catalogue for Peanuts. (Coop. res.: C. T. Young).

7. Leafspot resistance.

Seven peanut introductions, resistant to early leafspot caused by

Cercospora arachidicola, were identified in greenhouse and replicated (RCB) field trials at Tifton. Natural inoculum in the "No Pesticides" field tests in 1973 and 1974 gave epedemic expression of the disease which killed the more susceptible commercial cultivars grown interspersed with the resistant genotypes. The 0 - 5 disease index compared entries; yield and shelling grade data was obtained; and the Arginine Maturity Index (AMI) estimated harvest maturity.

PI 109839 appeared to have greater resistance to leafspot and 6 other geno-types (PIs 162857, 350680, 259636, 259747, 270806, and 259679) also possess adequate resistance for breeding and/or genetic use. (Two of these leafspot resistant lines, PI 259747 and PI 350680, have also been shown to have resistance to peanut rust). The fruit of the seven peanut genotypes with resistance to Cercospora arachidicola matured from 2 to 4 weeks later than present commercial cultivars in the Tifton field trials. Seed of the 7 resistant PI lines have been distributed by G. Sowell to interested U. S. and foreign scientists for international testing to evaluate resistance expression.

(Cooperative research: Grover Sowell, Jr., ARS-USDA, Experiment, GA., D. H. Smith, Texas AES, Yoakum, TX, and R. O. Hammons, ARS-USDA, Tifton, Ga.)

8. Arachis Species Live Plant Accessions.

Live plant material of Hammons-Langford collection number 327 (HL 327), Arachis lignosa Chod. et Hassl., PI 338315, was received in early July 1975 following its release from the P. I. Station at Glenn Dale, Maryland, and established in the Arachis species nursery at Tifton. This species, collected in May 1968, has been indexed free of virus.

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

In the 1974 Peanut A. flavus breeding work, we saved 19 single-plant selections from P.I. 337394 and 12 single-plant selections from P.I. 337409 for further evaluation, selection and use in our breeding program. Twelve other introductions were also selected for use in this work.

In laboratory evaluation, 11 selections from crosses in F_2 through F_4 generation hybrids between resistant peanut introductions and commercial varieties exhibited favorable resistance to toxin-producing strains of A. flavus.

P.I. 337394F and P.I. 337409 were registered as A. flavus-resistant germplasm in Crop Science. Samples of these genotypes were placed in the National Seed Storage Laboratory, Ft. Collins, and seed were distributed to scientist upon request.

Fifty three peanut introductions were obtained from the peanut breeding program in New Mexico for use in our A. flavus screening program.

IV. Dr. Ian Forbes, ARS, Coastal Plain Station, Tifton, Georgia

I have your letter of July 22 regarding recent progress in the evaluation of legume introductions. I note from my correspondence with you on this subject last year that I covered the use of Dolichos lablab introductions in the breeding of an experimental (unreleased) variety, Tifton No. 1, that seeds well at Tifton. This variety is still not released but has found some use by other researchers as a source of seeds with which to evaluate the species in U. S. I have been able to provide Tifton-grown seeds to several Agronomists and Entomologists for testing and research. I'm enclosing a publication on D. lablab (hyacinth bean) as a host for Heliothus spp. in which we used Tifton No. 1 experimental elite line as the host plant.

We have completed the evaluation for gray leaf spot reaction of the 126 blue lupine introductions which I collected in Morocco, Spain, and Portugal. We found many that were resistant to gray leafspot and also a new phenotype that gives an intermediate reaction to the disease. Since these results are in manuscript form, I'm sending you a copy of the manuscript. It is due for publication in the Nov.-Dec. issue of Crop Science.

Publications

1. Gross, H.R., J.R. Young, and Ian Forbes. 1975. Heliothis spp.: Seasonal Occurance and Overwintering on the Hyacinth Bean Plant in Tifton, Georgia. J. Econ. Entomol. 68: 169-170.

2. Forbes, Ian, John S. Gladstones, and Homer D. Wells. 1975. Gray Leafspot resistant Lupinus angustifolius L. Germplasm from Plant Exploration in the Western Mediterranean. Crop Science (in press).

Dr. Harold Brown, Dept. of Agronomy, College Station, Athens

We are grateful for seeds which you have provided for our work on physiology of grasses and peanuts. In the past year we have concentrated on research on Panicum milioides a species which appears to be intermediate between C_3 and C_4 in photosynthesis characteristics. I am enclosing a copy of a manuscript which was recently submitted to Science and which gives a brief summary of the results. We think this finding of intermediacy is important in understanding the evolution from C_3 to C_4 grasses. We are indebted to Plant Introduction for supplying seeds of 5 accessions of P. milioides (P. I. 285220, 285219, 310029, 310042, and 310043) and P. laxum (P.I. 310026) which is in this intermediate group. Of course, we are indebted to P. I. for the many other species you have supplied.

I am enclosing a reprint of an article which reports on 4 species, two of which you supplied.

Publications

1. Gallaher, R.N., D.A. Ashley, and R.H. Brown. 1975. C-Photosynthate Translocation in C_3 and C_4 Plants as Related to Leaf Anatomy. Crop Science 15: 55-59.

2. Brown, R.H. 1975. Panicum milioides, A Species Intermediate Between C_3 and C_4 . Science (in press).

Kentucky Annual Report to S-9 (New Crops) Technical Committee

Experiment, Georgia, August 21-22, 1975

Roy E. Sigafus, Agronomy Department, University of Kentucky

Development continues of the bush watermelon shown by Dr. H. C. Mohr at Lexington in 1973. A double dwarf variety is in the process of being registered under the Plant Variety Protection Act. This variety is round and of the size of Sugar Baby, but of Charleston Gray color. The variety should produce 2-3 melons per plant at 3 X 4 foot spacings.

Other varieties are being developed with melons up to 40 pounds and as small as 3-4 pounds. Single dwarf varieties at 4 X 6 foot spacings produce more melons per plant. The double dwarf type appears to be well suited at present to home gardens, and the single dwarf more for commercial use.

Using materials from plant introduction and other sources, Roger F. Quarles and N. L. Taylor tried several methods of overcoming interspecific crossing barriers in Trifolium. The abstract of Quarles' thesis reads: "Barriers to interspecific hybridization in Trifolium were investigated by manipulation of ploidy levels, incompatibility and male-sterility systems in addition to the application of mentor pollen. Crosses at the diploid level resulted in more hybrids than tetraploid level crosses. The self-compatible stock produced more seed than the self-incompatible stock, but produced more hybrids only in one cross, T. pratense L. X T. diffusum Ehrh. Low seed set was obtained from both types of compatibility systems. Male-sterile female parents produced fewer seed and hybrids than male-fertile male parents. While selfing was reduced, little benefit was derived as hybridization was adversely affected. The addition of mentor pollen was of no benefit in interspecific hybridization. The crosses involving the addition of mentor pollen produced less seed and hybrids than the crosses not utilizing mentor pollen. Interspecific hybrids produced during this study included T. pratense (2x) X T. diffusum (2x), T. pratense (4x) X T. diffusum (4x) and T. medium L. X T. sarosiense Hazsl. - all previously reported."

"Mentor pollen" was that collected from compatible plants of the same species as the female used in the mating. The mentor pollen was killed in methanol and mixed half and half with viable pollen.

Additional strains of Bigflower Vetch (Vicia grandiflora) are wanted by W. C. Templeton, Jr. About a dozen strains have been obtained through plant introduction sources. A locally naturalized strain is being tested on farms. Seed is being increased and a variety may be released soon. Seed yields were down in 1975, but the use of Parquat sprayed 72 hours before combining, again worked well to prevent excessive shatter losses.

Leafhopper infestations started early in 1975 in Kentucky. Big trefoil (Lotus pednuculatus) has been hit hard. The 'Kaiser' strain from Indiana seems to be the only one of 60 accessions to show any degree of tolerance to leafhopper. Big trefoil was not attacked by meadow spittlebug while birdsfoot trefoil (Lotus corniculatus) was badly damaged.

Zigzag clover (Trifolium medium) showed a wide range of responses to leafhopper feeding. In a spaced planting of a large number of accessions, some plants were badly damaged and their growth was stopped. Other strains showed no visible symptoms of leafhopper damage.

Publications and other references

Cytological, Morphological, and Agronomic Characteristics of Tall X Giant Fescue Hybrids and Their Amphiploid Progenies. R. C. Buckner, G. T. Webster, Paul B. Burrus, and L. P. Bush. Am. Soc. Agron. Abstr., p. 47. (Knoxville, Tennessee) Aug. 24-30, 1975.

Genetic Vulnerability and Germplasm Resource of the True Clovers. N. L. Taylor, P. B. Gibson and W. E. Knight. Am. Soc. Agron. Abstr., p. 64. (Knoxville, Tennessee) Aug. 24-30, 1975.

Inheritance and Morphological Traits of a Double Recessive Dwarf in Watermelon, Citrullus lanatus (Thunb.) Mansf. H. C. Mohr and M. S. Sandhu. Journal of American Society of Horticultural Science 100:135-137. (1975).

Interspecific Hybridization of Perennial Trifolium Species Related to Red Clover. Ph.D. Thesis of K. H. Quesenberry, University of Kentucky (1975).

Methods of Overcoming Interspecific Barriers in Trifolium. M. S. Thesis of Roger F. Quarles, University of Kentucky (1975).

Resistance of Cucurbits to Twospotted Spider Mite. P. A. Knipping, C. G. Patterson, D. E. Knavel and J. G. Rodriguez. Environmental Entomology 4:507-508. (1975).

POTATO BREEDING AND DEVELOPMENT - FONTENOT, JAMES F.

For emphasis it might be well to state again our need and use of plant introductions since one of our potato breeding objectives is frost resistance. In order to obtain desirable combinations we brought in widely diverse genetic material. Crosses between Solanum acaule and Solanum tuberosum were made and their progeny tested. Early generation progeny were poor in horticultural type and backcrosses were made to Solanum tuberosum. A number of clonal selections we now have are six generations away from these original crosses. Some of these lines are 91-237, 01-201, 11-24, 12-34, 12-36, 22-51, 22-78, and 21-103.

Twenty-four clones were selected at Rhinelander, Wisconsin, in 1974 that are related to Solanum acaule. Of all these clones 11-24 is the most promising and we are contemplating entering it in the regional trial. Other clones we plan to enter in the regional trial are 11-118 and 01-70.

Notes on Okra Plant Introductions - Aug. 7, 1975 - James F. Fontenot

P.I. Number	Origin	Maturity	Plant Condition	Plant Height	Growth Habit	Plant Color	Pod Type	Pod Length	Spines	Remarks
344073	Turkey	L	S	T	S	G	A	L	M	Cow horn type
349232	Ghana	L	S	TD	S	GR	A	M	L	Mixed
356831	India	E	S	D	S	G	A	L	M	
357989	Yugo.	E & L								Mixed
357990	Yugo.	E	S	T	S	G	A	L	L	Cow horn type
357991	Yugo.	no germination								
357992	Yugo.	E	discard		B	G	A		H	
357993	Yugo.	low germination - 1 plot looks good								
357994	Yugo.	L	S	T	S	R	A	L	M	
357995	Yugo.	discard								
357996	Yugo.	discard								
357997	Yugo.	E	S	S	S	G	A	M	H	Conc. maturity
357998	Yugo.	no germination								
357999	Yugo.	VL		T						
370025	India	E	S	M	S	G	A	L	L	Cow horn type
370026	India	M	S	T	S	G	R	S	M	Gold Coast type
370027	India	E	S	S	S	G	A	M	L	Clemson type
370028	India	E	S	D	S	G	A	L	L	Concentrated pod
370029	India	E	W	D	S	R	A	M	M	Red pods
370030	India	E	S	D	S	G	A	S & L	H	Mixed
378630	Zaire	no pods yet								
378631	Zaire	no pods yet								
379352	Yugo.	no pods yet								
379353	Yugo.	E	S	D	S	G	A	L	L	
379583	Japan	mixed, but check again								

Key to symbols:

Maturity: E = early, M = mid-season, L = late, v = very
Plant Condition: S = strong, W = weak
Plant Height: T = tall, D = dwarf, M = medium
Growth Habit: B = branched, S = single stem
Plant Color: R = red, G = green
Pod Type: A = angular, R = round
Pod Length: L = long, S = short, V = very, M = medium
Spines: H = heavy, L = light, M = moderate, V = very

Our okra was planted on May 19, 1975, and it has rained just about every day since that time. This excessive moisture condition has severely affected plant growth.

ORNAMENTAL TRIALS - R. J. STADTHERR

Below is a discussion of Plant Introductions and National Arboretum selections we have had for 5 or more years in our trials. In the future we will discuss only those plants we've had for 5 years and/or those lost or discarded which we've had for more than 5 years.

Pyracantha x 'Shawnee', PI315887 or NA28179-c, received 10/9/67 is well-adapted. Cuttings have been rooted and plants distributed. Fruits were starting to show color on 8/4/75.

Lagerstroemia indica 'Catawba', PI316671, NA28861-c; 'Conestoga', PI316672, NA28862-c; and 'Powhatan', PI316674, NA28864-c, are well-adapted varieties with excellent large trusses. All have been moved into the campus plantings. They were received 10/11/67.

The following rhododendrons were moved in 1974 and due to a severe drought were pruned very heavily. Some were lost. Rhododendron molle, PI 159034, has 4 plants remaining of the 5 planted. One plant each remains of Rhododendron mucronulatum PI317378 and PI317379 and Rhododendron weyrichii, PI317273.

For those plants received on 3/5/68, the following are well-adapted: Ardisia japonica, NA18686; Bambusa multiplex var. riviereorum, PI77014 or NA 29842; and Pyrrosia lingua, PI235271 or NA26379-d. These have been propagated and distributed. Cedrela fissilis, PI316932 or NA28921, died down each winter. It was moved to the Plaquemines Parish Experiment Station, Port Sulphur. Rhododendron decandrum, PI318656 or NA29131; R. japonicum, PI318657 or NA29132; and R. kuisianum, PI318658 or NA29133 were pruned severely and moved to a new location as mentioned above. Single plants of each remain.

The following plants were received 4/4/68. Amelanchier asiatica, PI317357; Cornus controversa, PI316616; Firmiana simplex, PI317365; Ligustrum ovalifolium 'Argenteum', Pittosporum tobira, PI317259; Pyrus calleryana var. fauriei, PI317371; Styrax japonica, PI316988; and Ulmus pumila var. arborea, PI297426 are well-adapted plants. The Amelanchier is quite susceptible to leaf-spot and defoliates annually very early in late summer. Betula platyphylla var. japonica, PI317211, which had been growing well for six years was moved in spring but died. Cotoneaster lucida, PI313962, and Cotoneaster racemiflora, PI313964 were so susceptible to scale that they were dropped. Iris rossii, PI316648, was dropped since flowers were not outstanding. Lonicera insularis, PI316409; Lonicera sp., PI314263; and Syringa velutina, PI 317293 succumbed due to lack of sufficient hours of chilling during the winter, I think. The ligustrum mutates frequently to green which is much more vigorous than the variegated branches. Hedera rhombea, PI318540, and Rapanea neriifolia 'Taimintachibana', PI227998 died. We were unable to locate Prunus cerasoides,

PI307323, which was transplanted into the landscape plantings. Rosa x fortuneana, PI316528 is very susceptible to black spot and defoliates early in mid-summer. Since we aren't growing vines, Schisandra chinensis, PI316712, which appeared to be well-adapted, were given to the Audubon Arboretum.

The Magnolia hybrids received 9/9/68 including 'Ann', PI326570 or NA28344-c; 'Jane', PI326576 or NA28349-c; 'Judy', PI326571 or NA28345-c; 'Pinkie', PI326577 or NA28351-c; 'Randy', PI326572 or NA28346-c; 'Ricki', PI326573 or NA28347-c; and 'Susan', PI326575 or NA28350-c have all been very precocious in flowering with late summer and fall blooming. Growth has been very slow. The tallest plants are less than 8 feet. Pinkie and Ricki were stolen in 1974 and Randy was stolen this spring. Plants have been propagated and distributed.

Ilex x 'Tanager', PI329155 or NA28322-c, which was received 9/16/68, is an excellent fruiting holly which colors early in the season with its dark yellow fruits. The plant was moved to a holly planting and has been propagated and cuttings distributed.

For the plants received 2/4/69, Acer morrisonense, PI324941; Alnus hirsuta, PI317354; Carpinus kawakamii, PI324959; Gordonia axillaris, PI324982; Lagerstroemia subcostata, PI324994; and Photinia sp., PI 325008 were well-adapted. The maple and hornbeam were moved to the campus. The others are growing at the Burden Research Center. The photinias vary greatly but the flowers and persistent red fruits make this an interesting small tree. One plant is narrow, compact and upright in habit. The 'Callicarpa formosana, PI324954, which annually killed to the ground was dropped as was the Lilium philippinense var. formosanum which reseeded much. Hydrangea chinensis, PI324984, was lost by cultivation. The Lindera erythrocarpa, PI317240 died. Keteleeria davidiana, PI 324993, had injury to the terminal shoot which induced many bottom breaks. This plant has been trained to a single leader and will be propagated. Pine shoot tip moth destroyed all buds on Pinus densiflora, PI317254, and Pinus thunbergii, PI317258. The one remaining plant of Taiwania cryptomerioides, PI325071, which survived transplanting was lost through cultivation injury. All of the hollies seemed to be well-adapted; however, Ilex crenata microphylla, PI317234, which bore black fruit heavily thus scarcely growing, was lost by cultivation. Ilex crenata microphylla, PI317235, fruits so heavily and grows so slowly also that it will be dropped. Ilex montana var. macropoda, PI316704, was propagated and distributed. Of much greater potential as woody ornamentals are the holly varieties all of which appear well-adapted and have both attractive foliage and fruits. These include: 'Albert Close', PI331202; 'William Cowgill', PI331203; 'Howard Dorsett', PI331204; 'Edward Goucher', PI331205; 'Harry Gunning', PI331206; and 'Wirt L. Winn', NA23214-c, which we got 1/28/70. The azalea, 'Ben Morrison', PI337618, is an outstanding well-adapted plant which has been propagated and distributed. The following rhododendrons were lost in moving: PI317270 and PI228004; however, these will grow here. The drought of late summer and early fall took out many established large commonly-planted azaleas. These plants were pruned back heavily and planted about a year previously. Rhododendron kiusianum, PI 226542, survived and has been propagated.

Of the plants received on 3/3/69, Cryptomeria japonica, NA29008, is outstanding. We have propagated and distributed some plants and hope to get

it into the trade. Cunninghamia konishii, NA28521, is an interesting narrow-leaved evergreen with potential. Only terminal cuttings can be used to obtain the upright growth habit. This species appears to be well-adapted and free of insects and diseases thus far. The Quercus chenii 'Nakai', NA827-s, show much variation in the five specimens we have. These were grown from seeds. All are low spreading trees which appear to be slow growing. The tallest specimen is about 25' x 12'; whereas the smallest is about 9' x 11'. These plants have potential use in the landscape as specimen slow-growing trees.

The two bottlebrush species, Callistemon citrinus, PI330375 or NA30282, and Callistemon sieberi, NA30284, were received 10/6/69 and moved 2/3/71 and are excellent well-adapted plants. Attempts to propagate them have failed. The first species has the more attractive red flowers. The Rhaphithamnus venustus, NA27899-c, which died down annually during the winter, was lost.

For the plants received 1/28/70, all appear to be well-adapted here. They include Glyptostrobus lineatus, NA31291; Ilex glabra 'Ivory Queen', NA 14278-c; Ilex x 'Wirt L. Winn'; Quercus robur 'salicifolia', NA15313-1-s; Rhododendron x 'Koromo Shikibu', NA16012-c; and Vaccineum cylndraceum, PI 317614, NA29045-c. The azalea has been used in our breeding program. Flowers have split petals and are fragrant.

In the plants we received on 4/14/70 and 8/28/70, all belong to the Rhododendron genus except two holly varieties - 'Elegance', NA28261-c, and 'Oriole', NA28322-c, both of which are well-adapted and have been relocated in our holly planting. The azalea 'Mrs. LBJ', PI337619, is an excellent white hose-in-hose azalea which has been used in our breeding program and which has been propagated and distributed. We consider it the best white in the Kurume or Japanese-type plants. Rhododendron kanehirai, PI325026, seems to be well-adapted as do the various selections of R. oldhamii: PI325036, PI325037, PI 325038, and PI325039. The R. oldhamii selections with its very dense hairy-leaves are not bothered by the leaf-sucking insects. These selections seem similar in flowers and colors and tend to bloom later in the season. We have used them in our breeding program. Several selections of R. rubropilosum including PI325043, PI325045, PI325048, and PI325582, are growing well; however, all have very small flowers and a narrow upright habit of growth. These azaleas as well as R. obtusum kaemferi, PI275032, have few characteristics in which we are interested, thus might be dropped.

The most outstanding introductions were the Cryptomeria japonica, the two bottlebrush species and the azalea varieties; Mrs. LBJ, Ben Morrison and Koromo Shikibu. Those which I'd list as good with a good potential for future use in landscape plantings are: Shawnee firethorn, the Catawba, Conestoga and Powhatan crape-myrtles, sword fern, varnish tree, Japanese Snowbell, Japanese birch, Faureii calleryana pear, the hybrid Magnolia varieties, the hybrid holly varieties, Morrison's maple, Carpinus kawakamii, Gordonia axillaris and the two oak varieties.

In 1973, 49 woody species, 4 herbaceous and 4 seed packets were received from USDA stations for trial purposes at Louisiana State University. In 1974 there were 30 woody species, 24 herbaceous species, plus 28 groundcover species from the Soil Conservation Service and 91 different PI's received as scions from the Chico, California, Station.

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357996	Yugo.	discard								
357997	Yugo.	E	S	S	S	G	A	M	H	Conc. maturity
357998	Yugo.	no germination								
357999	Yugo.	VL		T						
370025	India	E	S	M	S	G	A	L	L	Cow horn type
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The following rhododendrons were moved in 1974 and due to a severe drought were pruned very heavily. Some were lost. Rhododendron molle, PI 159034, has 4 plants remaining of the 5 planted. One plant each remains of Rhododendron mucronulatum PI317378 and PI317379 and Rhododendron weyrichii, PI317273.

For those plants received on 3/5/68, the following are well-adapted: Ardisia japonica, NA18686; Bambusa multiplex var. riviereorum, PI77014 or NA 29842; and Pyrrosia lingua, PI235271 or NA26379-d. These have been propagated and distributed. Cedrela fissilis, PI316932 or NA28921, died down each winter. It was moved to the Plaquemines Parish Experiment Station, Port Sulphur. Rhododendron decandrum, PI318656 or NA29131; R. japonicum, PI318657 or NA29132; and R. kuisianum, PI318658 or NA29133 were pruned severely and moved to a new location as mentioned above. Single plants of each remain.

The following plants were received 4/4/68. Amelanchier asiatica, PI317357; Cornus controversa, PI316616; Firmiana simplex, PI317365; Ligustrum ovalifolium 'Argenteum', Pittosporum tobira, PI317259; Pyrus calleryana var. fauriei, PI317371; Styrax japonica, PI316988; and Ulmus pumila var. arborea, PI297426 are well-adapted plants. The Amelanchier is quite susceptible to leaf-spot and defoliates annually very early in late summer. Betula platyphylla var. japonica, PI317211, which had been growing well for six years was moved in spring but died. Cotoneaster lucida, PI313962, and Cotoneaster racemiflora, PI313964 were so susceptible to scale that they were dropped. Iris rossii, PI316648, was dropped since flowers were not outstanding. Lonicera insularis, PI316409; Lonicera sp., PI314263; and Syringa velutina, PI 317293 succumbed due to lack of sufficient hours of chilling during the winter, I think. The ligustrum mutates frequently to green which is much more vigorous than the variegated branches. Hedera rhombea, PI318540, and Rapanea neriifolia 'Taimintachibana', PI227998 died. We were unable to locate Prunus cerasoides,

PI307323, which was transplanted into the landscape plantings. Rosa x fortuneana, PI316528 is very susceptible to black spot and defoliates early in mid-summer. Since we aren't growing vines, Schisandra chinensis, PI316712, which appeared to be well-adapted, were given to the Audubon Arboretum.

The Magnolia hybrids received 9/9/68 including 'Ann', PI326570 or NA28344-c; 'Jane', PI326576 or NA28349-c; 'Judy', PI326571 or NA28345-c; 'Pinkie', PI326577 or NA28351-c; 'Randy', PI326572 or NA28346-c; 'Ricki', PI326573 or NA28347-c; and 'Susan', PI326575 or NA28350-c have all been very precocious in flowering with late summer and fall blooming. Growth has been very slow. The tallest plants are less than 8 feet. Pinkie and Ricki were stolen in 1974 and Randy was stolen this spring. Plants have been propagated and distributed.

Ilex x 'Tanager', PI329155 or NA28322-c, which was received 9/16/68, is an excellent fruiting holly which colors early in the season with its dark yellow fruits. The plant was moved to a holly planting and has been propagated and cuttings distributed.

For the plants received 2/4/69, Acer morrisonense, PI324941; Alnus hirsuta, PI317354; Carpinus kawakamii, PI324959; Gordonia axillaris, PI324982; Lagerstroemia subcostata, PI324994; and Photinia sp., PI 325008 were well-adapted. The maple and hornbeam were moved to the campus. The others are growing at the Burden Research Center. The photinias vary greatly but the flowers and persistent red fruits make this an interesting small tree. One plant is narrow, compact and upright in habit. The 'Callicarpa formosana, PI324954, which annually killed to the ground was dropped as was the Lilium philippinense var. formosanum which reseeded much. Hydrangea chinensis, PI324984, was lost by cultivation. The Lindera erythrocarpa, PI317240 died. Keteleeria davidiana, PI 324993, had injury to the terminal shoot which induced many bottom breaks. This plant has been trained to a single leader and will be propagated. Pine shoot tip moth destroyed all buds on Pinus densiflora, PI317254, and Pinus thunbergii, PI317258. The one remaining plant of Taiwania cryptomerioides, PI325071, which survived transplanting was lost through cultivation injury. All of the hollies seemed to be well-adapted; however, Ilex crenata microphylla, PI317234, which bore black fruit heavily thus scarcely growing, was lost by cultivation. Ilex crenata microphylla, PI317235, fruits so heavily and grows so slowly also that it will be dropped. Ilex montana var. macropoda, PI316704, was propagated and distributed. Of much greater potential as woody ornamentals are the holly varieties all of which appear well-adapted and have both attractive foliage and fruits. These include: 'Albert Close', PI331202; 'William Cowgill', PI331203; 'Howard Dorsett', PI331204; 'Edward Goucher', PI331205; 'Harry Gunning', PI331206; and 'Wirt L. Winn', NA23214-c, which we got 1/28/70. The azalea, 'Ben Morrison', PI337618, is an outstanding well-adapted plant which has been propagated and distributed. The following rhododendrons were lost in moving: PI317270 and PI228004; however, these will grow here. The drought of late summer and early fall took out many established large commonly-planted azaleas. These plants were pruned back heavily and planted about a year previously. Rhododendron kiusianum, PI 226542, survived and has been propagated.

Of the plants received on 3/3/69, Cryptomeria japonica, NA29008, is outstanding. We have propagated and distributed some plants and hope to get

it into the trade. Cunninghamia konishii, NA28521, is an interesting narrow-leaved evergreen with potential. Only terminal cuttings can be used to obtain the upright growth habit. This species appears to be well-adapted and free of insects and diseases thus far. The Quercus chenii 'Nakai', NA827-s, show much variation in the five specimens we have. These were grown from seeds. All are low spreading trees which appear to be slow growing. The tallest specimen is about 25' x 12'; whereas the smallest is about 9' x 11'. These plants have potential use in the landscape as specimen slow-growing trees.

The two bottlebrush species, Callistemon citrinus, PI330375 or NA30282, and Callistemon sieberi, NA30284, were received 10/6/69 and moved 2/3/71 and are excellent well-adapted plants. Attempts to propagate them have failed. The first species has the more attractive red flowers. The Rhaphithamnus venustus, NA27899-c, which died down annually during the winter, was lost.

For the plants received 1/28/70, all appear to be well-adapted here. They include Glyptostrobus lineatus, NA31291; Ilex glabra 'Ivory Queen', NA 14278-c; Ilex x 'Wirt L. Winn'; Quercus robur 'salicifolia', NA15313-1-s; Rhododendron x 'Koromo Shikibu', NA16012-c; and Vaccineum cylndraceum, PI 317614, NA29045-c. The azalea has been used in our breeding program. Flowers have split petals and are fragrant.

In the plants we received on 4/14/70 and 8/28/70, all belong to the Rhododendron genus except two holly varieties - 'Elegance', NA28261-c, and 'Oriole', NA28322-c, both of which are well-adapted and have been relocated in our holly planting. The azalea 'Mrs. LBJ', PI337619, is an excellent white hose-in-hose azalea which has been used in our breeding program and which has been propagated and distributed. We consider it the best white in the Kurume or Japanese-type plants. Rhododendron kanehirai, PI325026, seems to be well-adapted as do the various selections of R. oldhamii: PI325036, PI325037, PI 325038, and PI325039. The R. oldhamii selections with its very dense hairy-leaves are not bothered by the leaf-sucking insects. These selections seem similar in flowers and colors and tend to bloom later in the season. We have used them in our breeding program. Several selections of R. rubropilosum including PI325043, PI325045, PI325048, and PI325582, are growing well; however, all have very small flowers and a narrow upright habit of growth. These azaleas as well as R. obtusum kaemferi, PI275032, have few characteristics in which we are interested, thus might be dropped.

The most outstanding introductions were the Cryptomeria japonica, the two bottlebrush species and the azalea varieties; Mrs. LBJ, Ben Morrison and Koromo Shikibu. Those which I'd list as good with a good potential for future use in landscape plantings are: Shawnee firethorn, the Catawba, Conestoga and Powhatan crape-myrtles, sword fern, varnish tree, Japanese Snowbell, Japanese birch, Faureii calleryana pear, the hybrid Magnolia varieties, the hybrid holly varieties, Morrison's maple, Carpinus kawakamii, Gordonia axillaris and the two oak varieties.

In 1973, 49 woody species, 4 herbaceous and 4 seed packets were received from USDA stations for trial purposes at Louisiana State University. In 1974 there were 30 woody species, 24 herbaceous species, plus 28 groundcover species from the Soil Conservation Service and 91 different PI's received as scions from the Chico, California, Station.

Mississippi Representative's Report
S-9 Technical Committee
August 21-22, 1975
Experiment, Georgia
Roy G. Creech

Forages

The cytology, method of reproduction and fertility of six introduced *Paspalum* species were determined and published[1] during the past year. The species studied were *P. alnum* Chase (PI 303957 and PI 303958), *P. brunneum* Trin. (PI 303961), *P. coryphaeum* Trin. (PI 303960 and PI 310039), *P. haumanii* Parodi (PI 304079), *P. proliferum* Arech. (PI 303992), and *P. rufum* Nees. (PI 304083). This investigation was conducted in order to determine how these species might be utilized in the *Paspalum* interspecific hybridization program.

During January and February 1975, Byron L. Burson accompanied W. R. Langford to Brazil, Paraguay, and Uruguay for the purpose of collecting *Paspalum* species. A total of 721 collections were made and 417 were *Paspalums*. More than 50 *Paspalum* species were collected and many are species we have not had prior access to. The material collected is presently being assigned PI numbers and the seed is at Experiment, Georgia. Forty-three *Paspalum* clones were sent to Mississippi. Most were clones of dallisgrass, *P. dilatatum* Poir. and they are presently being studied cytologically in an attempt to find sexual plants which will be of value in improving common dallisgrass.

[1] Burson, B. L. 1975. Cytology of Some Apomictic *Paspalum* Species. Crop Sci. 15:229-232.

Experimental Callie Bermudagrass, selected from PI 290814 in 1966, has been distributed to over 8,000 people in 22 states, 10 countries and 26 universities for evaluation. Preliminary observations suggest that it is adapted to a similar area as Coastal bermudagrass.

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 artifically 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 the 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

(over)

dwarf mosiac, 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.

Cotton

Triple hybrid breeding lines have been used by nearly all cotton breeders. These crosses derived from crossing three wild species of Gossypium (G. arboreum, G. thurberi, and G. herbaceum) were first made in the late 1940's. In the last 10 years at least seven new varieties or strains incorporating triple hybrid germplasm have been released across the cotton belt.

Seven lines which have cytoplasm from wild species and genes from G. hirsutum have been released as germplasm lines in Mississippi. Spider mite resistance has been found in some lines of G. barbadense. Cytoplasmic male sterile lines have been developed from crosses involving G. arboreum and G. harknesii with G. hirsutum. Nectariless has been transferred from G. tomentosum (a wild tetraploid species from Hawaii) to upland breeding lines. Germplasm releases of nectariless lines have been made. Commercial breeders have developed advanced nectariless strains. Nectariless provides some resistance to bollworms and tarnished plant bugs. G. raimondii was the source of Southwestern cotton rust resistance genes used in germplasm releases in Arizona.

One wild species, G. sturtii, has a feberous root system as compared to the normal tap root in upland cotton. This could be important in certain root diseases. A germplasm release has been made by ARS and Alabama of a line carrying resistance to nematodes. This resistance was transferred to upland from a primitive race of G. hirsutum from Mexico. Several of the primitive races of G. hirsutum from Mexico and Central America have been shown to carry genes for boll weevil and bollworm resistance and also resistance to certain diseases of cotton. These lines do not flower in the U. S.; however, excellent progress is being made in breeding flowering genes into these lines.

Introduction numbers of the above materials will be made available on request.

Sorghum

Sorghum plant 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 germplasm used 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. The Meridian, Mississippi Sugar Field Crops Station maintains a collection of 4600 sweet sorghum plant introductions.

BLUEBERRY SPECIES COLLECTION

Dr. Gene J. Galletta

AIM: To collect, classify and establish under garden and field conditions representatives of 27 *Vaccinium* species (including a seed collection where possible) broadly distributed over the Eastern United States.

ORIGINAL USAGE CONCEPTS:

1. Enlarge limited Blueberry Gene Pool for Breeding
2. Cytogenetic analysis of intra- and interspecific recombination patterns
3. Phylogenetic studies using comparative taxonomic (chemical, morphological, ontogenetic and cytogenetic) methods
4. Development of broadly adapted (to soil and climate) blueberries.

PRIMARY COLLECTING AREAS:

Virginia - West Virginia (mountains), Florida - Georgia (2), Arkansas, Wisconsin, New Jersey, North Carolina (western), North Carolina (eastern) - South Carolina, Virginia.

SEED AND/OR SPECIMENS SENT FROM:

USDA (Beltsville), Missouri, Florida, Minnesota, Texas, Mississippi, Washington, Nova Scotia, Hawaii, Japan and Costa Rica.

TYPE OF MATERIALS COLLECTED:

1. Clonal - to represent type, population and horticultural species and natural hybrid representatives.
2. Seed - to reproduce natural population derivatives under field culture for characterization and selection.

SELECTION CRITERIA

1. Adapted to Mid-South (vigorous, disease resistant, fruitful - except for ornamentals).
2. Botanical - type and extreme variants and natural hybrids.
3. Horticultural - outstanding for several plant and fruit characters.

SELECTION PROGRESS:

Clones evaluated - 200
O.P. seedling progenies grown - 165
Selected seedlings - 350
Species selection X cultivar progenies grown - 2
Species hybrid progenies grown - 20

Collection Problems:

1. Variable success in clonal propagation and establishment
2. Species purity variable - introgression common
3. "Overseeding" necessary to secure adapted types
4. Local diseases render some populations unselectable
5. Variable response to environmental, pest, soil and cultural practice fluctuations causes continued mortality, even of selected materials.

CANE CANKER TOLERANCE:

SPECIES	% RESISTANT SEEDLINGS 6 MONTHS FOLLOWING MIXED STRAIN INOCULATION
V. Darrowi O.P.	100
V. Angustifolium O.P. 1	0
V. Angustifolium O.P. 2	30
V. Constablaei O.P.	10
V. Myrtilloides O.P.	40
V. Arboreum O.P.	100
Highbush RXR	80
Highbush RXS 1	20
Highbush RXS 2	0
Highbush SXS	0

CANE CANKER RATINGS OF VACCINIUM SPECIES (28 CLONES) 4 MONTHS AFTER INOCULATION WITH 6 STRAINS OF THE FUNGUS:

A. Resistant Species Sources - V. Darrowi (1 clone), V. Elliottii (4), V. Caesariense (2), V. Macrocapron (1), V. Atroccum (2)
B. Mixed resistance sources - V. Australe (1/4), V. Arkansanum (1/2), V. Ashei (2/3), V. Virgatum (1/2), V. Amoenum (1/2)
C. Susceptible species - V. Fuscatum (1), V. Myrsinites (3), V. Amoenum (1), V. Pallidum (1).

REACTION OF BLUEBERRY SPECIES CLONES TO BUD MITE INFESTATION - January 1975:

A. Species showing no or almost no infestation: V. Arkansanum, Australe, Darrowi, Myrsinites, Myrsinites X Australe, Tenellum, Vacillans, and Virgatum.
B. Species showing about 5% of Weymouth infestation: V. Atrococcum and V. Angustifolium.
C. Species showing about 10-15% of Weymouth infestation: V. Amoenum, Ashei, Ashei X Amoenum.
D. Species showing over 15% of Weymouth infestation: V. Elliottii, V. Corymbosum.

POLLEN ANALYSES OF VACCINIUM SPECIES (X=12):

Ploidy Level	Clones Analyzed	No. Species	Mean Values: % Stainable Pollen	% Unreduced Gametes	Pollen[z] Diam μ
Diploids	27	5	72	2.6	29
Diploid hybrids	4	-	52	0.5	28
Tetraploids	18	5	85	2.0	32
Hexaploids	12	2	82	1.0	35
Heteroploids					
2X X 6X	2	-	28	1.0	36
4X X 6X	1	-	4	0.0	34

[z]Intines only measured.

MID-RIPENING SEQUENCE OF VACCINIUM SPECIES AND CULTIVARS, Castle Hayne, North Carolina - June 5-August 22, 1972:

A. Early (average mid-ripe dates in weeks 1-3) - Weymouth, Morrow, Croatan, Bluecrop, *V. Angustifolium*, V. Myrtilloides, and *V. Pallidum*.
B. Early midseason (ripening weeks 1 or 2 to 4 or 5)- *V. Elliottii*, and *V. Atrococcum*.
C. Midseason (average mid-ripe date weeks 4-6) - *V. Corymbosum*, *V. Australe* (3 populations), *V. Arkansanum*, Berkeley and Tifblue.
D. Late (average mid-ripe date weeks 7-9) - *V. Darrowi*, Homebell, Garden Blue, *V. Myrsinites*, *V. Tenellum*, *V. Virgatum*, *V. Amoenum*, *V. Ashei* (2 populations), and *V. Stamineum*.

STUDIES COMPLETED OR BEING ANALYZED:

1. Fruit characterization - pigment concentration, firmness, size, stem detachment pull force, acidity, soluble solids
2. Plant characterization - plant size and habit; leaf shape, margin length, width, color, glands; fruit color and diameter; stem and leaf pubescence
3. Breeding biology of the purported diploid ancestors of *V. Ashei*
4. Ornamental blueberry selection
5. Blueberry rootstock selection.

STUDIES IN PROGRESS:

1. Bloom and ripening time correlations
2. Chromosome pairing and disjunction patterns in species and species hybrids
3. Systematic species hybridization and characterization
4. Rooting and intergrafting potential comparisons.

PROGRAM COOPERATORS:

Susan Hall: M.S. degree, Botany - North Carolina State University
Larry Cockerham: M.S. degree, Botany - North Carolina State University
Jim Ballington: Ph.D. degree, Horticulture - North Carolina State University
Dr. R. D. Millholland: Plant Pathology
Dr. H. H. Neunzig: Entomology
Dr. W. E. Ballinger: Horticulture
Dr. L. J. Kushman: Horticulture
Dr. C. M. Mainland: Horticulture

PRESENTATIONS:

"Blueberry species characterization for parent potential." Fruit Breeding Symposium, July 22-24, 1975, Beltsville Ag Research Center.

"Ripening of *Vaccinium* species in Eastern North Carolina", August 25-29, American Society of Horticulture Science, Hawaii.

North Carolina - New Plants Project

Report of W. T. Fike to S-9 Technical Committee, Experiment, Georgia, August 21-22, 1975.

Of the 27 campus research personnel who receive P.I. catalogues and information through my office, and others who receive information direct, four cooperators received a total of 80 lines consisting of 11 species of 7 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 Varieties Released

No new varieties were released during the 1974-75 reporting period with plant introductions in their pedigrees.

B. Plant Introductions of Special Interest

1. Dr. D. C. Zeiger is attempting to bud apple onto P.I. 358790 *Contoneaster lucida* and P.I. 325010 *Photinia sp.* He is also interested in any of the Rosaceae as possible apple rootstocks.

2. Dr. J. C. Wynne reports that the peanut line P.I. 121067 shows tolerance to the new peanut disease *Cylindrocladium crotalarium* - Black Rot, as well as resistance to the corn rootworm. From the screening program of over 2000 peanut lines (many P.I's) it has been found that the Spanish types have shown tolerance to the Black Root Rot disease.

3. Dr. D. H. Timothy reports that the Pennisetums of previous years are still being tested at more advanced stages for adaptation and yield.

4. Dr. R. L. Lower reported that the complete collection of *Cucumis sativus* has been evaluated by Dr. A. R. Quisumbing and Dr. McCreight for resistance to the cucumber beetle and the pickle worm. The results of these screening programs will be published this Fall.

C. Evaluation of Potential New Crops

1. The fiber crops kenaf, jute, flax and sunn hemp are being evaluated for their yields of bast fiber to be used in making a quality paper product. Varieties, populations and row-widths, nitrogen levels and harvesting dates are being screened at two locations. All plots look good at this time.

2. Four sirup sorghum varieties and three sugar sorghum varieties were evaluated for yield and quality of carbohydrate juices to be used as raw materials in a fermentation process.

3. Sixteen sunflower varieties, both oilseed and birdfood types, are being grown at the Piedmont Research Station at Salisbury. These varieties are part of a Regional Variety Test.

4. Other crops being evaluated for various purposes are Deer-Tongue and Catnip. Plants from these crops are presently collected from the Wild but a scarcity of pickers coupled with an increased demand make the cultivation of these crops possible on a limited contract acreage.

D. Requests for Foreign Explorations

1. In answer to requests for material from the South American Exploration Dr. Will Cope backed the request for various *Trifolium* spp. from Pryce Gibson of Clemson. In addition, Dr. David Timothy requested *Tripsacium* and *Paspalum* spp. collected at selected places in Paraguay and Brazil.

E. Vaccinium Species Collection - Dr. Gene Galletta

An abstract of Gene's talk at Beltsville follows entitled "Blueberry Species Characterization for Parent Potential." An outline of his work appears also on the following pages. Dr. Galletta plans to get the S-9 Blueberry Publication ready this Fall.

"The blueberry species collection located at Castle Hayne and Raleigh, North Carolina has passed through one generation of characterization and selection. More than 200 clones and 150 open pollinated seed progenies have been screened for potential usefulness. Approximately 350 selected seedlings have been propagated and are growing to maturity. These selected seedlings and clones will now be further characterized for potential parent use in a systematic species hybridization study. The principal criteria to be employed in the second round of selection are continued vigor, disease resistance, productivity and horticultural or botanical traits of interest.

The interest and expertise of a number of colleagues and students has made it possible to survey portions of the collection for resistance to fungus and mite pests, and to characterize plant, fruit, chromosome, pollen, seed and compatibility relationships.

Some of the major findings to date follow: The diploid Cyanococcus species (true blueberries) genome is quite uniform, suggesting that the remarkable array of variation within and between species is largely genic in origin; sources of practically any desirable horticultural blueberry trait can be found among the collected species; practically all of the species produce a small number of unreduced gametes, making the postulated origin of polyploids from the diploids feasible; the polyploid species frequently show higher potential fertility and adaptability than the diploid species representatives; there is a fair amount of natural hybridization in the wild, but gene exchange between homoploid species may be more limited than previously supposed; species hybrids continue to offer some of the most exciting possibilities for the development of more useful and broadly adapted blueberries."

1975 S-9 Report, Oklahoma Agricultural Experiment Station

Charles Galeotti, James Kirby and Ralph S. Matlock

PULSE CROPS

Cowpeas (*Vigna unguiculata*)

Sixteen and twelve cowpea varieties and strains are being yield tested near Perkins and Stratford, respectively, in 1975. Data from the 1974 tests at these two locations are reported in Tables 1 and 2.

Forty-two cowpea varieties, P.I.'s and selections are being evaluated in a Fusarium wilt nursery near Stillwater in 1975. The 1974 data from this study has not been summarized.

Mungbeans (*Vigna radiata*)

Data for the 1974 uniform tests are reported in Table 3. Twenty-four mungbean varieties and selections are being grown in uniform tests in 1975 near Perkins, Mangum, Stratford and Lahoma. These twenty-four entries were planted in a late planting at Mangum in addition to the early planting.

Oklahoma is again cooperating in the International Mungbean Nursery in 1975. The 30 entries in the 1975 International nursery are being evaluated near Perkins. Data from the 1974 nursery are reported in Table 4.

Additional mungbean tests in 1975 include a preliminary test of 12 entries near Perkins and a first test of lines received from the Asian Vegetable Research and Development Center in Taiwan. The test includes 36 entries at Perkins. Sixteen of these entries were selected for evaluation at Lahoma in 1975. Individual plants selected from the 37 bulk hybrid segregating seed populations received from the AVRDC in 1974 have been planted at Perkins for additional evaluation and selection in 1975.

Chickpeas (*Cicer arietinum*)

Ten chickpea accessions were planted in a yield test at Stillwater on March 24, 1975. The test was harvested July 17, 1975 and the data are reported in Table 5. Each plot consisted of four 20-inch rows, 10 feet long.

Lentils (*Lens esculenta*)

Seventeen lentil accessions were grown in a scarce seed nursery in the Spring of 1975 near Stillwater. Eight accessions were planted in a replicated yield test. Data for the 1975 test have not been summarized.

Field Beans (*Phaseolous vulgaris*)

Recent interest in field bean production in Oklahoma prompted the testing of 10 field bean varieties at Perkins, Mangum and Goodwell in 1975. The data will be reported in 1976.

Field Peas (*Pisum arvense*)

Two winter field pea tests were planted at Stillwater. A Fall planting was s made on October 10, 1974 and was harvested July 2, 1975. The Spring planting was planted March 6, 1975 and harvested July 3, 1975. The combination of low germinating seed for some entries plus winter killing plus very heavy mildew in the spring gave very poor production for the ten field pea entries. Although better stands were obtained for the spring planting, the mildew greatly reduced yields and performance was again very poor.

Two lupine varieties, Frost and Hope, were included in the field pea plantings. The Hope white lupine produced 893 lb/acre from the fall planting while the Frost blue lupine produced 544 lb/acre in the fall planting. The Frost blue lupine seed shattered quite badly while the Hope white lupine appeared to be relatively free of shattering. Both varieties performed very poorly from the spring planting.

OILSEED CROPS

Brassica Spp.

Nine *Brassica* accessions and one *Crambe* accession were planted in a yield test at Stillwater on March 21, 1975. This test has been harvested but the data are not yet available.

Sunflower (*Helianthus annuus*)

With the appointment of Dr. Roy Stafford of Vernon, Texas as the coordinator for the Regional Sunflower Testing Program to replace Dr. Murray Kinman, Oklahoma resumed the evaluation of sunflower hybrids. Eleven varieties and hybrids were received for uniform tests at Perkins, Tipton and Mangum. A late planted test at Mangum had two additional entries. Data from these tests are not yet available.

MUCILAGE CROPS

Guar (*Cyamopsis tetragonoloba*)

Data from the 1974 regional guar tests at five locations are reported in Table 6.

The 1975 regional guar test again has 24 entries but is being tested only at Perkins, Chickasha, Tipton and Mangum in Oklahoma. The Ft. Cobb location was dropped due to other commitments.

The Oklahoma Agricultural Experiment Station cooperated with the U.S. Department of Agriculture and the Texas Agricultural Experiment Station in the release of Kinman and Esser guar varieties in January, 1975.

FORAGE CROPS

C.L. Dewald, Range Agronomist
U.S. Southern Great Plains Field Station, Woodward

Preliminary Report on Old World bluestem selections from Plant Introduction material grown at Woodward, Oklahoma.

Two hundred and fifty-two accessions of Old World bluestems were established at Woodward, Oklahoma in the spring of 1972.

After 3 years observation 14 (P.I.) accessions were selected for further evaluation based on their apparent productivity and persistence. They are listed below:

Row No.	P.I. Number	Okla. Accession No.	Bothriochloa	Drought tolerance rating	
304	301609	A-8937-A	ischaemum	1	
306	301601	A-8933-C	ischaemum	2	
309	301564	A-8904-C	ischaemum	2	
339	301496	A-4777	ischaemum	2	(small)
340	301494	A-4252	ischaemum	2	(small)
398	301556	A-8899-A	ischaemum	3	*
401	301557	A-8899-D	ischaemum	1	
402	301558	A-8899-E	ischaemum	2	
406	301561	A-8903-A	ischaemum	1	
409	301562	A-8903-B	ischaemum	1	
496	300741	A-4442	intermedia	1	*
498	300745	A-4603	intermedia	1	*
511	300771	A-6561	intermedia	2	
517	301549	A-8894-B	ischaemum	1	

1. P.I. accessions which remained green and made some growth during a short drought in late June to mid-July, 1975. Caucasian bluestem and other accessions browned off during this period.

2. P.I. accessions which browned off during a short drought in late June to mid-July, 1975, but made good regrowth following the first rain.

3. P.I. accessions which failed to make a quick comeback after a short drought in late June to mid-July, 1975.

* P.I. accessions which made a poor spring recovery (less than 50% of the tillers on the old crowns regrew) following the winter of 1974-75.

The most promising P.I. accessions tested at Woodward to date are listed below:

P.I. 301609	P.I. 301557	P.I. 301562
P.I. 301601	P.I. 301558	P.I. 300771
P.I. 301564	P.I. 301561	P.I. 301549

ORNAMENTALS

Carl E. Whitcomb
Department of Horticulture

Lagerstroemia indica	- PI 1316674	- Powhattan)	All three are performing well.
Lagerstroemia indica	- PI 1316672	- Conestoga)	No mildew problems after approxi-
Lagerstroemia indica	- PI 1316671	- Catawba)	mately 4 years.

Koelreuteria elegans - NA 35212

The first plants set out in July 1974 did not survive the winter. Other plants are being grown on in containers and will be planted in the spring of 1965.

Tetracentron sinense - NA 34779

In a container, but very drought sensitive and susceptible to grasshopper injury.

Petteria ramentacae - NA 33957

In a container, defoliated by grasshoppers twice, now dead.

Carpinus orientalis - NA 35101

Growing well in a container - to be planted out spring 1976.

Pinus michoacana - NA 34693

Growing well in containers - to be planted out spring 1976.

Ligustrum vulgare - NA 35139

Grows well but loose, open growth - of little value as an ornamental.

Pyracantha 'Mojave' - NA 32225-C

Growing and fruiting well. Well adapted.

Betula platyphylla - NA 33520, PI 361136

Growing very well on a dry site of heavy clay soil. A most impressive tree.

Pinus brutia - NA 33064, PI 271431

Growing well, no problems. Well adapted

Ilex spp. - PI 377618

Planted spring 1974. Only slight growth, some grasshopper injury, generally of little landscape value.

Acer distylum - NA 31120

Planted spring 1974. Fair growth but appears to be drought sensitive, i.e., leaf scorch and drop.

Hydrangea scandens, subsp. chinensis - NA 31487-C

Leaf scorched severely and died before planting in the field.

Salix fragilis - PI 370126

Growing poorly - leaf spot, dry wind leaf scorch and grasshopper injury.

Quercus acutissima

Now approximately 30 feet and growing very well. A good tree, well adapted to the southern plains.

Camellia japonica - 309009, 309019, 319163, 309164, 320889

Identity lost, but all are growing well.

Tilia dasyslyla - PI 61922

Seed. Germination poor but 2 plants were obtained and will be planted spring 1976.

Gleditsia heterophylla - PI 61922

Seed from Chico, California. A few seed germinated but non survived transplanting.

Cornus - PI 367881

Much leaf desiccation, then death.

Acer buergerianum - PI 44660

Seed from Chico, California. No germination.

Celtis caucasica - PI 32981

Seed from Chico, California. Several seedlings are being grown in containers for planting spring 1976.

Rhomnus utilis - PI 99202

Seed from Chico, California. Several seedlings being grown in containers for planting spring 1976.

Sapindus utilis - PI 18436

Seed from Chico, California. Several seedlings are being grown in containers for planting spring 1976.

Sorbus torminalis - PI 358440

Dead.

Clematis spp. - PI 358786, 358787, 358788.

Growing vigorously. Appear to be weeds.

Hypericum sp. - PI 358791

Leaf desiccation and death soon after planting out.

Ilex verticillata cacapon - PI 377678) Both dead, but doubtful if it was
Ilex verticillata Fairfax - PI 377679) due to environment.

Rhododendron austrinum - NA 10060-C

Flowered well the first spring after planting but leaf scorched severely, died second winter.

Table 1
1974 Cowpea Variety Test
Agronomy Research Station, Perkins
Soil Type - Teller Loam

Entry No.	Okla. C-No.	Identity	Yield Lbs./A.	Gms/100 Seeds	Plant Ht.(in.)	Lodging	Shatter	First Bloom	First Pod	Seed Quality
1	22	Black Autry	352	4.7	21.0	2.3	1.3	8-10	8-16	1.7
2	58	Bunch Purplehull	276	17.9	13.0	2.3	2.0	7-4	7-9	2.7
3	65	White B.E. Crowder	395	18.2	13.7	3.3	2.3	7-25	7-30	1.7
4	70	Early Sugar Crowder	457	19.7	13.3	3.7	2.0	7-30	8-4	1.7
5	238	Blackeye 1239	335	22.5	19.0	3.0	1.7	7-25	7-30	2.7
6	289	Miss. Brown Crowder	350	17.1	17.3	3.0	2.0	7-26	7-31	2.0
7	403	B71-B44A2x I-(7)A	659	8.2	24.0	1.7	1.0	7-17	7-20	1.7
8	615	Knuckle Purplehull	180	19.1	15.0	3.0	1.7	7-17	7-20	3.0
9	620	Topset	345	12.1	12.3	2.0	2.3	7-18	7-21	2.3
10	622	Arkansas 83	452	16.8	15.7	2.0	2.0	7-13	7-15	2.3
11	623	Arkansas 115	242	16.8	19.0	2.0	2.0	7-18	7-21	2.3
12	637	Silverhull Crowder	391	25.0	12.3	4.0	2.3	7-26	7-31	2.0
13	677	Ligon Blackeye	730	19.4	20.7	2.0	2.0	7-16	7-18	2.0
14	702	P.I. 200867	538	10.1	12.7	4.0	1.3	7-26	7-31	1.7
15	715	6 wk. Browneye	338	10.9	13.0	2.3	2.0	7-11	7-15	1.7
16	720	Two Crop Brown	339	15.8	21.0	2.3	2.0	7-24	7-29	2.3
17	721	Ladyfinger	432	10.6	17.3	2.7	2.0	7-30	8-4	1.7
18	727	Mississippi Silver	476	22.1	15.3	3.7	2.0	7-16	7-18	1.7
19	785	Mississippi Purple	463	23.3	14.7	3.0	2.0	7-16	7-18	2.7
20	787	Pinkeye Purplehull	399	18.8	14.3	2.3	2.0	7-14	7-17	2.3
		Location Mean	407	16.46	16.23	2.73	1.90	7-21	7-25	2.11

Table 2
1974 Cowpea Variety Test
Agronomy Research Station, Stratford
Soil Type - Shellabarger Sandy Loam

Entry No.	Okla. C-No.	Identity	Yield Lbs/A.	Gms/100 Seeds	Plant Ht.(in.)	First Bloom	First Pod	Seed Quality
1	22	Black Autry	251	4.5	23.0	8-5	8-10	1.3
2	58	Bunch Purplehull	310	21.6	11.0	7-10	7-15	2.0
3	65	White B. E. Crowder	714	17.3	13.0	7-30	8-3	1.0
4	70	Early Sugar Crowder	678	16.5	14.0	7-21	7-25	2.0
5	238	Blackeye 1239	407	19.1	15.7	7-17	7-22	3.0
6	289	Miss. Brown Crowder	546	15.5	17.7	7-18	7-25	3.0
7	403	B71-B44A2x I-(7)A	422	7.8	25.3	7-15	7-19	3.0
8	615	Knuckle Purplehull	418	21.0	14.3	7-16	7-21	3.0
9	620	Topset	524	14.3	10.7	7-15	7-19	2.0
10	622	Arkansas 83	629	18.1	14.7	7-16	7-20	1.0
11	623	Arkansas 115	273	18.0	16.3	7-19	7-25	1.3
12	637	Silverhull Crowder	981	24.8	11.0	7-22	7-25	1.0
13	677	Ligon Blackeye	760	20.3	16.3	7-18	7-23	1.3
14	702	P.I. 200867	---	----	----	----	----	---
15	715	6 wk. Browneye	535	12.4	12.3	7-12	7-17	1.0
16	720	Two Crop Brown	447	18.1	20.0	7-18	7-21	1.3
17	721	Ladyfinger	691	11.3	15.7	7-23	7-28	1.0
18	727	Mississippi Silver	---	----	----	----	----	---
19	785	Mississippi Purple	605	24.5	15.0	7-12	7-17	2.0
20	787	Pinkeye Purplehull	582	11.4	15.7	7-12	7-18	1.0
		Location Mean	543	16.47	15.65	7-18	7-23	1.73

Table 3
MUNGBEAN VARIETY AND STRAIN TESTS

Oklahoma - 1974

Yield (#/A)

Okla. M-No.	Entry	Perkins	Stratford	Mangum	Lahoma	Stillwater*	5 Loc. Mean	Rank
3	Okla. 12	601	996	500	1344	880	864	15
339	Berken	569	997	428	1223	1043	852	18
882	Lincoln	635	1133	880	1307	1500	1091	1
	966-71-1	523	971	420	1307	1063	857	17
	966-71-4	578	1021	642	1112	1367	944	7
	966-71-5	541	1054	403	1245	1064	861	16
	966-71-7	603	1111	1097	859	933	921	11
	966-71-8	494	1044	422	1071	1300	866	14
	966-71-10	730	1167	708	1207	1340	1030	3
	967-71-9	625	1142	790	1006	1143	941	8
	967-71-15	634	973	1002	948	1091	930	10
	967-71-17	621	1293	573	1216	1243	989	5
	967-71-22	654	1332	871	1026	972	971	6
	967-71-26	588	1164	1017	1044	1220	1011	4
	968-71-1	649	1121	640	1020	1253	938	9
	968-71-5	551	--	351	1133	1247	---	
	968-71-6	594	1135	365	1119	1217	886	12
	968-71-18	545	--	495	1203	1132	---	
	968-71-28	547	1148	980	631	1053	872	13
2293	Morden 39	667	1346	556	1397	1233	1040	2
	Location Mean	598	1120	657	1121	1165	937	

* Planted following small grains in 20" rows.

Table 4
1974 International Mungbean Nursery Yield Test
Agronomy Research Station - Perkins
Soil Type - Teller Loam

Entry No.	Missouri M-No.	Identity	Yield kg/ha	GM/1000 Seed	Lodging	Shatter	First Bloom	First Pod	Plant ht-cm	Seeds Per Pod	Seed Quality	Rank
1	4	P.I. 368268	759	56.7	3.0	1.7	7-3	7-4	37.3	11.3	3.0	9
2	14	P.I. 368278	516	68.7	2.7	2.0	7-18	7-19	40.6	8.7	3.0	27
3	15	P.I. 368279	739	76.7	2.3	3.0	7-10	7-11	37.2	9.7	1.5	12
4	76	Okla. 12	509	45.3	1.7	2.0	7-8	7-9	27.9	9.0	1.3	29
5	90	P.I. 223711	665	67.3	3.0	2.0	7-18	7-19	36.4	8.7	2.0	17
6	118	P.I. 180311	888	44.7	3.3	2.0	7-11	7-12	38.9	9.3	2.0	4
7	174	P.I. 164775	655	71.3	2.7	2.0	7-12	7-13	42.3	9.0	2.2	19
8	194	P.I. 180313	645	67.3	3.7	2.0	7-18	7-19	36.4	10.3	1.5	22
9	232	P.I. 212907	653	60.7	3.0	2.0	7-13	7-14	38.1	10.3	1.5	20
10	317	P.I. 298915	684	80.0	1.0	2.0	7-12	7-13	44.0	10.7	3.5	14
11	333	P.I. 374146	539	46.0	2.0	2.0	7-11	7-12	41.5	8.7	1.5	25
12	339	P.I. 362327	753	50.0	2.0	2.0	7-7	7-8	30.5	10.3	2.0	11
13	350	P.I. 362322	651	46.7	2.0	2.0	7-5	7-6	39.8	9.7	2.7	21
14	374	P.I. 369768	525	74.7	1.7	2.0	7-5	7-6	33.9	7.7	3.3	26
15	408	P.I. 378022	676	58.7	1.7	2.0	7-3	7-4	36.4	9.0	2.9	16
16	409	P.I. 378023	805	64.7	3.0	2.0	7-11	7-12	39.0	9.7	1.7	5
17	411	P.I. 370637	677	40.7	1.0	2.0	7-10	7-11	61.8	9.7	1.5	15
18	412	P.I. 370638	611	45.3	1.0	2.0	7-19	7-20	60.1	8.7	1.5	24
19	416	P.I. 371816	388	62.0	1.0	2.0	7-3	7-4	44.0	8.3	4.0	29
20	475	Kanke Multipurpose	656	72.0	3.0	2.0	7-10	7-11	33.9	9.7	2.0	18
21	531	48-071-10961	769	64.0	2.7	2.0	7-9	7-10	32.2	11.7	3.0	8
22	533	P.I. 377902	619	43.3	1.3	2.0	7-7	7-8	42.3	9.3	2.5	23
23	545	P.I. 377916	346	72.7	1.0	2.0	7-10	7-11	46.6	8.3	3.0	30
24	1132	Lincoln	755	72.0	2.3	2.0	7-11	7-12	40.6	11.7	2.0	10
25	1133	M-966-71-10	981	70.0	2.7	2.0	7-17	7-18	36.4	9.7	2.0	2
26	1134	M-967-71-15	1015	56.7	2.3	2.0	7-17	7-18	33.9	11.0	1.3	1

Table 4 con't.
1974 International Mungbean Nursery Yield Test
Agronomy Research Station - Perkins
Soil Type - Teller Loam
(continued)

Entry No.	Missouri M-No.	Identity	Yield kg/ha	GM/1000 Seed	Lodging	Shatter	First Bloom	First Pod	Plant ht-cm	Seeds Per Pod	Seed Quality	Rank
27	1135	M-967-71-22	936	81.3	3.0	2.0	7-12	7-13	40.6	12.7	1.7	3
28	1136	M-968-71-1	779	78.7	2.0	2.0	7-11	7-12	41.5	11.0	2.2	7
29	-	Berken	731	69.3	1.3	2.0	7-7	7-8	41.5	8.3	2.2	13
30	-	M-967-71-17	790	78.7	1.7	2.0	7-16	7-17	50.8	11.3	1.5	6
		Mean	691	62.9	2.2	2.02	7-11	7-12	40.2	9.8		

AOV

Sources	df	SS	MS	Cal. F.	
Total	89	2517142 455			
Treatments	29	2059800 455	71027.601	9.737	* *
Reps	2	34267 488	17133.744	2.348	
Error	58	423074 511	7294.388		

CV.= 12.30%

* * Significant at the .01 level of probability

Table 5
1975 Chickpea Yield Test
Agronomy Research Station - Stillwater
Soil Type - Kirkland Silt Loam

Okla. Cp-No.	Identity	Yield lbs/A	Gms/100 Seeds	Plant Ht.(in.)	First Bloom	First Pod
54	P.I. 257583	1232	10.5	11.7	5-18	6-2
177	P.I. 269881	1252	10.9	13.3	5-21	6-5
196	P.I. 297275	823	10.8	11.7	5-20	6-4
200	P.I. 315784	941	10.7	10.3	5-20	6-2
216	P.I. 315800	1169	10.4	11.7	5-21	6-4
219	P.I. 315803	1444	11.3	12.0	5-20	6-4
231	P.I. 315815	657	17.1	9.3	5-15	6-2
235	P.I. 315819	1213	10.4	12.7	5-21	6-4
246	P.I. 315830	1021	13.4	12.3	5-18	6-2
355	(Nanu)	591	9.9	11.7	5-18	6-2
	Mean	1034	11.54	11.67	5-19	6-3

C.V. = 16.19%

Table 6

REGIONAL GUAR VARIETY TESTS

Oklahoma - 1974

Yield (#/A)

Entry No.	Entry	Perkins	Chickasha	Ft. Cobb	Mangum	Tipton	5 Loc Mean	Rank
1	Brooks	942	878	1175	1528	1675	1240	10
2	Hall	977	1154	1129	1376	1706	1268	6
3	Mills	645	368	673	1266	1556	902	24
4	Esser	1006	808	860	1586	1746	1201	15
5	T64001-7-10-1-3-2-1-B	875	903	1041	1594	1443	1171	19
6	T64001-7-10-1-4-B	829	951	1109	1604	1658	1230	12
7	T64001-1-12-14-1-3-B	1034	999	1295	1502	1739	1314	2
8	T64001-36-8-1-6-1-B-B	835	906	1126	1603	1683	1231	11
9	T64001-36-8-4-8-1-B	893	1032	1089	1579	1673	1253	9
10	T64001-36-8-B-5-1	863	1104	1186	1559	1619	1266	7
11	T64001-36-8-B-5-3-2-B	819	808	1216	1448	1445	1147	22
12	T65001-6-2-4-B	975	745	1053	1523	1769	1213	14
13	T68009-2-8-7-B	760	749	1013	1431	1400	1071	23
14	OKG-1453	910	899	1221	1447	1299	1155	20
15	T64001-7-10-1-4-B-8-B	885	898	1045	1630	1655	1223	13
16	T64001-12-1-B-3-2-B-B	959	833	1139	1360	1634	1185	16
17	T64001-16-5-1-1-2-B	861	1054	1173	1697	1741	1305	3
18	T64001-26-9-2-1-B-1-B	891	774	1299	1598	1716	1256	8
19	T64001-26-9-2-2-2-B	962	956	1351	1501	1635	1281	5
20	Kinman	1166	712	1054	1794	1708	1287	4
21	T64001-29-2-B-4-B	977	978	1353	1561	1776	1329	1
22	T64001-29-11-2-2-3-B-B	852	821	1054	1513	1505	1149	21
23	T64001-29-11-2-3-B-B	777	1011	1241	1510	1352	1178	17
24	T64001-30-1-3-3-B	920	764	1346	1259	1592	1176	18
	Location Mean	900	879	1135	1519	1613	1209	

NEW CROPS RESEARCH IN PUERTO RICO
Annual Report Nov. 1974 - June 1975

Oscar D. Ramírez
Plant Breeding Department
Agricultural Experiment Station
University of Puerto Rico
Río Piedras, Puerto Rico 00928

During the period from November 1974 to June 1975, a total of 138 accessions were received. These were grouped as grasses, 20; legumes, 27; ornamentals, 66; root crops 14; and miscellaneous 11.

FRUITS
(A. Torres and L. B. Ortiz)

All fruit collections have been properly managed at the various substations. Data is being collected from the sapodilla (Manilkara sapota) cultivars planted at Fortuna. As reported last year there are very promising selections, as to size and flavor of the fruit. Very few are in production as yet. The most promising are being propagated for further testing.

As to avocados, an introduction received from Florida (M-4), described as a promising dwarf stock is being increased for testing.

The work on llama (Annona diversifolia) was discontinued at Fortuna and Isabela substations. Seems that this fruit is not adapted to conditions in those areas, coastal plains, hot and dry.

COFFEE
(C. J. Torres)

Germination of the beans of the new variety of coffee Paces, received from El Salvador, was very poor. Only 50 seedlings were obtained from one pound of seed. They are planted on polyethylene bags in the coffee nursery to be planted later in the field.

All valuable material in the coffee collection is maintained in small plots as a source of stock for future work.

ORNAMENTALS
(O. D. Ramírez)

The bougainvilleas continue to be the material best adapted to our conditions. A marked variation as to the color of the blooms has been observed as well as to their habit of growth and their rooting ability.

Of the twenty six cultivars under observation three were found to produce seed, Lady Mary Maxwell (P.I. 380551), Jennifer Fernie (P.I. 380549) and Sanderiana (P.I. 380556). This is a very important finding, due to the fact that most bougainvilleas do not produce seed. These constitute valuable germplasm for a breeding program in which they can be use as mother plants.

The New Guinea Creeper (Mucuna bennettii) P.R.P.I. No. 11598) bloomed last year with very showy flowers, but no seed was set. Hand pollinations will be attempted in an effort to obtain some seed. Also propagation by cuttings will be tried.

Ornamental proteas belong to the Family Proteacea. They are used as landscape plants, but because most flowers last three weeks when fresh and make good dried specimens they are more popular as cut flowers. They are being grown commercially in Hawaii and California, besides their native countries, Australia, New Zeland and South Africa.

Twenty different species belonging to 4 different genus of the Family Proteacea were received. The seed was planted and the germination was very poor and irregular. It seems that our climate is not favorable for this Family.

Also 60 cultivars of ornamental peppers were received from the Southern Regional Plant Introduction Station, Experiment, Georgia. The seed was planted and segregation was observed in the progenies of many of the cultivars. Data will be taken as to their potentialities as ornamentals.

ROOT CROPS
(O. D. Ramírez)

Fourteen yam varieties were received for evaluation. Of these seven were planted in a propagation planting in concrete beds, in a balanced incomplete block design in order to obtain preliminary yield data and to increase the material for further tests. The other seven were planted later in a similar design. All the yams belong to the species alata.

Two papers on yams were published during this year.

1. Ramírez, O. D., Preliminary evaluation of various introduced varieties of yam. J. Agr. Univ. P.R. 59 (2): 136-37, 1975.

2. _____ and Rodríguez, J. A., Performance of yam varieties in East-Central Puerto Rico. J. Agr. Univ. P.R. 59 (3): 182-85, 1975.

FORAGES
(J. Vélez-Santiago)

Twenty seven varieties of alfalfa (Medicago sativa) were received and planted for evaluation in an experiment at Corozal substation. The same varieties will be planted at Fortuna, in the Southern Coast where it is drier.

Also 20 forage grasses are under evaluation at Corozal.

ANNUAL REPORT
NEW CROPS RESEARCH IN SOUTH CAROLINA
R. G. HALFACRE
NOVEMBER 1974 TO JULY 1975

S-9 Technical Committee Meeting
Experiment, Georgia, Griffin, Georgia
August 21-22, 1975

There were 337 accessions of seeds and plants distributed to co-operators in South Carolina since November 1974. These accessions, along with promising accessions received in prior years, have been isolated and increased for use in various evaluation and breeding programs.

Reports from cooperators are presented as follows:

Dr. Pryce B. Gibson, U.S.D.A. - A.R.S., Clemson University, Clemson, South Carolina

A request for a plant exploration on Trifolium was submitted to Dr. R. G. Halfacre and at that time Dr. Halfacre forwarded this request to Dr. Creech.

There is interest in the chromosome number of P.I.'s of Trifolium ambiguum and Trifolium montanum from different countries. These are being used to breed for resistance to viruses which infect white clover. The basic challenge is to breed resistance by hydridization.

Dr. A. R. Mazur, Department of Horticulture, Clemson University, Clemson, South Carolina

Most of our new grass accessions have been received in the last two months and our major thrust to date is increasing the germ plasm. When sufficient quantities of germ plasm are produced these grasses will be evaluated for roadside stabilization and turf management programs.

John A. Floyd, Jr., Department of Horticulture, Clemson University, Clemson, South Carolina

The major thrust of our work with woody ornamental plant introductions has been distribution to nurserymen and making the public aware of their value. The following plants have been distributed to nurserymen in Georgia and South Carolina:

Azalea 'Ben Morrison'
Azalea 'Mrs. L.B.J.'
Trachleospernum asiaticum var. *oblanceolatum*
Osmarea x 'Burkwoodi'
Viburuum sargenti
Camellia sinensis
Hibiscus syriacus 'White Beauty'
Lagerstroemia indica 'Potomac'
Osmanthus heterophyllus 'Purpureus'
Osmanthus heterophyllus 'Variegatus'

S-9 TECHNICAL COMMITTEE REPORT

University of Tennessee
Agricultural Experiment Station
Knoxville, Tennessee 37916

October 1974-August 1975

M. J. Constantin

Cooperators in Tennessee received 203 accessions of plant introduction material during the reporting period. The majority of these accessions was of maize.

The following programs involving plant introduction material are underway at the University of Tennessee:

1) *Resistance to Corn Earworms*. L. M. Josephson of the Plant and Soil Science Department is continuing to use Zapalote Chico (PI 217413) as a source of resistance to corn earworms. This resistance is being transferred to Tennessee inbred lines that are used in the production of Tennessee hybrids.

2) *Mutation Induction in Soybeans*. N. S. Hall of the Department of Agricultural Biology and L. N. Skold of the Plant and Soil Science Department are working with a black-seeded soybean introduction (PI 88788) that has resistance to race 4 of *Heterodera glycines* (cyst nematodes). Chemical and physical mutagens are being used to induce mutations for cream-colored seed coats and bush-type plants that maintain their resistance to the nematode. Plants have been isolated that have cream-colored seeds; however, their response to race 4 of the cyst nematode will not be known until later this winter. Mutants that exhibit slight changes in plant type have also been isolated.

3) *Evaluation of Ornamental Plants*. H. van de Werken of the Ornamental Horticulture and Landscaping Department is continuing his evaluation of numerous ornamental plant species on the Knoxville campus.

Ben Burr of the Oak Ridge National Laboratory, Biology Division, has grown a relatively large collection of maize plant introduction accessions this year to be screened for electrophoretic variants involving the zein (major storage protein) synthesis in the kernels. This kind of information might provide a clue concerning the number and location of structural genes involved.

David Scanlon of the Tennessee Valley Authority, Wildlife, Forestry and Fisheries Division, at Norris, Tennessee, is continuing the evaluation of numerous plant accessions as a source of food for wildlife.

Annual Report on New Crops Research in Texas
Hatch 2091 - Contributing to Regional
Project S-9 Experiment, Ga. August
21, 22, 1975

Prepared by Eli L. Whiteley

Researchers in Texas received about 1,000 accessions in the 1974-75 crop year. The major genera included Pennisetum, Capsisum, Allium, Arachis, Helianthus, Leucaena, Desmodium, Panicum, Leptochloa, Zea Mays, Hibiscus, and Sesamum.

Grasses

Dr. A. Robert Shank is working with ryegrass with emphasis on seedling vigor. He has found five P.I.'s with large seed which he hopes will increase seedling vigor. These are: P.I.'s 218085, 219925, 220103, 220807 (Lalium temutentum) and P.I. 269386 (L. persicum).

Peppers

Dr. Ben Villalon of our Weslaco Center reports that six P.I.'s have been incorporated in his breeding program. These accessions have some level of field resistance to Tobacco Etch Virus, Potato Virus Y and Tobacco Mosaic Virus. These are listed below:

P.I. No.	Genus Species	Cultivar	Source	Fruit Type
264281	Capsicum annum	P11	USA	Conical Sweet Bell
342946	C. annum	Agronomico-8	Brazil	Conical Sweet Bell
342948	C. annum	Avelor	Brazil	Conical Sweet Bell
342949	C. annum	Cosca Dura	USA	Conical Sweet Bell
324947	C. potms	Acc. 2120	USA	Serrano, hot
324947	C. potms	Acc. 2207	USA	Serrano, hot

Eli L. Whiteley is evaluating about 100 ornamental peppers. These were selected from about 200 accessions grown in 1973. About 20 of these look very good at the present time. Two P.I.'s look very promising for mechanical harvesting. These plants mature nearly all of the pods at the same time and are very short (10 to 12 inches) in statue and very hot. These are: P.I.'s 357421, yellow pods, early, and 357499, red, early. These two accessions loose most of their leaves at maturity; pods mature uniformly.

Oilseeds

Dr. R. D. Brigham at the Lubbock Center is using P.I. 343765 (Helianthus annus) in test crosses. It is a early single-headed type. P.I. 372255 is being used as a pollinator for its high oil content. A total of 20 other sunflowers are being grown in the nursery.

Dr. R. D. Brigham is using P.I. 86145 as a source of the narrow leaf character in soybean breeding. For resistance to soybean mosaic virus he is using P.I. 227555 and 200503. He is evaluating 27 other P.I.'s in the soybean breeding nursery.

Legumes

Dr. E. J. Simpson of Sam Houston State University is working with a number of legumes for grazing in East Texas. His report is as follow:

Desmodium perplexum (322466) - germinates in cold soil.

Desmodium saliatolium (317051) - hardy, woody stem, responds to fertilizer and irrigation.

Dolichos lablab (280861) - climbing vine type, germinates in cold soil, responds to fertilizer and irrigation, fast growing, rapid spread by runners, peolific regrowth after clipping.

Glycine wightii (364856) - climbing vine type, good spread by runners, good regrowth after clipping.

Medicago lupulina (40508) - emerged as bushy type, runners formed and spreading, stalons rooting and spreading, may be vine type, responds to fertilizer.

Medicago orbicularis (40542) - same as above.

Phaseolus acontifolius (288580) - bushy, many leaves, seed set in July, responds to fertilizer, excellent regrowth after clipping.

Phasealus atropurpureus (296959) - vine type with climbing runners, excellent vigor, responds to fertilizer and irrigation, spreading by runners, seed set in August.

Phasealus lathyroides - upright growth, excellent vigor, can be propagated by stem cuttings, good response to fertilizer and irrigation, good regrowth after clipping, seed set in July (221897).

Stylosanthes humilis - bushy type, small, good response to fertilizer and irrigation, vigorous leaf production (187098).

Sweet Sorghum

Eight varieties were grown in a variety test at College Station. Part of the test was lost due to prolonged rains during August and September. A nursery consisting of 33 lines was grown for disease evaluations in 1974.

Sesame

Sixteen lines of sesame are being grown in the Brazos river valley for evaluation. Nine lines are non-shattering types and seven are shattering types. One line of the shattering type was harvested in early August from an early May planting. Several non-shattering types look promising.

Plants Released in 1974-75

Tamnut 74 - A high-yielding Spanish peanut variety with medium-sized pods released jointly by the Texas, Oklahoma and Georgia Agricultural Experiment Stations. One of the parents was Starr shich contained P.I. 161317 as one of its parents.

Plants cont'd

TAMO 301 - A new winter oat variety for South Texas. It is resistant to current races of crown rust. P.I. 295919 (*Avena sterilis*) is one of the parents and is the source of crown rust resistance.

TAMO 312 - A new oat variety for South and Central Texas. It is resistant to current races of crown rust and appears to be resistant to leaf blight (*Helminthosporium avenae*). P.I. 296244 is one of the parents used for crown rust resistance (races 264-Band 325).

Kinman - A new guar variety released jointly by USDA and the Texas and Oklahoma Agricultural Experiment Stations. Kinman was selected from a Brooks X Mills cross. Mills originated as a single plant selection from P.I. 263875.

Esser - A new guar variety released jointly by USDA, and the Texas and Oilahoma Agricultural Experiment Stations. Esser originated from a Brooks X Mills cross. Mills was single plant selection from P.I. 263875.

TAM Wintergreen - A drouth-tolerant perennial winter pasture grass for the 20 to 40 inch rainfall area of Central Texas. This hardingrass (*Phalaris acquatica*) was developed from two P.I.'s 193056 and 196338 that survived the severe drouths of 1953 and 1954 at the McGregor Station.

Work Planned for Next Year

Work on sesame and sweet sorghum will be continued in a field evaluation program.

Appendix C

Reports of Federal Agencies

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
South Technical Service Center

Report to S-9 New Crops Committee
1974

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 Specialists 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:

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

Shoreline Erosion Control Shoreline erosion control along streambanks and wave action and wind erosion control along tidal estuaries, inland and oceanic waterfronts.

Wildlife 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.

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

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

Initial studies 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 600 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
1974

Evaluation or Increase Status	Americus Georgia	Brooksville Florida	Coffeeville Mississippi	Knox City Texas	Total
Initial Evaluation	91	377	340	65	873
Advanced and Cultural Evaluations	18	15	3	0	36
Increase for Evaluation off Center	27	21	8	2	58
Breeder or Foundation Fields or Orchards	3	0	1	1	5
Seed Orchard, holding block or other	10	29	19	0	58
	149	442	371	68	

Report of National Plant Materials Center
to the S-9 Regional Technical Committee

August 21, 1975
Griffin, Georgia

The SCS National Plant Materials Center functions as a central coordinating office for the acquisition and distribution of plant materials needed in the SCS plant materials program.

Over 90% of the material that we process, increase, and distribute to our 20 Field PMC's (plus Alaska) are from foreign sources. This material is received through the ARS Plant Introduction system. We have a very close working relationship with the Germplasm Resources Laboratory in Beltsville and in particular with Mr. Howard Hyland and Dr. A. J. Oakes.

At the NPMC, we maintain seed storage facilities (with temperature and humidity controls); and we are a source of grass and legume seeds for many plant scientists other than our SCS plant materials centers. Each year we receive requests from research people here in the United States and from many foreign countries.

At present we are preparing a list of 17 genera (2,500 accessions) of grasses and legumes for Dr. Langford's review and selection. We have crowded our storage facilities and anticipate many new accessions in the next few years. Our intent is to make germplasm available for preservation to the Regional P. I. Stations and university researchers that we might otherwise lose after our use of the material is completed.

We are developing a computor program for the storage and retrival of plant information. The P. I. number will be the key code for the data fed into the system. Initial development will be in the area of accessioning records and summarization of plant performance. In time, all plant accessions brought into the SCS plant materials program will be assigned P. I. numbers and these will be the only accession numbers used in our program.

This emphasis on the P. I. number will make dispersal of information and exchange of plant materials more compatible with the work of ARS and university researchers who we work with so closely throughout the nation.

Gilbert R. Lovell
Manager
SCS, National Plant Materials Center
Beltsville, Maryland

Report for 1975 Meeting of the
S-9 Technical Committee

Northern Regional Research Center

New NRRC Leadership--Dr. William H. Tallent has been chosen as the Director of NRRC upon the retirement of Dr. Robert J. Dimler. Three Laboratory Chiefs were named by Dr. Tallent to fill vacancies: Dr. Edward B. Bagley for Engineering and Development, Dr. Herbert J. Dutton for the Oilseed Crops Laboratory, and Dr. L. H. (Bert) Princen for the Industrial Crops (IC) Laboratory. Messrs. Fontaine R. Earle and Thomas F. Clark, Research Leaders of New Crops Screening and Fibrous Products in the IC Laboratory, respectively, did retire per January 1 after many years of excellent service. Messrs. Robert Kleiman and Marvin O. Bagby have been named to fill the vacancies. Both have been with the IC Laboratory for some time, are well prepared for their tasks, and will be active from time to time in S-9 committee work.

Kenaf--Storage tests on "low-density" bales of kenaf under a variety of conditions have been completed after 1-1/2 years, and the data are being collated. Artificially covered stacks provided near quantitative recovery of solids, whereas nearly one-half of the solids were lost from unprotected bales. Early in 1975 a new test was started with 15 tons of solids in a stack. This experiment, like earlier ones, involves chemical preservatives.

Optimization of the soda pulping process with kenaf has been extended to include temperature variation, alkali concentration, and cooking time. Collection of kenaf roots would increase the fiber yield by at least 10%. Roots appear to be rich in corelike materials.

Crambe, Limnanthes, Jojoba--In the initial year of a 4-year contract between USDA and Agricom International about 450 tons of crambe seed was crushed (August 1974) in the Culbertson, MT, plant of P. J. Anderson and Sons, Inc. Yields of 27% oil and 66% meal were obtained, represented by approximately 300 tons of meal, 71 tons of mill oil, and 51 tons of solvent extracted oil. NRRC personnel were present to observe, to evaluate the oil and meal, and to advise on sample collection and process modifications during the run. Only minor mechanical problems arose during the 12-day run, but these did interfere with extended steady state operations. Representative samples, collected at key stages during two steady state operating segments, have been analyzed at NRRC. Seven tons of representative meal was shipped to Purdue U. and used in just completed 1974-75 beef feeding trials. Glucosinolase enzyme deactivation was achieved without difficulty, but more glucosinolate was destroyed than desired. Contamination of the Canadian grown seed by white mustard and rapeseed contributed to lowered meal quality. The meal is judged to be more

like the 1972 prepress-solvent extracted Cleveland meal and of lower overall quality than the straight solvent extracted 1973 Angola meal. Both the mill oil and the solvent oil were refined at the Culbertson plant and were recently marketed by Agricom. The crude solvent oil contained considerable meal fines which probably led to contamination of the oil by sulfur.

Since the crush the contractor has consulted with plant geneticists, seed dealers, and NRRC personnel regarding plans for 1975 and beyond, and has acquired necessary seed for use in increasing seed supplies for future production. The contractor's option to not crush this year is being exercised. Seed production in 1976 and 1977 will be crushed in Agricom's new prepress-solvent extraction plant in Grimes, CA, under more ideal and more sophisticated conditions than the 1974 crush. Independent crambe production in 1975, contracted for by the Culbertson plant under new ownership, will undoubtedly be crushed this fall with consultation again provided by NRRC personnel.

Research on utilization of crambe, Limnanthes, and jojoba seed oils in lubricants traditionally made from sperm whale oil has resulted in several promising candidates in preliminary testing at Southwest Research Institute. Some of these are now being prepared in larger quantities for testing at more advanced stages.

Epoxy Seed Oils--Recently, farm development organizations in East Africa have expressed an interest in crop diversification and have requested information on, and seed samples of Vernonia and Erlangea. Brooke Bond Liebig of Kenya, Ltd. and The African Highlands Produce Company, Ltd. are looking into the possibility to develop a source of epoxy oils, and have been supplied seed for this purpose. Since the USA produced 70,000,000 pounds of epoxidized soybean oil in 1971 for the plastics industry, the African efforts should be watched with interest.

Drugs, Pesticides, Brassins--An increased proportion of NRRC's efforts is directed towards the study of specialty chemicals from botanical sources. Especially Cephalotaxus and Sesbania extracts have shown great activity in the cancer screening program. Two Sesbania species are now being grown for seed increase, and another one has been recollected from the wild, to provide additional material for the screening program.

New techniques are being developed at a rapid pace in manipulating cell cultures of higher plants. It has now become possible to extract a principal ingredient without killing the cells and to produce mutants with higher concentrations of the desired ingredient. It may conceivably be possible to develop mutant callus tissue and later initiate cell differentiation and produce whole plants with improved yields of active materials. These new developments will be attempted on Tephrosia and Cephalotaxus for increased production of insecticides. As a first step these plants have been brought into culture successfully.

With the increased reliance on instrumental and computer techniques, other functions of this group are becoming increasingly important. In this respect, the Brassica improvement program, carried out jointly with Oregon State University, has resulted in 1,400 sample analyses for oil, erucic acid, and glucosinolate contents. Another example of the necessity of improved analytical expertise is the discovered contamination of commercial crops with jimsonweed seed, which required the development of methods to analyze for the alkaloids present in the seeds of this plant.

Rubber-Producing Plants--NRRC has developed expertise in rubber technology during the past few years, on account of its research program on starch in rubber. This work may be extended to include development of a domestic natural rubber crop. In the past, guayule did almost reach the commercial production stage in a big way, but the effort was abandoned for various reasons. The present world situation of raw materials may warrant a new look at various rubber-producing plants, including guayule, milkweed, goldenrod, Russian dandelion, and perhaps over 200 other species.

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

Highlights

Howard Hyland and Joe Craddock participated in an IBPGR Wheat Germplasm Symposium at Leningrad, USSR, in July, 1975. Extensive collecting is needed through the Near East Region from Afghanistan to the Mediterranean Basin, and Greece and Ethiopia as soon as possible. North Africa is another broad area for which some collecting efforts are already underway. International cooperation in germplasm collection, preservation, exchange, and data computerization was stressed.

John E. Bear, Agronomist, will provide badly needed backup support for plant introduction operations. John had been working with Dr. White on new crops since July, 1973.

The first phase of the Tomato Exploration involving Harold Winters and Ray Clark (Ames) resulted in 158 accessions of local cultivars and native species from Colombia, Ecuador, and Peru. The total collection of 478 accessions also included 32 corns, 29 peas, 17 peanuts, and 15 beans.

Seven *Digitaria* accessions were identified in greenhouse trials as being highly resistant to the yellow sugarcane aphid.

Muriel J. O'Brien, Plant Pathologist, was transferred to our Laboratory from the Vegetable Laboratory. She will work on various disease problems of crop germplasm. She and Harold Winters are screening the spinach collection for resistance to *Fusarium*.

Elmar Leppik presented an invitational paper at the International Symposium on the Biology and Chemistry of the Compositae at Reading, England, on July 14-18, 1975.

The first exchange with the Peoples' Republic of China resulted in a total of 167 samples for the U.S. of wheat, corn, sorghum, millet, soybean, ornamental, and miscellaneous vegetable crops.

During April-June, 1974, George White and K. J. Lessman, Purdue University, collected seed of Crambe species from Israel, Cyprus, Italy, Morocco, Portugal, and Spain. Ninety wild accessions including C. filiformis, C. hispanica, C. hispanica var. glabrata , and C. kralikii were collected. These species (section Leptocrambe) are relatively rare. Because of different ploidy levels (for example, n=15, 30, and 45 in C. kralikii), morphological differences, and expected genetic variability, the collection should be valuable in breeding improvement programs. It also assures the preservation of germplasm much of which is seriously threatened. Most of the accessions have been greenhouse or field increased.

Information requested from wheat breeders and pathologists indicates that 36 countries and 16 states have released 237 cultivars for commercial or germplasm purposes since 1971. New biotypes of leaf, stem, or stripe rust pathogens develop over periods of one to ten years.

Plant Introduction and Exchange

Since July 1, 1975, Mr. John E. Bear has been assisting the Plant Introduction Officer in plant procurement and exchange. A major objective will be to establish a working file on newly released varieties of cereal, fruit, forage, oilseed, ornamental, and vegetable crops to be used largely for international exchange. During the years, several plans were projected and discussed involving the move of the Plant Germplasm Quarantine Center from Washington, D.C., to the Beltsville Agricultural Research Center in order to increase efficiency. Nothing definite appears for the immediate future. The second meeting of the National Plant Germplasm Coordinating Committee was held April 17-18 in Washington, D.C., at which time the Principal Plant Introduction Officer was voted into membership to represent the Germplasm Resources Laboratory.

At the ARS Plant Germplasm Committee meeting held in El Paso, Texas, on October 29, 1974, two foreign exploration trips were approved. Dr. F. Douglas Wilson, Phoenix, Arizona, has started this past July collecting kenaf and surveying its crop situation in East Africa. A second collecting trip to the Soviet Union during July-September was approved for Drs. D. R. Dewey, Logan, Utah, and Perry Plummer, Ephraim, Utah, to collect Agropyron relatives and shrub species for forest revegetation. This trip has been postponed until 1976. The second phase of the tomato exploration to Central America is on the ARS approved travel plans. Dr. Jerrel Powell of the Field Crops Laboratory recently returned from five weeks in Morocco, Portugal, Spain, and

France. The primary objective was to find new variation in Festuca arundinacea (tall fescue). Rhizomatous and fine leaf types were sought for turfgrass purposes. More than 400 vegetative and seed bearing ecotypes were collected. Other genera collected included Cynodon, Lolium, Agrostis, Dactylis, and Avena.

Special significance should be noted in the field of preservation of corn germplasm. In 1972 a meeting was held at the CIMMYT headquarters, El Batan, Mexico, to review collections and additional sources of germplasm in the Latin American countries. It was estimated there could be around 25,000 duplicated samples for transfer to the National Seed Storage Laboratory, Fort Collins, Colorado. The first 2,000 samples of 500 grams each were received in June, 1975.

More specific information covering plant introduction and exchange activities is summarized as follows:

7,257 new germplasm accessions were placed on inventory with 4,512 small grain cereals the predominate group. This included 2,200 rice samples accumulated from numerous sources in recent years. Other crop categories included 953 forages, 687 vegetables, 428 ornamentals, 307 oilseeds, and 120 fruit accessions. PL 480 projects contributed 814 lots of cereals, vegetables, and ornamentals. Two major field trips were completed (1) to the Mediterranean where 168 collections were made, including 121 Crambe and closely related oilseed species; and (2) to Colombia, Ecuador, and Peru with emphasis on endemic and wild tomatoes. International exchanges with foreign nations involved 1,847 shipments to 115 countries covering 112,174 items. This included 69,052 small grain samples for special nursery trials. Australia, England, France, India, and South Africa were most active in introducing U.S. varieties; whereas Argentina, France, and Italy were extremely interested in soybean germplasm. Agriculturists in 26 countries, working with AID missions, received 64 shipments of experimental seed covering 3,290 varieties and/or selections. Plant Inventory No. 180 for 1972 was printed covering P.I. numbers 368261 to 377554.

Agronomic Crop Germplasm

The entire Digitaria collection is being screened for resistance to Pyricularia grisea. Perennial ryegrass accessions were established in field trials for agronomic characterization and assessment for winter-hardiness. Over 1,000 rice accessions were grown in quarantine for seed increase and distribution and 1,200 accessions were increased by cooperating stations. An automated inventory of the rice collection is being developed.

New entries to the Small Grains Collection totaled 495. Seed multiplications included 15,272 items. At the Aberdeen, Idaho, nursery, 884 hills of Avena sterilis were planted for increase. At Mesa, 8,280 accessions were grown in cooperation with the University of Arizona. These included 2,264 new introductions for which morphological data were recorded. There were 117,495 packets of seed prepared and shipped worldwide -- 71,987 to U.S. and 45,508 to foreign plant scientists. Dr. J. C. Craddock in close cooperation with the Federal Extension Service will prepare a wheat cultivar descriptive handbook. He also helped organize the Wheat Germplasm Symposium in Leningrad.

Five international, three uniform, and two special wheat and oat nurseries (Puerto Rico) were prepared in 1974 and sent to cooperators in 43 countries. Nine reports on reactions of wheat and oats to rust and other diseases were prepared and distributed to cooperators. Of 8,000 introductions inoculated with virulent cultures of stem rust, 400 were rated resistant. Monogene lines were ineffective for controlling leaf rust in the International Rust Nurseries in 1974.

Horticultural Crops

In cooperative screening efforts with the Vegetable Laboratory, two eggplant introductions (P.I. 269660 and 269663) from India were tolerant to feeding of the carmine spider mite. Antibiosis was found in Solanum mamosum (P.I. 245968), S. sisymbrifolium (P.I. 337597) and S. pseudocapsicum (P.I. 368425). In preference tests S. pseudocapsicum and the two eggplants were least preferred for feeding and oviposition. Field screening during 1973 and 1974 for resistance to Colorado potato beetle, flea beetle, and green peach aphid were not conclusive. Also in cooperation with the Vegetable Laboratory, screening of the spinach collection for resistance to Fusarium wilt showed P.I. 184137 from Yugoslavia to be more tolerant than standard cultivars. An extensive collection of asparagus germplasm has been assembled for cooperative disease screening. Of six lima introductions from Ecuador, one shows high resistance to anthracnose and downy mildew Race 'C', one was susceptible to both pathogens, the others had varying degrees of resistance to one or both pathogens. Seedling progenies of certain New Guinea Impatiens introductions are undergoing continuing reselection for plant and flower characteristics of value to the plant breeder. Ornamental grass introductions are being screened for usefulness as landscape materials. The evaluation of rosemallow hibiscus seedling progenies has revealed that flower color is sometimes conditioned by environmental factors, particularly temperature; also that a lethal factor prevents survival of seedlings in some progenies. The computerized fruit resources inventory is nearing completion.

New Crops

An effective technique for screening Crambe germplasm for possible resistance to Alternaria brassicicola has been worked out by Dr. R. A. Kilpatrick. It consists of inoculation on lower leaf surface, allow suspension to dry, and incubate plants in moist chamber (65-70°F) for 72 hours. Symptoms were apparent 72 hours after inoculation. The Crambe abyssinica collection is being screened and other germplasm in the collection will be included as seed is available. Several disease organisms including Alternaria, Fusarium, and Erysiphe (powdery mildew) have been identified on Stokesia laevis plants. Sclerotinia was observed to cause spotty damage to Limnanthes alba in eastern Maryland.

The Oregon station has released the cultivar 'Foamore', a selection of L. alba from P.I. 283704. It is moderately erect with fairly good seed retention. Many selections of L. alba and L. douglasii have been made or are being evaluated. Seed yields of Lesquerella gordonii at Tucson ranged from 669 to 1,485 pounds per acre in 1974. Prospects are good for high yields of L. fendleri but not L. gordonii in 1975. A paper company is supporting research at Rutgers University on kenaf and other annual species as sources of fiber for pulping. Weed problems in 1975 have been severe. In an N fertility study at Glenn Dale, the best yield of kenaf stems was 11,184 kg/ha at an N rate of 100 kg/ha preplant. Seed yields with a range of 116 to 618 kg/ha of Stokesia laevis were low because of poor seed retention and/or few heads per plant. P.I. 346981 has good seed retention and a desirable time of maturity. Some selections produced seed heads abundantly but shattered badly. Clonal materials are undergoing continuing evaluation for desirable agronomic traits. Twenty-four new selections were made. Preliminary germination tests were initiated because of stand establishment problems. Excellent germination occurs at 20° C constant temperature. Severe reductions occur when temperatures are raised to 30 or 35° C.

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~~Quentin Jones~~
USDA, ARS, NPS

Plant Explorations

Plant explorations, foreign and domestic, serve the national program of introduction, evaluation, use, and maintenance of genetic re urces. Of the many explorations conducted by USDA in the past, at least several States and usually several regions shared and used the collections that resulted from each exploration. In addition there are other overriding considerations which dictate that we maintain a nationally coordinated program of plant exploration and introduction. Among these are the need for: (1) a centralized documentation and record-keeping function (Principal Plant Introduction Officer, Beltsville); (2) a centralized quarantine inspection facility and close working relationships with Regulatory Services of APHIS (Washington, D. C. and Hyattsville, Maryland); (3) official access to appropriate Foreign Agriculture Service (USDA) and State Department offices for foreign policy clearances and protocol matters (both in Washington, D. C.); (4) as wide as possible base for setting exploration priorities in keeping with national needs and limited funds; (5) keeping all State, Federal, and private users of germplasm informed of scheduled explorations; (6) coordination with international organizations, such as FAO, that also sponsor explorations. Within the USDA, responsibility for national coordination of the introduction and maintenance of plant germplasm has been assigned to the ARS Plant Germplasm Coordinating Committee.

The ARS Committee has recommended procedures for routing, assessment, and approval of proposals for foreign and domestic plant explorations.

The essential steps in proposing a plant exploration are:

1. Scientist(s) develops proposal and sends it to the Regional Coordinator for Plant Introduction in his Region (D.D. Dolan, NER; W. H. Skrdla, NCR; W. R. Langford, SR; S. M. Dietz, SR). Proposal format and guidelines are available from the Regional Coordinators.
2. The Regional Coordinator will acknowledge receipt of the proposal, have it reviewed by his Technical Committee, or Plant Explorations Subcommittee, and forward the evaluated proposal to the ARS Plant Germplasm Coordinating Committee with any comments and recommendations made by his Technical Committee or Subcommittee.
3. The ARS Plant Germplasm Coordinating Committee will review all proposals with comments and recommendations from all regions, suggest possible modifications or combinations, assign overall priority ranking, and make recommendations accordingly to the Administrator for approval and funding. The Administrator of ARS holds funds specifically for plant explorations. Use of other ARS funds is discouraged by the ARS PGCC because it reduces the high level visibility of need for proper support of this vital activity and encourages by-passing of the national germplasm system.
4. When the Administrator has acted upon the ARS Plant Germplasm Coordinating Committee recommendations, the Chairman of that Committee will notify the proposer(s), through the Regional Coordinators, of the status of the proposal.

5. Scientists whose proposals have been approved for funding will then be responsible for initiating, if foreign travel is involved, a request to be included on the Foreign Travel Plan for the appropriate year. Early in the planning phase of an exploration, the prospective explorer should contact the Principal Plant Introduction Officer (Beltsville) for guidance and instruction on documentation and shipping of collections and on quarantine requirements.

ARS cannot, of course, require State and private sector scientists, who undertake explorations on their own funds, to follow these precedures. I would like to make two points in this regard:

1. ARS plant exploration funds are there to support the needs of the National Plant Germplasm System and are <u>not</u> for the exclusive use of ARS scientists.
2. We urge all collectors of crop germplasm to inform the ARS Plant Germplasm Coordinating Committee of their exploration plans and that they work with and through the Principal Plant Introduction Officer on possible plant quarantine problems <u>and in entering their collections into the national system</u>.

UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

July 3, 1975

SECRETARY'S MEMORANDUM NO. 1875

NATIONAL PLANT GENETICS RESOURCES BOARD

The Secretary of Agriculture, in order to assure proper management of our vital national resources, hereby establishes the National Plant Genetics Resources Board. The task of the Board is to advise on the assembly, description, maintenance, and effective utilization of the living resources represented by crop cultivars, primitive, and wild forms of our crops. These resources are vital for plant scientists to have the genetic variability necessary to cope with problems of today and the future.

The Plant Genetics Resources Board objectives are to advise the Secretary of Agriculture and officers of the National Association of State Universities and Land Grant Colleges in order to assess national needs and identify high priority programs for conserving and utilizing plant genetic resources including such things as collection, maintenance and description of genetic stocks, and utilization of the stocks in plant improvement programs.

The duties of the Plant Genetics Resources Board are (1) to inform themselves of domestic and international activities to minimize genetic vulnerability of crops; (2) to formulate recommended actions and policies on collection, maintenance and utilization of plant genetic resources; (3) to recommend actions to coordinate the plant genetic resources plans of several domestic and international organizations; (4) to recommend policies to strengthen plant quarantine and pest monitoring activities, and (5) to advise on new and innovative approaches to plant improvement.

The Board will meet at least twice each year and possibly more often at the outset. The estimated annual operating costs would be $6,000 (travel and per diem) and 0.2 man years.

Members of the Board will be appointed by the Secretary. Membership on the Board will be composed of individuals with diverse capabilities distinguished by their knowledge and interest in plant genetic resource management.

In the event the Board tenure is over a period of years, partial rotation of membership would be practiced every two years to provide for continuity and broad representation on the Board.

The Assistant Secretary for Conservation, Research and Education will be the Chairman. The Executive Secretary will be the Staff Specialist, Genetics and Plant Breeding, Plant and Entomological Sciences Staff, Agricultural Research Service, U.S. Department of Agriculture.

The Board will report to the Secretary of Agriculture throught the Administrators of the Agricultural Research Service and the Cooperative State Research Service, and the Assistant Secretary who has responsibility for Conservation, Research and Education for the Department. Support for the Board will be provided by these two Agencies of the Department of Agriculture.

The establishment of this Board is in the public interest. No existing committee can perform these functions, nor can the Department take effective unilateral action in view of the diversity of interested groups.

The Board shall terminate two years from the date of this memorandum.

This memorandum also serves as a charter.

J. Phil Campbell

J. Phil Campbell
Acting Secretary

Appendix D

Requests for Plant Explorations

Plant Exploration Proposal

Sugarcane:

To collect primitive cultivars of Saccharum and genera closely related to sugarcane.

Justification:

During the past 54 years, the International Society of Sugar Cane Technologists (ISSCT), the Hawaiian Sugar Planters' Association, and the U.S. Department of Agriculture have cooperated on four sugarcane germplasm expeditions in New Guinea (1921, 1928, 1951, and 1957). The U.S. Department of Agriculture has maintained the living world collection of sugarcane germplasm at Canal Point, Florida, and Beltsville, Maryland. Since 1957 very few new clones have been added to the collection. Most of the present gene pool have been exploited for desirable traits by the breeding programs of all sugarcane growing countries. Concentrated efforts should be made at this time to collect sugarcane and related grasses in New Guinea, West Irian, and associated islands for several important reasons: (1) Sugarcane evolved in New Guinea and associated islands. These places of origin of the sugarcane plant have yielded valuable new germplasm in the past and undoubtedly numerous additional ones still remain to be found and obtained; (2) rapid developments in minimg, agricultural expansion, and urbanization in some of these areas are leading to a rapid depletion of genetic resources in this region. Once lost, these resources will be lost forever; (3) recent studies on the origin of the sugarcane with chemical markers indicate that other genera besides Saccharum are involved in the origin of sugarcane. These genera are very poorly represented in the world collection because previous collecting expeditions concentrated almost exclusively on Saccharum. These genera could be vital to a reconstruction of the sugarcane plant for greater disease and insect resistance, higher sugar concentration and increased yields; (4) our present world collection is only a fraction of the total material available and needs augmentation.

The need for primitive cultivars has been stressed because of their close affinity to and cross compatibility with cultivated cultivars of sugarcane. The primitive cultivars also have a broader genetic base than cultivated sugarcanes. New gene sources need to be incorporated into cultivars grown in the United States and other countries to overcome an apparent sugar content plateau, to enhance desirable characteristics for harvesting and milling, and provide greater resistance to major diseases and insect pests in commercial cultivars.

Of particular interest are characters for resistance to diseases caused by: Physalospora tucumanensis (red rot), Sclerospora sacchari (downy mildew), Helminthosporium sacchari (eye spot), Xanthomonas albilineans (leaf scald), X. vasculorum (gumming), Ustilago scitaminea (culmiculous smut), Cercospora koepkei (yellow spot), several virus diseases and root rots.

Other characters of interest are resistance to adverse environmental conditions (e.g., drought, flooding, hurricanes, cold), erectness and uniform stalk height for mechanical harvesting, canopy characteristics most efficient for photosynthesis, and a strong root system desirable for some methods of mechanical harvesting and cultivation.

During recent years, sugarcane breeders have been called upon for cultivars better adapted to different methods of mechanical harvesting and cultivation, and which produce higher yields. For this purpose, additional genes are needed to give cultivars capable of withstanding high population densities with growth characteristics suitable for mechanical harvesting and cultivation.

At the XVth Congress of the International Society of Sugar Cane Technologists held in Durban, Republic of South Africa, June 18-29, 1974, the Standing Committee on Germplasm and Breeding presented a resoulution for"a jointly supported expedition into New Guinea, Indonesia and other areas of sugarcane origin to search out and procure new canes that promise to add new germplasm for sugarcane breeding programmes throughout the world.---." The resolution was passed and plans for the expedition are being formulated by the Committee. The delegate body authorized the General Secretary-Treasurer to release up to $15,000 of the ISSCT cash reserves to support this jointly financed expedition, with the following guidelines:

"1. The funds will be released upon application by the ISSCT Standing Committee on Germplasm and Breeding, supported by data sh wing that at least three sugar cane areas are aiding in the financing of the expedition and that the funds of the Society hereby made available are likely to contribute to the success of the project."

"2. The plans of the project include suitable arrangements for the quarantine and surveillance of the canes grown from the selected cuttings."

"3. The emerging canes will go into the world reference collections and will be available to cane breeders upon the same terms and conditions as are canes presently in the collection."

The U.S. Department of Agriculture will be responsible for the salary of its member of the expedition, his transportation to the site of operation in New Guinea/ Indonesia and maintenance in capital cities prior to expedition departure and return (see letter of 3rd Jan. 1975 from J. Daniels to R. E. Coleman).

Geographical Area:

Exploration to be conducted in New Guinea and Indonesia (Celebes, Borneo, West Irian, Halmertha and possibly other islands).

The collection will be transported to Brisbane, Australia and quarantined at the David North Plant Research Centre before release to the U.S. Department of Agriculture.

Time Proposed for Exploration:

Three months, probably March-May, 1976, the flowering season of sugarcane in the geographical areas of the expedition.

Estimated Cost:

Airline coach fare, Port Moresby, Papua and return =	$1950	
Per diem 15 days at $36.00 =	540	
TOTAL		$2,490.00

Proposed Collectors:

D. Heinz and S. Ladd, Experiment Station, Hawaiian Sugar Planters Ass'n. - Honolulu, Hawaii

I. Walker, West Indies Sugarcane Breeding Station, Barbados, B.W.I.

N. Berding, Bureau of Sugar Experiment Stations - Queensland, Australia

H. Koike, ARS, U.S. Department of Agriculture - Houma, Louisiana.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
SOUTHERN REGION
USDA Horticultural Research Laboratory
2120 Camden Road, Orlando FL 32803

August 8, 1975

Subject: Germplasm Exploration Trip

To: Dr. W.R. Langford, National Coordinating Committee,
Introduction and Maintenance of Plant Germplasm
Georgia Experiment Station
Experiment, GA 30212

A proposal to collect Eremocitrus and Microcitrus germplasm is presented as follows:

The citrus industry is founded upon genetic variation in the fruit and rootstock varieties upon which its very existence depends. Its continuing success depends upon the ability of breeders to find the variations needed to produce superior new varieties able to overcome the numerous problems that are continuing to make the culture of contemporary varieties increasingly more costly and uncertain of success.

The major problems of the industry are concerned with those brought about by diseases, pests, lack of sufficient cold hardiness, unfavorable soil and water relations, and by the requirements of a mechanized technology.

A search for new germplasm sources with a reasonable probability of having these variations becomes necessary when existing germplasm collections are inadequate to provide for this need. Two genera in the Aurantioideae, Eremocitrus and Microcitrus, both close relatives of Citrus, have known or suspected attributes that could be of great potential value in the solution of several of these problems.

Germplasm traits sought:

Traits of Eremocitrus that might be expected to contribute to breeding superior new citrus varieties.

1. Resistance to cold injury.

2. Drought resistance.

3. Tolerance of excess salt and boron in soils.

4. Very early fruit maturity.

5. Highly developed fruit abscission zone.

6. Pleasant tasting fruit.

Traits of Microcitrus that might be expected to contribute to breeding superior new citrus varieties.

1. Resistance to Phytophthora root rot.

2. Resistance to citrus burrowing nematode.

3. Precocious bearing and dwarf stature in at least one species.

4. Vigorous growth of some species on low fertility soils.

Complicating factors in germplasm collection:

1. Eremocitrus matures its fruit very early and drops promptly from the tree. Maturity period is estimated as late as November through first three weeks of December (possibly up into January in the southernmost portion of its range).

2. Eremocitrus grows in arid, semi-desert regions, where available moisture may be so scarce that fruit does not set or produce seed consistently. A recent attempt to obtain seed resulted in no seed from 2 lb. of fruit.

3. Fruit maturity for Microcitrus is estimated to be from mid-February through March.

4. Microcitrus is represented by several presumed species in the coastal rain forest of Queensland and New South Wales, with one or more species in New Guinea.

5. The natural range of Eremocitrus is said to approach within 100 miles or so of Microcitrus in Queensland, but other localities are several hundred (New South Wales) to a thousand miles (South Australia) inland of Microcitrus.

6. The New Guinea species of Microcitrus are estimated to be at least a thousand miles from the nearest Queensland Microcitrus species.

7. Because of the uncertainty of finding fruit with viable seeds in Eremocitrus and to avoid the cost of two separate trips, it is recommended that one trip be made at the time Microcitrus is in fruit, and that locations of Eremocitrus be found and local contacts be developed with forestry officers, research personnel, etc. in Australia to harvest fruit and seed from these sites.

In summary, one trip by one man would be necessary, approximate date mid-March through April of 1976.

Dr. Donald J. Hutchison, Research Geneticist of this Laboratory, is presently under consideration for this trip. He is in charge of citrus rootstock breeding and field evaluation and coordinates the disease screening program. He has previous experience with forage and pasture grasses and bananas.

Logistics:

Round trip air fare -	Orlando, Florida to Sydney, New South Wales, Australia.	$2,100.
Round trip air fares-	(in-country), using Sydney as "home base": Sydney to Mildura for *Eremocitrus* and *Microcitrus*. Sydney to Brisbane, Queensland (*Microcitrus* in coastal areas of southeast Queensland and northeast NSW. Brisbane to Darwin for *Microcitrus* in northern territory of Australia. Also, Brisbane as base for inland search for *Eremocitrus* in region of Darling Downs and N.W. section of NSW, as far as Dubbo, and possibly east of Broken Hill, NSW); to Port Moresby, New Guinea (from Sydney)--Port Moresby as base for *Microcitrus* search in eastern New Guinea in or near Milne Bay and Brown River regions; Port Moresby to eastern New Guinea; Brisbane to Cairns, Queensland.	2,400.
Car rentals for ground transportation, estimated for 30 days and 4,800 km (@ $8.50 per day and $.08 per km)		639.
Equipment (labels, bags, packing, seed preservative, photography equipment and postage)		200.
Per diem for food and lodging - 45 days at $47/day.		2,115.
Total estimated funds - Australian trip		7,454.
Round trip air fare Orlando to Beltsville, Maryland (to confer with Plant Introduction people on problems or complications that might delay or jeopardize the mission)		275.
	TOTAL	$7,729.

Because of the absence of towns and great distances separating the natural ranges of Eremocitrus and Microcitrus species (both Australia and New Guinea), it will be necessary to fly to larger-sized base areas and rent cars. In the case of New Guinea, it will probably be necessary to rely rather heavily on the assistance of local Australian experimental station personnel, etc., in getting into areas where Microcitrus may possibly be found.

It may be possible to greatly expedite collection and reduce car rental costs, if we can enlist the assistance and participation of Australian experimental station personnel. Their assistance and advice on possible collecting sites could certainly make for a more efficient use of time and money in covering a maximum area at minimum cost.

Because of the lack of exact facts on range and sites and other features of the problem, marked modifications of travel plans by air or car rental may have to be made as circumstances arise.

Allen G. Selhime
Acting Laboratory Director

PROPOSAL FOR COTTON GERM PLASM COLLECTION

The production of cotton consumes nearly 40% of all agriculturally applied pesticides in the United States. The need for these enormous applications to control insect pests is in part based on the lack of available genetic diversity of the crop itself. The extremely narrow genetic base of commercial cotton varieties has been well documented (1,2) as has been their vulnerability to pathogen and insect infestations (3,4). Three cultivars comprise nearly 60% of all upland cotton planted in the U.S. (4). To counterbalance this precarious distribution, a broadly based genetic background must be introduced into commercial cottons.

Exotic materials would fill this need, but because of photoperiodicity and generally poor agronomic potential they have been largely ignored. Recent research, however, has demonstrated that certain wild Gossypium hirsutum possess chemically based resistance factors to Heliothis species other than the previously established effects of gossypol (5), while other wild cottons appear less susceptible to the lygus bug and cabbage looper (6).

Despite their genetic potential, very little is known about the wild cottons. The USDA collection contains mostly dooryard forms with fewer than 10% truly wild cottons (7). S.G. Stephens (7) and M.J. Lukefahr (8) have recently suggested that an examination of the gulf and Pacific coasts of Northern Central America and Southern Mexico may provide additional information of the distrubution, variability and ecology of the wild cottons.

Our interests in obtaining seeds and studying these wild cottons are twofold. One of us (JRG) is investigating the biochemical basis of host plant resistance to Heliothis. This project is being performed in co-operation with M.J. Lukefahr (USDA/ARS -- Brownsville, Texas) who has been screening available wild cottons for insect resistance. The degree of success of this research is related to the genetic diversity available for examination. New germ plasm would greatly expand the potential for this program, and for others concerned with host plant resistance in cotton (9).

Additional approaches to the biological control of cotton insect pests include the use of pheromones and insect parasites. These have been the research goal of this group's entomologist (WHC). The current program involves the collecting of isolated strains of the bollweevil in search for one with unusually high pheromone production, and investigations on the cotton insect-host plant interrelationships. Alternate host plants (10), especially species of Hampea, also need to be examined. The isolated cotton populations in the designated collection area (Figure 1) may be well suited for these purposes, since weevil populations are probably of low density and have a greater need for communication with pheromones. No cotton entomologist or geneticist has proviously examined this part of Central America, which increases the need for this survey.

Specifically, we plan to examine the Caribbean coastal regions of Nicaragua and Honduras and collect germplasm of Gossypium hirsutum and other cottons (JRG; PAF); collect bollweevils for futher pheromone research (WHC); and investigate cotton insect-host plant interrelationships (all). This last objective will take the form of in-field observation and collections of voucher specimens and materials for further research.

Use of a small airplane will allow access to many areas on the Caribbean coast where roads are very poor or not present. Some 48 airstrips are located within 50 miles of the coast in the two countries.

Anticipated for the collection trip is a three and one-half week period in late November -- December, 1975 depending upon local conditions. A personal contact in eastern Honduras will be able to inform us of the optimum collecting time.

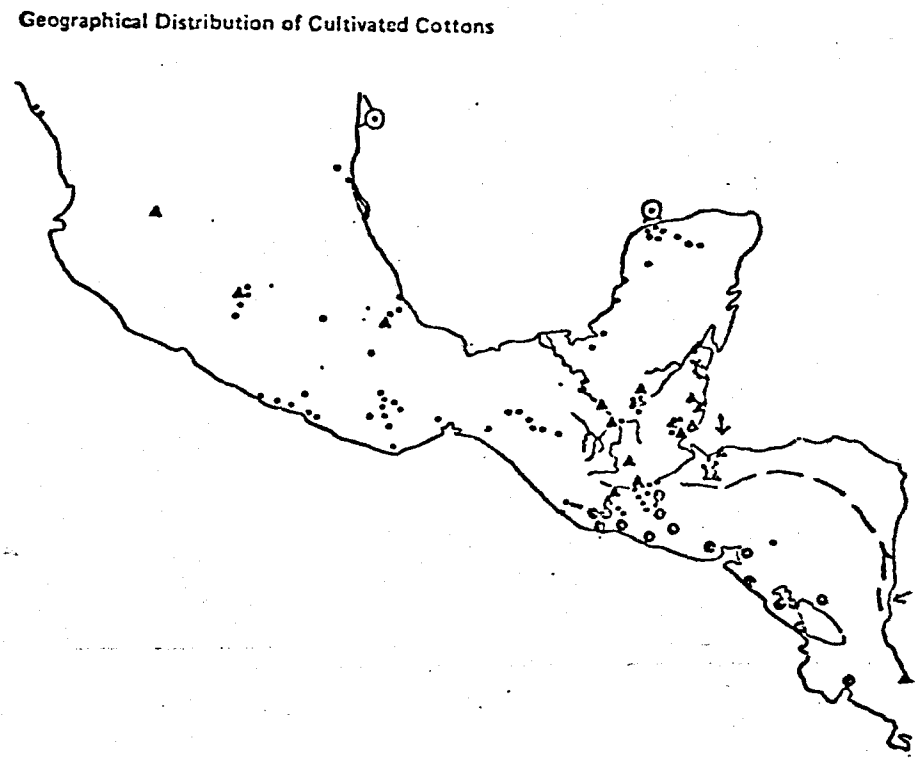

Figure 1. Map indicating collection area.

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2. Ramey, R.H. 1966. Historical review of cotton variety development. Proc. 18th Cotton Improvement Conf. pp. 310-314.

3. USDA/ARS 21st Annual Conference Report on Cotton Insect Research and Control (1973).

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PERSONNEL

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Harry N. Howell
Limitada, Honduras
(Local Contact in Honduras)

BUDGET

Rental of a Cessna 182 for 90 hours @ $35.00	$3150.00
Perdiem for three persons for 25 days @ $15.00 per person	$1125.00
Misc. expenses (shipping, additional in-country expenses, etc.)	400.00
A pre-departure meeting of expedition members	$ 250.00
Total Expenses	$4925.00

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
Northeastern Region
Agricultural Research Center
Beltsville, Maryland 20705

February 4, 1975

Subject: Plant Exploration - Trifolium species

To: C. H. Hanson, NPS
Howard Hyland, Germplasm Laboratory
Quentin Jones, NPS
Charles F. Lewis, NPS

Attached is a proposal prepared by Dr. Pryce B. Gibson outlining the need for additional introductions of several Trifolium species. Dr. Gibson submitted this proposal to the S.C. S-9 representatives.

Dr. Gibson has made significant progress in developing white clover for the southeastern states. His most recent release was Tillman, a Ladino type. It has desirable characteristics for forage production, but is a poor seed producer -- as is the Ladino type generally. Also it is susceptible to several viruses and is shallow rooted like other white clovers. In view of the high cost of N fertilizer and the need for more forage there is an urgency to develop adapted legumes for use in pastures in the southeast.

Dr. Gibson's work to date has indicated the potential for interspecific hybridization among several Trifolium species. He urgently needs a wider array of germplasm to develop disease and virus resistance, persistence and better yield capability in a white clover type plant for the southeast. A plant exploration team to the areas outlined in Dr. Gibson's memo is worthwhile and possibly would provide the basis for a major breakthrough to advance economical forage production efficiency in his region.

Dr. Leffel and I strongly recommend favorable action of Dr. Gibson's proposal.

C. S. Garrison, Chief
Seed Quality Laboratory, AMRI

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Georgia - South Carolina Area

December 17, 1974
Agron. Dept.
Agric. Expt. Sta.
Clemson, S. C. 29631

MEMORANDUM:

To: Dr. Robert G. Halfacre
S. C. Representative to
Regional Project S-9

From: Pryce B. Gibson

Subject: Needed collection of Trifolium species

I sent a copy of my memorandum to you dated December 2, 1974 to Mr. C. S. Garrison. He advised me that additional information should be provided. The purpose of this memorandum is to supply the additional information needed.

In preparing the attached information on habitats, distribution, flowering, etc. of the different species I used the references:

1. Coombe, D. E. 1968. Trifolium L. pp. 164-172. In Vol. 2. Flora Europaea, edited by T. G. Tutin (Chairman). Cambridge University Press.

2. Hossain, M. 1961. A revision of Trifolium in the nearer east. Notes from the Royal Botanic Garden. Edinburgh 23:387-481.

3. Zohary, M. 1969. Trifolium L. pp. 164-172. In Vol. 3 FLORA of TURKEY and East Aegean Islands. Edited by P. H. Davis et. al. Edinburgh University Press.

The months for exploration may have to be a compromise. T. uniflorum flowers in March-April and T. montanum flowers in August. Seed should be mature 4-6 weeks after flowering. If our flowering information is accurate, a three month collection trip is needed to collect all species. The trip would start with the collection of T. uniflorum and end with the collection of T. ambiguum and T. montanum.

Since we now have collections of T. uniflorum from only two sites and since we have hybridized this species with T. repens, I believe it should be our primary target. Choosing a number two target is difficult because we need collections of all.

I suggest that Katznelson (Dr. R. C. Leffel knows and corresponds with Katznelson) who has helped by supplying seed of some T. species or someone equally knowledgable of the Trifolium species in the Mediterranean Area be consulted on best dates for exploration.

I suggest the exploring be done by a team of two - One experienced in exploring, one who specializes in Trifolium research. An example of a team would be Dr. W. R. Langford (experienced explorer) and a member of the pre-ARS-reorganization Trifolium investigations section (i.e. Knight, Smith, Gibson, Leffel etc.).

Information on Species

T. ambiguum M. Bieb. reference Hossain page 463-464

Var. ambiguum.

Habitat: Steep non-lime scree slopes, forests, eroded banks, stream sides, mountain-meadowsc etc. Alt. 1900-2800 m. Flowering June-August.

Distribution: Romania, S. Russia, Transcaucasia.

Var. majus.

Habitat: Mountain-slopes, forest margins, fields, etc. Alt. 1900-2200 m. Flowering July-August.

Distribution: not listed apparently same as above variety.

Additional data from other references:
Zohary includes N. W. Iran in distribution

T. montanum L. reference Hossain page 463

Subsp. humboldtianum (Caucasus and N. E. Turkey)
Subsp. montanum (Central, South and Southeast Europe)

Habitat: Mountain-slopes. Alt. 1800-2100 m. Flowering August

Distribution: Caucasus

Additional data from other references:
Zohary includes Soviet Armenia in distribution.

T. repens L. reference D. E. Coombe

Subsp. prostratum nyman.

Habitat:

Distribution: C. part of the Mediterranean region from S. France and Corse to Albania.

T. uniflorum L. reference Hossain page 460

Habitat: Pastures, wastelands, path sides in the woods etc. Alt. 100-300 m. Flowering March-April.

Distribution: Greece, Sicily, S. Italy, S. France, Cyrenaica (Libya).

Proposal for EXPLORATION OF FOREIGN GRASS SPECIES FOR FORAGE BREEDING AND PRODUCTION RESEARCH

TO: ARS Plant Germplasm Coordinating Committee

Via: Southern Regional Coordinator for Plant Introduction and S-9 Technical Committee

From: ARS Crop Genetics and Improvement Group, Oklahoma-Texas Area and Department of Soil and Crop Sciences, Texas Agricultural Experiment Station, College Station, Texas

Date: June 19, 1975

1. Title: Exploration of Republic of South Africa for Germplasm of *Cenchrus*, *Panicum*, *Eragrostis* and Other Grass Genera

2. Objectives:

   a. Collect different biotypes of *Cenchrus ciliaris* L. (buffelgrass), *Cenchrus setigerus* Vahl. (birdwoodgrass), *Eragrostis curvula* Schrad) Nees. (weeping lovegrass) and *Panicum maximum* Jacq. (guineagrass) with particular emphasis on sexual plants and cold tolerance.

   b. Collect *Panicum coloratum* L. and related species for cytotaxonomic investigation and to provide a broad base for breeding of these species.

   c. Collect other species adapted to arid regions and potentially useful in Southern and Southwestern USA.

3. Justification:

The need for superior grass varieties which can be effectively and efficiently established and managed in Southwestern ranges and pastures is critical and ever increasing. Research has shown that species introduced from similar climatic regions, but having evolved under heavy and continuous grazing (ie. high concentration of mixed animal species vs the buffalo regime of the American Plains) offer the greatest potential for improvement of our ranges. Several grasses introduced from the Republic of South Africa (buffelgrass, weeping lovegrass, Kleingrass and guineagrass) have proven extremely valuable for permanent pasture, range improvement or revegetation in certain areas. All of these species have the potential for high forage production and extensive utilization, but the few cultivars available at this time lack specific characteristics needed for broad adaptation, efficient seed production or maximum possible animal production.

Sufficient progress has been made in the improvement of these species to show that major limitations could be overcome through breeding if appropriate germplasm were available. Apomixis has restricted improvement of buffelgrass, lovegrass and guineagrass and lack of

accessions has been a major limiting factor with all four species. We have had from one to a few sexual plants of the apomictic species and now recognize that sexuality exists in all of these grasses (2, 6, 8). Conversations with South African Scientists, examination of vegetation maps and the exaustive Botanical Survey by Acocks (1), and the polymorphic nature of limited accessions collected by American Explorers indicate a vast storehouse of valuable germplasm in South Africa. Unfortunately South African or American Scientists have not made an extensive collection of these species.

The success achieved thus far with buffelgrass indicates the tremendous potential of breeding programs with apomicts if the needed germplasm is recovered. We discovered a sexual mutant of buffelgrass on a Texas ranch and subsequently developed an effective apomictic breeding program based upon control and manipulation of obligate apomixis (7). Obviously the gene base of this material is quite narrow, based on one sexual plant, and use of a single cytoplasm poses problems of genetic vulnerability. We need additional sexual plants as well as a wide range of apomictic biotypes from the native habitat to achieve the breeding progress possible with this species. The apomictic machanisms of all of these species have been thoroughly investigated and the results indicate that apomictic breeding should be as effective as with buffelgrass (2,5,9,10). Present use of apomictic cultivars derived by direct increase and distribution of apomictic biotypes from limited accessions illustrates another proven approach for providing superior new cultivars.

The potential impact of the proposed collection is not limited to the arid areas of the South. In fact, guineagrass accessions may prove most valuable to present breeding programs in Florida and Georgia. Lovegrass is widely adapted and is one of the easiest species to establish in drouthy deep sands or shallow soils. Improvement in animal acceptance and intake, digestibility, and cold tolerance could provide a useful grass for broad areas of the region. Buffelgrass is highly productive under irrigation and is presently limited primarily by lack of cold tolerance. The species is known to exist at relatively high altitudes in South Africa and genes for cold tolerance should be available. The range of adaptation of kleingrass in the USA has not been clearly established. This grass is exceptionally high in digestibility and could be useful in much of the region.

4. Approach:

Major emphasis will be placed on (1) a search for sexual plants of the apomictic species as evidenced by extensive variability in a limited area, and (2) a search for cold tolerant genotypes at the higher altitudes, especially at the upper limits of survival of the species. A general collection of biotypes of all four species will be made throughout the area explored without regard for mode of reproduction. The expedition should require about 2-1/2 months, from late January through March. Areas explored will be based upon recommendations of South African Scientists, previous experiences of American Explorers

and Botanical Surveys of the Country.

The exploration will begin at Pretoria in the Transvaal where the explorers will meet and consult with South African Scientists familiar with the species and their distribution. Reports by Oakes (4) and Acocks (1) were used to identify areas of maximum concentration of the species sought, and to develop a tentative list of primary collection sites. Based upon these reports there are 4 regions that offer particular promise. Pending the outcome of discussions with South African Scientists, the itinerary for the exploration will include the following areas and various Experiment Stations.

a. The mixed Bushveld and Turf Thornveld: Pietersburg to Louis Trichard and south to the Elands-Olifants Valley in Transvaal.

b. The Kalahari Thornveld and The Orange River Brokenveld: Kimberley-Douglas-Prieska area in western Orange and eastern Cape Province including the Vaal Valley, Kaap Plateau and Asbestos mountains.

c. The Novsveld and Karroid Brodenveld: Middelburg-Jansenville-Fraserburg area in southern Cape Province.

d. The Highland to Valley Bushvelds: A diverse region from Bethlehem in Orange Free State to Estcourt in Natal Province.

We propose to devote particular attention to mountain sites in regions where the species occur. Here the effects of sudden changes in elevation and temperature could provide selection pressure for cold tolerance in a very limited area.

5. Special Considerations:

a. One of the primary objectives of this exploration differs significantly from the usual search for new and superior germplasm. Here we are vitally interested in finding sexual plants of normally obligate apomicts. The most vigorous plants are not necessarily the most desirable. Sexual plants, desperately needed for the breeding program, may appear useless and escape the attention of the collector unless he is specifically trained to search out particular types. Greatest success would be expected in sites of maximum variability comprising unique individual plants. The exploration should include a Geneticist familiar with the breeding programs of the species, the reproductive mechanisms involved and the morphological characteristics which serve as reliable indicators of genetic variation.

b. Periodic extended drouths, prior to and during the growing season, pose a serious hazard that could prohibit execution of the

proposed expedition. Occasionally there is insufficient rainfall for the initiation of growth and flowering in the regions of major significance. Unfortunately it may not be possible to predict the status of vegetation until a few weeks prior to the planned date for initiation of the expedition.

6. Budget:

Budget figures are based on teavel for two people at current 22-45 day airline tourist rates, a 90-day exploration involving the 4 major vegetation areas outlined, air travel between major areas with use of a rented vehicle for collection trips, and assumed minimum participation of South African Scientists and limited or no use of their official vehicles and facilities.

(a) New York to Johannesburg S. A. and return ($1200 per person)	$2400
(b) Air travel between major regions in South Africa	600
(c) Vehicle rental and expenses	1200
(d) Per Diem for 90 days @ $36.00 ($3240 per person)	6480
(e) Misc. equipment, shipping costs, etc.	400
(f) US travel to and from departure point	300
	$11,380

7. Suggested Personnel:

E. C. Bashaw, USDA, ARS Southern Region Oklahoma-Texas Area, Department of Soil & Crop Sciences, College Station, Texas

A. J. Oakes, USDA, ARS Germplasm Resources Laboratory, Beltsville Research Center, Beltsville, Maryland

Paul Voigt, USDA, ARS, Grassland-Forage Research Center, Temple, Texas

W. R. Langford, Southern Regional Coordinator, Project S-9, USDA Plant Introduction Station, Experiment, Georgia

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