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M I N U T E S

of the

MEETING OF THE S-9 TECHNICAL COMMITTEE

"NEW PLANTS"

The Introduction, Multiplication, and Evaluation of New Plants for Agricultural and Industrial Uses and the Preservation of Valuable Germplasm

Oklahoma State University
Stillwater, Oklahoma

July 21-22, 1965

AGENDA
S-9 MEETING
STILLWATER, OKLAHOMA

July 21, 22, 1965

1. Registration - Student Union 8:00 A.M.
2. Roll Call
3. Introduction of visitors - Dr. R. S. Matlock
4. Welcome - Dr. L. E. Hawkins, Director, Oklahoma Agricultural Experiment Sta.
5. Presentation of Agenda
6. Appointment of Committees
    a. Nominating
    b. Time and place of next meeting
    c. Resolutions
7. State reports
    a. Alabama
    b. Arkansas
    c. Florida
    d. Georgia
    e. Kentucky
    f. Louisiana
    g. Mississippi
    h. North Carolina
    i. Oklahoma
    j. Puerto Rico
    K. South Carolina
    l. Tennessee
    m. Texas
    n. Virginia
8. Federal Reports
    a. New Crops Research Branch
    b. Soil Conservation Service
    c. Cooperative State Research Service
    d. Northern Utilization Research and Development Division
9. Regional Station Report
10. Administrative Advisor's comments
11. Status of projects contributing to S-9
12. Domestic explorations
13. Development of Chart of Responsibilities for 1966
14. Requests for specific plant introduction through plant explorations
15. Discussion of Cassia and "pulp crops"
16. Use of automatic data processing - Dr. A. J. Oakes
17. Discussion of proposed S-9 bulletin
18. Committee reports
    a. Nominating of new officers
    b. Time and place of next meeting
    c. Resolutions
19. Adjourn

Call to Order and Introduction

The meeting of the S-9 Technical Committee was called to order by Dr. Eli L. Whiteley, Chairman, at 8:00 am, July 21, 1965. Each person present introduced himself. Those in attendance were:

S-9 Committee Members

R. L. Lovvorn	Administrative Advisor, N. Carolina
W. R. Langford	Regional Coordinator, Georgia
C. S. Hoveland (absent)	Alabama
A. M. Davis	Arkansas
G. B. Killinger	Florida
A. H. Dempsey (absent)	Georgia
W. H. Stroube	Kentucky
P. L. Hawthorne	Louisiana
H. W. Bennett	Mississippi
W. T. Fike	North Carolina
R. S. Matlock	Oklahoma
Hassan Azzam, Secretary	Puerto Rico
J. A. Martin	South Carolina
W. E. Roever (absent)	Tennessee
Eli L. Whiteley, Chairman	Texas
T. Jackson Smith (absent)	Virginia
D. Y. Perkins (absent)	Cooperative State Research Service Washington, D. C.
J. L. Creech A. J. Oakes	New Crops Research Branch, ARS Beltsville, Maryland
I. A. Wolff	Northern Utilization Research & Development Division, ARS Peoria, Illinois
Morris Byrd	Soil Conservation Service Little Rock, Arkansas

Visitors

L. E. Hawkins	Director, Oklahoma Agricultural Experiment Station
Tom Fullerton	Dept. of Agronomy, Univ. of Arkansas
Roy Oswalt	Dept. of Agronomy, Oklahoma State Univ.
Phil Luginbill, Jr.	Entomology Research Division, ARS Beltsville, Maryland
F. P. Gardner	Head, Dept. of Agronomy, Oklahoma State Univ.
G. R. Waller	Dept. of Biochemistry, Oklahoma State Univ.
Grover Sowell, Jr.	Regional Plant Introduction Station Experiment, Georgia
Charles E. Denman	Dept. of Agronomy, Oklahoma State Univ.
Leland Tripp	Oklahoma State University
Pai Frausson	Oklahoma State University
Ray Burley	Oklahoma State University
E. W. Jones	Oklahoma State University

Welcome

Dr. L. E. Hawkins, Director, Oklahoma Agricultural Experiment Station cordially welcomed the group to the Oklahoma State University Campus. He encouraged the group to visit individually with staff members at OSU and to visit laboratories and other research facilities on the campus. Individuals needing local transportation or travel reservations for the return trip home were invited to contact Dr. Hawkins for assistance with transportation schedules.

Minutes and agenda

Minutes of the 1964 meeting of the S-9 Technical Committee were approved as distributed and the agenda shown on page i was adopted for the 1965 meeting. Dr. Matlock invited the group to a banquet sponsored by the Oklahoma Crop Improvement Association at 7:00 pm in the Union Building, and he announced plans for a field trip the following morning to observe new plant materials under study at the Oklahoma Experiment Station.

Appointment of Committees:

The following committees were named by Chairman E. L. Whiteley:

Nominating Committee

A. M. Davis
W. T. Fike
G. B. Killinger

Resolutions Committee

I. A. Wolff
J. A. Martin
A. J. Oakes

Time and Place of Next Meeting

R. S. Matlock
H. W. Bennett
W. H. Stroube

State and Federal Agency Reports

Committee members presented reports on "New Plants" research in the following order. These reports are appended hereto as Appendix A:

Arkansas	A. M. Davis
Florida	G. B. Killinger
Georgia	A. H. Dempsey (Presented by Langford)
Kentucky	W. H. Stroube
Louisiana	P. L. Hawthorne
Mississippi	H. W. Bennett
North Carolina	W. T. Fike
Oklahoma	R. S. Matlock
Puerto Rico	Hassan Azzam
South Carolina	J. A. Martin
Texas	Eli L. Whiteley
New Crops Research Branch, ARS	J. L. Creech A. J. Oakes
Northern Utilization Res. & Dev. Div., ARS	I. A. Wolff
Soil Conservation Service	Morris Byrd
Southern Regional Plant Introduction Sta.	W. R. Langford Grover Sowell, Jr.

Dr. P. Luginbill, Jr., Entomology Research Division, ARS, discussed the possibilities of developing insect-resistant crop varieties as a means of biological control of insects, thereby reducing the use of pesticides. Although this has not been a major tool in controlling insects; he cited several crops including hessian-fly-resistant wheat and alfalfa resistant to spotted alfalfa aphid as outstanding examples of progress in this area of research. He stated that plans are now being formulated by ARS to direct

more effort towards this method of biological control of plant pests. Present plans include the employment of an entomologist at each regional plant introduction station to screen plants for sources of resistance to insects.

Banquet

The group enjoyed refreshments and a banquet dinner sponsored by the Oklahoma Crop Improvement Association. After the dinner Dr. Wayne Huffine and Dr. J. L. Creech gave very informative and entertaining reports of plant explorations. Dr. Huffine reviewed his trip around the world in 1963 to collect Cynodon spp., and Dr. Creech reviewed a trip to Russia in 1963 to collect stocks of fruit and ornamental plants.

Field trip

The field trip outlined below was made Thursday morning, July 22, to observe new plant materials under evaluation at the Agronomy and Horticulture farms:

1. Arrive Turf area east of Farm Headquarters at 7:45 am. Cynodon introduction nurseries - Dr. Wayne Huffine 7:45 - 8:45 am.
2. New Crops - Professor Roy Oswalt - 9:00 - 10:00 am.
3. Arboretum, Shade Trees and Pecan Varieties - Professor Austin F. Kenyon - 10:15 - 11:00 am.

Administive Advisor

Dr. Lovvorn discussed the responsibilities of S-9 Technical Committee members. In addition to keeping his station director informed of the progress of the new plants project and proceedings of the S-9 Technical Committee Meeting, each member should serve as a liaison and local coordinator of New Plants research in his state. Special effort should be made to determine the plant material needs of other scientists at each station and to keep them informed about the availability of plant materisls. The S-9 project is not as effective as it should be where the state representative is concerned only with his personal needs and use of the available plant materials.

Dr. Lovvorn discussed the regional station budget, pointing up the need for additional funds to meet the rising costs of labor and equipment and increase in salaries.

A motion was made by Dr. Fike and seconded by Dr. Stroube that the S-9 Committee recommend to the Southern Directors that an increase of $5000 in pooled funds be made available this year to help operate the regional station. Motion was adopted.

Contributing Projects

Regional Project S-9 was revised in 1962. Since then the following have been approved as contributing projects:

State	
Arkansas	State-323. Introduction and Evaluation of New or Special Plants for Industrial and Agricultural Uses - A. M. Davis
Florida	Hatch-1166. Evaluation of Introduced Plant Species and Varieties for Economic Uses - G. B. Killinger
Georgia	Hatch-171. The Introduction, Multiplication, and Evaluation of New Plants for Agricultural and Industrial Uses and the Preservation of Valuable Germplasm - W. R. Langford
	Hatch-172. Agronomic Evaluation of New Plants for the Production of Oils, Gums, Drugs and Insecticides - J. H. Massey
	Hatch-173. Evaluation of New Crops for Pulp, Fiber, and Forage - D. G. Cummins
	Hatch-174. Evaluation of New Ornamental Plants - George Tereshkovich
Kentucky	166 (Revised) The Introduction, Multiplication, and Evaluation of New Plants for Agricultural and Industrial Purposes - W. H. Stroube
Mississippi	470. The Introduction, Multiplication, and Evaluation of New Plants for Agricultural and Industrial Purposes and the Preservation of Valuable Germplasm - H. W. Bennett
North Carolina	Hatch-196. The Introduction, Evaluation and Improvement of New Crops for Industrial and Agricultural Uses - W. T Fike
Oklahoma	Hatch-1057. Introduction, Multiplication, Preservation, and Evaluation of New or Special Plants for Industrial and Agricultural Uses - R. S. Matlock
Puerto Rico	H-94. The Introduction, Multiplication and Evaluation of New Plants for Agricultural and Industrial Purposes and the Preservation of Valuable Germplasm - H. Azzam

South Carolina	88. Investigations of New or Special Crops (Revised) - J. A. Martin
Texas	H-717. Introduction, Multiplication, Preservation, and Determination of Potential Value of New Plants for Industrial and Other Purposes, and for the Preservation of Valuable Germplasm of Economic Plants - E. L. Whiteley

Federal

New Crops Research Branch, ARS, Line Projects

CRil-11 (Rev.)	The Introduction, Sanitary Inspection and Inventory of Fruit and Vegetable Breeding Stocks for U.S. Research Purposes
CRil-12 (Rev.)	The Introduction, Sanitary Inspection and Inventory of Field Crop (cereals, forage plants, cotton, tobacco, sugar plants) Breeding Stocks for U.S. Research Purposes
CRil-13 (Rev.)	The Introduction, Sanitary Inspection and Inventory of Specialty Crop (drug, oilseed, cellulose, beverage, ornamental) Breeding Stocks for U.S. Research Purposes
CRi2-1 (Rev.)	Evaluation and Maintenance of Fruit and Nut Introductions
CRi2-5 (Rev.)	Evaluation and Maintenance of Vegetable Introductions
CRi2-7 (Rev.)	Evaluation and Maintenance of Forage and Range and Other Miscellaneous Field Crop Introductions
CRi2-8 (Rev.)	Evaluation and Maintenance of Cereal Crop Introductions
CRi2-9 (Rev.)	Evaluation and Maintenance of Cotton and Other Fiber Crop Introductions Used for Cordage Fiber
CRi2-10 (Rev.)	Evaluation, Development, Maintenance and Placement of Drug, Beverage, Cellulose (except bamboo) and Other Promising Crops for Industry
CRi2-15	Evaluation and Development of New or Little-known Introduced Ornamental Plants

Plant Explorations

Dr. Fike submitted a proposal asking for financial support to collect domestic stocks of Vaccinium spp.

Dr. Creech recommended that collecting be done by one person from North Carolina and a local staff member from each state in which collections are made. He further recommended that progress of this exploration be summarized annually and recorded in the Minutes of S-9 Committee Meetings, and that upon completion of the exploration a final report summarizing the entire exploration be prepared.

J. A. Martin suggested that South Carolina be listed among states that will participate in this exploration. Dr. Creech recommended that the NC-7 and NE-9 projects be added to the list of cooperators.

Dr. Creech stated that the New Crops Research Branch, ARS, would support this exploration in the amount of $1500 annually for three years beginning July 1, 1966.

It was moved by Dr. Matlock and seconded by Dr. Davis that the S-9 Committee accept the proposal with above changes being made. Motion was adopted.

See plan for this exploration in Appendix B.

Other requests for new plant materials:

1. J. A. Martin suggested an exploration to collect okra and gourds.

2. Dr. Killinger requested:

   (a) Paspalum notatum from areas along 30° latitude from the equator.

   (b) Cold-hardy Digitaria spp. from elevations of 10,000 ft. or higher.

   (c) Large-stem kenaf (4-5 inches in diameter) from Africa and India.

Dr. Killinger pointed up the need for a kenaf breeder to develop varieties of kenaf better suited to pulp production.

Dr. Creech stated that priority recommendations for foreign plant explorations will come from the National Coordinating Committee, which meets October 19-20, and that a major objective of future explorations would be to obtain germplasm resistant to diseases and insects. Consequently, S-9 should be prepared to present its recommendations to the National committee for consideration.

It was agreed that each S-9 committee member would survey the plant material needs of his station and forward a report of the needs to the regional coordinator prior to the national committee meeting.

Use of Automatic Data Processing

Dr. Oakes explained that each regional station had developed plans for coding the preliminary evaluation of accessions of two major crops. These codes are to be put into use immediately on a trial basis so that needed changes can be made before the system is fully adopted. Descrepancies in the codes will be discussed at the national meeting in Baton Rouge and necessary changes will be made.

Langford discussed the proposed codes for Capsicum spp. and warm season grasses.

A motion was made by Whiteley and seconded by Davis that the metric system be used in recording evaluation data. Motion was adopted.

A motion was made by Davis and seconded by Bennett that in recording disease readings 1 should represent the most desirable (no disease) and 9 should represent the most severely diseased. Motion was adopted.

Publication of S-9 Bulletin

This topic was shelved until next meeting.

Committee Reports

(a) Industrial crops sub-committee presented the following report:

Pulp crops:
1. Sesbania exaltata, P.I. 296055
2. Aeschynomene scabra, P.I. 296044
3. Sorghum - nine new introductions
4. Kenaf - three new accessions

The most productive ones should enter the uniform tests next year.

Promising oilseed crops:

1. Vernonia - Nine new introductions of Vernonia - should have sufficient seed for regional plantings in 1966.

2. Euphorbia lagascae - Seed for uniform tests should be available for planting in 1967. The large seed of this species are rich in epoxy oil.

3. New Brassica accessions from Sweden should be available for limited plantings in the fall of 1965 or spring of 1966.

The committee recommends that the regional coordinator continue to notify S-9 representatives in each state of the available seed supply of each of the above and other promising industrial crops so requests can be made prior to the planting season.

The committee suggests that when information is available concerning the origin, culture, seed size, valuable constituent(s), potential industrial markets, etc., that it be made known as soon as possible.

We further recommend that data from uniform tests be sent to the regional coordinator as soon as possible and preferably by December 15 to facilitate the compilations made by the chemurgic crops investigator; the object being to provide cooperators with uniform test results prior to the next planting season.

The committee suggests that the representatives of the S-9 committee participate in the meeting of the NC-7 industrial utilization sub-committee, September 8, 1965, at Peoria, Illinois, should an invitation be forthcoming.

Respectively submitted

Eli L. Whiteley
Bill Fike
Ralph Matlock, Chm.

It was moved by Whiteley and seconded by Davis that the S-9 committee accept this report. Motion carried.

(b) Nominations

Dr. Davis, Chairman of the Nominating Committee, nominated Dr. Azzam for chairman, and Dr. Stroube for secretary of the S-9 Committee next year. These nominations were seconded by Dr. Bennett and unanimously passed.

(c) Date and location of next meeting

A motion was made by Dr. Matlock and seconded by Dr. Bennett that the next meeting of the S-9 Technical Committee be at the Southern Regional Plant Introduction Station, Experiment, Georgia, on a date selected by the executive committee sometime between July 26 and August 13, 1966. Motion carried.

(d) The following resolutions presented by Dr. Wolff, Chairman of the resolutions committee, were adopted unanimously:

1. Be it resolved that the S-9 committee express its appreciation to Dr. Ralph Matlock and other representatives of the Oklahoma State University for the excellent arrangements and facilities and warm hospitality which contributed so greatly to the success of its 1965 annual meeting. Also that thanks be extended, by a letter, to Dr. Wayne Huffine and Dr. John L. Creech for their instructive and entertaining talks following the banquet dinner.

2. Be it further resolved that the secretary express, by letter, to the Oklahoma crop Improvement Association, the thanks of the S-9 committee for their hospitality in providing the banquet dinner and refreshments.

3. Be it further resolved that the S-9 committee recognize and express its appreciation to Dr. C. O. Erlanson for his support and encouragment of the S-9 regional new crops research program while he was Chief of the New Crops Research Branch. The secretary, in conveying this message, by letter, to Dr. Erlanson, should extend the committee's wishes for happiness and good health in his retirement.

Respectively submitted

A. J. Oakes
J. A. Martin
I. A. Wolff, Chm.

The meeting was adjourned at 4:00 pm, July 22, 1965

APPENDIX A

State & Federal Reports

Arkansas
Florida
Georgia
Kentucky
Louisiana
Mississippi
North Carolina
Oklahoma
Puerto Rico
South Carolina
Tennessee
Texas

New Crops Research Branch, ARS
Northern Utilization Research & Development Division, ARS
Soil Conservation Service
Regional Station

ARKANSAS AGRICULTURAL EXPERIMENT STATION

Report to Regional Project S-9

"New Plants"

During the past year the revised contributing project was approved. The major activities under this project were:

1. Investigations With Sugar beets
   Fayetteville, Keiser, Clarkedale, Kelso

2. Vernonia anthilmentica P.I. 225851
   Fayetteville, Clarkedale

3. Lotus corniculatus
   Fayetteville

4. Pulp & Fiber Crops
   Fayetteville

5. Bromus inermis
   Fayetteville

Sugar beets: Further investigations terminated with the 1964 season. This completed 4 years of investigations with Sugar beets in Arkansas. During this time the production capacities of several locations were investigated. Good yields were obtained when the season had abundant rainfall (15 tons of roots per acre or better). The sugar content of the roots was good with sucrose percentages of 15-18 percent. In the absence of supplemental irrigation yields on silt loam soils were below 10 tons per acre but these same soils when irrigated produced up to 20 tons. The best yields were obtained on Sharkey clay with irrigation (Mississippi mud). Some better strains yielded up to 28 tons.

The major difficultues experienced were associated with disease, primarily Cercospora leaf spot and Rhizoctonia root rot. The former attacking in mid-summer until fall, the latter exhibiting greatest destruction from late summer until harvest. If these diseases can be controlled and the population of beets per acre held high, Sugar beets could be produced commercially in Arkansas.

Sixty-five P.I. accessions of Sugar beets as well as six named varieties were planted in the fall at Fayetteville, Jonesboro, and Kelso. These plantings failed to survive temperatures of 20 degrees as seedlings. No plants survived into December. These are now growing at Fayetteville and are being evaluated primarily on their resistance to Cercospora leaf spot.

Indian Iron Weed: Vernonia anthilmentica P.I. 225851

A plot of approximately 1/10 acre was grown at Fayetteville from seed produced the preceding year at that location. Some difficulties in stand establishment were experienced due primarily to a packing rain following seeding which crusted the soil. A rotary hoe was not available. The planting was irrigated once during the summer and seed was harvested with an A.C. all crop combine. It was planned to use chemical desiccants on this plot but a freeze occurred on the 6th of October before our planned desiccation on the 10th. The seed was harvested October 12. By visual estimates the harvester was saving only 60% of the seed on the plant at cutting. Some shattering had already occurred. The cleaned seed from this planting weighed out 28 pounds.

A single row 200 ft. long was grown at Clarkedale for observation only. Here the growth was 3 ft. tall and seed set satisfactorily.

There are 3 acres of P.I. 283729 at Clarkedale being grown under contract this season. This is under irrigation if necessary, with 1/4 acre blocks being a single fertility level. These will be desiccated and combine harvested. A 1/4 acre plot of P.I. 225851 from Fayetteville produced seed is being grown at Fayetteville.

Pulp Crops:

1964 Pulp Crops Fayetteville, Ark.

Entry No.	Tons Dry Matter Per Acre Harvest dates 8/24	9/1	9/8	9/18	9/30	10/9	10/23	11/11	Mean
1	3.73	2.33	4.42	6.07	6.67	7.21	7.81	10.27	6.06
2	3.17	2.80	3.55	5.60	6.84	8.24	7.77	10.12	6.01
3	3.79	3.05	3.86	2.89	4.20	4.20	3.89	7.00	4.11
4	2.95	2.55	2.64	2.58	3.67	4.04	3.11	4.82	3.29
5	3.55	2.96	3.55	4.33	5.60	7.20	8.56	7.62	5.42
6	3.14	3.11	2.55	3.52	3.67	4.26	4.04	7.59	3.99
7	3.27	2.64	2.86	3.79	3.73	4.32	4.20	8.09	4.11
8	3.11	4.36	2.76	6.16	9.30	9.33	9.93	13.69	7.33

1 & 7 Everglades 71 Kenaf	5.09
2 & 5 Crotolaria juncea, Brazilian B-56109 (P.I. 248491)	5.72
3 & 6 Crotolaria juncea, Texas 374	4.05
4 & 8 Everglades 41 Kenaf	5.19

Planted May 6, 1964

CV = 23%
LSD = 1.61 @ 1% "t"

Dates of Harvest Significantly different beyond the 1/10 of 1% level.
Entries Significantly different beyond the 1% level.

10 ft. of Row from each set of plots, cut on each date for samples. Dry matter determined as weight after drying in the shock for 2-4 weeks.

Birds foot Trefoil: Lotus corniculatus

Sixty-five P.I.'s were established in 1963 to evaluate possible sources of root rot resistance. These were lines that had shown some resistance in the northeast region. Due to this prior screening we have lost only 7 accessions to root and/or crown rot. These have been classified into maturity groups and leaf texture and are now under evaluation as composite lines by Dr. M. S. Offutt, the Forage Legume Leader. The following P.I. lines are being transferred to his program.

162456	222063	235113	251143	255302
161876	228568	232097	255304	259513
180171	226798	231123	251423	259514
186640	226797	232098	251558	262529
182770	226796	233807	255302	260013
193725	225115	234786	255303	262531
196539	222193	234805	258446	260011
206447	228233	234807	255176	260012
207765	226801	234809	255177	273443
205292	235101	235089	255301	
202700	230190	244036	258467	
213566	235110	247898	259512	

Bromegrass: Bromus inermis and related perennial Sps

The total collection of perennial Bromus species numbering 178 P.I. accessions was obtained from the North Central Introduction Station. These are being screened in the field and greenhouse for possible sources of leaf disease resistance, principally Helmenthosporium bromi. Difficulties with the artificial growing of the organism have been encountered. Field epidemics of various diseases plus the effect of climate are taking a heavy toll of this material.

The use of P.I. material has been less this year than in the past. 229 accessions are accounted for, these are broken to genera as follows:

Bromus	178	Cassia	14	Clitoria	9
Crotalaria	5	Erucastrum	1	Hibiscus	9
Palanisia	1	Vernonia	2	Sorghum	9

Project Leader A. M. Davis

Publications and Manuscripts Prepared:

1. Davis, A. M. Investigations With New Crops. Ark. Agri. Expt. Sta. Rpt. Ser. 139. June 1965

2. Manuscript:

   Sugar beets in Arkansas

Florida Report Project S-9 "New Crops"
1965-July 21-22--G. B. Killinger
Stillwater, Oklahoma

During the 1964-65 season over 2500 packets of seed and or plants were received in Florida by various researchers, nurserymen and individuals for testing and evaluating.

Since Florida is a long state, over 700 miles from Pensacola in Northwest Florida to Homestead near the Southern end of the peninsula, with branch Experiment Stations widely distributed, this report will cover introduction evaluations in the state from North to South.

L. S. Dunavin, Jr., reporting from the West Florida Experiment Station near Jay, notes 9 Trifolium repens accessions out of 18 are still under observation. Three P. I. numbered Trifolium vesiculosum accessions have been grown; however, in a field planting the T. vesiculosum failed to reseed as well as Dixie Crimson clover, and the resulting stand was poor. To date, Latononis bainesii has not persisted either in combination with grass or under clean cultivation. Siratro (Phaseolus atropurpureus) grows well and has survived one winter. The wild peanut (Arachis glabrata), P. I. 118457, which has been named "Arb", has not shown promise as a forage crop. Cynodon dactylon - Tifton hybrid 6 x 16, Coastal bermuda X Ethiopia No. 5, P. I. 225957, and Coastal X Kenya, P. I. 255445 are being evaluated and Ryegrass and Fescuegrass, P. I. 187220 and 234047, which looked good in 1964, do not appear superior at this time.

Russell W. Wallace, reporting for the North Florida Station at Quincy, notes that out of 76 Cynodon dactylon, (Bermudagrass), accessions under observation, that P. I. 291576 Rhodesia, 224696 Africa and 292249 from the Phillipines look promising for hay or pasture. P. I. 291587 from Rhodesia has turf possibilities. Out of 17 Paspalum notatum, 10 Paspalum dilatatum, 8 Panicum maximum, 10 Digitaria eriantha and 29 vetch introductions only P. I. 222812 and 274181, P. dilatatum from Iran and South Africa show any promise.

Harold Young, reporting for the Big Bend Horticultural Laboratory near Monticello, lists as outstanding and briefly describes the following ornamentals:

P. I. No.	
241339	Trachelospermum sp. - Very attractive, dark green leaved, vining plant. Ideal for hanging baskets or pots.
275490	- One of the most attractive in this species - Dwarf - Possible use potted specimens.
254602	Myrsine retusa - Could be useful for a small hedge to give slightly different texture than boxwood. Not yet tested for winter hardiness.
124956	Abelia grandiflora X A. schumanii (Md.) - Large flowered Abelia - Outstanding - Not yet tested for winter hardiness.
242347	Medinella nenosa - Very attractive potted plants. Foliage and flowers attractive.
237873	Helicia cochinchinensis - Foliage plant suitable for large potted plants.
292732	- Attractive and good grower.
292730	- Attractive and good grower.
247251	Hypocyrta radicans - Outstanding, tender potted plant specimen- Unusual

Mr. Noel Lake, Superintendent of Grounds Department at the University of Florida, has received and given a preliminary evaluation on a number of ornamental introductions. A detailed report has been furnished Dr. Langford; however, the following merit mention

in this report as being of value and as also being increased: P. I. 274764 and 275494, Damnacanthus indicus and macrophyllus var. giganteus. Ilex sugeroki P. I. 275805, a slow grower, but attractive. A number of other introductions look good, and cuttings will be made in 1965 for increase.

A. A. Cook, Gainesville, has a program underway to assess eggplant introductions for resistance to Phomppis vexans and tomato accessions for resistance to Xanthomonas vesicatoria.

S. C. Schank has received over 300 new warm season grass introductions from the 1964 Oakes' South African expedition. Most of these are Digitaria species and will be used in an interspecific breeding program. Fertility studies, chromosome counts and related genetic investigations are being conducted on these new accessions.

E. S. Horner of Gainesville reports 16 alfalfa introductions survived out of 136 under trial. The best of these were P. I. 196219, 196221 and 196232, all from India. Open-pollinated seed will be harvested from the 16 surviving introductions. White Clover, P. I. 214207 and 214208, from Israel, have good vigor, have set seed and have fair summer persistance. Seed of these two accessions are available in Florida for further testing.

B. N. Duck of Gainesville is evaluating a number of warm season grasses for forage possibilities in Florida. Among the grasses under study are 42 Chloris gayana, 21 Setaria sphacelata, 101 Panicum spp. and a number of Cynodon introductions for evaluation under moist to wet flatwoods soil conditions.

G. M. Prine of Gainesville is evaluating 36 accessions of perennial Arachis spp. for forage possibilities. The "Arb" peanut, Arachis glabrata, P. I. 118457, has given annual hay yields of 2 to 3 tons per acre with protein contents ranging from 11 to 17 percent.

G. B. Killinger of Gainesville reports "Abon" Clover, a Persian clover, released by Texas continues to produce high yields of forage and will likely have a place in the forage program. Four Paspalum nicorae introductions from South America and one collected by SCS known as "Brunswickgrass" still look promising. Kenaf, Hibiscus cannabinus varieties, Everglades 41 and 71, look promising as a paper-pulp crop when grown on flatwoods soils. Over 50 kenaf breeding lives and 20 plant introductions are being evaluated. All Crotalaria spp. tested last year failed to yield sufficiently or had poor root systems which allowed lodging and are not considered as good pulp crops at this time. Several Glycene spp. and Desmodium spp. received from Australia are being observed. Salina strawberry clover, slow to make growth after new seeding, has shown extreme persistance through summer and winter, and yields of dry forage are similar to red clover. Sunflower introductions planted in April were harvested in June, and severe disease on seedheads developed. August plantings with November harvest of seed were successful with little or no disease. Erucastrum abyssinica, P. I. 243913 continues to yield large quantities of seed as a winter annual.

J. M. Crall at the Watermalon and Grape Laboratory near Leesburg reports Cucumis melo, P. I. 164756 (India) and 211937 (Iran) as most promising in his search for cytoplasmic male sterility. A number of crosses are being attempted between the domestic cantaloupe and P. I. numbered accessions in a further search for male sterility. A similar program is underway with watermelons. A program was initiated in 1964 to test watermelons for the mosaic virus resistance. The entire Regional Station collection of Citrullus spp. was screened, and 40 have been retained for additional testing.

H. J. Reitz of the Citrus Experiment Station, Lake Alfred, reports having received citrus seed from Glenn Dale, and prior introductions have not produced any

rootstocks with sufficient burrowing nematode tolerance for release. L. C. Knorr, H. W. Ford and A. P. Pieringer are the researchers at Lake Alfred investigating plant introductions.

J. E. McCaleb and E. M. Hodges at the Range Cattle Station near Ona, report as to having received 127 warm and 15 cool season grasses and 59 warm and 270 cool season legume introductions during 1964. Seventeen grasses are under a yield - climatic adaptation study at this time. Bahia species, Brunswickgrass, Bracharia, Bermuda spp., Digitaria spp. and Chloris are under intensive fertilization and management trials. Stylosanthes, Glycine, Siratro and Arachis glabra have failed at the Range Station each of the past five years.

H. Y. Ozaki of the Plantation Field Laboratory near Fort Lauderdale, reports Cucumis melo var. Cantalupensis, P. I. 183310, from India produces many small, low-quality melons on powdery mildew resistant vines. Lacutca sativa, P. I. 264334 and 264335 from Spain and 271476 from India produced satisfactory spring harvested lettuce leaves.

A. E. Kretchmer, Jr., of the Indian River Field Laboratory near Fort Pierce, reports the establishment of Rhodesgrass varieties, Bermudagrass, IRFL153 (Coastal Bermuda x Kenya P. I. 255455) and rescuegrass, P. I. 189612. Summer growing legumes, siratro, Stylosanthes spp. and Lespedeza cuneata, look promising. Lotononis bainesii grows extremely well in the Fort Pierce area. Of the winter growing legumes, Berseem clover has performed exceptionally well.

F. D. Wilson of the Everglades Experiment Station near Belle Glade reports receiving in 1963 P. I. 292207, kenaf (Hibiscus cannabinus L.) from Kenya, collected by B. Verdcourt, East African Herbarium which is significantly more resistant to root-knot nematodes than any other line tested in 1964.

R. Allen, Jr., of the Everglades Station notes that Digitaria pentzii, P. I. 279651, is the best grass introduction received and will be included in grazing trials this summer. A synthetic Rhodesgrass selection is in the making coming from P. I. 203851, Brazil, 210690, S. Rhodesia, 213470, S. Africa and 220219, W. Africa. Guineagrass evaluations are in progress with 35 lines retained from 70 introductions grown last year.

V. E. Green, Jr., and P. K. Soderholm report from the Everglades Station that Dioscorea composita, selection F-13, from P. I. 201783, greatly outyielded D. speculiflora, P. I. 252684, 252887 and 253106. Twenty plants of P. I. 201783 supported with wire, 20 plants 1½ feet apart, yielded 438 pounds of fresh yams. This would calculate to 106,000 pounds or 53 tons per acre. Average dry matter is 21.5 percent.

C. W. Campbell reports from the Sub-tropical Station near Homestead having Aegle marmelos, P. I. 293750, 293751 and Cordyla sp. P. I. 290742 under observation. Magnolia grandiflora var. Freeman, P. I. 277263, and Musa sp. var. Rajapuri, P. I. 17783, are also being grown.

Grasses, legumes, ornamentals, vegetables and miscellaneous introductions will be grown at various locations in Florida next year. The Digitaria nursery at Gainesville will be maintained with intensified efforts made to find more cold tolerant types through hybridization, radiation and other techniques. Kenaf research will be continued with a view to finding a higher yielding, disease-resistant variety for paper-pulp. This crop could profit by maintaining a kenaf breeder at one of our stations in South Florida, breeding for yield of total cellulose coupled with disease resistance. Past breeding of this crop has been for shorter, smaller diameter plants with good bast fiber. Clover and grass breeding and selection for higher yielding, quality and persistance under Florida conditions using P. I. accessions wherever applicable will be continued.

GEORGIA S-9 ACTIVITIES (NEW CROPS)

July 1964 - July 1965

A.H. Dempsey
Horticulture Department
Georgia Experiment Station

A total of 434 introductions were received by State and Federal workers in Georgia during the past year. There is increased interest in the S-9 New Plants project. Research with new crops is being conducted in three contributing projects at the Georgia Station.

Hatch-172 (S-9) Agronomic evaluation of new plants for the production of oils, gums, drugs and insecticides. Project Leader: John Massey, New Crops Dept., Experiment, Georgia.

Experiments to study the effect of plant population on the seed yield of Cassia occidentalis and Vernonia anthelmintica are being continued in 1965. Row widths are 12, 18 and 36 inches, with plants 4, 8 and 16 inches apart in the rows. Split-plot designs were used and with row widths as the main plots. The spacing combinations used gave plant populations ranging from 44,000 to 131,000 plants per acre.

A severe leaf disease attacked the Cassia in 1964, causing premature defoliation. The average seed yield was reduced to 93 pounds per acre, as compared to 1851 pounds in 1963.

The Vernonia row-width X plant-density test in 1964 was planted on June 3 and harvested about September 24. Results are given in the following table:

VERNONIA PLANT DENSITY - EXPERIMENT, GA. - 1964

Row width (in.)	Distance between plants (in.)	Plant height (in.)	Seed yield (lbs./A)		
			Shattered*	Threshed**	Total
12	4	55	238	417	655
	8	52	313	375	688
	16	50	261	503	764
18	4	50	316	319	635
	8	55	296	410	706
	16	52	283	435	718
36	4	55	296	516	812
	8	54	218	680	679
	16	54	230	404	634

*Seed was shaken from standing plants onto a canvas.
**Seed was shaken from plants after drying in bundles.

Seed samples from this test were submitted for analysis. The analysis results appear in the 1964 "Vernonia Research Summary" compiled by George A. White.

Fertility studies with Vernonia and Ricinus are being continued. Fertilizer levels used are 0-0-0, 30-30-30, 60-60-60 and 90-90-90. A test is being initiated to study Vernonia harvesting methods.

Hatch-173 Evaluation of New Crops for Pulp, Fiber and Forage. Project Leader: David Cummins, Agron. Dept., Experiment, Ga.

Paper-pulp tests, 1964

The pulp yields of various crops tested at Experiment, Georgia in 1964 are shown in the following tables:

Comparison of kenaf, crotalaria, and okra for pulp yields

Crop and Variety	Pulp yield tons/A oven dry wt.
Everglades 71 Kenaf	6.84 a
Everglades 41 Kenaf	5.95 ab
Texas 374 Crotalaria	3.95 bc
Brazilian Crotalaria	3.86 bc
La. Green Velvet Okra	1.97 cd
P.I. Okra	1.23 d

Significance at 0.05 level by Duncan's Multiple Range Test. Planted 5-13-64, harvested 1-4-65.

Kenaf variety test, co-op. USDA, Belleglade, Fla.

Variety	Pulp yield, tons/A green wt.	oven-dry wt.
BG 52-52	20.9	4.3 a
Cubano	18.1	3.9 ab
Everglades 41	16.2	3.6 bc
Everglades 71	15.8	3.4 bc
BG 52-75	14.4	3.1 bc
BG 58-10	16.6	3.0 c

Significance (oven-dry wt.) at 0.05 level by Duncan's Multiple Range Test. Planted 6-16-64, harvested 10-9-64.

Sunflower pulp yield test

Variety	Pulp yield (stalks) tons/A oven-dry wt.
Mammoth Russian	1.89 a
Northrup-King Hybrid	1.09 ab
Hasting	0.70 b
Advent Hybrid	0.61 b

Significance at 0.05 level by Duncan's Multiple Range Test. Planted 5-13-64, harvested 1-4-65.

Kenaf and crotalaria have yield potentials which may make them of importance in the production of paper pulp. Okra and sunflower produce too low pulp yields for them to be of any importance in paper pulp production.

Kenaf and crotalaria storage test, 1964

This test was initiated to determine the effect of storage inside a building, stacked outside with the top covered, and stacked outside uncovered on the pulping quality of kenaf and crotalaria. Four stacks were made outside of 90 bales each (bales 18" x 18" x 24"). One stack of each kenaf and crotalaria was covered with plastic, one stack each left uncovered, and other bales were stored inside a building. Sample bales will be sent to the Utilization Lab., Peoria, Ill., for testing at the following times: initial, after 6 months' storage, 12 months' storage, and 18 months' storage.

Work in progress, 1965

Paper-pulp tests.

1. The effect of weed control (Treflan, mechanical, and no control), row spacing, and seeing rate on the production of kenaf.

2. The effect of N rate (0, 50, 100, 200, 400 lbs. N/A) on the production of kenaf.

3. The effect of the date of harvest (8 harvests from mid-August to mid-March) on the pulping quality of kenaf.

4. Eight Sorghum spp. introductions are being tested for their pulp yield potentials.

Evaluation of new crops for forage.

1. Five Paspalum nicorae introductions from Central and South America are being evaluated for their forage value.

2. Eighteen Indigofera introductions are being evaluated for their forage value.

3. Ten F_2 generation backcrosses of Lotus corniculatus (Birdsfoot trefoil) from a Brazilian introduction and some common varieties are being evaluated. These were obtained from Dr. Paul R. Henson, USDA.

4. A number of Festuca spp. introductions are being evaluated and several show good potential for this area.

Hatch-174 (S-9) Evaluation of New Ornamentals Plants. Project Leader: George Tereshkovich, Hort. Dept., Experiment, Ga.

Seventy new perennial and 22 Hirado azalea-rhodendendron selections were obtained from the USDA Ornamental Plant Introduction Station, Glenn Dale, Md. In addition, 35 new perennial and 17 Beltsville dwarf azaleas were obtained from the U.S. National Arboretum, Washington, D.C. These plants were potted and overwintered in the lathhouse. In December, 1964, extreme low temperatures (11°F) caused moderate to severe damage (bark splitting) to each of the Hirado azalea-rhododendrons, and to several of the Beltsville dwarf azaleas.

Several outstanding ornamental selections obtained in 1963 were propogated and planted this year at this Station and the Georgia Mountain Experiment Station for cultural and climatic adaptation.

Twenty Luffa, 12 Lagenaria P.I. selections and 28 commercial ornamental gourds were planted for observation and evaluation studies. Gourds come in many shapes, sizes and colors and are useful for decorative purposes, as well as sources of income.

Trials with Coleus are being conducted, but they are not true to name. Several Coleus cuttings and young, rooted plants were obtained from three locations in the United States, and it was found that plants morphologically the same had three varietial names. The original P.I. Coleus collection, I am sure, has been renamed to suit location by nurserymen, cooperators, and amateur horticulturists, and the true identity of each variety lost. It is suggested that the Coleus collection again be obtained to clear up this mixture.

Report from Dr. Ian Forbes, USDA, CRD, Tifton, Georgia

INHERITANCE OF RESISTANCE TO STEMPHYLIUM SOLANI IN BLUE LUPINE ENDEMIC TO PORTUGAL.

Resistance to Stemphylium solani in each of seven blue lupine breeding lines (S-1, (P.I. No. 167938), S-4, P.I. No. 167940), S-5, (P.I. No. unknown), S-6, (P.I. No. 168526), S-7, (P.I. No. 168527), S-8, (P.I. No. 168530), and S-10, (P.I. No. 168533), is controlled by a single pair of recessive genes, gl_2 gl_2. These breeding lines (resistant to S. solani) originated from six different seed collections obtained from natural stands in several districts of Portugal. The gl_2 gene was initially identified (in a previous study) in breeding lines WH-1 and S-9, which originated from two other

seed collections from natural stands in Portugal. Thus, eight separate seed collections from Portugal had the gl_2 gene. The gl_2 gene appears to be widespread in blue lupine endemic to Portugal. The gl_1 gene controlling resistance to S. solani (previously identified as a mutant in cultivated blue lupine in the USA, which assorts independently of gl_2) has not been found in any of the Portuguese material studied. Either gl_1 or gl_2 confers on blue lupine near immunity to S. solani. It is postulated that the gl_2 gene became well established early in the phylogeny of blue lupine in Portugal, thereby reducing the probability of the establishment of the gl_1 gene, since gl_1 mutations would have no survival advantage in the blue lupine populations already resistant.

Reference: Forbes, Ian, Homer D. Wells, and John R. Edwardson. 1965. Inheritance of resistance to Stemphylium solani in Blue Lupine Endemic to Portugal. Phytopathology 55: 627-628.

Report from B.B. Brantley, Jr., C.W. Kuhn and Grover Sowell

SCREENING SOUTHERN PEA (COWPEA) INTRODUCTIONS FOR VIRUS RESISTANCE.

1. Resistance of southern pea to cucumber mosaic virus (CMV). The 369 introductions of Vigna spp. maintained by the regional station were screened for resistance to this virus. Recovery of virus from symptomless plants indicate that the apparent resistance to CMV is actually tolerance. The virus multiplies in the plant but does not affect yield. Tolerance to CMV is apparently common in commercial varieties as well as in plant introductions. 'Purple Hull Pinkeye' offers a partial control of this disease since the virus has no effect on yield and is not seed transmitted in this variety.

2. Immunity to bean yellow mosaic virus (BYMV) in southern pea. P.I. 154134, P.I. 160024, P.I. 175962 and P.I.177101 of Vigna sinensis are immune to BYMV. Since immunity is the highest level of resistance obtainable, these introductions should be very valuable to plant breeders. Vigna cylindrica, P.I. 226106, was used as a highly-susceptible tester plant for detecting this virus in southern pea. This introduction should be valuable to virologists, plant breeders and others interested in detecting BYMV.

KENTUCKY

1965 ANNUAL REPORT S-9 "NEW PLANTS"

During the 1964-65 fiscal year, 11 accessions have been received by Kentucky workers.

Summaries of findings from the various groups of crop studies involving Plant Introductions are as follows:

Forages - Hybridization of red clover, Trifolium pratense with 38 species of the genus Trifolium was attempted. Pollination with T. hirtum (P.I. 206762), T. pallidum (P.I. 201213) and T. diffusum (P.I. 204517) resulted in some growth of T. pratense embryos. Sterile hybrid plants were obtained after pollination with T. diffusum, an annual autogamous nearly white flowered species. Amphidiploids of T. pratense x T. diffusum were highly self-fertile, allogamous and mostly cross-pollinated by bees in the field. Pollen fertility of the amphidiploid in the greenhouse was 89% as compared to 97% for diploid T. pratense. The hybrid was weakly perennial in the field and behaved as a summer or winter annual. The hybrid plants exhibited varying degrees of chlorosis.

The amphidiploid, evaluated as a winter annual at six locations throughout southeastern United States, was less vigorous than either parent but approached T. diffusum more closely. It was considerably less vigorous than T. incarnatum 'Ky Selection'. Date of flowering was intermediate between the parents but was closer to T. pratense 'R-28' (P.I. 224620) than to 4x T. diffusum. The hybrid was beneficially nodulated by strains of Rhizobium effective on T. pratense and by strains effective on T. diffusum. Examination of root tips of the hybrid and its parents showed the following 2n chromosome numbers: T. pratense 'R-28', 28; T. pratense 'Kenland', 14; 2n T. diffusum, 16; 4x T. diffusum, 32; diploid hybrid, 15; and the amphidiploid, 30.

Attempts to hybridize the amphidiploid with numerous other species of Trifolium have been unsuccessful.

Evaluation of Trifolium species has been accomplished in spaced plant and plot nurseries. Examination of a collection of 86 species revealed that 17 were biennials or perennials and the remaining 69 were annuals. Of 58 species which flowered without low-temperature induction, the flower colors were: white, 6; pink, 23; red, 12; purple 11; and yellow, 6. Variability within the introduced species was frequently as great as between species for degree of flowering and amount and type of vegetative growth.

In plot tests for evaluation of winter annuals, introductions of T. michelanium (P.I. 248405), T. incarnatum and T. pratense survived the winter in good condition and produced excellent seed crops. Intermediate in winter survival and seed production were introductions of T. hybridum, (F.C. 32587), T. hirtum (P.I. 234050), T. dubium (P.I. 222131), T. globosum (P.I. 168636, T. procumbums (F.C. 32228), T. resupinatum (P.I. 198737), T. filiforme (F.C. 23600) and T. campestre (P. I. 179055). Dry-matter yield studies including three introductions of T. visiculosum (P.I. 233,816, midseason; P.I. 234310, early; and P.I. 233782, late), T. incarnatum 'Frontier' and

and 'Ky. Select', T. michelanium (P.I. 258405 and P. I. 170829), T. subterraneum, 'Ga. Selection' (F.C. 35216) as well as selected lines of T. diffusum, T. pratense and hybrids of these species were conducted. Only the T. incarnatum and T. michelanium entries made sufficient growth to warrant harvesting. The T. michelanium introductions produced approximately 75% as much dry matter as the T. incarnatum varieties and were 7 to 10 days later flowering.

The following Trifolium species have been observed with varying degrees of intensity. Species noted (P) have been classed as perennials, all others as annuals under Kentucky conditions. Additional information concerning introductions of some of these species is on file in the Department of Agronomy, University of Kentucky, Lexington, Kentucky, 40506 (Dr. N. L. Taylor).

angustifolium
agarium
alexandrinum
ambiguum (P)
amabile (P)
arvense
balansae
campestre
medium (P)
mexicanum
michelanium
nigrescens
pallidum
pannonicum (P)
polymorphum
procumbens
radiosum
reflexum
repens
resupinatum
ruepellianum
scabrum
scutatum
semipilosum (P)?
spumosum
squarrosum
stellatum
striatum
subrotundum
diffusum
subterraneum
tomentosum
varigatum
visiculosum
velvivolum
parryi (P)
canescens (P)
carolinanum
cernum
cherleri
dubium
echinatum
filiforme
fragiferum (P)
wormskioldii (P)
xerocephalum
cheranganiense (P)
microcephalum
tembense
usambarense
petrisavii
leucanthum
rubrum
parviflorum
ligusticum
miegeanum
patens
desvauxii
africanum (P)
apertum (P)
alpestre (P)
rubens (P)
steudneri
baccarini
basconei (boccini?)
purpureum
johnstoni (P)
strictum
globosum
isodon
obscurum
mattirolanum
glomeratum
hirtum
hybridum (P)
incarnatum
isthmocarpum
lappaceum
lupinaster (P)
martinum
palaestinum
stenophyllum (P)
formosum
dichroanthum
pilulare
curvisepalum
ockroleucum (P)
carmeli
masaiense
montanum (P)
lugardii
chilense
polystachyum
longipes
fendleri
amphianthum
macilentum
megalanthum
vernum
depauperatum
burchellianum
riograndence
alpinum (P)
badium
lagopus
purseglovei
minis
shiatum

dasyphyllum (P)	gemellum	sarosience
armenium	bivonae	aureum
belariense	albidum	thallii
tridentatum	phleoides	clypeatum
memeghinianum	pratense	

Vegetables - Both open-pollinated and sib progeny of Cucumis melo v. reticulatus (P. I. 236355) have proven highly resistant to bacterial wilt in Kentucky and have been incorporated into the breeding program to introduce this characteristic into acceptable commercial lines according to Dr. H. C. Mohr. Three introductions of Cucumis sativus (P. I. 188807, P.I. 200815 and P. I. 200818) are currently being tested for possible use in the breeding program by the Horticulture Department.

Ornamentals - A relatively large number of perennial ornamental introductions are under observation but none have been incorporated in specific breeding or selection programs. Several red begonia introductions have created considerable interest and efforts will be made to concentrate observations on them for possible increase and release as varieties.

Vernonia - The leaders of the Kentucky S-9 Project have an informal understanding with Dr. K. J. Lessman of Purdue for cooperation in his program for selection of agronomically acceptable strains of Vernonia. Primary emphasis is being centered around selection for determinate flowering and non-shattering characteristics. A small planting was seeded in Kentucky for individual plant observation and selection.

Cooperative work with the Kentucky Highway Department in ground-cover studies has been initiated. The highway department has recently employed four plant materials specialists (3 agronomists and 1 horticulturist) to work in this area. In addition, cooperative relationships have been established with groups working toward the construction of a plant materials center at Jackson, Kentucky in connection with the Federal "Appalachian Project". It is hoped that work with these two groups will result in more intensive study of plant introductions and native collections for commercial use, as well as for roadside and strip-mine and spoil-bank cover and reclamation.

REPORT OF S-9 (PLANT INTRODUCTION) ACTIVITIES IN LOUISIANA DURING 1964-65

Julian C. Miller, S-9 State Representative

Since I have been asked to give a fruit report, I will discuss the fruit project first. I am happy to say that very definite progress is being made with the fruit project. In the case of peaches, release descriptions of two new varieties are in the hands of the printer at this time.

This past year 748 peach seedlings grown from controlled crosses were transplanted to the North Louisiana Experiment Station at Calhoun and 568 peach seedlings from controlled crosses and inbred lines were transplanted to the Idlewild Experiment Station at Clinton. A number of the older semi-proven selections from the Calhoun station were budded for grower plantings and expanded in the Calhoun and Idlewild experiment station tests.

A large number of peach phony disease-infected trees were removed from the variety tests and breeding block at Idlewild. A heavy infection of bacterial leaf spot on fruit and foliage occurred on all susceptible peach varieties and selections at the Calhoun location which made it possible for good bacterial disease resistance records to be taken.

The constant severe screening program is continuing at both Calhoun and Idlewild, and we are continuing in our objectives to develop high quality yellow and white freestone varieties that are adapted to mild winter conditions, to establish strains of high solids and vitamin content, to develop strains of free and clingstone peaches that are adapted to processing

and to concentrate efforts on early, mid, and late season varieties. Because of space, only the few objectives of this program are listed above.

In the case of pomes, 1000 seedlings of apple and pear from adpated parent trees were grown in greenhouse ground beds this past year. These were inoculated with suspensions of the fire-blight bacterium (Ervinia amylovora) in June, when the plants were about 18 inches high and in July when the surviving plants were about 2½ feet high. Two L.S.U. seedling pears were outstanding in blight resistance, all plants surviving both inoculations. Seedlings of some 40 female parents that were tested ranged from 0 to 100% in survival of both inoculations.

Fruit were observed on 15 apple seedlings and one pear seedling at Idlewild Experiment Station. Two of the apple selections and the pear appear promising. Buds of these have been set in seedlings and have already made some growth. When large enough, these selections will be planted in four tree plots for testing. A number of "spur-type" apple seedlings are being observed at Idlewild in light of the growing interest in this type of tree.

We feel that progress is being made with this phase. However, we will continue to study the plant response to environment and diseases of pear. There is a definite need for a good pear for the Gulf Coast region.

In the past, we have had an extensive planting of plums, but the phony peach disease came in with the plums, and we have had to pull up many of them along with other fruit. However, we about have it under control. We have budded the best selections as a method of getting stock free of virus. In doing so, we do not think that we have lost any of the best material.

We have a fig breeding project under way here at Baton Rouge. This is the only fig breeding project in southern United States. A nurseryman in Tennessee is increasing a dwarf seedling which has come out of this program. We are having to establish a new parental orchard at the Ben Hur Farm which is about five miles south of the Campus. However, we will continue our breeding program at this location, and planned crosses with the investigation of inheritance of certain characteristics will be made. We realize that this project has great potential, particularly for the Gulf Coast region.

Vegetable and Fiber Crops

Kenaf can easily be grown and produces a very fine tonnage as previously indicated in our report to Dr. Langford.

Cassia occidentalis is another promising crop. Should the need arise to grow these two crops, there would be no problem in increasing them in Louisiana.

In the case of Crotalara juncea, while it grows rapidly and produces a good crop, it lodges very badly, particularly during the late summer. The same is true of Vernonia, and I would not recommend the last two crops mentioned.

Our project to incroporate frost resistance, or even freeze resistance, into Irish potatoes is still under way. We have a large number of seedlings, and we hope that within a reasonable period of time that we will have a commercial variety which will withstand low temperatures. Such a variety would be of value, not only in the South where we get damage at least two

years out of five, but also in the North where they have freeze damage both spring and fall.

We are continuing to look for new germ plasm of Ipomoea batatas and have brought in a collection from the South Pacific which is being evaluated at this time for characters that we might be able to use in our present program.

Most of you have heard me say a lot about okra. I still consider it an important commercial crop in Louisiana. We now have more than 200 selections and varieties which we are studying for the inheritance of many genetic characters.

We are also giving considerable attention to one of our medicinal crops, Dioscorea. This plant can be grown in the Gulf Coast area and has survived the past six winters here at Baton Rouge. Our present objective is to breed varieties having a high cortisone value. Most of the introductions have a sapogenin content of only 2 to 3 percent. We need a variety having at least 8 to 10 percent.

These are some of the investigations in which we are interested. In addition to the strictly new crops, the ones that I have discussed have great potential in Louisiana and many other areas.

1964-1965 Report
Regional Project S-9 New Plants
Mississippi

Workers with the Mississippi Agricultural Experiment Station, USDA, and private individuals received during the 1964-65 year 299 plant introductions. These introductions consisted of 228 seed and 71 plant materials.

Eight counties in southern Mississippi were re-visited for budwood collections from previously selected trees and included apple, pear, and pecan. Budwood was sent to Dr. O'Rourke at Baton Rouge for propagation. Propagation of the apple and pear material was also made at State College. Other trees were called to the attention of Dr. Overcash by interested residents.

A major gene for resistance to the root-knot nematodes Meloidogyne incognita and M. incognita acrita was found in the pepper "405 B Mexico" and "Santanka x S". The odds were very high that the same gene controlled resistance to both nematodes and was the same in the two varieties. Both peppers were also resistant to M. arenaria and M. javanica and both were susceptible to M. hapla. Four peppers are listed in the Capsicum report of the regional stations as PI 135824, 135873, 141927, and 155299. Good resistance to Cercospora capsici was found in the following four peppers: 4682 Para, Brazil; 4785 _____, Brazil; 46101 Para, Brazil; and 46126 Puerto Rico. Presumably they are PI numbers. 46101 was used in breeding work and the resistance was multigenic, probably three or more genes. All domestic and foreign introductions of Pisum sativum were tested in the 1950's to Mycosphaerella pinodes and some tolerance was found in a few of the lines but it was so low it was useless under our conditions.

Sclerotinia homeocarpa is attacking Bahiagrass and Bermudagrass in the southern half of the State to the extent that resistance is being sought. Inoculations of Paspalum introductions with pure cultures show considerable variation in tolerance and selections are being made.

Four woody ornamentals are being increased for extensive testing - 242241 -275853 and 54-277653. The white crepe myrtle received many years ago is being increased and used on the Mississippi State campus.

Magnolia, a crown rust resistant ryegrass variety originating from plant introductions is being released.

NORTH CAROLINA - NEW PLANTS PROJECT

Report to S-9 Technical Committee, Stillwater Okla., July 21-22, 1965

Six cooperators received 3044 introductions from August 1, 1964 to July 1, 1965. The breakdown is as follows:

Crop Class	PI's	Genera	Species	Cooperators
Vegetables	2823	6	22	3
Legumes	146	2	2	1
Ornamentals	73	14	42	1
Industrial Crops	2	2	2	1
Totals	3044	24	68	6

The above introductions have just been planted and little is known concerning them. Hundreds of additional plant introductions received prior to this year are still being evaluated and many have been incorporated into the various breeding programs. It may be ten or more years before an introduction can be fully evaluated either as the original PI or as a supplier of a specific trait.

The Peking soybean is a good example of this long time evaluation process. It was introduced from China as PI 17852B in 1906, named Peking in 1910 and was grown as a black seeded hay variety in the Northeast in the 20's and 30's. In 1957 the resistance of black-seeded Peking to the soybean cyst nematode was observed and the transfer of this resistance to a yellow-seeded variety adapted to the southeast was initiated. The Pickett soybean variety resistant to the cyst nematode was released in 1965.

I. Varieties released by the North Carolina Experiment Station in Cooperation with the USDA and other State Experiment Stations.

A. Pickett, A Cyst Nematode Resistant Soybean.

Pickett is the result of an intensive attempt to transfer the resistance of black-seeded Peking, PI 17852B, which was first observed in 1957, to a yellow-seeded variety. Pickett is a selection from the cross of a cyst nematode resistant black-seeded strain and a strain very similar to Lee in yield and general performance. The black-seeded parent was from the third backcross of Lee to the original cross of Lee x Peking and was one of the three resistant strains used in the cyst nematode resistant composite designated as NC 55 released as a research tool in 1963. The other parent is a strain with white flowers and gray pubescence from the fifth backcross of D49-2491 to the cross D49-2491 x Dorman. D49-2491 is a sister selection of Lee. Cultural information concerning Picket follows in the Appendix of this report.

B. Morrow, A Canker Resistant, Very Early Commercial Blueberry Variety.

The Morrow originated as a hybrid seedling from the cross Angola x Adams, made in 1945. A disease resistant selection of Vaccinium corymbosum, a wild species from New Jersey is a parent of Adams. A disease resistant selection of Vaccinium australe, a wild species from North Carolina is a grandparent of the variety Adams.

Morrow is introduced for use in North Carolina and southeastern United States as a canker-resistant, very early commercial variety with improved size and color as a replacement for Angola. Cultural information concerning Morrow appears in the Appendix of this report.

C. Earlibelle, An Early Ripening Strawberry Variety.

Originated as a seedling from the cross of Albritton x Md-US 2101 [Midland x Md 683 (Scotland BK 46 - a plant introduction x Fairfax)].

Earlibelle is recommended for use in North Carolina and southward as an early commercial variety. It is introduced because of its attractive appearance, firm fruit, early maturity, and greater productivity than the Albritton variety. Yields of the Earlibelle are given in the Appendix of this report.

II. Plant Introductions of Special Interest

A. Cabbage.

Thirty-three varieties of cabbage obtained from commercial firms and from the Regional Plant Introduction Station at Geneva, N. Y. were evaluated for resistance to the cabbage looper at Fletcher, N. C. by R. B. Chalfant.

The damage scores and insect counts are in Table 1 of the Appendix. There was no correlation between damage scores and insect numbers, and there was not a close relationship in damage between varieties and their respective sibs (197226, 261770, 263061, 263070, 263072), all sibs showed higher damage scores than their respective parents. Reds and savoys were more resistant than smooth, green types as has been generally true over several years; however, one smooth, green type - P. I. 194226 - was the most resistant of all varieties tested in 1964. It is a medium-late cabbage resembling Charleston Wakefield in having a conical head. The "viridis" which showed resistance is Brassica oleracea var viridis and did not form a head. It grows as a tall, thick, indeterminate stalk.

B. Tomato.

In my 1964 report it was reported that PI 3814 Lycopersican esculentum, a pear shaped tomato that is resistant to Southern Bacterial Wilt had been incorporated into the breeding program.

This line 3814 was never assigned a PI number. It was sent to Beltsville about 1942-43 by W. K. Bailey while he was at the Mayaquez station. It was called "Tomate del pais" which means "native tomato." The number 3814 was Dr. Porte's identification of the material (information courtesy of Drs. Skrdla and Winters).

III. Domestic Plant Explorations.

During 1963-65 Dr. Gene Galletta from North Carolina and Dr. A. W. Stretch, a USDA plant pathologist from New Jersey collected 27 clones of Vaccinium australe in the southeastern counties of North Carolina. These clones were selected for resistance to stem canker.

A proposal for S-9 funds for a Domestic Collection of Eastern Vaccinium species for use in the Southeast will be made at the S-9 meeting.

B. Advanced Testing

1. Kenaf - Results of plant spacing tests - Plymouth.

1. Dry matter yields were higher in 1964 than in previous years. This is partially due to an earlier planting date. Yield averaged 7.3 tons per acre dry matter compared to an average of 5.0 tons per acre for the years 1960-63.

2. Highest dry matter yields were obtained in 14 inch rows, 8.2 tons, as compared to 7.8 tons in 7 inch rows, and 6.7 tons and 6.6 tons in 21 and 28 inch rows.

3. Highest dry matter yields were obtained at the lower plant densities in the 7 and 14 inch rows. This trend was reversed in the 21 and 28 inch rows where the higher yields were obtained at the higher plant densities.

4. Plant heights and plant diameters were greater at the lower densities within each row width and increased as row width increased.

Plant spacings and fertility studies are being evaluated this year.

2. Indian Ironweed - Vernonia anthelmintica

A plant spacing experiment was grown at Rocky Mount. Rainfall was very sparce in the early half of the 1964 growing season. Plants varied greatly in height and flowering due to drought conditions at time of germination. Most plants germinated early and did poorly due to the lack of moisture.

Plants were harvested October 27, four weeks before the first killing frost. Individual plants were selected for their vegetative vigor and potential seed yield. Seed yield per acre from these selected plants was 441 pounds based on an average plant spacing of 1.75 square feet.

Seed from the first flower, from the second group of flowers and from the third group of flowers of 100 plants were harvested separately. Oil analyses were made.

Flowering Stage	Wt. gms	% seed	% Oil	% Oil mfb	Epoxy oxygen	FFA
Flower # 1	12	1.5	27.88	29.35	3.85	2.83
2nd Flowers	122	15.2	27.66	29.12	3.92	1.52
3rd Flowers	670	83.3	23.30	24.53	3.72	1.42

Plant spacings, harvesting techniques, defoliation methods, and fertility studies are being evaluated this year. A one and a half acre planting is being grown for seed increase.

IV. Evaluation of Potential Industrial Crops and Pulp Crops.

A. S-9 Preliminary Screening Program.

The trials were located at the Upper Coastal Plain Research Station, Rocky Mount, on a sandy loam soil. Rainfall was normal in April but practically nil in May and June. Plots were irrigated on July 2 and rainfall was normal during the remainder of the growing season.

The following trials were evaluated.

1. Pulp test : Seeded May 6 in 14 inch rows consisting of five selections of three crop species. Drought in May and June lowered yields considerably. Stands of okra were very poor so yields are not given.

2. Oil, seedgum and pulp test : Transplanted May 22 in 3 foot rows, on row per plot. Test consisted of 10 entries. Not enough seed was available at planting time to get a true evaluation of these crops.

Dry matter yields, seed yields, and agronomic characteristics of the crops grown are given in tabular form.

Table 1. Dry matter yields of pulp crop grown at Rocky Mount - 1964

Crop & Variety	Dry matter yield	Plant height	Plant density
	tons/A	feet	#/ row foot
Kenaf - Everglades 41	4.21	7.0	7
Kenaf - Everglades 71	5.18	6.8	6
Sunn hemp - Brazalian	3.34	9.0	5
Sunn hemp - Texas L-374	2.80	8.0	7
Okra - La. Green Velvet	--	4.7	-

Table 2. Seed yield and dry matter yield of the ten plant introductions grown for evaluation for pulp, seed oil and seed gum, Rocky Mount - 1964

No.	Crop	PI number	Potential use	Seed yield	Dry Matter yield	Plant height
				gms	tons/A	feet
1	Aeschynomene sp.	296044	pulp	----	2.26	8'
2	Crotalaria eriocarpa	296046	pulp	3	Low	5.5'
3	Desmanthus interior	296052	pulp	----	Low*	5'
4	Desmodium sp.	296053	pulp	----	Low*	5'
5	Indigofera suffruticosa	296054	pulp	----	Low*	5'
6	Sesbania sp.	296055	pulp	----		9'
7	Tagetes lucida	296056	oil	-----	No stand	----------
8	Trichosanthes cucumerina	296058	oil	-----	No stand	----------
9	Cassia javanica	296081	seed gum	----	No stand	----------
10	Cassia hirsuta	296080	seed gum	----	No stand	----------

* Perennials - will harvest in 1965

3. Cassia occidentalis and C. bonariensis

These seed gum crops do very well in North Carolina. Yields are high and are best on the poorer soils. Even though the plants and seed are toxic, the forage people aren't worried about it as no feed grains or hay crops are grown in the Sandhills area where they have the most potential. A 3/4 acre planting is being grown this year.

V. New Crops for North Carolina

A. Sunflowers.

A regional sunflower test was evaluated at three locations. Ten PI's were among the ones tested.

Table 3. Sunflower seed yields of the regional sunflower variety tests grown at three locations in North Carolina, 1964.

Entry No.	Sunflower #	Variety	Yield Plymouth	Salisbury	Waynesville
1	1	T 56002 (S-37-388T x HA 7)	1313	1345	2220
2	2	Peredovik (Morden 883)	524	630	*
3	3	Peredovik 15659 (PI 294659)	860	658	1456
4	4	Smena (PI 294658)	792	708	*
5	5	VNIIMK 89.31	788	810	*
6	6	VNIIMK 16.46 (PI 265099)	871	788	*
7	7	Ienissei (PI 294660)	*	677	*
8	8	Tchernianka 66 (PI 265104)	719	893	1376
9	9	Armavirsky 93.43 (PI 265101)	816	851	674
10	10	Armavirsky 93.45 (PI 265102)	445	1000	*
11	11	VNIIMK 88.83 (PI 265103)	693	817	*
12	12	Jdanovsky 82.81 (PI 265100)	833	919	2205
13	13	Stepnyak (PI 257641)	1252	1020	1824
14	14	Mingren	1303	963	--
15	15	Commander	1351	1046	1752
16	16	Arrowhead	1222	999	760
17	17	NK Hybrid I	1234	1282	1723
18	18	NK Hybrid II	1639	1204	1254
19	19	Lyng Hybrid I	----	1234	1908
20	20	Greystripe	*	854	1871
21	21	Manchurian	----	810	1476
22	22	Lyng Manchurian-26	----	1058	1397
23	23	Russian	824	938	1943
24	24	Mennonite (NK)	1822	1072	----
25	25	Mennonite (NC, m)	1236	611	1240
26	26	Advent	788	1044	1580
27	27	Mennonite (NC1)	1320	--	--
AV Location Yield			1082	932	1647

* Varieties planted but no yields obtained due to shattering.
\- Varieties not planted.

B. Sugarbeets

Sugarbeets were grown in eight North Carolina counties during 1964 with the following agencies cooperating: N. C. State Experiment Station and Extension Service, N. C. Department of Agriculture, N. C. Department of Commerce and Development, U. S. Department of Agriculture and individual farmers.

Table 4. Yields, percent sugar, and percent purity of those sugarbeet varieties grown at each of seven locations in North Carolina, 1964. Averages based on 25 to 70 samples.

Location	Sugarbeet Yield		Sugar Content		Purity	
	av.	range	av.	range	av.	range
	T/A	T/A	%	%	%	%
Waynesville	16.2	13.4-19.4	15.1	13.7-16.5	82	77-86
Salisbury, 4/1	13.4	9.1-16.7	15.1	13.8-16.7	81	76-87
Salisbury, 4/29	15.2	11.2-18.2	16.8	14.1-18.2	83	80-87
Rocky Mount	12.3	10.5-16.0	13.9	12.2-15.4	80	76-86
Plymouth	9.0	8.1- 9.7	13.3	11.3-15.6	82	77-85
Pasquotank Co.	15.5	14.0-18.9	14.6	14.0-15.3	84	82-85
Camden Co.	21.4	17.6-24.2	12.5	11.7-13.4	85	84-86

VI. Plans for 1966.

A chart of responsibilities will be turned in at the meeting.

Appendix A

PICKETT, A CYST NEMATODE RESISTANT SOYBEAN

Pickett, the first yellow-seeded soybean variety resistant to the soybean cyst nematode (Heterodera glycines), was released by the Crops Research Division, Agricultural Research Service, and the Agricultural Experiment Stations of Arkansas, Missouri, North Carolina, Tennessee, and Virginia on July 1, 1965. Selection and preliminary evaluation of the new variety was conducted by C. A. Brim and J. P. Ross at the North Carolina Agricultural Experiment Station. Advanced evaluation was done cooperatively by them and workers in Mississippi, Missouri, Tennessee, and Virginia. Seed should be available for farmer planting in 1967.

Pickett is very similar to the variety Lee in yield and general performance and can be grown where Lee is adapted. Like Lee, Pickett is resistant to shattering and to many leaf diseases (bacterial pustule, wild fire, and target spot). Plants of Pickett have gray pubescence and seeds are yellow with dark brown hila. Seed size is essentially the same as Lee.

Pickett is the result of an intensive attempt to transfer the resistance of black-seeded Peking, which was first observed in 1957, to a yellow-seeded variety adapted to the southeast.

Pickett is a selection from the cross of a cyst nematode resistant black-seeded strain and a strain very similar to Lee in yield and general performance.

Field evaluations of Pickett for cyst nematode resistance and general performance were conducted in 1964 in cooperation with research workers in Missouri, Virginia, Mississippi and Tennessee. Pickett was about equal to Peking in resistance to strains of the nematode in North Carolina, Missouri and Tennessee, while at Holland, Virginia, both Pickett and Peking were susceptible. Peking has also been found resistant in Arkansas. On non-infested soils in North Carolina, Missouri and Mississippi, Pickett yielded slightly less than Lee and was similar to Lee in other attributes.

Although yields of Pickett have not been compared to those of Lee on cyst nematode infested soils, NC 55 yielded 19.0 bu./acre versus 6.2 bu./acre for Lee on infested soils at Clayton, N. C. in 1963. Pickett is expected to have a yield advantage similar to NC 55 on infested soils since both have equivalent degrees of resistance.

It is expected that Pickett will exhibit cyst nematode resistance in most infested areas known today in the United States. However, its culture over wide areas may disclose other physiological strains of the nematode, in addition to the one in the Virginia test, capable of reproducing on Pickett. Since Lee may have a yield advantage over Pickett on non-infested soils, the new variety is being recommended for production only in cyst nematode infested areas. In these areas the new variety should stabilize production and at the same time will be effective in reducing nematode populations thereby decreasing chances of spreading the pest to new areas. Successful production of Pickett in Virginia, however, will depend on the prevalence of nematode strains in the state to which the variety is not resistant.

Earlibelle, A New Early Ripening Strawberry Variety

A new early ripening strawberry variety EARLIBELLE, formerly tested as NC 2486 was released by the Crops Research Division and the North Carolina Experiment Station in November 1964.

Earlibelle ripens earlier than Albritton in eastern North Carolina. At the Coastal Plain Experiment Station at Willard, North Carolina, Earlibelle averaged 1,655 as compared to 681 quarts per acre for Albritton in the first week of harvest and 25 percent greater total yield over a five-year period. Fruits of Earlibelle are medium-large and average 62 berries per pound compared with 66 for Albritton. The skin color of the berries is originally bright red, turning deep red at maturity, and the flesh color is a uniform bright red. The surface of the berries is very glossy and firm. The berries are uniform, long-conic in shape with few rough fruits. The flavor is tart and good.

Plants of Earlibelle are comparatively small but produce runners so freely on most soils that fruiting beds frequently must be thinned. The new variety has not been productive at Beltsville, Maryland, and northward. Leaves are resistant to leaf spot and leaf scorch.

Earlibelle is recommended for use in North Carolina and southward as an early commercial variety. It is introduced because of its attractive appearance, firm fruit, early maturity, and greater productivity than the Albritton variety.

Morrow - A Canker-Resistant, Very Early Commercial Blueberry Variety.

Morrow, a blueberry variety formerly tested as NC 678 was released by the Crops Research Division and the North Carolina Experiment Station in December, 1964.

Morrow originated as a hybrid seedling from the cross Angola x Adams, made in 1945. It was selected and tested on a farm near Ivanhoe, North Carolina during 1948-1952, by E. B. Morrow, G. M. Darrow and D. H. Scott. It has been tested in North Carolina by G. J. Galleta and J. M. O'Neal during 1960-1964.

Morrow ripens five to seven days ahead of Wolcott and Croatan and about two to three days ahead of Angola in eastern North Carolina. Morrow ripens all of its fruit in a shorter period than any of the other commercial varieties grown in North Carolina. During a five-year period at Ivanhoe, N. C., Morrow ripened 47 percent of its fruit in the first week of the season, whereas Angola ripened only 34 percent; Wolcott, 21 percent; and Croatan, 16 percent. The average yield of fruit from young plants in the 1960-1963 seasons was 6.2 packed pints for Morrow, 3.7 for Angola, 7.3 for Wolcott, 7.7 for Murphy and 13.2 for Croatan. Morrow berries were somewhat lighter blue than Wolcott, Croatan or Murphy and much lighter blue than Angola. The Morrow fruit scar is large and moist and may tear under some circumstances. Morrow's mild, pleasant taste is as flavorful and its flesh as firm as Wolcott.

Morrow bushes are characteristically medium-sized and slow-growing when the bush is of fruiting age. The bush is semi-upright and broad, having many thick canes which have about the same tolerance to the stem canker fungus as Wolcott. Fruit clusters are usually borne upright at the periphery of the bush. Leaves are subject to Septoria leaf spot. Morrow cuttings root readily from either hardwood or softwood.

Morrow is introduced for use in North Carolina and southeastern United States as a canker-resistant, very early commercial variety with improved size and color as a replacement for Angola.

Table 1. Cabbage caterpillar feeding damage and population of cabbage caterpillars on 33 varieties of mature cabbages August 11, 12, 1964. Fletcher, N. C. 1964.

Variety	Source[a]	Type[b]	Percent damage[c]	No. Cabbage Loopers (L) Imported Worms (I) and Cross-Striped Worms (C) on 12 plants.		
				L	I	C
P.I. 194226	Germ.	G.S.	29.5 a	25	0	2
P.I. 214298	U.K.	Viridis	30.0 ab	25	3	6
P.I. 261770	France	Savoy	34.0 a-c	10	1	0
Red Danish	Harris	Red	37.2 b-d	52	1	0
Mammoth Red Rock	Asgrow	Red	41.6 c-e	49	0	2
P.I. 246098	Germ.	Savoy	42.6 c-f	17	3	0
P.I. 246103	Germ.	Savoy	44.8 d-g	21	1	1
P.I. 261770(S)	France	Savoy	45.2 d-h	13	1	0
Round Red Dutch	Corn.	Red	45.9 d-h	36	2	1
Sav. Perf. D'Head	Asgrow	Savoy	47.4 d-h	11	2	2
St. Flat Dutch	Asgrow	G. S.	48.8 e-i	14	3	0
P.I. 263061	USSR	G. S.	49.6 e-j	19	0	0
Res. Danish	Harris	G. S.	50.0 e-k	14	2	0
P.I. 225857	Den.	G. S.	50.1 e-k	8	4	0
P.I. 194226(S)	Germ.	G. S.	50.1 e-k	22	0	6
P.I. 263070	USSR	G. S.	52.0 f-l	31	1	0
P.I. 245021	France	Savoy	54.4 g-l	35	5	0
Oakview	Asgrow	G. S.	55.4 h-m	29	6	0
Copn. Mkt. 86	Asgrow	G. S.	55.6 h-m	5	3	0
P.I. 225855	Denm.	G. S.	58.0 i-n	6	0	0
P.I. 263072	USSR	G. S.	58.1 i-n	14	0	15
King Cole	F-M.	G. S.	58.1 i-n	12	2	1
P.I. 245011(S)	France	Savoy	58.8 i-n	12	1	0
Market Topper	Harris	G. S.	58.8 i-n	14	3	0
P.I. 225857(S)	Denm.	G. S.	59.8 j-n	6	2	0
P.I. 263072(S)	USSR	G. S.	60.2 jn	16	2	7
P.I. 245011	France	Savoy	60.6 k-n	13	2	3
P.I. 263070(S)	USSR	G. S.	60.9 k-n	11	0	4
Emerald Cross	Burpee	G. S.	61.2 l-n	7	0	0
P.I. 263061(S)	USSR	G. S.	65.1 mn	17	1	2
O. S. Cross	Burpee	G. S.	65.2 mn	18	3	3
Surehead	Burpee	G. S.	67.2 n	22	2	6
P.I. 212971	India	G. S.	68.0 n	45	1	0

a. Corn. = Corneli, F-M = Ferry-Morse
b. G. S. = Green-smooth
c. Average of 60 plants. Values with letters in common are not significantly different at the 5% level. Scores are multiplied by 10 to obtain percents.

Oklahoma Report to S-9 Technical Committee

Oklahoma State University
Stillwater, Oklahoma

July 21 and 22, 1965

Interest in plant introductions during the past year has been expressed by plant breeders, biochemists, botanists, plant pathologists and entomologists. Research on oilseed, pulse, mucilage, and other industrial crops was reduced 1965 at the request of the administration because of inadequate funds. Since July 1964, 196 accessions have been received by Oklahoma researchers in the following groups:

Forage Crops:	Number Accessions
Grasses	107
Legumes	7
Pulse Crops:	
Peanuts	40
Cowpea	3
Soybean	8
Vegetable Crops:	
Tomato	14
Cucumis	1
New Crops:	3

The performance of cool season crops planted in March and April was very erratic due to lack of rainfall in June, and July (i.e. 1.12 and 0.70 inches at Perkins). A severe hail storm also occurred at Perkins on June 28.

A. Forage Crops:

1. Cynodon collection: A list of the Cynodon introduction was prepared and duplicated and distributed by W. R. Langford.

   A progress report is available by Jack R. Harlan, Wayne W. Huffine, J. M. J. deWet and S. P. Sen Gupta on the Biosystematics of the Genus Cynodon (Gramineae). Proc. Series P-499. 1965.

2. Old World bluestems: Process Series P-480, 1964 reports the progress on Improving Old World Bluestems for the South (J. R. Harlan, W. L. Richardson and J. M. J. deWet).

3. Vicia sativa: (C. E. Denman) The ten accessions planted in the fall of 1964 all winter killed.

4. Vicia villosa: (C. E. Denman) The four accessions planted in 1964 near Perkins all appear to be winter hardy.

5. Medicago sativa and M. falcata: (C. E. Denman) The seven accessions will be planted in the fall of 1965.

6. Eragrostis curvula and Digitaria smutsii: (O. J. Hunt) no report at this time.

B. Vegetable Crops:

1. Tomato: (Cordner) The Nemared tomato contains germ plasm of a nematode resistant wild, small-fruited species, Lycopersicon peruvianum (Muller), P.I. 128658 from South America.

2. Cucumis sativus: (G. Barnes) Obtained for disease resistance.

C. Ornamentals: (A. Kenyon) Most of the accessions received did not survive under Oklahoma conditions.

D. Oilseed Crops:

1. Safflower, Carthamus spp.: The mean seed yields for three of the varieties in the irrigated variety test near Goodwell was 1260 pounds per acre (1958, 1960, 1961, 1962, 1963). The plant height for the above tests averaged 20 inches. The mean oil content of the seed was 30.7 percent and iodine number averaged 146. The mean seed yield for the above entries in dryland tests near Stillwater was 568 pounds per acre (1961 1964). The plants averaged 25 inches in height and 28.4 percent and 153, respectively for oil content and iodine number.

3. Castorbeans: Eight varieties and hybrids were evaluated in four tests near Goodwell, Altus, and Perkins. The mean seed yield in the irrigated test near Goodwell was 2052 pounds per acre. No castorbean plant introductions were grown in 1964.

4. Soybeans: Seed of several wild species were obtained in 1965 for determining possible sources of greater drought tolerance.

E. Pulse Crops:

1. Peanuts, Acachis spp.: Sixty peanut accessions have been evaluated for their breeding potential with respect to their agronomic, physical, chemical and organoleptic characterists during the past four years. Four of these accessions were included in a 1965 natural crossing block (P.I.'s 161300, 229553, 259662, and 259681) with a genetic marker line P.I. 259662 (P-294) had high oil, protein, and iodine number.

Eighty spanish and valencia accessions were advanced to the 1965 preliminary strain tests near Perkins and Ft. Cobb.

This year 212 accessions were planted for increase and preliminary evaluation. Forty-five accessions of wild species of Arachis were transplanted in nurseries near Perkins and Ft. Cobb in 1964 and 1965. Two significant observations were made. P.I. 261870 (P-227) over wintered at Perkins and P.I. 261875 (P-231) produced seed at Ft. Cobb.

2. Field peas, Pisum arvense: Nine accessions and seven varieties were tested in 1963 and 1964. In 1963, the test was planted in 20-inch rows on a Norge fine sandy loam soil near Paradise on March 25 and harvested June 13. In 1964 the test was planted in 40-inch rows on April 16 on a Teller fine sandy loam. Data for the best performing accessions are shown in Table 2.

3. Dolichos biflorus and D. lablab(Hyacinth bean): There has been an insufficient quantity of seed for testing the accessions until 1965. Five accessions were planted May 18 and June 4 near Stillwater.

4. Pigeon pea, Canjanus cajan: Nine accessions and three selections were planted April 16, 1964 near Perkins in rows spaced 40-inches apart. All entries made excellent vegetative growth ranging from 54 to 72 inches in height. Only four entries matured seed when harcested November 27, 1964 [P.I.'s 218066 (Sp-46), 249623 (Sp-227), 249262 (Sp-229), and OAESP 59-2 (Sp-49)]. Nine entries were included in the 1965 tests planted April 13 and June 4 near Stillwater.

5. Phaseolus spp.:

   a. Mungbeans, P. aureus: Approximately 200 accessions of mungbeans are shown in the seed inventories. Approximately 175 mungbean accessions were grown near Stillwater in 1964 to obtain new seed and preliminary evaluation. Considerable variability was noted with respect to plant type, maturity, seed size and color, productivity and disease tolerance.

   b. Math bean, P. acontifolius: Fourteen accessions have been introduced but seed of only four accessions have been grown in Oklahoma (P.I.'s 213014, 214332, 214333, and 218101). The accessions tested appear to be free of diseases and insects and offers possibilities for a wildlife feed.

   c. Urd bean, P. mungo: Approximately 50 accessions are shown in the seed inventories. Eleven accessions have been evaluated in Oklahoma. P.I.'s 271497 (M-749), 271498 (M-750), and 288602 (M-787) have produced excellent seed yields in preliminary t tests.

   d. Field beans, P. vulgaris: Nine varieties of field beans were planted in an irrigated test near Goodwell and a dryland test near Perkins. Red Mexican (Sp-437) and Pinto (Sp-438) produced 1715 and 1369 pounds per acre of seed in the Goodwell tests but no seed were produced at Perkins.

   e. Adsuki bean, P. angularis: Two of the three accessions obtained from domestic sources but originating from Formosa and Korea produced 594 and 426 pounds per acre of seed in tests near Perkins and Goodwell in 1964. A planting made by a grower near Hennessey in 1964 showed severe lesser cornstalk borer damage.

f. Indian bean, P. latifolus: A domestic accession (Sp-222) has produced excellent seed yields (1500 pounds in two 1964 tests) every year tested.

6. Horsebean, Vicia faba: Four accessions are being tested in 1965. Narrow rows and disease resistance will be needed for maximum yields.

7. Fenugreek, Trigonella foenum - graecum: Seven accessions were grown at Perkins in 1964. When planted April 16, P.I. 288653 (Sp-350) was the most productive. The 1965 test was planted May 18 near Stillwater.

8. Lentil, Lens culinaris: Three accessions were tested in 1964 and 1965. They were planted May 18 near Stillwater.

9. Cowpea, Vigna spp: Twenty accessions were grown at Perkins in 1963. No plants emerged for P.I. 255750 (C-597) and P.I. 288660 (C-666) Several accessions did not produce mature pods at Perkins in 1963. (P.I.'s 288672, 288887, 288656, 288657, 288660, 288663, 288667, 288668, 288669 and 288671). The outstanding producer was P.I. 238110 (C-599).

Twelve accessions were included in the fusarium wilt test during 1959, 1960 and 1961 and three were tested in 1963 and 1964. The results are shown in Table 3. Twelve of the 15 accessions had less than 10 percent of the plants killed by unknown races of fusariums wilt.

F. Plants for Industrial Use:

1. Crambe kale, Crambe abyssinica: Eleven accessions of crambe kale were planted April 16, 1964 on the Perkins Agro. Research Sta. The seed yields and oil content were extremely low for each accession.

Crambe has been tried on three soil types (Norge, Kirkland, and Teller) around Stillwater since 1960. Mean seed yields have ranged from four to 540 pounds with an average of 206 pounds per acre for P.I. 247310 (Sp-76).

Six accessions were planted April 13 at Stillwater but stands were obtained only for P.I. 247310 (Sp-76). The latter was also planted June 4 near Stillwater.

2. Indian Ironweed, Vernonia anthelminthica: Seed yields have averaged 605 pounds per acre in three tests. The results of the weed control experiment near Perkins is shown in Table 5. Nine selections were planted near Stillwater on June 3. The seed yield, plant height and oil content were markedly different for the 1963 selections from P.I. 283729 (Sp-263) (Table 5).

In 1965, two plant introductions and nine selections were planted May 18 and June 4 near Stillwater. Six acres of P.I. 292522 (Sp-465) was planted near Perkins in cooperation with USDA. No volunteer plants were noted in the test areas in years following the test.

3. Fennel, Foeniculum vulgare: P.I. 268383 (Sp-401) was planted February 17 and February 28 and Beltsville no. 54999 (Sp-429) was planted March 13 and March 26 near Stillwater. The test was harvested October 19 and seed yields were less than 100 pounds per acre. The later the planting date the higher the yield. Some disease and tomato horn worms were observed. There was no evidence of plants over wintering at Stillwater.

4. Pulp Crops: Two entries each of sorghum, kenaf, sunn hemp and okra were planted at Perkins in 40-inch rows. The mean dry matter produced by the sorghum hybrids, kenaf, sunn hemp and okra entries were 14871, 7251, 6481 and 3300 pounds per acre, respectively (White, G. A. Annual Pulp crops 1964 Agronomic evaluation, July, 1965).

5. Mucilage Crops:

   a. Guar, Cyamopsis tetragonoloba L.: In 1963 and 1964, 190 guar accessions collected by Dr. Ted Hymowitz and five accessions previously lost were increased for further evaluation. Seed of five accessions believed to be lost (F. C. 23058, P.I. 116034A, 156988, 158122, and 158128) were obtained from H. W. Johnson, Stoneville, Miss. Seed were obtained from F. C. 23058 and 116034A but no plants emerged for the others.

   Seed of Hall and Mills guar varieties will be released for planting in 1966. The varieties cooperatively released by U.S.D.A. and the Texas and Oklahoma Agri. Experiment Sta. trace to selections made by Murray Kinman from Plant Introductions 263875 and 179930. Mills, Brooks, and Hall provide early, medium and late maturing varieties that have shown field tolerance to bacterial blight and Alternaria leaf spot. These varieties have produced 36 to 45 percent more seed than Texsel or Groehler in Texas and Oklahoma tests.

   Seed were obtained from each of the 48 new introductions grown in 1964 except P.I. 288463 (G-657). About five percent of the introductions were rated high in production and free of diseases but additional research is needed to determine the potential of the germ plasm for guar improvement.

   In our opinion, guar has excellent potential with yields above 1000 pounds per acre and with a market for 26 million pounds of guar gum selling for $7,8000,000 annually.

   b. Coffee Senna, Cassia occidentalis: In four tests in 1963 and 1964 P.I. 204366 (Sp-253) has averaged 266 (16 percent) pounds per acre more seed than Brooks guar. A leaf spot disease was noted at Perkins in 1964. Combine harvest will be difficult with coffee Senna.

G. Sugar Crops:

1. Sugar Beets: Tests were planted at Goodwell and Altus in 1964.

	Altus	Goodwell
Date planted	3-27	3-26
Row width	2.5 feet	2.3 feet
Plot length (Harv.)	20 feet	16 feet
Rainfall (Mar. 1 - Oct. 31)		8.05 inches
Water	33" (11 times)	36"
Harvested	11-3 & 11-10	10-31
Mean Beet yield (tons/a)	14.8	30.4
Sucrose (%)	15.2	14.8
Sucrose yield (lb/a)	2500	9003
Thin juice purity	84.2	86.4

PUBLICATIONS

1. Cordner, H. B., Hugh Thomson and Charles Galeotti. Origin and development of the Nemared tomato. Oklahoma Agri. Exp. Sta. Bul. B-635. 1-19. 1965.

2. Ford, R. N., Bill Webb, R. M. Oswalt, R. S. Matlock, B. J. Ott. Irrigated Sugar Beets in Oklahoma. Proc. Series. In Print. 1965.

3. Harlan, Jack R., Wayne W. Huffine, J. M. J. deWet and S. P. Sen Gupta. Biosystematics of the Genus Cynodon (Gramineae). Proc. Series P-499. 1965.

TABLE 1. Summary of data obtained for Safflower accessions grown in 1963 and 1964, Stillwater, Oklahoma. (1963 - planted 3-22, harvested 7-16; 1964 - planted 2-28, harvested 7-23).

P.I. No.	Year Grown	Okla. Sp-No.	Seed Yield (lbs/A)	Gms/100 seed	Plant Ht.(ins.)	Test wt.	Oil %	Protein %
174080	1964	122	586	3.2	36	40.1	21.7	19.7
183669	1963	49	498	3.5	49	--	--	--
198290	1963	50	416	3.1	22	--	--	--
198291	1963	51	332	3.6	20	--	--	--
199889	1963	52	334	3.5	25	--	--	--
199890	1963	53	506	3.2	22	--	--	--
253914	1964	114	630	2.5	30	39.5	27.6	21.4
257582	1963	42	654	3.5	32	--	--	--
288307	1964	123	246	3.7	18	40.5	26.7	19.7
288983	1964	124	408	4.0	28	42.5	17.1	15.5
C. Palestinius	1963	41	360	3.7	30	--	--	--
Ethiopia	1963	43	456	2.6	31	--	--	--

1/ P.I.'s 170274 (Sa-110), 202728 (Sa-110), 235668 (Sa-112), 253913 (Sa-113), 268374 (Sa-115), and 269879 (Sa-116) were not planted.

TABLE 2. Mean seed and forage yields, seed size and testa characteristics for four Pisum sativum accessions tested in Oklahoma, 1963 and 1964.

P.I. or F.C. no.	Okla. Sp. no.	Yield (lbs/A) Seed		Forage D.M.		Grams/100 Seed		Testa Color	Testa Surface
		1963	1964	1963	1964	1963	1964		
174918	291A, 460A	259	175	2445	600	14.2	15.4	Green*	Smooth
175227	292, 461A	889	227	1712	830	15.6	18.3	Cream	Smooth
33520	135	263	65	2024	799	9.7	9.5	Green	Smooth
Stral	133	557	36	2337	870	12.9	9.3	Cream	Smooth

TABLE 3. Mean percentage of plants killed in Fusarium wilt tests near Stillwater

F.C. or P.I. No.	Okla. C-No	Mean Plants Fusarium Wilt 1959-61	Percent Fusarium Wilt 1963-64
31629	126	4.2	
31653	397	15.6	
121679-5	527	2.1	
121609	629		28.6
145198	111	1.2	
147076	112	1.4	
148681	114	8.2	
152195	115	1.6	
162690	116	2.1	
162995	220		7.0
170865	117	0.0	
186386	119	6.0	
188702-B	120	9.9	
189378	121	7.4	
276102	633		34.2

TABLE 4. 1964 Vernonia* Pre-emergence weed control, agronomy research station, Perkins, Oklahoma, 1964.

Treatment	lbs/A	Mean Seed Yield lbs/A	No. Plts. Plot	Plant Ht.	% Moisture	% Oil	Oil	Oxirane	FFA
Diphenamid	4	1071	72	51	4.8	22.7	23.8	4.0	2.0
NPA	4	978	73	50	4.9	24.3	24.9	3.9	1.9
Amiben	2	914	43	47	4.9	23.8	24.0	4.0	1.8
Check	-	895	64	49	4.7	22.8	23.9	3.9	1.8
Dacthal	10	890	41	48	4.6	22.3	23.5	3.9	2.0
Randox	4	653	44	51	5.0	22.1	26.6	3.9	2.0
Mean		899							

*Sp-465 P.I. 292522 Approximately 2" water applied in Mid-July, Planted May 20.

TABLE 5. 1964 Vernonia* Selection Yield Test, Stillwater, Oklahoma, 1964.

Selection	Mean lbs/A Seed	Mean Ht. (ins.)	% Moisture	Oil	Oxirane	FFA
1	435	36	5.5	27.1	3.8	1.9
2	295	35	6.1	24.4	3.7	2.4
3	491	35	6.0	24.7	3.9	2.4
4	552	32	6.1	23.8	3.8	1.8
5	357	35	4.8	22.4	3.8	2.0
6	265	35	4.6	24.4	3.9	2.1
7	349	35	4.5	24.1	3.8	1.8
8	453	35	4.5	26.0	3.9	1.7
9	573	33	4.5	26.6	3.8	2.0
Mean	419					

*Sp-263 P.I. 283729 Selections, dryland test, planted June 3, 1964.

University of Puerto Rico
AGRICULTURAL EXPERIMENT STATION
Río Piedras, Puerto Rico

REPORT TO THE S-9 TECHNICAL COMMITTEE MEETING
July 21 - 22, 1965
STILLWATER, OKLAHOMA

Prepared by: H. Azzam

During the period of July 1964 to July 1965, a total of 2,500 introductions were obtained. They were as follows: 1,651 sugar crops, 584 grasses, 108 fruits, 51 ornamentals, 36 grains, 33 vegetables, 19 legumes, and 18 miscellaneous.

Several of these introductions are being used as new germplasms in various projects.

Sugar Crops

These includes sugar cane, sugar beets and sweet sorghum. Sugar cane introductions are still under observation.

None of the sugar beet introductions showed any resistance to Cercospora. However few lines from Michigan showed some resistance only in the early stages. Our average yield is 15 Tons of roots per acre or about 2 Tons of sugar per acre.

Six varieties of Sweet Sorghum were planted at the Lajas Substation. These varieties gave the following brix readings:

Rio	-	13.5	Wiley	-	9.0
Brawley	-	13.0	Sart	-	8.6
Tracy	-	13.0	Rex	-	7.8

The ratoons are being maintained for further evaluation.

Grasses

The grass introductions obtained from Dr. J. Oakes are being distributed to interested Governments in the Caribbean Regions. Evaluation of these materials is still in the preliminary phase.

Fruits

New female trees of the date palm, Phoenix dactylifera, are producing fruits this year which should ripen in late August. Sex identification and fruit quality is being observed.

Data is being assembled for the sapucaia nuts, Lecythis elliptica, as to the production per clone, pod characteristics and time of bearing.

Several selected clones and seedlings from different sources of the sapodilla, Achras zapota, were planted at the Fortuna Substation with the hope of obtaining in the future better quality propagating materials.

Root-cuttings of five clones of the breadfruit, Artocarpus altilis, two of which are pink fleshed, were introduced for the second time from the French Polynesian Islands. This second attempt was successful and we are now multiplying all five clones.

The experiments on vegetative propagation of the annatto "achiote", Bixa orellana, indicated that the use of root-cuttings was the best method.

Ornamentals

Thirty more Coleus varieties were added to the original 63 collection making a total of 93 varieties. These were obtained from Clemson, S. C.

Other ornamentals genera such as Ilex, Osmanthus, Chrysanthemum, Metasequoia, Cassia, Eugenia, Tabebuia and others, are being evaluated.

Vegetables

Most of the 100 pepper introductions from the Regional Station when screened for the Pepper Mosaic virus, "Puerto Rican strain" showed 80% infection. Plants, not showing symptoms after the first inoculation, were reinoculated and came down with the disease. A pepper from Guatemala called the "Jalapeño" is considered to be the most resistant introduction available so far.

A Solanum species obtained from Guadaloupe as S. topiro, showed excellent resistance to the bacterial wilt caused by Pseudomonas solanacearum, even when the stem-inoculation method was used.

Industrial Crops

Seed increase of Crotalaria juncea was made at the Isabela Substation during the winter, for the USDA Spring plantings. 285 pounds of seeds were obtained from 1/2 acre. The volunteer plants appearing now after harvesting are showing a good stand for another crop.

Miscellaneous Crops

Several other miscellaneous introductions are still being evaluated. These include grains, legumes, fruits, vegetables, lawn grasses and ornamentals.

Clemson University
South Carolina Agricultural Experiment Station
Clemson, South Carolina

Report to the S-9 Technical Committee Meeting
July 21-22, 1965, at Stillwater, Oklahoma.

By
J. A. Martin
Associate Professor of Horticulture

There were 373 P. I. accessions of seeds and plants distributed to 16 cooperators in South Carolina since July 1, 1964. These accessions included ornamentals, vegetables, clovers, gourds, and miscellaneous crops.

Reports from various cooperators are presented as follows:

Dr. C. F. Andrus, U. S. Vegetable Breeding Laboratory, Charleston, South Carolina.

We are currently working with the following P. I. accessions: 164493, 193498, 193967, 196477, 196844, 233646, 249894, 249895, 249896, 249897, 264217, 273648, 275571, 282441, 282442, 282443, 282446, 282449, 282450, 292189, 292190, 293396. All are wild species of Cucumis. Our objectives are to (1) Test affinities in interspecific crosses, (2) Find a bridging cross which will be compatible with the commercial C. melo, (3) Measure the degree of attractiveness to Diabrotica (beetles), and (4) Find new sources of resistance to root knot nematodes.

Many fertile interspecific hybrids have been produced. One of these shows a rather high level of compatibility with Cucumis melo (cantaloupe) but no fertile hybrids with melo have yet resulted.

Root extracts show that potent attractants to Diabrotica occur in P. I. 196844, 275571, and 282446. Small quantities of stimulants are present in most other of the above-mentioned accessions, but are lacking in 292190 which is Cucumis metuliferus, the African Horned Cucumber. There is presumptive evidence that Diabrotica-repellent substances also occur in some of the wild species.

Dr. W. C. Barnes, Clemson University Truck Station, Charleston, South Carolina.

Progress in breeding a cabbage highly resistant to downy mildew has been slow but encouraging. Most selections were in the crosses made with P. I. 261774.

The same may be said about the broccoli using P. I. 189028.

Stock seed for increasing SC 59 slicer cucumber for release to seed companies this winter is now being increased in California. If seed supply is as great as expected, limited supplies will go on sale for spring planting. This new variety will carry high resistance to downy and powdery mildew, and to race 1 anthracnose. Resistance to race 2 anthracnose is fairly good. It also carries good tolerance to angular leafspot.

P. I. 197087 and 220860 were used in developing this variety.

Progress is being made in building up seed of gynoecious lines for use in producing hybrid slicers and pickles. P. I. 197087, 196289, and 220860 were used in this material. Both types carry the same resistance as SC 59 and the pickles also have good tolerance to cucumber mosaic virus. It is planned to release some of these hybrids within the next year.

We are quite sure the angular leaf spot resistance we have in most of our material came from 197087.

Mr. J. P. Fulmer, Assistant Professor, Department of Horticulture, Clemson University, Clemson, South Carolina.

Facilities for evaluation of ornamental introductions have been expanded to include more lathe, area in pines and field planting. Field planting will include space for trees as well as shrubs.

Emphasis in the past has been on plant material for home grounds, but with the expansion of the highway beautification program different types of plant material are needed. Landscape architects have expressed interest in P. I. 237869 Elaeagnus crispa for screening houses and industrial sites. Highway officials expressed an interest in this plant for highway beautification. The excellent foliage color, dormant twig structure and durability are excellent characteristics for highway planting. Other introductions which may have promise for highways are: P. I. 241910 Rhamnus alaternus, P. I. 235500 Ilex integra, P. I. 247782 Hypericum patulum "Hidcote Gold" and P. I. 237897 Raphiolepis Sp.

Introductions which have grown well and survived two winters are: P. I. 262712 Betula pendula, P. I. 267824 Ilex "Lydia Morris", P. I. 267825 Ilex "John T. Morris", and P. I. 237910 Vaccinium bracteatum. There are many more which show promise, but these are being propagated except the Betula.

Collections of Camellias, Rhododendrons, and Ilex and being evaluated at present. Two of the new Glandale azaleas look good.

The most promising introductions are being propagated for distribution to nurserymen and highway personnel.

J. A. Martin, Associate Professor, Department of Horticulture, Clemson University, Clemson, South Carolina.

Tephrosia vogelii. Four varieties were grown in 1964 to determine the affect of plant spacing on yield of stems and leaves, plant heights, and rotenone content. This work was carried on in cooperation with the Federal Station - Mayaguez, Puerto Rico. To date the analyses for rotenone content of the samples have not been received. However, the yield data and other information are available. No work is underway in South Carolina in 1965.

Sunflowers. Eighteen varieties including a number of P. I. Accessions from Russia were tested at Clemson and Sandhill Experiment Stations in 1964. Yield of seed ranged from 806 to 2448 pounds per acre for the Clemson test and 543 to 1101 pounds per acre for the Sandhill Station at Pontiac. Some of these yields are encouraging and since there is interest in the production of the seed for poultry and bird feeds in South Carolina, the work is being continued at Clemson to determine best varieties and other characteristics for a desirable type.

Sesame. The sesame yield tests were conducted in 1964 at Clemson, Florence, Pontiac, and Blacksville, using sixteen varieties. The test at Florence was a complete failure for the first time in over 15 years due to storms and diseases. Good yields and results were obtained at other locations.

The sesame wilt nursery for determining reaction of sesame varieties to Fusarium wilt was used in 1964 to test 171 varieties. A good field epidermic developed and reliable reactions were recorded. The work has been completed for the time being and the results have been published in the Plant Disease Reporter - Volume 49, No. 5, May, 1965.

The results of the pre-emerge weed control work with sesame over the past years have shown that Chloro IPC, Herban and Treflan are very effective in controlling most weeds in sesame fields. If sesame is to be grown in the Southeast, weed control measures will be essential.

Peppers. Approximately 70 promising accessions of peppers are being grown this year for further evaluation for use as ornamentals and for use in pickling and in other ways.

Coleus. The Coleus collection is being perpetuated and maintained. Many requests have been made for Coleus plants by florists and others. Plants have been supplied and it is hoped that more people will learn to use more of them in pots, beds, borders, and other places.

Luffas and Gourds. This is the second year in which Luffas and Gourds have been undergoing testing and evaluation at Clemson. At the present time there are 200 entries of many types of gourds from many sources, including P. I. accessions from Drs. Dolan and Langford. The plants are being grown on trellises as well as on the ground. A bulletin has been prepared as a results of the work and it is now in the printer's hand.

Herbs. Many herbs are being grown to obtain more information for use in preparing bulletins to take care of the many inquiries on the subject. Herbs which are now being grown include sage, mints, sweet basil, sweet marjoram, thyme, catnip, borage, coriander, fennel, dill, rue, and lavender.

Pulp Crops. Kenaf and Crotalaria juncea have been tested and evaluated at several locations in South Carolina during the past years. Kenaf produces very high yields on nematode-free soil. Crotalaria juncea appears to have immunity to root-knot nematodes and produces high yields. Yield figures and other information are provided in Table 1.

Table 1. Kenaf and Crotalaria juncea performance at Clemson - 1963.

Crop and Variety	Dry Matter Yield, Lbs./A	Average. Ht., Inches	Plants per Foot of row
Crotalaria juncea - Texas L-374	7749	101	4.2
Crotalaria juncea - Brazil strain	9243	127	2.2
Kenaf - Everglades 41	15684	135	3.2
Kenaf - Everglades 71	17419	127	3.1

The plot area was fertilized with 1,000 pounds per acre of 5-10-10.

Mr. R. B. Taylor, Greer Nursery, Greer, South Carolina.

I would like to report that the new plants that I have received are growing nicely. I did have a little cold damage on some of the varieties of Azaeleas but think they will come out if they can stand the cold next year. I will report them by number.

I am working on a new plant myself. It is a limb off a Clemson Elaeagnus that I found four years ago. It seems to hold its color and from the growth I think it will be semi-dwarf as you will see from the photograph that I am sending you. It has been potted two years in a gallon can and one year in a four gallon can, and it does not show as much gold as it has in the photograph. Let me know any comments on the plant.

1965 ANNUAL REPORT TO S-9 TECHNICAL COMMITTEE ON NEW PLANT INTRODUCTION REGIONAL PROJECT

W. E. Roever
July 20, 1965

Forty-one acquisitions were received to date in 1965. These were primarily Medicagos. No reports on woody ornamentals received in 1964 are yet available.

In Dr. E. Gray's orchard grass breeding program, persistance (longevity of stand) is a primary objective. Thirty-eight introductions and 20 varieties have been studied in a replicated test. Two summers after establishment average survival for the introductions was 73% and for the varieties 83%. Range of survival was 42-92% for the introductions and 56-94% for the varieties. Observations will be continued for at least one more year.

Thirty-nine alfalfa introductions were screened for resistance to alfalfa weevil. No resistant plants were found.

In screening for resistance to smut in Zea Mays, inoculations were made by Dr. Josephson in 1962, 1963, and 1964. The following were resistant:

P.I.	213731	Arizona
	213798	N. Dakota
	213799	N. Dakota
	218135	N. Mexico
	213771	Iowa

Introductions low in infestation and girdling by Southwestern corn borer were:

167123	193435	213778
167976	193901	213793
168046	193902	213799
174413	194386	213800
175968	194389	213805
177593	198897	213807
179135	200291	213811
182323	200302	217469
183643	200308	217488
184278	204794	217493
184285	204848	218135
186185	209135	221889
186189	213705	231296
186198	213729	239102
186217	213731	267180
186218	213767	270289
186221	213770	
186226	213771	

P.I. 217413 continues resistant to corn earworm.

Ratings on what is either Stunt or Dwarf Mosaic of corn were made in 1964 as follows:

VIRUS INFECTION IN PLANT INTRODUCTIONS AT KNOXVILLE. (SINGLE PLOT OBSERVATIONS) 1964
(Zea)

P.I. No.	Origin	Total Plants	Diseased Plants	
		no.	no.	sev.*
162700	Argentina	34	0	--
162701	Argentina	48	18	ML
166164	India	36	3	M
167123	Turkey	36	3	VL
167974	Turkey	38	4	VL
167976	Turkey	42	5	VL
168046	Turkey	41	3	VL
172592	Turkey	39	0	--
173828	Turkey	42	4	VL
173831	Turkey	39	14	L-H
174413	Turkey	35	3	VL
175968	Turkey	36	5	M
175975	Turkey	40	4	M
177593	Turkey	32	12	ML
179132	Turkey	39	23	H
179135	Turkey	38	5	M
179141	Turkey	39	10	ML
182323	Turkey	42	4	L
183643	Austria	37	15	M
183762	Turkey	34	5	VL
183806	Turkey	44	8	VL
184278	Yugoslavia	29	0	--
184285	Yugoslavia	40	3	VL
185059	Turkey	38	2	VL
185067	Turkey	39	15	M
186192	Australia	40	2	VL
186193	Africa	33	6	VL
186221	Argentina	25	3	VL
186222	Argentina	32	6	VL
193427	Hungary	38	2	T
193433	Rumania	43	9	VL
193435	Rumania	33	9	L
193901	Ethiopia	28	9	M
193902	Ethiopia	34	1	L
194386	Ethiopia	39	9	L

* L = light infection (late), top leaves only, M = medium, H = heavy infection (early, with stunting). T = tiller infection.

VIRUS INFECTION (CONT'D)

P.I. No.	Origin	Total Plants	Diseased Plants	
		no.	no.	sev.*
194389	Ethiopia	31	8	M+T
195116	Ethiopia	19	1	L
195233	Hungary	37	8	VL
195235	Hungary	41	6	M
195237	Hungary	34	6	T
197503	Ethiopia	38	4	L
198641	Ohio	34	0	-
198895	Argentina	30	2	L
198896	Argentina	30	18	H
198897	Argentina	40	10	H
198906	Argentina	43	0	-
200189	Israel	27	7	VL
200195	Israel	37	6	L
200204	France	40	0	-
200205	France	36	1	L
200284	Yugoslavia	31	13	M
200285	Yugoslavia	42	10	L&T
200286	Yugoslavia	37	8	L
200287	Yugoslavia	38	5	VL
200291	Yugoslavia	42	5	L-M
200308	Yugoslavia	34	4	L
204793	Turkey	28	2	VL
204794	Turkey	37	2	VL
204847	Turkey	33	0	-
209135	Puerto Rico	46	0	-
210551	India	37	0	-
213696	Iowa	34	4	VL
213697	Iowa	42	3	L
213700	Iowa	38	6	L
213703	Iowa	37	9	M
213704	Iowa	45	8	ML
213705	Iowa	33	9	L
213707	Iowa	39	7	L
213710	Iowa	37	6	L&T
213712	Iowa	28	6	VL

* L = light infection (late), top leaves only, M = medium H = heavy infection (early, with stunting). T = tiller infection.

VIRUS INFECTION (CONT'D)

P.I. No.	Origin	Total Plants	Diseased Plants	
		no.	no.	sev.*
213725	Iowa	41	7	L
213742	Iowa	43	20	M
213757	Iowa	38	38	VH
218191	Arizona	44	0	-
221889	Missouri	21	10	M+T
231296	Northrup-King	37	23	H
239102	Yugoslavia	41	1	L
239104	Yugoslavia	36	7	M
239109	Yugoslavia	36	13	L
239111	Yugoslavia	41	3	T
239112	Yugoslavia	32	10	VL
239116	Yugoslavia	44	16	L
239117	Yugoslavia	37	14	M
240328	Bolivia	21	8	L
251651	Yugoslavia	41	14	L-M
257515	France	34	10	M
257610	Ethiopia	36	7	L
257625	Ethiopia	34	3	VL
260614	Kenya	36	3	VL
262479	U.S.S.R.	39	5	VL
262587	U.S.S.R.	49	16	L
267168	U.S.S.R.	21	8	L
267169	U.S.S.R.	37	1	VL
267186	U.S.S.R.	28	10	H
267203	U.S.S.R.	41	6	M
270289	U.S.S.R.	45	15	L
West Indian Comp.		14	0	-

* L = light infection (late), top leaves only, M = medium, H = heavy infection (early, with stunting). T = tiller infection.

Projected research in Tennessee will continue along the lines of testing new introductions for direct adaptation to Tennessee agriculture or for incorporating desirable germplasms into breeding programs.

ANNUAL REPORT ON NEW CROPS RESEARCH IN TEXAS

HATCH 717 - CONTRIBUTING TO SOUTHERN REGIONAL PROJECT S-9

Stillwater, Oklahoma
July 21 and 22, 1965
Prepared by Eli L. Whiteley

The 1964-65 crop year has been exceptional. The fall and winter months of 1964 were about normal. The winter was cold enough to kill all plants except fennel (Foeniculm vulgare). High rainfall from January to May, 1965 made the establishment of new crops very difficult.

A total of 1361 accessions were received by researchers, individuals and commercial concerns in 1964-65. Most of these plants are now growing in the field and will be evaluated at the end of this growing season.

Crops for Industrial Uses

Oilseed Crops:

Crambe abyssinica (PI 247310) was released to several farmers in Texas for trial plantings, yield data have not been filed at this time. Small pockets of seed were released to the Philippine Islands and the Dominican Republic for trial plantings. A 25 acre planting was made at Bay City, Texas for the Northern Utilization Research and Development Division, A.R.S. Peoria, Illi-

nois. Yield data on this planting has not been received at this time.

Considerable effort has been devoted to the development of high oil lines of crambe. Twenty one lines were analyzed by Dr. Wolff and his group at Peoria, Illinois. The data are presented in Tables 1 and 2.

The data in Tables 1 and 2 show that it is possible to select lines of crambe with a high oil content and that there is some difference in the erucic acid content of the material that is available for breeding purposes.

Seed from irradiated material was started in the greenhouse and transplanted to the field. These plants grew well in the field and seed have been shipped to the Industrial Crops Laboratory at Peoria for analysis. It is hoped that the oil content, erucic acid content and the thioglucoside content can be changed favorably by this treatment.

Due to weather conditions and duties on other projects work with breeding lines was reduced to a few of the most promising lines. Seed from these lines will be analyzed in the winter.

Lesquerella:

Seed of three species of Lesquerella were planted on two dates but all plantings failed to germinate in the field and greenhouse. The four accessions were -

Table 1. Analysis of *Crambe abyssinica* seed grown at College Station, Texas in 1964.

NU No.	PI or Texas Number	Wt./1,000 gram	Pericarp %	Dry basis, % Protein N x 6.25	Dry basis, % Oil C_{22}:1	Oil analysis Iodine Value	Oil analysis Refractive Index	Total thioglucosides air-dry basis % of soil-free meal
50188	281728	4.0	27	27.6	41.6	89.2	1.4646	9.6
50189	281729	4.0	30	28.6	42.3	90.0	1.4648	10.5
50190	281730	4.0	29	29.7	41.2	90.0	1.4650	10.1
50191	281731	4.0	29	29.0	41.1	89.9	1.4655	10.0
50192	281732	3.7	29	30.6	40.3	90.0	1.4643	10.0
50193	281733	3.9	31	30.3	39.5	90.3	1.4649	10.8
50194	281734	4.8	26	29.3	40.7	90.2	1.4647	9.1
50195	281735	4.2	26	30.4	42.2	89.7	1.4646	9.8
50196	281736	4.2	25	29.4	41.9	88.2	1.4649	8.8
50197	281737	4.6	24	29.1	41 4	88.5	1.4646	9.4
50198	W-9	4.5	30	28.9	45.0	88.8	1.4646	9.1
50199	W-12	4.7	28	29.1	43.5	90.9	1.4646	9.6
50200	W-13	4.5	28	29.3	42.4	91.0	1.4694	8.3
50201	W-16	4.7	30	29.7	43.2	90.8	1.4644	9.1
50202	W-18	4.9	25	27.8	47.0	90.0	1.4646	9.2
50203	W-21	4.0	30	29.9	43.3	91.0	1.4651	9.7
50204	W-27	4.8	28	28.4	44.7	90.9	1.4644	8.7
50205	W-28	4.3	26	29.9	43.0	90.6	1.4643	9.1
50206	W-38	4.0	27	31.4	39.3	89.8	1.4640	9.1
50207	W-39	4.3	28	31.6	41.6	88.9	1.4638	9.4
50208	W-50	3.2	36	29.1	40.4	89.3	1.4638	8.2

Table 2. Fatty acid composition of *Crambe abyssinica** grown at College Station, Texas in 1964.

N.U. Na	C_{14}:0	C_{16}:0	C_{16}:1	C_{18}:0	C_{18}:u	C_{20}:0	C_{20}:1	C_{22}:0	C_{22}:1	C_{24}:0	C_{24}:1
50188	Tr	2.0	0.4	0.9	31.5	0.8	3.7	2.4	56.2	0.5	1.6
50189	0.1	2.1	0.3	1.0	30.2	0.8	3.8	2.5	57.1	0.7	1.4
50190	Tr	2.1	0.3	0.9	30.9	0.8	3.7	2.5	56.7	0.6	1.5
50191	Tr	2.4	0.4	0.9	30.6	0.8	3.7	2.4	56.4	0.6	1.8
50192	Tr	2.1	0.3	0.9	30.9	0.9	4.1	2.3	55.9	1.0	1.6
50193	0.1	2.1	0.4	0.9	31.1	0.9	3.9	2.2	56.9	0.4	1.1
50194	0.1	2.2	0.3	1.0	31.6	0.7	4.0	2.2	55.4	1.0	1.5
50195	0.1	2.0	0.3	1.0	30.5	0.9	3.8	2.6	56.4	0.6	1.8
50196	0.1	2.0	0.3	0.9	30.7	0.6	3.6	2.5	56.6	1.0	1.7
50197	Tr	1.9	0.3	0.9	31.0	0.9	3.8	2.2	56.6	0.9	1.5
50198	0.1	1.8	0.3	1.0	30.5	0.7	3.4	2.4	57.3	0.9	1.6
50199	Tr	1.7	0.3	1.0	30.9	0.6	3.4	2.2	58.2	0.4	1.3
50200	0.1	1.8	0.3	0.8	30.5	0.8	3.5	2.4	57.7	0.9	1.2
50201	Tr	1.8	0.3	0.7	29.9	0.6	3.3	2.5	58.7	0.7	1.5
50202	0.1	1.7	0.2	0.8	30.5	0.7	3.1	2.1	57.2	1.0	2.6
50203	0.1	1.9	0.3	0.8	30.7	0.6	3.6	2.1	57.8	0.4	1.7
50204	Tr	1.8	0.3	0.8	30.1	0.8	3.5	2.3	58.1	0.6	1.7
50205	0.1	1.7	0.2	0.9	29.8	0.7	3.2	2.3	58.7	0.8	1.6
50206	0.1	2.2	0.2	1.0	31.5	0.6	3.5	2.2	56.9	0.6	1.2
50207	0.1	2.1	0.3	0.8	31.0	0.8	3.9	2.3	56.8	0.5	1.4
50208	0.1	2.4	0.4	1.4	31.1	0.9	4.2	2.4	55.3	0.5	1.5

*Long ApL analysis only.

L. gordoni (PI 293017), L. fendleri (PI 293016), L. densipila (PI 292577), and L. gordoni (PI 29142). Before more plantings of Lesquerella are made, a thorough study should be made of the morphology and physiology of the seed.

Vernonia anthelmintica:

Two plantings of Vernonia (NU 40159) were made at College Station for yield tests. These plantings are growing well and the early planting should be ready for harvesting tests in August.

Plants from irradiated seed of Vernonia were started in the greenhouse and transplanted to the field. These plants are now flowering and will be observed for plants that retain their seed. Seed from these plants will be analyzed for oil content, epoxy oxygen, free fatty acids and saponifiables after seed harvest.

Foeniculm vulgare:

Fennel (PI 268383) was planted in October, 1964 and will be ready for harvest around August 1, 1965. This planting will be used for a yield test and seed will be send to the Southern Laboratory at New Orleans, Louisiana for analysis.

Seed from last years planting were analyzed by Dr. L.A. Goldblatt and the results were as follows:

Moisture - 10.33%
Total Nitrogen - 3.04% (dry basis - 3.39%)
Oil - 9.55% (dry basis - 10.65%)
Petroselinic acid, per cent of mixed fatty acids -72.3%
Petroselinic acid per cent of oil - 54.0%

Fennel grows well in the College Station area and combines well. If yields and oil content are high enough, it may develop into a potential crop for Central Texas.

Euphorbia lagascae:

Euphorbia (PI 296064) was planted in the early spring of 1965. Although poor stands were obtained due to weather conditions, some seed will be harvested. Due to the poor stands, no yield estimates can be made. Further testing will have to be carried out before the potential of this crop can be evaluated.

Crops for Paper Pulp:

Crotalaria juncea Texas 374 was planted in a one acre block at College Station for a yield test. Lines with white seed were planted to evaluate these materials as a source of genetic material. The inheritance of the white seed character has been under study by W.R. Cowley for a number of years. Data are being collected at College Station and Weslaco in an attempt to determine the mode of inheritance of this character.

Data from the pulp tests at Lubbock and Denton are given in Tables 3, 4 and 5. Only the data on kenaf are presented from the Lubbock test since C. juncea did not germinate and grow well at Lubbock.

Yields in the 14 inch row widths test were about six tons of oven dry material per acre. With some adjustment in fertilizer practices the yield should be increased to about eight tons per acre.

Champion Papers, Inc. and Chance Farms have a test in the Brazos River valley to determine the maximum yield of kenaf and Texas 374.

Table 3. Kenaf yields at Lubbock, Texas 1964.

Rep.	Pl.Ht.	Stem Dia. (cm)	Plants Per ft. row	Harvested Row Length	Plot yield lbs. oven-dry	Yield lbs. Per Acre
			14-inch Rows Dryland			
I	43"	.89	3.0	20'	3.5	3272
II	44"	.95	4.1	18'	4.0	4154
III	38"	.75	3.0	18'	2.3	2389
			20-inch Row Dryland			
I	56"	1.05	4.1	20'	8.0	5280
II	48"	1.05	4.1	20'	8.0	5029
III	40"	1.01	4.3	20'	5.4	3564
			14-inch Row Irrigated			
I	76"	1.28	4.3	20'	12.8	11,965
II	78"	1.37	3.2	18'	11.5	11,944
III	84"	1.34	4.2	20'	13.2	12,389
			20-inch Row Irrigated			
I	78"	1.28	4.2	23'	15.7	9010
II	81"	1.20	4.7	20'	13.8	9108
III	78"	1.12	5.2	20'	13.9	9174

Table 4. Reaction annual pulp crops to row spacing and cultivation T.A.E.S. Substation No. 6 - Denton, Texas, 1964.

	Pounds Air Dry Plants Per Acre				
	I	II	III	Total	Mean
A - Kenaf					
14" Rows - Cultivated	4862	4675	3740	13,277	4425.7
14" Rows - Not Cultivated	5797	5049	5423	16,269	5423.0
20" Rows - Cultivated	3924	4447	6148	14,519	4839.7
20" Rows - Not Cultivated	4447	4316	4055	12,818	4272.7
B - Crotalaria juncea (PI 248491)					
14" Rows - Cultivated	4675	5984	5236	15,895	5298.3
14" Rows - Not Cultivated	5423	4675	6545	16,643	5547.6
20" Rows - Cultivated	4186	5886	5227	15,299	5099.6
20" Rows - Not Cultivated	4447	4970	4055	13,472	4490.6
C - Crotalaria juncea (Texas 374)					
14" Rows - Cultivated	4862	3927	3553	12,342	4114.0
14" Rows - Not Cultivated	4675	5236	3553	13,464	4488.0
20" Rows - Cultivated	5232	3662	4578	13,472	4490.6
20" Rows - Not Cultivated	3401	4186	3139	10,726	3575.3

Table 5. Field Notes - Annual pulp crops 11/12/64
T.A.E.S. No. 6 - Denton, Texas.

Plots	1	2	3	4	5	6	7	8	9	10	11
III. Entry-Row Space-Cult.	C-20-C	A-20-C	B-20-C	C-20-NC	A-20-NC	B-20-NC	B-14-C	C-14-C	A-14-C	C-14-NC	A-14-NC
Disease	0	T	T	T	0	T	T	T	0	T	0
Height-Ft. & In.	4-10	7-2	6-0	5-10	4-4	7-0	6-6	5-0	4-0	5-0	4-6
Plants Per 24 Inches	12	10	10	9	9	11	10	11	11	9	10
Maturity	1	2	2	2	1	2	2	2	1	2	1
Lodging	0	0	0	0	0	0	0	0	0	0	0
II. Entry-Row Space-Cult.	B-20-C	C-20-C	A-20-C	A-20-NC	B-20-NC	C-20-NC	C-14-C	A-14-C	B-14-C	A-14-NC	B-14-NC
Disease	T	T	0	0	T	T	T	0	T	0	T
Height-Ft. & In.	7-8	6-6	5-0	5-0	7-4	6-2	6-0	4-10	7-10	4-8	7-6
Plants Per 24 Inches	11	11	10	9	12	10	11	9	12	10	11
Maturity	2	2	1	1	2	3	3	1	2	1	2
Lodging	0	0	0	0	0	0	0	0	0	0	0
I. Entry-Row Space-Cult.	A-20-C	B-20-C	C-20-C	B-20-NC	C-20-NC	A-20-NC	A-14-C	B-14-C	C-14-C	B-14-NC	C-14-NC
Disease	0	0	0	T	T	0	0	T	T	T	T
Height-Ft. & In.	5-10	5-0	7-8	7-6	5-10	4-4	4-6	7-6	6-6	7-9	5-6
Plants Per 24 Inches	10	10	11	10	11	12	9	9	12	12	11
Maturity	3	1	3	3	2	1	1	2	2	2	2
Lodging	0	0	0	0	0	0	0	0	0	0	0

Column 12 Continued.

III.	B-14-NC	II.	C-14-NC	I.	A-14-NC	Entries:
	T		T		0	A-Kenaf
	7-0		5-8		4-10	B-Crotalaria juncea (PI 248491)
	9		12		13	C-Crotalaria juncea (Texas 374)
	2		1		1	
	0		0		0	

Maturity: 1-No Blooms
2-Blooms no seed
3-Blooms and seed

Disease: T-Trace, 0-None
Disease was indicated by brown spots of leaves - Not identified.

Ipomoea

Thirty-six species of Ipomoea were grown in the greenhouse last winter and in the field this spring. These materials are being studied for alkaloid production by Dr. J.D. Smith in the Department of Plant Sciences.

Crops for Gum

Cassia occidentalis (PI's 292843, 292844, and 279694) was the only gum crop grown in 1964-65. Plant introductions 292843 and 292844 were quite variable and several selections were made for further testing.

About 500 pounds of seed were supplied to the Department of Biochemistry and Nutrition for study of the toxic factor(s) in Cassia. The toxic factor(s) has been isolated and is being purified for identification.

Sugar Crops - Sugar Beets and Sweet Sorghum

Sugar beet trials in the Winter Garden Area of Texas continue to look promising. Two tests of breeding lines have been harvested but the analyses for sugar content and purity have not been completed. Yields have been very satisfactory, but sugar content and purity have been low in some of the material due to prolonged spring and early summer rains and the high nitrogen content of the soils involved in the tests. However, in areas where well drained soils occur, the sugar content and

purity has been high.

The results from the sugar beet tests at College Station and Thrall, Texas are summarized in Table 6.

Table 6. Percent sugar, apparent purity, and yield of sugar beet varieties at Thrall and College Station, Texas, 1965.

Variety	Percent Sugar	Apparent Purity	Yield in Tons per acre
		Thrall, Texas	
S-1	15.95	79.23	26.91
302-H	20.01	86.79	24.35
S-5	18.54	86.23	23.71
HC-11	20.45	90.41	21.33
737	19.29	86.12	17.63
		College Station	
S-1	14.50	77.79	17.02
S-5	12.33	68.46	20.14
302-H	11.75	75.51	16.70
737	13.63	73.56	14.52
HC-11	13.63	73.40	13.21

The results from College Station indicate that the beets were immature when harvested. Another harvest will be made on these beets at a later date.

Sweet sorghum tests are being carried out in the Winter Garden area this year. Several replicated tests are growing well in the area and will be ready for harvest in the late summer or early fall. Yields of sweet sorghum in the Lower Rio Grandy Valley have been very good. The sugar content and purity are satisfactory for the production of sugar.

FIELD CROPS

Guar:

Two new guar varieties, Hall and Mills, were released to certified seed growers in Texas and Oklahoma in the spring of 1965. Both of these varieties are direct selections from heterogeneous introductions bearing P.I. numbers. Hall (PI 179930-5) is late maturing while Mills (PI 263875-6) is early maturing. Both are resistant to the most serious guar diseases, Alternaria leaf spot and bacterial blight. No further selection (except roguing of natural crosses) was required for either of these varieties. A leaflet describing these varieties will not be prepared until after the 1965 harvest when certified seed will be available.

(The above report was prepared by Dr. M.L. Kinman).

Sorghum:

About 400 samples of sorghum were submitted to the Department of Biochemistry and Nutrition for lysine determinations by the late J.C. Stephens.

Peanuts:

The peanut accessions received by Dr. A.L. Harrison will be screened for leaf spot resistance this summer.

WORK PLANNED FOR NEXT YEAR

Work with crambe will be continued along the same lines as last year. Additional selections will be made toward increasing the oil content of crambe. Selections will also be made toward increasing the erucic acid content. Attempts will be made toward decreasing the thioglucocide content of crambe meal by selection. Irradiated material will be tested for oil, erucic acid, and thioglucocide content.

Vernonia lines will be tested for resistance to shattering. The irradiated material will be analyzed for oil and epoxy content.

Work with sugar beets and sweet sorghum will be continued to find the best varieties for the Winter Garden Area of Texas.

Work with pulp crops will be confined to a small test at College Station.

Introductions of field and forage crops will be evaluated by those researchers working with these cros.

PUBLICATIONS ON NEW CROPS

1. Dollahite, J.W., Henson, J.B. and Householder, G.T. Coffee Senna (Cassia occidentalis) Poisoning in Animals. Progress Report No. 2318. Texas Agri. Expt. Sta. July, 1964.

2. Dan A. Wolfenbarger. Corn Earworm Resistance in Sweet Corn Inbreds and Hybrids in South Texas. Progress Report No. 2321. Texas Agri. Expt. Sta. August, 1964.

3. Dan A. Wolfenbarger. Variations in Turnips, Mustard, Lettuce, and Cabbage Varieties to Various Aphid Species. Progress Report No. 2320. Texas Agri. Expt. Sta. August, 1964.

4. Matocha, J.E., Cowley, W.R. and Lime, B.J. Yield and Quality of Sugar Beets Produced in the Lower Rio Grande Valley. Progress Report No. 2317. Texas Agr. Expt. Station. August, 1964.

5. A.F. De Werth. New Coleus for Texas Gardens Leaflet 639. Texas Agri. Expt. Station.

Plants Released:

Hall guar (PI 179930-5

Mills guar (PI 263875-6)

REPORT OF
THE NEW CROPS RESEARCH BRANCH, ARS, USDA
TO
REGIONAL TECHNICAL COMMITTEES

This report is designed to bring to the technical committees a summary of research of the New Crops Research Branch for the reporting period, April 1, 1964, through March 31, 1965. It is based on the annual "Multiple Use Report" which is used to inform Advisory Committees and others of the Branch activities. Although a portion of this report reflects other than regional programs, our research is so overlapping that all of the activities reported here are of interest to the technical committees.

USDA AND COOPERATIVE PROGRAM

The nature of this program is to conduct investigations concerned with the introduction, evaluation and maintenance of plant germ plasm for the development of a strong yet diversified agriculture for the United States. Both basic and applied research is undertaken in the areas of: assessment of the world's plant resources; search for diverse germ plasm in the world center of crop origin, and exchange of improved types; evaluation of introductions through a national cooperative program as breeding stocks, sources of natural resistance to crop pests, potential new crops and other uses brought about by shifts in agriculture; and the preservation of important segments of germ plasm either as seed or as vegetative stocks. Leadership for this program is at Beltsville, Maryland.

Four national introduction stations are responsible for evaluation, maintenance and/or quarantine of new introductions which require special handling; Chico, California; Miami, Florida; Savannah, Georgia; and Glenn Dale, Maryland. The responsibility for preservation of seed stocks of national interest lies with the National Seed Storage Laboratory, Fort Collins, Colorado. Cooperative new crops studies to determine significant agronomic characteristics of plants having valuable end-products are conducted cooperatively with experiment stations of Alabama, Montana, Nebraska, North Carolina, South Carolina and Texas. Four regional and one inter-regional introduction stations deal with the evaluation of crop breeding stocks essential to programs in state experiment stations.

Fifteen PL 480 projects are active, all dealing with research on the collection and evaluation of native plants of potential use in the agriculture of the United States. The countries and number of projects are as follows: Colombia - 1, India - 6, Israel - 2, Korea - 1, Pakistan - 1, Spain - 1, Turkey - 1, Uruguay - 1, Yugoslavia - 1.

The Federal scientific effort devoted to research in New Crops totals 42.5 man-years. Of this number, 4.0 are devoted to international plant exchange, 4.7 to botanical investigations, 5.7 to special plant procurement and related botanical activities. Research on new crop evaluation includes 8.7 man-years for horticultural research, 3.8 for agronomic studies, 6.1 devoted to evaluation of potential new crops, 6.0 to pathology and 3.5 to maintenance of germ plasm.

PROGRESS -- USDA AND COOPERATIVE PROGRAMS

A. Plant Introduction

1. Breeding Stock Introduction. The plant exchange program in 1964 resulted in 9,188 introductions from and 1,654 shipments to 119 different countries. Forage plants (4,027), cereal grains and sorghums (2,175) and ornamentals (1,034) were the largest groups.

a. International exchange. Major collections received through this medium included 414 cereal and forage plants - Bulgaria, 297 paspalums - Brazil, 338 peanut lines - Israel, 370 hordeums and triticums - Ethiopia, 152 forage grasses and legumes - Spain. Exchanges with the Soviet Union and related satellite countries were not as productive (715 items) as in previous years, other than the Bulgaria material shown above.

b. Foreign exploration. Direct exploration in South Africa resulted in 750 collections of warm season grasses, approximately half being Digitaria spp. Extensive collections of Carthamus from eastern Mediterranean and western Asiatic countries were obtained through cooperation with a University of California collector. In connection with investigations of cultivated plants and correlated studies to locate potential sources of disease and insect resistance, an initial study on gene centers for cultivated beans is being used as a basis for plant exploration presently underway in Latin-American countries. Similar information will be used for collecting Phaseolus species of old-world origin. Another study is underway on Cucumis and will be utilized in the search for natural resistance to diseases affecting this plant group. Literature review and bibliographic files have been started pertaining to sources of other economically-important diseases such as the corn stunt viruses.

c. Domestic exploration. The major accomplishment was placing on inventory 475 collections from the Great Plains States of woody ornamentals assembled in 1963 and 1964 under supervision of the University of Nebraska (NC-7). Emphasis was placed on hardiness, and growth types suitable for highway landscaping and erosion control. Additional germ plasm obtained for other regional domestic exploration projects included 22 Vaccinium (NE-9), 41 Prunus, Pyrus, and Malus (S-9), and 20 Ceanothus (W-6).

d. Support for AID missions. The special plant project provided AID missions with a total of 1,050 lots of seeds or plants. While the total number of countries served remained about the same as in previous years (40), the amount of plant material was somewhat less and of a different nature. The agricultural programs in many missions have developed to the stage where breeding material and newer varieties are requested rather than large quantities for screening purposes. Specially-devised forms for reporting plant performance were distributed to the missions. Lists of plant materials supplied by the Branch to missions from 1955-63 were prepared and distributed in circular airgram form. The missions were requested to complete the forms for as many items as could be identified and for any other plant materials, native or received from other sources. Some of the reports that have been returned are of great value to the Branch in recommending further materials for trial by the reporting mission and other missions having similar conditions.

The cacao, coffee and rubber germ plasm center at Miami continues to increase in new clones. Thirty-two clones have been added to the 194 mentioned in the previous report. Rust-resistant strains of coffee and several new Coffea species have been added to the 500-plus items in the collection. The rubber collection is being re-evaluated so that obsolete clones may be discarded, valuable clones rejuvenated and new ones added.

e. Maintenance of germ plasm. Approximately 6,000 items were added in 1964 to the NSSL long-term storage, bringing the total to 34,750. Considerable progress was made in getting soybeans and rice world collections. Practically all obsolete varieties of various crop seeds still available were located. Periodic germination tests revealed no evidence of deterioration of any crop seed with the exception of lettuce. These develop red cotyledons, a physiologic change being studied further.

After four years of storage, seeds of lettuce, safflower, sesame, crimson clover and sorghum retained their viability very well with 10% moisture and 50° F. At temperatures above 50° F., crimson clover and sorghum seeds retained their viability better than the other three crops.

The third part of the survey of fruit and nut clones was completed with the publishing of ARS 34-37-3, A Survey of Pears, Nuts, and Other Fruit Clones in the U.S. The National Coordinating Committee (New Crops) has appointed a new subcommittee to determine utilization of these surveys in proposals for national repositories.

One issue of the Printed Inventory (No. 163) appeared in 1964 covering introductions received in 1955. Four additional manuscripts (Years 1956-59) are at the printers or in editorial review.

2. Plant Resources.

a. Plant identification and classification. Taxonomic research on Agave, Lolium, and Vernonia continue to be the only isolated classification studies under way. Type specimens and other herbaria material essential to the revision of the genus Lolium have been obtained and the revision of Lolium will be completed in 1966. Herbarium material on Vernonia obtained in Europe shows the limited knowledge available on this important new crop and warrants a field study and collecting expedition to the center of species distribution in East Africa if we are to achieve our objectives with this oilseed. New approaches to seed identification including keys based on anatomical features and development of a polyclave set for identification have been accomplished for the important family Leguminosae. A total of 240 CR manuscripts were checked for scientific names and 992 plant specimens examined for identity.

b. Botanical investigations on new crops. During August, 1964, seed collecting of Crepis was undertaken in California and Oregon. A dry summer season resulted in only four species and several varieties being found in sufficient quantity to provide samples for analysis. Two of these, C. biennis and C. occidentalis were found to be good seeders and to contain 34-65% vernolic acid in their seed oils. The most promising species of Crepis, however, belong to the Section Barkhausia. Species of this section are mostly annuals and are found from the Mediterranean to West Pakistan. This group of species should be intensively studied and collected in following up the very promising crepenynic acid discovered in this program.

A species of spurge (Euphorbia legascae) from Spain has seed containing 42% oil, rich in epoxy fatty acid. The plant is an annual herb and a good seed producer. It should be adaptable to dry land wheat areas of Western U.S. About 45 pounds of seed were obtained through our PL 480 project in Spain for utilization research and for field plantings.

During the reporting year, the oilseed and pulp screening programs have resulted in the selection of 27 species, representing 10 plant families, for further agronomic and chemical studies. These leads constitute the materials for increase at Federal and regional introduction stations.

A joint botanical-chemical report on interpretation of screening results of 1,010 seed samples has been completed and will be of considerable value to botanists and chemists.

c. Anti-tumor screening. Since July 1, 1964, 998 plant samples have been supplied to laboratories designated by the Cancer Chemotherapy National Service Center for preparation of extracts for anti-tumor screening. This number includes 875 samples for general screening, 26 recollections of small samples needed to complete general screening, and 97 recollections of confirmed actives.

Sixteen recollections of confirmed actives represent a single species. Most of the remaining 81 samples are recollections of different confirmed actives. Emphasis has been placed on samples of larger size, resulting in an 80% increase in average sample size (over the preceding year) to 62.5 pounds.

Field work in Ethiopia from November, 1964, through February, 1965, yielded 127 large collections of confirmed and preliminary actives and 226 new samples for general screening.

Screening of plants for anti-tumor activity has yielded two compounds that have survived pre-clinical pharmacological testing and have been cleared for trial in human patients. Several others are at an advanced stage of chemical fractionation leading to isolation and identification of the active constituents. These include Apocynum cannabinum, from which two active glycosides have been isolated, Solanum dulcamara, source of an active glycoside of an alkaloidal steriod, and two species of Eupatorium with active flavonoids. The active constituent of Camptotheca acuminata has been isolated but is, as yet, unidentified. It is known now, however, that it is not an alkaloid, glycoside, or other type of compound normally responsible for physiological activity.

d. PL 480 projects. Sample Procurement - PL 480 projects continued to supply practically all samples entering the seed screening program during the reporting year. Israel provided 68 samples, a number of which were large collections of cancer actives; Korea 176 samples; Pakistan 195; Spain 157; Turkey 314; Uruguay 247; and Yugoslavia 882, for a total of2,038 samples. Of this number, 1,632 were seed samples; the rest were for anti-cancer testing.

Steroidal alkaloids from Solannaceae. PL 480 projects in Colombia and India are screening Solanaceae for solasodine. The Colombia project has now screened 100 species of Solanaceae. Of these, 19 species were found to contain 2.0% or more glycoalkaloids (dry weight basis) in some part of the plant. One species (Valdivia 4) probably undescribed, contains 6.0% in the fruits, 2.0% in the leaves, and 0.3% in the stems. Solanum trachycyphum was found to contain 6.5% in the fruits, 1.4% in the leaves, and 0.6% in the stems. These are highly promising leads but it remains to be determined what fraction of the total glycoalkaloids is solasodine. Based on earlier work with other species, solasodine should compose about half of the total glycoalkaloids.

The Indian project has reported analysis from 13 species of Solanum. Three are promising: S. khasianum (fruits 2.024%, leaves 0.969%), S. seaforthianum (fruits 2.64%, leaves 0.872%), and S. vagum (fruits 1.380%, leaves 2.410%).

Vegetation studies of tropical regions. As a phase of the studies on control and defoliation of woody plants and other tropical and subtropical vegetation, intensive field studies were undertaken in Puerto Rico and Thailand.

In Puerto Rico, all major forest types have been studied and correlated with the associations identified in control plots. Information on specific forest composition and physiognomy has been recorded. A manual method of assessing vertical visibility was developed and tested. Seedling succession studies have been initiated to determine the order of succession following defoliation.

In Thailand, ground and aerial surveys of forest types were accomplished, especially of rain or moist evergreen forests and mangrove woodland. These surveys were directed toward identification of the structure and composition of the forest canopy and shrubby undergrowth. Some 36 forest sites covering the entire country were examined. An annotated bibliography containing several hundred references on the vegetation of Thailand and adjacent countries is in preparation.

B. New Crop Evaluation

Evaluation of Breeding Stocks. Research emphasis is directed toward evaluation of germ plasm as sources of natural resistance to plant pests, determining characters which will enhance adaptation and crop versatility, and development of new varieties of agronomic, horticultural and chemurgic crops at Federal introduction stations and through regional cooperative programs.

1. Horticultural Crops.

a. Fruits and nuts. Screening programs for adapted fruit varieties and disease resistance are particularly active. The current trend is to supply more elite germ plasm to cooperators. Requests are for materials as free as possible from virus diseases and with as much background information as possible. During 1964, 21 virus-free stone fruit introductions were released by the Glenn Dale Station. Research was initiated at Glenn Dale during the year on indexing procedures for apples and pears.

Information about fruit and nut introductions is supplied in the research report series Evaluation of Foreign Fruits and Nuts. Report No. 13 (published as CR-42-64), completed at Chico during the year, contains evaluation data on 127 introduced plum varieties.

One of the most frequently requested characteristics is early fruit maturity for both the northern and southern fruit growing areas. Many apple introductions were supplied to cooperators in south-central Georgia. Fruit growing is expanding in this area as a replacement for row crops.

Two early ripening sweet cherry introductions, 'Moreau' and 'Early Burlat', are outstanding in California. Growers received 24$ per lug for these varieties during 1964 while older varieties were bringing only $6 to $8.

An apple introduction, 'Tydeman's Early Worcester', that ripens in early fall with a good red color is highly regarded in Oregon.

During recent years the pistachio nut has received considerable attention as a new nut crop for California. Many demands have been made on the Chico Station for information and propagation material. Commercial orchards now total about 500 acres, varying in age from recently-budded to full-bearing. Seeds of rootstock species to plant an additional 400 acres have been distributed.

Several years of effort have shown little improvement in texture, flavor, or size of fruit of jujube varieties. There are indications that it may be possible to select from seedling populations for spinelessness of the branches and blunt-tipped seeds.

b. Vegetables. Disease, insect and nematode resistance continue to be the most sought after characters in vegetable introductions. In some kinds of vegetables the present germ plasm collection appears to be adequate; in others satisfactory levels of resistance to important diseases have not been discovered. The pathogens causing vegetable diseases often develop new races making resistance an unstable character. New sources of resistance can be supplied only by continuing the present program of plant introduction. A series of reports initiated during the year by phytopathologists located at the regional stations summarizes sources of resistance in plant introductions to diseases, insects and nematodes. Four of the reports pertain to vegetable crops.

Sources of cold tolerance, male sterility, plant habit and quality of edible product are also being used in breeding programs.

During the year 100 potato introductions were indexed for virus diseases. Of these, 26 introductions were released as virus negative and 74 positive. Four new potato varieties were released for commercial production in the United States in 1964 by plant breeders. The numbers of foreign introductions entering into the pedigrees of these varieties are 3, 2, 3, and 7, respectively.

Five new introductions of sweet potato from New Zealand were distributed to 10 state and Federal stations for testing and possible use in plant breeding programs.

Screening tests at the S-9 station revealed 5 sources of resistance to bacterial spot of pepper.

An introduction of Lycopersicon pimpinellifolium, P.I. 127805, was used to determine the genetics of resistance to bacterial wilt in tomato.

New sources of resistance to anthracnose in cucumber were reported by NC-7. This region also evaluated 250 tomato introductions for soluble solids and sugar/acid ratio.

The S-9 Region reported finding 8 sources of resistance to cowpea chlorotic mottle virus.

Vegetable varieties released during the year with germ plasm from plant introductions are: 'Gem', sweet potato - North Carolina; 'Valmaine', lettuce USDA and Texas; 'Eversweet', cucumber - Robeson Quality Seeds, Inc., Hall, N.Y.; 'Butter King', lettuce - Canada; 'Male-sterile 2', cantaloupe - USDA; 'Large German Cherry', tomato - Oregon; 'Campo', cantaloupe - Arizona and USDA; 'Jacumba', cantaloupe - California and USDA;and 'Floricream', cowpea-Florida.

c. Ornamentals. At Glenn Dale, preliminary results show that introduced Camellia species with fragrant flowers will cross with varieties of the Japanese Camellia. At Chico, selections of Acer truncatum are proving valuable for fall-foliage color. At Miami, preliminary evaluation of seedlings from woody plant introductions has shown that this will be a rewarding type of research.

The Crops Research Division, Beltsville, has released 'Spring Pink', a poinsettia variety bred from P.I. 247812. 'Spring Pink' has bracts of a very uniform light-pink color. It flowers after the Christmas season and throughout the spring.

Introductions of chrysanthemum from Japan have been released as cold hardy varieties for the northern states and have been used in breeding additional varieties.

The selection of Ligustrum vulgare, from P.I. 107630, which has proved outstanding for cold-hardiness in the North Central states has been named 'Cheyenne' and released jointly by the North Central Region and the Crops Research Division.

2. Agronomic crops.

a. Forage Crops.

Grasses. The reservoir of germ plasm required by researchers throughout the United States can be maintained and increased only by a sustained and continued program of introduction from all parts of the world. Current trends in research place particular emphasis on the need for germ plasm of both cool- and warm-season grasses containing resistance to diseases and insects. Cold resistance is sought to extend the production range of warm-season species and for winter survival in cool-season grasses. The primary use made of cool-season grass introductions in the northeastern U.S. is that of screening in search of disease resistance; i.e., leaf blight and rust; vigor, winter hardiness and productiveness.

The gradual change of the agriculture in the southeastern U.S. from row crops to predominantly grassland agriculture has increased the need for forage crops. Associated with this need is the desirability of (1) extending the productive range of many species, (2) increasing the productivity of others, (3) incorporating disease and insect resistance in established varieties and clones, and (4) obtaining new forage species capable of sustained high yields of forage high in nutritive value. The need for warm-season grasses and legumes resulted in an exploration to South Africa in 1964; its specific objective was to obtain disease and/or cold resistant strains of Digitaria species. Seeds and/or vegetative stocks of 316 digitarias including 22 species were collected. The collection also included other warm-season grass and legume species adapted to the South. Oklahoma State University has been collecting, classifying, evaluating and increasing certain warm-season grasses for the past two decades. This collection, which came from all parts of the world, consists of 1,350 accessions representing a wide range of genetic diversity; it primarily includes Andropogon, Bothriochloa, Cynodon and Dichanthium. Seeds and/or vegetative stocks have been acquired by the Regional Plant Introduction Station, Experiment, Georgia, bringing the total to about 2,000 introductions of warm-season grasses received during the year. This widespread interest in warm-season grasses culminated in the compilation of an inventory of certain genera, CR-83-64, Inventory of Selected Genera of Warm-Season Grasses. This inventory includes all stocks of Andropogon, Bothriochloa, Cynodon, Dichanthium and Digitaria held by the three regional plant introduction stations, Forage and Range Research Branch and Soil Conservation Service.

Legumes. Introduced germ plasm of Medicago species is being screened in the search for resistance to five specific diseases, four insects and stem nematode. This work is being done at regional plant introduction stations in addition to state, private and other Federal institutions. Clover research is highlighted by the release of several varieties adapted to the southeastern U.S. derived in part from introduced germ plasm. Two peanuts, one common and one forage type, were released for use in the southeastern U.S. A source of low mimosine content in Leucaena insularum is reported from W-6 and S-9 reports the acquisition of a leguminous tree, Acacia cyclops, useful in dune stabilization.

Miscellaneous. A technique for multiple inoculation used in screening corn introductions for disease and insect resistance is reported from NC-7. This technique which is equally adaptable to field and greenhouse conditions is beneficial in increasing the efficiency of and time required in the preliminary screening program.

b. Cereal crops. New Crops Research Branch handled 1,819 accessions of cereal crops during the interim of this report. This represents an increase of about 33 per cent over the previous year. This material was turned over to Cereal Crops Research Branch after being assigned P.I. numbers and processed in the usual manner. Aside from their usual utilization, oat and wheat introductions are continually added to the International Rust Nurseries. Introductions received by crops are as follows: barley - 825; oats - 405; rice - 76; wheat - 513.

c. Fiber crops. The Boll Weevil Laboratory at State College, Mississippi, is continuing their screening program of P.I. introductions for insect resistance. Three commercial cotton varieties were released in 1964, all derived from introduced germ plasm. Due to many factors the time lapse between the receipt of cotton introductions and their incorporation in released varieties may be of considerable duration. Paramount among these factors is the complex genetic constitution of the crop requiring release of a proven variety. Although it is often quite difficult to pinpoint the contribution made by introduced germ plasm to released varieties, it is known that exotic germ plasm is contained in 'Acala 1517-V' released jointly by California and USDA and the varieties 'Kemp' and 'Verden', released jointly by Oklahoma and USDA.

3. Chemurgic Crops.

a. Oilseeds. Progress with the development of Vernonia anthelmintica as a potential new crop has been slow because of inherent undesirable characteristics of this species and because of limited research personnel. A three-year research contract between the Crops Research Division and Purdue University for genetical and cultural consideration of V. anthelmintica is being negotiated. Intensive effort as proposed through this contract should permit agronomic improvement of planting stock and provide valuable cultural information. Some new introductions from India will provide a wider selection base.

No increase acreage was planted in 1964 but 15 or more acres will be used for that purpose in 1965. Through the cooperative efforts of EURDD, Vernonia plot samples from the 1964 season were analyzed. As in 1963, Vernonia seed produced in Pennsylvania, Ohio, Kansas and Wyoming was of poor chemical quality.

Although rows not more than 24 inches apart are best for good yields, wider rows facilitate field cultivation. First-year tests of herbicides indicate that chemical weed control will probably be feasible but further research is needed to more precisely determine the proper herbicides and suitable rates to use. Treflan was particularly promising in a Nebraska trial but

some crop injury resulted. On heavy soils, low rates of nitrogen application generally are adequate. Although nematodes, disease and virus-like mottling have been observed in Vernonia plantings, damage has been minor for the most part.

Commercialization of Crambe abyssinica, a source of erucic acid, is expected in 1965 with most of the acreage in Montana and Oregon. Because of severe drought conditions, 1964 increase plantings arranged by PVO in western Nebraska were not successful and similar plantings in Montana were only moderately so. For USDA increase acreage in Oregon, Idaho and Wyoming, yields per acre were 2,000; 500; and 0 pounds, respectively. Arrangements have been made for 125 acres of Crambe to satisfy experimental needs of the Crops and Utilization Divisions in 1965. Continued research on row spacing and planting dates indicates that, for most areas where Crambe is adapted, row widths of 6 to 14 inches and early planting dates (after danger of severe frost) will be the most productive. Oregon data for 1964, however, showed that an extended planting period from late March to early May had little effect on yield. Several new introductions including some good Swedish lines are being incorporated into the 1965 Crambe program.

Fennel (Foeniculum vulgare), a seed oil source of petroselinic acid, has been erratic in seed production both in NC-7 and S-9 cooperating states. Vegetative growth is generally excellent but seed setting varies from year to year and location to location. Climatic conditions are perhaps mainly responsible for this response although insects could also be involved. Excellent yields were obtained in western Oregon and larger scale cultural tests are needed there. Earlier maturing lines are needed particularly for the cool, relatively short season areas.

Limnanthes, as a source of long chain fatty acids, has shown considerable promise under Alaskan conditions (Palmer area). Seed yields of four species exceeded 1,000 pounds per acre and one of these, L. douglasii (P.I. 278170), produced 2,100 pounds. Increased seed size of several Limnanthes species from Alaskan increases as compared to original seed was noted. Seed shattering is a major problem with most species. Also of concern is the harvesting of such small-statured plants. Work with herbicides in Alaska has shown that production of Limnanthes in narrow rows may be feasible and yield improvement would be expected. An increase contract with the Alaska station for production of 1,000 pounds of Limnanthes seed has been set up. The major portion of this seed is for industrial utilization studies. Fall and spring plantings of a few species have been made at Glenn Dale, Maryland.

b. Annual pulp crops. Industrial interest in kenaf as a potential pulp source has been stimulated by an excellent one-acre planting at Gainesville, Florida. Two companies heretofore having little or no experience with kenaf will plant several acres of kenaf this year. Another company which grew 13 acres in 1963 expanded to 27 acres in 1964. This increased interest will likely generate work on suitable harvesting and handling procedures.

Less emphasis on Crotalaria juncea is expected because of plant lodging and weed problems. Yields generally are lower than for kenaf but available seed stocks of C. juncea are potentially productive, however, breeding

efforts are needed so that better stands and more yield consistency can be attained. C. juncea dries out rapidly after being killed by frost, thereby facilitating harvesting operations.

Long-term studies in North Carolira show that the best yields of kenaf can be obtained from narrow rows spaced about 12 to 14 inches apart. Tests at more southerly locations have yielded well with considerably wider rows, but row width comparisons have not been made. Wide rows may be required in more arid regions. Fertility trials in the North Central region have not shown any clear-cut response to different nitrogen levels except on sandy soils.

A storage test at Experiment, Georgia, was designed for an 18-month duration. Storage in the chopped form was planned as a treatment but not included. Elsewhere, kenaf stalks were baled satisfactorily with a hi-density wire baler but feeding and pickup mechanisms leave much to be desired. A high-volume baler with adequate pickup or cutter-bar attachment might be appropriate for harvesting kenaf if the crop can be field-dried.

Kenaf seems to have real promise as a cellulose crop provided the economics of production, harvesting and storage are favorable. Of the tested varieties, 'Everglades 71' is preferred.

Research with pulp sorghums was greatly curtailed in 1964 by scarcity of seed. Yields obtained in an Iowa test were excellent. Several French sorghums will be evaluated both for agronomic and pulping attributes in 1965.

c. Other new crops. Even though wild sources of Dioscorea species apparently remain adequate, prices are increasing and sources may be less reliable. These views are expressed by industrial people who make inquiry from time to time concerning the status of the USDA's program with this genus. Various aspects of breeding and production are being worked out at the Federal Experiment Station, Mayaguez, Puerto Rico. Results from much of this work will be published within the next two years. Virus outbreaks have necessitated additional work on resistance, but the commercial plantings of Dioscorea in Puerto Rico are not believed to be virus infected. Data from and experiment at Belle Glade, Florida, indicate tuber yields are not appreciably greater with three years growth as compared to two. Seemingly, tuber growth is restricted by the high water tables in that area.

Tephrosia. Although research emphasis has centered around development of high rotenoid-yielding strains, other studies on rotenoid extraction, diseases, seed treatment, treatment with growth regulators, rotenoid toxicity, etc., have been conducted or are in progress. This potential insecticidal crop is at the stage where larger scale feasibility studies such as a pilot-plant operation are needed. An important consideration involves suitable w equipment for harvesting the leaves. Tephrosia is well adapted in the southeastern states but production economics might be more favorable in Latin or Central American countries.

Report for S-9 Committee
July 21-22, 1965
I. A. Wolff - Northern Utilization
Research and Development Division

Program Developments in Utilization Research: It was decided administratively that new crops research programs would be terminated July 1, 1965, at the Eastern, Southern, and Western Utilization Research and Development Divisions. At the time of preparing this report the f. y. 1966 USDA appropriation bill had not been passed by the Congress. However, it is anticipated that new crops research at the Northern Division will continue at about the same support level as in recent years. Personnel changes include appointment of Dr. R. J. Dimler as the new Director of the Northern Division, promotion of former Director F. R. Senti to Deputy Administrator of Nutrition, Consumer, and Industrial Use Research, and appointment of Dr. S. R. Hoover as Dr. Senti's Assistant Deputy Administrator, all under Dr. George Irving, ARS Administrator.

The Northern Division in September 1965 will be host for the annual meeting of the NC-7 Committee on new crops, and for a day prior to the general meeting to the Industrial Utilization Subcommittee of NC-7.

Oilseeds in Developmental Stages of Utilization Research: Western Division research on Lesquerella and Eastern Division research on Vernonia indicate excellent utilization prospects for developing markets for products derived from these two oilseeds. Agronomic and crop production aspects are currently limiting in these as well as in the Cuphea (coconut-like oils) and Umbelliferae oils which were under study at the Southern Division.

Crambe prospects continue to be favorable, but the infant crop still requires nurturing by all interested parties if expansion is to be fostered. Through Northern Division efforts and industry cooperation crambe oil was shown to function as a superior mold lubricant in the continuous casting of steel. This process is coming into increasing use as steel companies modernize and expand, and could offer a good market outlet for crambe oil. Generally, the oil market picture for crambe looks favorable in three areas: Usage of the glyceride oil itself, use of erucic acid from the oil, and use of chemicals derived from the erucic acid. Northern Division research along these lines is continuing.

The Pacific Vegetable Oil Corporation (PVO) decided to undertake commercialization of crambe in 1965. A first snag in planting arrangements occurred when growers found that crambe was not approved for diverted lands. This problem was solved when crambe was finally permitted as "a mustard" with diversion payments like those granted mustard. Commercial production then suffered further from the abnormally severe weather in Montana, the intended growing area. Consequently, 1965 plantings by PVO are less than they desired. Interest in crambe commercialization also continues to be high in the Willamette Valley region of Oregon where in 1965 experimental plantings have been made in 11 counties.

Crambe seed from Texas received at the Northern Division in June 1965 had more protein, less oil, less total oil plus protein, and smaller seed size than earlier Texas samples. The 1965 seed seemed to contain slightly lower C-22 acid content and no significantly altered quantity of thioglucosides.

Emphasis in crambe research at the Northern Division is on continued basic and applied research to learn more about crambe meal composition, improved use of meal as feed, and improved processing methods. Cattle feeding studies at the Nebraska AES show no meal toxicity but presence of antipalatability factor(s). Untreated crambe meal is toxic to monogastric animals, but processing improvements under development at NU encourage a hope that a product suitable for feed use for monogastric animals will be possible. Good strides have been made in basic research in identifying components present in crambe meal and in understanding their reactions under various conditions of meal processing and use.

Fiber Crops: Florida AES plantings of kenaf have stimulated intensification of commercial interest in its use for paper pulp. Information developed at the Northern Division on kenaf pulping technology has been shared with a number of companies. A cooperative agreement between one company and the Northern Division involves cooperative evaluation of three methods for storing kenaf which has been harvested while green.

The 1964 annual S-9 report lists Aeschynomene (PI 296044) and Sesbania (PI 296055) as highly productive annual plants. In laboratory evaluations at NU these raw materials showed poorer properties in sulphate pulps than kenaf. Their average fiber lengths were quite short, especially the Aeschynomene. However, the materials may be adapted for preparing other types of pulps and should be so tested if their growth and yielding potential in the field continue to look encouraging. Further samples may be required at NU for additional pulping tests.

Critical points in pulp usage for annual plants continue to be the development of suitable economic procedures for harvest, handling, transport, and storage by means that will make them competitive with wood. Any efforts the S-9 committee can bring to bear on this problem would be helpful.

Seed Mucilages: Endosperm gum from Cassia occidentalis seed has been evaluated as a wet-end additive for paper handsheets of both unbleached kraft and bleached sulfite softwood pulps. The gum is comparable to guar in improving strength characteristics of the handsheets. However, coloration of the C. occidentalis gum decreased brightness of the bleached sulfite paper from 68.5% (control) to 63.5% (2% gum additive). The color in the gum is partially the result of adherent seed coat particles not separated from the gum. Further research on processing methods for obtaining C. occidentalis seed gum may possibly lead to production of a lighter colored product.

Leaves as well as seed of C. occidentalis are toxic to animals (Texas A and M, July 24, 1964, PR-2318). The seed kills rats in 29 days when fed at 5% of the diet. However, NU studies showed that autoclaving the seed completely destroys the toxicity for rats, as shown by short-term (28-day) feeding trials.

Oilseed Screening Results: The chemical survey is being continued at the same rate as in the last several years. In the last year about 800 samples were screened, making the total to date nearly 6,000.

Erucastrum abyssinicum obtained from the Florida AES has been further studied. We believe it could be a promising oilseed for the South if selection and breeding were initiated to raise erucic acid content of the seed oil, and we recommend that such work be undertaken.

Euphorbia lagascae is a very promising newly found natural source of epoxy oil for industry in an oil-rich seed. Thorough evaluation to assess suitable production areas is recommended.

Samples of Rambutan and Quenepa (Spanish lime) seed from Puerto Rico were analyzed. The former had 34% of solid oil, 80% of which could be accounted for as glycerides of the common acids, stearic, oleic (C-18 monoene) and arachidic. The seed contained 11.2% protein. The Quenepa was a starchy seed which contained 12.9% protein and less than 1% oil. No studies of toxicity or searches for presence of other potentially valuable constituents were made.

Chemically different seed oil composition of potential industrial value has been demonstrated in species of Crepis, Helichrysum, Cephalaria, Stenachaenium, Briza, Coriaria, and Acanthosyris. In accordance with established procedures the New Crops Research Branch decides whether trial plantings are justified and if so, the most probable regions for test. Thus, the S-9 may be receiving some of these materials for increase and evaluation.

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
South Regional Technical Service Center
Fort Worth, Texas

The Soil Conservation Service in its evaluations of new plants for soil and water conservation uses had under observation during 1964 1,275 accessions. A list of these accessions by genera is attached in Table 1. This is a considerable number of species and represents the observations of three locations: Arcadia, Fla., Americus, Ga., and Coffeeville, Miss. During the year, the Soil Conservation Service reorganized some of its activities and regrouped certain States for technical supervision which added Texas to the list of States serviced through the Regional Technical Service Center of the South at Forth Worth. This gave us a new center to report from in Texas. However, due to other reorganizations, this center is only newly established and has not grown a crop during the year. We look forward to having information from them by next year.

At the three other centers, 56 accessions were placed on supplemental increase. In our procedure, this simply means that sufficient seed were grown and harvested for further observations. A list of these species by P.I. number is shown in Table II.

Likewise, 67 accessions were under supplemental observation which means that they have shown sufficient promise for the Service to consider them for further study. These plants are shown in Table III.

In the Service program of evaluation of new plants, one step includes field evaluations on field plantings on Soil Conservation Service district cooperators' farms. Seventeen accessions were studied in this manner in 1964. These materials are shown by P.I. number in Table IV.

Six accessions have been planted for the production of seed for commercial purposes. These species are shown in Table V.

A brief comment on several of the items under study follows:

Three of the Trifolium vesiculosum have reached the commercial market. One is known as Amclo clover, one as Yuchi clover, and a third, unnamed, is being grown and studied through the Mississippi Plant Materials Center, and we expect it to be certified through the Mississippi State University.

The Echinochloa crusgalli accessions are highly adapted Japanese millets making high yields of seed and one particularly suited to our day length.

The Panicum miliaceum, Proso Millet, is also particularly suited to our day length.

Both of these plants are primarily used for wildlife habitat improvement.

Three wild peanuts, one a perennial, and two annuals, are showing particular promise as forage plants. The perennial, Arachis glabrata, is well adapted to Florida conditions and perhaps to the lower Rio Grande valley of Texas. The two annuals are highly satisfactory reseeders and may work well as reseeding forage legumes in grass crops.

Lespedeza virgata is showing considerable promise as a wildlife vegetative cover. The Trifolium diffusum and pallidum species are highly productive, but it appears that they will be restricted to a limited belt. They are not hardy enough to range north of approximately Highway 80, but require more winter rainfall than generally is available in peninsula Florida.

The wild soybean, Glycine ussuriensis, is a good reseeder and makes a good wildlife food crop when grown on good land, preferably in combination with corn.

Emphasis is being given to the evaluation of recreation and beautification materials for use in the programs of conservation beauty and recreation. The several oaks, Elaeagnus, Pyracanthia, and crabapple species under study indicate the general direction that this work is taking with the Service. We expect to get into some herbaceous material for this purpose.

Attachments--5

I. LIST OF PLANT INTRODUCTIONS UNDER OBSERVATION DURING 1964

Agropyron	1	Lotononis	6
Alopecurus	1	Lotus	81
Alysicarpus	3	Lupinus	17
Andropogon	20	Malus	2
Antopetitia	1	Medicago	145
Antraxanthum	1	Melinis	1
Apluda	1	Metasequoia	1
Arachis	12	Mimosa	1
Aristida	1	Panicum	74
Arrhenatherum	1	Paspalum	21
Arundinella	1	Pennisetum	110
Astragalus	1	Phalaris	10
Axonopus	1	Phaseolus	4
Bothriochloa	7	Phyllostachys	2
Brachiaria	25	Pesidium	1
Brachypodium	6	Psoralea	6
Bromus	15	Rhynchosia	1
Cajanus	3	Salix	3
Calopogonium	7	Sesbania	4
Canavalia	5	Setaria	21
Cantharospermum	1	Sophora	1
Cassia	1	Sorghum	1
Castanae	1	Sporobolus	1
Centrosema	7	Stipa	18
Chloris	5	Stylosanthes	16
Chrysopogon	11	Sutherlandia	1
Clitoria	8	Teramnus	2
Crotalaria	9	Themeda	2
Cyamopsis	1	Trifolium	272
Dactylis	1	Vicia	110
Desmanthus	1	Vigna	14
Desmodium	20	Zoysia	3
Dicanthium	4		
Digitaria	20		
Dolichos	30		
Echinochloa	9		
Eragrostis	10		
Festuca	14		
Glycine	17		
Helianthus	8		
Hordeum	1		
Indigofera	14		
Lallemanthia	1		
Lathyrus	3		
Lespedeza	20		
Lessertia	1		
Leucaena	1		
Listia	1		
Lolium	10		

II. LIST OF ALL PLANT INTRODUCTIONS THAT WERE ON SUPPLEMENTAL INCREASE DURING 1964

Accession Number	Species	Location
216751	Andropogon scoparius	Americus
216752	" "	Americus
216757	" "	Americus
216759	" "	Americus
216778	" "	Americus
217039	" "	Americus
118457	Arachis glabrata	Arcadia
116976	" "	Americus
116979	" "	Americus
162801	" "	Americus
172223	" "	Americus
262794	" "	Americus
151982	" " var. hagenbeckii	Americus
172224	" " " "	Americus
263393	" monticola)	Americus Coffeeville
153053	Brachiaria dictyoneura	Arcadia
195479	Bromus catharticus	Americus
58602	Castanea mollissima	Americus
213885	Chrysopogon montanus)	Americus
215586	" ")	Coffeeville
279746	Crytomeria japonica	Americus
279748	" "	Americus
224152	Cynodon dactylon	Americus
114693	" "	Americus
106663	Digitaria eriantha	Americus
223254	Echinochloa crusgalli	Coffeeville
203728	Festuca arundinacea	Americus
163453	Glycine ussuriensis	Coffeeville
197015	Indigofera pseudotinctoria	Americus
186171	Lespedeza cuneata	Americus
218004	" virgata	Americus
185099	Lupinus elegans	Arcadia
99907	Malus baccata	Americus
122586	" hupenhensis	Americus
184776	Panicum coloratum	Americus
210692	" maxarikariense	Americus
196292	" miliaceum	Americus
178257	" stapfianum	Americus
202044	Paspalum nicorae	Americus
210693	Pennisetum ciliare	Arcadia
276183	Phaseolus lathyroides	Americus
55975	Phyllostachys aurea	Americus
40842	" bambusoides	Americus

II. (continued)

Accession Number	Species	Location
143540	Phyllostachys bissetii	Coffeeville
		Americus
116768	" meyerii	Americus
		Coffeeville
143540	" sp.	Americus
203240	Pyracantha coccinea	Americus
52674	Sasa pygmae	Americus
197687	Stipa hyalina	Americus
187098	Stylosanthes sundaica	Arcadia
234310	Trifolium vesiculosum	Americus
233782	" "	Americus
		Coffeeville
249880	Vicia lutea	Americus
162699	Vigna sinensis	Americus
189380	" "	Americus
227826	" "	Americus

III. LIST OF PLANT INTRODUCTIONS THAT WERE UNDER EITHER SUPPLEMENTAL OR FACILITATING OBSERVATION DURING 1964

Accession Number	Species	Location
261851	Arachis burkartii	Americus
262865	" glabrata	Americus
262287	" "	Americus
262294	" "	Americus
262796	" "	Americus
262797	" "	Americus
262798	" "	Americus
262801	" "	Americus
263393	" monticola	Americus
	" "	Coffeeville
262811	" sp.	Americus
262817	" "	Americus
262819	" "	Americus
262828	" "	Americus
262839	" "	Americus
	" "	Arcadia
262286	" "	Americus
262301	" "	Americus
262812	" "	Americus
262813	" "	Americus
262814	" "	Americus
262816	" "	Americus
262818	" "	Americus
262819	" "	Americus
262820	" "	Americus
262821	" "	Americus
262832	" "	Americus
262834	" "	Americus
262839	" "	Americus
262840	" "	Americus
262847	" "	Americus
262815	" "	Americus
262826	" "	Americus
215586	Chrysopogon gryllus	Coffeeville
223254	Echinochloa crusgalli	Coffeeville
250392	" "	Coffeeville
234218	Eragrostis robusta	Arcadia
170393	Helianthus annuus	Coffeeville
175723	" "	Coffeeville
184049	" "	Coffeeville
163453	Glycine ussuriensis	Coffeeville
184776	Panicum coloratum	Americus
207990	" "	Americus
263602	" "	Americus
263603	" "	Arcadia

III. (continued)

Accession Number	Species	Location
156080	Panicum maximum	Arcadia
259563	" "	Arcadia
202294	" miliaceum	Coffeeville
202295	" "	Coffeeville
202812	" "	Coffeeville
196292	" "	Coffeeville
208015	" stapfianum	Americus
208016	" "	Americus
208017	" "	Americus
208176	" "	Americus
208247	" "	Americus
208246	" "	Americus
208400	" "	Americus
208402	" "	Americus
202044	Paspalum nicorae	Americus
276248	" "	Americus
276249	" "	Americus
243199	Pennisetum ciliare	Arcadia
271198	" "	Arcadia
202480	Phalaris tuberosa var. stenoptera	Americus
276183	Phaseolus lathyroides	Arcadia
262148	Stylosanthes mucronata	Arcadia
162801	Trifolium arachis repens	Americus
233782	" vesiculosum	Coffeeville

IV. LIST OF ALL THAT WERE IN ANY STAGE OF FIELD EVALUATION OR FIELD PLANTING DURING 1964

Accession Number	Species	Location
118457	Arachis glabrata	Arcadia
263395	Arachis monticola	Americus
263393	" "	Coffeeville
153053	Brachiaria dictyoneura	Arcadia
163453	Glycine ussuriensis	Coffeeville
218004	Lespedeza virgata	Americus, Coffeeville
202294	Panicum miliaceum	Coffeeville
202295	" "	Coffeeville
196292	" "	Americus
210693	Pennisetum ciliare	Arcadia
238362	Trifolium diffusum	Americus
168636	Trifolium globosum	Americus
249868	Trifolium pallidum	Americus
233782	Trifolium vesiculosum	Americus, Coffeeville
233816	" "	Americus
234310	" "	Americus
249880	Vicia lutea	Americus

V. LIST OF ANY THAT WERE BEING INCREASED FOR COMMERCIAL PRODUCTION DURING 1964

Acession Number	Species	Location
223254	Echinochloa crusgalli MS439	Coffeeville
	MS390	Coffeeville
250392	" "	Coffeeville
196292	Panicum miliaceum	Americus
233782	Trifolium vesiculosum	Coffeeville
234310	" "	Americus
233816	" "	Americus

REGIONAL STATION REPORT

PROJECT: Hatch H-171 (S-9). The Introduction, Multiplication, and Evaluation of New Plants for Agricultural and Industrial Uses and the Preservation of Valuable Germplasm.

COOPERATING AGENCIES: State Agricultural Experiment Stations of the Southern Region; Crops Research Division and Utilization Research & Development Divisions of ARS, USDA, and the Soil Conservation Service of USDA.

PERSONNEL: W. R. Langford, W. L. Corley, J. H. Massey, Grover Sowell, Jr.

PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS

Plant Introduction

Seed or vegetative stocks of 2819 new accessions representing 106 plant genera were received last year. Approximately one-half of this material was obtained from the Oklahoma Experiment Station. It represents collections made by Dr. J. R. Harlan, Dr. Wayne Huffine and others at the Oklahoma State University. The S-9 Project is indeed fortunate to obtain this collection, and I personally would like to thank Dr. Harlan and Dr. Huffine for making it available. Another large collection received last year resulted from Dr. Oakes' exploration in South Africa. It consisted of seed of Digitaria spp. and an assortment of other grasses and tropical legumes.

Seed increase and preliminary evaluation

Because of the large collection of new material from Oklahoma and South Africa, and the depletion of seedstocks by the disease screening program, the number of accessions planted for seed increase this year is considerably greater than ever before. The old nursery was inadequate, and plantings were made on two additional sites, neither of which has a source of water for irrigation. A summary of materials being grown for seed increase is shown in table 1.

Table 1. Materials grown for seed increase, 1965

Crop	No. of accessions
Grasses	1120
Oilseeds (Peanut and sesame)	472
Sorghum and millet	360
Summer legumes	157
Winter legumes	438
Capsicum spp. (Pepper)	252
Vigna spp. (Cowpea)	80
Melons	510
Brassica spp.	56
Misc.	53
Total (planted 1965)	3498
Carry-over of perennial grasses	563
TOTAL	4061

Seed distributed by Regional Station

A complete inventory of all plant materials available at the regional station was issued to plant scientists in the region. The inventory contained 12,886 accessions representing 130 genera and 583 species. Through the exchange of plant inventories, lists of plant materials held at the other regional stations were obtained and distributed to state stations.

The distribution of seed and vegetative material to research workers in the Southern Region is summarized in table 2.

Table 2. Distribution of plant materials

State	Plants distributed by					
	S-9	NE-9	NC-7	W-6	Others	Total
Alabama	70	2	8	287		367
Arkansas	52		245			297
Florida	1639	19	1674	137	124	3593
Georgia	206	77	25	89	37	434
Kentucky			3			3
Louisiana	258		7		1	266
Mississippi	269	22	3	3	1	298
N. Carolina	26	105	2545	156		2832
Oklahoma	137	92	15	54		298
Puerto Rico	22			6	2	30
S. Carolina	666	188	32	60		946
Tennessee		1	1			2
Texas	277	13	51	1		342
Virginia	20	115	4	47		186
TOTAL	3642	634	4613	840	165	9894
NE-9	210					
NC-7	605					
W-6	325					
Foreign	1354					
TOTAL	6136					

Chemurgic crops

Thirteen accessions that ranked high in chemical screening for new sources of pulp, oil, and gum were grown for seed increase and preliminary evaluation in 1964. Only two of these appeared promising agronomically. Aeschynomene scabra, P.I. 296044, and Sesbania exaltata, P.I. 296055, grew to heights of 10 and 14 feet and yielded 5 and 7 tons of dry matter respectively. Both of these flowered late and produced few seed. Crotalaria eriocarpa, P.I. 296046, was much less productive than C. juncea. It set numerous seed pods, but early frost kept them from maturing. Three perennial species (Desmanthus interior, P.I. 296052; Desmodium sp., P.I. 296053; and Indigofera suffruticosa, P.I. 296054) made little growth and failed to survive the winter. However, Indigofera suffruticosa, P.I. 296054, produced an abundance of seed.

Three Brassica accessions (P.I's. 296037, 296062, and 296079) that contain erucic acid bloomed profusely but set few seed. These were grown again in Florida this spring but seed set was poor there also.

Cassia hirsuta (P.I. 296080) and Cassia javanica (P.I. 296081), classified as sources of gum, did not flower. Four plants of C. javanica were overwintered in the greenhouse and set in the field again this spring. This is a woody shrub and shows no promise as a seed crop in our climate.

Trichosanthus cucumerina (P.I. 296058) is a viny plant that produces small melon-like fruits about 1 to 2 inches in diameter. It produces a fair seed crop, but special machines would be required for harvesting and drying.

Tagetes lucida (P.I. 296056) made little growth, flowered profusely during August and September but set no seed.

Forty-five new accessions of chemurgic interest were received for seed increase and preliminary evaluation in 1965. These include 8 Vernonia, 9 Solanum, 3 kenaf, 2 okra, 9 sorghum, and 14 miscellaneous plants containing special oils or classified as pulp plants.

Pathology investigations

A. Screening for disease resistance

1. Resistance of watermelon race 2 anthracnose

The 288 introductions received and increased by the Regional Station since the work of Winstead and others (3) were screened for resistance to an isolate of Colletotrichum orbiculare, race 2, obtained from Dr. Winstead. Six introductions which had a very low infection grade in the preliminary tests were included in a replicated test. P.I. 225557 appeared to have the most resistance, but eventually all of the plants of this introduction were killed.

2. Resistance of sorghum to anthracnose

Losses in grain yield as high as 50% have been reported by Harris et al (1) as due to the anthracnose fungus, Colletotrichum graminicola (Ces.) G. W. Wils. Although 'Wiley' has been immune in all tests to date, Dr. H. B. Harris of the Georgia AES believes that there is a serious need for additional sources of resistance, particularly in grain-type sorghums. In cooperation with Dr. Harris, 200 recent introductions were screened for resistance in the field. The 26 introductions which were resistant in the field were also tested for resistance in the seedling stage in the greenhouse. P.I. 267519, P.I. 267459, P.I. 267444, and P.I. 267340, had an infection index of 0.5 as compared to 0.5 for 'Wiley' and 3.5 for 'Martin'. The 500 earliest introductions in the regional station collection were screened for resistance in a series of preliminary screening tests in the greenhouse. In two replicated greenhouse tests the above listed

resistant introductions and six introductions selected on the basis of their resistance in preliminary screening tests were resistant. All resistant introductions have been included in a replicated field test this summer.

3. Resistance of southern pea to CMV

(Reported in Georgia report)

4. Resistance of southern pea to BYMV

(Reported in Georgia report)

B. Field notes on resistance of introductions

The following 14 introductions of Arachis hypogaea had an infection index of 1 (on a 1-5 scale) as compared to 4 for 'Argentine' when infected by Cercospora arachidicola Hori.

276105	290596	290607
277197	290597	290608
290536	290598	290633
290580	290599	290647
290581	290606	

C. Identification of diseases present on plant introductions

1. The unidentified bacterium reported in 1964 on Citrullus introductions is apparently carried on the increase seed on many recent introductions. The fact that the bacterium is associated with seed grown during several seasons including 1959 may indicate high susceptibility to an established but undescribed bacterial disease. Nevertheless, the distribution of all Citrullus introductions has been restricted since January 1965, until additional information indicates that they can be safely distributed.

2. Anthracnose of Cassia occidentalis, caused by a Colletotrichum spp. probably of the Glomerella cingulata (Ston.) Spauld & Schrenk group produced severe defoliation and pod and stem necrosis. The pathogen was isolated and the symptoms were reproduced on seedlings in the greenhouse by inoculation with pure cultures of the fungus. This disease could be a serious limiting factor in growing this potential industrial crop, particularly under conditions of high rainfall. The pathogen was isolated from seed harvested from infected plants. It is recommended that only seed produced in disease-free fields be used in field research with this crop.

3. Virus-like symptoms were observed on a few introductions of Digitaria spp. in the field and greenhouse. Attempts to mechanically transmit a virus were unsuccessful.

4. Other diseases observed for the first time in 1964

(a) Colletotrichum sp. on Ricinus communis

(b) Sphacelotheca diplospora (Ell. & Ev.) Clint. on Digitaria pentzii

D. Production of pathogen-clean seed

Sesamum and Cyamopsis introductions should continue to be increased in areas less favorable to diseases than Georgia.

Seed of Indigofera spp. suspected of carrying Colletotrichum dematium f. truncata specific in its pathogenicity, was planted in the greenhouse as were several Crotalaria introductions suspected of carrying virus diseases. Disease-free seed will be obtained from these before they are distributed. The Cucurbit introductions were sprayed more frequently in 1965 to provide higher quality pathogen-clean seed.

E. Supporting research to screening plant introductions for disease resistance

1. Gummy stem blight

A technique involving the measurement of progress of infection by the gummy stem blight fungus on excised watermelon cotyledons was developed in an attempt to evaluate the resistance of individual plants. Two plants which gave an immune reaction when this technique was used were grown to maturity in the greenhouse. Their progeny were no more resistant than was the original increase seed of this introduction.

Single-conidium and single-ascospore isolates from Florida and South Carolina varied significantly in their pathogenicity. A non-pathogenic isolate spread to the edge of lesions produced by a mixture of equal numbers of conidia of a non-pathogenic isolate and a pathogenic isolate. The pathogenic isolate was present in the tissues of a larger area of the lesion than was the non-pathogenic isolate. Attempts to demonstrate heterocaryosis in this fungus as a possible mechanism of variation in pathogenicity were unsuccessful. Since the sexual stage is common in nature this finding is not surprising and it seems likely that the sexual stage provides the mechanism for variation in pathogenicity. It is important to determine the pathogenic capabilities of this fungus so that the length of time that a given source of resistance will control the disease can be determined. The preliminary results obtained thus far indicate that Citrullus lanatus, P.I. 189225, has a type of resistance that would be ineffective against some isolates of the pathogen. Consequently, superior sources of resistance are needed.

2. Sorghum anthracnose

Single-conidium isolates from six locations in Georgia did not differ significantly in their pathogenicity either within or between locations.

The low level of infection obtained in these tests may have resulted in the masking of significant differences in nature. These preliminary results indicate, however, that Colletotrichum graminicola is a relatively stable fungus---that is, it does not form new, pathogenic strains readily. The fact that 'Wiley' has been immune in all field tests since its release in 1957 supports this hypothesis. If this hypotheses is correct, the plant breeder can expect resistance to anthracnose to be stable in the field and it may not be necessary to continually breed for resistance to new pathogenic strains. Thus research on the variation of pathogenic fungi is very practical to the plant breeder in planning his breeding program.

F. Compilation of information on the insect and disease resistance of plant introductions

Two additional lists, "Selected Forage Crop and Field Crop Species" and "Vigna spp.", of resistant introductions were completed and distributed. The following lists have now been completed by this cooperative endeavor of the four regional stations and the New Crops Research Branch:

1. Capsicum spp.
2. Cucumis melo
3. Cucumis sativus and Cucumis spp.
4. Cucurbita spp.
5. Brassica oleracea var. botrytis
6. Selected forage crop and field crop species (includes all species maintained by the Southern Regional Station)
7. Vigna spp.

Data on the reaction of additional introductions of Citrullus vulgaris and Cucumis melo to Verticillium alboratrum were received from Dr. C. B. Skotland of Prosser, Washington. Data on the reaction of 187 introductions of Cyamopsis spp. to potato virus S was obtained from Dr. C. E. Logsdon, Palmer, Alaska, through Dr. W. H. Skrdla. We have permission to include these data in the next edition of our catalogue.

G. The future of screening for disease and insect resistance

Screening of the regional station collection of southern pea for resistance to viruses has resulted in the successful location of resistance to three of four viruses. This work forcefully demonstrates the potential usefulness of plant introductions as sources of disease resistance. We have only begun to utilize plant introductions in this manner. The fact that the breeding of resistant varieties is the most efficient and economical means of controlling disease, combined with the increased emphasis on disease and insect control other than with pesticides, indicates a significant expansion of research in this area. As additional scientists in state experiment stations and administrators of experiment stations become convinced of the potential of plant introductions as sources of resistance, new screening programs will be established.

Such an expansion will require an expansion of regional station facilities if we are to continue to provide genetic material of maximum value to research workers. Already our seed supply of some Cucumis melo introductions is seriously depleted by repeated requests for seed to be used in screening for disease resistance. Improved disease control practices which result in higher quality seed and fewer losses of individual introductions also require additional technical assistance.

To my knowledge there has been no systematic screening of plant introductions for insect resistance under controlled conditions. Yet, the report by Painter (2), of resistance to chinch bugs, Blissus leucopterus say in sorghum varieties from Africa and Asia, may indicate that this approach to insect control would be profitable. Painter also reports resistance to corn earworm, Heliothis zea Boddie, the wooly apple aphid, Eriosama lanigerum (Hausm.), European corn borer, Phrausta nubilalis (Hbn.), corn leaf aphid, Rhopalosiphum maidis (Fitch), the spotted alfalfa aphid, Therioaphis maculata (Backton), and others. Of equal importance is considering the potential of plant introductions as sources of insect resistance is that the resistances located thus far are effective over a long period of time. The chinch bug, for example, still does not attack 'Atlas' sorghum although this variety was released 37 years ago. Apparently insects do not adapt themselves to attack new resistant varieties as readily as do many plant pathogens. For this reason plant introductions may have an even greater potential as sources of insect resistance than they have as sources of disease resistance.

Improvement of physical facilities

The following equipment was purchased during the fiscal year 1965:

1. 1/2 ton pick-up truck. This is in addition to the truck already on inventory. With nursery plantings on three different sites, seven miles apart, another vehicle was needed to transport equipment and labor from one nursery area to another.

2. Cub tractor

3. Gravely tractor

4. Fertilizer and lime spreader

5. Rotovator

6. 400 ft. of 3" irrigation pipe and sprinklers

Regional Station budget and expenditures

Funds allocated to the Regional Station last year and those available for its operation this year are summarized in table 3.

Table 3. Sources of Funds and Expenditures of Southern Regional Plant Introduction Station

Source of Funds	Amount 1964-65	1965-66
Regional Research Funds (pooled)	$30,000	$30,000
Regional Research Funds (Georgia)		1,694
New Crops Research Branch, ARS	28,525	26,620
State (Georgia)	3,600	2,000
TOTAL	$62,125	$60,314

Expenditures	1964-65	1965-66 (Proposed)
Salaries	$46,650	$50,195
Seasonal labor	4,347	3,800
Operating supplies	4,046	4,200
Capital outlay	6,008	1,119
Travel	1,036	1,000
TOTAL	$62,087	$60,314

Literature cited

1. Harris, H. B., B. J. Johnson, J. W. Dodson, Jr., and E. S. Luttrell. Evaluation of anthracnose on grain sorghum. Crop Science 41:460-462. 1964.

2. Painter, R. H. Breeding plants for resistance to insect pests. In Biological and chemical control of plant and animal pests. Pub. No. 61 of AAAS, Washington, D. C. 1960

3. Winstead, N. N., M. J. Goode, and W. S. Barham. Resistance in watermelon to Colletotrichum lagenarium, races 1, 2, and 3. Plant Disease Reporter 43:470-477. 1959.

APPENDIX B

Plan for Domestic Exploration to Collect Native Stocks of *Vaccinium* spp.

North Carolina State University and The University of North Carolina

Agricultural Experiment Station - Raleigh, and
Department of Botany - Chapel Hill

S-9 Regional Exploration Proposal
Submitted July 9, 1965

1. Title: Domestic Collection of Eastern Vaccinium Species for Use in the Southeast.

2. Objective: 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.

3. Justification: The genus Vaccinium is a very diverse (as to habitat, morphology and breeding behavior) North American genus which is considered taxonomically difficult because of a good deal of species hybridization (morphological intergrades) and three distinct chromosome levels which are found in nature. Economically, blueberries of several species and the closely related cranberries represent a livlihood for many persons owning otherwise agriculturally valueless acidic land. Further, blueberries show every promise of becoming the most popular small fruit crop in the United States by the end of this century.

The proposed collection of Vaccinium species would serve 1) to enlarge the limited gene pool currently available to blueberry breeders, 2) to provide material for cytogenetic assessment of recombination patterns within and between species, 3) to provide material for detailed taxonomic studies using the more modern methods of comparative analysis of chemical constituents as well as side-by-side morphological, ontogenetic and cytogenetic comparisons, in an effort to arrive at a phylogenetic history of the genus, and, 4) to permit the long range development of blueberries which are adapted to a wide variety of soil and climatic conditions so as to permit their culture essentially throughout our region irrespective of local environmental conditions.

We submit that North Carolina would be the near ideal location in which to maintain such a collection since both the temperate and the near subtropical (short chilling requiring) species perform reasonably well here, and since a great deal of natural hybridization was shown by Camp and Darrow to have taken place in the western part of the state.

4. Plan of Work: Collections of the following 27 species should be made in the Eastern United States to bring back three geographically well-spaced population samples of each species:

Species	Proposed Collecting Locales			
V. elliottii Chapm.	Va.	Fla.	Ark.	
V. myrtilloides Michx.	Wisc.	NY	W. Va.	
V. angustifolium Ait.	Wisc.	NY	W. Va.	
V. brittonii Porter ex Bickn.	Wisc.	N.J.	W. Va.	
V. pallidum Ait.	NY	Ga.	Ark.	
V. simulatum Small	Ky.	Va.	Ga.	
V. vacillans Kalm ex Torrey	Minn.	Me.	Ga.	
V. altomontanum Ashe	Va.	Ky.	Ga.	
V. constablaei A. Gray	N. C.	Tenn.		
V. caesariense Mackenzie	Me.	N. C.	Fla.	
V. australe Small	N.J.	Ga.	Fla.	
V. atrococcum (Gray) Heller	NY	Tenn.	Fla.	
V. marianum Wats.	NY	W. Va.	N. C.	
V. arkansanum Ashe	Fla.	Texas	Ark.	
V. fuscatum Ait.	Ga.	Fla.		
V. hirsutum Buckley	N. C.	Tenn.		
V. darrowi Camp	Fla.	La.	Ala.	
V. myrsinites Lam.	S. C.	Fla.	Ala.	
V. tenellum Ait.	N. C.	Ga.	Va.	
V. virgatum Ait.	Ga.	Fla.	Ark.	
V. amoenum Ait.	S. C.	Fla.	Ark.	
V. ashei Reade	Ga.	Fla.	Ala.	
V. erythrocarpum Michx.	N. C.	Va.	W. Va.	
V. crassifolium Andr.	Va.	N. C.	S. C.	
V. arboreum Marsh.	N. C.	Fla.	Ark.	
V. stamineum L.	Maine	N. C.	Fla.	Texas
V. macrocarpon Ait.	N. J.	N. C.	Ill.	

In addition to all possible representative collections from the Carolinas, the above collections from the more distant parts of the range are necessary in order to obtain different variants with differing genetic potentialities. Trips to six specific areas would be necessary in order to complete the collections. These areas are as follows (also see distribution of species in appendix):

1. New York - New Jersey - New England
2. Southern Georgia and Northern Florida
3. East Texas and Arkansas (Ozarks)
4. Mountains of Georgia and Tennessee
5. Mountains of Virginia and West Virginia
6. Minnesota - Wisconsin

To secure the necessary series of identifiable living and preserved materials from these areas would require a minimum of twelve trips, two to each area, spring and summer or summer and fall. This would involve a total of approximately 30,000 miles travel and 88 field days (with a two-man field team).

Most of the collecting and classifying would be done by the botanical staff at U.N.C. with local help and directions from state extension services, botanical societies and interested private citizens in locating promising blueberry populations. Many population sites are already known from previous collections. A portion of all collections will be propagated for growth at the North Carolina Botanical Garden at Chapel Hill and at N. C. Agricultural Experiment Station land holdings in Raleigh. A collection of seeds from each species will be held in dry cold storage at Raleigh and at the National Seed Laboratory at Fort Collins, Colorado. Cooperating states may secure seed or propagations of any of the collected materials as they become available.

All collections will be documented as to exact locales of the population, date of collection, general population characteristics and specific selection notes. This documentation will be submitted to the Plant Introduction Section, New Crops Research Branch, Beltsville, Maryland, through the S-9 Regional Coordinator's office. This information will become part of the permanent inventory records and used for assignment of plant introduction (P.I.) numbers.

The maintenance and evaluation phases will be coordinated by the N. C. Agricultural Experiment Station and the U.N.C. at Chapel Hill. Funds for this maintenance and evaluation are not covered by this proposal, which only supports the actual collecting phase. A report of this exploration will be published at the completion of the project. Progress will be reported at S-9 meetings.

5. Personnel: Dr. C. Ritchie Bell, Associate Professor of Botany and Director of the North Carolina Botanical Garden, and his staff will assume primary responsibility for the collection, classification, and preparation of specimens of the desired species, as well as for the Garden planting at Chapel Hill.

   Dr. G. J. Galletta, Associate Professor of Horticultural Science, will assume the responsibility for propagation of species representatives, maintaining the seed collection, growing and evaluating species seedling progenies for horticultural and botanic characteristics, maintenance of representative plantings in the Raleigh area, sending of propagation materials to other cooperators upon their request, and handling of correspondence relative to the collection.

   Both men will work directly with the Regional Coordinator at Experiment, Georgia, and our local state representative at Raleigh.

6. Financial Support: It is proposed that the Plant Introduction Section, New Crops Research Branch, ARS, furnish a maximum sum of $5236 over a 2 to 4 year period to support the collecting and documentation of the material. (See proposed budget below.) Such funds would be placed with the Georgia Agricultural Experiment Station, which will honor vouchers submitted by state collectors and covering expenses incidental to the collecting phase only. Previous approval of the vouchers before submitting to the Georgia Experiment Station will come from the S-9 Regional Coordinator's office.

Proposed Budget for Eastern Blueberry Collection
(figures based on travel regulations of N.C. State Employees)

1.	30,000 miles travel at 8¢ per mile.....	$2400.00
2.	88 days subsistence for 2 people at $11 per day average ($12 maximum daily allowance for in-state travel, $16 per day for out-of-state travel).....	$1936.00
3.	Field supplies and postage for plant materials - $100/year for three years.....	$ 300.00
4.	Propagation materials incidental to collection procedures - $200/year for 3 years.....	$ 600.00
	Total over 3 to 4 year period.....	$5236.00

7. Duration: Two to four years depending upon annual progress reported and availability of plant exploration funds. (A return to collecting locales at different times of year to secure seeds and clonal propagations is anticipated. Some difficulty in securing success of initial propagations from the wild in the genus Vaccinium is also common.)

Cooperating Agencies: New Crops Branch, ARS, USDA, Beltsville, Maryland; The Regional Plant Introduction Station, Experiment, Georgia; The North Carolina Agricultural Experiment Station; The University of North Carolina; The Experiment Stations of Florida, Georgia, Louisiana, Alabama, Mississippi, Texas, South Carolina, New Jersey, Maryland, Arkansas; the Small Fruit and Grape Investigations Section of the Crops Research Branch, ARS, Beltsville, Maryland, and the states of NE 9 and NC 7 from which collections would be made.

This proposed collection would be of interest to taxonomists, geneticists, horticulturalists, plant physiologists and plant pathologists interested in blueberries, and conservation and development people also for wildlife and community development purposes.

APPENDIX C

CHART OF RESPONSIBILITIES, 1966

S-9

CHART OF RESPONSIBILITIES 1966

Objective	Type Activity	State Station and Federal Agency
1. To participate in the coordinated program of foreign and domestic plant exploration and introduction to obtain new plants for agricultural, industrial and other uses.	1. Collection of fruit stocks near Gulf Coast and in coastal plains area of South Carolina and Georgia.	Agr. Expt. Stations in Ala., Georgia, Florida, Louisiana, Miss., S. C. and Texas. NCRB, ARS.
	2. Coordinate requests for new plant materials and forward them to the New Crops Res. Br., ARS.	Regional Plant Introduction Station, Experiment, Georgia
	3. Seed lists and reports of S-9 activities will be exchanged for similar reports of the other three regional new plants projects. All such reports and seed lists, including those of the S-9 new plants project, will be distributed to plant scientists in the Southern Region.	Regional Plant Introduction Station, Experiment, Georgia, and the S-9 committee member representing each state station and the Soil Conservation Service.
	4. Collect native species of Puerto Rico that may be of potential value.	Agricultural Experiment Station, Rio Piedras, Puerto Rico.
	5. Collect domestic stocks of Eastern Vaccinium.	North Carolina

CHART OF RESPONSIBILITIES 1966

Objective	Type Activity	State Station and Federal Agency
2. To multiply, evaluate, maintain and preserve germplasm of innroduced plant materials for the Southern Region.	Increase new plant materials received since the last planting season and make them available for further evaluation at state stations and S.C.S. Plant Materials Center. Test germination of seed in storage and increase those low in supply or viability. New introductions will be observed for useful horticultural and agronomic characters and for the presence of disease and insects.	Regional Plant Introduction Station, Experiment, Georgia
	Introductions will be screened for disease resistance in the greenhouse. Field notes on the reactions of introductions growing in the Regional Station nursery will be taken when disease distribution and severity are adequate to yield reliable results. Disease and insects occurring in the nursery will be identified. Supporting research will be conducted on disease-causing organisms to facilitate the screening of plant introductions for disease resistance and their utilization as sources of disease resistance.	Regional Plant Introduction Station, Experiment, Georgia
	Seed of introductions of potential economic value will be stored as working stocks for research workers in the Southern Region.	Regional Plant Introduction Station, Experiment, Georgia

CHART OF RESPONSIBILITIES

Objective	Type Activity	State Station and Federal Agency
2. Continued	Evaluation of turf grasses	Ala.,Ark., Fla., N.C., Okla., Tex., Tenn., Miss., S.C.
	Evaluation of ornamental plants	Ala., Fla., Ky., La., Okla., N.C., S.C., Tenn., Tex., Va., P.R., Miss., Ga.
	Evaluate introductions of the following species of agronomic drops as sources of new breeding lines or for commercial plantings in their present form:	
	grain crops	
	corn	Ala., Fla., Ky., P.R., N.C., Tex.
	sorghum	N.C., Ga., Fla., Okla., P.R., Tex.
	small grain	Fla., Ky., Ga., N.C.
	soybeans	N.C.
	sunflowers	Ark., Ga., N.C., Tex.
	forage crops	
	Trifolium repens	Ala., La., S.C.
	Trifolium spp.	Ala., Ky., S.C.S., N.C.
	Lespedeza cuneata	Ala., N.C., S.C.S.
	Vicia spp.	Ala., S.C.S.
	Phalaris spp.	Ala., N.C.
	Cynodon spp.	Ga., Fla., N.C., Tex., Okla.
	Paspalum spp.	Fla., Ga., La., N.C., Tex.
	Pennisetum spp.	N.C.

CHART OF RESPONSIBILITY 1966

Objective	Type Activity	State Station and Federal Agency
2. Continued	forage crops, con't	
	Bothriochloa spp. and Andropogon spp.	Ala., Okla., N.C., Tex., Fla.
	millets and Misc. summer grasses	Ala., Fla., Ga., N.C., Miss., Texas, P.R.
	Alfalfa	N.C.
	Misc. summer legumes	Ala., Fla., Ga., La., Okla., N.C., P.R., Soil Conservation Service
	Arachis spp.	Ala., Fla., Ga., N.C., Okla., Tex., Va., Soil Conservation Service
	Tobacco	Fla., Ky., N.C.
	Cool season perennial grasses	Ark., Ky., N.C., Va.
	Evaluate introductions of the following horticultural crops:	
	Cantaloupe	Ark., Ala., S.C., Texas, N.C.
	Watermelon	Ark., Fla., Miss., S.C., Tex., Va., N.C.
	Tomato	Ala., Fla., Tex., N.C., Miss.
	Pepper	Ala., Ga., S.C., N.C., P.R.

CHART OF RESPONSIBILITY 1966

Objective	Type Activity	State Station and Federal Agency
2. Continued	Evaluation of horticultural crops, con't.	
	Southern pea	Ala., Fla., Ga., Miss., Okla., Tex.
	Fruits and nuts	Ala., Ark., Fla., Ga., Ky., La., Miss., N.C., Okla., P.R., S.C., Tenn., Tex., Va., NCRB, ARS
	Irish potatoes	La., N.C.
	Sweet potatoes	Ga., La., N.C., Okla.
	Other vegetables	Fla., Ky., La., N.C., P.R., Va., Tex., Okla.
	Strawberries	La., N.C., Tenn.
	Adaptation and cultural studies of the following:	
	Oilseed crops	Ala., Ark., Fla., Ga., La., N.C., Okla., S.C., Tex., NCRB, ARS
	Fiber and pulp	Ala., Fla., Ga., La., N.C., Okal., S.C., Tex., NCRB, ARS
	Gum crops	Ala., Ark., Fla., Ga., La., N.C., Okla., S.C., Tex., NCRB, ARS
	Drug crops	La., Fla., NCRB, ARS
	Crops for insecticides	S.C., NCRB, ARS

CHART OF RESPONSIBILITIES 1966

Objective	Type Activity	State Station and Federal Agency
2. Continued	Adaptation and cultural studies of the following: con't.	
	Chemical evaluation of new plant materials for new sources of oil, pulp and gums.	URDD, ARS
	Storage of pulp plant materials	Ga.
3. To provide plant and seed materials for assessments of their chemical and physical properties and industrial use potentials	Plant and seed material from increase and evaluation nurseries will be supplied for chemical and physical evaluation	Fla., Ga., Ky., La., N.C., Okla., P.R., S.C., Texas
4. To catalogue and distribute introduced plant materials and to maintain and publish records of their performance and use in the Southern Region.	A complete list of available introductions will be prepared for distribution to research workers.	Regional Plant Introduction Station, Experiment, Georgia
	Distribute seed lists and reports of new plant activities. Maintain records of new plant materials received within the state and report their performance and use to the S-9 Technical Committee.	S-9 Committee members representing each state station and the Soil Conservation Service
	Prepare an annual report for the S-9 'New Plants' Project	Eli. L. Whiteley, Chairman, S-9 Committee