File

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

Georgia Experiment Station
Experiment, Georgia

July 19-20, 1966

AGENDA
S-9 MEETING
Experiment, Georgia
July 19-20, 1966

1. Registration 8:00
2. Roll call 8:30
3. Introduction of visitors
4. Welcome
5. Presentation of agenda
6. Appointment of committees
   a. Nominating
   b. Time and place of next meeting
   c. Resolutions
7. Regional Station Report
8. 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
9. Federal reports
   a. Soil Conservation Service
   b. Utilization Research & Development Divisions
   c. New Crops Research Branch
   d. Cooperative State Research Service
10. Administrative Advisor
11. Status of projects contributing to S-9
12. Plans for New Crops research in 1967
13. Reporting results from regional tests
14. Report on 1965 meeting of NC-7 Committee attended by Dr. Fike and Dr. Whiteley
15. Report on National Coordinating Committee meeting
16. S-9 regional publications:
   a. Five-year progress report of S-9 project
   b. Culture of kenaf for paper pulp
   c. Fruit stocks collected near the Gulf Coast
17. Requests for new plant materials
18. Tour of regional station
19. Committee reports
   a. Nominations
   b. Next meeting
   c. Resolutions
20. Adjourn

Call to Order and Introduction

The meeting of the S-9 Technical Committee was called to order by Dr. W. H. Stroube, Acting Chairman, at 8:00 am, July 19, 1966. Each person introduced himself. Those in attendance were:

S-9 Committee Members

R. L. Lovvorn	Administrative Advisor, North Carolina
W. R. Langford	Regional Coordinator, Georgia
C. S. Hoveland (absent)	Alabama
A. M. Davis	Arkansas
G. B. Killinger	Florida
A. H. Dampsey	Georgia
W. H. Stroube, Acting Chairman	Kentucky
E.N. O'Rourke	Louisiana
H. W. Bennett	Mississippi
W. T. Fike	North Carolina
R. S. Matlock	Oklahoma
J. Velez Fortuno (absent)	Puerto Rico
J. R. Haun	South Carolina
W. E. Roever	Tennessee
Eli L. Whiteley	Texas
T. Jackson Smith (absent)	Virginia
D. Y. Perkins	Cooperative State Research Service Washington, D. C.
H. L. Hyland H. F. Winters	New Crops Research Branch, ARS Beltsville, Maryland
I. A. Wolff	Northern Utilization Research & Development Division, ARS Peoria, Illinois
W. C. Young	Soil Conservation Service Fort Worth, Texas

Visitors

Herbert C. Cary Harry J. Haynsworth	Soil Conservation Service Athens, Georgia
W. O. Hawley	U.S. Plant Introduction Station Savannah, Georgia
W. T. Fullilove, Director W. L. Corley D. G. Cummins J. H. Massey Grover Sowell, Jr. S. V. Stacy George Tereshkovich	Georgia Experiment Station Experiment, Georgia

Welcome

Dr. W. H. Stroube, Acting Chairman, called the meeting to order with a group introduction and roll call.

Director Fullilove welcomed the group to the Georgia Agricultural Experiment Station and issued an invitation to a social hour at his home from 6:00 to 7:00 this evening.

Minutes and agenda

Minutes of the 1965 meeting at Oklahoma State University were approved as distributed and the agenda shown on page i was adopted for the 1966 meeting.

Appointment of Committees

The following committees were named by Acting Chairman W. H. Stroube:

Nominating Committee

W. T. Fike, Chairman
I. A. Wolff
A. M. Davis

Resolutions Committee

R. S. Matlock, Chairman
Eli L. Whiteley
H. F. Winters

Time and Place of Next Meeting

H. W. Bennett, Chairman
A. H. Dempsey
W. C. Young

State and Federal Agency Reports

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

Southern Regional Plant Introduction Station	W. R. Langford Grover Sowell, Jr.
Alabama	C. S. Hoveland (absent)
Arkansas	A. M. Davis
Florida	G. B. Killinger
Georgia	A. H. Dempsey D. G. Cummins J. H. Massey George Tereshkovich
Kentucky	W. H. Stroube
Louisiana	E. N. O'Rourke
Mississippi	H. W. Bennett
North Carolina	W. T. Fike
Oklahoma	R. S. Matlock
Puerto Rico	Comments by Dr. Langford in absence of Dr. Velez. Report submitted by Dr. Velez after the meeting appears in Appendix B.
South Carolina	J. R. Haun
Tennessee	W. E. Roever
Texas	Eli L. Whiteley
Virginia	J. T. Smith (absent)
Soil Conservation Service Utilization Research & Development Divisions New Crops Research Branch	W. C. Young I. A. Wolff H. L. Hyland H. F. Winters
Cooperative State Research Service	D. Y. Perkins

Drs. A. M. Davis and J. R. Haun issued invitations for the 1967 Technical Committee Meeting to meet in Fayetteville, Arkansas and Clemson, South Carolina, respectively.

Social hour and dinner

The group enjoyed refreshments at Director Fullilove's home followed by a dutch dinner in the Station auditorium.

Administrative Advisor

Dr. Lovvorn commented on several topics relative to the S-9 project. Among them were:

1. Appreciation of the work being done by the staff at the regional station.

2. His expression of regret over the untimely death of Dr. Hassan Azzam, who represented Puerto Rico on the S-9 Project and was elected Chairman of the Technical Committee at the 1965 meeting.

3. An acknowledgment of our indebtedness to those who worked so conscientiously for the restoration of funds in the federal budget for agricultural research.

4. Emphasized responsibilities of S-9 committee members. Each member should, (a) Keep all plant scientists at his station informed of the availability of plant materials introduced through the regional station. (b) Summarize annually the progress of new plants research at his station and report it to the Regional Technical Committee and Coordinator, and (3) periodically survey the new plant material needs of research workers at his station.

5. Expressed appreciation to Director Fullilove of the Georgia Experiment Station and to Dr.J. L. Creech of the New Crops Research Branch for providing additional financial support to the Regional Station last year.

6. Stressed the need for publishing results from research projects. Publications are of utmost importance to the individual research worker and to his institution. For maximum effect publications should be in a more attractive form than mimeographed reports.

7. Discussed the background information assembled by H. F. Winters, NCRN, ARS, regarding national repositories. Dr. Lovvorn will send two copies of the background report to each committee member. He suggested that each member study the report and brief his Station Director on its content prior to the Southern Directors Meeting in August.

Dr. Whiteley moved that the S-9 Committee go on record as favoring the establishment of federally operated repositories for the propagation and maintenance of asexually propagated plants of value to agriculture. Motion was seconded by Dr. Dempsey and approved.

Status of projects contributing to S-9

There are 13 state projects and 10 ARS line projects supporting the S-9 New Plants project. All states in the region except Alabama, Louisiana, Tennessee, and Virginia have formal contributing projects. Research workers in those four states participate in the project on an informal basis through evaluation and use of new plant materials distributed from the regional station.

Dr. Lovvorn stated that the regional project outline, which was prepared in 1962, should be revised. He suggested the new outline be prepared by the coordinator and committee chairman within the next few months so that it could be approved by the Southern Directors, the Committee of Nine, and CSRS before the next fiscal year begins.

Plans for New Crops Research in 1967

The following report prepared by the sub-committee for industrial crops was presented by Dr. Matlock:

The committee recognizes that any species suggested for regional effort must have sufficient quantities of good seed and preferably from a common source.

Pulp Crops

The committee recommends that yield tests of superior kenaf lines be conducted by interested states. It is further suggested that wherever possible lines be exposed to plot areas infested with nematodes for screening. One important study would be to determine the amount of weathering by exposing a bundle of stalks approximately 20 mm. in diameter to ambient conditions for observing and recording the amount of retting, color, and mold formation.

New Oilseed Crops

The new oilseed crops suggested for uniform yield tests and/or genetic improvement include Fennel (Foeniculum vulgare),a seed oil source of petroselinic acid, planted as a winter annual and in the early spring; Brassica carinata planted both in the fall and spring; and Euphorbia lagascae, a seed oil source of epoxy fatty acid. A need for a shatter-resistant line of the latter should receive consideration.

Other New Crops

The committee suggested the evaluation of lines of Tephrosia vogelii by interested states providing sufficient seed is available.

It was recommended that uniform test procedures be circulated to each state and the S-9 researchers try to follow uniform design and procedures in so far as feasible in each state.

Lastly, it was suggested that reports be submitted as early as possible, preferably before mid-December, to George White and W. R. Langford.

Respectively submitted: Eli L. Whiteley
W. T. Fike
Ralph Matlock, Chm.

Reporting Results from Regional Studies of New Plants

Langford reminded the committee that this topic was discussed at the 1965 meeting, at which time the Industrial Crops Sub-committee recommended that results "from uniform tests be sent to the regional coordinator as soon as possible after harvest and preferably by December 15". (See page 9 of minutes of 1965 S-9 meeting).

Early reporting of results facilitates preparation of the S-9 Annual Report, and the summary of regional results aids in planning field studies

for the next growing season. It was noted that because of the long growing season some experimental plantings may not be harvested early enough to meet the December 15 deadline. However, efforts should be made to report such results as early as possible after harvest.

Report on 1965 Meeting of NC-7 Committee

Dr. Fike and Dr. Whiteley reported on their attendance of the meetings of the NC-7 Industrial Crops Sub-committee and the NC-7 Technical Committee. Both meetings were held at the Northern Utilization Research & Development Laboratory, with the Industrial Crops Sub-committee meeting one day before the Regional Technical Committee. Both Dr. Fike and Dr. Whiteley indicated that their attendance was beneficial to them and that their comments regarding the S-9 regional program were well received by the NC-7 Committee. Dr. Fike strongly urged that the S-9 Committee schedule one of its annual meetings at the Northern Utilization Laboratory.

Dr. Dempsey moved that the S-9 Committee Chairman, or an alternate, attend one of the meetings of the three regional new plants technical committees. Seconded by Dr. Matlock and approved.

Report on National Coordinating Committee Meeting

Dr. Whiteley reviewed the proceedings of the 1965 meeting of the National Coordinating Committee which was held at Louisiana State University October 19-20. Regional Project S-9 was represented at the meeting by W. H. Stroube, Eli L. Whiteley and W. R. Langford. Major points reviewed by Dr. Whiteley were:

(1) Action of the national committee regarding establishment of national repositories for maintaining asexually propagated plants.

(2) Assignment of new P.I. numbers to selections made from introduced plant materials. A selection should be thoroughly evaluated and found to possess valuable germplasm before assigning it a new P.I. number.

(3) A resolution adopted by the national committee urging ARS and State Experiment Station Directors to allocate more funds for research on new industrial crops, which will realistically support the activity at a level commensurate with its potential and importance.

(4) Distribution of National Seed Storage Seed Inventories. The national committee asked Dr. James to provide each regional coordinator with 25 copies of each inventory for distribution within the region.

(5) Data Retrieval

(6) Compilation of genes known to exist in plant introductions.

(7) Attendance at Regional Technical Committee Meetings by representatives from other regions. As a result of Dr. Fike and Dr. Whiteley attending the NC-7 meeting in 1965 the concensus of the national committee was that inter-regional attendance is beneficial to the regional programs and it indicated that such exchanges would be in order providing expenses raise no problems.

Regional Publications

(a) Five Year Progress Report of S-9 Project

Dr. Whiteley submitted a tentative list of varieties developed from P.I. material and released during the last 5 years in the Southern Region. He also submitted a list of P.I. accessions now in the advanced stage of evaluation or being used as breeding stocks. He urged that P.I. numbers be checked for accuracy and that efforts be made to ascertain P.I. numbers which were missing on the two lists. He also suggested that we bring together good black and white photographs. It was the concensus of the committee that progress made since the last S-9 bulletin was published in 1961 should be summarized and published in the form of a bulletin.

Dr. Fike moved that the Executive Committee be empowered to delegate assignments on the compilation of a 5-year progress report and to complete a draft of it before the 1967 S-9 meeting. Motion seconded by Dr. Whiteley and approved.

(b) Culture of kenaf for paper pulp

Dr. Killinger expressed the need for a publication on culture of kenaf but indicated that our present knowledge of kenaf culture is inadequate for a publication. Lack of a dependable source of seed, even for research studies is a problem. Dr. Wolff stated that additional information is needed on harvesting, transportation, and storage of kenaf; and he suggested that cooperation of agricultural engineers be solicited to solve some of the problems.

Dr. Haun suggested that Dr. George White be asked to prepare a tentative production guide for kanaf based on information now available. The committee agreed that a publication of that type would be very useful in answering inquiries about kenaf.

Dr. Killinger stated that representatives of 30 countries have gone on record asking the United States for leadership and assistance in solving problems in kenaf production. He suggested that A.I.D. funds should be solicited for this purpose.

(c) Domestic Fruit Stock Collection

Mr. Hyland stated that a bulletin or termination report is needed upon closing a project such as the Gulf Coast Fruit Stocks Collection on which federal support has been terminated.

Dr. Whiteley moved that the S-9 committee go on record asking the Louisiana station to prepare a progress report on the Domestic Fruit Stocks collection and to have the report in the hands of the S-9 committee by the 1967 meeting. Seconded by Dr. Davis and approved.

Requests for New Plant Materials

Mr. Hyland reviewed plans for two plant explorations in Africa this fall and winter, and he suggested that requests for specific materials that might be obtained from the regions to be explored be in his hands by late August.

Dr. Matlock suggested that a list of requests made during the year be incorporated into the minutes of the S-9 annual meetings.

The following requests were made during the meeting:

Whiteley	-	Winter-hardy Crambe
Bennett	-	Teosinte for corn-stunt studies
Killinger	-	Short-day kenaf with larger stalks than in material now in U.S.

For a complete list of requests made during the year, see Appendix A.

Tour of Regional Station

On Wednesday afternoon, July 20, the committee toured the regional station facilities, nursery plantings, and some of the new crops studies conducted under Georgia station contributing projects. Stops were made at the greenhouse, seed cleaning laboratory, seed storage room, nursery plantings for seed increase and evaluation, cultural studies of kenaf, and breeding stocks of trefoil and tall fescue.

Committee Reports

(a) Dr. Fike, Chairman of the nominating committee, nominated Dr. H. W. Bennett for Chairman, and Dr. R. S. Matlock for Secretary of the S-9 Technical Committee next year. These nominations were seconded by Dr. Davis and unanimously elected.

(b) A motion was made by Dr. Bennett and seconded by Mr. Young that the next meeting of the S-9 Technical Committee be held at the University of Arkansas during the third week of July 1967.

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

Be it resolved that the S-9 committee express its appreciation to Director W. T. Fullilove and family and to the staff of the Georgia Agricultural Experiment Station for the excellent hospitality extended to the committee.

Be it further resolved that the committee express appreciation to Dr. W. R. Langford, Dr. A. H. Dempsey and others for the excellent arrangements, facilities and hospitality which contributed to the success of the 1966 meeting; and to Mrs. Sallie Williams, thanks and appreciation for the excellent refreshments provided during the breaks.

Be it resolved that the secretary, express by letter on behalf of the S-9 committee, regrets to Mr. John Martin, South Carolina Agricultural Experiment Station, who couldn't be with us because of illness. We wish John a quick recovery and hope to see him next year; to express appreciation to Dr. Julian Miller, Louisiana Agricultural Experiment Station, for representing his State so ably on the new plants technical committee until his retirement on June 30, 1966; and appreciation to Dr. W. H. Stroube for serving as secretary and chairman. We regret that Dr. Stroube will be leaving the new plants research for advancement to a new position with Western Kentucky University on August 1, 1966.

Necrology

Be it further resolved that the S-9 committee acknowledge with regret the loss of Dr. Hassan Azzam, Puerto Rico Agricultural Experiment Station, who died November 23, 1965; and Dr. R.L. Thurman, Arkansas Agricultural Experiment Station, who died June 14, 1966.

Dr. Azzam contributed greatly to the leadership of the S-9 technical committee and utilized plant introductions in his program. Dr. Thurman rendered valuable service to the region through his evaluation and use of accessions of cereal crops.

The committee suggests the secretary send copies to the families.

Respectively submitted

H. F. Winters
Eli Whiteley
R. S. Matlock, Chm.

The meeting was adjourned July 20, 1966 at 3:00 pm.

MOTIONS PRESENTED AND APPROVED

1. "That the S-9 Committee go on record as favoring the establishment of federally operated repositories for the propagation and maintenance of asexually propagated plants of value to agriculture."

2. "That the S-9 Committee Chairman, or an alternate, attend one of the meetings of the three regional new plants technical committees."

3. "That the Executive Committee be empowered to delegate assignments on the compilation of a 5-year progress report and to complete a draft of it before the 1967 S-9 meeting."

4. "That the S-9 committee go on record asking the Louisiana station to prepare a progress report on the Domestic Fruit Stocks collection and to have the report in the hands of the S-9 committee by the 1967 meeting."

APPENDIX A

New Plant Materials Requested by Research Workers in the Southern Region

New Plant Materials requested by Research Workers
in the Southern Region

Two surveys have been conducted since the 1965 S-9 meeting to determine the plant material needs of research workers in the Southern Region. The first was made to determine all plant material needs but with emphasis on specific needs for insect and disease resistant breedstocks. The second survey was conduted to determine the need for specific plant materials, particularly ornamentals, that could be obtained from southern Japan and South Korea.

Following is a list of plant materials that research workers in the South requested from future explorations:

Alabama

J. F. Goggans	Pinus spp. for breeding and genetic studies Cupressus spp. " " " " Liquidambar spp. " " " "

Florida

J. A. Mortensen	Vitis spp. Cucumis melo
J. M. Crall	Citrullus spp. with resistance to watermelon mosaic
P. J. Westgate	Pisum sativum var. saccharaturn (edible podded peas)
J. E. McCaleb	Paspalum nicorae P. rojassi Chloris spp. Eleusine spp. Panicum maximum Desmodium spp. Trifolium repens Melitotus spp. Summer legumes with rhizomes and/or stolons (High producers of palatable forage)
E. M. Hodges	Melitotus alba Desmodium spp. (low growing)
E. S. Horner	Alfalfa (from central and southern India)
A. P. Lorz	Phaseolus spp. (from tropical and sub-tropical Americas) Vigna spp. and wild types from Asia, Asia minor and Africa

Florida continued

G. B. Killinger	Kenaf (large diameter, tall growing)
	Lupinus spp.
	Digitaria spp. (from high elevations in So. Africa)
	Paspalum spp. (tall growing for forage)
N. R. Lake	Myrica rubra
	Juniperus rigida
	Ilex chinensis
	Pinus koraiensis
	Pinus densiflora
	Wisteria floribunda (and varieties)
	Wisteria japonica
	Milletia japonica
	Milletia reticulata
	Ground covers such as Bambusa sasa pygmaea
	Camellia japonica (especially dwarfs)
	C. sasanqua " "
	C. reticulata " "
	C. rusticana " "
	Ligustrum japonicum " "
	Diospyros kaki " "
	Juniperus chinensis " "
	Pittosporum tobira " "
	Podocarpus macrophylla " "
	Rhododendron obtusum " "
	Buxus microphylla " "
G. C. Horn	Zoysia spp.
	Cynodon spp.
	Eremochloa spp.
	Axonopus spp.
	Paspalum spp. (low growing)
	Stenotaphrum spp.
	Other grasses with turf possibilities

Kentucky

Dean E. Knavel	Brassica oleracea var. acephala with resistance to yellows (Fusarium oxysporum f. conglutinans)
	Brassica juncea
	B. juncea var. crispifolia
	B. hirta or alba
	B. nigra
	B. japonica
Richard Thurston	Nicotiana spp. (Highly resistant to green peach aphid, tobacco hornworms, and tobacco budworms)

Kentucky continued

James D. Kelley	Evergreen ground covers hardy to Zone 5 Horizontal forms of broad-leaved evergreens, especially Ilex but hardier than crenata with a maximum height of 24-30" Broad-leaved evergreens, 6-8 feet high, with the form of Prunus laurocerasus 'Zabeliana' or P.I. 'Schipkaensis' Pyracantha that are cold hardy and have a range of fruit color, size and form
North Carolina	
W. A. Cope	Coronilla spp. from S.E. Europe Lespedeza spp. from China
G. J. Galletta	Wild strawberries from central and western Europe: Fugaria vesca (seed if possible, diploid) F. moschata (seed if possible, tetraploid) Billberry - Northern and central Europe: Vaccinium uliginosum
Franklin Correll	Prunus persica from Indo China area for disease resistance
Ben W. Smith	Rumax spp. for cytogenetic studies
David L. Strider	Disease resistant germ plasm in relation to: Bacterial canker of tomato Scab of squash Root rot of bean
Richard B. Chalfant	Cabbages resistant to cabbage looper and the cabbage maggot
D. H. Timothy	Pennisetum species - P. orientale and P. flaccidum P. orientale - Western Himalayas, Concan, Behar (Parasnath, Westwards to Arabia, Iraq, Iran and North Africa P.flaccidum - Himalaya, Tibet at high altitudes
Oklahoma	
George R. Waller	Ricinus communis L., which produces the alkaloid ricinine. Skytanthus acutus Meynen, commonly called "goats-horn, comes from the mountains of northern Chile and produces the monoterpenoid alkaloid skythanthine

Oklahoma continued

Nepeta cataria L., the common catnip plant. If any of the explorers should hear any native stories about cats (big and little) being attracted to any type of plant, we would very much like to receive seeds or cuttings

Actinidia polygma L., Chinese gooseberry which grows in northern Japan and produces a monoterpenoid alkaloid called actinidine which is a feline attractant similar to catnip oil

Delphinium ajacis or larkspur which produces the diterpenoid alkaloid ajaconine

Garrya veatchii - Mexico - Alkaloids which are
Garrya laurifolia toxic

Carex brevicollis - Russia - Alkaloids that have ganglion blocking action

Piper longum - India - pyridine alkaloid

Strychnos nux-vomica - India - loganin

Salvia divinorum - Mexico - hallucinogenic mint

Genipa americana - Mexico - genipin-antibiotic activity

Skimmia laureda, Hook - India - fodder plant

Aegle marmelos Correa - India - medicinal plant

R. S. Matlock

Cowpea - Edible types with resistance to fusarium wilt, rust, and brucid

Mungbean - Resistance to bacterial blight and root knot nematode

Peanuts - Resistance to cercospora leafspot, southern blight, thrips, lesser corn stalk borer and northern root knot nematode particularly in the cultivated types

Weeping lovegrass - Winter hardy - palatable

Tennessee

Hendrik van de Werken	Acer nikoense Acer rufinerve Flaxinus Spaethiana Abies koreana (Not to be confused with A. nephrolepis or A. Veitchii) Pinus koraiensis Picea koyamai (Not be be confused with P. koraiensis or P. abies) Thuja koraiensis (Dwarf types)

Texas

Hollis H. Bowen	Peach and plum varieties resistant to bacterial spot (Xanthomonas prunii) Rootstocks resistant to oak root rot (Armillaria mellea and/or Clitocybe tabescens)

Virginia

J. H. Tinga	Hardy types of broad leaf evergreens such as Ligustrum and Rhododendrom or other Eracaceous plants
P. L. Smeal	Camellias Hollies Magnolias Rhododendron Azaleas Other types of broad leaf and needle evergreens presently not hardy beyond the Tidewater-Richmond area
W. P. Judkins	New or unusual species of: Rhododendron Azalea Pinus Picea Rosa

APPENDIX B

State & Federal Reports

Southern Regional Plant
Introduction Station

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

Soil Conservation Service
Utilization Research &
Development Divisions
New Crops Research Branch

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

During the year beginning July 1, 1965 the regional station received seed or vegetative stocks of 1406 new accessions. Sorghum and Paspalum spp. constitute nearly 600 items. The other 800 new introductions represent 81 plant genera.

Collection of domestic fruit stocks in southern Mississippi was continued by Dr. Overcash. Nine items were assigned P.I. numbers, making a total of 160 numbered accessions in this collection. Several accessions collected by Dr. Overcash and Mr. Corley have not been assigned P.I. numbers.

Seed increase and preliminary evaluation

The total number of accessions planted for seed increase this year, including winter legumes planted last fall, is 3160. These plantings are summarized in Table 1.

Table 1. Materials grown for seed increase, 1966

Crop	No. of accessions
Grasses	702
Sorghum and millet	324
Oilseeds	283
Summer legumes	187
Winter legumes	582
Capsicum spp.	799
Melons	135
Other horticultural spp.	148
Total planted 1966	3160
Carry-over of perennial grasses	1120
TOTAL	4280

In addition to plantings at the regional station arrangements were made with the Department of Plant Breeding at the Puerto Rico Experiment Station to increase seed of 168 late maturing legume introductions, and 176 Bermudagrass introductions are being increased at the Georgia Coastal Plain Experiment Station.

The grasses referred to as carry-over plantings from previous years largely consist of three major collections: (1) Cynodon spp. collected by Dr. Huffine in 1963, (2) Digitaria spp. collected by Dr. Oakes in 1964, and (3) the collection of Old World Bluestems obtained from the Oklahoma Experiment Station in 1964. The Cynodon and Digitaria collections have been maintained vegetatively in the field and greenhouse. Although these stocks have been available at least two years, we think they have received too little attention by research workers interested in forage and turf grasses. There are several Cynodon introductions that have good turf qualities. With greater emphasis on beautification of our surroundings I believe these merit evaluation in every state in the southern region.

The Digitaria collection has been in the field two winters. The winter of 1964-65 was mild, but we got a good test of the winter-hardiness of this material last winter. Although the temperature dropped to -2° F., 49 accessions of Digitaria, representing 10 species, survived the winter. Thirty of these, having good forage qualities as well as cold-hardiness, have been distributed to stations near the Gulf Coast from Quincy, Florida, to Weslaco, Texas. We believe these merit evaluation in the coastal plain region of Georgia and South Carolina, and perhaps North Carolina.

Approximately two-thirds of the clovers and many vetches in the winter nursery failed to survive the late January cold wave. Among the survivors were two introductions of Berseem clover (P.I's. 250105 and 205237). Berseem clover is usually thought of as a non-hardy species, but these two accessions appear to be a good source of winter hardiness.

Among the new introductions of horticultural crops are some pimiento-type peppers that produce very large pods. They are P.I's. 297455, 297456 and 297460.

Seed distribution

Seedstocks distributed by the regional station during the year beginning July 1, 1965 are summarized in the following table.

Distribution of Seedstocks, July 1, 1965-66

State	Number of accessions supplied by: S-9	Other stations	Total
Alabama	106	60	166
Arkansas	66	0	66
Florida	891	1127	2018
Georgia	500	82	582
Kentucky	0	47	47
Louisiana	124	52	176
Mississippi	237	154	391
North Carolina	3	3	6
Oklahoma	4	27	31
Puerto Rico	170	7	177
South Carolina	32	58	90
Tennessee	9	46	55
Texas	649	231	880
Virginia	383	44	427
TOTAL	3174	1938	5112
Personnel outside Sou. Region	2001		
TOTAL	5175		

Forty-five new accessions of chemurgic interest were received at the regional station for seed increase and preliminary evaluation. These include 8 accessions of Vernonia, 9 Solanum, 3 kenaf, 2 okra, 9 sorghum, and 14 miscellaneous plants containing special seed-oils or classified as potential pulp-crops. Adequate increases of seed were obtained from the new introductions of Vernonia, sorghum, and kenaf for regional testing in 1966; but many of the other species failed to flower or mature a seed crop under Georgia conditions. Ipomoea parasitica, Ipomoea sp., P.I. 279715, Polanisia viscosa, Trichosanthes cucumerina, and Solanum aviculare, which entered the program prior to 1965 were increased adequately for regional evaluation in 1966.

Seventeen new accessions found by chemical screening to have chemurgic potential were received for seed increase this year. These can be observed when we visit the nursery this afternoon.

Pathology Investigations

A. Screening for disease resistance

1. Resistance of watermelon to race 2 anthracnose.

Inoculation of excised cotyledons resulted in significant difference in the severity of this disease among introductions demonstrating resistance in preliminary tests. When the entire plants were inoculated, however, all introductions tested were susceptible. Dr. D. M. McLean, plant pathologist at the U.S. Vegetable Breeding Laboratory, Charleston, S. C., is now working on this problem and screening for resistance at the regional station will be discontinued.

One field of 'Charleston Gray', a variety which is resistant to race 1 but not resistant to race 2, was 75% destroyed by anthracnose in Georgia in 1966. Race 2 ia also known to be a serious problem in North Carolina and probably causes serious losses in the higher rainfall areas throughout the southern region.

2. Resistance of sorghum to anthracnose

In cooperation with Dr. H. B. Harris, leaf, stalk, and head resistance of the most resistant introductions were studied in the field. Nine introductions (P.I's. 55123, 164447, 180002, 180004, 180005, 267340, 267444, 267459, and 267519) had a disease index of 1.0 (less than 20% of leaf area diseases) as compared to 5.0 (100% diseased) for 'Martin'. The introductions with leaf resistance also had significant stalk resistance. The highest levels of head resistance were found in seven introductions (P.I's. 164447, 180005, 221656, 267340, 267444, 267459, and 267519).

The remainder of the sorghum collection which has not been screened for resistance to this disease (approximately 800 introductions) is being screened in the field this summer.

3. Resistance of cantaloupe to gummy stem blight

Cucumis melo, P.I. 140471, was highly resistant to gummy stem blight in replicated greenhouse tests. Since field trials conducted by Dr. J. D. Norton and Mr. Krisina Prasad at Auburn University have confirmed the resistance of this introduction it can now be recommended to plant breeders as a source of resistance.

4. Resistance of watermelon to watermelon mosaic viruses 1 and 2

In cooperation with Dr. C. W. Kuhn preliminary tests were conducted in an attempt to develop satisfactory techniques to use in screening for resistance to these viruses. A very low percentage of plants have become infected in all tests and it appears that it may be very difficult to screen for resistance to these viruses. They have been found on watermeloms in Texas, Florida, and Georgia, and losses as high as 60% of the watermelon crop have been reported from South Florida.

5. Anthracnose of Cassia occidentalis

In cooperation with Dr. J. H. Massey, all Cassia occidentalis and Cassia bonariensis introductions were screened for resistance to anthracnose (Colletotrichum spp.). These preliminary tests indicated that P.I's. 271140, 279694, 292843, and 292844 are resistant to the disease. The seed of several introductions carried the pathogen. It is recommended that seed harvested from disease-free plants be used whenever possible in field experiments with this species.

B. Identification of diseases present on plant introductions

1. The unidentified bacterial disease reported on Citrullus introductions has not appeared on watermelon in our nursery in 1966. If the plants do not show the disease at harvest the seed will be distributed. The bacterium has not been identified as yet by Dr. M. P. Starr who is working on the problem, but the evidence is increasing that the disease is a well-established disease which has been recognized as a distinct watermelon disease only recently. I hope that the evidence on this point will be strong enough before January 1, 1967, to allow us to distribute all watermelon introductions.

2. Symptomless plants of all introductions of Digitaria spp. were obtained from introductions previously showing a virus-like mottling. The observed symptoms were probably not caused by a virus.

3. Diseases observed for the first time in 1965

a. Sclerospora macrospora was found on a single plant of Sorghum bicolor which did not produce seed. A number of other stunted plants were examined but were not infected. Sclerospora sorghi, recently reported from Texas as a new disease, has not been found in our nursery.

b. An unidentified bacterium which appears to be identical to the bacterium on Citrullus was isolated from a leaf spot on an introduction of Cucumis melo. This disease was arrested by several applications of a basic copper sulfate.

C. Production of pathogen-clear seed

Most of the vegetable crop introductions and many of the field and forage crop introductions distributed currently are used in disease screening tests. Pathogens on and in the seed can seriously interfere with the results, or in some cases completely destroy the experimental material. The frequent and thorough application of fungicides to the cucurbits is absolutely essential to assure production of satisfactory seed. This is extremely difficult with the soil type and weather conditions in our nursery. This was done in 1965 with the production of the best cucurbit crop in six years,

but with serious damage to the land due to soil compaction by the spray equipment. The production of pathogen-clean seed should receive increasing attention as the demand for material for screening tests increases.

Twenty-five seed of each introduction of Vigna spp. grown in our nursery in 1965 were planted in the greenhouse for virus assay. Very few plants were infected and the virus present was apparently an established virus. Therefore our entire Vigna collection can be certified as virus-clean. The few virus-infected plants that will result from planting the introductions will not interfere with any screening tests conducted with these introductions.

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

Three new "Summary of Reports on the Resistance of Plant Introductions to Diseases, Insects and Nematodes" were issued: (1) Allium spp., (2) Daucus carota and (3) Pisum sativum. A table was prepared listing all of the resistances to viruses reported in plant introductions. A review article on the disease resistance of warm season grasses is being prepared in cooperation with Dr. S. W. Braverman.

Regional Station Budget

Funds allocated to the regional station last year and those available for its operation this year are summarized in the following table.

Sources of Funds and Expenditures of Southern Regional Plant Introduction Station

Source of Funds	Amount 1965-66	Amount 1966-67
Regional Research Funds (pooled)	$30,000	$30,000
Regional Research Funds (Georgia)	13,194*	13,194*
New Crops Research Branch, ARS	31,415	29,670
State (Georgia)	2,501	2,653
TOTAL	$77,110	$75,517
Expenditures	**1965-66**	**1966-67 (Proposed)**
Salaries	$59,845	$61,445
Seasonal labor	4,754	4,572
Operating supplies	4,358	5,000
Capital outlay	7,069	2,000
Travel	1,043	2,500
TOTAL	$77,069	$75,517

* Includes funds supporting contributing project H-172.

Regional Station Improvements

Major pieces of equipment acquired last year are as follows:

1. A metal building, 24' x 42', now being erected near the nursery. This will be used for drying and cleaning seed and for storing seed cleaning equipment.

2. A peanut picker that was designed and constructed by the Agricultural Engineering Department of North Carolina State University for harvesting experimental plots of peanuts.

3. Peanut sizer and sheller which was placed here for our use at no charge by the Federal State Inspection Service.

4. 200' of irrigation pipe with necessary fittings and sprinklers.

5. An incubator-refrigerator for culturing fungi and bacteria used in screening plants for disease resistance.

Publications

1. Corley, W. L. Some Preliminary Evaluations of Okra Plant Introductions. Ga. Agr. Exp. Stas. Bul. N.S. 145. September 1965.

2. Corley, W. L. Some Preliminary Evaluations of Vigna Plant Introductions. Ga. Agr. Exp. Stas. Bul. N.S. 165. June 1966.

3. Kuhn, C. W., B. B. Brantley, and Grover Sowell, Jr. Southern Pea Viruses: Identification, Symptomatology, and Sources of Resistance. Ga. Agr. Exp. Stas. Bul. N.S. 157. May 1966.

4. Kuhn, C. W., B. B. Brantley, and Grover Sowell, Jr. Immunity to Bean Yellow Mosaic Virus in Cowpea. Plant Disease Reporter 49:879-881. 1965.

5. Brantley, B. B., C. W. Kuhn, and Grover Sowell, Jr. Effect of Cucumber Mosaic Virus on Southern Pea (Vigna sinensis). Proc. Amer. Soc. Hort. Sci. 87:355-358. 1965.

6. Sowell, Grover, Jr. Alternaria Leafspot of Guar. Plant Disease Reptr. 49:605-607.

7. Sowell, Grover, Jr. Anthracnose of Guar. Plant Disease Reptr. 49:607-609. 1965.

8. Sowell, Grover, Jr. The Effect of Seed Treatment on Seed-borne pathogens of Guar. Plant Disease Reptr. 49:895-897. 1965.

9. Braverman, S. W., S. M. Dietz, W. H. Skrdla, G. Sowell, Jr., and H. F. Winters. A Summary of Reports on the Resistance of Plant Introductions to Diseases, Insects, and Nematodes - Allium spp. 1965 (Mimeographed)

10. Braverman, S. W., S. M. Dietz, W. H. Skrdla, G. Sowell, Jr., and H. F. Winters. A Summary of Reports on the Resistance of Plant Introductions to Diseases, Insects, and Nematodes - Daucus carota. 1965. (Mimeographed)

11. Braverman, S. W., R. L. Clark, S. M. Dietz, G. Sowell, Jr., and H. F. Winters. A Summary of Reports on the Resistance of Plant Introductions to Diseases, Insects, and Nematodes - Pisum sativum. 1965. (Mimeographed)

12. Langford, W. R., W. L. Corley, J. H. Massey, and Grover Sowell, Jr. Catalogue of Seed Available at the Southern Regional Plant Introduction Station. 1966 Supplement (Mimeographed)

Arkansas Report to S-9 Technical Committee July 19, 1966

"New Plants"
State Project 323
A.M. Davis Leader

During the past year Arkansas has recieved only a limited number of introduction accessions.

This year there are 24 accessions of plants having industrial potential in the screening nursery. In addition to these there is a planting of Euphorbia lagaseca P.I. 296064 that is being tested under fertilizer differentials. An adjacent planting of Kenaf, Everglades 41 and 71 is under similar testing. Unfortunately irrigation is not available in qualtity for this test.

Beginning in 1964 the total collection of perennial Bromus species was obtained from the North Central Regional Station. This collection consisted of 185 accessions representing 11 species plus some undetermined species entrys. The goal was to find resistance to Helmenthosporium bromi and tollerance to summer heat and Humidity. Also we were seeking a plant with a longer vegetative growing period than is found in the available varietys of Bromus inermis, out of this material we have selected and will maintain the following accessions. Each of these score high in one or more of the criteria listed above.

Bromus inermis

251527	206678
258746	230111
262454	172395
262455	172393
262458	173652
251681	172761
279647	172760
234045	206678
258745	206418

Bromus erectus

251106	234714
234743	206645
220580	229488
253301	234713
173653	

Bromus carinatus

236757

Bromus straminius

251107

Bromus pumpellianus

232241

Bromus marginatus

236769
236770
236773

Bromus tomentillus

227840
268217
222968
229603
229593
229487
227839

Bromus ciliatus

231760
232210
232215

Bromus syriacus

229939

Bromus scoparius

251805

Bromus spp.

208066
229530
172392
172390
240154
251804
172397
172389

P.I. 266964 Sorghum sudanense was found to be variable in prussic acid and in perrenial growth habit. It is presently in an open testing program with sights on a release in which it is one of the parents of a cross. This cross has very vigorous rhizome developement with low prussic acid and exceptional leaf disease resistance.

In 1965 a collection of Beta vulgaris was screened for resistance to Cercospora beticola. The following accessions showed a marked superiority to the mass of germplasm in the collection.

175596	274394
169018	220506
169014	286501
266104	274395

As a group these had very poor root developement. Yield per entry and beet size was small. Some were fibrous rooted, particularly 286501. Refractometer estimates of sugar content on the above entrys indicate that this is a variable character within the resistant group. 169014 had a sugar content of 19% in the expressed juice. These accessions appear to have promise in a disease breeding program.

Entered on Promising accession cards aug, 1966 HHS

In addition to the above materials there was received 38 accessions of Vigna, and one Sorghum bicolor. These were used by Dr. John Bowers and Dr. John York respectively.

We are continueing our cursery examination of Crambe. We have at present small increase blocks of P.I. 281730, 281729, 281734 and 281731. These have performed well here when planted in early March. Crambe may fit in a cropping system with late planted Soybeans

We plan to continue screening promising accessions for industrial use and to evaluate their possabilities in this northwestern corner of the south.

The only publication prepared in the past year is subject to publication in the fall. "Sugarbeets in Arkansas"

Florida Report to S-9 "New Plants"

Gordon B. Killinger
July 19 and 20, 1966, Experiment, Georgia

Besides Experiment Station personnel there were many private citizens, nurserymen and other state and federal agencies in Florida who received either seed, plant or vegetative material from or through the Experiment, Georgia, Introduction Station. The accessions received numbered into the thousands.

Grasses and legumes accounted for a goodly number of the Florida introductions, however vegetable seeds and ornamental plants also were received in quantity.

J. A. Mortensen of the Watermelon and Grape Investigations Laboratory (Leesburg) reports that attempts to fertilize wild Cucumis spp. with Cucumis melo were unsuccessful. In 1965 C. africanus (273192), (274036), C. membranifolius (273652) and C. spp. (273649) all of the wild type were used for breeding. Resistance to fungi was apparent in P.I. 183307 (C. melo from India). J. M. Crall of the same station included a number of plant introductions in a program designed to locate cytoplasmic male sterility in Citrullus spp. (watermelon). In some back crosses of these accessions approximately 50 percent pollen sterility was found in 1965. Backcrossing of these lines is being coutinued. The entire Citrullus species group of accessions were obtained from the Regional Station to test for watermelon mosaic virus resistance. Four progenies were not obviously infected in a 1965 field planting and these will again be tested.

B. F. Whitner, Jr. of the Central Florida Experiment Station (Sanford) reports extensive use of PI 140471 a small wild cantaloupe seemingly immune or very resistant to gummy stem blight.

P. J. Westgate of the same station reports plantings of Everglades 71 kenaf (Hibiscus cannabinus) on Zellwood mucky peat and on Sanford sand with both making satisfactory growth.

Fifty-nine kenaf breeding lines were secured from Dr. Douglas Wilson of the Everglades Experiment Station for planting at Gainesville on Leon find sand along with 11 plant introductions (kenaf) from G. White and 9 introductions from Bob Langford. These 79 lines of kenaf were planted on April 15, 1965 and harvested on November 17, 1965. Highest yield of oven-dry stem 21,684 pounds, came from a G. White introduction No. 208,832 which blossomed very late in October and made no seed. G-58, BG52-38 and BG52-1 yielded from 19,060 to 17,135 pounds per acre of dry stem.

Sunflower seed production from introductions and commercial seed sources appears most promising in Florida when plantings are made in mid August to mid September rather than in the spring.

N. R. Lake, University Grounds Department, reports increased propigation of PI 274764 Damnacanthus indicus. Much comment on PI 286608 Metasequoia glyplostroboides growing on U. of F. president's lawn. A number of other ornamentals under observation by Mr. Lake are growing nicely and more comments can be expected at a later date.

A. H. Krezdorn of the Fruit Crops Departments reports after testing Rubus spp. PI 251718, 250170 and 254563 were discarded, however PI 298628 Rubus rigidis is being kept for further evaluation and use in a breeding program.

L. S. Dunavin at the West Florida Experiment Station (Jay) had three Digitaria spp. survive the 1965-66 winter with a four hour low temperature of 10°F. These introductions were, PI 299655 D. milanjiana, 299795 D. setivalva, and 299814 D. smutsii. Stylosanthes humilis PI 187098 has been difficult to establish. Siratro, phaseolus atropupureus, shows some promise in West Florida as a perrenial summer legume.

At the North Florida Station (Quincy) R. W. Wallace reports PI 158817 Paspalum notatum from Paraguay shows more promise than any other P. notatum tried. Paspalum dilatatum PI 222812 and 274181 from Iran and S. Africa were superior out of 10 accessions grown.

A. E. Kretschmer, Jr. at the Indian River Field Laboratory (Fort Pierce) indicates two Trifolium resupinaturm introductions PI 164356 and 227387 to show promise in his area. Both are similar to Abon but produce flowers and seed earlier than Abon. Kretschmer plans continued studies with Glycine javanica PI 279904, 279906, 260239, 279908 and a variety from Australia since these 5 out of 12 introductions make rapid spring and summer growth and are somewhat frost and drought resistant.

PI 243913 Erucastrum abyssinicum from Ethiopia, was reclassified as Brassica carinata according to Dr. Ivan Wolff this past summer. This winter growing oilseed crop continues to be of interest because of its high yield of seed and ease of growing. Through Dr. Wolff and the Peoria Lab suggestions have been made to make selections out of this introduction. Seed color is variable from pale yellow to red or black, plants have green stems, purple stems and yellow stems and different plants have white and yellow flowers. Selection for erucic acid content should be made.

Digitaria breeding (crossing) and treatment with Gamma radiation continues in hopes of developing a Digitaria similar to Pangolagrass with more cold tolerance and possibly insect resistance.

265 copies
July 7, 1966
Agronomy/G.B.K.

GEORGIA S-9 ACTIVITIES (NEW CROPS)

July 1965 - July 1966

A.H. Dempsey

Horticulture Department
Georgia Experiment Station

State and Federal scientists in Georgia received a total of 782 introductions during the past year. The requests included grasses, legumes, fruits, vegetables, and ornamentals. 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.

Spacing studies

Experiments to study the effect of plant population on the seed yield of Cassia occidentalis and Vernonia anthelmintica are being continued in 1966. Row widths were 12, 18, and 36 inches, with plants 4, 8, and 16 inches apart in the rows. Randomized block split-plot designs were used with row widths as the main plots. The spacing combinations used gave plant populations ranging from 44,000 to 131,000 plants per acre.

C. occidentalis. 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.

In 1965 the Cassia spacing test was repeated at a location about 5 miles from the 1963-64 test site. Seed from the same lot planted in 1963 was used. The plants were again severely diseased and produced low yields. The late planting date of June 22 was probably a factor in the low yields.

Effect of row width and within-row spacing on the seed yield of Cassia occidentalis at Experiment, Georgia in 1963 and 1965.

Row spacing (in.)	Seed yield in pounds per acre at within-row spacing of: 4"	8"	16"	Mean	4"	8"	16"	Mean
	(1963)				(1965)			
12"	1872	1880	1920	1891	57	91	157	102
18"	2049	1751	1880	1893	82	101	120	101
36"	1855	1718	1751	1775	101	107	156	121
Mean	1925	1783	1850		80	100	144	

V. anthelmintica. The Vernonia row-width x within-row spacing test in 1965 was planted on May 31 and harvested about September 20.

Effect of row width and within-row spacing on the seed yield of Vernonia anthelmintica at Experiment, Georgia, in 1965.

Row width	Seed yield in pounds per acre at within-row spacing of: 4"	8"	16"	Mean
12"	331	492	564	462
18"	556	581	629	589
36"	516	573	460	516
Mean	468	549	551	

Fertility studies

Fertility studies with Vernonia and Ricinus are being continued. The levels of N - P_2O_5 - K_2O used were 0-0-0, 30-30-30, 60-60-60, and 90-90-90. These were supplied as 250 pound increments of 4-12-12, with the additional N supplied as a sodium nitrate side-dress. The randomized block experiments were planted on May 18th.

The effect of four fertilizer levels on the seed yields of Vernonia anthelmintica and Ricinus communis at Experiment, Georgia in 1965.

Fertilizer level	Pounds of seed per acre	
	Vernonia	Ricinus
0-0-0	258	1092
30-30-30	330	1515
60-60-60	457	1749
90-90-90	476	2029

Seed harvesting studies

Four methods of harvesting V. anthelmintica seed to minimize shattering loss were compared. These methods and the seed yields obtained by each are given below.

Harvest method	Seed yield lbs./A.
Standing plants (Sept. 23 & Oct. 6)	1027
Hvst. on canvas Sept. 23, plants cut, remaining seed threshed from bundles	965
Plants cut when first heads were ripe. All seed threshed from bundles.	1222
One harvest when all seeds were ripe	236

PROGRESS REPORT, 1966

Hatch 173 (S-9) - Evaluation of New Crops for Pulp, Fiber, and Forage

Project Leader: David G. Cummins
Department of Agronomy
Georgia Experiment Station
Experiment, Georgia

Paper-pulp tests, 1965.

1. Kenaf cultural test, weed control and row spacing

Type weed control	Row spacing, inches	Yield, tons per acre dry matter				
		I	II	III	IV	Avg.
Treflan	12	--	4.9	4.4	6.2	5.2
	24	--	4.3	3.8	3.8	4.0
	36	--	--	4.0	3.3	3.7
	Avg.		4.6	4.1	4.4	
Cultivated	12	5.4	5.8	3.7	4.9	5.0
	24	4.0	3.4	4.3	2.2	3.5
	36	3.8	4.8	2.6	3.5	3.7
	Avg.	4.4	4.7	3.5	3.5	
No control	12	--	4.6	2.4	--	3.5
	24	--	4.7	2.5	4.4	3.9
	36	--	3.9	2.9	--	3.4
	Avg.		4.4	2.6	4.4	

Planted 5-27-65, 500 lb./A 4-12-12 broadcast before planting. Treflan sprayed on at 3/4 lb./A before planting, disked in at approximately 3 inches in depth.

2. Sorghum introductions evaluated for pulp yield

Sorghum P.I. No.	Species	Yield, tons dry matter per acre			
		I	II	III	Avg.
229837	S. bicolor	6.3	6.9	6.2	6.5
B-56195	S. bicolor	6.2	4.0	7.0	5.7
88000	S. bicolor	5.0	3.2	4.4	4.2
229847	S. bicolor	3.4	3.4	5.8	4.2
202410	S. almum	4.1	3.7	4.2	4.0
190579	S. sp.	2.9	3.2	2.5	2.9
179749	S. bicolor	2.8	2.8	2.9	2.8
177549	S. bicolor	1.5	1.9	2.5	2.0

Planted in 3 ft. x 16 ft. plots, 1 row wide.
Planted 5-28-65, harvested 10-28-65.
500 lbs. 4-12-12 before planting, seed rate 25 lb./A.

3. Periodic harvests were made on kenaf from mid-August until late March to determine the effect of harvest date on pulp quality. Laboratory evaluations are to be made on samples from this test.

4. A kenaf and crotalaria storage test was initiated in late December and early January 1964 and 1965. Bales of material were stored outside in both covered and uncovered stacks and inside for a check. The test is now at the end of its 18 months period with samples being taken at 0, 6, 12, and 18 months. The samples will be evaluated at the Peoria laboratory.

Evaluation of new crops for forage, 1965.

1. Five Paspalum nicorae introductions from Central and South America were planted in replicated plots including a Pensacola bahiagrass check. A good stand was obtained but only the check plots survived the winter (1965-66). These introductions had survived previous winters in the Plant Introduction nursery.

2. Eighteen Indigofera introductions were planted and observed. They did not perform well enough to warrant further testing at the present time.

3. Ten F_2 generation backcrosses (a total of about 2000 plants) of Lotus corniculatus from a Brazilian introduction and some common varieties are being evaluated. About 80 of these plants were rated superior to the check plants during the first season. During the second season (1966) these plants will be further screened and the better plants will be used to make mass crosses and a recurrent selection program will be used to further develop superior lines. From field observations these crosses of Lotus show promise of being adapted for grazing and hay crops in the Southeast.

4. A number of Festuca spp. introductions are being evaluated. Several of these have superior characteristics for this area and are being closely studied. They are being used in a program to develop a well-adapted variety for this area.

Work in progress, 1966.

1. Effects of row spacing, plant population, and weed competition in kenaf production.

2. Response of kenaf to various levels of N, P, and K under two rates of lime.

3. Kenaf-crotalaria storage test.

4. The influence of harvest date on the quality of kenaf pulp.

5. Evaluation of Lotus corniculatus for forage.

6. Festuca evaluation for forage.

7. Screening of plants in the introduction nursery for superior characteristics of forage quality and production.

8. Evaluation of promising Trifolium spp. (planned for fall of 1966).

PROGRESS REPORT

July 1, 1965 through June 30, 1966

Hatch-174 (S-9) - Evaluation of New Ornamental Plants

Project Leader: George Tereshkovich
Department of Horticulture
Georgia Experiment Station
Experiment, Georgia

In the spring of 1966, 15 new ornamental selections were obtained from the U.S. Ornamental Plant Introduction Station, Glenn Dale, Maryland, and 9 selections from the U.S. National Arboretum, Washington, D.C. These plants were potted and placed in the lathhouse for a period of 1 year. The following year (1967), these plants will be set in the nursery. In addition, several ornamental mountain ash trees; 9 varieties of ornamental flowering crabapple trees (Malus sp.); 13 varieties of Juniperus sp. evergreen (ground cover) varieties; 10 Chaeonemeles, flowering quince varieties; Virdissina Bronxensis, dwarf forsythia; Pyrus Calleryana, Bradford ornamental pear; 66 ornamental gourd varieties (J.H. Martin, Clemson University); and Jackson & Perkins dwarf holly varieties (Blue Boy and Blue Girl) Ilex rugosa X Ilex Aquifolium (English Holly) were obtained for cultural and climatic adaptation studies.

Ornamental P.I. and N.A. plants obtained in 1963 and 1964 were planted in permanent nursery plots at this Station and at the Georgia Mountain Experiment Station, Blairsville, Georgia last summer (1965), and plants obtained in 1965 were planted this spring (1966) at this Station only for evaluation purposes. On January 31, 1966, low temperatures at this Station (-2.5°F and -10°F at the Blairsville Station) killed over 50 percent of the plants in the nursery and severely damaged many plants overwintering in the lathhouse. To date, very few of the P.I.'s and N.A.'s under observation have shown plant characters worthy of propagation and/or release to nurserymen for specific uses in landscaping.

Trials with Coleus and gourds are being conducted, since there is a great deal of local interest in these crops. One local nurseryman in Griffin, Georgia has obtained cuttings of the Coleus collection for the sale of this plant.

At present, the following ornamental flowering crabapple varieties appear to be best adapted to the Georgia Piedmont. They are: Malus Floribunda, M. Bob White, M. Radiant, M. baccata var. Jackii, M. Morden-457, and M. Zumi var. calocarpa.

Detailed descriptive reports on specific ornamental species obtained in 1963 and 1964 from the U.S. Ornamental Plant Introduction Station, Glenn Dale, Maryland have been made as requested when plant material is obtained from this facility for testing and evaluation.

KENTUCKY - NEW PLANTS PROJECT
1966 Annual Report to S-9 Technical Committee

During the 1965-66 fiscal year 61 accessions were received by Kentucky workers. These included 44 accessions of vegetable crops, 7 ornamentals and 10 forages.

FORAGES - Continued studies relative to classification of the species of Trifolium utilizing paper chromatographic and cytologic techniques were conducted by Dr. N. L. Taylor.

VEGETABLES - Dr. H. C. Mohr reports success in crossing bacterial wilt resistant P.I. 236355 (Cucumis Melo V. Reticulatus) with short-internode types. F_1 generation crosses produced high quality fruit. Preliminary screening of F_2 plants showed segregates of the short-internode type that have survived inoculation with the wilt organism.

ORNAMENTALS - Several introductions of perennial evergreens show promise of becoming valuable ornamentals. They will continue to be studied for cold and droughth resistance as well as growth type. Some of the red begonia introductions have created some interest and several are currently being increased for additional study.

LOUISIANA

1965-1966 REPORT, S-9 Project

Fruits.

Apples and pears from Plant Introductions are tried for general adaptability to conditions near Baton Rouge, La. Of those introductions tested since 1958, several are of particular interest. 186636, the Nijiseiki pear, has been notable as a garden subject as well as for production of large, regular crops of attractive russet pears that can be eaten from the tree. It is resistant to blight, although blossom blight is severe some seasons. The leaves are large, attractive, and resistant to leaf spots. It has grown well in Baton Rouge since 1957. Two more recently acquired apples, 280400, Anna, and 280401, Ein Shemer, both from Israel, have looked very good in Baton Rouge from the standpoints of low chilling requirement, precocity, and fruit quality. Trees of these introductions in their third season of growth produced good sized, attractive apples with definite Golden Delicious shape and good quality. 267822, Vered, showed delayed foliation in spring of 1966, as did 276256, Tropical Beauty.

Forty early ripening apple introductions, about which little was known concerning their climatic adaptability, were planted at Idlewild Experiment Station near Clinton, Louisiana, in the winter of 1964-1965. Early spring activity has been noted in 102174, 187099, 104727, 133569, and 151720. Growth has been rather poor since planting, due to drouth conditions and activity of a large group of deer which are eating new shoots from the plants. We hope to control both of these factors in the future.

A number of apple and pear introductions from cooperators in the regional domestic explorations effort of several years are growing at the Idlewild Experiment Station and in Baton Rouge. The selections from Mississippi have shown the best adaptability to our conditions, which was expected.

New Crops.

Dr. Julian Miller, who retired in 1966, has asked me to report that his plantings of kenaf, pigeon peas, and Cassia are growing well. He hopes to make a collecting trip soon in other parts of the world, with an eye toward all horticultural materials. Okra 120833 appears quite nematode resistant, but very spiny.

Ornamentals.

Mr. Claude Blackwell reports that he is impressed with several introduced azalea varieties in his continuing tests with introduced materials. 276291, 276290, and 226144 (Miyono no suki) look particularly good.

1965 - 1966 Report
Regional Project S-9 New Plants
Mississippi

Workers with the Mississippi Agricultural Experiment Station, ARS and SCS of the USDA, private individuals, and Denominational Schools have received 526 accessions during the 1965-1966 fiscal year.

An inventory of material collected on the domestic fruit-plant exploration has been conducted and descriptive information has been sent to the Regional Station to bring up-to-date the request for PI numbers on a total of 28 apple selections, 2 crab apples, 1 chestnut, 5 figs, 11 pears, and 15 plums which are now growing at State College either in a fruit-tree nursery or in the orchards. Several selections have not yet been successfully propagated. Fruit plants in Forest, Covington, Lincoln, Harrison and Jackson counties were marked in June 1966 for propagation next winter.

Three introductions of Digitaria species have been classed as outstanding grasses. Tier 2 Row 15 is an excellent hay grass, 210 carries leaves well up the stems, and Tier 2 Row 13 carries leaves well to a 4 foot height. A Cynodon, PI 288676, is very leafy with excellent leaf life and has been classed as outstanding. Two sub-clovers, PI 184962 and 279010 are unusually good. Four Persian clovers, PI 305518, 305519, 305521 and 305522, produced large amounts of aftermath after mid-May cutting. Introductions are promising for roadside and highly eroded soil coverage--217039, 202044, 223124. An annual peanut, PI 263393, is showing promise as a summer legume in pastures.

Varieties of crops released by the Agricultural Experiment Station carrying PI or domestic introduction numbers and reported in the Mississippi Farm Research:

Rio - March 1965 - sweet sorgo - from progeny of cross Rex (MN23) x MN104. High yield, high sucrose, and resistant to leaf anthracnose and rust.

Semmes - August 1965 - soybean - from Rolsay x Ogden cross - high oil, high yielding, phytophthora resistant.

Verona - October 1965 - watermelon - dark green color with excellent shipping qualities, resistant to fusarium wilt and anthracnose. From Skipper x Blackstone x Charleston Gray.

Mississippi Silver - December 1965 - Southern pea - from Newton Silverskin x M57-1 - with less vine, pods concentrated to center of plant, and resistant to the 3 races of fusarium wilt.

Mississippi Nemaheart - February 1966 - pimento pepper - from M152B x Trueheart Perfection - for processing and home garden - resistant to cotton root-knot nematodes.

Foundation seed now being increased for release in 1966:

Meechee Arrowleaf clover - Trifolium vesiculosum - PI 233782 - A reseeding annual legume with excellent seed and forage production - seed do not shatter - matures late July.

Chiwapa Japanese millet - Echinochloa crusgalli var. - sumentacea - A single plant selected from PI 196239 (Setaria italica) and to be used mainly for wild-life feed. Bearing numbers BN8963-MS176-and F211.

North Carolina - New Plants Project

Report to S-9 Technical Committee, Experiment, Georgia, July 19-20, 1966.

Four cooperators received 77 introductions from July 1, 1965 to July 1, 1966. These introductions along with others received in prior years are being evaluated. Many introductions have been incorporated into the various breeding programs and are now in various stages of advanced testing. It should be remembered that it may take ten or more years before an introduction can be fully evaluated either as the original PI or as a supplier of a specific trait.

I. Varieties or strains released by the North Carolina Experiment Station in cooperation with the USDA and other State Experiment Stations:

A. Blueboy Wheat

1. Origin and Development.

Blueboy, C. I. 14031, (N. C. 4672) was selected at North Carolina State University from a cross made at Clemson University in 1957. Blueboy is from the cross (Norin 10, PI 156641 Japan, X Brevor) x (Anderson x Coker 55-9). It has been tested in the North Carolina Official Variety Test and in cooperation with the Crops Research Division, ARS, USDA, and at various state experiment stations.

2. Description of Blueboy.

Blueboy is a short (semi-dwarf), early, very stiff-strawed, high yielding wheat with good soft wheat milling quality. In all tests in which it has been grown it has shown an average yield increase of 35% over Wakeland. It has performed very well in both the Piedmont and Coastal Plains of North Carolina and appears to be well adapted in Virginia, North Carolina, South Carolina, Georgia and central and northern Mississippi and Alabama. Winter temperatures are apparently too high for sufficient vernalization in the Gulf Coast region. Test weights on Blueboy have been relatively low but these have been more than offset by increased yields.

Blueboy is resistant to soil-borne mosaic virus, which is a problem in many Piedmont soils. It has a variable reaction to some races of leaf rust and is susceptible to others. It has still performed well, however, in some tests in which leaf rust was a factor. It is resistant to some races of mildew but susceptible to others.

This variety is characterized by somewhat more variability in height and color than is exhibited in most varieties. The name Blueboy traces to a distinctive bluish color prior to ripening. This color results from a bluish coating (bloom) which is found on the stems and the upper side of the flag leaves. Blue boy has also been shown to have very good soft wheat milling and baking characteristics.

The outstanding features of Blueboy are high yield, short stiff straw, nitrogen responsiveness and milling quality.

First sale of certified seed will be for planting for fall, 1967.

B. N. C. W(64)1 (Medicago sativa var. gaetula). Alfalfa germplasm with weevil resistance was released to plant breeders in December 1964.

The Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, and the North Carolina Agricultural Experiment Station announce the release of an alfalfa strain selected for resistance to oviposition (egg laying) of the alfalfa weevil. Resistance in this germplasm is superior to any observed to date in commercial alfalfa varieties. Release is for breeding purposes.

The seed lot, N. C. W(64) 1, was produced by intercrossing 11 plants of Medicago sativa var. gaetula (PI 239953 collected in Algeria) selected for resistance to oviposition. Resistance of the 'gaetula' strain to egg laying was repeatedly confirmed in greenhouse tests. Eggs recovered from stems of 'gaetula' accessions averaged only 4 to 18 percent as many as from the 'Atlantic' check. Reduction in total eggs produced was correlated with a reduction in the number and size of egg masses and was associated with a decrease in amount of stem pith or an increase in stem solidness. The effectiveness of this type of resistance under field conditions remains to be determined.

The introduction is spreading in growth habit, low in forage production and generally not adapted to hay production in the United States. Hence, resistance will need to be transferred to agronomically desirable types. In crossing studies, this strain appeared to be fully interfertile with other forms of M. sativa.

A limited number of seeds, the number depending on requests, is available to plant breeders upon written request and with the understanding that the source will be acknowledged as a matter of open record when this germplasm contriubtes to the development of a new variety or hybrid. Send requests to, 182 Williams Hall, North Carolina State University, Raleigh, North Carolina.

II. Plant Introductions of Special Interest.

A. Alfalfa

Cooperative research conducted by Crops and Entomology Research Divisions, USDA, and North Carolina Agricultural Experiment Station. (Information from Panel Discussion on Alfalfa Weevil, Alfalfa Improvement Conference July 6-8, 1966, "Sources of Breeding Material" C. H. Hanson.

During September 1964, 407 plant introductions of Medicago sativa and M. falcata were established at each of three locations; Beltsville, Md., Raleigh, N. C., and University Park, Pa. The planting at each location consisted of 4 replications. Each replication consisted of one 5-plant row. In the spring of 1965, the plantings at Beltsville and Raleigh were scored for larval damage. The planting at University Park was scored in June, 1966.

Obvious differences in growth habit and larval damage were apparent among plant introductions at all three locations. In some instances, a

Table 1. Twenty-two plant introductions among 407 tested at Raleigh, N. C., Beltsville, Md., and University Park, Pa., which had relatively low larval damage scores at each location.

P.I.Number	Country of origin	BW code no.*	Larval damage score** Beltsville Md.	Raleigh N.C.	Univ. Park Pa.	Fall growth*** Raleigh N.C.
			6/65	5/65	6/66	10/66
172980	Turkey	324	5.2	4.5	7.1	4.9
172981	Turkey	325	3.8	4.0	7.4	5.8
174272	Turkey	343	4.6	4.6	7.9	4.7
204886	Turkey	502	4.2	4.8	7.5	4.9
206282	Turkey	519	4.5	3.9	7.8	4.0
228152	USSR	581	2.7	4.2	7.7	3.5
229955	Iran	589	4.5	3.4	7.5	6.4
231731	USSR via Wisconsin	594	3.8	3.1	7.6	4.1
234815	Switzerland	715	2.8	1.9	8.0	4.8
235021	Switzerland	719	2.9	2.5	6.8	5.2
251689	USSR	775	3.8	3.6	6.6	3.5
251830	Austria	783	2.3	3.8	6.8	4.3
253443	Yugoslavia	789	4.2	3.7	7.4	3.3
258750	USSR	902	2.1	2.7	6.9	6.4
258751	USSR	903	2.5	4.6	6.9	2.3
258752	USSR	904	3.9	3.5	7.8	4.8
258753	USSR	905	3.3	3.4	8.1	4.0
258754	USSR	906	3.1	3.8	7.2	4.0
260993	USSR	964	3.6	4.7	7.9	4.5
262532	USSR	965	1.7	4.1	7.0	5.6
263154	USSR	984	1.9	3.2	7.4	5.3
277489	Spain	998	4.4	3.3	7.8	5.0
Check varieties						
Atlantic		191	5.3	5.3	8.8	3.6
Cherokee		192	4.4	4.8	8.9	3.4

* Beltsville weevil code number.

** 1 = no damage, 9 = completely defoliated.

*** 1 = most growth, 9 = least growth.

line had relatively low larval damage at one location and relatively high larval damage at one or both of the other locations. Analyses of the data are not entirely complete; but, on the basis of means alone, we have listed 22 plant introductions which had relatively low damage scores at all three locations (Table 1).

No information is presently available as to what resistance mechanisms may have been present in plant introductions listed in Table 1.

B. Peanuts

Dr. Gregory and associates have found resistance to the leaf mosaic and Cercospora leafspot diseases in the plant introductions collected in South America in the early 60's. Since these resistance lines are in species other than A. hypogaea, various breeding techniques are now being initiated for transferring the germplasm. Six Journal Papers are in various stages of publication concerning this material.

C. Pigeon Pea PI 218066 - A Potential Green Manure Cover Crop.

The Pigeon pea (Cajanus cajan) is a legume cultivated in tropical countries for the edible small seeds which often are known simply as "peas." It is grown as an annual from seeds, reaches a height of from 4-7 feet, flowers in late August, and if planted early produces a fair seed crop in slender pods which are from 3/4 to 1-1/2 inch long. The seed are about the size of common vetch seed.

Pigeon peas have yielded well in small plots at both Lewiston and Jackson Springs. These data appear in Table 2.

Pigeon peas are resistant to the three main North Carolina root knot nematodes: Southern, M. incognita; northern, M. hapla; and M. javanica. They also show some resistance to the fourth root know nematode M. arenaria. The crop is presently being tested for resistance to the other common nematodes of North Carolina. These data appear in Table 3.

Table 2. Dry matter yields of green manure crops grown in North Carolina 1961-1965.

	Dry matter yield - tons per acre						
	Jackson Springs				Lewiston		
Crop	1961	1964	1965*	Av.	1964	1965	Av.
1. Pigeon Peas	3.55	3.82	1.60	2.99	4.05	3.91	3.98
2. Crotalaria striata	3.21	3.62	1.09	2.64	2.03	4.03	3.03
3. Hairy indigo	3.26	1.45	.00	1.57	2.26	3.02	2.64

*Stands very poor at Jackson Springs in 1965 due to drought.

Table 3. Reaction of pigeon peas to four strains of root knot nematode - Medoidogyne. Greenhouse tests 1961 and 1962.

Nematode	Years	Rating*	Reaction
1. M. incognita - Southern root knot	1961-62	0	None
2. M. hapla - Northern root know	1961-62	0	None
3. M. javanica	1961	0	None
4. M. arenaria	1962	3+	Medium production and egg masses.

Rating: 0-none, 1-trace, to 5-heavy; + egg masses produced.

One acre plantings of pigeon peas are being evaluated in nine counties this year. Seed is also being increased on a two acre planting at the Sandhills Research Station, Jackson Springs.

III. Domestic Plant Explorations.

The domestic collection of Eastern Vaccinium species for use in the Southeast, approved by S-9, has been funded by the New Crops Research Branch as of July 1. Drs. Bell and Galletta will be leaving next week for the mountains of Virgina, West Virginia, and Kentucky to begin collecting materials.

IV. Foreign Plant Explorations.

A. Dr. Timothy has just returned from South America where he collected strains of Tripsicum.

B. Drs. Phillips and Stephens are presently in South America collecting exotic cottons.

V. Requests for Plant Material.

A. New - J. M. Jenkins - Gladiolus species

We particularly need varieties or species of gladiolus that may have resistance to diseases such as Fusarium, Curvularia and Stromatinia. Such material might be found in the areas in which the gladiolus apparently originated. These include Rhodesia, the Transvaal, other areas of Africa, and parts of Southern Europe. Many species originated in these areas and were used in the development of the present day cultivated gladiolus. I feel sure that many desirable genes have been discarded over the years as plant breeders concentrated on developing showy flowers while ignoring the possibility of disease resistance.

B. Requests made to the National Coordinating Committee Meeting November 1965.

1. Will Cope - Coronilla spp from S. E. Europe
   Lespedeza spp from China

2. Gene Galletta - Wild strawberries. Central and Western Europe.
   Fugaria vesca - seed if possible, diploid
   Fugaria moschata - seed if possible, tetraploid
   Breeding studies.

   Billberry - Northern and Central Europe
   Vaccinium uliginosum

3. Franklin Correll - Prunus persica - Peaches from Indo China area disease resistance.

4. Ben Smith - Rumax spp for cytogenetic studies

5. David L. Strider - Disease resistant germplasm in relation to:
   Bacterial canker of tomato
   Scab of squash
   Root rot of bean

6. Richard B. Chalfant - Cabbages - Trichoplusia ni resistant to cabbage looper and the cabbage maggot (Hylemia brassicae).

   Snap beans - resistant to the Mexican bean beetle (Epilachna varivestis) and the potato leafhopper (Emposca fabae).

7. D. H. Timothy - Pennisetum species - P. orientale and P. flaccidum.
   Pennisetum orientale - Western Himalayas, Concan, Behar (Parasnath), Westwards to Arabia, Iraz, Iran and North Africa.
   Pennisetum flaccidum - Himalaya, Tibet at high altitudes.

8. Thad Busbice - Alfalfa species resistant to the alfalfa weevil.

VI.. Evaluation of Potential Industrial Crops, Pulp Crops and Other Crops.

A. Vernonia anthelmintica

Studies with Vernonia were restricted to Plymouth during the 1965 growing season. Plots, including a 1.5 acre block were seeded May 5 using PI 292522. Treflan had been incorporated into the soil at this time. These tests were discarded on May 31 because of poor stand and tremendous weed competition. Plots were seeded again using North Carolina grown seed of PI 263368.

Plants began to flower August 17, were cut green October 27 before frost and combined when dry. A corn binder was used to cut and shock the 1.5 acre field prior to combining.

Data for the tests appear in the following tables.

Table 4. Yield of Vernonia harvested from five row spacings.

Row Width	Replications	Plants per row foot	Plant height	Yield per acre
inches			inches	pounds
7	2	2.4	57	372
14	3	3.5	55	530
21	1	2.8	54	519
28	2	3.9	55	568
35	2	3.5	54	550

Table 5. Yield of Vernonia harvested from four plant spacings in 38-inch row widths. One row plots 30 feet long. Total 31 plots.

Plant spacing	Replications	Plants per 30 row feet	Plant height	Yield per acre
inches			inches	pounds
20	7	18	66	503
13	8	28	67	645
8	10	43	71	665
5	6	73	73	867

Summary

1. The yields of Vernonia planted in 7-inch rows were less than when planted in 14, 21, 28 and 35 inch rows. There was little difference between the latter row widths with the highest yield of 568 pounds obtained in 28-inch rows.

2. The highest per acre yield of Vernonia in 38-inch rows was 867 pounds obtained at the closest plant spacing of 5 inches. Yield of Vernonia decreased as population decreased to a low of 503 pounds of seed per acre at an in-the-row plant spacing of 20 inches.

3. Less seed was lost this year because of early cutting with the plants maturing in bundles on the ground.

B. Kenaf

Studies with kenaf were restricted to the Tidewater Research Station at Plymouth during the 1965 and 1966 growing seasons. It is in this area of the state that kenaf does well and where land is available for production. A pulp-paper-plywood corporation is also located here.

A plant spacing test was seeded May 14 in 7, 14, 21 and 28 inch rows. A second seeding had to be made on June 3. The yields of this test are low due to the late date of establishment.

Table 6. Yield of kenaf harvested from two rates of seeding in four row spacings. Yields are from one-twelve foot section of row containing the required population. Average of four replications.

Row Width	Plants per row foot	Dry Matter Yield/acre	Plant height	Stem diameter	Dry Matter % at harvest
		tons	ft.	mm	
7 inch	3	5.74	7.7	12	79
	6	4.73	6.2	7	80
	Av.	5.24	7.0	10	80
14 inch	3	5.29	8.6	14	84
	6	5.68	7.6	11	80
	Av.	5.48	8.1	12	82
21 inch	3	4.35	9.3	16	85
	6	4.32	8.1	11	78
	Av.	4.34	8.7	14	82
28 inch	3	3.59	9.2	17	81
	6	4.44	8.7	13	83
	Av.	4.02	9.0	15	82

Summary

1. Dry matter yields were low in 1965 because plots had to be reseeded.

2. Highest dry matter yields were obtained in 14-inch rows as in the past.

3. Highest dry matter yields were obtained at the in-the-row spacing of 6 plants per foot in the 14,21 and 28 inch rows and at the 3 plants per foot spacing in the 7 inch rows.

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

C. Sunflowers

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

Table 7. Sunflower seed yields of the regional sunflower variety tests grown at three locations in North Carolina, 1965.

Entry No.	Variety	Yield		
		Plymouth	Salisbury	Waynesville
1.	T 56002	1387	1278	2140
2.	Peredovik	1209	1028	1486
3.	Peredovik 15659 (PI 294659)	745	1053	1104
4.	Smena (PI 294658)	1006	890	1482
5.	VNIIMK 89.31	933	868	2157
6.	VNIIMK 16.46 (PI 265099)	827	782	1030
7.	Armavirec	1031	1084	1198
8.	Ienissei (PI 294660)	1053	1034	869
9.	Tchernianka 66 (PI 265104)	1065	805	1864
10.	Mingren	1949	1006	1740
11.	Commander	1326	1559	2064
12.	Arrowhead	1524	1367	2304
13.	Greystripe	807	2079	2762
14.	Manchurian	404	2441	2780
15.	Lyng Manchurian 26	645	2293	2447
16.	Lyng Hybrid I	963	2135	1943
17.	Mennonite (NK)	1279	1185	1632
18.	Greystripe (NK)	526	2350	2952
	Average Yield	1032	1402	1886
	C.V.	33.33%	26.60%	No A.N.O.V.
	LSD 5%	480	462	-------

D. Cowpeas

One hundred and forty cowpea PI's (named varieties) were evaluated with the George Wise pea as a source of dry peas. None of the named varieties were equal to the George Wise pea in yield or quality.

E. The following crops are being evaluated this year, 1966. Results will be reported at our 1967 meeting.

1. Vernonia anthelmintica

a. Row spacings of 7, 14, 21, 28, and 35 inches with two populations. PI 263368 used.

b. PI Evaluation: 225851, 263368, 283729, 292522, 304905

2. Euphorbia lagascae

   a. PI 296064 seeded in row spacings of 7, 14, 21, 28 and 35 inches with four populations.

3. Brassica carinata

   a. PI 243913 seeded in row spacings of 7, 14, 21, 28 and 35 inches with two populations.

4. Tephrosia vogelii

   a. Row spacings of 12, 24, and 36 inches with four populations: 10,890, 14,520, 21,780, 43,560 plants per acre.

   b. Evaluation of four PI's and 12 breeding lines.

   c. Two acre planting for extraction tests by companies.

5. Kenaf

   a. Row spacings of 7,14,21 and 28 inches with four populations.

   b. Fertility test.

6. Mentha arvensis

   a. Evaluation of introductions

7. Pigeon Pea

   a. County evaluations
   b. Seed increase plots
   c. Fertility test
   d. Seeding rates
   e. Crop rotation tests
   f. Crop comparison tests

8. Cassia occidentalis

   a. Evaluation with Mills, Brooks, Hall, and Texal guar.

9. Crambe abyssinica

   a. Evaluation at two seeding rates.

10. Others

   a. Sugarbeets
   b. Dry peas and beans

c. Castorbeans
d. Sunflowers
e. Ornamentals

VII. Plans for 1967

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

OKLAHOMA REPORT ON S-9 "NEW CROPS", July 19 AND 20, 1965,
S-9 TECHNICAL COMMITTEE MEETING AT EXPERIMENT, GEORGIA

Roy Oswalt and Ralph Matlock

A. OILSEED CROPS:

1. Fennel (Foeniculum vulgare) P.I. 268383 (Okla. Sp-No. 401 and 429). It was planted March 10, March 29 and April 13, 1965 at Stillwater. The March 10 date produced seed, but the later dates proved to be unproductive.

2. Euphorbia heterophylla (Okla. Sp. 401) produced some seed when planted on May 18 and June 4, but yields were low and considerable shattering was noted. P.I. 296064 (Sp-543) is growing well at Goodwell this season under irrigation.

3. Nigella arvensis, P.I. 257591 (Sp-97) produced less than 100 pounds per acre of seed when planted May 18 and June 4.

4. Vernonia anthelimintica was planted May 18 and June 4 at Stillwater. The early planting of P.I.'s 283729 (Sp-263) and 292522 (Sp-465) averaged 186 pounds of seed per acre at Stillwater. Nine selections of P.I. 283729 produced mean seed yields ranging from 102 to 298 pounds per acre.

Approximately, 120 pounds of good seed per acre were obtained from an increase planting made on the Agronomy Research Station near Perkins. The seed were planted June 1 in rows spaced 40 inches apart. The crop was cut and bundled with a grain binder and run through the combine after curing in shocks. Seed losses were estimated at 25 to 33 percent.

5. Six Crambe accessions were planted April 13, 1965. No plants survived because of insect damage and weedicide residues.

6. Six Brassica accessions were planted April 13, 1965. No plants survived because of insect damage and weedicide residues.

7. Safflower, P.I. 174080 (Sa-122) was a tall medium producing accession with very little leaf rust.

8. Sunflower, variety Smena (Su-266) produced excellent seed yields (1875 pounds per acre). Plant height was 59 inches and seed averaged 5.6 grams per 100 seed.

9. Eight soybean accessions were planted for evaluation. P.I. 135589 was the most productive and averaged 6.8 grams per 100 seed. Approximately, 200 selections from the cross Hill (2) x P.I. 196177 were evaluated in 1965. Some of the small-seeded types were worthy of further selection and evaluation in 1966.

B. PULSE CROPS:

1. Pigeon pea, Cajanus cajan, accessions were planted April 13 and June 4 at Stillwater. P.I. 218066 (Sp-46) produced the highest seed yield of the eight accessions tested.

2. Field pea, Pisum arvense, accessions were planted April 13. None of the three accessions included in the test were particularly outstanding.

3. Horsebean (tic bean), Vicia faba, accessions were planted March 29, April 13, April 27 and June 4. Of the four dates the March 29 date was the most productive. The four accessions tested were unproductive in 1965.

4. Fenugreek, Trigonella foenum-graecum, accessions were planted May 18. P.I. 288651 and 288652 (Sp-349 and 350) were the most productive of the seven accessions tested.

5. Lentil, Lens culinaris, planted May 18 produced very few seed at Stillwater for the three accessions tested.

6. Dolichos biflorus, P.I. 163321 (Sp-241) and Dolichos lablab, P.I. 288467 (Sp-389) were the more productive of the five accessions evaluated in the Stillwater test planted on May 18, 1965.

7. Mungbean, Phaseolus spp., accessions planted May 18, at Stillwater produced seed yields ranging from 0 to 520 pounds of seed per acre. Of the 28 accessions tested the following were the only ones approaching the mean yield of Okla. 12, Kiloga and Berken (582 lbs./A):

P.I. No.	Okla. M-No.	Seed Yield (lbs/A)	Gms/100 seed	Testa Color
271401	732	420	4.2	Dull green
271402	733	400	6.4	Dull green
288816	812	520	2.8	Yellow
271498	750	1055		Black
271497	749	931		Black

8. Cowpea, Vigna spp., accessions were planted May 18 at Stillwater. The following produced good seed yields and five showed good field tolerance to fusarium wilt of the 62 accessions tested:

P.I. No.	Okla. C-No.	Seed Yield (lbs/A)	Gms/100 seed	Percentage Fusarium Wilt
205140	304	755	8.6	--
288661	657	695	14.8	--
255811	707	655	11.8	--
293453	709	660	11.6	--
276102	633		--	14.6
147071	294	605	--	60.0
145198	111	-	--	2.9
167284	295	-	--	3.0
145190	362	-	--	4.6
115681	529	-	--	9.3

9. Peanuts, Arachis hypogaea, About 500 peanut accessions were grown in 1965 for either observation, seed increase or an agronomic, physical, chemical and organoleptic evaluation. Thirty new introductions were grown for seed increase. In tests near Perkins 396 accessions were grown for observation and seed maintenance. Seventy-four accessions were chosen on the basis of previous evaluation for replicated tests near Perkins and Fort Cobb.

In 1965, 127 peanut accessions (25 percent) had mean yields above the mean of the Checks, Argentine, Starr and Spantex (2280 pounds per acre). Mean yields ranged from 136 pounds per acre (P.I. 268604, 268691) to 3857 pounds per acre for P.I. ~~26879~~ 268739

The accessions varied with respect to thrips damage. Forty accessions were equal to or better with respect to thrips injury than the Check, Argentine, Starr and Spantex varieties.

Cecospora leafspot was very light in 1965, and disease score did not vary markedly.

Six accessions were noted that appeared to show some drought tolerance at Perkins.

C. ANNUAL PULP CROPS:

Two entries each of Kenof, Crotalaria juncea, Okra and Sorghum forage hybrids were planted May 24, in tests at Perkins. Only Everglade 71 Kenaf and F5 400 R Sorghum exceeded the yield of five tons of dry matter. No pulp test was planted in 1966.

D. MUCILAGE CROPS:

1. Guar varieties, Mills and Hall, were released cooperatively in 1966 by the United States Department of Agriculture, and the Texas and Oklahoma Agricultural Experiment Stations.

   Mills originated as a single plant selection from the hetorogeneous accession, P.I. 263875.

   Hall originated as a single plant selection from the heterogeneous accession, P.I. 179930.

Both varieties along with Brooks have shown excellent performance in the presence of bacterial blight and alternaria leafspot.

E. GRAIN CROPS:

Sorghum vulgare, (From D. E. Weibel) R OKY 10 and R OK Y8 are released grain sorghum restorers with yellow endosperm that have a plant introduction in their pedigree.

Introductions that have been of value as breeding material include short Kaura and Korgi (yellow endosperm) and Collubi (stiff stalks).

Sorghum vulgare, accessions with potential value include the following:

1. T 32, Teso, East Africa Collection, 100 percent twin seed
2. W 11, West Nile, East Africa Collection, flat white seed.
3. SB 40, Uunaba, East Africa Collection, apparent midge resistance.
4. SB 48, Peto, East Africa Collection, deep red pericarp color.
5. SB 117, Msumbyi, East Africa Collection, shallu type with apparent resistance to weathering.

F. FORAGE CROPS: (from C. E. Denman)

The following accessions are of Vetch, Vicia villosa, made good growth and were winter hardy in Oklahoma:

P.I. or A No.	Origin
268189	Russia
263190	Russia
263191	Russia
232959	Hungary
11026	Yugoslavia
11035	Yugoslavia
11038	Yugoslavia

PUBLICATIONS

The Potential of Oilseed, Pulse, and Industrial Crops for Oklahoma. Staff in Departments of Agronomy, Biochemistry, and Agricultural Economics. January, 1966.

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

Report to the S-9 Technical Committee

July 19-20, 1966

Experiment, Georgia

Prepared by: J. Vélez Fortuño

During the fiscal year 1965-1966, a total of 1042 introductions were obtained mostly through the Primary Station at Experiment, Georgia. They fall in the following groups: 760 sugar crops, 13 forage grasses, 128 forage legumes, 38 fruits, 15 vegetables, 31 flowers and ornamentals, 52 grains, and 5 miscellaneous.

The most important results of the year are summarized as follows for each group. Many of these introductions are handled through other projects and included in their respective reports.

Sugar Crops

Sugar cane and sugar beets are included in this group.

All sugar cane introductions are handled by the A.R.S. cooperative project, and the results of their evaluation are included in the report of the sugar cane breeding program.

Sugar beet introductions Cercerave, from the Netherlands; Cercopoly, from Germany and U.S. 201 (SP 581001-0), an experimental variety obtained from Beltsville, exhibited most resistance to Cercospora among 18 varieties in observational trials this year. U.S. 201, however, showed extremely low vigor and poor yield.

Grasses

Among the 204 accessions of Digitaria introduced in 1964, thirty were selected on the basis of agronomic characters for more precise evaluation in replicated trials. Some of these accessions look very promissing even for the areas in which Pangola is now the grass.

Forage Legumes

At Lajas 8 forage legume introductions were planted for evaluation. After bacterial inoculation, they were sown under greenhouse conditions and only 5, namely Pueraria phaseoloides, Desmodium sandwicense, D. Uncinatum, Stylosanthes humilis, and Medicago sativa showed good germination. Two Glycine javanica accessions from Australia and Brazil, and Phaseolus atropurpureus germinated very poorly.

Data on green matter, dry matter, protein yield and insect and disease behavior will be obtained.

Fruits

Banana introductions from Jamaica were planted at Adjuntas Substation for observation.

On the basis of the observational trial at Fortuna the best introductions from Jamaica, Altafort and 2390 were established in a replicated trial for comparison with the commercial varieties Monte Cristo and Gross Michel. The Jamaican varieties showed resistance to leaf spot (Cercospora) and Panamá disease, and yield quality fruit.

The evaluation of grape varieties continued at Fortuna. So far there are 6 promissing varieties, namely, Exotic, Ribier, Lake Emerald, Tamiami, I-48 and I-52, the latter two hybrids from California.

As the result of hand pollination 19 trees of the date palm, Phoenix dactylifera produced fruit at Fortuna, although low in sugar content. Propagation of both female and male trees is underway.

Seedlings of the sapucaia nut, Lecythis elliptica were planted in the field and are showing good growth. Older plantings produced for the 5th straight year, yielding valuable information for clone selection.

In Gurabo a five-acre planting of Rambután was established for selection, which is expected to be done in the next 4 years. So far this planting has made very poor growth. Soil sampling is under way to diagnose the difficulty. Seed analysis by the Northern Utilization Laboratory revealed an oil content of 34 percent.

Some of the Rambután and Pulasan introductions made in May 1966 from the Federated Malay States survived the trip and the fumigation treatment given by the Federal Plant Quarantine Service. Survival on July 1, 1 1/2 months after arrival was as follows:

Rambután clones;

R 4	-	Vigorous, from scion
R 3	-	Root stock survived, scion dead
R 7	-	Entire plant dead

Pulasan clones;

P 28	-	Vigorous, from scion
P 63	-	Root stock survived
P 22	-	Entire plant dead

The Durian budwood was lost for lack of rootstocks.

At Fortuna, some Macadamia trees are fruiting in small numbers this year.

Everbearing strawberry varieties Gem, Ozark Beauty and Stream Liner, tested at Adjuntas produced low yields in the period from July to November. Apparently they are not well adapted to that area.

Seedlings of promissing annatto (Bixa orellana), selections are growing well at Adjuntas, and some of them are in production. Selections S-1 and S-2 are apparently promissing as ornamentals.

Passion fruit showed symptoms of die-back after two heavy crops at Adjuntas. However they recovered very well after fertilizer application and are now in production.

Guava pineapple, Feijoa sellowiana evidenced poor adaptation at Fortuna, and was transferred to Adjuntas where it is showing good progress. They bloomed profusely in May.

Chineese goose berry, Actinidia chinensis and tree tomato, Cyphomandra betacea, have been discarded, as they do not show economic possibilities for Puerto Rico.

Vegetables

Among 9 melon introductions planted at Fortuna, variety Campo resulted the best as regards powdery mildew resistance, although it was only of a fair quality. In contrast PMR 6 produced high quality fruit but showed low resistance to powdery mildew.

Pepper (Capsicum annuum) accessions from the Primary Station, Experiment, Georgia and from Dr. Greenleaf, at Auburn, were screened for the Puertorrican pepper mosaic virus, and most of them came out susceptible to the disease. Only P.I. 152217 and 152234 showed some resistance after reinoculation.

Others

Flowers, ornamentals, grains, and miscellaneous crops are still under evaluation and not much can be reported about them.

1966 ANNUAL REPORT TO S-9 TECHNICAL COMMITTEE ON NEW PLANT INTRODUCTION REGIONAL PROJECT

W. E. Roever
July 14, 1966

Fifty-seven P.I. acquisitions were received since the previous report. These include Medicagos, Zea, Cynodon, ornamentals and seed for grower production trials of Crambe and Kenaf.

Two plots of Crambe P.I. 247310 were seeded last year in West Tennessee, one in the Mississippi bottoms and one on good upland. The 1/20 acre plot in the bottoms matured in September. It was hand-harvested and produced 15 pounds of clean seed. The upland plot matured earlier and was effectively harvested by a hurricane. Its yield would have been less than 300 lbs. per acre.

Dr. H. R. DeSelm (Botany Dept.) reporting on the results of ecological studies on Andropogon acquisitions said:

"The following is a statement that can be made about the garden growth of the about 200 clones of Andropogon scoparius and A. s. variety neomexicanum to date:

Plant height at time of flowering is inversely related to latitude of clone origin; northern clones flower when shorter. The change averages -1.1 inches per degree of latitude.

Date of clone flowering exhibits much variation since one clone may flower over a few week's period. A general relation exists; flowering occurs earlier in the year for the more northern clones. The average change is about -1.5 days per degree of latitude."

P.I. acquisitions previously screened by Dr. L. Josephson and his co-workers for corn smut and corn earworm resistance are being screened for Maize Dwarf Mosaic for a second time. A new group of corn acquisitions designated as Virus Streak resistant is also being screened for MDM and for Southwestern Corn Borer resistance. A small seed stock is being maintained of lines showing the best smut and earworm tolerance or resistance for continued screening purposes.

Agronomic evaluations by Dr. Elmer Gray are being continued on 38 orchard grass introductions and during the past two years about 80 alfalfa introductions have been included in the alfalfa weevil studies. The following had the least weevil feeding injury in the nursery:

P.I.	27705	234818
	234817	258757
	228152	228152
	251205	262532
	231731	239953
	251869	

Professor J. S. Alexander reports as follows on ornamentals:

Plants that show excellent characteristics:

255075 Buxus 'Agrams'
Very upright, should make excellent low hedge.

235583 Ilex mutagara
Cannot separate from crenata. Many of the same characteristics. Good grower, plant about 36-42" tall and 36" in diameter.

231948 Ilex crenata (yellowberry)
Foliage very attractive being small, dark green leaved. Berries have not been very attractive. This plant is worthwhile just for foliage and branching characteristics. Oldest plant 30-36" high and 36" in diameter.

276162 Ilex crenata 'Radicans'
This plant is small leaved, and dwarf. Plant approximately 4-6" high and 10-12" in diameter. Grows in full sun. Being propagated.

275854 Ilex crenata 'Radicans'
This plant is a rather fast upright grower. Leaves medium and dark green. Good possibility for use as hedge plant due to branching habit.

Of possible use as a perennial due to its excellent gray foliage.

294095 Cornus paucinervis
235423 Corylopsis spicata

Plants that were not injured during winter 65-66; -10° F.

255075 Buxus 'Agrams'
235583 Ilex mutagara (Resembles crenata)
231948 Ilex crenata (yellowberry)
279748 Cryptomeria japonica (Dwarf 12-15")
279746 Cryptomeria japonica (4-5')
275858 Ilex crenata
275859 Ilex crenata
275860 Ilex crenata
275861 Ilex crenata
275851 Ilex crenata 'Radicans'
275854 Ilex crenata 'Radicans'
236020 Ilex crenata 'Varigated'
276162 Ilex crenata 'Radicans'
274539 Ilex crenata 'Fukasawana'
279066 Ilex crenata
286608 Metasequoia g. 'National'
267825 X Ilex 'John T. Morris'
267824 X Ilex 'Lydia Morris'
262710 Acer ginn
206687 Iris sp.
250061 Iris sp.
212308 Iris sp.

Plants that were killed back to ground level, but growing July 12, 1966:

239232 Callicarpa japonica
238783 Teucrium betonicum

Plants with new growth killed during winter 65-66; -10° F.

241325	I. altaclarensis 'Wilsonii'
242241	Osmarea burkwoodi
260383	Buxus 'Bruns'
242519	Buxus sempervirens 'Latifolia'
	Cydonia sp.

Established plants, lost winter 65-66; -10° F. low.

275853	Ilex crenata 'Radicans'
242290	Osmanthus heterophyllus 'Aureus'
242291	Osmanthus heterophyllus 'Purpureus'
242292	Osmanthus heterophyllus 'Variegatus'
262716	Prunus maacki
285392	Pieris formosa
243957	Cotoneaster 'cornubia'
248492	Crataegus aestivalis
275073	Euonymus fortunei
285437	Viburnum sp.
285477	Viburnum coriaceum
286570	Weigela hortensis
23032	Syringa meyeri

Liners planted September 1965, lost winter 65-66; -10° F.

240756	Buxus microphylla
276274	Buxus microphylla 'Suffruticosa'
242518	Buxus sempervirens 'Aureopendula'
242520	Buxus sempervirens 'Latifolia Maculata'
242522	Buxus sempervirens 'Myosotifolia'
76560	Buxus sempervirens 'Myrtifolia'
240528	Buxus sempervirens 'Rosmarinifolia'
242523	Buxus sempervirens 'Pendula'
242525	Buxus sempervirens 'Salicifolia Elata'
261849	Buxus sp.

ANNUAL REPORT ON NEW CROPS RESEARCH

IN TEXAS

HATCH 717 - CONTRIBUTING TO SOUTHERN REGIONAL

PROJECT S-9

Experiment, Georgia
July 19 and 20, 1966
Prepared by Eli L. Whiteley

The 1965-66 crop year has been unusual even for Texas, the early fall was dry and the winter was mild and wet. Continued rains prevented field work from late November to early March. Most of the field planting were made under rather difficult conditions.

A total of 958 accessions were received by researchers, individuals, and commercial concerns in 1965-66. Most of these plants are now growing in the field and will be evaluate during the growing season.

Crops for Industrial Uses

Oilseed Crops:

Crambe abyssinica (PI 247310) lines were grown to check oil content and quality. The samples submitted to Dr. Wolff were lower in oil and C_{22} acids than the 1964 samples. The analyses of the samples are given below.

Sample No.	NV No.	Wt. / 1000 g.	Hull %	Oil %	Protein %	Total C_{22} Acids %	Thioghicosides, %
W-9 (1964)	50198	4.5	30.0	45.0	28.9	59.7	9.1
W-9	50331	1.6	27.5	30.4	35.1	56.1	8.5
2000R	50332	2.1	33.0	33.5	35.3	57.7	8.3
4000R	50333	2.3	33.5	32.5	36.2	58.4	8.2
8000R	50334	1.6	36.2	30.4	36.4	55.4	8.2

The seed of the above samples were smaller, lower in oil, and higher in protein than the 1964 seed. Seed of these and other lines are being grown for further testing to see if better quality material can be isolated from this plant introduction.

Oil processors have shown considerable interest in crambe for processing and a large seed increase will be made in the Lower Rio Grande Valley in the fall. Seed for this increase will be furnished by Dr. White through NC - 7.

Vernonia anthelmintica:

Seed of several lines of vernonia are growing in the field at this time. Several selections were made from plants grown from irradiated seed. However, none of these plants show much promise in seed retention. Very little can be done with this plant unless a comprehensive breeding program is established and new sources of germ plasm are found.

Euphorbia lagascae:

Euphorbia lagascae (PI 296064) was planted on two dates

(March 15 and April 15). Good stands were obtained and the plants are growing well. A good estimate of the yield of this crop should be obtained from these plantings.

Cassia occidentalis:

Cassia (PI 292843) planted in 1965 produced about 1000 pounds of seed per acre. The low yield was due to losses prior to combining. Studies in the Department of Biochemistry and Nutrition have isolated the toxic factor in cassia and identification and structure studies are almost complete. Studies in the College of Veterinary Medicine on the toxicity of cassia are being continued. Seed produced in 1966 will be used in these feeding trials.

Kenaf:

A 40 acre planting of kenaf has been made on a commercial farm in the Brazos river valley for yield and harvesting trials. This planting was made by a paper company and the harvesting tests will be run by the Department of Agricultural Engineering.

A yield test was planted in the Blacklands of Texas in 1966. This planting should indicate the potential of this crop in that area. About 30 new lines are being tested.

Crotalaria j[illegible]

Lines of C. juncea produced good yields in 1965. The range

was from 5 to 7 tons per acre under dryland conditions. Several lines looked very good and two could be released if there was a demand for the crop. One line, 214, has out yielded Texas 374 at College Station for the past 5 years.

Ioeniculm vulgare:

Iennel (PI 268383) produce good yields of seed in 1965. The seed were combined and a yield of 2475 pounds of seed per acre was produced by the planting at College Station. If uses for the oil from this crop can be developed it will be easy to establish as a new crop.

Sugar Crops

Sugar Beets:

Sugar beets continue to show promise as a new crop for Texas. The 1965-66 crop has not been harvested at this date, but brix readings indicate that the sucrose percentage will be fairly high this year. Yields under dryland conditions should be between 20 and 30 tons per acre.

Sweet Sorghum:

The sweet sorghum program in 1965 included (1) demonstration plantings at 11 locations (2) replicated strain trials at 5 locations.

The demonstrations were largely planted from late March to mid-April and were harvested for yield and quality evaluations in 140 to 160 days. Two late season demonstrations were planted in July to August. The cultural practices followed were those common to the farm and the surrounding area. Two demonstrations were grown under dryland production. The number of irrigations ranged from 2 to 5. In sprinkler irrigated areas, it was not possible to obtain uniform application of water after the height of the sorghum significantly exceeded that of the sprinkler outlets. Rainfall in the 6 county area ranged from 6 to 12 inches during the growing season. The fertilizer applied generally included both nitrogen and phosphorus and in some instances all three major nutrient elements were included. Observations made during the season indicated that nutrients were deficient for maximum growth and development at several locations. Yields of the earlier planted demonstrations ranged from 6.6 to 13.2 tons per acre; the juice quality of these demonstrations, however, were excellent and despite the low production most of them produced the estimated equivalent yield of 2000 to 3000 pounds of sugar per acre. Production on the heavier soils was generally better than that on the sandy soils; however with adjustment of cultural practices, yields on both types of soils can, no doubt, be substantially increased. The late planted demonstrations were affected by cold weather which was

reflected in the lower quality of the cane. From these demonstrations, it can be concluded that the new variety, Rio, has a wide range of adaptation and the potential for favorable yields and quality. As with any new crop, cultural practices for optimum production will have to be developed in the various areas of common soil and crop management conditions. The indicated range in planting dates is from mid-April to mid-July. Adequate supplies of nutrients, particularly nitrogen, should be applied in preplant applications. Soil moisture should be available in adequate supply until the soft dough stage of maturity; an adequate moisture supply at the boot stage of growth apparently is a somewhat critical requirement. The sugar cane borer is the only insect of potential danger that is foreseen at the present time; chemical and cultural practice control measures can be adapted from culture practices used in sugar-cane production. No diseases of significance were noted; however, Rio is susceptible to damage from drifting organic phosphates applied to adjacent crops.

The strain trials which were planted later in the spring generally produced better yields of cane than the earlier planted demonstrations. The two trials planted in August were damaged by cold weather before the cane matured. Rio produced the best quality cane in 4 of the 5 tests but was out yielded by strain, Mer. 63-6, in three of the trials; this new strain merits extensive testing in the area. While these two entries were generally superior in yield and quality the Mer. strains

61-8 and 63-7, produced creditable yields and/or qualities in one or more trials. The adaptation of these and related lines should be further tested at different locations in the area. Screen trials with genetic stocks, from which possible new strains might be developed, should be conducted at one or more locations. Sirup varieties should also be tested for possible sources of invert sugars for use in the manufacture of liquid sugar.

Sweet sorghum seems well adapted for production in the San Antonio area. With the standardization of cultural practices to obtain optimum yields and quality, this crop would seem to offer an excellent potential as a companion source of sugar with sugar-beets.

Table 1. DEMONSTRATION PLANTING WITH RIO SWEET SORGHUM
San Antonio-Winter Garden Area - 1965

Farm	County	Soil	Date Planted	Date Harvested	Stripped Yield tons/Ac	Brix	Sucrose %	Purity %	Est Sugar per ton (lbs)	Est Sugar lbs/Ac
Byrd	Zavala	Si. Cl. Loam	3-18-65	-	-	-	-	-	-	-
Strube	Uvalde	Clay	3-20-65	8-4-65	9.66	25.27	20.03	79.3	280	2708
Jamison	Guadalupe	Clay	4-1-65	8-9-65	10.12	25.16	20.10	79.7	282	2856
Muckleroy	Atascosa	S. Loam	4-1-65	8-19-65	8.57	23.35	17.25	73.9	231	1982
Stacy	Zavala	Clay	4-2-65	-	-	-	-	-	-	-
Toalson	Frio	S. Loam	4-8-65	8-5-65	8.68	23.48	18.80	79.9	264	2293
La Fere	Zavala	Si. Cl. Loam	4-10-65	9-18-65	9.75	25.29	20.25	80.1	285	2779
Woodman	Zavala	Clay	4-10-65	9-17-65	9.78	23.70	18.80	79.3	263	2573
Easter	Zavala	Si. Cl. Loam	4-13-65	9-18-65	6.63	22.59	16.40	72.4	217	1439
Van De Walle	Bexar	Clay	4-20-65	8-25-65	13.19	23.10	17.70	76.6	243	3205
Starr	Atascosa	S. Loam	7-11-65	11-23-65	4.60	19.16	14.60	75.9	199	915
Strube	Uvalde	Clay	8-6-65	12-8-65	15.30	15.42	10.70	69.1	137	2096

Field Crops

Guar:

Guar plantings continue to show promise in Texas. The three new varieties, Brooks, Hall, and Mills, developed from plant introductions have outyielded all the standard varieties. Some time and effort has been devoted to testing guar in the Blackland area of Texas. With the completion of a new processing plant at Vernon, Texas guar acreage should expand rapidly in the next few years.

Yields in the Blacklands have been very promising. The 1965 test produced the following results.

Variety	Yield per acre - pounds
Brooks	2161.5
Mills	1700.5
Hall	1999.5

A regional test including 10 varieties and lines is being grown this year along with a narrow row test of three varieties.

Soybeans:

Soybeans have not produced economical yields in the Blacklands. Nutrient deficiencies were noted last year and efforts to solve this problem were iniated during this growing season. Yields from the 1965 test are given below.

Variety	Yield per acre - pounds
Bragg	712
Hardee	626
Rebel	1351

A variety test is in progress in the Blacklands this year.

Sorghums:

Sorghum accessions are in process of being evaluated. Most of these materials are being evaluated for lysine content or for use in the development of new hybrids.

Vegetables

Tomatoes:

Dr. Harrison reported that 21 Lycopersicon esculentum accessions were tested for heat tolerance last year. None of the materials appeared to be as good as existing materials. Some of the lines did set fruit but because of size, color susceptibility to cracking were discarded.

Vigna sinensis:

Several plant introductions of Vigna are being evaluated by Dorman and Company for possible inclusion in a breeding program.

Okra:

Several okra lines are in advanced generations in the okra program at Weslaco. W. R. Cowley reported the following P.I.'s and the crosses that were made with them.

OKRA P.I.'S IN ADVANCED LINES OF THE 1966 BREEDING PROGRAM

at the

LOWER RIO GRANDE VALLEY RESEARCH AND EXTENSION CENTER

Weslaco, Texas

PARENTAGE	GENERATION
La. Grn. Velvet x 164273	F_5
Emerald x 169695	F_6
Emerald x 174006 (3 lines)	F_6
Emerald x Perkins) x 251500	F_6
Emerald x 251500 (7 lines)	F_6
Clemson x 251500 (3 lines)	F_6
Perkins x 249620 (22 lines)	F_6
Perkins x Emerald) x 249620	F_5
Emerald x Clemson) x 249620-9	F_5
Emerald x Clemson) x 249620-4	F_5
Perkins x Emerald) x 249620	F_5
D. L. Grn. Pod x La. Mvkt) x 169710	F_5
Perkins x Emerald) x 164925	F_6
249620 x 248999	F_4
Perkins x 248999-2) x Emerald	F_5
D.L. Grn. Pod x La. Mvkt) x 175561 (4 lines)	F_4
Emerald x 169698	F_4
Emerald x 169704	F_5
Emerald x Perkins) x 169704 (2 lines)	F_5
Clemson x 248999 (2 lines)	F_5 ornamental

(cont.)

PARENTAGE	GENERATION
249620 x 248999	F_5 ornamental
249620-3 x 248999	F_5 ornamental
165058 I.P. sel.	- ornamental

Most of this material was developed and tested for mechanical harvesting. Some of the lines look very promising.

Forage and Turf Grasses

Grasses:

Several grass accessions are in synthetic varieties and are in the testing stage. These accessions of Panicum coloratum will be reported in future reports by Dr. E. C. Holt.

Several plant introductions of rhodesgrass are being evaluated prior to inclusion in a breeding program by Mr. M. F. Schuster.

Mr. Dave Weaver evaluated 28 Digitaria accessions at the San Benito Grass Nursery. Based on his field notes, several plant introduction show promise as pasture grasses for south Texas. These grasses and some of their characteristics are:

P.I. No.	Name	Characteristics
299795	Digitaria setivalva	Upright growth, 24 in., leafy
299892	D. sp.	Semi-runner, 20 in., leafy
299743	D. pentzii	Semi-runner, 20 in., rapid spreader

(cont.)

P.I. No.	Name	Characteristics
299601	D. decumbens	Runner, 12 in., rapid spreader
299837	D. decumbens	Runner, 15 in., good spreader
299720	D. milanjiana	Upright, 18 in.
299708	D. milanjiana	Upright, 15 in.
299745	D. pentzii	Runner, 6 in., good spreader
299655	D. milanjiana	Upright, bushlike, 12 in.
299814	D. smithsii	Upright, 10 in., leafy
299613	D. diversinervis	Runner, 8 in., rapid spreader

Further evaluations of these grasses for forage yield, forage quality, and seed germination will be made at a future date.

Several Pennisetum species are being evaluated by Dr. L. C. Coffey for use in a breeding program.

Turf Grasses:

Several potential turf grasses are being evaluated by Dr. George G. McBee. These grasses and some of their characteristics are given in the table on the next page.

Several accessions including Chloris, Digitaria, Echinochloa, Enneapogon, Microchloa, and Themeda are being used by Dr. F. W. Gould in his cytotaxonomic studies. Dr. W. G. McCully received Melica and Elymus accessions from the Western Region, these accessions will be evaluated next year.

Grass Introductions

George G. McBee

Name & No.		% G.C. 7-26	Texture	Density* 6-10	Density* 7-26	Density* 11-13	Color* 7-26	Color* 11-13	Thatch* 11-13	Quality* 11-13
Cynodon barberi	287253	90	M	4.5	3.5	2.5	2.0	2.0	1.5	1.5
	287254	90	M	4.5	2.5	2.0	2.0	2.5	2.5	2.0
	287255	90	MC	2.0	3.0	1.0	2.0	2.0	2.5	1.5
C. dactylon	287151	90	M	3.0	1.5	1.0	1.5	1.5	1.5	2.0
	287244	80	M	2.5	2.0	1.5	3.0	2.5	2.0	2.5
	287245	95	M	2.5	2.0	1.5	3.0	3.5	2.5	3.5
	287256	98	C	3.5	2.0	1.5	2.0	3.0	2.0	2.5
	288676	100	VC	4.0	4.0	3.5	2.0	1.5	1.0	3.0
	290869	75	C	2.0	1.0	2.0	1.5	1.0	2.0	1.0
	291580	90	C	2.0	2.0	2.0	1.5	2.5	3.0	3.0
	291581	75	VF	1.0	1.5	1.0	2.5	1.0	4.5	2.0
	291582	95	F	1.0	2.0	1.0	2.5	1.5	4.0	2.5
	291583	100	M	2.5	1.0	1.5	1.0	2.5	3.0	3.0
	291585	98	MP	5.0	1.5	1.0	1.5	1.5	3.5	2.0
	291586	100	MC	1.5	1.5	1.0	1.0	1.0	3.0	1.0
	291587	95	F	4.0	1.5	1.0	1.0	1.5	3.5	1.5
	291953	90	MC	5.0	2.5	1.5	1.0	1.5	2.5	2.0
	291954	90	C	3.0	2.0	2.0	1.0	1.0	2.0	1.0
C. hirsutus	290664	60	F	2.5	3.0	1.5	1.5	2.5	3.0	2.5
C. Magennissii	184339	85	MF	2.5	3.5	1.0	2.5	3.5	3.0	2.0
	289916	80	MF	3.0	2.0	2.5	1.0	2.5	3.5	2.5
	291589	85	MF	4.5	1.5	1.0	1.0	2.5	3.0	2.0
	291590	85	MF	1.5	1.5	1.0	1.0	2.0	3.0	1.5
C. transvaalensis	286584	80	F	1.0	1.0	1.5	1.5	5.0	4.5	3.0
	289917	65	VF	2.0	2.0	2.0	2.0	5.0	5.0	5.0

Con'td-------

(cont.)

Vigor* 6-10	Seed* 7-26	Remarks
1.0	3.0	Loose growth habit; medium amt. of seed
1.0	4.0	Loose growth habit; medium amt. of seed
1.5	3.0	Few seed heads, one of kind of coarser types, very prostrate growth habit
1.5	2.0	Needs shorter cut to reduce seeding
2.3	2.0	Needs shorter cut to reduce seeding
1.5	2.0	Needs shorter cut to reduce seeding
1.0	1.0	Coarse; color below average
1.0	5.0	Coarse; vigorous; uniform; low density
2.5	5.0	Slightly slow to cover; open & free of thatch
1.5	3.5	Loose & uneven; abundant seed
3.0	2.0	Dense but thatchy (cut too high)
1.0	1.0	Dense but thatchy (cut too high)
1.5	3.5	Turf loose; excessive amount of seed
1.0	2.0	Uniform & free of seed heads
1.0	1.0	Uniform & free of seed heads
1.0	2.0	Uniform, well-tied down sod, no seed
3.0	1.5	Coarse but high quality turf free of seed
2.5	2.0	Coarse but high quality turf free of seed
1.5	3.0	Excessive seed heads reduce quality
3.0	3.0	Pale yellowish green, very few seed
3.5	1.5	Abundant seed heads; diseased
3.0	3.0	Abundant seed heads; diseased
2.5	1.0	Moderate amount of seed heads
3.0	1.0	Non-resilient, thatchy (cut too high)
4.5	1.0	Non-resilient, thatchy (cut too high)

Name & No.		%G.C. 7-26	Texture	Density* 6-10	Density* 7-26	Density* 11-13	Color* 7-26	Color* 11-13	Thatch* 11-13	Quality* 11-13
	289918	75	VF	1.5	3.0	1.5	4.0	3.0	4.5	2.5
	290812	60	F	1.5	2.5	3.0	2.0	3.0	3.5	3.5
	290813	80	VF	3.5	1.0	2.0	2.0	2.5	4.0	2.5
	290892	70	F	2.5	2.0	2.5	2.0	3.5	2.0	3.0
	291591	60	VF	3.5	1.0	2.0	2.5	2.5	2.5	3.0
Zoysia japanica	231389	5	MF	1.0	1.0	1.0	1.5	1.5	-	-
	235334	10	M	1.0	1.0	1.0	1.0	1.0	-	-
Z. matrella	231146	5	F	1.0	1.0	1.0	1.5	1.5	-	-
	264146	5	F	1.0	1.0	1.0	1.0	1.0	-	-
	0-318	-	M	-	-	2.0	-	2.5	2.0	4.0
	0-319	-	MC	-	-	2.5	-	3.0	1.5	5.0
	0-162		M	-	-	2.5	-	2.0	2.0	3.5
	C-309	-	M	-	-	1.0	-	1.0	2.0	1.0
	0-005	-	M	-	-	1.0	-	1.0	2.5	1.0
	0-443	-	MC	-	-	1.0	-	2.5	2.0	4.0
	0-328	-	MC	-	-	2.0	-	2.5	3.0	3.5
	E-1	-	MF	-	-	5.0	-	3.0	-	-
	P-16	-	M	-	-	4.0	-	1.5	-	-
	0-8	-	M	-	-	3.0	-	1.0	-	-
	R-8	-	MC	-	-	2.5	-	1.0	-	-
	F-7	-	MF	-	-	2.0	-	1.0	-	-
	H-8	-	F	-	-	2.5	-	2.5	-	-
	S-16	-	M	-	-	1.5	-	2.0	-	-
	G-11	-	MF	-	-	2.0	-	2.5	-	-
	56-8	-	M	-	-	1.0	-	1.0	-	-
	J-5	-	MC	-	-	1.0	-	1.0	-	-
	225809	-	VF	-	-	3.0	-	2.5	-	-
	220588	-	C	-	-	5.0	-	3.0	-	-

Con'td ------

(cont.)

Vigor* 6-10	Seed* 7-26	Remarks
4.0	1.0	Non-resilient, thatchy (cut too high)
4.0	1.0	Leaf spot disease
3.5	2.0	Flacid & non-resilient
4.0	2.0	Pale yellowish green color
5.0	1.5	Flacid & non-resilient
-	1.0	-
-	1.0	Appears to be slightly diseased
-	1.0	Hummocky
-	1.0	Very Hummocky
-	-	Uneven; diseased
-	-	Excessive seed heads; coarse & grainy
-	-	Non-resilient
-	-	Soft textured
-	-	Very uniform
-	-	Abundant seed
-	-	Resembles common bermuda
-	-	Slow to cover
-	-	No seed
-	-	Clean, few seeds
-	-	Severe leaf spot disease
-	-	Remains very hummocky
-	-	Remains slightly hummocky
-	-	Uniform, few seed
-	-	Slightly thatchy; no seed
-	-	Clean
-	-	Excellent appearance, no seed
-	-	Uneven; thatchy; no seed
-	-	Coarse; seedy; uneven; diseased

Name & No.		% G. C. 7-26	Texture	Density* 6-10	7-26	11-13	Color* 7-26	11-13	Thatch* 11-13	Quality* 11-13 Con'td ---
	229576	-	-	-	-	-	-	-	-	-
	299579	-	-	-	-	-	-	-	-	-
	299580	-	M	-	-	-	-	-	-	-
	299584	-	F	-	-	-	-	-	-	-
	299585	-	-	-	-	-	-	-	-	-
Ferguson	1									
	2									
	3									
	4									
Tom Leonard	1									
P. vaginatum	36									
Meyer Zoysia	25									

(cont.)

Vigor* 6-10	Seed* 7-26	Remarks
-	-	Non-survival
-	-	Non-survival
-	-	Vigorous; good color; good health
-	-	Fine textured; pale color; thin but uniform
-	-	Non-survival

Texture:
F - fine
MF - medium fine
M - medium
MC - medium coarse
C - coarse

* 1 - good
5 - poor

WORK PLANNED FOR NEXT YEAR

Work will be continued on oilseed and pulp crops at a slightly higher level in 1967. Several lines of crambe will be placed in a yield test. Seed from these lines will be analized for oil content and other factors.

Work with pulp crops will be increased to include a kenaf variety test. A small seed production trial will be conducted in the fall of 1966 at Weslaco. This test will include Everglades 41 and Everglades 71.

Publications:

Mills and Hall. New Guar Varieties.Leaflet No. L-679. Texas Agricultural Experiment Station. March, 1966.

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Report on
Plant Introductions under test in the South

The Soil Conservation Service conducts tests with plants for use in its programs of soil, water, watershed conservation, recreation and development, and beautification. These tests begin at Service plant materials centers, and are concluded on the problem sites in the field where their suitability for the purposes needed can be evaluated under actual use conditions.

One principal source of new materials for testing and observation is the New Crops Branch, Plant Introductions.

The Soil Conservation Service observed Plant Introductions in four plant materials centers in the South during the fiscal year 1966. These centers were the Americus Plant Materials Center, Americus, Ga., the Arcadia Plant Materials Center, Arcadia, Fla., the Coffeeville Plant Materials Center, Coffeeville, Miss., and the Knox City Plant Materials Center, Knox City, Texas.

Approximately 1,600 different numbered plant introductions were under observation. These were distributed between 105 genera, and approximately 341 species. There were 46 grasses, 33 legumes, 8 shrubs, 7 trees, and 17 composites, forbs, and other genera represented.

Included in this group were 64 separate accessions which have shown sufficient merit, for some conservation purpose, to warrant further observation and study. These have been placed in special observational tests and are under some type of seed increase program to supply planting stocks in the quantity needed for further testing.

Two plant introductions are currently before the release committee of the Crop Improvement Association in Mississippi for possible certification. The first is Meechee Arrowleaf Clover, Trifolium vesiculosum, P.I. 233782, and the second is Chiwapa japanesemillet, Echinochloa frumentacea. This latter has a dubious P.I. connection inasmuch as it was a rogue in a lot of seed of Setaria italica, P.I. 196293. It was saved and resulted in a superior seed-yielding variety for the mid-South. Still another plant, Dove proso, Panicum miliaceum, P.I. 196292, is reaching the commercial market in a limited way as a wild life food crop.

Some other items of promise include the following:

Arachis

Many of the wild peanuts offer promise as forage, ground cover, and as a wildlife crop. Arachis monticola, P.I. 263393, and A. pusilla, P.I. 210553, are both annual reseeders. They show promise in the field in Florida as a

wildlife food crop, and on the plant materials centers as a component of a grass-legume mixture for forage. More testing has been done with the former than with the latter. It has reseeded itself consistently for five years in Florida, Georgia, and Mississippi, and for one year in Texas at Knox City. Seed production is high, approximately a ton per acre on plot samples. Conventional equipment cannot be used to harvest the nuts because of the weak pegs, but the Mississippi Center has devised a machine that will mechanically harvest them.

Arachis glabrata, P.I. 118457, Arb perennial peanut; A. glabrata, P.I. 262839, Arblick perennial peanut; and A. sp., P.I. 262749 and P.I. 261851: The Arb perennial peanut is light green in color, makes a dense mat and produces more forage than the leading grasses on the well-drained sands of Florida. It is not hardy enough to endure the winters outside Florida. It is under grazing on several sites, and shows persistence under heavy use. As with all perennial peanuts so far tested, it requires vegetative establishment and is slow to develop a stand. The Arblick peanut is less well tested but is a more rapid spreader and has a deeper green color. A. sp., P.I. 261851 and P.I. 262794, appear to be superior at Americus. P.I. 261851 appears to be the most resistant to cold.

Brachiaria dictyoneuria, P.I. 153053, is capable of high forage yields, will compete with pangola under conditions of moderate management. Establishment by vegetative means is relatively easy and rapid. Not hardy outside the peninsula of Florida.

Cenchrus-Pennisetum. Several of this group offer promise. Three in Florida of promise are: Cenchrus ciliare, P.I. 210693, Chipinga buffelgrass is fine stemmed, leafy, rhizomatos, and insect and disease resistant; C. ciliare, P.I. 243199, and C. ciliare, P.I. 271198, are similar to the first. P.I. 271198 is the best seed producer. The three are being compared.

In Georgia, Pennisetum ciliare, P.I. 161633, is the most promising and so far the most tolerant of cold of the true buffelgrasses. It is early, strongly rhizomatos, and a heavy producer. It was rated the best out of 80 or more selections tested for the past three years. Cenchrus ciliaris, P.I. 196008, Cenchrus setigerus, P.I. 271114 and P.I. 271528, are very leafy, good producers and effective seed producers.

In Mississippi, Pennisetum sp., P.I. 271603, has been hardy where none of the other buffelgrasses are. It does not produce sufficient seed to be capable of effective farm reproduction.

Chrysopogon fulvus, P.I. 213885 and P.I. 215586, are both heavy producing grasses. Both are hardy, give early spring production and produce abundant viable seed. The former is at Americus, Ga., and the latter at Coffeeville, Miss.

Digitaria eriantha, P.I. 106663, and Digitaria setivalva, P.I. 299795, both at Americus, Ga., are hardy and high producers. Similar to pangola, but

more productive, they offer possibilities of extending the range of this group northward. Both are sterile and must be reproduced vegetatively.

Desmodium ovalifolium, P.I. 237955, is at Arcadia, Fla., and its field evaluation station in Mayaguez, P.R. This tickclover is a good insect and disease-resistant vining plant, capable of providing low, dense, non-climbing ground cover under rather dense shade. Hardy in the peninsula of Florida but non-reproductive outside the Tropics.

Echinochloa holubii, P.I. 207924, is a warm-season perennial grass with short rhizomes, adapted to wet land classes. It produces seed abundantly but of poor quality. Enough are produced, however, to make seeding establishment feasible. It has potential as a plant for wave action control on reservoirs, stream channels, and as a forage crop on wet sites. Hardy at Coffeeville, Miss.

Eragrostis

Eragrostis curvula, P.I. 208994 and P.I. 232813, both show some superiority over common weeping lovegrass. The initial screening was done at Oklahoma State, and increases are being made at Knox City, Tex., for seed to make field comparisions.

Eragrostis lehmanniana, P.I. 295698 and P.I. 295699, are heavy forage producers. They will be compared with common Lehman lovegrass at Knox City, Texas.

Eragrostis robusta, P.I. 234218, is hardy from Florida to Mississippi, makes good vegetative growth without as much of a tussock formation as weeping lovegrass, and is a heavy seed producer.

Eragrostis superba, P.I. 295705, is a highly productive strain. It is being grown at Knox City (as an annual) for testing in southern Texas where it is best adapted.

Festuca arundinacea, P.I. 203728, has shown remarkable persistence at Americus, Ga. A selection from this number is strongly rhizomatos.

Hemarthria altissima, P.I. 299993, is an excellent producer, free from insect and disease problems. A vegetative reproduction process is necessary. Not tested outside Florida.

Lespedeza

Lespedeza cuneata, P.I. 246770, a prostrate type of Sericea lespedeza at Coffeeville, Miss.

Lespedeza virgata, P.I. 218004, a prostrate type of lespedeza, has shown promise on critical areas like road cuts and severely eroded areas from South Carolina to Mississippi. Stands have shown persistance and thickening up on such sites, somewhat slow and perhaps less effective than Sericea lespedeza, but without the sometimes objectional characteristic of height.

The Georgia Highway Department is increasing seed for use in highway erosion control planting in that state. It is being maintained and increased at Americus, Ga., and at Coffeeville, Miss.

Lupinus elegans, P.I. 185099, Armex lupine, offers promise as a leguminous cover crop in peninsula Florida. This plant is not as disease and insect susceptible as the ordinary blue lupine, but is not sufficiently hardy outside Florida to warrant testing. Field plantings on farms have been both successes and failures. Failures are connected primarily with difficulties in getting stands in the dry fall season and in lack of inoculation take. Fall irrigation has produced good results. The plant is said to be an excellent honey producer.

Panicum

Panicum coloratum - two accessions, P.I. 263603, Bambatsi kleingrass in Florida, and P.I. 184776, in Georgia. Both very good producers, tall but somewhat stemmy, free of insect and disease attack.

Panicum maximum, P.I. 156080, Arbill guineagrass, and P.I. 259563, Ardrool guineagrass, both in Florida. The former is a medium height, leafy, fine-stemmed type, while the latter is a tall broadleafed type. Both produce fair amounts of good seed, and are apparently resistant to insect and disease attack. Useful in subtropics and tropics only.

Paspalum nicorae, P.I. 202044, Amcorae brunswickgrass. Under test at Arcadia, Fla., Americus, Ga., and Coffeeville, Miss. A warm-season, rhizomatos sod grass, with qualities similar in some respects to both bahiagrass and bermudagrass. This accession is the most rapidly spreading of several, produces good quality seed in abundance, and is hardy in most of the South.

Phaseolus

Phaseolus atropurpureus, P.I. ?, IRFL-483, Siratro - a vigorous, highly productive perennial legume, hardy at Americus, Ga., but better adapted climatically to Florida.

Phaseolus lathyroides, P.I. 276183, Florida - a leafy strain with moderate steminess. It grows to five feet or more in height. An excellent seed producer. Seed were relished by quail. Highly susceptible to nematode attack.

Malus baccata, P.I. 122586, a small tree or large shrub that is well adapted to the South. Seedlings are easily produced, and retain their ornamental values. May be useful in both conservation and beautification plantings.

A summary of the genera and species is given in Table 1, and a summary of all items in some stage of advanced testing is given in Table 2.

Attachments.

Table 1. Summary of Plant Introductions Under Observation by the Soil Conservation Service in the South, Fiscal Yeal 1966.

Genera	Number Accessions	Number Species
Acacia	4	3
Aeschynomene	4	3
Agropyron	2	2
Albizzia	1	1
Alysicarpus	1	1
Andropogon	27	12
Antraxanthum	1	1
Arachis	36	5
Argyrolobium	2	2
Aristida	2	1
Arrhenatherum	1	1
Arundinacea	2	1
Arundinella	1	1
Astragalus	2	2
Astrebla	1	1
Axonopus	12	4
Berberis	1	1
Bothriochloa	19	4
Bracharia	15	7
Brachypodium	7	4
Bromus	18	6
Calopogonium	3	1
Canavalia	4	1
Cassia	5	5
Castanea	1	1
Casuarina	1	1
Catalpa	2	1
Cedreia	1	1
Cenchrus	45	2
Centrosema	1	1
Chloris	30	7
Chrysopogon	5	2
Clitoria	2	1
Crotalaria	13	10
Cunninghamia	1	1
Cryptomeria	2	1
Cymbopogon	4	1
Cynodon	6	2
Desmodium	32	16
Desmostachya	1	1
Dichanthium	10	2
Digitaria	6	5
Dolichos	12	2
Echinochloa	6	3
Eleocharis	1	1
Eleusine	2	1
Eragrostis	87	17
Eysenhardtia	1	1

Table 1 (continued)

Genera	Number Accessions	Number Species
Festuca	10	1
Glycine	21	2
Helianthus	3	1
Hemarthria	1	1
Hordeum	1	1
Indigofera	14	13
Ischaemum	1	1
Kochia	2	2
Lasiacis	2	1
Lathyrus	1	1
Lespedeza	14	7
Leucaena	9	2
Lolium	10	2
Lotononis	1	1
Lotus	9	5
Lupinus	2	2
Malus	2	2
Medicago	29	11
Metasequoia	1	1
Mimosa	1	1
Myrica	1	1
Olea	1	1
Ornithopus	2	1
Panicum	64	14
Paspalum	229	23
Pennisetum	49	6
Phalaris	16	3
Phaseolus	14	5
Phyllostachys	4	4
Pistachia	1	1
Pittosporum	1	1
Pyracantha	1	1
Psoralea	6	1
Quercus	2	1
Rhamnus	1	1
Sacciolepsis	1	1
Salix	5	5
Sassa	1	1
Schinus	1	1
Sesbania	3	2
Setaria	83	10
Sorghastrum	2	1
Sorghum	7	3
Sporobolus	8	5
Stenotaphrum	1	1
Stipa	7	3
Stizolobium	2	2

Table 1 (continued)

Genera	Number Accessions	Number Species
Stylosanthes	8	2
Themeda	17	3
Trachypogon	1	1
Tricholaena	2	1
Trifolium	46	22
Tristania	1	1
Vetiveria	1	1
Vicia	454	7
Vigna	6	3
Zoyzia	3	2

Table 2. Summary of Species of Promise at the Plant Materials Centers of the South

P.I. Number	Species	Initial 1/ Increases	Supple. 2/ Increases	Supple. 3/ Observations
78758	Andropogon caucasicus		T	
118457	Arachis glabrata		F	F
263393	Arachis monticola	M	G	
262839	Arachis sp.		F	F
237128	Axonopus compressus	G		
210693	Cenchrus ciliare		F	F
243199	Cenchrus ciliare	F		F
271198	Cenchrus ciliare	F		
284792	Chloris gayana			F
215586	Chrysopogon fulvus	M		
237955	Desmodium ovalifolium	F		
208287	Digitaria natalensis			F
208994	Eragrostis curvula		T	
232813	Eragrostis curvula		T	
295699	Eragrostis lehmanniana	T		
295696	Eragrostis lehmanniana	T		
234218	Eragrostis robusta	M	F	F
295705	Eragrostis superba	T		
106274	Eleochoris dulcis	M		
203728	Festuca arundinacea		G	
163453	Glycine ussuriensis		M	
299993	Hemarthria altissima	F		F
299995	Hemarthria altissima	F		F
218004	Lespedeza virgata	M	G	
246770	Lespedeza intermixta	M		
286464	Lolium multiflorum		G	
185099	Lupinus elegans		F	F
122586	Malus hupehensis	M		
263603	Panicum coloratum	F		
184776	Panicum coloratum			G
210692	Panicum coloratum var. makarikariense			G
156080	Panicum maximum	F		F
259563	Panicum maximum	F		F
196292	Panicum miliaceum		G	
178257	Panicum stapfianum			G
202044	Paspalum micorae		GM	
276248	Paspalum nicorae			G
276249	Paspalum nicorae			G
165749	Pennisetum ciliare			G
185562	Pennisetum ciliare			G
185565	Pennisetum ciliare			G
203366	Pennisetum ciliare			G
253259	Pennisetum ciliare			G
253261	Pennisetum ciliare			G
253269	Pennisteum ciliare			G
253271	Pennisetum ciliare			G

Table 2 (continued)

P.I. Number	Species	Initial 1/ Increases	Supple. 2/ Increases	Supple. 3/ Observations
253237	Pennisetum ciliare			G
271204	Pennisetum ciliare			G
271205	Pennisetum ciliare			G
271201	Pennisetum ciliare			G
271216	Pennisetum ciliare			G
274082	Pennisetum ciliare			G
271603	Pennisetum ciliare			G
291392	Pennisetum sp. (hybrid)			F
271603	Pennisetum sp.	M		
276183	Phaseolus lathyroides	F		
55975	Phyllostachys aurea		G	
40842	Phyllostachys bamboides		G	
111768	Phyllostachys meyerii		GM	
143540	Phyllostachys sp.		G	
21970	Pistachia chinensis	M		
234310	Trifolium vesiculosum		G	
233782	Trifolium vesiculosum		M	M
249880	Vicia lutea		G	

F = at Arcadia, Fla.; M = at Coffeeville, Miss.; T = at Knox City, Tex.; and G = at Americus, Ga.

1/ Initial increases or small increase plantings of about 1000 row feet or equivalent.

2/ Supplemental increases or larger increases of 1/4 to 5 acres or more depending on the crop.

3/ Supplemental observations or studies of a detailed nature in progress.

Report for S-9 Committee
July 19-20, 1966
I. A. Wolff - Northern Utilization
Research and Development Division

Honor Award: The USDA has seen fit to bestow a Superior Service Honor Award this spring on the crambe team which included 10 individuals from the Northern Division and two from the Crops Research Division. The citation read: "For interdisciplinary research with the excellence of vision, scientific attainment, and teamwork that resulted in introduction and industrial utilization of crambe as an oilseed crop new to American agriculture."

Such recognition is generally beneficial to the new crops program, since it brings into focus the useful results that can derive from it.

We realize that many participants, unnamed in the formal award, have been of great help in bringing the crambe work to fruition. I want to thank the S-9 committee, and individual States and researchers that took part, for their cooperation in that accomplishment, and their contributions towards it.

Progress in Chemical Screening for New Oilseeds: Our screening studies continue to find new oils and new sources of known oils. Epoxyoleic acid, which constitutes some 70 percent of oil from Vernonia anthelmintica, has been found in three other species of Vernonia (45-70 percent), five species of Crepis (20-68 percent), Euphorbia lagascae (60-70 percent), two species of Cephalaria (25-30 percent), Scabiosa sp. (22 percent), Schlectendalia luzuliflora (50 percent), and Valerianella radiata (30 percent). We analyzed 227 samples this year for the breeding program on Vernonia initiated at Indiana under contract with CR. The chemical analyses indicate that a number of the lines selected are of high quality in oil content, amount of epoxy acid, and low content of free fatty acids. The industrial interest generated by the early work and publicity on Vernonia oil is being maintained and suggests increased effort to obtain a suitable new oilseed crop that contains epoxy acids.

Crepenynic acid (an acetylenic acid) is found in six species of Crepis (10-75 percent), three of Picris (30-45 percent), three of Jurinea (13-36 percent), three of Centaurea (10-13 percent), two of Chrysanthemum (10-15 percent), Saussurea candicans (33 percent), and Lapsana communis (50 percent). Although industrial uses for crepenynic acid have not yet been developed, since agronomic promise has not been demonstrated for any particular accession, the reactivity of the unsaturated structure suggests commercial value for the oil. Development of agronomically practical sources of the crepenynic acid should proceed as promptly as possible.

Unusual components have also been identified in numerous other oils; e.g., Jurinea anatolica (esters of triterpene alcohols in addition to crepenynic acid), Chamaepeuce spp. (trihydroxy stearic acid), Cuspidaria pterocarpa (keto C_{24}-C_{28} acids), Euonymus verrucosus and other Celastraceae (acetoglycerides).

In the year ending May 31, 1966, 978 new samples for screening were received, plus 434 special samples, which include the 227 vernonias previously referred to. Bulk lots of Vernonia (500-700 pounds each) were received from Georgia, Oklahoma, and Arkansas.

Crambe: 5620 Pounds of crambe seed were grown for NU processing research in Bay City, Texas, in 1965. Dr. Whiteley made the needed arrangements for us. Acreage involved and yields obtained are not known to us. Thirty thousand pounds were received from Oregon plantings in 1965.

Commercial plantings of crambe were increased in 1966 over 1965. The Pacific Vegetable Oil Corporation has plantings both in the Montana-North Dakota area, and in northern California. A group in southern Indiana has 100 acres; the seed will be processed in a small mill in northern Indiana. Crambe plantings in 1966 were permitted on lands diverted for payment from feed grains, wheat, and cotton. in 1965 planting was permitted on feed grain land only.

Emphasis in crambe research at the Northern Division continues to be on (a) expanded markets for the oil; (b) improved processing methods; (c) study and identification of meal components with the objective of upgrading the meal for improved use as feed. One very promising use for the oil is the preparation of a new, tough type of nylon known as nylon 1313. Future marketing potential for crambe oil seems favorable.

Seed Mucilages: As a result of NU research and contacts one manufacturer of gums contracted in 1965 for several acres of Cassia occidentalis seed in Alabama. Unfortunately, he states that only Cassia tora was obtained; the latter species is low in gum content and the gum is of poor quality. Industrial interest in new seed gum crops continues. However, manpower limitations at NU have prevented as much emphasis as might be profitably placed on seed mucilage work.

Eighteen samples of Cassia occidentalis were compared at NU for endosperm color. It is desirable to have as light a color as possible. None were really good, but variations were noted, as follows:

	NU No.	Other Description
Lightest in color:		
	50416	PI 194854, 1963, Ames, Iowa
	17755	Gentry Collection, NCRB, Collector No. 16510
	50434	PI 204366, So. Reg. PIS, 1964
	50438	PI 204366-1, North Carolina, 1962
Intermediate in color:		
	50440	PI 204366, North Carolina, 1964
	50341	PI 204366, Oklahoma, 1964
	50439	PI 204366-1, North Carolina, 1964
	50443	PI 246379, North Carolina, 1962

	NU No.	Other Description
Intermediate in color:		
	50444	PI 246379, North Carolina, 1964
	50340	1964, Louisiana State University
	50441	PI 279,694, North Carolina, 1964
	50442	PI 292,843, North Carolina, 1964
	50335	PI 204366, Alabama, 1964
	50433	College Station, Texas, 1964
Darkest in color:		
	50119	1963, Clemson, South Carolina
	50344	PI 204366, 1963, Sandhill Expt. Sta., South Carolina
	50343	PI 204366, 1963, Peedee Expt. Sta., South Carolina
	50342	PI 204366, 1963, Clemson, South Carolina

Kenaf: Industrial interest in kenaf as a pulping raw material is being sustained in those companies already studying its potential, and is being expanded to other companies. Economic factors and the supply-demand relations of pulpwood in the South appear favorable toward future usage of kenaf. A special committee on kenaf and related annual crops was established in New York at the annual meeting of the Technical Association of the Pulp and Paper Industry (TAPPI). Mr. T. F. Clark of the Northern Division is serving as chairman of that committee.

The Northern Division in 1965 carried out extensive studies on the chemical composition and fiber dimensions of green kenaf, harvested at different stages of maturity. The investigations were in cooperation with a paper company. Dr. Killinger's demonstration plots of kenaf were particularly effective in helping to attract additional commercial attention to the crop.

Some of the principal obstacles to be overcome to secure commercial acceptance of kenaf are in areas in which the State AES's, through their agricultural engineering and other departments, might be of considerable help. Kenaf is a bulky, perishable raw material in comparison with wood. How can it through baling, briquetting, or pelletizing, or otherwise be converted economically to a more dense form? How can the moisture be effectively reduced economically to permit storage for year-round pulp mill operation? What are the effective ways of harvesting, handling, and hauling kenaf to a paper mill? The Northern Division and the companies are working on some of the pulping and technological problems of kenaf usage, and the outlook is optimistic. However, it can only become a practical raw material if help is forthcoming in solving some of the other problems raised above.

Brassica carinata: This material was first brought to the attention of NU under the name Erucastrum abyssinica by Dr. Killinger who pointed

out its field productivity. Chemical research and evaluation suggest that this species may have commercial possibilities. The seed may have utility as a condiment mustard for food purposes if seed quality and uniformity can be increased. If breeding studies could result in selection of lines containing a higher percentage of erucic acid in the oil, this plant could really "give crambe a run for its money."

REPORT OF
NEW CROPS RESEARCH BRANCH, ARS, USDA
TO
REGIONAL TECHNICAL COMMITTEES
NE-9, S-9, NC-7, W-6

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, 1965, through March 31, 1966. 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 are undertaken in the areas of: assessment of the world's plant resources; search for diverse germ plasm in the world centers 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, maintanance, 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 Montana, Nebraska, North Carolina, and Oregon. Four regional and one inter-regional introduction stations deal with the evaluation of crop breeding stocks essential to programs in State Experiment Stations.

A contract has been established at Lafayette, Indiana, to investigate the crop developmental problems of Vernonia anthelmintica, a natural source of epoxy acid in the seed oil.

Sixteen PL480 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 - 7, 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 38.5 man-years. Of this number, 4.0 are devoted to international plant exchange, 4.4 to botanical investigations, 5.0 to special plant procurement and related botanical activities. Research on new crop evaluation includes 7.5 man-years for horticultural research, 3.8 for agronomic studies, 4.8 devoted to evaluation of potential new crops, 6.0 to pathology, and 3.0 to maintenance of germ plasm.

PROGRESS -- USDA AND COOPERATIVE PROGRAMS

A. Plant Introduction

1. Breeding Stock Introduction. The international plant exchange program in 1965 yielded 6,694 introductions and 1,619 shipments were made to 108 countries. Cereals and Sorghums (1,664), Forages (1,409), and Oilseeds (1,012) constituted the major introductions.

a. International exchange. Major collections obtained through this medium included two large shipments from Rumania (116 small grain cereals) and Czechoslovakia (120 legumes). PL 480 projects contributed 500 forage grasses (Brazil S3-CR-11) and 600 Avena samples (Israel A10-CR-20).

b. Foreign exploration. Four direct explorations were completed in 1965. (1) In cooperation with FAO, a survey team in Ethiopia provided 488 lots of coffee seed for inclusion in the Miami germ plasm collection. (2) Phase two of a major bean exploration in Central America and Mexico resulted in bringing the total collections to 1,300 local types of beans. These will contribute greatly to our diversity of germ plasm for breeding disease resistance. (3) In cooperation with Longwood Gardens, a collecting trip to northern India and Sikkim gave 189 species and types of hardy ornamentals. (4) The two-man forage and grass expedition to the USSR was especially productive. Some 700 collections were obtained directly from remote regions of Central Asia and a similar number of requests were left with Soviet scientists. To date, 1,100 introductions have been inventoried from this trip. In addition to Departmental explorations, 785 oilseeds were provided as a result of a University of California expedition to India and the Middle East.

A survey was conducted in central and southern European countries on the distribution of the cereal leaf beetle. This information will be used in planning a possible plant exploration for sources of resistance to this pest.

c. Domestic explorations. Domestic exploration was at a minimum. A few token lots were added to the fruit project (S-9) and the Juniper project (NE-9). Five hundred potential ornamental and ground cover collections (NC-7) were reported but inventory records have not been completed. This project will terminate June 30, 1966.

d. Support for AID missions. The Special Plant Project provided AID technical missions with 2,888 lots of seeds and plants. For the first time in the 11 years operation of this project, a direct contact was made with mission recipients of plant materials. Seven Latin American countries were

visited for the purpose of developing a clearer understanding of their respective needs not only for crop germ plasm but also prospects of developing new crops. Progress in crop improvement is slow but, for example, trials and subsequent farm use of Pangolagrass A-24 resulted in a substantial increase in beef yield in Brazil; in Paraguay, sweet potato varieties Centennial, Unit 1-PR, and Copperskin Goldrush have been well adapted; and USDA selections of Korean lespedeza were superior to native types in Korea for erosion control purposes.

The cacao, coffee, and rubber collection in Miami continues to expand. Virus-indexing released 155 cacao clones for distribution on an international basis as disease-free germ plasm. New techniques in grafting cacao were developed at Miami as a means of speeding up indexing and providing propagating stock.

e. Maintenance of germ plasm. At the National Seed Storage Laboratory, approximately 9,000 accessions have been added to the collections reported for 1964, making a total of slightly over 43,000. Approximately 22,000 lots represent world collections.

When seeds are received in good condition with germination percentages ranging from 75% to 100%, no evidence of loss of viability has been detected.

An effort has been made during the past year to locate genetic collections for permanent storage. This has not been very successful, but during the next year additional emphasis will be directed toward obtaining such collections. At the present time the only genetic stocks in storage are those for barley (Colorado) and a collection of tomato mutants.

Seeds of lettuce, safflower, sesame, crimson clover, and sorghum stored with 4% moisture in various gases in sealed metal cans held at temperatures from 10 to 90° F. had only small losses in viability over a 60-month period.

Sorghum and crimson clover seeds with 7% moisture retained good viability for 60 months at 90° F. or less while lettuce seeds stored safely at 70° F. or less. Safflower seeds did not store well at temperatures above 70° F. and sesame seeds decreased in viability at temperatures above 30° F.

Seeds of crimson clover, safflower, lettuce, and sorghum with 10% moisture retained very good viability at 10° and 30° F. for 60 months. At temperatures above 30° F. crimson clover and sorghum seeds retained their viability better than safflower and lettuce seeds. Sesame seeds with 10% moisture did not store well at any temperature.

No inventories were published in 1965. Nos. 164 (1956), 165 (1957), and 166 (1958) are in press. Page proof has been read and all three should appear in 1966. Later inventories are in process of editorial review.

2. Plant Resources

a. Plant identification and classification. Taxonomic research on the important grass genus Lolium has been completed and results will be pub-

lished during the year. The genus Agave, important source of fibers and alkaloids, is in final stages of taxonomic revision. A comprehensive study of the seed characteristics of the leguminous genus Crotalaria has been completed and the results are in manuscript. This treatment provides keys for the identification of seed of 46 species of Crotalaria. Botanical studies in Vernonia, sources of an industrially useful new seed oil, will continue with field study scheduled in Africa for the period January-March 1967. This will provide the opportunity for collection of much-needed germ plasm of this promising new oilseed crop.

A total of 172 USDA scientific manuscripts were checked to authenticate scientific names of plants; 1,233 plant specimens and 4,140 seed accessions were identified.

b. Botanical investigations on new crops. A Correspondence Aid was prepared on psyllium (Plantago ovata), a plant long grown in India as a source of mucilage, and in which interest is now being shown among farmers in southwestern United States.

Additional seed samples of the genus Crepis have been obtained from several PL 480 countries and now eight species have been analyzed. These species were found to fall into three categories with respect to the amount of crepenynic acid and the amount of epoxy acid present in their seed oils. One group of species is high in vernolic acid (47-68%0, another high in crepenynic acid (36-65%), and a third group is intermediate in chemical composition (18-35% vernolic and 7-11% crepenynic). This species comprising these groups show, in part, a marked agreement with Babcock's sectional classification of the genus. Although the crop potential of most of the species so far investigated leaves much to be desired, the information we now have provides valuable leads for further new crops screening. The sections containing both the high vernolic and high crepenynic species are Old World in distribution with the largest concentration of species in the Mediterranean region. The species belonging to these and related sections should be thoroughly collected and studied. A joint botanico-chemical paper entitled "Compositional variation in seed oils of the genus Crepis" is being prepared for publication.

Jarilla chocola, an herbaceous member of the papaya family from northwestern Mexico, has been found to contain sufficient proteinase activity in its fruits to warrant further investigation. A mg. of Jarilla juice has the same order of activity as a mg. of commercial trypsin and more activity than a like amount of commercial papain. The habit and ecology of this plant indicate that it could probably be successfully grown in warmer regions of the United States and thus provide a domestic source of proteolytic enzyme.

The seed oil and protein screening program continue to produce promising leads to new and unusual constituents. During the reporting year 39 of the most promising of these leads were selected for further evaluation as potential new crops. Three additional species of Vernonia from Ethiopia were found to contain seed oils high in epoxy acid. Vernonia pauciflora, an erect annual with large heads, has seeds containing 41% oil which is 73% epoxy acid. Field observations suggest that this plant has considerable crop potential. These findings emphasize the desirability of a significant investment in field work on Vernonia.

c. Antitumor screening. Since July 1, 1965, 1,517 plant samples have been supplied to laboratories designated by the Cancer Chemotherapy National Service Center for preparation of extracts for antitumor screening. This number includes 1,291 new samples for general screening, 28 recollections of preliminary actives needed to complete general screening, and 156 recollections of confirmed actives.

During the reporting period new and highly promising anticancer agents were isolated from five plant species. These substances display anticancer activity against one or both of two experimental tumor systems that are considered most reliable in detecting activity likely to be similarily expressed in humans. These agents will be further evaluated in a broad array of experimental tumor systems in laboratory animals. After preclinical pharmacological study to detect possible undesirable side effects and gain data on proper dosage levels, they are expected to be cleared for trials in human patients.

Camtothecin, the anticancer constituent of Camtotheca acuminata is now known to be an alkaloid of unique structure. Chemical structure was determined by M. E. Wall, Research Triangle Institute, Durham, North Carolina, and will be described by Dr. Wall in a paper to be presented before the International Union of Pure and Applied Chemistry in June 1966. During the reporting year, Branch botanists procured over 2,500 pounds of this plant. This supply will be adequate to complete all preclinical studies and the early stages of clinical trial. An additional quantity of approximately 500 pounds is now available at Chico PIS from seedlings planted two years ago. These seedlings have been tested and are considered to contain workable quantities of camptothecin. New seedlings, adequate to produce about 5,000 pounds of Camptotheca acuminata two years hence, are available at Chica PIS for field planting during the spring of 1966.

d. PL480 projects. Professor Zohary and his colleagues under PL 480 project A10-CR-11 in Israel have continued their valuable work on the taxonomy of native grasses and legumes of economic importance. During the reporting year they have produced critical studies on the following: the genus Trifolium in Palestine; the genus Lupinus in Palestine; cytotaxonomic studies in the Israel Lotus species; cytotaxonomy of Onobrychis caput-galli; studies in Vicia; critical studies on the Palestine Ononis species; Coronilla and Hippocrepis studies; and variation in chromosome numbers within a single population of Poa bulbosa.

PL 480 projects continued to supply practically all samples entering the seed screening program during the reporting year. Israel supplied 63 samples; Korea 47; Pakistan 108; Spain 110; Turkey 175; Uruguay 181; and Yugoslavia 142, for a total of 826 samples. Of this number, 688 were seed samples, the rest for antitumor screening.

The Pl 480 project in Colombia for screening the family Solanaceae for solasodine has been completed. In the course of a four year period, more than 100 species of Solanaceae were screened. Of the 27 species that were

found to produce Solanum alkaloids, specifically solasodine, S. trachycyphum, S. marginatum, S. mammosum, and S. atropurpureum are the best choices for cultivation. Solanum trachycyphum contains the highest concentration of glycoalkaloids of all the species analyzed (6.5% in the fruit; 2.0% in the leaves and 0.3% in the stems). This species is a perennial shrub or small tree and is probably not suitable for cultivation in temperate regions. The other three species are annual herbs and might be cultivated in the southern U.S. In all cases, the fruit contained the highest concentrations of glycoalkaloids and both S. marginatum and S. mammosum fruit abundantly. S. marginatum fruit contain up to 4.6% glycoalkaloids; the immature fruit of S. atropurpureum contain 4.2%; and the juice of S. mammosum contain 18-20% of total glycoalkaloids on a dry weight basis.

The richest solasodine source to emerge from the Indian PL 480 project is Solanum khasianum var. chatterjeeanum. Fruit contain 5.4% solasodine (calculated on dry weight of fruit). Seed of this variety has been received from India and trial plantings are planned for Experiment, Georgia, and Mayaguez, Puerto Rico.

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

The considerable data gathered on two field missions to Thailand were collated and categorized. This task culminated in the publication, in December 1965, of a comprehensive report (CR 49-65), entitled "Vegetation of Southeast Asia: Studies of Forest Types 1963 - 1965."

This report is of considerable military value, as a source of reference, and in correlating the principal forest types of the Mekong basin countries. It contains descriptions of the major Evergreen and Deciduous forests of that region, based on ground studies, supplemented by aerial observations, and the distribution of the principal formations and dominant tree species of that area. The physiognomy, climate, pedology, and other natural features of Thailand, Vietnam, Cambodia, and Laos are discussed. Attention is drawn to some of the most frequent plants, with a wide distribution in Southeast Asia, which are considered hazardous from the standpoint of the military.

Field work in Puerto Rico was primarily concerned with the study of plant succession following application of herbicides and to compare succession in defoliated and radiated forests. No substantial differences were detected in succession in forests cleared by (1) mechanicam means, (2) chemical defoliants, and (3) radiation; except that there may be a narrower array of seedlings invading herbicide-treated plots than radiated plots.

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. The screening programs for desirable horticultural characters and for resistance to adverse environmental factors and diseases have been particularly active at the Chico, Glenn Dale, and Miami Plant Introduction Stations.

Emphasis at Chico continues on development of Actinidia chinensis as a new fruit crop for the mild temperate areas of the country. A seedling population has started to fruit and several have been selected for further study. The seed germination experiments showed that stratification at 40°F. followed by alternating temperatures gave the best germination. A journal article containing these results has been approved for publication.

One hundred pounds of fruit, believed to be the first commercial crop of Chinese gooseberries produced in this country, was sold last season in the San Francisco wholesale market. It brought 60¢ per pound. Propagation material for the planting came from the Chico station. Plantings totaling 27 acres are at various stages of establishment in California ranging from recently sown seed for rootstocks to seedlings ready for budding the commercial varieties.

At Glenn Dale, the major emphasis in research with fruit introductions is on virus studies. Apple, pear, and grape are being indexed for the presence of latent viruses for the first time as part of the quarantine procedure. The research studies include methods of detection and identification.

Detection of stone fruit viruses is more advanced. Sixty-five virus-free introductions have been released from the program. Of the foreign introductions indexed to date, 52% have been infected.

Evaluation of tropical and subtropical fruit introductions at the Miami station has been slowed by the devastating hurricanes of 1964 and 1965. Evaluation plots of most fruit introductions, usually seedlings, were almost completely defoliated during both storms. In addition there was considerable breakage of branches and almost a complete loss of fruit.

The testing of excised branches of avocado seedlirg for cold hardiness in test chambers was conducted. While inconclusive, the tests do indicate a difference in cold tolerance between progenies and between individual seedling within progenies. Usually leaf blade hardiness (mesophyll) and vein hardiness (vascular tissue) appear to be correlated, but some plants have relatively hardy leaf blades with quite tender veins.

Horticulturists at the New York State Experiment Station reported that the 'Senga Sengana' strawberry, P.I. 264680, performed well during 1965. This leading variety from Europe produces medium-sized, dark, glossy berries which cap easily. The berries are about as soft as in 'Catskill'.

The 'Kerman' (P.I. 121776) pistachio, so far the overall best selection made at Chico, has shown a strong biennial bearing tendency as the trees grow older. There was a light crop in 1965, partially because of cool

damp weather during the blossoming season. One tree of this clone at Chico has been a consistent cropper when others have failed. During 1965, it produced 160 pounds of nuts, fresh weight, which gave about 46 lbs. of dry, clean, well-filled nuts. A local nut-handling concern paid $1.00 per pound for the 1965 crop of pistachio nuts. Two local growers each marketed about 100 lbs.

b. Vegetables. The vegetable germ plasm collection was expanded considerably during the year. Hundreds of lines of Phaseolus vulgaris and other Phaseolus species from Central America and Mexico were added as a result of Branch collecting activities in these areas. As rapidly as possible the new collections will be evaluated for disease and insect resistance. Of special interest at present are characters for resistance to bean root rot (Fusarium) and the bacterial blights. A few years ago these diseases were thought not to be troublesome in specialized areas of the West, where bean seed crops are grown. During recent years, even these areas have been invaded by the diseases and breeders are seeking new sources of resistance. There is evidence that plant introductions may contain heritable characters for tolerance to the bacterial diseases. At the University of Nebraska, P.I. 165078 from Turkey was more tolerant to bean bacterial wilt than were commercial dry bean varieties. At the University of Wisconsin, P.I. 150414 from El Salvador showed a high degree of tolerance to races 1 and 2 of halo blight.

Phytopathologists located at the regional stations compiled disease resistance summaries during the year, listing sources of resistance in carrot, onion, pumpkin-squash, and southern pea (cowpea).

During the year 67 potato introductions were indexed for virus diseases. Of these, 20 introductions were released as virus negative and 47 positive. A revised inventory of introduced tuber-bearing Solanum species was issued by the IR-1 Project. All accessions are listed by Plant Introduction number.

Ten introductions of Chinese waterchestnut from Hong Kong were grown in replicated plots for three years at Savannah for yield in comparison to the original introduction received 30 years ago. Five of the introductions which yielded significantly more marketable-sized corms than the other five will be retained for further study.

Screening tests at the Georgia Experiment Station located sources of immunity to bean yellow mosaic virus in four introductions of Vigna sinensis (P.I.'s 154134, 160024, 175962, and 177101).

Cucumber breeders in South Carolina and Hawaii report several new breeding lines and varieties ready for release with resistance to downy mildew, powdery mildew, anthracnose, angular leaf spot, cucumber mosaic, and watermelon mosaic. Gynoecious lines for production of both slicer and pickle types are being developed in South Carolina. Several plant introductions supplied the genes for disease resistance and gynoecious flowering.

The 'Butter King' lettuce, selected from P.I. 211118 at Ottawa, was an All-American vegetable selection in 1965. It is a butterhead type larger than 'White Boston' and more tip burn resistant.

Out of 977 introductions of Pisum sativum screened by Oregon State Experiment Station, 31 remained uninfected with alfalfa mosaic virus, four were resistant to pea streak virus, four were resistant to powdery mildew, but none were resistant to clover mosiac virus.

The Utah Agricultural Experiment Station and the USDA have released to tomato breeders the curly top resistant tomato breeding line CVF4. This line is also highly resistant to verticillium and fusarium wilts. Three small-fruited species, Lycopersicon peruvianum var. dentatum (P.I. 128660), L. hirsutum (P.I. 126447), and L. pimpinellifolium were crossed to produce a resistant breeding line which was crossed with commercial tomatoes. Vegetable varieties and breeding lines released during the year with germ plasm from plant introductions are: (1) 'Tuckers Forcing' tomato, A red fruited wilt and mold resistant forcing tomato. V. N. Lambeth. 1965. Univ. of Mo, Res. Bul 597, 8pp; (2) 'Mountaineer', A white half-runner bean introduction by New Hampshire Agr. Expt. Sta. from P.I. 236467; (3) 'Poinsett', a slicer type cucumber with resistance to downy and powdery mildew and to race 1 anthracnose from P.I. 197087 and P.I. 220860, released by South Carolina Agr. Exp. Sta; (4) 'Tomato Breeding Line CVF4', a curly top resistant tomato breeding line released jointly by USDA and the Utah Agr. Exp. Sta. Resistance to curly top came from P.I. 128660 and P.I. 126447; (5) 'Immokalee', a disease resistant, determinate vine-type tomato with genes for disease resistance from P.I. 79532 and P.I. 126445. Released by Florida Agr. Exp. Sta.

c. Ornamentals. At Glenn Dale hybrids of the highly fragrant Camellia lutchuensis with odorless cultivars of C. japonica have produced their first flowers. Although odor in the hybrids varies considerably, some seem even more fragrant than the C. lutchuensis parent. The seedlings flowering to date have had single to semi-double flowers, usually not over two inches in diameter. They are being back-crossed to C. japonica.

Pollination studies at Glenn Dale revealed that the 'Bradford' clone of Pyrus calleryana is self-incompatible. It is also incompatible with P. communis and P. Harbin (Hansen). It sets moderate crops of small fruit when pollinated with some other Oriental pear species and heavy crops with other clones of P. calleryana.

Ornamental clones developed from plant introductions are: 'Kinbyobu' chrysanthemum from P.I. 231097, released to nurserymen by the U.S. Department of Agriculture and the Montana Agricultural Experiment Station on January 11, 1965; 'Cheyenne', a hardy privet from P.I. 107630, released to nurserymen by the U.S. Department of Agriculture on April 8, 1965; 'Longwood', clone of Euonymus fortunei from P.I. 275073, released to nurserymen by the U.S. Department of Agriculture on September 17, 1965.

2. Agronomic Crops. Agronomic research largely reflects the activities of the four regional cooperative programs, NE-9, NC-7, S-9 and W-6. These combined State-Federal research efforts on preliminary evaluation of forage and other agronomic crops bring to light a multitude of sources of genetic diversity, resistance to insects and diseases, and similar factors essential to meet the requirements of shifting our principal regions of grassland agriculture.

a. Forage crops. Accessions of certain warm-season grasses, to include Andropogon, Bothriochloa, Cynodon, Dichanthium, and Digitaria are being evaluated for cold and drought tolerance, seed production, disease and insect resistance, and production capacity. The range of adaptation of certain Digitarias is being ascertained through plantings at widely separated locations throughout the Gulf of Mexico region and in Hawaii. Other accessions are being utilized in basic research to ascertain phylogenetic relationships within this complex genus. The Oklahoma collection of warm-season grasses, comprising some 1,300 accessions of Anrodpogon, Bothriochloa, Cynodon, and Dichanthium, is being increased and evaluated at the S-9 Regional Station as time, labor and space permit.

'Magnolia' ryegrass was released jointly by the Mississippi Agricultural Experiment Station and ARS. Four plant introductions were used in its development. Outstanding among the attributes this grass possesses is that of resistance to crown rust.

The low alkaloid content of Lupinus angustifolius from Sweden, P.I. 189191, contributed to the development of 'Rancher' lupine, a gray leafspot resistant variety, released jointly by the Georgia Agricultural Experiment Station and ARS.

The majority of evaluations conducted in the North Central Region (NC-7) is carried out by various State cooperators. Outstanding winter hardiness is reported for certain Bromus and Festuca accessions from Alaska, some of which are being incorporated into plant improvement programs. Two accessions of Elymus, E. arenarius var. mollis (P.I. 294105) and E. arenarius (P.I. 294636), exhibit disease resistance and winter hardiness; they are being incorporated into plant breeding programs. Dactylis glomerata (P.I. 262459) is winter hardy and exhibits some rust resistance. Exceptional vigor is reported for three accessions of Eremopyrum (P.I. 219964, P.I. 220568, and P.I. 239711). Four accessions of Panicum miliaceum are being used in the improvement of seedcoat color. Seed of this species is used in birdfeed mixtures. Winter hardiness is reported for four accessions of blue panicgrass, Panicum antidotale. Accessions of Phalaris canariensis are being used in plant improvement programs aimed toward increasing seed production in this pasture grass. A dwarf strain of Phalaris arundinacea (P.I. 269728) is being utilized as effective ground cover to reduce siltation in waterways by SCS.

Alfalfa introductions are being utilized in plant improvement programs in Indiana, Illinois, Ohio, Nebraska, Minnesota, and Maryland, among other states. In addition, portions of the collection of some 600 accessions are being screened for disease and insect resistance by Federal, State, and private researchers. One introduction (P.I. 205329) from Peru contributed to the multiple-pest resistant variety 'Washoe', developed and released jointly by ARS and Nevada.

At Geneva, New York, 30 accessions of red clover, Trifolium pratense, and 22 white clovers, T. repens, are promising for upright growth habit, vigor, leafiness, winter hardiness, good stand persistence, good spring recovery, and disease resistance.

Six accessions of tall oatgrass, Arrhenatherum elatius, and four accessions of timothy, Phleum pratense, are reported from NE-9 as being outstanding for cold tolerance and growth characteristics, to include good spring recovery, based on observations made during two growing seasons.

Interest in birdsfoot trefoil, Lotus corniculatus, continues throughout the region. Of those accessions being evaluated at Geneva, 17 show particular promise for further evaluation.

A plant breeding program is underway in Hawaii (W-6) designed to increase production and lower the depilatory alkaloid, mimosine, to an acceptable level in Leucaena leucocephala. This perennial arborescent legume is an important source of protein for livestock in Hawaii and in limited regions of Florida. Additional accessions were added to the collection held in Hawaii during this past year. Field trials are underway also in Hawaii to ascertain the production capacity of different ecotypes of this crop.

b. Cereal crops. New Crops Research Branch handled 1,107 accessions of cereal crops during the interim of this report. This material was turned over to Cereal Crops Research Branch after being processed and assigned plant introduction numbers. Thirty-four species from 52 countries were represented. Introductions of small grains are continually being used in International Rust Nurseries.

The conversion (and reduction to eliminate repetition) of the World Collection of sorghums obtained from India continues. This work is being accomplished mainly in Puerto Rico and Texas. When this phase of the work is complete, estimated completion time - two to three years - plant introduction numbers will then be assigned to those accessions requiring same. Meanwhile, accessions are being evaluated as for north as Wisconsin.

Use of corn introductions in screening for disease resistance is reported from the North Central, Southern, and Western Regions. One State in each of the Southern and Western Regions and five States in the North Central Region report the use of corn accessions in this manner. Of particular interest is the search for resistance to so-called corn stunt or corn mosaic, which has increased in scope and severity during the past few years.

Resistance to the corn earworm, obtained from P.I. 217413 (Mexico), is reported from Tennessee.

c. Fiber crops. The Boll Weevil Laboratory at State College, Mississippi, is continuing screening introductions for sources of insect resistance. Two noncommercial breeding lines were released jointly by ARS and South Carolina during the year.

Transfer of Gossypium seed stocks into the National Seed Storage Laboratory is complete for all practical purposes. Only a few lines, all difficult to obtain seeds when grown in continental U.S., have not been transferred to the Laboratory. The cessation of research with other fiber crops; i.e., Hibiscus species, located at Everglades Experiment Station, Belle Glade,

Florida, necessitated the transfer of breeding stocks to NSSL. This transfer has been completed. NSSL Seed Inventory Supplement No. 2, Cotton and Fiber Crops, CR 28-62, March 1966, was issued during the period of this report.

d. Miscellaneous evaluations. Two new guar varieties, 'Hall', derived through plant selections from P.I. 179930, and 'Mills', derived in a similar manner from P.I. 263875, were released in 1965. Both varieties possess high degree of resistance to the major guar diseases. 'Mills' matures earlier than the established variety 'Brooks', and 'Hall' matures later than 'Brooks'.

Arrangements were completed for the initial screening of all safflower introductions, and closely allied forms, at the Regional Plant Introduction Station, Pullman, Washington. This location is outside the production area for this crop, where it is considered safe from a disease standpoint to accomplish this work. This screening from field plantings supplements that being done by Oilseeds and Industrial Crops Research Branch at Beltsville.

3. Chemurgic Crops. The total U.S. acreage of Crambe abyssinica in 1965 was about 1,300 acres. The major portion of this acreage (about 900 acres) was in northeastern Montana and northwestern North Dakota. The average seed yields per acre from harvested fields in these states were approximately 600 and 700 pounds, respectively. Most fields were outstandingly free of weeds. Swathing is recommended for this area because of high winds that can cause severe shattering losses and because of differential drying of plants. Studies to determine the proper time to swath are needed. Yields probably can be boosted substantially by nitrogen fertilization and by refining cultural practices, especially harvesting.

About 100 acres were grown under contract for ARS agencies. Irrigated plantings (40 acres) at Albany, Oregon, averaged 2,150 pounds per acre. A dryland planting of 25 acres near Pullman, Washington, produced 995 pounds per acre.

The remaining acreage was in Oregon. Plantings on "white" soils were not very successful. Grower yields were considerably less than estimated yields that were obtained by taking small samples from the fields. This discrepancy indicates that more attention to time of harvesting and possibly methods of harvesting is needed.

Plant selection and improvement work has been continuing in Montana, Texas, and Washington. Montana work has shown a wide range in seed oil content of selections that are now in the S_2 and S_3 generations. Work at this location was hampered in 1965 by poor stands.

A detailed fertility-irrigation trial in Oregon resulted in yields in excess of 4,000 pounds per acre for the best combinations of nitrogen and irrigation. Plots receiving an application of 100 pounds of nitrogen at a prebloom stage with one and two irrigations yielded 3,982 and 4,180 pounds per acre. This study will be continued in 1966. Excellent yields have been obtained in the area of Tulelake, California, for the past three years. Irrigation is required.

Seed of six new Swedish accessions was increased. Crambe hispanica (P.I. 279346) was found to be fully two weeks earlier at Ames, Iowa, than other C. abyssinica introductions. A uniform nursery test for 1966 has been arranged at several locations. It will include the six Swedish lines, P.I. 284861, and the most commonly used line, P.I. 247310, as a check.

Research on Vernonia anthelmintica is being conducted at a low level until improved selections or breeding lines evolve from the intensive breeding program at Purdue University (ARS contract, Line Project CR i2-25 (C)). Increase plantings were not overly successful in 1965. Diseases or insects did not pose any problem except for a heavy white fly infestation in an increase planting at Clarkedale, Arkansas.

Plantings must be made sufficiently early in order that the ideal fruit maturity stage occurs before frost since yields and seed quality are lowered. Under irrigated conditions at Glenn Dale, seed yields in excess of 1,600 pounds per acre were obtained. Floral and fruit developmental stages can be followed by a method devised at Glenn Dale. By employing this method, the proper timing of harvest for maximum yields can be determined.

Under contract at Purdue University, all available accessions of Vernonia anthelmintica were grown and selections were made periodically. Two plants believed to be chimeras and three white-flowered plants were found. In greenhouse plantings, 41 plants from the white-flowered plants have been grown and all but 15 developed white flowers. There may have been some chance cross-pollination in the field that resulted in the 15 purple-flowered plants. It is believed that a technique has been perfected for hand emasculation of individual florets. V. anthelmintica is self-fertile and is likely self-pollinated to a high degree. The mode of pollination is being studied by autoradiographic methods.

Seed increases were obtained for selections made before the 1965 season. Most of these grew to a height of about three feet. There was variation between selections and seed yield, seed weight, and flowering date. The best selection yielded 1,535 pounds per acre when grown in wide rows (nonreplicated). It is expected that narrower rows will result in better yields.

In 1965, the first detailed agronomic evaluation of Euphorbia lagascae began. This plant, a source of epoxy fatty acids, is easy to establish and grows well vegetatively. Flowering is indeterminate and seeds shatter readily. It overwinters under conditions at Chico, California. Results for plantings in Iowa, Kansas, and Maryland show that narrow rows may be required for best yields and that planting date greatly influences seed yield. The best yield of about 750 pounds of seed per acre was obtained at Glenn Dale, Maryland, from a May 3 planting with six-inch rows.

A non replicated yield estimate of 700 pounds was obtained at Wawawai, Washington, from wide rows. Proper timing of harvest is important. Further

research is needed to determine areas of adaptation, seed yield potential, and whether the species can be handled as a perennial. The need for selection of better seed retention is evident.

Seed yields of 5,233 and 4,642 pounds per acre of fennel (Foeniculum vulgare), a seed oil source of petroselinic acid, were obtained in 1965 in a small replicated yield test at Geneva, New York. An estimated yield of about 2,400 lbs./A was obtained in 1964 in Texas.

Progress of the crop development research on Lesquerella, a source of hydroxy fatty acids has been slow, primarily because of stand establishment difficulties. Recent laboratory germination tests at Fort Collins show that germination is increased by light exposure and more strikingly by soaking in a gibberellic acid solution. Germination of seed stored in cool storage for several years was excellent when treated with gibberellic acid. A follow-up of this method will be made on a greenhouse and field basis. Fair stands were obtained in heavily seeded plots of several species in Arizona. L. palmerii holds promise because of its height and upright nature.

b. Annual pulp crops. Industrial interest in annual pulp crops, especially kenaf, has never been higher. Although wood supplies are adequate, some companies apparently are experiencing local shortages. These shortages and the supply of wood in general will likely become more acure as population and per capita consumption increase. Annual crop species offer an attractive pulp source with potentially high average yields per acre in comparison with wood. In view of the high interest in kenaf (Hibiscus cannabinus), research on Crotalaria juncea and selected sorghums is being deemphasized.

Studies in Georgia and Nebraska indicate that good weed control in kenaf with no plant damage is possible with trifluralin. In the Georgia test, yields from 12-inch rows from both cultivated (5.0 tons/A), and trifluralin treated (5.2 tons/A) plots were better than from 24- and 36-inch rows. Plots with no weed control produced yields of less than 4 tons/A. In North Carolina tests, narrow rows, 7 to 14 inches apart, resulted in yields of better than five tons per acre.

c. Other new crops. In recent years, there has been relatively little Stateside research on Teprosia vogelii because emphasis was placed on developing higher rotenoid lines through an intensive breeding program in Puerto Rico. In view of industrial interest in this species, cultural and large sized plantings for extraction are planned in 1966. In 1964 tests, three introductions and a breeding line were grown at Glenn Dale, Maryland, Clemson, South Carolina, and Mayaguez, Puerto Rico. Three plant spacings were used. The rotenoid content for all entries was lower at Glenn Dale, probably because of higher populations than from the other locations. However, total yield of rotenoids for test entries was intermediate with the best production at Mayaguez. The rotenoid accumulation pattern differed among entries but apparently was not influenced by latitude. Since stems contain only about 1/3 as much rotenoids as leaves, the leaf-stem ratio is important. Data from the test described above indicated that the leaf-stem ratio was influenced

by spacing distance and that test entries differed in their inherent proportion of leaves to stems. The leaf-stem ratio appeared to be influenced by latitude. During 1965, 33 lines and species of Tephrosia were grown at Glenn Dale and Mayaguez to compare growth habits, flowering, and fruiting. None of the species fruited abundantly at Glenn Dale. Phenological studies with T. vogelii were also conducted at Glenn Dale during 1965. These studies are designed to provide information concerning proper timing of planting and harvesting. The best dry-matter yields were obtained from irrigated April 29 plantings that were harvested on September 22 and 30. The average yields of leaves and stems for these two harvest dates were approximately 2,500 and 4,200 pounds per acre, respectively.