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M I N U T E S

of the

MEETING OF THE S-9 TECHNICAL COMMITTEE

" NEW PLANTS "

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

Florida Experiment Station
Gainesville, Florida

July 18, 19, 1963

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SOUTHERN REGIONAL PROJECT S-9; "New Plants"

University of Florida

Gainesville, Florida

A. M. Davis, Chairman; W. T. Fike, Secretary

1. Registration

The meeting of the S-9 Technical Committee was called to order by Chairman A. M. Davis at 8:30 a.m. July 18, 1963. Roll call of S-9 Technical Committee members is shown below. Others in attendance are also listed.

2. Welcome

The group was welcomed to the University of Florida by Associate Director Liles, Assistant Dean Thornton and Department of Agronomy Head Hull.

3. Minutes and Agenda

The minutes of the 1962 meeting of the S-9 Technical Committee were approved as distributed. Dr. Killinger announced plans for a buffet dinner at the Holiday Inn. Whiteley moved, seconded by Matlock and passed, that the proposed agenda be accepted as modified.

1. Registration - Provost Conference Room, McCarthy Hall
2. Welcome - Representatives of the University of Florida
3. Presentation of agenda
4. Roll call (S-9 members) - Introduction of visitors
5. Appointment of Committees
6. Potential New Crops for the South
7. State and Federal Agency reports
8. Report of S-9 Sub-Committee - Industrial potential of new crops.
9. Inventory of Clonal Stocks.
10. Seed to National Seed Storage Lab.
11. Status of Contributing Projects to S-9.
12. Development of Chart of Responsibility for 1964
13. Requests for specific plant introductions through plant explorations.

14. Other business

A. National Coordinating Committee report
B. IBM inventory cards
C. Suggestions for improved use of the Regional Station
D. Other remarks

15. Committee reports

A. Next meeting: Where? When?
B. Election of Executive Committee: (1) Chairman; (2) Secretary, (3) Resolutions

16. Adjourn

17. Tour Experiment Station, University of Florida

4. Roll Call of Members

Administrative Advisor	R. L. Lovvorn	
Regional Coordinator	W. R. Langford	
Alabama	C. S. Hoveland	Absent
Arkansas	A. M. Davis, Chairman	
Florida	G. B. Killinger	
Georgia	A. H. Dempsey	
Kentucky	W. H. Stroube	
Louisiana	J. C. Miller	
Mississippi	H. W. Bennett	
North Carolina	W. T. Fike, Secretary	
Oklahoma	R. S. Matlock	
Puerto Rico	Hassan Azzam	
South Carolina	J. A. Martin	
Tennessee	W. E. Roever	
Texas	E. L. Whiteley	
Virginia	T. J. Smith	Absent

Coop. State Exp. Stations Service, Washington, D. C.	D. Y. Perkins
New Crops Research Branch, Beltsville, Maryland	A. J. Oakes
Soil Conservation Service, Athens, Ga.	W. C. Young
Northern Util. Res. & Develop. Br., Peoria, Ill.	F. R. Earle
Chermurgic Crop Investigations, NCRB, Beltsville	J. R. Haun

Visitors

J. W. Sites, Associate Director, Fla. Agr. Expt. Station.

George Thornton, Assistant Dean, College of Agriculture, Univ. of Florida

Fred Hull, Head, Dept. of Agronomy, University of Florida

Grover Sowell, Regional Plant Introduction Station, Experiment, Ga.

C. B. Blickersderfer, USDA - SCS, Palmetto, Florida

H. J. Haynesworth, USDA - SCS, Arcadia, Florida

S. H. Schank, Asst. Agronomist, Univ. of Florida

O. C. Ruelke, Asst. Agronomist, Univ. of Florida

5. Appointment of Committees

Chairman A. M. Davis appointed the following committees:

Nominations	Time and Place of Next Meeting	Resolutions
J. C. Miller, Chairman	Hassan Azzam, Chairman	H. W. Bennett, Chm.
W. H. Stroube	W. C. Young	E. L. Whiteley
J. R. Haun	W. T. Fike	W. E. Roever

6. Potential New Crops for the South

The following progress reports on the developmental status of some potential new crops were presented and discussed by the group. Copies of these reports are found in Appendix A.

A. Crotalaria juncea, a New Crop for Paper Pulp and Soil Improvement - E. L. Whiteley

B. Sugar Beet Production in the South - A. M. Davis

C. Crotalaria intermedia, a potential Seed Gum Crop - W. T. Fike

D. The future of Guar as an industrial crop depends on Agronomic Research - R. S. Matlock.

E. Sesame - J. A. Martin

7. State and Federal Agency Reports

Reports by committee members were given in the following order - these reports are summarized in Appendix B.

Alabama	G. B. Killinger (for C. S. Hoveland)
Arkansas	A. M. Davis
Florida	G. B. Killinger
Georgia	A. H. Dempsey
Kentucky	W. H. Stroube
Louisiana	J. C. Miller
Mississippi	H. W. Bennett
North Carolina	W. T. Fike
Oklahoma	R. S. Matlock
Puerto Rico	Hassan Azzam
South Carolina	J. A. Martin
Tennessee	W. E. Roever
Texas	E. L. Whiteley
Virginia	W. R. Langford (for T. J. Smith)

Regional Plant Introduction Station - Langford and Sowell

Cooperative State Expt. Stations Service - D. Y Perkins

New crops Research Branch - A. J. Oakes

Northern Utilization Res. & Development Division - Earle

Soil Conservation Service - W. C. Young

Crops Development Section of NCRB - J. R. Haun

Discussion by various committee members followed all reports.

Sowell reported that there is on file at Experiment a list of all disease resistant PI's in the nation. He will make it available to anyone interested.

John Creech, NCRB representative, was unable to attend the meeting because of a plant exploration trip to Russia. Collections are being made of ornamentals and fruit crops.

Remarks by the Administrative Advisor

Dr. Lovvorn suggested that an additional half day be added to the number of days allowed for the meeting or else a night meeting should be scheduled so that all members of the committee could take the tour of the experiment station. This is one of the main reasons for holding these meetings at the universities of member states.

The Southern Directors voted to eliminate all RR pooled funds except for two projects, one of which is S-9, New Plants.

Killinger moved, seconded by Stroube and passed that pooled regional research funds be continued to be used in support of the regional station.

Each member of S-9 was delegated the responsibility of gathering facts and information concerning PI's, their use, and their value to the states. This information should then be presented to their respective directors to support the contined use of pooled regional funds to maintain the regional station at Experiment, Georgia.

It was suggested at the National Coordinating Committee Meeting concerning New Crops that each regional project have a representative from the Forestry Service. Dr. Lovvorn will contact the Forestry Service concerning representation.

8. Report of S-9 Sub-committee - Industrial Potential of New Crops.

It was moved by Matlock and seconded by Whiteley and passed that the following report be incorporated into the minutes and forwarded to the Crop Research section and the Plant Exploration Section of the New Crops Research Branch and the Utilization and Research and Development Branch.

Report of S-9 Subcommittee on Industrial Potential of New Crops

Four to eight entries were included in annual pulp fiber tests at the Florida, Georgia, Louisiana, North Carolina, Oklahoma, South Carolina and Texas Experiment Stations. The entries included accessions or line of Crotalaria juncea, kenaf, okra, and sesbania. The committee recommends that in addition to the best one or two lines of each of the above crops that representative accessions or strains of sorghum be considered for inclusion another year.

The subcommittee recommends the following for consideration by the S-9 technical committee: (1) That those crops from the utilization screening program that have industrial potential be announced to the Crop Development Section in time for determining seed germination, literature review and potential industrial use(s) prior to the time of the S-9 summer meeting (by December 1, for 1963). During the annual S-9 summer meeting (by correspondence) the crops will be discussed which will be planted in the season following the annual meeting, i.e., in the fall or spring depending on the seasonal habits, (2) that the seed of a particular entry originate from a common source, (3) that the cordinator circulate a form

listing basic and supplemental entries with available seed for a pulp, oilseed or mucilage tests so seed can be requested well in advance of the planting season, and (4) that whenever crops are removed from the potential use category that the information concerning the reason for its removal be made available to the S-9 cooperators.

Respectfully submitted

Eli L. Whiteley, Bill Fike, Ralph S. Matlock, Chr.

9. Inventory of Clonal Stocks

The inventory dealing with "A Survey of Apple Clones in the United States" has been completed and published, ARS 34-37-1, May 1963. Inventories of pears and other tree fruits and nut crops are being prepared for publication.

Inventorying of other clonal stocks such as small fruits, vegetables, and forage and turf was discussed. The committee agreed that surveys of clonal stocks of these crops should be initiated and conducted simultaneously. Dr. Oakes was requested to develop inventory cards and furnish instructions for the inventory of forage and turf stocks.

10. Seed to National Seed Storage Lab.

Each state has a representative appointed by its Director to coordinate seed storage of named varieties and valuable breeding stocks. This representative has a list of varieties stored at NSSL. Each S-9 representative should check the list to see that all Station released varieties have been sent to the Seed Storage Lab at Fort Collins.

11. Status of Contributing Projects to S-9.

The 1962 revision of the S-9 Regional Project has been approved. Ten state projects and several ARS line projects have been accepted as contributing projects.

A brochure containing the Regional Project and most contributing projects was passed out to each member by Langford.

12. Development of Chart of Responsibility for 1963-64.

The chart of responsibility has been revised for the coming year and appears in Appendix C.

13. Requests for Specific Plant Materials Through Plant Exploration

A. J. Oakes will be making an exploration to South Africa in January, 1964. (W. T. Fike left the meeting at 2.20 p.m. and G. B. Killinger was asked to serve as secretary for the balance of the meeting.)

Dr. Oakes requests technical committee members check with their state personnel and write him and Langford for the particular grasses, legumes, and/or other crops for plant exploration parties.

Dr. Oakes reported that according to Hyland the collection of domestic fruits in the South should be brought to a conclusion soon.

Dr. Miller made a plea to continue the project. Dr. Oakes states it was hoped the fruit plantings would be maintained and evaluated but the collection of stocks should be completed.

Dr. Langford stressed under domestic fruit project that financial support from the New Crop Research Branch was for collection and not maintenance, and Dr. Oakes said this was the point.

14. Other business

A. Report of National Coordinating Committee

Dr. Davis reported: Each coordinator gave a report for his region at the Washington meeting. Other project leaders, Dr. Ivan Wolff and Quenton Jones also reported. Mr. Hyland reported on seed deterioration in storage and raised some questions and problems. Next meeting of Nat. Coordinating Committee should meet in the South two years hence and Louisiana and Puerto Rico both put in a bid for same. The minutes of the meeting should be available shortly.

B. IBM cards were discussed by Dr. Oakes, very briefly. Dr. Oakes has been designated by his boss to initiate an IBM system with headquarters at Beltsville. The four Federal Stations and National Seed Storage Laboratory will all come under the IBM card system.

Question by Davis: Where do the individual states fit -- reports will be given to Langford and he will apply the code and place on cards.

Basic documentary information will only be put on the cards at Beltsville.

Each Regional Station will have duplicate punched IBM cards for all crops for which the region is responsible.

C. Suggestions for improved use of Regional Station.

Langford stressed need for getting seed inventory lists in proper hands. Whitley says we need more copies of seed lists and Killinger agrees. Grover Sowell would like more suggestions on diseases to be studied. When IBM code cards are put into use, Langford requests comments from Technical Committee members on what characters should be coded.

D. Other remarks.

Dr. Stroube suggests: Compile list of known sources of resistance to plant diseases -- made into a motion and passed. Each state to furnish information on resistant lines to specific diseases to Dr. Sowell.

Preparation of Annual Report

The 1962 annual report will be prepared by W. T. Fike. The report should summarize the accomplishment of contributing projects and the activities of the regional station. Dr. Fike will call for the state reports by December 1, 1963.

15. Committee Reports

A. Meeting place and time reported by Dr. Azzam.

Proposed North Carolina as first choice and Texas as alternative. Exact time or date left to the executive committee and host state. Discussion: August not too good a month. July better suited to most members. Left to discretion of executive committee and host state with a July date preferred. The meeting will be held in North Carolina during July.

B. Nominating committee report by Dr. Miller -- Chariman 1963-64, Dr. Fike, Secretary 1963-64 Dr. Whiteley. Moved nominations cease and Dr. Fike and Dr. Whiteley proclaimed unanimously elected.

C. Resolutions.

Resolutions Committee Report by Dr. H. W. Bennett. The Resolutions Committee moves that:

A special note of thanks be given to the officials of the Florida Agricultural Experiment Station. Drs. Sites, Thornton, Hull, and Killinger for the excellent arrangements and facilities afforded the meeting of the S-9 Committee. Our sincere thanks go to Dr. and Mrs. Killinger for their gracious hospitality and the delicious dinner given the members during the meetings. The many courtesies extended the committee helped to make the meeting personally enjoyable and professionally profitable.

The resolutions committee further moves that. The committee extend a special welcome to Director Lovvorn and Dr. Perkins to the committee.

The resolutions committee further moves that. The committee extend our special thanks to Dr. Whitehouse for his contributions to the New Crops project and our best wishes for his happiness in his retirement.

16. Adjournment

Meeting adjourned at 3:15 p.m. to take members to the airport.

17. Tour of Experiment Station

Nine members of S-9 toured the Agricultural Experiment Station at 4:00 p.m.

APPENDIX A

Potential New Crops For The South

Crotalaria juncea - A New Crop for Paper Pulp and Soil Improvement

Eli L. Whiteley[1]/
Texas A&M College

The Crotalarias have been used as soil improving crops in Texas for many years. The early records of the Station show that a number of species of Crotalaria were tested on the Substations as early as 1908. Crotalaria juncea was introduced into Texas from Puerto Rico or Cuba in 1934. It is a native of India and is naturalized in the West Indies. Research on C. juncea was started in 1934 at the Lower Rio Grande Valley Substation at Weslaco, Texas to determine its value as a soil improving crop. The original seed were quite mixed and efforts were started to purify a few lines of the material before a formal project was set up to test C. juncea. When the demands for paper pulp became great and the search for an annual pulp crop was intensified, personnel of the Texas Agricultural Experiment Station turned to C. juncea as a source of paper pulp.

Crotalaria juncea is a summer annual growing to heights of 6 to 14 feet. It is a member of the Leguminosae family and is easily innoculated and produces an abundance of nodules. The flowers are borne on terminal racemes and are bright yellow in color. The seed are black in color and are borne in pods containing 18 to 20 seed per pod. The seed resemble alfalfa in shape and are about 1/16 x 1/8 inch in their smallest and largest dimensions respectively.

The Crotalarias contain alkaloids in both the plants and seed which are poisonous to livestock. The seed of Crotalaria should not be mixed with feed grains. Several lines of Crotalaria juncea have been isolated which have a low alkaloid content. When these lines are properly developed all danger from alkaloids should be eliminated. The total alkaloid content of some of the C. juncea lines isolated by Mr. W.R. Cowley at Weslaco, Texas are shown in Table 1.

Table 1. The total alkaloid content of certain C. juncea lines isolated at Weslaco, Texas.

Line Number	Percent Alkaloid Found
17	0.036
44	0.059
179	0.039
214	0.060
296	0.077
299	0.036
386	0.022
391	0.052
501	0.043
3745	0.013
Unselected stocks	0.134

1/ Associate Professor, Department of Soil and Crop Sciences, Texas A&M College.

The solvent system used for the alkaloids from extracts of C. juncea consists of sec-butanol; formic acid; water in a ratio of 75:15:10 by volume respectively. The alkaloids are detected by spraying the dried chromatogram with potassium iodoplatenate or Dragendorff's spraying agent. The data presented above were determined by Dr. B. J. Camp, Department of Biochemistry and Nutrition, A&M College of Texas.

In laboratory scale pulping studies Crotalaria juncea has yielded 57.0 percent of screened sulfate pulp. This compares favorably with spruce and maple pulped under identical conditions which gave yields of 57.8 and 56.4 percent pulp, respectively. The strength characteristics of handsheets made from C. juncea are comparable to blends of hardwood and softwood pulps. Average fiber lengths of C. juncea compare favorably with those of hardwoods but are considerably shorter than the fiber lengths reported for softwoods. The pulp from C. juncea should be suitable for making some grades of paper.

An estimate of production costs under Texas conditions is presented in Table 2.

Table 2. Estimated costs per acre for producing and harvesting Crotalaria juncea, College Station, Texas, 1963.

Cost Item	Cost based on the production of S T per acre
Land preparation	$ 3.50
Seeding	1.50
Fertilizer and Cultivation	6.00
Seed ($15 per cwt.)	4.50
Harvesting	3.50
Hauling (25 miles)	10.00
Interest on land (5%)	5.00
Taxes (1 1/2%)	1.50
Overhead and Miscellaneous costs	2.00
Total Costs	$37.50

The total costs for producing and harvesting five tons of Crotalaria juncea per acre are estimated to be about $37.50 per acre. In estimating these costs it was assumed that the C. juncea would be harvested and loaded with a forage harvester. If the dry material was worth $7.50 per ton the farmer would break-even at a yield of five tons per acre. At double the above price, or $15.00 per ton, the farmer would make a profit of $37.50 per acre. If the yield of dry material was increased to ten tons per acre, the hauling and harvesting costs would be increased and profits would also be increased. The total costs of producing ten tons of dry material is estimated to be about $49.50 per acre. At a selling price of $7.50 per ton the profit would be $25.50 per acre and at $15.00 per ton the profit would be $100.00 per acre.

These figures may seem somewhat optimistic, but they are based on average production and handling costs of similar materials and should not be too far from the actual costs that could be expected to occur in farm production of Crotalaria juncea.

The storing, handling and processing of Crotalaria juncea will probably be more expensive than pulpwood. The cost of storing and handling of wheat straw is approximately $1.50 to $2.50 greater per ton of pulp produced than for pulpwood. The cost for C. juncea should be similar to cost for wheat straw. However, this cost could be reduced considerably by increased mechanization of the handling process.

The processing costs for Crotalaria juncea should be less than the costs for pulpwood. Industry sources indicate that chemical and power consumption in wheat straw processing is one-third to one-half of that required for processing pulpwood. Processing costs for C. juncea should be similar to that of wheat straw and this reduction should offset the higher handling and storage costs.

The yields of oven dry material from Crotalaria juncea have varied between three and ten tons per acre. Yields of Texas line number 374 averaged seven tons per acre in 1962. Another Texas line, number 214, produced 8.2 tons per acre. These yields were produced on the A&M College Plantation in Brazos river valley. These plantings received 0.29 inch of rainfall between June 22 and September 5, 1962. If near normal rainfall had occurred, they should have produced over ten tons of dry material per acre.

Plant spacing both within and between the rows is an important factor in yield of Crotalaria juncea. Research in Texas indicated that when the plants are spaced about 1 1/2 inches apart in the row and the rows 20 inches apart yields are almost double those from a 1 1/2 inch spacing in the row and the rows 40 inches apart. Considerable work needs to be done on stand density and fertility needs of C. juncea under different spacings within the rows and between the rows.

Spacing within the rows and between rows will determine to some extent the diameter of the Crotalaria juncea stalks. This may be a factor in the harvesting and processing of the plants. One paper company has indicated that they would like stalks with diameters between 3/4 and 1 1/2 inches. Stalks more than one inch in diameter would present a problem in the harvesting operation due to the short cut of 1/4 to 3/4 inch desired by the company. Stalks 3/4 inch in diameter or smaller present no appreciable problems in harvesting. Crotalaria juncea can be harvested with an ensilage harvester with very little modification of the equipment provided the stalks are not more than 3/4 inch in diameter.

The use of Crotalaria juncea as a soil improving crop is being studied in the Blackland area of Texas. A three acre planting was made on the Stiles Farm Foundation at Thrall, Texas. The resistance of C. juncea to cotton root rot is being investigated and yields of cotton following C. juncea turned under as a soil improving crop will be determined. Yields of cotton in the Rio Grande valley have increased between 25 and 50 percent following C. juncea used as a soil improving crop. Cotton root rot has been less damaging following C. juncea

than any other crop observed to date. These observations indicate that a research program should be initiated to study the effects of C. juncea on the occurrence of cotton root rot in cotton following C. juncea turned under as a soil improving crop.

The Crotalaria juncea planting on The Stiles Farm Foundation at Thrall, Texas was made on land which was planted to cotton in 1962. Ninety percent of the cotton in this area was killed by cotton root rot. As of July 2, 1963 none of the C. juncea had been killed. Cotton in other areas on the farm was showing severe killing of cotton by root rot on July 2, 1963. If this planting increases the yield of cotton in 1964 a research project will be developed on the use of C. juncea as a soil improving crop.

SUGAR BEET PRODUCTION IN THE SOUTH

A. M. Davis
University of Arkansas

It would appear that N. E. Arkansas, S. E. Missouri and N. E. Tennessee are about to get into the sugarbeet business. This is also true to varying degrees of Western Oklahoma and Arizona. In Arkansas last year yields were seriously reduced by Cercospora leaf spot. The yields followed very closely the degree of resistance possessed by the variety. The top yields were 18 tons of topped beets with a sucrose content of 16% and 96% purity. This is within the range of commercial production. These yields were obtained on 42 inch rows. The most widely used single row width is 24 inches, due to lack of field equipment to handle the narrow rows the wider rows were employed.

At present commercial field size plantings exist in the three state area mentioned above. These have been planted on wide topped "vegetable" beds with 2 rows per bed. This permits use of power equipment on hand and only modifying the cultivator. These fields are now showing evidence of disease attack and fungicides are being employed. If these are effective in controlling Cercospora, yields in the neighborhood of 25 tons can be expected. On heavy land, Mississippi aluvium, harvesting difficulties are anticipated if heavy fall rains occur. This is frequently a problem with soybeans and cotton.

If these problems **are not** insurmountable a sugarbeet processing plant will be built in the northern part of the cotton belt in 1964.

"Sesame" by J. A. Martin

Clemson College

Most of the sesame produced in the United States goes into confection trade. Sesame seed are now bringing 13.50 cwt. for use in this trade. When used for oil the seed bring from 6 to 7 cents a pound.

First emphasis should be placed on an oil variety with the non-shattering habit. At present the non-shattering varieties yield less and have smaller seed than the shattering varieties. These non-shattering varieties cannot now compete at oil prices.

A research report on Sesame was passed out. It is available from the Horticultural Department at Clemson under the title "Sesame and Castorbean Research in South Carolina - 1962" Research Series No. 41, January 1963.

The Future of Guar as an Industrial Crop Depends on Agronomic Research

Ralph Matlock and Theodore Hymowitz
Department of Agronomy, OSU

Guar production guides have been developed primarily from experience. Under dryland conditions in Southwestern Oklahoma, returns to land, labor, risk and management were estimated as $6.09 per acre for guar and $6.16 per acre for grain sorghum. Under experimental conditions, seed yields of 2000 pounds per acre have been obtained. This is more than three times the average yield of commercial fields. Factors that may limit seed yields and indirectly the amount of galactomannan produced per acre include (1) disease susceptibility, particularly Alternatia leafspot and bacterial blight, (2) lack of early maturing strains,and (3) strains adapted to specific regions.

Approximately 150 accessions were collected by the junior author (Fulbright Scholar, I.A.R.I. New Delhi, India) from farmers' field in the India states of Rajesthan, Gujerat, and in the Punjab. These states account for about 90 percent of the total guar production in India. Many of these introductions are new to this country, i.e., in respect to areas where guar collections have not previously been made. At the Oklahoma Experiment Station the previous introductions have been evaluated and useful germplasm has been found which if incorporated into the present agronomic types would make the crop adapted to other regions.

Whether guar succeeds as a permanent crop depends on the attitude of private, state and federal agencies. It is useless to spend money on finding industrial uses for guar gum without simultaneously supporting investigations on cytological, genetic, and cultural practices on the cultivated crop. It is obvious that a farmer will not grow guar if his net return per acre is not competitive with other crops.

There are several advantages that guar may have as a source of galactomannan gum for industrial use. They include: (1) as far as it is known guar does not have an alkaloid factor in its seed; (2) a valuable germplasm bank has been established, (3) a marketing system has been established for the grower of the seed; (4) the mature seed do not shatter; (5) there is no volunteer problem, and (6) industry has invested millions of dollars in building guar gum production plants not only in the United States but also in other countries, e.g. India and Pakistan.

Natural hybrids have been noted by Texas investigators. One strain selected by these investigators and tested at several locations in both Oklahoma and Texas appears to show promise as a stop gap variety. Breeder seed of this strain (Groehler-1-2) is being increased for possible release in 1964.

If the average yield of guar were increased to even 1000 pounds per acre, the farmer at the current market prices, would net approximately $15 per acre. This would put guar in a more favorable competitive position with other crops in respect to profit per acre.

POTENTIAL NEW SEED GUM CROPS FOR INDUSTRY
Progress Report - 1960-62

W. T. Fike
North Carolina State College

In 1960 approximately 22 million pounds of polysaccharide gums were used in the United States in paper, food, textile and mining applications. The one crop grown on a limited acreage in the United States for this gum is guar. "Biggest use for guar gum is in the paper field, where it's used in the 'wet end' of paper making to replace or supplement the natural hemicelluloses in the paper. It's also used to improve retention of fillers and as an additive in size press or calendar operations. About half of the guar gum now used in the U. S. goes into papermaking. The bulk of the rest is used in mining (as a flocculant); in foods (as a thickener; and binder of water), in cosmetics (as a thickener); and in explosives (to improve water resistance)"1/

Most of the guar gum is imported from India and Pakistan at the present time as seed yields of guar in this country are low and adaptation is limited. With this in mind, Dr. I. A. Wolff and Dr. Quenton Jones of the USDA are screening the plant kingdom for new sources of seed gum.

Many species in the genera Crotalaria and Cassia have high percentages of gum in their seed. A few of those tested agronomically during this period were Crotalaria intermedia, Crotalaria lanceolata, Cassia occidentalis, and Cassia marilandica. Five more species are to be added to the list in 1963.

Crotalaria lanceolata and Cassia marilandica were discarded by the research chemists in 1961. C. lanceolata grew well in North Carolina but yields were in the range of 250-500 pounds per acre. C. marilandica seed did not germinate and those plants transplanted to the field did poorly under field conditions.

Research on Crotalaria intermedia has been partially discontinued by the USDA due to toxic properties of the seed. The same could be said for Cassia occidentalis as the seed of this crop are extremely toxic.

Even though the USDA has dropped their research on C. intermedia, interest by commercial concerns is quite high. Seed requests for ten tons of this seed were made to Dr. E. L. Whiteley of Texas and myself in 1962. A representative of Stein Hall visited with me just last month so interest is still very high. A few companies interested in obtaining seed of Crotalaria intermedia are:

1. The Burtonite Company (Burton H. Greenwood), Nutley 10, N. J.
2. Duvekot & Duffy (John J. Duffy) 39 Cortland St., New York 7, N. Y.
3. Stein,Hall & Co., Inc. (Max Goldfrank) 285 Madison Ave., New York 17, N. Y.

1/ Goldfrank, H. "Guar: A Plant Gum with Many Uses." Chemurgic Digest XIX, 10-11, July 1960.

This report is a summary of the data collected under North Carolina conditions on the two legumes which have the greatest potential as new sources of seed gum, namely Crotalaria intermedia and Cassia occidentalis.

Toxicity

Since 1960 a large number of legumes have been screened as potential green manure crops to replace the banned Crotalarias. Both Crotalaris intermedia and Cassia occidentalis yielded more dry matter per acre than the banned Crotalarias. They were then screened for toxicity to chicks by Dr. J. W. Kelly of the Poultry Department.

Chicks were fed rations containing 6% seed of these two legumes from 1 day to 4 weeks of age. Upon termination of each trial, the surviving chicks were killed for necropsy. Mortality as well as gross lesions observed in the survivors (hydropericardium, hydroperitaneum, various gradations of hemorrhage, hepatitis, extreme atrophy and cirrhosis of the liver) were used as measures of toxicity. Table 1 shows that the Cassia occidentalis diet was extremely toxic as all the chicks died by the fourth week. Crotalaria intermedia was also very toxic.

Both of these legumes produced seed with toxic properties, and since C. intermedia reseeds itself neither of these two crops could be used as a green manure crop in a rotation with feed grains. However, there are many arces in North Carolina where they could be grown as a seed gum crop. Also it is in these areas that any new crop would have an important effect on the agricultural economy. This is the reason for continued interest in cultural research concerning these two crops.

Crotalaria intermedia

C. intermedia is a legume that starts slowly but reaches a height of from 3.5 to 5 feet at maturity. Once started it grows well. It is native to the subtropics and under North Carolina conditions doesn't flower until September which is a tremendous drawback. At frost many flowers and an abundance of pods are present but the majority of these pods are empty due to the short growing season remaining after flowering. In addition to this much of the seed harvested after frost is of poor quality.

The yield range of from 0 to 772 pounds of seed per acre doesn't show much promise for this crop at the present time especially using those lines that we have looked at so far. This data is shown in Table 2. A few selections have been made of early flowering plants and these have shown some promise of producing mature seed earlier. Seed of these lines are being increased and will be available in 1964.

Three acres of C. intermedia were planted in 1962 to meet the requests of industry. The plants grew well but no seed was harvested due to an early frost.

Cassia occidentalis

C. occidentalis is a legume with good seedling vigor and at maturity reaches a height of from 4 to 6 feet. It begins flowering in late July or early August and can be combine harvested in September. The selection P.I. 204366-1 is the early seed from the 1960 harvest of 204366. Five pounds of this seed was sent to the U. S. Plant Introduction Station at Experiment, Ga. in 1962 for distribution to Southern members of S-9. Under North Carolina conditions this selection yields much better than the original.

Table 2 shows the yield of C. occidentalis for the three year period at Jackson Springs. An early planting of C. occidentalis seeded May 3 at Plymouth yielded about 800 pounds per acre combined while a planting seeded June 19 didn't yield a thing.

C. occidentalis is a crop that is now ready for large scale plantings to provide seed for pilot plant studies by industry. Seed yields from this crop have been high all over the South and all cultural operations can be done mechanically from planting to harvesting.

Environment and Maturity

These crops were grown at Jackson Springs, North Carolina on a Lakeland sand. Plants showed signs of wilting four times in 1961 but did well at all other times during the three year period.

Jackson Springs is located at a latitude of 35° 13' and the average daylengths in minutes from May 20 to September 21 are shown in Table 3. The flowering dates, dates of pod formation and the yields of seed per plot at various harvest dates in the Fall are shown in Table 4. Crotalaria intermedia should be seeded as early as possible because it appears that not only is daylength a factor in flowering as in P.I. 244587 but that a certain number of days growth is required before flowering takes place as in P.I. 225881.

Date of Planting	Date of Flowering	
	P.I. 225881	P.I. 244587
5/7/60	9/9	8/29
5/18/61	9/21	9/6
5/16/62	9/18	8/24

These data can only be verified if the lines are planted in other States to the south of North Carolina which have differences in daylength and longer growing seasons.

Pods of C. intermedia shatter when over-mature and as shown in Table 4, seed matures over a long period of time. This is another problem which will have to be worked out before C. intermedia is put in the new crop category.

Table 1. Effect of feeding different species of legume seed to chicks. (Av. of 20 chicks per lot).

Diet	Av. weight 4th week. % of control	Chick mortality 4th week #	Survivors with gross lesions #	Total chicks affected %
Control	100	0	0	0
6% Crotalaria intermedia	43	7	11	90
6% Cassia occidentalis	0	*	-	100

* No survivors to the fourth week.

Table 2. Potential seed production of seed gum crops - Jackson Springs 1960-62

Seed Gum #	Crop	Potential yield - Pounds per acre				
		1960	1961		1962	
		row	row	large	row	large
Crotalaria intermedia						
1.	PI 207541	*	*	-	-	-
2.	PI 225560	772	-	-	25	**
3.	PI 225881	203	-	114	27	**
4.	PI 244584	0	-	-	-	-
5.	PI 244585	54	-	72	9	**
6.	PI 244587	423	-	96	121	**
7.	NU 28786	226	-	150	14	**
9.	PI 022820	-	-	128	0	**
10.	PI 106972 R-43	184	-	85	0	**
11.	PI 213378 R-7	-	110	75	27	**
12.	PI 247125	-	108	-	-	**
13.	R-53	-	103	-	-	**
14.	R-71	-	262	182	0	**
Cassia bonariensis						
16.	PI 214042	-	-	-	725	-
Cassia occidentalis						
8.	PI 204366	1408	-	888	213	-
15.	PI 204366-1	-	-	1738	800	-
Cassia sp.						
16.	PI 246379	-	-	-	242	-

Seed Gum #7 obtained from New Crops Research Branch.
Seed Gum #10, 11, 13, 14, obtained from J. R. Edwardson, Univ. of Florida.
Seed Gum #15. Seed came from the 9/22 harvest of PI 204366.

* No germination.
** No seed harvested due to early frost.

Table 3. Daylength in minutes for days from May 20 to September 21 at Jackson Springs, North Carolina.

Date	Months (1960)				
	May	June	July	August	September
1	-	867	875	838	776
2	-	868	874	836	775
3	-	869	874	836	772
4	-	870	872	833	770
5	-	870	872	831	768
6	-	871	871	829	766
7	-	872	870	827	764
8	-	873	870	825	761
9	-	874	868	824	759
10	-	874	868	822	756
11	-	875	867	820	754
12	-	875	867	818	752
13	-	875	865	816	750
14	-	876	864	815	747
15	-	876	863	812	746
16	-	877	862	810	743
17	-	877	860	808	741
18	-	879	860	807	738
19	-	879	858	805	737
20	853	877	857	802	734
21	855	877	855	800	732
22	855	877	853	798	-
23	857	877	852	795	-
24	858	877	851	794	-
25	859	877	849	792	-
26	860	877	848	789	-
27	862	876	846	787	-
28	863	876	844	785	-
29	864	875	843	783	-
30	865	875	842	781	-
31	867	-	840	778	-

Table 4. Potential new seed gum crops for industry, Jackson Springs - 1960-62

Seed Gum #		Plot size a-One row b-large plots	Flowering Date	Dates pods formed	Seed Harvest - grams				
1960 - Planted May 7, Killing frost November 17					10/6	10/21	11/3	11/17	Total
Crotalaria intermedia									
1	PI 207541	a	---	No germination		-	-	-	-
2	PI 225560**	a	8/20	8/29	202*	211	101	65	579
3	PI 225881	a	9/9	9/15	-	3	-	73	76
4	PI 244584	a	9/30	10/6	--	-	-	-	0
5	PI 244585	a	8/29	9/9	-	13	9	18	40
6	PI 244587	a	8/29	9/15	6	41	22	248	317
7	NU 28786	a	9/9	9/15	-	20	57	92	169
Cassia occidentalis									
8	PI 204366	a	7/25	8/8	578*	71	98	308	1055
1961 - Planted May 18, Killing frost November 10					10/18	10/25	11/1	11/30	Total
Crotalaria intermedia									
9	PI 022820	b	9/15	9/28	-	-	-	640	640
10	PI 106972	ab	9/15	9/28	-	-	4	420	424
1	PI 207541	a	-------No germination----------						
11	PI 213378	ab	9/15	9/28	-	3	-	370	373
3	PI 225881	b	9/21	9/28	-	4	35	530	569
5	PI 244585	b	8/22	9/20	120	60	50	130	360
6	PI 244587	b	9/6	9/20	290	330	480	1010	2110
12	PI 247125	a	8/22	9/20	-	-	40	40	80
7	NU 28786	b	9/15	9/28	10	30	50	3200	3290
13	R-53	a	9/22	10/1	-	-	-	76	76
14	R-71	ab	9/15	9/28	-	-	-	1250	1250
Cassia occidentalis									
8	PI 204366	b	8/9	8/22	-	-	1280	3160	4440
15	PI 204366-1**	b	7/30	8/9	8172	520	-	-	8692
1962 - Planted May 16, Killing frost October 27					10/18	10/30	No November harvest		Total
Crotalaria intermedia									
9	PI 022820	ab	9/12	10/18	-	-			0
10	PI 106972	ab	10/2	10/18	-	-			0
11	PI 213378	ab	9/18	10/18	-	15			15
2	PI 225560	ab	8/30	10/2	4	10			14
3	PI 225881	ab	9/18	10/2	-	15			15
5	PI 244585	ab	8/24	10/2	5	-			5
6	PI 244587	ab	8/24	9/12	24	44			68
12	PI 247125	b	9/18	10/18	-	-			0
7	NU 28786	ab	9/18	10/18	-	8			8
13	R-53	b	9/12	10/18	-	-			0
14	R-71	ab	9/18	10/18	-	-			0
Cassia bonariensis									
16	PI 214042	a	8/16	8/23	-	408			408
Cassia occidentalis									
8	PI 204366	ab	8/16	8/23	-	120			120
15	PI 204366-1	ab	8/10	8/16	-	450			450
Cassia sp.									
16	PI 246379	a	8/16	8/23	-	136			136

* Harvest also made 9/9, 9/15 and 9/22.

** C. sp. in catalogue *** Seed came from the 9/22 harvest of PI 204366

APPENDIX B

State and Federal Agency Reports

REPORT ON S-9 (PLANT INTRODUCTION) ACTIVITIES IN ALABAMA DURING 1962

C. S. Hoveland
Agronomy and Soils Department
Auburn University

A total of 281 new plant accessions were received by personnel of the experiment station and private nurseries through the Regional Station since the annual S-9 meeting in August 1962. Of these introductions, 213 were ornamentals, 31 forage grasses and legumes, 16 industrial crops, 13 beans, 7 cantaloupes, and 1 corn.

Potential industrial crops were planted on Cahaba fine sandy loam at Tallassee, Alabama, April 24, 1962. Only one entry appeared promising. Cassia occidentalis, P.I. 204366, gave excellent stands when planted in rows 3 feet apart. Good growth was made in spite of the extreme drouth. Seed ripened and was harvested in late August. The yield of hand harvested seed was 1225 lbs. per acre. Some shattering occurred and it is likely that even more would occur if the crop were combined. Ipomoea parasitica, P.I. 279698, also produced good stands. Plants were allowed to climb on bamboo poles but this was not successful as many plants fell to the ground. Few seed were produced so no harvesting was attempted. No stands were obtained of Polanisia viscosa, Zaluzania discoidea, and Solanum aviculare. A new yield trial of Cassia and Crotalaria introductions from Dr. Fike was planted in April of 1963. A larger area of Cassia occidentalis will be harvested with a combine.

Two introductions of Lotononis bainesii, a perennial summer legume from Kenya, showed possibilities in summer pastures. This legume was a slow starter but once established it spread quickly by stolons, pegging down to make a solid mat of fine leafy herbage. The herbage remained green and succulent through two frosts and did not get frozen back until December. Survival through the winter was excellent, even though the temperature at Auburn reached an all time low of -1°F. Chemical analysis of forage harvested on October 31 showed a crude protein content of 18.4%.

Prospects for a good reseeding vetch are excellent. The interspecies hybridization program of Dr. E. D. Donnelly has utilized several plant introductions in the development of a reseeding vetch. One of the most promising hybrids having a high percentage of hard seed survived the extreme cold of the past winter and made good forage production.

Arrowleaf clover (P.I. 233816) acreage is expanding in Alabama. Severe drouth during the spring of 1963 sharply reduced forage yields. P.I. 233816 continued to be more productive in Alabama tests than P.I. 234310. Arrowleaf clover leaves in May were found to contain a high level of tannin similar to that of sericea.

Mike clover (common and P.I. 170829) was found to be very susceptible to alfalfa weevil (Hypera postica Gyll.). Plots of mike clover were severely damaged and had high populations of weevils while adjacent plots of crimson, ball, and arrowleaf clovers were undamaged and had virtually no weevils.

MANUSCRIPTS PREPARED

1. Donnelly, E. D. Reseeding vetch - prospects good. Highlights of Agr. Research (Auburn Univ.). Fall 1963.

2. Hoveland, C. S. Temperature requirements for germination of different clover species. Highlights of Agr. Research (Auburn Univ.). Summer 1963.

3. Hoveland, C. S. and Bass, Max H. Susceptibility of mike clover (Trifolium michelianum Savi) to alfalfa weevil. Crop Sci. Jan. - Feb. 1964. (In Press).

4. Hoveland, C. S. and Webster, H. L. Growth of Warrior vetch as influenced by clipping management. Crop Sci. 3:274-275. 1963.

Report of State 323 to S-9, Gainesville, Florida July 18-19, 1963

Arkansas
by
A.M.Davis

Arkansas has received 940 introductions since the last meeting of this committee. These are divided as follows:

Agronomic	361
Horticultural	568
Industrial	11

The above agronomic material may be divided as 220 Sunflowers, 12 Crambe, 65 Trefoil and the remainder of the Argonomic material has entered into the Soybean Cyst Nematode host range studies under the direction of Dr. R. D. Riggs. Dr. Riggs has just finished an exploration for native legumes in the western states. Some of this material may be available to interested parties from him.

The horticultural introductions are primarily Cucumis and have entered into disease resistance studies for transfer into breeding lines.

The industrial plantings consist of field size plantings of Vernonia anthelmintica and Foeniculum vulgare. The planting depth of 3/4 inch and dry weather seriously hampered emergence of Vernonia. More shallow planting and destruction of any crust that forms may inprove this. This planting is not subject to irrigation. At present no evidence of flowering can be observed. Continued lack of rain during the next two weeks may cause this planting to fail.

Foeniculum vulgare failed to germinate in the field or in the greenhouse. This seed was either sterile or it needs some special treatment.

Crambe, P.I. 281730, from Russia has a very eratic emergence.. This line emerged over a 6 week period, resulting in a staggered maturity. The other 10 lines had uniform emergence. The Crotalaria, Cassia, and Ipomoea have as yet not flowered but are making good growth. I obtained two seeds of Ipomoea tillaceae, a parent of sweet potato by natural cross with another Ipomoea sp., from our plant board for comparison with I. parasitica. The seeds are as large and appear to be similar in growth habit. The stems are smooth as opposed to the roughness of parasitica.

Twelve varieties of flax have just been harvested at Fayetteville. Yields ranged from a high of 24 bu/acre to a low of 6.8 bu/acre. As previously observed, early plantings, ie, February or early March have returned the higher yields.

Safflower: This appears to be a success this year, even though no harvest has been made. The plants have been treated three times with a fungicide between bud and maturity. This coupled with low humidity has prevented the prematurity leaf drop that has occured in the past. The heads have filled well and the immature seeds seem to be filling well.

Sugarbeets: It would appear that N.E. Arkansas, S.E. Missouri, and N.E. Tennessee are about to get into the sugarbeet business. This is also true to varying degrees of Western Oklahoma and Arizona. In Arkansas last year yields were seriously reduced by Cercospora leaf spot. The yields followed very closely the degree of resistance possessed by the variety. The top yields were 18 tons of topped beets with a sucrose content of 16% and 96% purity. This is within the range of commercial production. These yields were obtained on 42 inch rows, the most widely used single row width is 24 inches. Due to lack of field equipment to handle the narrow rows, the wider rows were employed.

At present, commercial field size plantings exist in the three state area mentioned above. These have been planted on wide topped "vegetable" beds with 2 rows per bed. This permits use of power equipment on hand and only modifying the cultivator. These fields are now showing evidence of disease attack and fungicides are being employed. If these are effective in controlling Cercospora, yields in the neighborhood of 25 tons can be expected. On heavy land, Mississippi aluvium, harvesting difficulties are anticipated if heavy fall rains occur. This is frequently a problem with soybeans and cotton.

If these problems prove to be not insurmountable a sugarbeet processing plant will be built in the northern part of the cotton belt in 1964.

Florida Report for Regional Project S-9
"New Plants", Hatch 767 Cooperating Project, "The Introduction, Multiplication, and Evaluation of New Plants for Agricultural and Industrial Uses and the Preservation of Valuable Germplasm.

Gordon B. Killinger
Gainesville, Florida, July 18-19, 1963

Several thousand seed lots and vegetative plant specimen were introduced into Florida through the Southern Regional Plant Introduction Station, Experiment, Georgia, other federal stations and private sources for testing and evaluation. At the North Florida Station, Quincy, Mr. W. H. Chapman evaluated 259 corn introductions for various characteristics including prolificness with heavy stands. None of the introductions were significantly more prolific than hybrids now available. H. W. Young at the same station reports the continued observation of a number of ornamentals including Camellia introductions, however, more time is necessary to properly evaluate. Hedera rhombea an Ivy introduction shows promise as does Chrysanthemum PI's 231097 (yellow), 231096 (pink), 231099 (yellow), 231102 (white), and 231100 (dark lavender) as reported by Dr. Young.

The Everglades Experiment Station report by R. J. Allen, Jr., shows 254 grass introductions seeded in 1962 with 82 still under observation in the nursery. Panicum maximum introductions are being evaluated for mechanical harvesting and dehydration programs. V. E. Green, Jr. of the Everglades Station has taken over the Dioscorea evaluations since the death of C. C. Seals. He reports a number of new accessions untested in the USA from Central America were received and planted in April 1963.

E. M. Hodges and J. E. McCaleb of the Range Cattle Station report no outstanding results from 250 cool season legume accessions. Some 551 grass and 511 legume introductions were received in 1962. A Starr bermunda PI 225957 was planted in a block to furnish planting material to establish pastures for grazing trials in 1964. All grasses at this station were severely damaged by spittlebug except the bahia and Reed's Canary grasses. Centros ema pubescens 212980, Desmodium intortum 226593 and Indigofera echinata have been replanted for further evaluation.

From the Central Florida Station at Sanford, Philip J. Westgate reports Erucastrum abyssinica (PI 243913) and Crambe abyssinica were winter killed by a combination of temperature and dry weather on Zellwood muck, however both crops made mature seed on a mineral soil at Sanford. Safflower (Carthamus tinctorius Linn.) from Dr. P. F. Knowles is maturing seed at both locations.

The watermelon and grape laboratory at Leesburg report by J. M. Crall and J. A. Mortensen note the search continues for cytoplasmic male-sterility in Citrullus vulgaris Schrad, and related species with P.I.s 175665, 179876, 183217, 195927 and 248178 included in the program. P.I. 164756, a Cucumis melo introduction from India, is resistant to powdery and downy mildews and to fruit rot. It has been crossed with commercial cantaloupes in a search for cytoplasmic male-sterility.

At the Gainesville Station, G. M. Prine is evaluating four perennial wild peanut accessions for forage in combination with Pensacola bahi , pangola and coastal bermuda grasses. Fifteen accessions of wild peanuts have been established in nursery rows for evaluation as to forage qualities.

E. S. Horner reports the testing of 38 white clover and 136 alfalfa P.I.s with nothing conclusive at this time.

W. A. Carver reports the crossing of a peanut introduction P.I. 280688, which carries a deep purple plant pigment with Florida varieties, to test the utility of plant color in combination with other plant and seed characters. Other Arachis hypogaea introductions from Israel and Jamaica are under observation.

Two digitaria species PI's 279651 and 279652 received in 1962 from Taiwan withstood 10° F temperatures with some winter killing, but recovered to a stand by early summer 1963. These two Digitarias have nine pair of chromosome (18) according to S. C. Schank whereas Pangolagrass Digitaria decumbens has 15 pair of chromosome (30 or 27). These two Digitaria species have temporarily been classed as pentzii rather than decumbens and carry Taiwan numbers A 24 and A 82 respectively. A selection Paspalum notatum var. from P.I. 227832 has been increased and is being tested as a turf or lawn grass.

Two new projects State 1167 and Hatch 1166 have been initiated to evaluate pasture and forage species with 13 leaders located at five stations and two branch field stations and to evaluate industrial crops at the Gainesville Station. Hatch 1166 has been designated as a contributing project to S-9. The present project Hatch 767 will be closed out this season.

A number of Kenaf accessions from Glenn Dale, Maryland and Experiment, Georgia are being grown for evaluation. Kenaf grown in 1962 and harvested after frost with all leaves gone and the stems semi-airdried yielded from 7000 to 61000 pounds of plant per acre. Future yields will be calculated on an oven-dry basis. An evaluation nursery of two Everglades Kenaf varieties, one okra P.I. 120833 and two Crotalaria varieties was planted according to the plan developed by our subcommittee for the evaluation of potential industrial crops.

A. E. Kretsehmer at the Indian River Field Laboratory, Fort Pierce reports favorably on five summer legumes for the lower part of the Florida peninsula, namely: 1. Big trefoil (Lotus uliginosus) 2. Lotononis bainesii (no common name) 3. Siratro (Phaseolus atropupureus (no common name) 4. Centro (Centrosema pubescens) and 5. Glycine (Glycine javanica).

In 1963-64 a number of plant introductions of summer and winter grasses and legumes, field crops, industrial crops, vegetable, Ornamental, fruit and miscellaneous seeds and/or plants will be evaluated.

Annual Report To Technical Committee Project S-9 "New Plants"

Gainesville, Florida
July 18 and 19, 1963
A. H. Dempsey

Georgia - A total of 342 plant introductions were received by State and Federal workers in Georgia during 1962-63 season. The requests included sorghum, grasses, legumes, pepper, Ipomoea, Vigna and ornamentals. Commercial nurserymen and cooperators continue to obtain direct from Glenn Dale, Maryland most of the ornamental stocks. There is a real interest in pears and apples that may be adapted to the Peach Belt in the Goergia Coastal Plain.

Three Georgia projects contributing to the S-9 Regional Project have been initiated and copies of these projects are now in the hands of the CSESS for review.

'Amclo' arrowleaf clover, released: 'Amclo' arrowleaf clover, released by the Georgia Experiment Stations, is an increase of P.I. 234310, Trifolium vesiculosum. In forage production tests the new variety has been superior to crimson clover in total yield, ability to reseed itself, and in seasonal distribution of growth. 'Amclo' remains vegetative two to three weeks later in the spring than does crimson clover.

Report from Dr. H. H. Tippins, Entomology Department, Georgia Experiment Station

A planting of 'Amclo' at the Americus Georgia Plant Materials Center was remarkably free of insect pests. The clover was swept first at full bloom and again when most florets were pollinated. No clover head weevils (Hypera meles) or lesser clover leaf weevils (Hypera nigrirostris) were taken in either of the sweepings. Both of these weevil species occur in the area and cause extensive damage to Crimson clover.

Pepper (Capsicum annuum L.). In the pimiento breeding program P.I. 163192, P.I. 163189, and P.I. 246331 are being used as sources of genes for bacterial spot resistance, Xanthomonas vesicatoria (Doidge) Dows. The F_1 progenies were resistant from the crosses of P.I. 163192 and P.I. 246331 to the susceptible varieties Truhart Perfection and Yolo Wonder. The F_2 progenies segregated in the ratio of 3 resistant to 1 susceptible for bacterial spot, however there was considerable difficulty in classifying individual plants in the segregating population for disease reaction. With the assistance of Dr. Sowell the segregating pimiento breeding lines are being inoculated and then evaluated for bacterial spot resistance.

Southern Pea (Vigna sinensis): Dr. B. B. Brantley, Georgia Experiment Station reports that his southern pea lines P.I. 205139 and P.I. 121437 are resistant to the cowpea strain of southern bean mosaic virus (SBMU-CS). The

southern bean mosaic virus has been isolated and identified by Dr. C. W. Kuhn (2) of the Georgia Experiment Station from commercial southern pea fields in two widely separated regions of Georgia.

Report of Dr. J. P. Craigmiles, Agronomy Department, Georgia Experiment Station

In the pulp and fiber improvement and testing program we have the following tests:

1. Pumpkin - Pulp and Yield Test - 40 plant introductions and standard varieties being evaluated. Both the vine and fruit are considered.

2. S-9 Pulp Evaluation Test - consist of 7 entries including kenaf, Sesbania, okra, and Crotalaria juncea. In cooperation with S-9 and Southern Regional Plant Introduction Station.

3. Kenaf Pulp Test - consist of 5 entries in a latin square design. In cooperation with Everglades Florida Experiment Station (USDA).

4. Plant Introduction Pulp Test cooperating with G. A. White USDA, Beltsville. Testing 9 entries known to have desirable pulp characteristics. This includes broomcron, durra, Tift sudan grass and Sorghum almum.

5. Sunflower - 20 plant introductions and commercial varieties - most entries from Ames. Test for yield and pulp quality.

6. Coffeeweed Management and Cultural Practice for Pulp and Forage. Rate of seeding, row spacing and fertilizer rate on coffeeweed (Cassia tora). Also interspecific crosses being made in an effort to make coffeeweed usuable as a forage plant.

Gasel, A Mildew and Smut Resistant Rescuegrass Released

Gasel rescuegrass, selected by Mr. Elrod (1), reselected from an old P.I. (number lost) for mildew and smut resistance and presistency.

Publications:

1. Elrod, Julius M. 1963. Gasel, a mildew and smut resistant rescuegrass. Ga. AES Leaflet N.S. 37.

2. Kuhn, C. W. 1963. Field occurrence and properties of cowpea strain of southern bean mosaic virus. Phytopathology 53: 732-733.

Kentucky Report to Technical Committee S-9 "New Plants"
Gainesville, Florida
July 18, 1963
W. H. Stroube

Since January 1, 1963 workers in Kentucky have received 66 accessions. These may be broken down as follows:

Trifolium
4 species - 6 accessions
Ornamentals
8 genera, 11 species, 28 accessions
Vegetables
Lycopersicon - 15 accessions
Cucumis - 5 accessions
Miscellaneous
9 genera, 9 species, 12 accessions

Difficulty has been experienced in securing information concerning the accessions received by the research men especially after several months or a year has elapsed. Consequently, two forms are in the process of being developed in an attempt to get more complete information. The first will go to the research person within a few days after receipt of notification that he has received accessions. This form will list the materials he received and request information as to the expected use of the material and where it will be planted. The second form will be forwarded just prior to report writing time to each person who has received material during the year listing the individual accessions received and requesting information concerning performance, potential value and/or disposition of the accession. It is hoped that this method will result in more uniform and complete reporting of information.

Attempts to hybridize Trifolium species are continuing, utilizing various P.I. accessions. The successful T. diffusum (P.I. 204517) x T. pratense hybrid is being utilized as a possible bridge to cross other species with T. pratense.

Considerable effort is being expended attempting to develop a taxonomic scheme of classification in the genus Trifolium using chromatographic analysis of the plant material. Present findings are encouraging and the work is being continued. A large number of the approximately 110 species that have been assembled in Kentucky came through the Plant Introduction Program.

Publications reporting use of P.I. materials

(1) Taylor, N. L., W. H. Stroube, W. A. Kendall and G. W. Hicks. Evaluation of the hybrid Trifolium pratense x T. diffusum. Univ. of Ky. Results of Research in 1961, 69th Annual Report. Dec. 1962.
(2) Collins, G. B. Interspecific compatabilities and taxonomic classification in Trifolium as related to chromatographic analysis. Masters thesis, Dept. of Agronomy, Univ. of Ky. May 1963.
(3) Collins, G. B. and N. L. Taylor, Chromatographic analysis of Trifolium species. Crop Science. In Press, 1963.

REPORT OF S-9 (PLANT INTRODUCTION) ACTIVITIES IN LOUISIANA DURING 1962-63

Julian C. Miller, S-9 State Representative

During this past season, 199 accessions were brought in by institutions and nurseries in Louisiana. Most of these introductions were of ornamental and vegetable crops. The usual number of sweet potato varieties from various parts of the world, particularly the South Pacific, were also introduced.

New Plants in Tests

As far as new crops as concerned, plantings have been made of Crambe abyssinica, Cassia occidentalis and several others which will be evaluated at the end of this season. The Crambe came up and grew rapidly early in the spring but was soon attaked by aphids which killed most of the plants. We are making another planting this fall and hope that we will have better luck with it. The Cassia is making excellent growth. It is 8 to 9 feet tall at present and is going into seed production. Indications are that Cassia will make an excellent cover crop.

Dioscorea

The work with Dioscorea is progressing as planned, that is, crosses are being made between introductions which possess high sapogenin, a precursor of cortisone. We have around 200 new seedlings from such crosses.

As previously mentioned, unless we can produce a plant with as much as 10 to 15 per cent sapogenin, we will not be able to compete with areas such as Mexico, Guatemala and Puerto Rico. There is no question that it can be grown to produce satisfactory yields as far as the root is concerned. So far the plantings have withstood the cold winters of the past two years. This will be a long-time program, but every effort should be made to produce this crop in the continental United States.

Fruit Exploration

Most of the earlier plantings of the fruit trees in the collection at Idlewild Experiment Station have come into production. Several of these will probably be recommended for increase and distribution. We have about 40 acres of seedling peach, apple, pear, and plum trees, and additional plantings will be made from year to year.

The lack of cooperation which has been shown by some states has been somewhat discouraging. While we have had the fullest cooperation from some of the collaborators, others have made no contribution. Another factor toward slowing up the work has been the incidence of phony peach virus in the introduced plums. This has spread to some of the peach trees, and they are having to be rogued twice a year to see if it can be eliminated. Otherwise, a great deal of delay will be encountered in releasing varieties and seedlings that appear superior.

Okra

We are continuing to test the various okra lines, particularly P.I. 120833, for possible use as a fiber crop. We think okra offers greater possibilities from this standpoint than some of the other plants, such as Crotalaria. I should like to exhibit here samples of paper which was made from okra fibe by Dr. Wolff at the

Northern Utilization Research and Development Division. He found that the P. I. number and the Louisiana Green Velvet, which has been one of our standard varieties, were equally as good for the manufacture of paper.

Irish Potatoes

We have made crosses between Solanum acaule and Solanum tuberosum and now have selected seedlings in the F_3 and F_5. We have selected for both red and white skin. In each category we have one or more, showing a high degree of frost resistance, which could be introduced as varieties. Many of these lines have exhibited resistance to temperatures as low as 25° Fahrenheit. Since plantings of potatoes along the Gulf Coast receive some frost damage in 2 out of 5 years, we plan to continue this work.

Sweet Potatoes

Our search for new sweet potato germ plasm carrying the genes for yield, carotene and disease resistance will continue for years. Although we have most of these characters in our breeding nursery, we will not be satisfied until a world survey has been completed.

Recommendations for Testing New Crops

It is my opinion that, in testing and developing promising new crops, for example, castor beans, Crambe and others, we are going to have to request that the United States Department of Agriculture allow some type of subsidy in order to make their production attractive to the farmer. A farmer is reluctant to start a new venture if it is doubtful that it will pay greater dividends than one of the standard crops that is now subsidized. I do not care for subsidization any more than anyone else, however, in order to have such a crop accepted, financial returns from it must equal those of one of the standards.

Mississippi Report to S-9 Technical Committee

Gainesville, Florida

July 18-19, 1963

H. W. Bennett

Mississippi has no contributing project to S-9 but such is in the process of review, etc. Workers in Mississippi have received 342 accessions since our last meeting. The majority has been forage grasses and legumes and ornamentals. Use in breeding programs and growing for adaptability has prompted requests. One domestic exploratory trip for fruit was made in southern Mississippi which was followed by a collection trip. An apple, highly resistant to fire blight has been collected. Several former collections have been assigned P.I. numbers. Frontier, a named crimson clover introduction, was increased to over 8000 pounds of foundation seed. Crown rust resistant selections of ryegrass are now going into grazing tests for final determination as to release. Introductions are classed as follows:

Grasses - 42
Legumes - 169
Vegetable- 33
Ornamental-60
Tree -- 38

North Carolina - New Plants Project

W. T. Fike

REPORT TO S-9 TECHNICAL COMMITTEE - GAINESVILLE, FLORIDA - July 18-19, 1963

Fourteen cooperators received 533 plant introductions from August 1, 1962 to July 1, 1963. The breakdown is as follows:

	Number			
Crops	PI's	Genera	Species	Cooperators
Ornamentals	264	22	27+	5
Legumes	142	23	74	3
Corn	50	1	1	1
Vegetables	49	3	5	3
New Crop Screening	12	7	10	1
Grasses	8	2	2	2
Fiber	5	1	5	1
Misc. Crops	3	2	2	2
TOTAL	533	61	126+	

Most of the above plant introductions were planted during 1963 and are being tested along with the many hundreds of plant introductions received prior to 1962. These introductions include vegetables, grasses and legumes (warm and cool season), sunflowers, millets, bamboos, fruits and ornamentals.

Dr. Gregory has sent additional peanut introductions to Experiment during the past year. These introductions were obtained in Peru during 1961 and are sent to the Introduction Station as soon as seed has been increased.

A list of 15 Rubus introductions (early PI's) available from the North Carolina Rubus project was circulated to all the regional projects in early 1962. Requests were received from eight states. Mr. Underwood increased the introductions and 123 plants of 9 introductions were sent to those interested in March 1963.

The following industrial crops were planted in 1962 in cooperation with S-9 to determine adaptation and yield.

Cassia occidentalis — P.I. 204366-1; Excellent potential, yields of up to 2000 pounds of seed per acre have been combined harvested.

Ipomoea parasitica — P.I. 279698: A viney plant, has to be poled, seed will have to be hand harvested.

Solanum aviculare	PI 280049; Plants destroyed by potato beetles
Polanisia viscosa	PI 279699; Has potential, can be combined
Zaluzania discoidea	PI 279702; no stand
Foeniculum vulgare	G-11912; no stand

The following industrial crops were planted in 1963 in cooperation with S-9:

Cassia alata	PI 279691; poor stand, growth fair
Cassia leptadenia	PI 279692; poor stand, growth fair
Cassia leptocarpa	PI 279693; poor stand, growth fair
Cassia occidentalis	PI 279694; poor stand, growth fair
Crotalaria longirostrata	PI 279695; poor stand, growth fair
Crotalaria sp.	PI 279696; poor stand, growth fair
Ipomoea sp.	PI 279715; no stand
Salvia texana	PI 279722; no stand
Schkuhria wrightii	PI 279700; no stand
Ipomoea parasitica	PI 279698; good stand, growth good
Cassia occidentalis	PI 204366-1; good stand, growth excellent
Polanisia viscosa	PI 279699; poor stand, growth good

Two varieties of kenaf, Everglades 41 and 71, are also being evaluated for fiber along with two lines of Crotalaria juncea, L-374 and Brazilian.

Small plot research concerned with dates and rates of planting, fertility factors, herbicide tolerance, and harvesting techniques are being continued on Vernonia anthilmintica and Kenaf. Seven acres have been planted with Vernonia for seed increase.

All available plant introductions of Cucurbita spp. (607) have been screened in the laboratory for resistance to scab incited by the fungus Cladosporium cucumerinum. Dr. Strider reports that the following plant introductions rated resistant:

93034	C. maxima
135352	"
194268	"
199032	"
199033	"
215750-A	"
234610	"
222760	C. moschata

Attempts are now being made to incorporate this resistance into a yellow summer squash.

Introductions of sunflowers, millets, grasses and legumes, vegetables, ornamentals and potential new industrial crops will also be tested in future years.

New Crops Research In Oklahoma
S-9 Technical Committee Meeting
Gainesville, Florida, July 18 and 19, 1963
Ralph Matlock and Roy Oswalt
Dept. of Agronomy, Okla. State University

A total of 1305 accessions were received by Oklahoma workers from January 1, 1962 through May 1963. The number of accessions for groups of crops received for testing were as follows:

Crop	No. Accessions	Crop	No. Accessions
Forage Crops	125	Horticulture	
Field Crops		Vegetable	55
Pulse (incl.peanuts)	716	Ornamentals	26
Pulp	21	Total	1305
Mucilage	316		
Oilseed	36		
Others	10		

1. Plants for Industrial Use:

Several oilseed, mucilage and pulp crops are being grown and tested during 1963 to evaluate their potential for Oklahoma.

A. Oilseed crops. A few accessions of sunflower and safflower are being evaluated in 1963.

1. Momorbica balsamina. Sp-106 produced 577 pounds per acre of dry seed planted March 31 on the Paradise Station during 1962. It required eight harvests to obtain this yield.

2. Euphorbia heterophylla: Sp-104 was easy to establish. It produced 120 pounds of seed per acre from March 31 seeding on the Paradise Agronomy Research Station. Seed were harvest July 26. Severe shattering occurred.

3. Foeniculum vulgare: P.I. 268383 (Sp-401) was planted May 17, May 24, May 25 and June 7 but practically no emergence was obtained. It is possible that an early planting would have been more desirable. The accession G-11912, B-54999 (Sp-262) was planted May 17 and one plant resulted.

4. Solanum aviculare: P.I. 280049 (Sp-255) was planted at two locations at Perkins on May 17 and at Stillwater on May 24. No plants were obtained in 1962 and 1963.

5. Zaluzania discoidea: P.I. 279702 (Sp-256) was planted at two locations, May 17 and May 24. No plants were obtained in 1962 and 1963.

6. Salvia texana. P.I. 279722 (Sp-322) was planted May 17, 1963. No plants were obtained.

7. Schkuhria wrightii: P.I. 279700 (Sp-323) was planted May 17, 1963. No plants were obtained.

8. Ipomea. P.I. 279698 (Sp254) and P.I. 279715 (Sp-321) were planted May 17, 1963. Good stands were obtained. P.I. 279698 was larger plants and was more vigorous on July 15 than P.I. 279715. In 1962, P.I. 279698 from a two-row observation plot produced 477 pounds of clean seed per acre. Several fruit had not matured by frost. The seed average was 22.7 grams per 100 seed.

9. Polanisia viscosa: P.I. 279699 (Sp-257) was seeded June 8, 1962 and May 17, 1963. Poor stands occurred both years. In 1962 the plants were blooming and fruiting October 10 and about 50 pounds of seed per acre were harvested November 6, 1962. The plants emerge slowly but appear to grow well once established.

10. Crambe abyssinica: (P.I. 247310) Sp-76-77 and 266 were seeded in 20" rows at the Paradise Agronomy Research Station, March 25, but due to poor stands were reseeded April 15. Other variety tests were planted at Stillwater and Perkins. Each test had reduced stand resulting from turnip aphid damage and an unidentified vascular disease. Yield data were not available on this date.

A date-of-planting and row width study was planted at the Stillwater Agronomy Research Station. A heavy infestation of turnip aphid reduced stands. The preliminary results show that the March 1 date and highest plant population produced the best yields (Table 1).

11. Brassica napus: Golden (Sp-267) and Regina 11 (Sp-268) were each seeded in variety tests and increase block at the Paradise Agronomy Research Station on March 25 and reseeded April 15. The seed were ripening on July 15. The plots and increase blocks were sprayed for control of Harlequin bug. Potential yields appear to be good. Another test was also planted June 7.

12. Vernonia anthelmintica: P.I. 283729 (Sp-263) hand planted May 24, and replanted June 7 in an oilseed variety test using 20-inch rows but no stands were obtained. A 0.6 acre increase block planted May 24 in 40-inch rows has good stands. The test was irrigated July 8 and was in the pre-bloom stage July 15. A local selection of Vernonia (Sp-258) did not emerge from the May 24 and June 7 plantings.

B. Annual Pulp Fiber Crops: Previous tests have been conducted using accessions of Okra and Sesbania and a strain of kenaf and selection of Crotalaria juncea. The 1963 pulp tests contain two entries for each of the four above mentioned crops. The tests were planted on Vanoss loam near Perkins May 17, 1963, at a row spacing of 20- and 40-inches between rows. Good stands were obtained for each entry except P.I. 120833 (Sp-196).

Data obtained in previous Oklahoma tests are summarized in Tables 2, 3 and 4.

1. Sesbania. Seven accessions and two selections of Sesbania sp. have been tested one or more years in rows spaced 40-inches apart on the Perkins Agronomy Research Station. The mean yields of dry matter per acre ranged from 5270 to 5730 pounds for the four-year period 1959-1962 (Table 2). The mean plant height during the same period ranged from 90 to 108 inches. The dry matter acre yields obtained from two-row observation plots near Perkins during 1962 were as follows:

Sp-No.	P.I. No.	Sesbania Species	Pounds d.m./A	Plant Ht. (ins.)	Plants Per Ft.	%dry matter
246	167069	arabica	4433	102	2.7	36.1
247	167290	arabica	5623	120	1.1	36.4
248	180050	cannabina	4914	126	4.4	34.9
250	219851*	speciosa	7268	102	3.7	25.0

*accession very late, very few seed produced

2. Okra: Three varieties, four selections and eight plant introductions of okra were tested during 1961 and 1962. The four row plots were planted in rows spaced 40 inches apart. Each entry was replicated three times in a randomized block design. The tests were planted in a Vanoss loam soil on June 21 in 1961 and June 8 in 1962. The tests were harvested November 11, 1961 and September 22, 1962. Dry matter yields ranged from 2505 to 4388 pounds per acre in 1961 and from 4163 to 7842 in 1962 (Table 3). In 1962 the spacing between the harvested plants averaged from 1.8 to 2.9 plants per foot of row. The mean plant height ranged from 48 to 62 inches for the two year period.

3. Crotalaria juncea: Fifteen selections from Texas were planted for preliminary evaluation in 1963. The selection was planted May 17, 1962 in rows spaced 40 inches apart. Line 374 (Sp-161 and Sp-165) was evaluated.

Year	Yield d.m. lbs/A	Plant Ht. (ins.)	% D.M.	Date Planted	Date Harvested
1962	2885	106	35		
1962	7783	102	38	6-8	9-22

Both Texas 374 and P.I. 248419 (B-55617) were included in the 1963 tests.

4. Kenaf (Hibiscus cannabinus): A selection from Cuba, Sp-109, has been evaluated since 1960. In 1963 Everglades 41 and 71 were included in the pulp tests on the Perkins Agronomy Research Station.

C. Mucilage Crops: We have been evaluating accessions and selections of guar, Crotalaria, Cassia and Clitoria. An entry each of Crotalaria intermedia and Cassia occidentalis was included in the nine Oklahoma-Texas guar tests in 1963.

1. Guar: The potential for guar has been greatly enhanced by recognizing the diseases that attack guar and locating accessions which appear to have field tolerance. A selection, Groehler 1-2 made by Texas researchers, shows promise over Texsel and Groehler. The accession P.I. 179930 has given some promising single plant selections. The germ plasm available has been evaluated except for the 150 accessions collected by Ted Hymowitz. The data for guar are being published regularly, so a detail account will not be given here.

2. Crotalaria: Accessions and selections of eight species of crotalaria have been evaluated. The best seed yields have been with selections and accessions of C. spectabalis and C. retusa. Both of the above are potential weed problems. C. intermedia accessions and selections obtained from North Carolina and Texas were planted May 17, 1963. Very poor stands were obtained for all plantings.

3. Cassia: Aecessions of four species of cassia were planted May 17, 1963 for evaluation. Cassia occidentalis, P.I. 204366 (Sp-253, Sp-231) produced 1450 pounds per acre of seed in 1962.

II. Pulse Crops: Peanut, cowpea, mungbean, chickpea and pigeonpea accessions are being evaluated. The evaluation program is continuing on each of these crops except chickpea. The chickpea accessions have been summarized and germ plasm of those with appreciable seed has been sent to the regional station. The plant introduction evaluation program for cowpeas and mungbean will be reduced in future years except as new introductions are received.

An attempt is being made to evaluate the spanish peanut introductions from the agronomic, physical, chemical and organeloptic standpoint.

TABLE I. Crambe date-of-planting and row spacing study, Stillwater Agronomy Farm, 1963.

Seeding Date	Distance Between Rows: 12-inches Seed Yield (lbs/A)	12-inches Plants Per Plot	12-inches Plant Height (ins.)	24 inches Seed Yield (lbs/A)	24 inches Plants per Plot	24 inches Plant Height (ins.)
January 14	62	47	14	13	15	10
February 14	166	97	19	18	11	12
March 1	220	96	22	71	33	19

TABLE II. Mean yields of plant material, plant height, and percent dry matter for the Sesbania selection, Sp-42, and three accessions, Perkins, Oklahoma.

Okla. Sp-No.	Selection or P.I. No.	Mean Plant Yields Pounds of dry matter/A 1959	1960	1961	1962	Mean	Plant Height (ins.) 1960	1961	1962	Mean	%dry matter 1962
39	167069	4905	6950	6534	4531	5730	110	104	99	108	35.6
40	167290	4701	8176	3675	4528	5270	111	106	104	103	35.2
41	180050	3883	9606	3430	4723	5410	95	108	102	106	35.1
42	Selection	5110	8176	4534	5004	5706	86	106	96	98	35.2

TABLE III. Mean yields of dry matter, plant height and percent dry matter for Okra varieties, selections and accessions in pulp test near Perkins, Oklahoma, 1961 and 1962.

Okla Sp-No.	Variety Selection or P.I. No.	Mean Pounds Dry Matter per acre 1961	1962	Mean	Mean Height (inches) 1961	1962	Mean	Dry Matter (%) 1961	1962	Mean
1	Dryden	--	5208		--	46	--	--	30.9	30.9
2	Clemson Spinelers	2850	5859	4354	50	50	50	17.1	29.1	23.1
3	109215	4388	5602	4995	61	53	57	23.2	32.5	27.8
4	120833	4206	5389	4798	63	52	58	20.5	29.7	25.2
5	125567	2931	5616	4274	63	55	59	24.3	27.7	26.0
6	217511	2505	4163	3344	56	56	56	23.0	32.0	27.5
7	218510	2151	6786	4468	60	60	60	14.5	44.2	29.4
8	178808	4079	5268	4674	60	55	58	22.3	27.0	24.6
9	OAE059-1	2772	5844	4308	55	42	48	14.8	24.2	19.5
12	OAE059-4	4229	4935	4582	60	55	58	23.3	26.8	25.0
22	OAE059-14	3099	4922	4010	59	44	52	20.5	28.6	24.6
26	OAE059-17	3203	7842	5522	64	45	54	21.4	32.6	27.0
28	175567	3562	6836	5199	69	42	56	21.8	31.2	26.5
196	120833	3966	7116	5541	57	57	57	19.0	26.6	22.8
197	La.Green Velvet	3371	7191	5281	65	58	62	17.4	28.4	22.9
25	172674		--	--	--	61	--	--	25.1	25.1
Test Mean			5905							
LSD .05			N.S.							
C.V. (%)			25.8							

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

REPORT TO THE S-9 TECHNICAL COMMITTEE MEETING JULY 18-19, 1963, AT GAINESVILLE, FLORIDA

Prepared by: H. Azzam

During the period of July 1962 to June 1963, a total of 600 introductions were made. They were as follows: 77 ornamentals, 106 vegetables, 5 fruits, 347 forages, and 65 miscellaneous.

The date palm, Phoenix dactylifera, introductions at Fortuna are growing fairly well. Two female trees of line 2501 were pollinated in April 1963 with pollen of line 2503, the only available pollen at the time. These two trees are developing five racemes of dates. When one tree of line 2505 was pollinated with line 2503, all fruit aborted within sixty days. Possible incompatability is suggested. The insect Diaprepes abbreviatus was observed to attack female flowers and Kimri stage fruit. Control with aldrin was effective. At the moment, dates appear promising for the dry regions of Puerto Rico. The critical period for fruit production will be during the wet humid months.

The sapucaia nuts, Lecythis elleptica, established at Fortuna in 1960 are now entering their third year of nut production. Studies made to determine the pollinating agent have shown that the plant is apparently self-sterile, with the female Carpenter Bee, Xylocopa brasilianorum being the principal insect responsible for pollination. Trees yielding an abundance of nuts with high oil content will be selected for propagation and production studies. Propagation material of other species, such as L. ollaria and L. zabucajo will be obtained and included in this study.

The 195 seedling and grafted trees of Macadamia Nut, Macadamia ternifolia, variety IKAIKI, established in 1960 at Fortuna are making slow but steady growth. It is believed to be worthwhile to establish a number of trees at higher elevations for observational purposes.

Of the original 96 trees of Pineapple Guava, Feijoa sellowiana, established in Fortuna in 1961, only 46 have survived. The plants are making slow growth, and have not flowered as of now. Higher elevation may be needed for better growth.

The grape, Vitis spp. introductions are entering their second season of production. Three varieties seem to be outstanding and show promise. They are: Lake Emerald from Florida, Ribier from California and a hybrid from California.

Five banana introductions from Jamaica are being evaluated for their adaptation and disease resistance to Panama disease and Sigatoka. They are: Altafort, 2390, Paggi, Highgate, and Governor Giant.

Seed germination of some sugar beet, Beta vulgaris, ranged from 15 to 70 percent. Some introductions seem promising. Further evaluation is still under way.

Two selections of achiote, Bixa orellana, are now highly homogeneous and have ornamental characters and resistance to mildew. One of them is a high yielder.

More male and female trees in the aceituno, Simaruba glauca, introduction were identified in the second year of production.

Four introductions of Taniers, Xanthosoma spp. from Trinidad seem promising and are now under evaluation in a regional test.

Large introductions of Sorghum sp. are still being evaluated at Lajas. Second ratoon crop was obtained from some lines.

Three accessions of Digitaria valida, P.I. 208934, P.I. 208937, and P.I. 209179, did not produce flowers at Rio Piedras even with methods used for flower inductions. Two of these, P.I. 208937 and P.I. 209179, had flowered, however, at Gurabo Substation. Cytological studies are still being conducted. P.I. 209177 and P.I. 209372 seem promising because they produce naturally abundant flowers, with viable seeds.

At Lajas Substation, two Buffel grass introductions, Pennisetum ciliare, P.I. 193445 and P.I. 156546 yielded 23.23 and 22.64 tons of dry matter, as compared with Guinea, Panicum maximum and Pangola, Digitaria decumbens, which yielded 21.17 and 11.09 tons of dry matter respectively, in terms of production per acre, per year, at 60-day cutting intervals. The difference between the Buffels and Guinea were not significant.

Several other introductions are still being studied such as rambutan, Nephelium lappaceum; mangosteen, Garcinia mangostana; passion fruit, Passiflora edulis var. flavicarpa; tree tomato, cyphomandra; cardamonium; annona; legumes; ornamentals, and vegetables.

PUBLICATIONS

1. Jackson, G. and Bauza J. "Insect visitors of Lecythis elliptica" (Manuscript in preparation)

2. Jackson, G. Diaprepes abbreviata on Phoenix dactylifera J. Agric. U. P. R. (In press)

3. Singh T., Gonzalez Melendez and Sepulveda Torres: Experiments on strawberry growing in the central western region of P.R. (Manuscript submitted for U.P.R. Journal)

4. Singh T. Strawberry Culture in Puerto Rico (Manuscript submitted for U.P.R. Journal)

Clemson College
South Carolina Agricultural Experiment Station
Clemson, South Carolina

Report to the S-9 Technical Committee Meeting
July 18-19, 1963, at Gainesville, Florida

By J. A. Martin

There were 627 accessions of seeds and plants distributed to 17 cooperators in South Carolina since July 1, 1962. These accessions included ornamentals, vegetables, agronomic, and miscellaneous crops.

Reports from various cooperators are presented as follows:

Dr. G. Fassuliolis, Nematologist, U. S. Vegetable Breeding Laboratory, Charleston, S. C.

This year we completed testing Cucumis spp. for resistance to the root-knot nematode, Meloidogyne incognita acrita. A total of 1463 PI's involving 1152 C. melo, 289 C. sativus, and 24 Cucumis spp. were evaluated. Almost all of the PI's were very susceptible and marked by profuse galling and reproduction. However, one plant accession, P.I. 233646 (Cucumis sp. originating from Ethiopia) showed marked resistance with roots exhibiting only small, widely scattered galls. The leaves and fruits of this PI closely resemble the gherkin, C. anguria.

Attempts to transfer this resistance to cucumber or cantaloupe have been unsuccessful. Fourteen fruits have been obtained from 59 pollinations in crosses with P.I. 233646 x C. melo, however no viable seed have been recovered. The embryo culture technique is being employed to attempt to raise any embryos excised from the seed coats.

Dr. William C. Frierson, Frierson's Flowers, Denmark, S. C.

All the plant material has been received in excellent condition. And all has done well but the azaleas. The early freeze last October killed them.

The items most interesting to us are the yellow-berried Ilex crenata and the white-berried I. glabra. The former was grafted as fast as wood would grow, and we developed quickly ample cutting wood. Several thousand are now growing in the field. It was both disappointing and interesting to note that as soon as the I. glabra luteo (white berried) turned white the birds devoured them the first of all holly berries. I had meant to plant them. We now have a hedge of them and also specimen plants of it heavily berried. This time I'll protect tham and plant all seeds. They should come true. We are also interested in camellias but they are too numerous to mention.

I believe the white-fruited I. glabra has been misnamed. "Luteo" means creamy or yellow. I think they are light enough to be called LEUCOCARPA (white fruited). I wonder if in the beginning "Luteo" was not confused with "leuco". Kindly investigate.

Mr. J. P. Fulmer, Department of Horticulture, Clemson, S. C.

Ornamental Plant Introductions (This report arrived after the S-9 Technical Committee Meeting, but is being included for the records)

Many ornamental plant introductions have been received since 1956. Some have been very promising and some have not survived in our area. Those which appear to be promising as to cold requirements and have shown considerable landscape promise are P.I. 235425, Eurya emarginata, P.I. 237871, Eurya japonica, and P.I. 235502, Eurya ochnacea. All except P.I. 235425 survived the five degree temperatures of last winter. This particular plant has many landscape uses. We know, by now, that it must be planted in protected areas in our climate. P.I. 240914, Eurya emarginata, was received in 1960 and is a dwarf species, and if conditions are right, may be an excellent plant for espalier.

At a recent short course here at Clemson, P.I. 237867, Elaeagnus crispa, was noted by a local landscape architect, and he stated that this particular plant may have promise in fulfilling a gap between green and variegated plants. P.I. 213308, Osmanthus 'gulftide', is a source of a much needed upright plant for screens and hedges. It is easy to propagate and grows rather rapidly. P.I. 241910, Rhamnus alaternus, has withstood low temperatures since 1958. It is a rather open-growing plant and not too showy, but appears to be tough and can be used in areas where there may be growth problems. P.I. 262382, Arbutus peninsularis, is another plant in the same category with P.I. 241910, and it also withstood at low temperatures, and is a promising new ornamental shrub. P.I. 239376, Mahonia lomariifolia is an excellent plant of this species, but winter-killed for the first time since 1958 this last winter. With protections, it too may be a good ornamental.

The camellia collections which were submitted in 1961 and 1962 have not been thoroughly evaluated. We lost many this past winter, but hope that some may be hardy enough to withstand our climatic conditions.

A thorough evaluation of all ornamental introductions will be needed in the near future noting those which have not survived and those which appear promising.

Dr. Pyrce B. Gibson, Agronomist USDA, Clemson, S. C.

Have screened several P.I. numbers of Trifolium repens for resistance to root-knot nematodes. Have not found anything that looks better as a source of resistance than Oregon grown Ladino.

Dr. J. C. Hoffman, Horticulturist, U.S. Vegetable Breeding Laboratory, Charleston, S. C.

I have your letter concerning new crops. Actually, I tested only several P.I. lines during 1962. We have over 100 P.I. cabbage lines that have been planted. These should be ready or approaching that stage by the scheduled breeders meeting in November. I hope you can see them at that time.

This last season we had two P.I. cabbage that had excellent resistance to downy mildew. These are P.I. 261774 and P.I. 261769. We have made several crosses with P.I. 261774 and will continue to use both of these lines in our breeding program.

I found one very slow bolting line that headed 86.9% in the spring, this being very good for the spring of 1963. This line is P.I. 281547.

I found another line with an unusually tall stem that possibly could be suitable for mechanical harvesting. This is a quality that is needed when cut by machine, as well as uniform maturity. I was successful in producing seed from three plants of this line, which is P.I. 279852. If we can establish a procedure to produce a hybrid with this line and maintain the tall stem and short core, it could possibly be valuable.

We had nothing unusual in beans this year from the P.I. material; however, we are carrying several in our program.

Mr. Robert H. Littrell, Botany Department, Clemson, S. C.

Results of Screening Tests for Root-knot Resistance in Okra.

All known okra varieties are extremely susceptible to root-knot nematodes. A root-knot resistant variety would be of considerable value to home gardeners and commercial growers in the Southeast. It was the objective of this program to select P.I. accessions that could successfully be used to incorporate resistance to root-knot in an otherwise good variety.

Seed of fourteen P.I. numbers were obtained from personnel at the Regional Plant Introduction Station, Experiment, Georgia. All screening tests were conducted under greenhouse conditions in wooden frame boxes filled with soil infested with root-knot nematodes. A heating cable was employed to maintain optimum temperatures for infection. Seed of all P.I. numbers were planted March 15, 1962, including a known susceptible variety (Clemson Spineless). Seedlings were allowed to remain until heavy galling was observed on the root system of the check variety. Individual plants were then examined and rated for severity of disease. A 0-5 scale was used with 5 indicating all roots were decayed and 0 indicating no visible galls.

Table 1. Summary of screening tests of P.I. accessions for resistance to root-knot nematodes.

P.I. No.	Root-knot Index**					
	0	1	2	3	4	5
183286	2*	6	10	3		
182831		3	9	8		
182121		8	12	1		
178818	1	5	1	7		
175567			12	4		
175566	1		12	8	6	
175563		2	23	9	4	
175562	1	1	4			
172677	1	1	10	6		
172674		1	10	5		
171661		1	3			
165468		2	4	6		
120833		2	2	7		
109215		3	4	2		
Check				8	6	

* Number of plants

** 0 = Roots free of galls; 1 = 1-25% of roots with galls; 2 = 26-50% of roots with galls; 3 = 51-75% of roots with galls; 4 = 76-100% roots with galls; and 5 = all roots decayed.

The results of the screening tests indicated that a high degree of resistance was not present in the material; although there were considerable differences between many of the plants and the check variety. There were six plants selected that were completely free of galls, but because of the high incidence of root-rotting fungi, an adequate root system was not present to insure a high level of resistance.

Mr. J. A. Martin, Department of Horticulture, Clemson, S. C.

Crotalaria juncea. A Brazilian strain obtained through Dr. J. R. Haun was planted at Clemson for observation.

Sesame. 89 breeding lines were screened for Fusarium wilt resistance in 1962 at Clemson. Results of this test are presented in Research Series 41, Sesame and Castorbean Research in South Carolina, 1962, Clemson. This year the work is being continued with approximately 100 breeding lines and 125 P.I. accessions. Sesame yield tests are being conducted as usual at Clemson, Blackville, Pontiac, and Florence stations. A pre-emerge weed control test, involving 10 herbicides, is underway at Florence. Yield results from the 1962 pre-emerge weed control work are presented in the Research Series 41.

Castorbeans. A yield test, 6 varieties, is being conducted at Florence. Results of 1962 yield tests are presented in Research Series 41.

Eggplants. A number of eggplant accessions are being tested again this year. There are a number of accessions which appear to be promising as ornamentals as well are for edible use.

Peppers. Approximately 100 promising accessions of ornamental, hot, sweet, and Pimento types are being tested this year. However, the whole pepper nursery is infested with a virus. All we can hope for now is to check for resistance to this virus.

Coleus. The collection of coleus are being maintained and perpetuated at Clemson. Anyone interested in getting a start may obtain cuttings by writing to me.

Cassia occidentalis. This crop is being tested at Clemson, Blackville, Florence, and Pontiac. An excellent stand was secured and the crop is making excellent growth at all locations. We have a total of two acres at all locations - one acre at Clemson. Bees have been noted to be very active working among the glands in the axils of the leaves before blooming!

Vernonia anthelminica. There are four rows (200 feet long) planted to this crop at Clemson. A good stand was obtained and the crop appears to be making good growth.

Crambe abyssinica. This crop is planted at Clemson and Pontiac. A good stand was obtained and harvest time is almost at hand.

Other crops being tested this year at Clemson include Mordica balsamia, Foeniculum vulgare, Ipomoea parasitica, and fiber crops, such as kenaf and Crotalaria strains.

No plants were obtained from Salvia texana and Schkuhria wrightii.

Dr. T. L. Senn, Head, Department of Horticulture, Clemson, S. C.

With reference to an apple seedling growing in Mrs. Wilder's yard at Sumpter, S.C., I have asked Mr. J. A. Martin and Mr. H. J. Sefick to stop by Sumpter at their earliest convenience and make arrangements to obtain propagating material.

Mr. R. B. Taylor, Greer Nursery, Greer, S. C.

I have just this spring received quite a number of plants from USDA. There is only one of these plants that I have been growing for about six years and this plant has survived all the cold weather. Plant No. 242292, varigated Osmanthus (dwarf). I have just started with the other plants. We received the following list of plants back in the thirties that are doing fine in this area. Ilex latifolia should be used more. The two trees I have are over 15 feet. I have 1 male and 1 female loaded with berries. Chinese Frienge (Loro-P. Chineses) should be used more. I also have developed a new dwarf large leaf Cornuta (Ilex). This plant at the age of 35 is only 4 feet high. The berries are 4 times larger than Ilex cornuta (Chinese Holly). I have developed a new Weeping Cherry. Place Pink, to white heavy foliage to the ground very dense will stand cold weather. Named (Bernice Taylor W.C.)

Dr. S. H. Yarnell, Geneticist, U. S. Vegetable Breeding Laboratory, Charleston, S. C.

This is in response to your memo of June 27 to various cooperators, which reached me last week.

This season we grew 26 P.I. sweet corns in a continuing search for resistance to the corn earworm. On a basis of 1, most susceptible, to 5, least susceptible, these 26 lines ranged in an average rating from 2.9 to 4.9. Three of these rated 4.5 or better. These were P.I. 198641 Atkinson 4.5, P.I. 217413 Chico Zapalote 4.9, and P.I. 221889 Mexican June 4.6. The last two are field corn, both with very tough, tight husks. The resistance appears to be largely mechanical.

For comparison, two VBL hybrids rated 4.3, six rated 4.4 and one rated 4.6.

1963 ANNUAL PROGRESS REPORT
FOR TENNESSEE ON S-9 PROJECT (Hatch 57)

W. E. Roever, Committeeman
July 16, 1963

Evaluation of New Plants

Two hundred and twelve P.I. accessions were received by eight Tennessee cooperators through June 1963, and during late 1962. Included were ornamental shrubs, trees, flowers, and grasses, vegetables, fruits, and forage grasses.

One hundred and four agronomy accessions received by J. K. Underwood in 1961 for evaluation will be terminated in 1963. Seventy-six accessions of 1962, of which 60 are ornamental grasses, are now being appraised. These include six bamboos.

With a low of -17° at the Plateau Experiment Station, T. R. Gilmore reports the following on survival of apple accessions of a 1960 planting:

Mutsu - hardy
Sokeri-miron - hardy
Mio - hardy
Branley's Seedling - hardy
Cox's Orange Pippin - winter killed
Red Gravenstein - winter killed

The variety Gallen is susceptible to fireblight. It ripened a few apples (white, 2 1/2") on June 25. The variety Huritus also fruited in 1963. Fruits were small, 1 3/4 to 2", bright with attractive red stripe, 85-90% colored. It ripened June 25 - July 1. Snovit will ripen about July 20. Fruit is small, showing some color.

In Dr. L. M. Josephson's tests for corn smut, he recorded high resistance in P.I.'s 213731, 213737, 213739, 186183, and found medium resistance in P.I.'s 186218,213799, and 218173.

Testing for earworm resistance in cooperation with Dr. Stelman Bennett, he found high resistance in P.I.'s 217413, 186225, 186183, 186185, and 213758. In P.I. 217413 resistance has been demonstrated for two seasons. All of these lines are being retested during the current year. In P.I. 186225, larvae fed only on the tip of the silk, and 81.2% failed to reach the ear. In P.I. 213746, 45% fed in the silk channel only, while in P.I. 213750, 42% remained in the silk, and in P.I. 213758, 58% remained there. Dr. Bennett is also studying the nature of the resistance involved.

In tests of materials for foliage or house plants, J. S. Alexander found that P.I. 242808 (Chlorophytum laxum "Variegatum") forms a very nice pot plant

when grown with no direct sunlight. Cyanotis Kewensis (P.I. 240536) can grow under medium to low light intensities. P.I. 246661 (Cinnamomum daphnoides), 235425 (Eurya emarginata), and 236260 (Distylium racemosa) look promising and will grow in either partial shade or full sun.

The following mums rated well in greenhouse tests:

P.I. 235952 - white spoon, very showy light green foliage, good cut flower, too tall for pots, long stems, good.
P.I. 236061 - light purple, a little tall for pots, good cut flower, even bloom, spoon, showy, good.
P.I. 235942 - light pink-purple, yellow center, tubular rays, nice cut flower, showy, good.
P.I. 240386 - white standard, showy, darkest ash center, good pot plant, even bloom, best in group, very good.

The winter of 1962-63 was severe with wide temperature fluctuation within a narrow span of time. On January 12 the high was 69°; on January 24 the low was -8° at Knoxville. Under these conditions, the following plants were lost:

P.I. 229889 - Quercus phillyroeoides
P.I. 235433 - Quercus wrightii
P.I. 241910 - Rhamnus alternus
P.I. 235423 - Corylopsis spicata
P.I. 243957 - Cotoneaster "Cornubia"
P.I. 243862 - Camelia saluenensis
P.I. 241325 - Ilex altaclarensis "Wilsonii"
P.I. 239376 - Mahonia lomarifolia
P.I. 231135 - Gaultheria cuneata
P.I. 243870 - Magnolia globosa
P.I. 249423 - Mahonia japonica
P.I. 237505 - Syringa meyeri
P.I. 235138 - Rhododendron japonicum
P.I. 235139 - Rhododendron japonicum
P.I. 256257 - Pinus griffithii
P.I. 262716 - Prunus macckii

Quercus acutissima came through the winter in campus landscape plantings without damage, but four and five inch trunks of Quercus glauca were killed to the ground.

ANNUAL REPORT ON NEW CROPS RESEARCH IN TEXAS
Contributing to Southern Regional Project S-9
Prepared by Eli L. Whiteley
Gainesville, Florida
July 18-19, 1963

The 1962-63 crop year in Texas has been unusual. Rainfall in the fall of 1962 was below normal and unusually low temperatures occurred in January. A low temperature of 12° F. occurring in January killed all plants growing at that time. March, April, and the first half of May were unusually dry. The first effective rainfall occurred May 17, 1963. All plantings made in April were irrigated to keep them growing.

A total of 1874 accessions were received by research workers, individuals, and commercial concerns in Texas during 1962-63. Many of these plants can not be included in this report, since they can not be evaluated before the meeting date of the Technical Committee. These materials will be included in next year's report.

Crops for Industrial Uses

Crambe abyssinica (247310) was released to a number of Texas farmers under a memorandum of agreement this year. The yields were very low in most cases due primarily to dry weather during the critical period of growth of the Crambe. Farmer trials will be continued next year in order to give them some experience in growing and harvesting the crop.

All plantings of Crambe made prior to February 15, 1963 were killed by the low temperatures occurring in January and February. The February 15, 1963 plantings were harvested in a yield test and the results are presented in Table 1. Yields of the plantings made after February 15 were very low due to the extremely dry weather at College Station.

Table 1. Yields of Crambe abyssinica as influenced by fertilizer and spacing.

20 inch Rows		Broadcast 7 inch Drill	
Treatment N-P*-K*	Yield in pounds/acre	Treatment N - P - K	Yield in pounds/acre
0 - 0 - 0	**	0 - 0 - 0	329
60 - 0 - 0	**	60 - 0 - 0	593
0 - 21 - 0	965	0 - 21 - 0	802
0 - 0 - 41.5	677	0 - 0 - 41.5	1813
60 - 21 - 0	923	60 - 21 - 0	1016
60 - 0 - 41.5	1331	60 - 0 - 41.5	1807
0 - 21 - 41.5	629	0 - 21 - 41.5	1274
60 - 21 - 41.5	856	60 - 21 - 41.5	1500
120 - 42 - 0	1077	120 - 42 - 0	1346
120 - 42 - 41.5	831	120 - 42 - 41.5	675

* P_2O_5 = 48 and 96 lbs. per acre (P_2O_5 x 0.437 = P)
K_2O = 50 lbs. per acre (K_2O x 0.8301 = K)

** No harvest made due to poor stands.

A three acre broadcast planting of Crambe was made on the Stiles Farm Foundation at Thrall, Texas on February 27, 1963. The Crambe received 4.5 inches of rain after it was planted with most of the rain occurring in early March. This planting produced 786 pounds per acre of Crambe. A one and one-half acre planting in 37 inch rows was made at the same time, this planting produced 430 pounds of seed per acre.

The ten lines of Crambe received from Russia (PI 281728-37) were grown in the greenhouse to increase the seed during the winter. They were planted in the Field in February to further increase the seed. These lines will be planted in the field in the fall to test their cold resistance.

About fifty breeding lines of Crambe were grown this year to observe their resistance to cold and to increase seed of some of the lines. The seed of these lines have been harvested but yields have not been determined at this date. A summary report of one of the feeding trials with Crambe meal is included in this report. This feeding trial compares Crambe meal with soybean meal as a source of protein for chicks and was carried out by the departments of Poultry Science and Biochemistry and Nutrition.

THE NUTRITIONAL VALUE OF CRAMBE ABYSSINICA MEAL

Hesketh, H. R., J. R. Couch, C. M. Lyman*

Chemical analysis has shown that the sample of Crambe abyssinica meal supplied contained 43.75% crude protein, 7.52% fat, 6.89% ash, and the following amounts of the essential amino acids expressed as a % of the protein:

Amino acid	% of Protein
Arginine	5.81
Lysine	5.26
Histidine	2.24
Methionine	1.54
Glycine	4.96
Phenylalanine	3.48
Tyrosine	2.57
Leucine	5.90
Iso-leucine	3.72
Threonine	4.20
Valine	4.51

Feeding trials have been carried out to compare Crambe abyssinica meal with soybean meal as a protein source for chicks. The broiler type chicks were reared to four weeks of age in raised wire floored electrically heated brooders with sixty birds for each treatment. Rations containing 5, 10, 20 and 42% of Crambe abyssinica meal produced growth depression which were directly proportional to the amount of meal added; for every 1% of Crambe abyssinica meal added there was a growth depression of 0.7%. Efficiency of food utilization was not significantly affected nor was there any increase in number of mortalities. Careful

post-mortem examinations have shown that in chicks fed Crambe abyssinica meal, there were no abnormal lesions, but the thyroid glands were enlarged, suggesting that the meal contains a goitrogenic material.

Further experiments will be carried out to try to reduce the goitrogenic effect by extracting with various non-polar solvents and by supplying additional iodine. In its present state Crambe abyssinica meal can not be used successfully as a protein source for chicks, but if the goitrogen can be removed and if this is the only toxic factor present, Crambe abyssinica may become a popular feed ingredient.

Limnanthes douglasii

A planting of 12 Limnanthes accessions was made on December 10, 1962. These plants were randomized in three replications. Only one of the accessions (283712) showed any promise. All other accessions were either killed or severely damaged by the low temperatures in January. All plants that survived the low temperatures were about eight inches in height at maturity and most of the seed were produced on branches that were prostrate. This would make it impossible to harvest the crop mechanically.

Dimorphotheca aurantiaca

Eight lines of Dimorphotheca were planted on February 26, 1963. These seed emerged to a very poor stand on March 11. Very few seed will be harvested from these plantings.

Foeniculum vulgare (268383) was planted April 23, 1963 but failed to emerge. Cassia alata (279691) failed to emerge after planting on April 18, 1963 as did Cassia leptadenia. Salvia texana (279722), Ipomoea (279715), Crotalaria (279696), and C. longirostrate (279695) emerged to a very poor stand. These plants do not show much promise as industrial crops at this time.

About one acre of Cassia occidentalis (279694) was planted April 22, 1963 for a mechanical harvest test. These plants are growing well at this time and show promise of setting a good seed crop.

One acre of Vernonia anthelmintica (NU 40159) was planted for a method of harvesting test on April 22, 1963. This planting emerged to a very poor stand and it will be impossible to use it for a method of harvesting test. Seed will be harvested by hand to insure planting seed for next year.

Lesquerella

Lesquerella gracilis and L. grandiflora were planted twice and both plantings were failures. It is believed that the pH of the soil is too low to grow Lesquerella in this area. A test is in progress at this time to check the effects of pH on the germination of Lesquerella. It is hoped that this test will give some indication as to the reason for the failures with Lesquerella.

Crotalaria intermedia

Plantings of Crotalaria intermedia were complete failures in Texas this year. The seed failed to germinate in the first two plantings and the third planting was a very poor stand so it was disked up and the area planted to Crotalaria juncea.

Mr. Abdul Jabbar Mia of Bishop College, Dallas, Texas reports the use of Rauwolfia canescence (249512), R. nana (246683), R. obscura (246684), R. serpentina (245922), and R. vomitoria (no number) in the study of their alkaloid content. He is studying the alkaloid, reserpin which is used in tranquilizers. Mr. Mia is also studying the sclereids in the petiole and stem of Camellia japonica (231691).

Paper Pulp Materials

Nine sorghums were planted in a pulp test on April 17, 1963. These materials were: Sorghum alum - 190579 and 202410, S. vulgare - 229837 and 229847, kaoliang - 88000 and 88004, broomcorn - 177549, durra - 179749, and Tift sudan - B 55623. The yields of these materials will be reduced greatly due to the dry weather in the early spring.

The regional pulp test was planted on May 6, 1963 and all plants emerged to a good stand on May 14, 1963. Growth of these plants has not been as rapid as it should be due to limited rainfall. Yields will be low compared with other years of better rainfall.

About 200 lines of Crotalaria juncea were planted on the A & M plantation May 6, 1963. These lines represent the best of the C. juncea lines and will be used in the breeding program on this crop.

A three acre planting of Crotalaria juncea was made on The Stiles Farm Foundation at Thrall, Texas to check its resistance to Cotton root rot. Some evidence from other areas has indicated that it was resistant to root rot. This planting was made on April 25, 1963 and on July 2 there were no plants killed by root rot. The area in which the C. juncea was planted was in cotton in 1962 and 90% of the cotton was killed by root rot. The Crotalaria will be used as a soil improving crop and the area will be planted to cotton next year to check the effects of C. juncea on the yield of cotton.

Ornamentals

Lowery Nursery of Houston, Texas reports the following plants grown over a two year period to be of value: Ilex rotunda (237879) very fast growing holly. Alnus formosana ( ) fast upright growth. Largerstoemia faurei (237884) has small white flowers but earlier blooming, larger leaves, faster growth and more tree like than L. indica. Plants grown last year: Cinnamomum brevifolium (277857) and C. japonicum (246665) appear to have the same hardiness as C. comphora (camphor tree) in the Houston area. This means that small plants were badly damaged out doors by temperatures below 20° F.

Link Floral Company of Weslaco, Texas reported that Rosa "Porpora"(266804) and Rosa (268279) grow well in the valley but have not flowered. Cinnamomum brevifolium (237857) and C. japonicum (246662, 246665, 246666) are all growing well in the valley.

Forage Crops

Two accessions of Panicum antidotale (268410, 269943) were received by Dr. E. C. Holt in his Panicum breeding program. These plants are being tested for leafiness and vigor.

Mr. Michael F. Schuster has combined P.I. 151008, Rhodesgrass (chloris gayana, into a synthetic variety which is tentatively scheduled for release this year. The open pollinated F_1 of this variety showed very good rust resistance and tolerance of rhodesgrass scale. Other materials received this year have not been evaluated.

Dr. W. G. McCully reports the following accessions of Paspalum nicorae, 202044, 276248, and 276249 growing in the greenhouse along with FC 36768 (Pensacola Bahia), FC 36910 (Tifhi - 2 Bahia) and FC 36137 (Argentine Bahia). These plants will be used in a breeding program if they are adapted to this area. The following materials were received by Dr. McCully from the Pullman station and will be planted this fall: P.I. 206700 and P.I. 230262, Melica sp.

Horticultural Crops

Dr. H. T. Blackhurst reports that Luffa acutangula (183059, 183324, 271368) and L. aegyptiaca (271370, 271371) will be tested for possible use by home gardners since they are gaining popularity as a food similar to okra and are of excellent quality. The skeletons of the mature also make excellent scouring pads. Phaseolus angularis (157642, 221974) and P. bracteatus (158831) will be checked for possible use in the green bean breeding program. P. mungo (164441, 212615, 269522) will be tested for uniform maturity since there is a place in Texas for mung bean production if the harvesting problem can be solved.

Tomato accessions received by Dr. A. L. Harrison at Yoakum, Texas are being evaluated this summer and the results will be available in September or October.

Dr. Dan A. Wolfenbarger evaluated 442 Southern peas for plant resistance to the cowpea curculio. Dr. Grover Sowell Jr., Plant Pathologist, Regional Plant Introduction Station, Experiment, Georgia has a copy of the data. The data include the results from varieties and plant introductions. Dr. Wolfenbarger also checked each plant of ten varieties of Southern peas for resistance to the cowpea curculio. Dr. Sowell also has a copy of these results. These results are not presented in this report since there are 24 pages in two tables.

Mr. A. F. De Werth of the Floriculture Section reports the following accessions received since the last report and those not reported on before are as follows:

P. I. no.	Botanical Name	Desirable Characteristics	Possible Use
260703	Achimenes grandiflora	Excellent growth, vigorous, adaptable	Greenhouse crop
238684	Cyanotis cristata	Very adaptable and satisfactory for hanging baskets and ground covers	Foliage plant for interior and outdoor landscaping
242278	Madera rhombea	Received in very poor condition	Died 2/13/63
262716	Prunus m-Ackii	Not adaptable	Discarded
266804	Rosa 'perpera'	Vigorous growth, has not bloomed	Needs further evaluation
268279	Rosa species	Vigorous growth, has not bloomed	Needs further evaluation
274526	Ardisia japonica	Compact habit, vigorous dwarf growth	Landscape
274764	Damnacanthus indicus	Touchy in hot weather	Needs further study
275494	Damnacanthus indicus	Touchy in hot weather	Needs further study
275496	Fatasia japonica	Very adaptable vigorous growth habit, attractive	Excellent foliage plant
277653	Raphiolepis umbellata	Excellent growth habit. Outstanding appearance. Has not bloomed to date.	Landscape
277664	Raphiolepis umbellata	Excellent growth havit. Outstanding appearance. Has not bloomed to date.	Landscape
275865	Skimmia repens	Doubtful adaptability	Require another year trial
277857	Cinnamomum brevifolim	Needs further study	Landscape

P. I. no.	Botanical Name	Desirable Characteristics	Possible Use
246662	Cinnamomum japonicum	Needs further study	Landscape
246665	Cinnamomum japonicum	Needs further study	Landscape
246666	Cinnamomum japonicum	Not adaptable	Discarded
249458	Cephalonena polyandrum	Growth habit and appearance	Indoor and Zone 10 Landscape
255007	Leptospermum pubescens	Vigorous growth. Excellent appearance.	Landscape
242347	Medinella venosa	Vigorous growth, flowering habit	Foliage plant Greenhouse crop
249832	Myrtus communis	Compact, rapid, vigorous growth. Adaptability	Landscape
241392	Oreopanax capitatum	Rapid attractive growth	Indoor and Zone 10 landscape
240122	Rhynchosia pyramidalis	Not adaptable	Discarded
240045	Rogiera elegans	Excellent growth habit	Foliage plant
241339	Trachelospermum sp.	Leaf size, compact growth attractive growth habit	Ground cover
240768	Undetermined (Trachelospermum)	Did not survive	Died 2/13/63

Field Crops

Peanut accessions received by Dr. A. L. Harrison at Yoakum are growing in the field at this time and will be evaluated for leaf spot resistance and other diseases this summer.

Guar plantings at Weslaco, Texas were reported up to a fair to excellent stand by Dr. Bailey Sleeth. These plantings were made to observe their resistance to diseases, particularly virus diseases. It is too early for a report on these plantings.

Safflower (Carthamus tinctorius) plantings were made by Dr. E. O. Gangstad at the Texas Research Foundation at Renner, Texas. These accessions were planted March 27, 1963 in the nursery and emerged to a good stand. Most of them were in flower by the middle of June with no apparent insect or disease problems. No yields will be available until later in the growing season.

Sesame (Sesamum indicum) introductions that were received by Dr. M. L. Kinman have been planted. Most of these accessions were planted to reincrease the seed. Forty-three accessions were 1962 introductions which were grown disease-free in the greenhouse at Beltsville, Md. All of these accessions were planted in isolated blocks to increase the seed under disease-free conditions. Five Helianthus annuus accessions were received too late for planting in 1963.

Mr. J. C. Stephens made the following report on the sorghum work at Chillicothe, Texas. A total of 136 samples of sorghum seed were forwarded to Dr. C. H. Lyman, Head, Department of Biochemistry and Nutrition, for lysine and total protein determinations. A shipment of introductions was received from Mr. J. R. Quinby, Pioneer Sorghum Company, most of which came from the Rockefeller Foundation collection in India. Of these, 58 strains were sent to Dr. Lyman for analysis. These were assigned P.I. numbers and the remanent seed will be sent to Dr. W. R. Langford, Experiment, Ga. Another group of accessions was received from the regional station at Ames, Iowa. These accessions will be used in a yield test.

Mr. J. Roy Quinby of the Pioneer Sorghum Company, Plainview, Texas received several hundred introductions from India and Africa. These introductions will be grown in Jamaica and Texas for use in the company's breeding program.

Work Planned for Next Year

Work will be continued with Crambe along the lines pursued in past years. Date of planting and fertility tests will be continued with bulk seed. Several lines will be entered in a yield test. Seed of other lines will be increased so that they can be entered in a replicated yield test the following year. Both fall and late winter plantings will be made in the Blacklands of Texas. Cold resistance of the Russian lines will be tested in fall plantings at College Station.

Work with Vernonia anthelmintica will be continued along present lines. If uniform stands can be established harvesting tests will be conducted on Vernonia to determine the best method of harvesting this crop.

An early winter planting of Lesquerella will be attempted again next year.

Small plantings of Dimorphotheca will be made in the fall. These plantings will consist of about fifteen lines of D. aurantiaca that have been isolated at College Station.

Crotalaria juncea lines will be tested at the Stiles Farm Foundation in the Blackland area of Texas. A number of promising lines will be increased for yield tests.

The regional pulp test will be conducted again next year.

Publications Submitted

Abdul Jabbar Mia - Ontogeny and diferentation of sclereids in Rauwolfia, American Journal of Botany

_____ _____ _____Histochemical studies of sclereid induction in the shoot of Rauwolfia sp. Journal of Experimental Botany.

_____ _____ _____Histochemical studies of shoot apex of Rauwolfia. In preparation.

Eli L. Whiteley and Calvin A. Rinn - Crambe - A potential new crop for the Blackland of Texas, Texas Agricultural Progress. Numerous radio and television programs about new crops have been given. Two short movies, one on Crotalaria juncea and one on Kenaf were made for release to television stations in the state.

Annual Report on New Crops Research in Virginia

Gainesville, Fla.
July 18-19, 1963

Approximately 1000 accessions of seeds and plants were received by agronomists and horticulturists in Virginia during 1962. Most of them were peanut introductions which were screened for resistance to Southern Corn Rootworm at the Tidewater Research Station.

Two apple introductions received several years ago have been outstanding in evaluation trials at Blacksburg. They are 'Ringstad', introduced from Sweden as P.I. 102146; and 'Houblon', introduced from England as P.I. 127010. Both have a crisp juicy flesh, a dark red skin, and are good dessert apples. 'Ringstad' ripens at Blacksburg from August 16 to 20. 'Houblon' ripens about ten days later. Dr. Oberle reported that both will be recommended for trial plantings in Virginia.

Materials Received and Distributed. A summary of plant materials received, increased, and distributed by the Southern Regional Plant Introduction Station during the last two years is shown in Table 1.

Table 1. Plant materials processed by the Southern Regional Plant Introduction Station, July 1, 1961 to June 15, 1963.

	1961-62	1962-63
New introductions received	1923	1759
Number grown at Experiment, Ga.	3247	3566
Number grown by contract	340	296
New material catalogued	975	1682
Seed packets distributed	14191	8018
(a) Within Southern Region	10237	3922
(b) Outside Southern Region	3964	4096
Received from other stations	7651	1951

The number of new accessions received during this period was somewhat higher than the long-term average of 1500 annually. The largest collections include Pennisetum spp., from Nigeria, Sorghums from India, Capsicum from South American and Cynodon spp., from Asia and Africa.

Preliminary Evaluation. Approximately 3900 accessions were planted this year for seed production and preliminary evaluation. Most of this work is being done at the Regional Station. Sesame, guar, and castorbeans are being increased by stations in Oklahoma and Texas.

Some of the new materials that appeared promising in the 1962 nursery and worthy of further evaluation for forage are:

(1) Panicum maximum accessions from Africa.
(2) Setaria sphacelata accessions from Africa.
(3) Arachis sp., P.I. 262839, from South America.
(4) Indigofera hirsuta, P.I. 198004, from Brazil.

Panicum maximum was highly productive and should be evaluated for pelleted forage in the Lower South. It is not winter-hardy at Experiment, Ga. Arachis sp., P.I. 262839, is the most vigorous accession of the wild peanuts released thus far by Dr. Gregory.

In the preliminary evaluation of new oilseed plants, Ipomoea parasitica and Polanisia viscosa made satisfactory seed yields. The seed yield of Ipomoea parasitica was equivalent to 2300 lbs. per acre, and that of Polanisia was approximately 1200 lbs. per acre. Viability of the Polanisia seed was quite low. Otherwise controlling weeds appeared to be the greatest problem in growing this plant. Although Ipomoea made a high seed yield, seeds shatter as

they mature and the plant should be trellised for maximum growth. Cassia occidentalis, a potential source of gum, made slightly more than one ton of seed per acre. No major problems were apparent in growing this plant.

Domestic Exploration. Approximately 230 clones have been collected since the domestic fruit stocks exploration was initiated in 1959. Only 141 accessions have been assigned P.I. numbers. The other materials are being propagated at Clemson, Experiment, and State College before requesting P.I. numbers for them.

Project Outline. The Regional Project Outline was reviewed at the last meeting of this Committee. Several minor changes were suggested. These were incorporated into the outline and it was approved by the Committee of Nine and the Cooperative State Experiment Station Service.

Supporting projects submitted by Florida, Georgia, N. C., Okla., P. R., S. C., and Texas have been approved. Seven line projects submitted by CRD, ARS, have been accepted as contributing projects.

Financial Statement. Funds available to the regional station and a summary of expenditures are shown in Table 2.

Table 2: Financial statement for Southern Regional Plant Introduction Station, 1962-63 and 1963-64.

Source of Funds	Amount 1962-63	1963-64
Regional Research Funds		
Pooled	30,000	30,000
Allocated to Ga.	6,000	6,000
State appropriations (Ga.)		1,380
ARS (New Crops Res. Br. CRD)	24,592	22,965
TOTAL	60,592	60,345

Expenditures	Amount 1962-63	1963-64 (Proposed)
Salaries	42,372	43,455
Common Labor	5,235	3,090
Travel		
Coordination of S-9 activities	660	900
Collection of fruit stocks	410	500
Capital Outlay	6,441	1,700
Supplies and operating costs	5,394	4,500
Contributing project (Ga. H-171)		6,200
Total	60,512	60,345

Regional Station Improvements.

Several pieces of new equipment were purchased during the last year.

These include:

1. 404 Farmall tractor (replacement for 1951 Ford)
2. Cub Farmall tractor (replacement for 1950 Allis Chalmers G)
3. Portable irrigation system (replacement for 1933 engine and pump)
4. Seed dryer
5. Apeco copying machine (transferred from New Crops Research Branch)
6. Garden tractor
7. Gestetner mimeograph machine
8. Disc harrow

The major need at the regional station now is additional greenhouse space for starting seedling plants before transplanting them to the nursery and for growing to maturity certain tropical spp., that fail to mature seed in the field.

SOUTHERN REGIONAL PLANT INTRODUCTION STATION

Report of Plant Pathologist to S-9 Committee

1963

A. SCREENING INTRODUCTIONS FOR RESISTANCE.

If one examines the list of new varieties released during the past year which have plant introductions in their pedigrees the value of plant introductions as sources of disease resistance is obvious. Polaris and Pixie cucumbers, Manapal and Floralou tomatoes, all have plant introductions in their pedigrees as sources of disease resistance. Among the forage and field crops, pathology and entomology research has not reached as advanced stage as it has among the vegetable crops. Nevertheless, the potential with these crops may be even greater. After almost 5 years of service as your Regional Station pathologist, I am fully convinced that plant introductions have a tremendous potential as sources of disease resistance and that we have only begun to utilize this potential. I believe that the research worker who systematically screens several hundred introductions for resistance to a disease has a very favorable probability of success. Research at the Regional Station on disease resistance has been concerned with the following problems:

(a) Resistance of cantaloupe to gummy stem blight.
Personal communications with two cantaloupe breeders who have shown considerable interest in obtaining sources of resistance to gummy stem blight indicated that Edisto is considered as being moderately resistant, based on field observations. There are no reports in the literature, however, to indicate that Edisto is resistant. To determine the level of resistance present in commercial varieties, all varieties carried in stock by a major seed company were included in a replicated test at the Regional Station. The results of this test (Table 1) indicate that four of the commercial varieties were significantly more resistant than the six most susceptible varieties.

Table 1: Severity of gummy stem blight on cantaloupe seedlings.

Variety	Disease Index		Percent Plants Dead	
Banana	1.88[1/]	a[2/]	17.97	a
Rio Gold	1.88	a	20.35	a
Hale Best #36	3.00	ab	32.95	ab
Edisto	3.00	ab	28.04	ab
Rocky Ford	3.38	abc	48.83	ab
Hale Best Jumbo	3.63	bc	51.60	abc
Honey Rock	3.75	bc	47.79	ab
#45SJ	3.75	bc	53.69	abc
#45	4.50	bc	66.26	bc
Honey Dew	5.00	c	90.00	c

1/ 0-5 scale, when 0=no infection and 5=100% plant area affected.
2/ Means not followed by a letter in common are significantly different at the 1% level according to Duncan's multiple range test.

The variety Florisun released by Florida in 1962 was reported as resistant to this disease in Florida. This variety was tested in comparison with other varieties. The plants were incubated in the moist chamber for 48 hours (instead of the 24 as used in previous tests) to provide conditions favoring a higher infection grade. All varieties, including Edisto, Banana and Rio Gold, were killed by the fungus except a single replication of Florigold. It was concluded from this experiment that no commercial variety previously reported as resistant has adequate resistance to enable the plants to survive a severe epidemic of gummy stem blight. Consequently, the screening of plant introductions for resistance to this disease was continued, using a 48 hour incubation period. Approximately 800 introductions of Cucumis melo have been screened to date. Of the introductions screened, P.I. 140471 gave the lowest disease index and number of plants dead. This introduction must be included in replicated tests however before a definite conclusion can be drawn regarding its resistance.

(b) Resistance of watermelon to gummy stem blight.

The F_1 generation of the cross Charleston Gray x P.I. 189225 was as resistant as the resistant parent. The lack of clear segregation between resistant and susceptible individuals in the F_2 generation and among the progeny of the back-cross to the susceptible parent indicates a complex inheritance of resistance. Therefore it may be difficult to transfer the resistance of P.I. 189225 to commercial varieties. Seed from resistant individuals among the progeny of the back-cross will be made available to watermelon breeders who wish to conduct further research with this material.

(c) Resistance of cucumber to gummy stem blight.

Dr. W. C. Barnes has reported (personal communication) that the gummy stem blight problem appears to become more acute each year. Apparently many of his breeding lines are highly susceptible to this disease. Of the three cucurbits commonly affected by gummy stem blight in the southern United States, cucumber is generally considered to be the least susceptible to this disease. Therefore high levels of resistance may be found in commercial varieties. This has not been previously investigated under controlled conditions. All commercial varieties of cucumbers in stock at a major seed company were included in a replicated test. An incubation period of 72 hours was used. The results of this test indicate that the cucumber variety Model is more resistant to gummy stem blight than is the most highly resistant watermelon introduction, P.I. 189225 (Table 2). Under these circumstances it does not appear profitable to undertake the screening of cucumber introductions for resistance.

Table 2. Severity of gummy stem blight on cucumber seedlings.

Variety or P.I. No.	Disease Index 1/
Pixie	3.125
Marketer	2.250
Ohio	2.000
Polaris	3.250
Ashley	2.500
Model	1.500

1/ 0-5 scale, when 0=no infection and 5=100% plant area affected.

B. FIELD NOTES ON RESISTANCE OF INTRODUCTIONS

As a general rule field notes on resistance on introductions have not been taken this year except when the disease severity was adequate and distribution of the disease was uniform enough to justify this. Phomopsis blight of eggplant and bacterial leafspot of sesame were the only two diseases which had these characteristics. Notes on the reaction of the peanut introductions to Cerospora leafspot were taken in spite of a low level of severity.

C. RESEARCH ON NEW OR UNREPORTED PLANT DISEASES.

Specimens of all diseases appearing in the nursery were collected and identified. When the disease could not be identified by microscopic examination, isolation tests were conducted. Pathogenicity tests were conducted when the isolated organisms were not readily identified. No new bacterial or fungal pathogens were detected this year.

(a) Diseases of guar.

The investigation of the diseases of guar was continued and given major emphasis because of the following factors: (1) The need for resistance to these diseases as expressed by S-9 cooperators. (2) The difficulty of distinguishing between the diseases and of determining the relative importance of the several disease problems, at present. (3) The severity of the diseases in the Regional Station nursery and the resultant heavy infection of seed in storage at Experiment. (4) The need for knowing whether or not these diseases are new to the United States in determining policy for growing and distributing seed at the Regional Station.

Anthracnose, caused by Colletotrichum dematium, was not found in the commercial fields of guar in Texas or in the plantings at experiment stations in Texas and Oklahoma. In 1961, however, a Colletotrichum sp. was found on experimental plantings of guar in Oklahoma (personal communication from R. S. Matlock). Nevertheless it seems inadvisable to distribute seed of introductions known to carry this fungus until the distribution of the fungus within the United States is more definitely known. Alternaria leafspot caused by Alternaria cucumerina has been present in this country for many years. Its economic importance may have been exaggerated because of the difficulty of distinguishing diseases with similar symptoms. In the survey of guar plantings this year typical Alternaria leafspot caused by A. cucumerina was found only on a single introduction at one location in southern Oklahoma.

The bacterial diseases of guar were very severe in experiment station plantings in Texas and Oklahoma. They were not found in the few commercial fields which were examined. The destructiveness of those diseases indicates that they are of more potential danger to the crop than is Alternaria leafspot. Isolations from specimens from Texas and Oklahoma yielded two or three distinct species of bacteria. Two of these may be strains of the same bacterium. One is apparently a Xanthomonas spp. and appears to be identical to the causal organism of the bacterial blight first observed at Experiment in 1960. This organism appears to be the most important of the group in terms of prevalence and destructiveness. Preliminary pathogenicity tests in the greenhouse indicate that the three bacteria are pathogenic.

Several seed treatments including hot water at 54° C, 1000 ppm $H_g Cl_2$ and 1000 ppm streptomycin were tested to determine the feasibility of utilizing stocks of pathogen-infected seed. Streptomycin was apparently the most effective treatment against bacteria while $H_g Cl_2$ was most effective against Colletotrichum. While seed treatment may have value in reducing infection to a very low level it has not completely eliminated pathogens from the seed. Seed treatment combined with growing guar under conditions unfavorable to disease appears to offer the most practical means of eliminating pathogens from the seed.

Disease free seed grown by Dr. Matlock in Oklahoma is now available for distribution. The importance of using this seed rather than that grown at the Regional Station was demonstrated in tests designed to detect pathogens in guar seed (Table 3). These results indicate that guar should not be grown for seed increase at the Regional Station.

Table 3: Percent seed carrying Colletotrichum dematium as indicated by three techniques.

P.I. No.	Germination on blotter (Okla.)	(Experiment)	Germination on V-8 Agar (Okla.)	(Experiment)	Germination in soil (Okla.)	(Experiment)
179930	0	4	0	12	0	60
263875	0	2	0	8	0	30
263901	0	2	0	26	0	50

(b) Virus diseases of Vigna spp.

The most common virus present in the seed of Vigna spp. introductions caused a symptom reaction on Early Ramshorn variety which is very similar to that of a virus reported as a strain of cucumber mosaic virus. A virus which causes the same symptom was isolated from commercial fields of Vigna sinensis in Georgia by Dr. C. W. Kuhn (personal communication). At least one other unidentified virus was isolated from Vigna spp. introductions. Consequently, no introductions were distributed as a precaution against the distribution of new viruses. The Regional Station pathologist does not consider it advisable to distribute seed of Vigna spp. until "virus clean" seed is available. All introductions of Vigna spp. are being grown this season, rogued weekly to remove all virus-infected plants, and treated with systemic and foliar insecticides. The seed of the early-maturing introductions has been harvested and the remaining plants appear to be free of virus diseases. It is recommended that the seed from these plants be distributed as virus clean rather than virus free, recognizing that it is practically impossible to assure that they are completely free of viruses.

(c) Ringspot of peanut.

In cooperation with Dr. C. W. Kuhn, peanut ringspot was investigated by planting in an insect-proof cage, seeds of introductions which were harvested from affected plants. Half of the plants received an application of K once a week in addition to the weekly application of soluble complete fertilizer which was applied to all plants. There was no relationship between the percentage of

infected plants in the row from which the seed was harvested, and the percentage of infected plants in the greenhouse. Plants of Argentine variety included as a check also showed symptoms of ringspot at a high level of K. Attempts to transmit an agent responsible for the symptom by grafting and dodder have been unsuccessful. Dr. R. O. Hammons reported (personal communication) that there was no recurrence of symptoms in the introductions which were adjacent to the affected introductions in 1961, but showed no symptoms. This indicates that the symptom is not caused by a transmissible agent. It is therefore recommended that all introductions which have been with-held from distribution because of this problem should be distributed except the original 19 affected introductions.

REPORT TO THE S-9 TECHNICAL COMMITTEE

FOR THE SOIL CONSERVATION SERVICE

JULY 18-19, 1963 GAINESVILLE, FLORIDA

By W. C. Young

There were 1,047 plant introductions under observation at the three Soil Conservation Plant Materials Centers in 1962. These included: 608 introductions from the Grass Family comprising 52 genera, 412 introductions from the Legume family comprising 37 genera, 11 introductions from the Mallow family comprising 1 genera, 7 introductions from the Composite family comprising 3 genera, 3 introductions from the Beech family comprising 2 genera, 3 introductions from the Willow family comprising 1 genera, 1 introduction from the Pine family comprising 1 genera, 1 introduction from the Wax-Myrtle family comprising 1 genera and 1 introduction from the Mustard family comprising 1 genera.

The Plant Materials Center at Arcadis, Florida was observing 549 accessions; the Americus Plant Materials Center at Americus, Georgia 262; and the Center at Coffeeville, Mississippi 363. This group comprises the initial step in the Plant evaluation program of the Soil Conservation Service. They have been under observation from one to five years depending upon the date of receiving them.

There were 11 plant introductions under initial increase at the three Centers. They included 5 grass introductions, 3 Legume introductions and 3 composite introductions. This group has shown some promise for conservation use after several years observation and are being increased to provide seed stocks for further testing.

There were 61 plant introductions at the Centers under various secondary testing procedures to determine their value in a conservation use program. They included 25 introductions from the grass family, 11 introductions from the Composite family and 25 introductions from the Legume family.

In addition to this, 35 introductions are being increased or secured from other sources and tested in the field on Soil Conservation District Cooperator farms. They include:

PI 78758 Andropogon caucasicus

PI 209168 Andropogon glabra

PI 44096 Andropogon ischaemum

PI 190302 Andropogon nodosus

PI 118457 Arachis glabra

PI 263393 Arachis monticola

PI 195476 Bromus catharticus

PI 250357 Cyamopsis tetragonoloba

PI 162637 Chloris distochophylla

PI 106663 Digitaria sp.

PI 163453 Glycine ussuriensis

PI 144994 Indigofera hirsuta

PI 218004 Lespedeza virgata

PI 260012 Lotus corniculatus

PI 185099 Lupinus elegans

PI 202497 Panicum maximum var. trichoglume

PI 196292 Panicum miliaceum

PI 178257 Panicum stapfianum

PI 153671	Pennisetum ciliare	PI 74222	Quercus myrsineafolia
PI 210693	Pennisetum ciliare	PI 187098	Stylosanthes sundiaca
PI 55957	Phyllostachys aurea	PI 235521	Trifolium meneghenianum
PI 116768	Phyllostachys meyeri	PI 210354	Trifolium nigrescens
PI 143540	Phyllostachys sp.	PI 234310	Trifolium vesiculosum
PI 271431	Pinus sp.	PI 233816	Trifolium vesiculosum
PI 203246	Pyracantha caccinea	PI 233782	Trifolium vesiculosum
PI -----	Quercus acutissima	PI 249880	Vicia lutea
PI 168939	Quercus acutissima		

The more outstanding in this group include:

Amclo clover, which has been certified and released by the Georgia Experiment Stations from PI 234310 Trifolium vesiculosum. This is the best of the 3 strains in the Eastern portion of the Southeast. The late strain, PI 233782 Trifolium vesiculosum is performing best further to the west while the Midseason strain PI 233816 is performing best in Alabama and central locations in the Southeast. Field planting on Soil Conservation District cooperator farms have shown this.

Arachis glabrata PI 118457 is providing a good Legume grass mixture in sods in peninsula Florida. Panicum miliaceum PI 196292 is performing well and giving good seed crop. Plants have attained 5 feet and are producing up to a ton of seed per acre. Vicia lutea PI 249880 is providing good volunteering and can be mechanically harvested. It is intermediate in forage production between grandiflora and Augusta vetch, neither of which have been efficiently harvested mechanically.

Publications not previously reported:

1. Sullivan, E. G. and W. C. Young. 1961. An exotic oak, Quercus acutissima, for wild life food planting. Proceedings 15th Annual Conference, Southeastern Association of Game & Fish Commissioners, Oct. 22-25, 1961,. Atlanta, Ga. Printed by the Assoc., Nashville, Tenn. PP 136-141.

Discusses two introductions PI 168939 and the other number lost.

2. Byrd, Morris, W. C. Young and Verne E. Davison. Jan. 1963. Seed Yields of Shrub Lespedeza in Arkansas. Journal of Wildlife Management, 27(1):135-136.

Discusses Lespedeza japonica but does not cite the PI number. Cited earlier in Langford and Killinger, New Crops for the South.

3. Beaty, E. R., John D. Powell and R. A. McCreery. June 1963. Amclo-A High Yielding Winter Clover. Ga. Agri. Exp. Sta., Univ. of Ga., College of Agri. in Coop. with the Soil Conservation Service. Circ N.S. 35.
Trifolium vesiculosum - PI 234310, 233816, 233782.

Report on the New Crops Research Branch

by

J. L. Creech

This is a general report to cover the overall status of our Branch activities as it exists today. At the last meeting of this committee, Dr. Whitehouse reviewed the regional program during the last 13 years. Since some representatives to this meeting are new, I shall endeavor to summarize our general research program briefly.

The nature of this program in its broadest sense is to undertake the introduction, preliminary evaluation, and preservation of all economic plants for the development of a strong yet diversified agricultural program in the United States. Specifically, this program involves the survey of the plants of the world for those species which are essential to solving the current problems of agriculture, the procurement of the desired germ plasm through exploration and international exchange, P. L. 480 projects, the evaluation of the introductions either as breeding stocks, as potential new crops, or for conservation and land restoration purposes, the increase and distribution of such materials to Federal, State, and private research agencies, and the preservation of valuable germ plasm either as seed or as vegetative stocks.

Plant Introduction

Plant introduction is undertaken in both foreign and domestic fields through direct exploration and international exchange, to provide materials for breeding stock evaluation and for new crop development. Taxonomic and economic botanical research on world plant resources, development of national inventories of introduced stocks, coordination of foreign and domestic plant collecting, and botanical assessment of the results of cooperative crops/utilization screening programs are conducted at Beltsville. Cooperative arrangements with the National Institutes of Health provide for collection of plants for anti-cancer activity screening, with Longwood Gardens for ornamentals, and the four regional projects, NE-9, NC-7, S-9, and W-6 for domestic explorations for crop breeding stocks. Public Law 480 projects in India, Israel (2), Korea, Pakistan, Turkey, Spain, Yugoslavia, Colombia, and Uruguay provide for the collection of plants for utilization and agronomic evaluation for potential new crops. The needs of AID missions abroad for research materials and foreign distribution of germ plasm of cacao, coffee, and rubber are handled at Beltsville by cooperative agreement.

New Crop Evaluation

New Crop evaluation includes two main areas of research. (1) evaluation of breeding stocks and (2) development of chemurgic crops. Activities in the evaluation of crop breeding stocks are directed from Beltsville with programs at four Federal Plant Introduction Stations and programs under four Federal/State Regional Cooperative Projects. Maintenance of germ plasm is at Fort Collins, Colorado, and Federal Introduction Stations.

At the Federal Introduction Stations, Glenn Dale, Md., Savannah, Ga., Miami, Florida, and Chico, Calif., horticultural and specialty crop introductions undergo preliminary evaluation, involving observations for specific characters needed in varietal improvement, development of potential new or improved rootstocks, quarantine propagation and indexing for viruses, and the maintenance of collections of important foreign varieties that are continually requested by breeders for specific research activities. At the Regional Plant Introduction Stations, Geneva, N. Y., Experiment, Ga., Ames, Iowa, and Pullman, Wash., field crops, vegetables, and other seed-propagated plants are given preliminary evaluation, increased, and reported on to provide research workers at Federal and State experiment stations with a broad base of outstanding parental stocks. Regional station pathologists screen the introductions for disease tolerance. In some instances, Federal, State, and private breeders cooperate in the early evaluation of crop plant introductions. Material resulting from the Federal and Regional programs that shows breeding potential on the basis of assessment by the four Regional Program Coordinators and the national leaders at Beltsville, Md., is made available to all research workers in the United States. Needs for additional breeding stocks determined from activities in the various regions or from Federal workers, are assessed by the research leaders at Beltsville and these requests become the basis for activities in plant introduction.

The preservation of valuable seed germ plasm, including important plant introductions, selected breeding lines, and new crop varieties, together with research on problems affecting long-term seed viability, is undertaken at the National Seed Storage Laboratory, Fort Collins, Colorado. National inventories of asexually-propagated breeding stocks held at Federal and State experiment stations are developed at Beltsville, from data supplied by individual research workers.

Species of plants determined to have important chemical and physical properties as a result of the cooperative crops/utilization screening program undergo developmental studies at both Federal and State experiment stations. Research is undertaken in several agronomic areas, including phenological studies, population evaluations for selection of outstanding parental lines, preliminary cultural and seed increase studies, and the development of agricultural practices including propagation, field establishment, insect and disease assessment, fertilizer requirement, and harvesting methods. Initial phases of this research are conducted at locations providing diversity in environment, such as Federal Stations at Glenn Dale, Md., Savannah, Ga., Miami, Fla., Chico, Calif., Cheyenne, Wyo., and Mayaguez, P. R., and at experiment stations where formal cooperative agreements are in effect.

The Federal scientific effort devoted to research in New Crops totals 39.7 man-years. Of this number 2.8 are devoted to plant exchange activities, 4.8 to world plant resources research, 4.6 to plant procurement for special activities. Research on new crop evaluation includes 8.3 devoted to evaluation of horticultural crops, 3.8 to agronomic crops, 6.9 to advanced evaluation of potential new crops, 4.0 to the pathological screening of breeding stocks, and 3.5 to maintenance of germ plasm. One man-year is devoted to program leadership.

REPORT TO TECHNICAL COMMITTEE FOR THE NEW CROPS RESEARCH BRANCH

July 18-19, 1963

Plant Introduction Investigations (Work Projects CR i11, CR i12, CR i13)

Our plant introduction program is functioning quite smoothly as a result of the orderly procedures developed among the Regional Coordinators, who keep aware of breeding stocks needed in their respective regions and the NCRB program leaders who make final recommendations for introducing the material. The summaries of plant introductions for 1961 and 1962 indicate an increasing number of requests from research workers that can be handled better by correspondence rather than direct exploration.

A new situation has developed in recent years regarding plant introductions and that pertains to state workers traveling on grants in foreign countries who desire to do collecting on the basis of value to the regional program. Presently, we have no direct means to support such efforts financially. We do offer use of our other facilities, such as the Inspection Station, inventorying of accessions, and distribution to their research associates where there is sufficient material. We do believe that regardless of whether or not NCRB can assist a traveler, the proposal should be brought to the attention of the Regional Technical Committee for their consideration and recommendation.

Foreign Exploration

Only two foreign explorations were conducted during the past reporting year. An ornamental expedition to Nepal under our cooperative program with Longwood Gardens was undertaken during October and November, 1962 and resulted in 206 collections of woody and other ornamental plants.

Two trends in exploration or procurement are (1) more specific materials requested and (2) more coming in through AID, correspondence, and P.L. 480. These introductions will be distributed in 1964. In early 1963, a special exploration for vanilla breeding stocks was completed in Mexico. Approximately 3,000 clones were procured and placed at the Federal Experiment Station, Mayaguez, Puerto Rico, for evaluation against disease resistance.

Only one exploration is being planned for the immediate future and covers forage grasses for the warmer southern climates. S-9 is on record as approving this proposal and the Soil Conservation Service has also expressed interest. The trip is under consideration for early 1964. No other Regional or Federal proposals are at hand. Dr. Creech is now going to USSR very shortly on an exploration. Tentative plans for sesame germ plam may culminate in a trip once a definite proposal is submitted outlining objectives and justification. Both the forage grass and sesame trips would locate in southern Africa.

We continue to receive good response through plant exchange with the Soviet Union and satellite countries. Hungary and Poland, in addition to the Soviets, have supplied the major portion of samples during the past year. The NCRB now administers P.L. 480 projects in nine countries (Colombia, India, Israel, Korea, Spain, Pakistan, Turkey, Uruguay, Yugoslavia) related to screening of local species for chemical and industrial crop uses. Relatively few items for use in the regional new crops program have been received. Good collections of lettuce and watermelon breeding stocks, along with a few legumes have come from Turkey and some forage grasses from Uruguay.

Domestic Exploration

Details pertinent to progress and completion of the various explorations have appeared in the Minutes of the Regional Technical Committee Meetings. Briefly, projects covering small fruits in Alaska (NC-7), ornamental gourds in New England (NE-9), native grape species in southwestern U.S., and nearby Mexico (W-6) and alsike clovers from Rocky Mountain States (W-6) were successfully terminated. The project covering native and naturalized fruits of the Gulf Coast (S-9) will continue through 1963-64 in view of the success in locating promising stocks since its initiation in 1960. A small amount of additional collecting is under way or planned during the summer of 1963 for junipers (NE-9) and Ceanothus (W-6).

Plant Introductions by Crop Categories

A classification of accessions by crop groups for calendar years 1961 and 1962 shows the following:

Grouping	1955-60 Av.	1961	1962
Forage plants	1,667	925	2,068
*Cereal grains	1,153	1,290	1,679
Vegetables	1,116	1,679	1,916
Ornamentals	1,768	1,439	697
Specialty crops	614	250	103
Fruits and Nut crops	461	500	487
Sugar plants	272	164	51
Cotton and Fiber crops	116	160	211
Oilseed crops	688	834	523
Tobacco	25	5	12
	7,880	7,246	7,747

*Includes sorghums

National Seed Storage Laboratory

Considerable progress has been made in getting the Laboratory operations functioning more smoothly. Among these was the appointment of a contact representative at each of the State Agricultural Experimental Stations by the Station

Director. These representatives will work directly with Dr. James and arrange for released varieties and related parental stocks in their respective states to be sent to NSSL. The first inventories covering corn, sorghum, cotton and fiber crops, tobacco, forage crops, oilseed crops, vegetable crops and small grains were published March, 1962.

Contributions from the Regional Stations to date include (approximate numbers) 500 open-pollinated corns and 1,600 tomatoes (NC-7), 204 guar (S-9) and 11 safflower (W-6). Major consideration will be given by the coordinators and NCRB crop program leaders to transfer of alfalfas, beans, peanuts and other large-sized collections of germ plasm of current value to improvement of economically important crops.

One other area of plant materials which should constantly be under consideration by all concerned research workers is the preservation of native and naturalized seed producing plants. Good examples are Lupinus species which produce relatively small amounts of good quality seed in certain years, and the naturalized alsika clovers collected by W-6 through domestic exploration.

Clonal Inventory of Fruits and Nuts

In order to speed up work on the deciduous fruits and nut crop survey, the NCC (p. 49 of 1961 Meeting Minutes) moved and approved the following action: "That a deadline of December 31, 1961 be set for completion of fruit and nut clonal inventory". (cards).

Part I of the survey, including only apple clones, was completed and published in May 1963. Copies are being distributed to obtain fruit breeder's reactions as to general usefulness and especially how the data should be screened and evaluated to determine minimum items for inclusion in national, regional or other type repositories.

Part II covering stone fruits is well toward stage of publication.

As soon as all the evaluations of the apple report have been received by NCRB, these will be reviewed to provide guidance for the development of additional inventories.

AGRONOMIC CROPS OF CROP BREEDING STOCK INVESTIGATIONS

by A. J. Oakes

This report is concerned with the agronomic crops which comprise a portion of the broad project of the introduction, evaluation, and maintenance of crop breeding stocks. It includes all aspects of research undertaken by New Crops Research Branch on cereal, oilseed, fiber, forage and range, and tobacco and sugar crops. The work with these crops is done in close cooperation with and in conjunction to that done by the following research branches here at Beltsville: Cereal Crops, Cotton and Cordage Fibers, Forage and Range, Oilseed and Industrial Crops, and Tobacco and Sugar Crops. In addition, close liaison is maintained with Soil Conservation Service, a cooperating agency, whose National Plant Materials Center is located here at Beltsville.

Branch headquarters is primarily concerned with the acquisition and distribution of foreign and domestic germ plasm, whereas the evaluation and maintenance is done at four Regional Plant Introduction Stations. In other words, we serve as a clearing house for the receipt and distribution of these and other crops. Recommendations are made regarding the desirability of storing proven germ plasm in the National Seed Storage Laboratory.

Certain crops, such as vegetatively--reproduced grasses for example, which do not meet the required standards following sanitary inspection by either New Crops Research Branch or Plant Quarantine Service are maintained in quarantine until cleared for distribution. These crops are kept in quarantine at the Plant Introduction Station, Glenn Dale, Maryland. Other precautionary measures taken against the possibility of introduced seedborne diseases on oilseed crops include their close surveilance for one or more generations before release. Generally, this work is done by Oilseed and Industrial Crops Research Branch here at Beltsville, however, some crops such as guar and sunflower are screened for diseases at the Regional Plant Introduction Stations. One other activity worth mention, which is underway at Glenn Dale, is that of growing a limited number of accessions for identification. This work is continuing at a rate which is primarily limited by physical facilities in an effort to augment that which is being done at each of the Regional Plant Introduction Stations.

Cereal Crops

All cereal crops, other than corn and grain sorghums, are distributed directly to the Cereal Crops Research Branch following their introduction, sanitary inspection, and inventory, therefore, Regional Plant Introduction Stations are not responsible for their evaluation and maintenance. The Regional Plant Introduction Station at Ames, Iowa, has the primary responsibility for the maintenance of all Zea Mays accessions, whereas the Regional Plant Introduction Station at Experiment. Georgia, has this responsibility for grain and/or forage sorghums.

Research with barley, buckwheat, oats, rice, rye, and wheat is done by Cereal Crops Research Branch. During the interim of this report this branch has

handled approximately 3,400 cereal crop accessions for Cereal Crops Research Branch. These are in addition to those corn and sorghum accessions within our own program. Plant introductions continue to contribute germ plasm used in both basic and applied research. Introduced germ plasm is continually found in newly-released varieties of cereal crops. Frequently, its identity and association with specific varieties is reduced and obscured in time and by techniques to the point of uncertainty and in many cases beyond recognition altogether. New varieties of all cereal crops to include buckwheat have been released during the period of this report. Another example of the utilization of cereal crop accessions by Cereal Crops Research Branch is that of barley and wheat introductions being used in the development of hybrid barley and wheat. Cytoplasmic male sterile lines are being sought among Triticum introductions as well as resistance to wheat diseases.

Fiber Crops

All introductions of fiber crops are turned over to Cotton and Cordage Fibers Research Branch for maintenance and utilization. The transfer of breeding stocks to the National Seed Storage Laboratory which began in 1960 will be virtually complete after the 1963 season. Basic genetic studies using exotic cottons are being continued. Plant breeding programs using introduced germ plasm are oriented toward the production of high-yielding, strong-fiber varieties particularly adapted to certain regions within the Cotton Belt. Breeding and genetic research have been accelerated through the use of the winter breeding facility in Mexico and the recently-established Boll Weevil Research Laboratory in Mississippi. Plant breeding programs currently in progress have multiple objectives among which are as follows:

(1) gossypol-free cottons, (2) high yielding strong fiber types, (3) types which are storm, insect, and disease resistant, and (4) hybrid cotton. Bacterial blight, Fusarium and Verticillium wilt, seedling diseases, cold tolerance, and disease-nematode relationships comprised from all parts of the world continue to contribute to these studies. Several non-commercial breeding stocks were released jointly by various state experiment stations and USDA during the period of this report. A unique character, male sterility in Gossypium hirsutum L., was discovered in an introduction, P.I. 153974, from Guatemala. These breeding stocks of upland cotton are serving essential purposes in basic genetic studies and in breeding programs involving insect resistance.

Forage and Range Crops

Forage and range crops comprise the majority of introductions of agronomic crops. All Regional Plant Introduction Stations participate in the procurement, evaluation, increase, distribution, and maintenance of forage and range plant introductions. These crops are allocated to the various Regional Plant Introduction Stations on an agreed priority basis. Several new forage and range crop varieties were released for general agricultural use during the interim of this report. The list of new forage crop varieties known to be derived in part from plant introductions is somewhat impressive. It is expected that the demand for

introduced grasses and legumes will be increased in the very near future as a result of increased interest in and emphasis placed upon wildlife refuges and recreation areas by the federal government.

A. Legumes

Forty-five species of trefoil, medicagos, lespedeza, vetch, lupines and other miscellaneous legumes are of regional or national importance in the United States. One or more of these legumes are grown either as a pure stand or in grass-legume combinations for single or multiple usage on 95 percent of the farms and ranches in this country. Progress in the improvement of forage legumes consists mainly of reports on taxonomic, cytogenetic, plant breeding and crop adaptation studies. The search for sources of insect and disease resistance in these crops continues. Much useful information is reported on adaptation studies made throughout the country.

The improvement of alfalfa, a pasture legume of major importance grown throughout the country, is aided in large degree through introduced germ plasm. Adaptation studies with this crop include the screening of introductions for tolerance and/or resistance to cold, nematodes, and various insects and diseases. Progress is reported in the development of new varieties and breeding lines which exhibit resistance to insect and disease attacks with more spectacular results being reported for insect resistance. Other Medicago accessions are being used in phylogenetic studies.

Among the clovers, white, red, crimson, sweet persian, alsike, and zig-zag are receiving the most attention. Red and white clovers are receiving the most attention among plant breeders and agronomists throughout the northeastern and central United States. The improvement of other clover species is given in a few reports from widely scattered areas throughout the country. These are being evaluated for winter hardiness and disease resistance. Concentration is reported on plant type and root-knot nematode resistance in white clover. In addition, introductions of Trifolium species are being used on an increasing scale in basic investigations involving cytogenetic relationships within the genus.

Continued interest is being shown in birdsfoot trefoil introductions throughout the north central and northeastern United States. Trefoil breeding is being done by USDA in cooperation with various state experiment stations in the improvement of the crop. Breeding research is being done at Beltsville on crownvetch while cultural investigations are being done cooperatively with the University of Georgia.

Plant introductions are known to play a role in the progress reported on the improvement of other legumes which include: Arachis, Desmodium, Lupinus, Lespedeza, Dorycnium, Sutherlandia, Onobrychis, Glycine, Psoralea, Vicia, Vigna, Cajanus, and Leucaena. Over 500 legume introductions representing 176 species were screened in Arkansas for susceptibility to soybean cyst nematode.

B. Grasses

(1) Forage and Range

Forage and range grass introductions are being used by state, federal and private researchers for multiple purposes. Some are used in determining the host range of certain insects, others are being used in taxonomic and phylogenetic studies, still others are being used in plant improvement programs through breeding and adaptation studies. Investigations involving both basic and applied research are reported on the following selected genera:

> Andropogon, Agropyron, Agrostis, Aegilops, Bromus, Brachypodium, Bothriochloa, Bouteloua, Cenchrus, Chloris, Cynodon, Dactylis, Dichanthium, Digitaria, Echinochloa, Elymus, Eragrostis, Eleusine, Festuca, Hordeum, Ischaemum, Lolium, Phararis, Phleum, Panicum, Pennisetum, Paspalum, Secale, Sorghum, and Trisetum.

These investigations involve genetic and cytological studies and plant breeding programs directed toward the production of forage crops characterized by many criteria among which are cold, disease and/or insect tolerance and resistance, high yield, good spring and fall recovery, stand persistence, palatability, digestibility, and other desirable agronomic characteristics. Many examples of introductions may be cited containing germ plasm of proven value when used in the improvement of existing pasture and range grasses. New varieties of brome, orchard, and wheat grass are among those forage grasses released during the period of this report and about which plant introductions are known to be involved in their development.

(2) Turf

Turfgrass improvement is reported through selections made from introductions of Festuca, Poa, and Cynodon.

(3) Special Purpose

One state, Minnesota, has expressed a desire for obtaining information on and planting materials of grasses of reported ornamental value.

Oilseed Crops

Castorbean, flax, guar, peanut, safflower, sesame, soybean, and sunflower comprise the major oilseed crops handled by New Crops Research Branch. The high probability of the introduction of serious seedborne diseases through the introduction of these crops necessitates that they be screened thoroughly before distribution into production areas throughout the United States. Plant pathologists, located at the various Regional Plant Introduction Stations and here at Beltsville continue to screen these crops for diseases, mostly seedborne, and insects. Oilseed crops with the exception of guar and sunflowers are screened at Beltsville by Oilseed and Industrial Crops Research Branch under an existing working agreement.

Progress in the improvement of oilseed crops is reported along lines similar to that for forage crops. Continued interest is being given safflower introductions based primarily on the increased acreage of the crop and it being a source of dehydrogenated fats. Crop improvement programs with this crop include breeding work aimed at higher yields and disease resistance. Approximately 1,200 accessions of Arachis, mostly A. hypogaea, were received during the period of this report. Among this germ plasm are some introductions carrying marker genes which are proving to be useful in genetic studies. In addition to peanuts, continuing interest is shown in wild types of Arachis used as a pasture legume in grass-legume conbinations. New varieties of castorbeans, peanuts, flax, and soybeans were released containing germ plasm which is identifiable with plant introductions. Sesame introductions are being used in plant breeding techniques in the improvement of that crop.

Tobacco and sugar crops

Sugarbeet introductions are being screened for disease resistance. Resistant lines are being utilized in plant breeding programs in the improvement of the crop. Introduced germ plasm of sugarcane contained in newly-released varieties from Florida has extended the range of that crop into colder areas of the Florida Everglades.

In summary, research progress with field, and forage and range crops is demonstrated largely by the release of new and improved crop varieties from federal, state, and private plant improvement programs. Introduced germ plasm of these crops has lent impetus to basic research studies with them. The role that the four Regional Plant Introduction Stations play in making introduced germ plasm available to all interested researchers through their careful and thorough evaluation of introductions cannot be overemphasized.

REPORT ON CROP BREEDING STOCK INVESTIGATION; HORTICULTURAL CROPS

by Harold F. Winters

This report is concerned with the horticultural crop aspects of the rather broad project on evaluation and maintanance of crop breeding stocks. It includes all aspects of research undertaken by the New Crops Research Branch on fruit, ornamental, and vegetable crops.

Fruits:

Research with fruit introductions including nuts, is undertaken at the four Federal Plant Introduction Stations. There is little duplication in the introductions being maintained at the different stations. Emphasis at Glenn Dale, Maryland, is on quarantine procedures and on apples, pears, and citrus; at Miami, Florida, on tropical and sub-tropical fruits; and at Chico, California, on stone fruits, Chinese gooseberry, jujube, pistachio, and walnut. At Savannah, Georgia, only a few fruit introductions are maintained. During 1961, 500 new introductions were received and in 1962, 487.

Research with the fruit and nut introductions is accomplished in a variety of ways. Clonal introductions of established fruit crops, such as the apple and pear are tested for adaptability and yielding ability by several of the State Experiment Stations. At the Federal Stations the same introductions may be studied for characteristics such as date of flowering, leafing and fruit ripening, or for disease tolerance. These observations are published in a series of evaluation reports.

The most recent in the series is an evaluation of early ripening apple introductions. One of the introductions which appears promising in the eastern apple region is P.I. 143973, 'Red Apple' from Canada.

Research at Chico, Californic, with the Chinese Gooseberry (Actinidia chinensis) has attracted a good deal of interest in this prospective new fruit crop. A flood of requests for seed followed a semi-technical article in Western Fruit Grower for October 1961 and another in Organic Gardening, March 1963.

Two sweet cherry varieties released to growers are the Moreau, P.I. 125697, and Early Burlat, P.I. 125106. Both varieties ripen earlier in the sweet cherry section of Central California than standard varieties and are in demand for planting.

Many fruit introductions are received as seeds. These are planted at the Federal Station most suitable for growth of the crop in question, and the seedling progenies are evaluated for characteristics of value to the horticulturist and plant breeder. Examples of this type of investigation are the several seedling lines of stone fruits being observed at Chico particularly for late flowering.

Emphasis at the Miami station has been shifted from the arboretal approach of holding collections to a more active program of genetical evaluation of introductions. Seedlings of the Arue avocado, from Tahiti, are being observed for transmittal of an early fruiting character.

The Prunus virus indexing program at Glenn Dale has started to show results. Some 23 virus free cherry varieties have been released and others are scheduled for release within the next two years. Included in the 39 introductions inoculated during 1962 were the first apricot, peach, and plum introductions.

Ornamentals:

During the past two years expeditions have been completed to Japan, and Nepal for the collection of ornamental plants. Some of the collections already have been propagated and released to cooperators. Of special interest are azalea species from the entire range of climates represented in Japan. The materials from Nepal are still in the early stages of being propagated but will be released to cooperators in due time.

The Bradford Pear, released to nurserymen and other cooperators in 1960, has been favorably received. This is a seedling selection of Pyrus calleryana that has been thoroughly tested at the Glenn Dale Station and in nearby areas of Maryland. An article describing these tests appeared in the American Nurseryman on April 15, 1963.

Five new azalea varieties were released from the Glenn Dale Station in 1962, to nurserymen and others for propagation. The new varieties, Bayou, Green Mist, Petite, Pink Ice, and Whitehouse were designed to combine the large flower size of the Belgian-type azalea with the hardiness of the Glenn Dale Hybrids.

Vegetables:

Research in vegetable introduction is accomplished mainly through the Regional Cooperative program. Although some screening programs are now being conducted within the Regional Stations by pathologists employed by the New Crops Research Branch, the Branch is largely dependent upon cooperators in the State Experiment Stations for complete evaluation of introductions.

During 1961, a total of 1,679 vegetable introductions were processed and distributed by the New Crops Research Branch. The comparable figure for 1962 was 1,916 introductions.

During 1961, two hundred and eight introductions of potato were indexed for virus diseases. Thirty-three were infected with one or more of the viruses X, M, A. Y, or Leafroll. Fifty-two were infected with unidentified viruses or atypical strains of viruses widely distributed in this country. Comparable figures for 1962 were 144 potato introductions indexed, 72 infected with viruses, X, M, A, Y, or Leafroll, and 18 introductions destroyed because of having hazardous viruses. This work is performed at Glenn Dale, Maryland by Dr. R. P. Kahn of the Plant Quarantine Division.

Six introductions of sweet potato indexed negatively for viruses and were released from quarantine during the year to cooperators in the South.

Research with the waterchestnut has continued at the Savannah Station. A fertilizer experiment completed during the year revealed that the level of phosphorus and potassium in the soil are comparatively unimportant but that yield of the corms increased significantly within the limits of the experiment, with each level of nitrogen applied. In fact, the data indicate that the optimum level of application may not have been reached. The highest average yield in the experiment, 22,550 lbs. of corms per acre, was obtained from the application of 200 lbs. of available nitrogen per acre. Increased interest during recent years indicates that it may be possible to develop the waterchestnut as a limited commercial crop for this country.

REPORT ON CHEMURGIC CROP INVESTIGATIONS BY J. R. HAUN

For Minutes
of the S-9 Technical Committee Meeting, July 1963.

In the program for development of new crops for industrial utilization the following progress has been made:

Crambe abyssinica, a potential source of erucic acid in the seed oil, was sucessfully produced under dry land (up to 1100 lbs/A) and irrigated (up to 2800 lbs/A) conditions in the northwestern United States. Fertilizer studies indicated that relatively low rates of nitrogen (similar to barley) will be required. Spacing experiments indicated that the crop will be most productive when drilled in rows 6 to 14 inches apart at seeding rates of 5 to 10 pounds per acre. It was established that planting should be as early as possible for spring plantings in the northwestern states. Arrange-ments were made with growers in Oregon, Washington, Montana, and Wyoming to produce approximately 100,000 pounds of seed (in pod) in 1963 for extraction and distribution of oil to interested industries for use in product evaluation.

Vernonia anthelmintica, a potential source of epoxy fatty acid in the seed oil, produced yields above 1000 pounds per acre in experimental plots in Nebraska.

Plantings were arranged at 10 different locations in 1962 with an aggregate area of approximately six acres. Although hand-harvested yields were promising on several locations, the total amount of seed actually collected for the Eastern Utilization Lab was only a few hundred pounds. This was due to the difficulty of harvesting caused by shattering, and to irregular stands.

Vernonia is still considered a good crop prospect. The problems of seed shattering, poor germination and disease control do not appear insoluble, provided that sufficient research effort can be applied.

Limanthes, a potential source of long chain fatty acids in the seed oil, was planted in the fall, survived winter temperatures at Glenn Dale, Maryland, and produced seed in early May. Observations of morphologic change when plants were covered with snow indicated that growth actually took place during this period. The plants died immediately after fruiting as the early summer temperatures increased. This further confirms the observation that Limanthes will be adapted to cool-season conditions.

Twenty-eight new accessions from the recent collecting trip have been planted as fall plantings in California, and, where sufficient seed was available in Georgia and Maryland (24 accessions). Selected accessions are scheduled for early spring planting in Minnesota, New York, Washington, and Wyoming.

The performance of these plantings in 1963 should provide sufficient information to determine whether Limanthes can be developed into a crop. However, it should be emphazied that the small stature of this plant is such that mechanical harvesting may be difficult. Further, if the moisture and temperature requirements are too narrow it may be difficult to find sufficient areas for production. If unusual irrigation requirements are necessary, the costs of production may be excessive.

Annual Pulp Fiber Crop: As potential sources of paper pulp, kenaf (Hibiscus cannabinus), Crotalaria juncea, and Sorghum almum are considered promising for crop development. Dry-matter yields in 1961 and 1962 were, in general, superior to those of previous years. Although virus and botrytis infections have been reported on Crotalaria and kenaf, no serious disease or insect problems have evolved for these crops. Crotalaria can be substituted in nematode-infested areas for susceptible kenaf varieties.

Five acres in southeast Indiana were planted to kenaf (Everglades 71) with a conventional grain drill and weeds were well-controlled by use of a 14-inch row spacing. The planting appeared uniform except for a gradual shortening of plants due to a moisture gradient; however, yields from individual plots varied considerable from the average of 3.86 tons per acre. Yields were not increased by nitrogen application. More than 10 tons of chopped kenaf was supplied to paper companies and the Utilization Laboratory. An international No. 50 chopper with cutter-bar attachment easily handled the close row spacing, and the chop attained would be satisfactory provided a full chemical pulping treatment was planned. It would not be adequate for making structural board because a shorter, more precise cut is needed. Since an attempt to bale the chopped material was unsucessful, bagging was necessary. This material, as evidenced by the fact that only 20 pounds could be placed in a coffee bag, is quite bulky. A handling method as described would be economically unsound in a commercial operation. Sorghum almum has, in most cases, yielded less than what is considered economically feasible. However, more research is needed on row width spacing and fertilization in order to estimate its yield potential.

Dioscorea spiculiflora was found to be governed rather closely by special environmental conditions. At least three weeks of continuous high temperature above 80° F is necessary for sprout initiation on tubers and at least two more weeks at approximately 90° F for sprout elongation. This period should be followed by long days, high temperatures, and plentiful moisture for rapid vegetative growth. In the fall, short days (12 hours or less) induce flowering and subsequent senescence of the plants. The tubers then become dormant and require a rest period of 2 to 3 months.

Bamboo, a potential source of paper pulp and a replacement crop for the South, is being established in large-scale experimental plots. The planting at Camden, Alabama, is nearing completion and will be used for comparisons of harvesting cycles, cultural practices, harvesting methods, and in comparison with pine and poplar pulp sources.

Fennel (Foeniculum vulgare) appears to be well adapted to the North Central states; however, its indeterminate flowering behavior and subsequent seed shattering causes less than maximum yields to be obtained.

Early seeding is necessary because fennel germinates slowly but growth is quite vigorous during the warm summer months. As is the case with most members of the Umbelliferae family, this plant is visited by many different insects some of which are harmful.

Fennel seed analysis by the Southern Utilization Laboratory indicates that the oil content is affected by planting dates and, to a lesser degree, by plant spacing. Seed samples on this analysis were supplied from 1961 Nebraska plantings. These results, although based on limited determinations, suggest that further research of this nature is highly desirable.

Fennel and dill seed can be successfully produced in Oregon and in the Imperial Valley of California, however, dill is easier to grow and slightly outyields fennel. In these same areas, parsnip and celery yield approximately 1,000 pounds of seed per acre.

On the basis of yield reports and oil composition, it appears that other species, in addition to Foeniculum vulgare, could be included in further evaluation of petroselinic acid sources.

Dimorphotheca - The research at Chico, Calif., and work at other locations has provided valuable cultural information, but tends to stress the conclusion that certain existent problems must be overcome before this plant can be developed as a new crop. Several years would probably be required to acquire disease resistant and better seed retaining varieties because much selection and breeding would be necessary.

At the present time, there is one species of Dimorphotheca that offers a ray of hope - D. cuneata. This species has the advantages of high seed yield, short blooming period, good seed retention, disease resistance, and cold tolerance. Its principal disadvantages are poor seed form and slow growth rate, but the seed form is no worse than in D. sinuata and the slow growth rate is not much inferior to O. ecklonis. Provided there is sufficient interest in the seed oil from the chemical viewpoint, it is believed that this species merits further study.

In view of the poor performance of most species under trial, it is recommended that work on Dimorphotheca be greatly reduced in favor of the more promising prospects such as Vernonia. Additional but limited evaluation of D. cuneata and Osteospermum species will be continued.

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Publications by Line Project

CR i2-11 Preston, W. H., Jr. and J. R. Haun
Factors involved in the vegetative propagation of Dioscorea spiculiflora Hemsl. from vines. ASHS. Vol. 80. pp. 417-429. 1962.

CR i2-11 Anon. - U. S. Source of cortisone found.
Agricultural Research. Page 15. Feb. 1963.

CR i2-21 Anon. - Introducing Crambe
Agricultural Research. pp. 6 & 7. Nov. 1962.

CR i2-21 Anon. - (Haun, J. R., I. A. Wolff and Q. Jones prepared) Crambe - A potential new crop for industrial and Feed uses. ARS 34-42. Sept. 1962.

CR i2-22 Anon. - (Haun, J. R. prepared)
Kenaf - A potential source of paper pulp.
CR CA-34-89-62. May 1962.

CR i2-23 Anon. - (Haun, J. R. and G. A. White prepared)
Vernonia - A potential new oilseed crop.
CR CA-34-91-62. July 1962.

7/12/63 - F. R. Earle
Northern Utilization Research
and Development Division

Not for Publication

Comments for the July 18, 1963
Meeting of the S-9 Committee

Seed screening continued much as in the past, but with some increase in volume. We analyzed about 900 seed samples in preliminary screening, and determined the fatty acid composition of about 175 oil samples. Samples received by May 1, 1963 totaled 4560, and samples analyzed, 4160.

Perhaps the most significant result of the year is the discovery and identification of our tenth new fatty acid. It is cis-9-octadecen-12-ynoic acid, and constitutes 60 percent of seed oil from Crepis foetida. Evidence from gas chromatography shows it to be present in at least four other oils in amounts up to 20 percent.

Extensive screening of two groups of plants was completed. All known species of Limnanthes, except the one believed to be extinct, were analyzed for oil content and oil composition. All oils were essentially like that of L. douglasii in that at least 95 percent of the oil consisted of fatty acids with 20 or 22 carbon atoms. The amounts of cis-5-eicosenoic acid varied from 52 to 77 percent.

In the second group, relatives of Dimorphotheca, 91 samples have now been analyzed representing 30 species in 5 genera. Dimorphecolic acid occurs in oil of all six Dimorphotheca and Castalis species tested, and in five of the Osteospermum species in amounts ranging from 28 to 75 percent. All other samples of Osteospermum, Calendula and Chrysanthemoides oils contained from 14 to 60 percent of conjugated trienoic acids and little if any dimorphecolic acid.

Evaluation work on assigned oils (Vernonia anthelmintica, Cuphea, Limnanthes, petroselinic acid sources, Dimorphotheca, Lesquerella, and erucic acid oils) continues with detailed analyses of the oils and seeds, preparation of pure constituents, and preparation of derivatives for industrial evaluation. Industrial interest continues high: Vernonia and crambe oils made the first page of the Wall Street Journal for May 13, 1963.

Of 506 species of plants (746 samples) carried through primary fiber screening, 89 show promise for pulping. Attention is now being given to measurement of factors that may permit more effective selection within these 89 species. In a study of 11 species, statistical treatment now in progress should provide 2700 simple and multiple correlations of chemical and physical characteristics. An extensive study with sorghums is continuing with accessions from six locations expected from the 1963 crop. Kenaf pulps from three types of chemical pulping have been evaluated for use in fine papers. Blends of kenaf chemical pulp with wood pulp have shown favorable synergistic effects for some properties. Mechanical and chemi-mechanical kenaf pulps have shown promise for use in resin-bonded hardboard, newsprint and a variety of papers.

Over 300 species of seed have now been tested for their content of water-soluble gums, and legumes continue to be the most promising source. Thus far, legume gums seem so similar in properties that the major factors in industrial acceptance relate to the economics of production and to toxicity of seed and milled products. Six species are being grown in 1963.

Report of Cooperative State Experiment Station Service

D. Y. Perkins, who this year replaced W. C. Kennard as CSESS representative on the S-9 committee, spoke briefly on changes within CSESS and how they effect S-9. He indicated that he will be in a position to keep the S-9 committee informed of developments in the other three New Crops projects and the IR-1 project as he will attend all five of the yearly New Crops meetings. The S-9 group is the second group to have met this year, the IR-1 Technical Committee having met at Presque Isle, Maine on June 11 and 12. Dr. Perkins touched briefly on Hatch appropriations and indicated that the chances are good for at least a modest increase in Hatch funds this year. In closing, he complimented the committee for the excellent manner in which the project outline had recently been revised.

APPENDIX C

1964 Chart of Responsibilities

CHART OF RESPONSIBILITY 1964

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

C-1

CHART OF RESPONSIBILITY 1964

Objective	Type Activity	State Station and Federal Agency
2. To Multiply, evaluate, maintain and preserve germplasm of introduced plant materials for the Southern Region.	Increase new plant materials received since the last planting season and make them available for further evaluation at state stations and S.C.S. Plant Materials Center. Test germination of seed in storage and increase those low in viability or low in supply. New introductions will be observed for useful horticultural and agronomic characters and for the presence of disease and insects.	Regional Plant Introduction Station, Experiment, Georgia
C-2	Cucumis melo introductions which demonstrated resistance in preliminary screening tests will be tested in replicated tests in the greenhouse and in the field. Other diseases will be investigated and at least one will be selected for detailed screening. When necessary to prevent spread of new diseases, propagating material will be withheld from distribution.	Regional Plant Introduction Station, Experiment, Georgia
	Seed of introductions of potential economic value will be stored as working stocks for research workers in the Southern Region.	Regional Plant Introduction Station, Experiment, Georgia

CHART OF RESPONSIBILITY 1964

Objective	Type Activity	State Station and Federal Agency
2. Continued.	Inventorying of asexually propagated plants will be continued.	Regional Plant Introduction Station, Experiment, Georgia
	Evaluation of turf grasses.	Ala., Ark., Fla., N.C., Okla., Tex., Tenn.
	Evaluation of ornamental plants.	Ala., Fla., La., Okla., N.C., S.C., Tenn., Tex., Va.
C-3	Evaluate introductions of the following species of agronomic crops as sources of new breeding lines or for commercial plantings in their present forms:	
	grain crops	
	corn	Ala., Fla., Ky., Puerto Rico, N.C.
	sorghum	Ga., Fla., Okla., Puerto Rico, N.C., Tex.
	small grain	Fla., Ga., N.C.
	sunflowers	Ark., Ga., N.C.
	forage crops	
	Trifolium repens	Ala., La., S.C.
	Trifolium spp.	Ala., Ky., Soil Conservation Service, N. C.
	Lespedeza cuneata	Ala., N.C., Soil Conservation Service
	Vicia spp.	Ala., Soil Conservation Service
	Phalaris spp.	Ala., N.C.
	Cynodon spp.	Ga., Fla., N. C.
	Paspalum spp.	Fla., Ga., La., N.C., Tex.
	Pennisetum spp.	N.C.

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Objective	Type Activity	State Station and Federal Agency
2. Continued.	forage crops (cont.)	
	Bothriochloa spp. and Andropogon spp.	Ala., Okla., N.C.
	millets and misc. summer grasses	Ala., Fla., Ga., N.C., Miss., Texas, Puerto Rico
	Alfalfa	N. C.
	Misc. summer legumes	Ala., Fla., Ga., La., Okla., N.C., Puerto Rico, Soil Conservation Service
	Arachis spp.	Ala., Fla., Ga., N.C., Okla., Tex., Va., Soil Conservation Service
	Tobacco	Fla., N.C.
	Cool season perennial grasses	Ark., Ky., N.C., Va.
	Evaluate introductions of the following horticultural crops:	
	Cantaloupe	Ala., Ark., S.C., Texas, N.C.
	Watermelon	Ark., Fla., Miss., S.C., Tex., Va., N.C.
	Tomato	Ala., Fla., Texas, N. C.
	Pepper	Ala., Ga., S.C., N.C.

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Objective	Type Activity	State Station and Federal Agency
	Evaluation of horticultural crops (cont.)	
	Southern pea	Ala., Fla., Ga., Miss., Okla.
	Fruits and nuts	Ala., Ark., Fla., Ga., Ky., La., Miss., N.C., Okla., Puerto Rico, S.C., Tenn., Tex., Va., NCRB, ARS
	Sweet potato	Ga., La., N.C., Okla.
	Other vegetables	Fla., La., N.C., Puerto Rico, Va.
	Strawberries	La., N.C., Tenn.
	Adaptation and cultural studies of the following:	
	Oilseed crops	Ala., Ark., Fla., Ga., N.C., Okla., S. C., Tex., NCRB, ARS
	Fiber and pulp	Ala., Fla., Ga., N.C., Okla., S.C., Tex., NCRB, ARS
	Gum crops	Ala., Ark., Fla., Ga., La., N.C., Okla., S.C., Tex., NCRB, ARS
	Drug crops	La., Fla., NCRB, ARS
	Crops for insecticides	S.C., NCRB, ARS
	Chemical evaluation of new plant materials for new sources of oil, pulp, and gums.	URRD, ARS

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Objective	Type Activity	State Station & Federal Agency
3. To provide plant and seed materials for assessments of their chemical and physical properties and industrial use potentials.	Plant and seed material from increase and evaluation nurseries will be supplied for chemical and physical evaluation.	Fla., Ga., Ky., La., N.C., Okla., Puerto Rico, S.C., Texas
4. To catalogue and distribute introduced plant materials and to maintain and publish records of their performance and use in the Southern Region.	A complete list of availabe introductions will be prepared for distribution to research workers. The following manuscripts will be published: (1) Seed treatment for the control of seed-borne pathogens on guar. (2) Two diseases of guar in Georgia.	Regional Plant Introduction Station, Experiment, Georgia

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Objective	Type Activity	State Station and Federal Agency
4. Continued.	Distribute seed lists and reports of new plant activities. Maintain records of new plant materials received within the state and report their performace and use to the S-9 Technical Committee.	S-9 Committee members representing each state station and the Soil Conservation Service.
	Prepare an annual report for S-9 'New Plants' Project.	W. T. Fike, Chairman S-9 Committee