ANNUAL REPORT OF COOPERATIVE REGIONAL PROJECTS
Supported by Allotments of the Regional Research Fund,
Hatch Act, as Amended August 11, 1955
January 1 to December 31, 1964

1. PROJECT: SOUTHERN REGIONAL PROJECT S-9, "NEW PLANTS"

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

2. COOPERATING AGENCIES AND PRINCIPAL LEADERS:

State Experiment Stations	Representatives
Alabama	*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, Secretary
South Carolina	*J. H. Martin
Tennessee	*W. E. Roever
Texas	*E. L. Whiteley, Chairman
Virginia	*T. J. Smith
Administrative Advisor	R. L. Lovvorn

U. S. Department of Agriculture

New Crops Research Branch, ARS	C. O. Erlanson
	*J. L. Creech
Plant Introduction Investigations	H. L. Hyland
Plant Materials Investigations	
Agronomic Crops	A. J. Oakes
Horticultural Crops	H. F. Winters
Chemurgic Crop Investigations	G. A. White
Cooperative State Experiment Stations Service	D. Y. Perkins
Utilization Research and Development Divisions, ARS	*I. A. Wolff
Soil Conservation Service	*W. C. Young

Southern Regional Plant Introduction Station, Experiment, Georgia

Regional Coordinator	W. R. Langford
Plant Pathologist	Grover Sowell, Jr.
Assistant Agronomist	J. H. Massey
Assistant Horticulturist	W. L. Corley

* Voting Members of the S-9 Technical Committee

3. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS

Receipt of New Plant Materials

Seed or vegetative stocks of more than 3000 new accessions were received by the regional station during 1964. The new material represents 78 plant genera, but five grass genera (Bothriochloa, Andropogon, Cynodon, Dichanthium, and Digitaria) constitute about two-thirds of it.

309 accessions of Digitaria spp. were obtained through an exploration to South Africa by Dr. A. J. Oakes of the New Crops Research Branch to collect warm season grasses, especially Digitaria with greater cold tolerance and more resistance to diseases and insects. Approximately 1800 accessions of Cynodon spp. and old world bluestems were obtained from stocks collected over a period of years by Dr. J. R. Harlan and Dr. Wayne Huffine of Oklahoma State University.

The exploration to collect domestic fruit stocks near the Gulf Coast was continued in 1964. Thirty-nine accessions collected in Texas were assigned P.I. numbers, bringing the total of stocks documented in this collection to 161. Additional stocks collected in Mississippi and being propagated at State College, Mississippi, will increase this total to more than 200 accessions.

Production and Distribution of Seed

Thirty-seven-hundred-thirty-four accessions were planted at the regional station for seed increase and preliminary evaluation. Some of these were old stocks that were low in supply or low in viability. In addition to plantings at the regional station, 99 tropical legume introductions which had failed to flower under Georgia conditions, were grown at the Soil Conservation Service Plant Materials Center near Arcadia, Florida. New introductions of sesame and guar were grown at the Texas and Oklahoma Experiment Stations, respectively, for seed increase and evaluation.

A catalogue of all plant materials available at the regional station was prepared and issued to plant scientists at state and federal stations. The catalogue contained 12,486 accessions, representing 130 genera and 583 species. The regional station supplied 10,626 packets of seed or vegetative stocks to plant scientists in 1964. Research workers in the Southern Region received 7151 lots, and 2333 packets were sent to plant scientists in other regions. Seed of 406 introductions were placed in the National Seed Storage Laboratory. 736 packets of seed were sent to the USDA Inspection Station for further shipment to experiment stations abroad.

In addition to materials distributed from the Southern Regional Plant Introduction Station, research workers in the South also received 3749 packets of seeds or plants from other regional and federal stations. Thus

a total of 10,900 packets of seed or plants entered the regional evaluation program conducted by cooperating stations in 1964.

Evaluation Program

Although additional testing will be required to determine the merits of these introductions, further evaluation of many accessions that entered the evaluation program previously was quite rewarding. Several new varieties that were developed entirely or in part from introduced plant stocks were released during the year. Others reached the advanced stage of testing and probably will be released in the near future.

Agronomic Crops

P.I. 233816, Trifolium vesiculosum, was increased and released as Yuchi arrowleaf clover by the Auburn University Agricultural Experiment Station. Results from clipping trials at 10 locations in Alabama show that this clover reseeds well and produces an abundance of forage during late winter and spring, maturing about 2 months later than crimson clover. Winter production of Yuchi in Alabama has been superior to that of Amclo arrowleaf (P.I. 234310), an earlier maturing accession that was increased and released by the Georgia Experiment Stations in 1963. Another accession of T. vesiculosum, P.I. 233782, which is even later maturing than Yuchi, was released informally by the Soil Conservation Service to Soil Conservation district cooperators in Arkansas.

Abon Persian clover, developed from plant materials orginating from seven plant introductions from the Near East (P.I's. 141500, 141501, 141502, 143496, 143497, 173974, and 180492) was released to farmers by the Texas Agricultural Experiment Station and the Agricultural Research Service of USDA. These introductions were more desirable than Persian clover grown in the United States, but none produced enough hard seed for satisfactory volunteer stands. Concurrent selection for hard seed and superior forage characteristics resulted in improvement of both. Compared to the common strain of persian clover grown in the United States, Abon can be grazed 4 to 8 weeks earlier in the fall and 4 weeks later in the spring.

Texas 374, Crotalaria juncea, selected from variable stock first introduced from Puerto Rico in 1934, was released as a soil improvement crop by the Texas Agricultural Experiment Station. Texas 374 is a vigorous growing, uniform substrain with resistance to cotton root rot caused by Phymatotrichum omnivorum and to root knot nematodes (Meloidogyne sp.). It is the most versatile warm-season legume available for soil improvement in Texas and possibly in the Southwest.

P.I. 168535, Lupinus angustifolius, and Borre lupine (P.I. 189191) were used in the development of a strain of sweet lupine with resistance to anthracnose and grey leafspot. The gene for sweetness was found in P.I. 189191, and genes for resistance to grey leafspot and anthracnose

were found in two different selections from P.I. 168535. This new disease-resistant strain is now under consideration for release as a new variety by the Georgia Coastal Plain Experiment Station and the Agricultural Research Service, pending the quantity of foundation seed produced in 1965.

P.I. 121067, Arachis hypogaea, a large seeded Virginia-runner type peanut, was used as a breeding line in the development of the new peanut variety NC-5, released by the North Carolina Experiment Station. NC-5 plants are of intermediate runner-bunch growth habit, and they are 10 days later in maturity than NC-2. NC-5 is comparable to NC-2 in yield and in resistance to insects, but NC-5 yields a higher percentage of fancy size pods and extra large kernels than does NC-2.

P.I. 118457, Arachis glabrata, was released under the varietal name Arb by the Soil Conservation Service for forage production in southern Florida. Arb is a drought resistant rhizomatous, perennial legume that can be grown successfully in mixtures with Bahia and pangolagrass. This peanut exhibited resistance to leaf spotting and immuntiy to rust in plantings at Mayaguez, Puerto Rico. It produces few seed and they are impractical to harvest. It is propagated vegetatively in the same manner as coastal bermudagrass.

P.I. 246332, Ricinus communis, was used in the development of an indehescent S-pistillate castorbean breeding line. The new line, developed by the Texas Agricultural Experiment Station and ARS, is designated TSP10R. It has the dwarf-internode character derived from P.I. 246332. Seed of it are now available to castorbean breeders.

OK-RY10, a pollinator for grain sorghum hybrids, was released by the Oklahoma Experiment Station. OK-RY10 resulted from crossing Redlan with Kaira, a yellow endosperm sorghum introduced from Nigeria. In addition to high yields the new pollinator line has shown good resistance to diseases in the South.

Horticultural Crops

Valmaine, a new downy-mildew-immune variety of romaine lettuce, was released by the Texas Agricultural Experiment Station. The downy-mildew-resistant parent used in the development of Valmaine was a selection from P.I. 167150 from Turkey. Compared to the Parris Island variety, Valmaine is more uniform in plant type, taller with a darker green color, caps better and has straighter leaves. In yield tests in the Rio Grande Valley the average marketable yield of Valmaine was 459 cartons per acre and that of Parris Island was only 51 cartons per acre.

P.I. 153655, Ipomoea sp., introduced from Tinian Island and possessing a high degree of wilt resistance, was used as a parental line in the development of the new sweet potato variety Gem. The new variety, released

by the North Carolina Experiment Station, develops good baking qualities shortly after harvest without the normal curing process. It is early maturing and has good resistance to cork and wilt.

A new all-purpose cream-seeded southern pea variety named Floricream was released by the Florida Agricultural Experiment Station. Korean crowder, P.I. 293526, characterized by large seed size, regular pod fill, and good vegetative vigor, was one of the basic parental lines used in the development of Floricream. Floricream is an early maturing variety with high borne pods and determinate plant habit lending itself to mechanical harvesting.

Three other Vigna introductions were used in the development of valuable southern pea breeding stocks at the Florida Agricultural Experiment Station. A selection from the progeny of Two Crop Conch x P.I. 269667 is noted for the set of nearly all pods above the foliage, an important factor in mower-type harvesting. Another selection from a cross involving a wild Nigerian Vigna is likewise noted for its top setting of pods and determinate habit. P.I. 162699 from Argentina is considered valuable for vegetative vigor, disease resistance, and excellent pod characters.

In screening studies at the Georgia Experiment Station to locate a source of resistance to cowpea chlorotic mottle virus (CCMV), eight Vigna introductions were found to be resistant to this virus.. The resistant introductions are P.I. 147562, P.I. 186458, P.I. 186465, P.I. 194203, P.I. 255788, P.I. 255811, P.I. 297561, and P.I. 297562.

In an effort to transfer gummy stem blight resistance to commercial-type cantaloupes, crosses involving P.I. 140471 as a source of resistance, were made at Auburn University. F_1 plants resulting from these crosses continued to grow vigorously and showed little or no damage from gummy stem blight as compared with severe infection on commercial varieties.

Four introductions of Cucumis melo (P.I. 134200 from India, P.I. 164756 from India, P.I. 171596 from Turkey, and P.I. 182187 from Turkey) were used in crosses that produced partially male-sterile plants at Leesburg, Florida. Plants from these crosses developed normal or near-normal male flowers until the setting of 1 or 2 fruits, then all subsequent male flowers aborted. Further backcrossing to recurrent parents was done in an effort to obtain segregants that produce no fertile male flowers.

Results from screening tests in Puerto Rico to find resistance to the Puerto Rican strain of pepper mosaic virus showed that P.R. 6256 and P.R. 6228 were highly resistant to this disease. P.R. 6256 was obtained from the U.S. Virgin Islands under the varietal name 'Madame Elsita'. P.R. 6228 from Surinam is a very hot pepper named 'Madame Jeanette'.

A number of ornamental plants that appeared promising in evaluation trials at Clemson University were propagated and distributed to nurserymen in South Carolina. The plants are P.I. 237867, Eleagnus crispus; P.I. 237879, Ilex rotunda; P.I. 237910, Vaccinimum bracteatum; P.I. 241910,

Phamnus alaternus; P.I. 262383, Arbutus peninsularis; P.I. 267824, Ilex "Lydia Morris", and P.I. 267825, Ilex "John T. Morris".

Eight introductions of Begonia were propagated for release to retail trade in the Lower Rio Grande Valley. They are: P.I's. 292728, 292729, 292730, 292731, 292732, 292733, 292734, and 292735. Although susceptible to nematodes and damping-off, these Begonia plants are considered much superior to those previously available because of their compact growth and abundant flowering.

Chemurgic Crops

Studies to determine the adaptation and cultural requirements of new plants for industrial use were continued in 1964. As a result of chemical screening of plant materials by the Northern Utilization Research & Development Division of ARS, 13 new accessions found to contain unusual oils and gums or possess good pulping qualities for making paper were grown for seed increase and preliminary evaluation in Georgia and North Carolina. The plants grown and constituent of interest were:

P.I. Number	Crop	Constituent of Interest
296037	Brassica hirta	51% erucic acid
296044	Aeschynomene sp.	Pulp
296046	Crotalaria eriocarpa	Pulp
296052	Desmanthus interior	Pulp
296053	Desmodium sp.	Pulp
296054	Indigofera suffruticosa Mill.	Pulp
296055	Sesbania sp.	Pulp
296056	Tagetes lucida	25% unsaponifiables
296058	Trichosanthes cucumerina L.	47% conj. triene
296062	Brassica sinapistrum Boiss.	54% erucic acid
296079	Brassica sinapistrum Boiss.	High erucic acid, with no oxazolidieutbione
296081	Cassia javanica L.	Seed gum
296080	Cassia hirsuta	Seed gum

P.I. 296044, Aeschynomene sp.; and P.I. 296055, Sesbania sp. grew to a height of 11' and 14', respectively, and made very satisfactory yields of dry matter in Georgia. Plant samples of them were sent to the Utilization Laboratory for pulping evaluation. Seed production was poor on all plants except Indigofera suffruticosa, P.I. 296056, and Trichosanthes cucumerina, P.I. 296058.

The following plants entered the regional program prior to 1964, and they are now in various stages of development:

(1) Kenaf, Hibiscus cannabinus, is of interest as a source of paper pulp. It has been one of the most productive annual plants tested

for this purpose. In 1964, plantings in Florida, Arkansas, and Louisiana made more than 8 tons of dry stalks per acre. Inadequate soil moisture limited kenaf yields in Oklahoma and Texas to 3 to 5 tons per acre. A date of harvesting study was conducted in Arkansas to determine the effect of early harvesting on the yield and pulping qualities. Dry matter production increased until the first killing frost occurred.

A four-acre planting was made in Georgia to provide material for studying the pulping quality of kenaf after long periods of storage. Material is stored inside for protection against weathering and outside, unprotected from the weather. This information is important to pulp mills maintaining a stockpile of raw material.

(2) Crotalaria juncea, also of interest as a source of pulp, was somewhat less productive than kenaf in 1964. Severe lodging of this plant occurred in Florida, making it quite difficult to harvest. Lodging was also observed in a four-acre planting in Georgia which provided material for a storage test similar to that of kenaf.

(3) Crambe abyssinica (P.I. 247310) has been under study since 1959 as a source of erucic acid used in the plastics industry. After considerable success in Lower Rio Grande Valley tests, this plant was released to 9 farmers in Texas during 1964. All plantings made during the fall were killed by cold weather. Seed yields from February plantings in 40-inch rows ranged from 600 to 1000 pounds per acre. Single plant selections were made in Texas in an effort to improve cold tolerance and increase the oil content.

(4) Evaluation of Erucastrum abyssinica, P.I. 243913, as a winter oilseed and protein meal feed crop was continued in Florida. Seed oil from this plant also contains erucic acid, but at a much lower percentage than found in Crambe oil.

(5) Vernonia anthelmintica is under evaluation in 7 southern states as a source of epoxy fatty acid which is of great interest to the plastics industry. Seed yields in 1964 ranged from 200 to 900 pounds per acre. Plant selections were made in Oklahoma and Georgia in an effort to obtain a more uniform plant type and more determinate flowering habit. Tests were conducted in Georgia to determine fertility requirements and the effect of spacing and plant population on the seed yield of Vernonia.

(6) Cassia occidentalis is a source of seed gum similar to that found in guar. Seed yields from all plantings in the South in 1963 were quite high, but a leaf disease that caused premature defoliation sharply reduced the yield of plantings from South Carolina to Texas in 1964. Severity of the disease is shown by yields obtained in Alabama. Cassia produced 2276 pounds of seed per acre at Tallassee, Alabama, in 1963, but only 400 pounds per acre at the

same location in 1964. Only the plantings in North Carolina and Oklahoma appeared to be disease free.

Other Activities

The S-9 Technical Committee met at North Carolina State July 22-23, 1964. Detail reports given by each committee member occur in the Minutes, copies of which may be obtained from the Coordinator.

Three project outlines submitted by the Arkansas, Kentucky, and Mississippi Experiment Stations were accepted as contributing projects to S-9.

Tentative codes were devised for recording evaluations of plants in the S-9 program on IBM cards.

4. USEFULNESS OF FINDINGS

Improved crop varieties developed from superior breeding stocks provided through the S-9 Project should improve the efficiency of crop production in the South. New sources of disease resistance and other valuable germplasm discovered in the screening and evaluation program in 1964 will enable plant breeders to continue their development of better varieties. Information obtained from cultural studies of chemurgic plants is a basic need in the development of these plants into established crops.

5. WORK PLANNED FOR NEXT YEAR

The regional station will continue to receive, propagate, and catalogue new plant materials. Preliminary evaluations will be made at the regional station as seed and vegetative stocks are increased. A catalogue of all plant material available at the station will be prepared and distributed to plant scientists at state stations.

Further studies will be conducted at state stations to determine specific cultural practices for growing Kenaf, Vernonia, and other chemurgic plants that prove to be adapted to areas in the South.

Greater emphasis will be placed on screening introductions for new sources of disease and insect resistance. Such germplasm, when transferred to new and improved varieties, provides natural resistance to plant pests, thus reducing the need for pesticides.

6. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR

Regional Station

Leppik, E. E. and Grover Sowell, Jr. Alternaria sesami, a Serious Seed-borne Pathogen of World-Wide Distribution. FAO Plant Protection Bulletin, Vol. 12, No. 1. Feb. 1964.

Kuhn, C. W., R. O. Hammons and Grover Sowell, Jr. A Ringspot Disease of Peanuts. Plant Disease Reporter 48:729-732. 1964.

Alabama

Hoveland, C. S. Germination and seedling vigor of clovers as affected by grass root extracts. Crop Sci. 4:211-213. 1964.

_____. Frontier crimson clover. Auburn Univ. Agr. Exp. Sta. Highlights of Agr. Res. Vol. 11, No. 3. 1964.

_____. Yuchi - new arrowleaf clover. Auburn Univ. Agr. Exp. Sta. Leaflet 71. 1964.

_____ and H. L. Webster. Flooding tolerance of annual clovers. Agron. Jour. 57:(January) 1964.

Arkansas

Investigations with new crops. (Man.) Submitted for publication as an Exp. Sta. Rpt. Series.

Florida

Lorz, A. P. and L. H. Halsey. "Floricream, A New All-Purpose Cream-Seeded Southern Pea Variety". Fla. Agr. Exp. Sta. Circular S-154, August 1964.

Crall, J. M. "Jubilee, A Black-Seeded Garrison Type Watermelon". Fla. Agr. Exp. Sta. Circular S-148, November 1963.

Wolf, Emil A. "Florida 683, A Utah-Type Celery". Fla. Agr. Exp. Sta. Circular S-156, September 1964.

North Carolina

Fike, W. T. "Sunflowers, A New Crop for North Carolina". Proc. Assoc. So. Agr. Workers. 1964.

Pope, D. T., L. W. Nielsen and M. W. Hoover. "Gem, New Sweet Potato Variety". N. C. Research and Farming Vol. XXIII: No. 1, Summer 1964.

Oklahoma

Huffine, Wayne. Catalogue of Cynodon spp.

Harlan, J. R., W. L. Richardson and J. M DeWet. Improving Old World Bluestems for the South. Proc. Series P-480. July 1964.

Matlock, Ralph, and R. M. Oswalt. Brooks Guar. Okla. Agr. Exp. Sta. B-624. 1964.

Reeves, H. E., R. S. Matlock and B. J. Ott. Irrigated Sugar Beets in Oklahoma Panhandle. Proc. Series P-478. 1964.

Texas

Anonymous - Valmaine - A New Downy-mildew-immune Romaine Lettuce Variety. L-610. Texas Agr. Exp. Sta. November 1963.

Cowley, W. R. and Eli L. Whiteley. Texas 374. A New Summer Legume for Soil Improvement and for Possible Industrial Use. L-619. Texas Agr. Exp. Sta. April 1964.

Weihing, Ralph M. Abon Persian clover. L-618. Texas Agr. Exp. Sta. April 1964.

_____. Registration of Gulf Annual Ryegrass. Crop Science 3:366. 1963.

Whiteley, Eli L. and Calvin A. Rinn. A New Crop Promises Additional Revenue in the Southwest. Grain Age. Vol. 4, No. 12, p, 32. Dec.1963.

Young, P. A. Summer Cherry. A Spring, Summer, and Fall Cherry-type Tomato for East Texas. L-609. Texas Agr. Exp. Sta. Sept. 1963.

Soil Conservation Service

Blickensderfer, C. B., Harry J. Haynsworth and Robert D. Roush. Wild peanut, a promising forage legume for the upland soils of Florida. What's New in Crops and Soils. Nov. 1964.

Haynsworth, Harry J., C. B. Blickensderfer and Robert D. Roush. New lupines for winter cover crops in Florida (to be published).

7. APPROVED

Jan. 18, 1965
Date

Eli L. Whiteley
Eli L. Whiteley, Chairman
S-9 Technical Committee

February 2, 1965
Date

R. L. Lovvorn
R. L. Lovvorn, Administrative Advisor

Southern Regional Plant Introduction Station

Supplement to the ANNUAL REPORT of Project S-9 for 1964

PLANT PATHOLOGY REPORT FOR 1964

I. ACCOMPLISHMENTS IN 1964

A. Screening introductions for resistance.

1. Resistance of Cucumis melo to Mycosphaerella citrullina.

Replicated tests to evaluate eighteen introductions which were resistant in preliminary screening tests were not successful because of an epidemic of powdery mildew and varying levels of infection by gummy stem blight. It was decided not to repeat this test until supporting research on the pathogen results in the development of more accurate techniques for evaluating resistance.

2. Resistance of Vigna spp. to viruses.

(a) Resistance of southern pea to cowpea chlorotic mottle virus (CCMV). In cooperation with Dr. C. W. Kuhn and Dr. B. B. Brantley of the Georgia AES, the 373 introductions of Vigna spp., primarily Vigna sinensis, maintained by the Regional Station were screened for resistance to CCMV. Eight of these were highly resistant throughout a series of five tests (5). The virus was recovered from inoculated primary leaves on several of these, but it could not be recovered from inoculated true leaves.

(b) Resistance of southern pea to cucumber mosaic virus (CMV). In cooperation with Kuhn and Brantley, the Regional Station collection and a few commercial varieties of Vigna spp. were screened for resistance to CMV. Less than 20 percent of the plants of seventeen entries showed symptoms in the preliminary screening tests. In later tests, however, as many as 60% of the symptomless plants were infected.

(c) Resistance of southern pea to bean yellow mosaic virus (BYMV). Eleven introductions were symptomless in a preliminary screening test conducted in cooperation with Kuhn and Brantley. Virus could not be detected in P.I. 154134, P.I. 167024, P.I. 175962, and P.I. 177101.

(d) Resistance of watermelon to race 2 anthracnose. 'Charleston Gray' and other anthracnose resistant varieties are not resistant to race 2 anthracnose. Watermelon breeders have

been seeking a source of resistance to this race with little success except for a citron, W695 (6). The 288 introductions received by the Regional Station since the work of Winstead et al (6) were screened for resistance to an isolate of Colletotrichum orbiculare, race 2 obtained from Dr. Winstead. Six introductions which had a very low infection grade in the preliminary tests were included in a replicated test. P.I. 225557 appeared to have the most resistance, but eventually 100% of these plants were killed by the disease.

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

B. Field notes on resistance.

Fourteen introductions of Arachis hypogaea had an infection index of 1, as compared to 4 for 'Argentine' when infected by Cercospora arachidicola Hori. Other diseases were not severe enough or uniform enough to provide useful data.

C. Research on new or unreported diseases.

1. Anthracnose of Indigofera is caused by a fungus which is morphologically identical to Colletotrichum dematium f. truncata. The fungus on Indigofera is distinct in its pathogenicity from the fungus isolated from guar. This disease has not been previously reported from the United States. It did not re-occur on introductions in the nursery in 1964.

2. The Pseudomonas sp. isolated in 1963 was isolated again in 1964 from seedlings of four introductions of Citrullus vulgaris growing in fumigated soil in the greenhouse. Cultures were sent to a bacteriologist for identification.

3. Anthracnose of Cassia occidentalis. A Colletotrichum spp., probably of the Glomerella cingulata (Ston.) Spauld & v. Schrenk group, caused severe defoliation and pod and stem necrosis in plantings of Cassia

occidentalis. The pathogen was isolated and the symptoms were reproduced on seedlings in the greenhouse by inoculation with pure cultures of the fungus. This disease could be a serious limiting factor in growing this potential industrial crop, particularly during seasons with high rainfall.

4. Chlorosis of Digitaria spp. Virus-like symptoms were observed on a few introductions in the field and greenhouse. Attempts to mechanically transmit a virus from the diseased plants to healthy plants was unsuccessful.

5. Other diseases observed for the first time in 1964.
   (a) Colletotrichum sp. on Ricinus communis.
   (b) Sphacelotheca diplospora (Ell. & Ev.) Clint on Digitaria pentzii.

D. Production of pathogen-clean seed from infected stocks. Disease control practices for producing pathogen-clean seed were followed as proposed in the 1963 Annual Report.

E. Supporting research to screening plant introductions for disease resistance. The gummy stem blight fungus. A semi-quantitative technique involving the measurement of the progress of infection on excised cotyledons was developed. Single-conidium and single-ascospore isolates of the pathogen from Florida and South Carolina varied significantly in their pathogenicity. Two plants out of 51 Citrullus vulgaris, P.I. 189225, were immune to a highly pathogenic isolate of the fungus when excised cotyledons were inoculated. The remaining plants of this introduction showed varying degrees of resistance. A non-pathogenic isolate spread to the edge of lesions produced by a mixture of equal numbers of conidia of a non-pathogenic isolate and a pathogenic isolate. The pathogenic isolate was present in the tissues of a larger area of the lesion than was the non-pathogenic isolate. Attempts to demonstrate heterocaryosis as a possible mechanism of variation in pathogenicity by mixing equal numbers of conidia of pathogenic and non-pathogenic isolates were without success.

F. Identification and investigation of diseases of potential industrial crops. Peanut mottle virus (PMV) in Cassia occidentalis. Four hundred seeds of Cassia occidentalis harvested from plots which had been heavily infected by the virus described by Kuhn (2) were planted in the greenhouse. The plants did not develop symptoms of the virus. Therefore it seems likely that seed is not a significant source of the virus in field plantings. Peanuts and possibly other legumes are the most likely sources of the virus in the field.

G. Compilation of information on the resistance of plant introductions to disease. Lists of reports of disease resistance in introductions of Cucumis melo and Capsicum were published during the year (3,4). Notes on the reaction of plant introductions to specific diseases have been added to the regional station catalogue as the notes were received from research workers. This year we received data on the reaction of 87 introductions of

Cucumis spp. to Verticillium dahliae and the reaction of 475 introductions of Citrullus vulgaris to the same pathogen. This data was supplied by Dr. C. B. Skotland, Prosser, Washington. Data on the reaction of 758 introductions of Cucumis melo to powdery mildew was supplied by Dr. F. W. Whitaker, La Jolla, California.

II PROPOSED RESEARCH 1965

A. Screening introductions for resistance.

1. Resistance of Sorghum vulgare to Colletotrichum graminicola (Ces.) G. W. Wils. A preliminary screening test of 72 introductions will be conducted. If the currently-used inoculation technique proves satisfactory the entire collection of approximately 1800 introductinns of S. vulgare will be screened for resistance.

2. Resistance of Vigna sinensis to bean yellow mosaic virus. If Dr. Brantley finds a satisfactory level of resistance to this disease in his breeding lines, screening of introductions for resistance to this virus will be discontinued until such time as additional sources of resistance are needed by plant breeders.

B. Field notes on resistance. The same policy will be followed as in the past. Research on the accuracy of field notes in detecting resistance will be continued.

C. Research on new or unreported diseases. Research in this area will be continued as necessary to deal with the practical problem of seed distribution. Attempts to transmit the chlorosis of Digitaria will continue. Experiments will be conducted to determine if Digitaria pentzii can be freed of the systemic mycelium of Sphacelotheca diplospora.

D. Production of pathogen-clean seed from infected stocks. All seed planted for increase will be treated with a fungicide except for certain legumes in which seed-treatment may interfere with inoculation with N-fixing bacteria.

E. Supporting research to screening plant introductions for disease resistance. The investigation of the mechanism of variation in the gummy stem blight fungus will be continued. Additional isolates of this fungus and of Colletotrichum orbiculare will be obtained to study the fungus population in nature, particularly with reference to the occurrence of races and variation in pathogenicity. This should allow the selection of types of resistance which will be persistent in the field. Seed will be harvested from individual selfed fruits of P.I. 189225 (Citrullus vulgaris) on plants having superior resistance or immunity. The progeny will be compared with unselected P.I. 189225 in resistance to gummy stem blight.

F. Identification and investigation of diseases of potential industrial crops. Anthracnose of Cassia occidentalis will be described and isolations will be made to determine if the pathogen is seed borne. Other serious diseases will be identified as they appear in plantings at Experiment.

G. Compilation of information on the disease resistance in introductions from other research personnel. The lists of resistant introductions on all crops for which the Southern Regional Plant Introduction Station has priority will be completed. Notes on the reaction of plant introductions to specific diseases and insects will be added to the seed catalogue as they are received.

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