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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, 1963

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
South Carolina	*J. H. Martin
Tennessee	*W. E. Roever
Texas	*E. L. Whiteley
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
Chermurgic Crop Investigations	J. R. Haun
Cooperative State Experiment Station 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

*Voting Members of the S-9 Technical Committee

3. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS

Evaluation Program

Industrial Crops

Various genera and species of the plant kingdom are being screened in a cooperative program between the New Crops Research Branch, ARS and the Utilization Research and Development Division, ARS. Plants are sought which have valuable constituents, namely oils, seed gums and fibers known to be of value for their industrial uses. Species that appear most promising from the standpoint of chemical composition are given a preliminary evaluation in regional testing programs for agronomic adaptation and potential yield.

A regional oil and seed gum crop test was grown in five states and consisted of the following entries:

Cassia alata	PI 279691	Crotalaria sp.	PI 279696
Cassia leptadenia	PI 279692	Ipomoea sp.	PI 279715
Cassia leptocarpa	PI 279693	Salvia texana	PI 279722
Cassia occidentalis	PI 279694	Schkuhria wrightii	PI 279700
Crotalaria longirostrata	PI 279695		

The only crops from this group that produced enough seed for harvest were Cassia occidentalis, Crotalaria longirostrata and Ipomoea sp. Very poor stands resulted from seed of low germination. Most of these plants, native to the sub-tropics did not flower and if flowering took place, did not set seed.

Regional fiber crop tests containing from four to eight entries were grown in five states. Entries included kenaf, Everglades 41 and Everglades 71; Crotalaria juncea, Texas L-374 and Brazilian 55617; Sesbania spp., PI 180050 and a selection; and okra, PI 120833 and OAE 059-1. A 5 ton per acre dry matter yield of these fiber crops is necessary for a potential economical return per acre. The kenaf varieties, ranging in yield from 1.0 to 11.5 tons per acre are the only entries that approach this yield.

The following crops are in the advanced stages of testing. Larger plantings, up to 8 acres, are being harvested for seed increase. Rates and dates of seeding trials, fertility trials, and harvesting trials are being initiated with these crops.

Crotalaria juncea: This annual fiber crop is being grown for pilot plant studies in Texas. It is also being tried as a green manure crop in Texas and other areas.

Bamboo: Large scale plantings, up to 100 acres, of this perennial fiber crop are being evaluated in Alabama and South Carolina. Small scale plantings are also located at Arkansas, Louisiana, North Carolina, and Texas.

Crambe abyssinica: Seed increase acreage of this oil crop is located mainly in the Northwestern region of the United States this year. Texas had a large planting in 1962-63 and Arkansas, Oklahoma, and Texas are again testing this crop. Yields in 1963 ranged from 300 pounds per acre in Oklahoma, 1120 pounds per acre in Arkansas and up to 1800 pounds per acre in Texas.

Cassia occidentalis - This seed gum crop does extremely well all over the South. Hand harvested yields per acre ranged from 1900 pounds in North Carolina, to 2000 pounds in Georgia and up to 2350 pounds in Alabama. Combine yields per acre have been over 1000 pounds per acre in many states. A North Carolina report shows that the seed is toxic, however. Enough seed is available in the Southern region for more advanced studies at the Utilization Lab in Peoria. This seed will be delivered to Peoria in 1964.

Vernonia anthelmintica: Large scale plantings of this crop were grown in North Carolina, Oklahoma, and Texas. Arkansas, Georgia and Kentucky also planted the crop on a small scale. Hand harvested yields per acre ranged from 125 to 1000 pounds. It appears that this crop will have to be cut and then either windrowed or shocked for maturing as much seed is lost by shattering when combined directly.

Polanisia viscosa: This is a carry over oil crop from 1962 and stands were very poor in 1963.

Ipomea parasitica: This spreading oil crop yielded 856 pounds in Oklahoma in 1963. Plants from the 1962 crop volunteered as a weed in Arkansas. This is also a carry over oil crop from 1962.

Tephrosia sp. Strains of this crop developed in Puerto Rico for high rotenoid content are being evaluated at South Carolina and Louisiana.

Agronomic Crops

The development of new forage crops through direct release of P.I.'s or by incorporating desired characters of P.I.'s into present varieties by breeding is one of the main uses of plant introductions in the South.

Arrowleaf clover: Amclo, a variety released by the Georgia Experiment Stations, is an increase of PI 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.

Arrowleaf clover: Acreage of PI 233816 is expanding in Alabama where this introduction yields more than Amclo clover (PI 234310).

Reseeding Vetch: The interspecies hybridization program in Alabama has utilized several P.I.'s in the development of a reseeding vetch.

Rescuegrass: Gasel, a mildew and smut resistant rescuegrass was released in 1963 by the Georgia Experiment Station. This variety was selected from an old P.I. (number lost).

Sericea lespedeza: Gasyn, a synthetic variety of Sericea lespedeza was released in 1963 by the Georgia Experiment Station. This variety also resulted from unknown P.I.'s.

Rhodesgrass: PI 151008 (Chloris gayana) has been combined into a synthetic variety which is tentatively scheduled for release this year in Texas. The open pollinated F_1 of this variety showed very good rust resistance and tolerance of rhodesgrass scale.

Bitter Blue lupine: A variety release circular "Ritchey - an Improved Seed Producing Variety of Bitter Blue Lupine" was published by the Florida Experiment Station. Although no specific P.I. was mentioned, this variety quite obviously is the result of earlier plant introductions.

Mike clover: In Alabama, the common strain and P.I. 170829 were found to be very susceptible to alfalfa weevil (Hypera postrica Gyll.)

Digitaria valida: Puerto Rico reports that P.I. 209177 and P.I. 209372 seem promising as germplasm for a breeding program because they produce abundant flowers, with viable seeds and reproduce sexually.

In addition to the above forage crops the following sorghum pollinator lines were released.

Sorghum: Four pollinator lines for male sterile combine Kafir 60 were released in Arkansas. One of these lines 1001-2 is the product of an Atlas outcross x (E -26 x Ladore, a P.I. named and released by Oklahoma).

In Tennessee tests for corn smut, high resistance was recorded in P.I. 213731; 213737; 213739; 186183; and medium resistance in P.I. 186218; 213799; and 218173. Testing for earworm resistance - high resistance was found in P.I. 217413; 186225; 186183; 186185; and 213758. In 217413 resistance has been demonstrated for two seasons.

Horticultural Crops

Two new varieties of horticultural crops were released.

Summer cherry tomato: (STEP 437 and SI 447E) was developed by crossing S1119 summer tomato with a wild cherry tomato P.I. 190256 from Novelle Caledonia at the Tomato Laboratory at Jacksonville, Texas in 1950. Selections were made to fix a plant type producing large prolific plants with uniform ripening fruit.

Avocado: A variety release circular "The Ruehle Avocado" was published by the Florida Experiment Station. Although no specific P.I. was mentioned, this variety quite obviously is the result of earlier plant introductions.

The following introductions will be of value to various cooperators to the S-9 program:

Date palm: Some of the date palm introductions, Phoenis dactylifera, produced their first crop in Puerto Rico. It appears that dates may be promising for production in the dry regions of Puerto Rico

Southern peas: 442 introductions were evaluated in Texas for plant resistance to the cowpea cruculio. This data can be obtained from the Regional Station, Experiment, Georgia.

Cucumis melo: Florida reports that PI 164756 from India is resistant to powdery and downy mildews and to fruit rot.

Cucumis sp.: A total of 1463 PI's involving C. melo, C. sativis, and C. spp. were evaluated for resistance to rootknot nematode, Meloidogyne incognita acrita in South Carolina. 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 resembled 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 seed coats.

Cabbage: South Carolina reports that P.I. 261774 and P.I. 261769 are resistant to downy mildew.

Coleus: Georgia reported that the highest ratings of 34 Coleus P.I. selections were given to the following: Trailing Red, Trailing Queen, Mme. Caroline Beck, Canadian Yellow, Red Crotan, Beckwith's Gem, Pineapple Beauty, Golden Mottle, and Campfire.

Ornamentals: The following ornamentals looked very good under Texas conditions.

Achimenes grandilora	P.I. 260703	Greenhouse crop
Cyanotis cristata	P.I. 238684	Interior and outdoor landscaping
Ardisia japonica	P.I. 274526	Landscape
Fatasia japonica	P.I. 275496	Ex. foliage plant
Raphiolepis umbellata	P.I. 277653	Landscape
Raphiolepis umbellata	P.I. 277664	Landscape
Cephalonena polyandrus	P.I. 249458	Indoor and Zone 10 landscape
Leptospermum pubescens	P.I. 255007	Landscape
Medinella venosa	P.I. 242347	Foliage plant, greenhouse crops.
Myrtus communis	P.I. 249832	Landscape
Oreopanax capitatum	P.I. 241392	Indoor and Zone 10 landscape.

The following ornamentals look good under South Carolina conditions:

Eurya emarginata	P.I. 235425	Landscape
Eurya japonica	P.I. 237871	Landscape
Eurya ochnacea	P.I. 235502	Landscape
Eurya emarginata	P.I. 240914	Landscape
Elaeagnus crispa	P.I. 237867	Landscape
Osmanthus 'gulftide'	P.I. 213308	Screens and hedges
Rhamnus alaternus	P.I. 241910	Landscape
Arbutus perinsularis	P.I. 262382	Landscape
Mahonia lomariifolia	P.I. 239376	Landscape
Osmanthus (dwarf)	P.I. 242292	Landscape

A Tennessee test showed that the following line forms a very nice pot plant when grown in no direct sunlight.

Chlorophytum laxum "Variegatum" P. I. 242808

New Plant Materials Received and Distributed and Other Activities of the Regional Station Experiment, Georgia

Seventeen-hundred fifty-nine new accessions were received this year. Approximately 3900 accessions were grown for seed increase and preliminary evaluation. A cumulative catalogue of all plant material in storage, including 1682 accessions not previously available, was prepared and distributed to plant scientists at state stations. Slightly more than 11,000 packets of seed and vegetative clones were supplied to research workers.

A survey was conducted to determine the plant material needs of plant scientists in the Southern Region. Results of the survey will be used by the NCRB of ARS in planning an exploration to collect seeds and plants in Africa during 1964.

In preliminary screening tests to locate new sources of disease resistance, 19 accessions of cantaloupe showed resistance to gummy stem blight, and 7 cowpea introductions showed resistance to cowpea mottle virus. Three pathogens, Colletotricum dematium (Pers. ex. Fr.) Grove, Alternaria cucumerina (Ell. & Ev.) J. A. Elliott, and a species of Xanthomonas were isolated from guar.

Increase of new plant materials will provide plant scientists with 1682 new introductions for further evaluation and use in plant breeding programs. New sources of disease resistance found in cantaloupe and cowpea introductions should enable plant breeders to develop more productive varieties of these crops. Identification of the guar pathogens will enable plant breeders to accurately evaluate losses caused by diseases and to select for resistance to them.

Other Activities

The S-9 Technical Committee met at the Florida Experiment Station, July 18-19, 1963. Detail reports presented by each committee member occur

in the minutes, copies of which may be obtained from the coordinator. The present executive commitee of S-9 for 1963-64 are:

W. T. Fike, Chairman
E. L. Whiteley, Secretary
A. M. Davis, Past Chairman
R. L. Lovvorn, Administrative Advisor

The 1964 meeting of the S-9 regional project will be held at the North Carolina Experiment Station, Raleigh, July 21-22, 1964.

4. USEFULNESS OF FINDINGS

The adaptation and yield information obtained from the regional screening of those crops high in oil or seed gum and those fiber crops from the USDA screening program will be very beneficial to increasing the land use capabilities for the South.

The following varieties were released in 1963 to better benefit the agricultural economy of the South:

Amclo arrowleaf clover	A synthetic variety of rhodesgrass
Arrowleaf clover - PI 233816,	Ritchey bitterblue lupine
A reseeding vetch	A summer cherry tomato
Gasel rescuegrass	The Ruehle avocado
Gasyn sericea lespedeza	Four breeding lines of sorghum

In addition to the named varieties released, other P.I.'s showed promise as ornamentals and as breeding stock containing genes for disease resistance.

5. WORK PLANNED FOR NEXT YEAR

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

Emphasis of the regional project will be placed on determining the range of adaptation, productivity, and cultural requirements of plants

containing interesting chemical components. The plants to be tested will be recommended to the Project by the New Crops Research Branch of ARS and the Utilization and Development division of ARS. The list of plants for field evaluation will be revised annually (See 1963 minutes of S-9). A summary of the regional work will be forwarded to the Crop Development Section of the NCRB at the end of the growing season.

6. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR

Regional Station

Langford, W. R. Plant Introductions and Development of New Crops. Proc. Soil & Crop Science Soc. of Fla. 1963 (In Press).

Sowell, Grover Jr., and W. R. Langford. Evaluation of Introduced Peppers for Resistance to Bacterial Spot. Amer. Soc. Hort. Sci. December, 1963. (In Press).

Sowell, Grover Jr., Three Diseases of Guar. Phytopathology. 53:890. 1963

Alabama

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

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

Hoveland, C. S. and Bass, Max H. Susceptibility of mike clover (Trifolium michelianum Savi) to alfalfa weevil. Crop Sci. 3: 452-453. 1963.

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

Arkansas

Davis, A. M. The feasibility of Sugarbeet production in Arkansas, (A report to the Legislative Council of the State of Arkansas).

Florida

Edwardson, J. R. Ritchey - an Improved Seed Producing Variety of Bitter Blue Lupine. Univ. of Fla. Ag. Expt. Station Circular S-143 June, 1963.

Popenoe, John. The Ruehle Avocado. Univ. of Fla. Ag. Expt. Station Circular S-144, June 1963.

Georgia

Elrod, J. M. Gasel, A mildew and smut resistant rescuegrass. Georgia Experiment Station Leaflet NS 37: 1-4. 1963.

Elrod, J. M. Gasyn, A synthetic variety of Sericea lespedeza. Georgia Experiment Station Leaflet NS 38: 1-4. 1963.

Craigmiles, J. R. Registration of varieties of Sudangrass. Suhi-1 (Rhodesian grass - Sudangrass hybrid, Reg. No. 110) Crop Sci. 3: 367. 1963.

Craigmiles, J. P., and H. B. Harris. Dosage evaluation for gamma irradiation of Rhodesian Sudangrass seed. Crop Sci. 3: 452. 1963.

Craigmiles, J. P. and S. V. Stacy. Suhi-1, a new high yielding Sudangrass hybrid. Georgia Agricultural Research 4(4): 10-11. 1963.

Craigmiles, J. P., H. B. Harris, B. J. Johnson and J. P. Newton. General and specific combining ability in forage sorghum. Sorghum Newsletter 6:11-12. 1963.

McCullough, M. E., J. P. Craigmiles, H. B. Harris, B. J. Johnson and J. P. Newton. Sorghum Silage Studies. Sorghum Newsletter 6:12-13. 1963.

Kentucky

Collins, G. B. Interspecific compatabilities and taxonomic classification in Trifolium as related to chromatographic analysis. Master thesis, Department of Agronomy, University of Kentucky, May, 1963.

Taylor, N. L., W. H. Stroube, G. B. Collins and W. A. Kendall. Interspecific hybridization of red clover. Crop Science 3: 549-552. 1963.

Collins, G. B., N. L. Taylor. Chromatographic analysis of Trifolium species. Crop Science. In press.

Stroube, W. H., R. E. Sigafus. New crops and plant introduction. Results of Research in 1963. Kentucky Agriculture Experiment Station Annual Report. December 1963.

North Carolina

Fike, W. T., J. W. Kelly, and C. J. Nusbaum. Hairy Indigo - A Replacement Green Manure Crop for the Banned Crotalarias. Proceedings - Assoc. of Southern Agric. Workers, Memphis, Tenn. Feb. 4-6. 1963.

Gregory, W. C. Peanut Breeding resources. Proc. 2nd National Peanut Res. Conf. Raleigh, N. C. Aug. 13-15, 1962. pp. 11-12, 1963.

Thompson, D. L. Stalk Strength of Mexican Strains of Maize. Crop Science Dept., N. C. State, Res. Rep. No. 1, July 1962.

Oklahoma

Matlock, R. S. and R. M. Oswalt. Adsuki bean, Phoseolus angularis. Okla. Agri. Exp. Sta. Bul. B-617. 1963.

Puerto Rico

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

Jackson, G., Diaprepes abbreviata on Phoenix dactylifera. J. Agric. U. P. R. 47(4): 290. 1963.

Singh, T., P. Gonzales-Melendez, and A. Spulveda-Torres. Experiments on Strawberry Growing in the Central Western Region of P. R., J. Agric. U.P.R. (In Press).

Texas

Abdul Jabbar Mia - Ontogeny and deferentation of sclereids in Rauvolfia. American Journal of Botany

_____. Histochemical studies of sclereid induction in the shoot of Rauvolfia sp. Journal of Experimental Botany.

_____. Histochemical studies of shoot apex of Rauvolfia. In preparation.

Whiteley, Eli L. and C. A. Rinn - Crambe - A potential 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 on Kenaf were made for release to television stations in the state.

Bingham, R. D. Castorbeans--- Industrial crop with a potential. To be published in Crops and Soils.

Bingham, R. D. Development of S-pistillate, dwarf-internode castorbean lines for use as female parents in the production of F hybrids. Presented at ASA Meeting, Cornell University, Ithaca, New York.

Soil Conservation Service.

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, Georgia. Printed by the Assoc., Nashville, Tenn. PP 136-141. Discusses two introductions PI 168939 and the other number lost.

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.

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.

Discusses Trifolium vesiculosum - PI 234319, 233816, 233782.

New Crops Research Branch

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.

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

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

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.

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

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

7. APPROVED:

January 28, 1964
Date

W. T. Fike, Chairman
S-9 Technical Committee

January 28, 1964
Date

R. L. Lovvorn, Administrative Advisor

SOUTHERN REGIONAL PLANT INTRODUCTION STATION

Supplement to the ANNUAL REPORT of Project S-9 for 1963

PLANT PATHOLOGY REPORT FOR 1963

I. ACCOMPLISHMENTS IN 1963

A. Screening introductions for resistance.

1. Resistance of cantaloupe to gummy stem blight.

The variety Florisun which has been reported (2) as resistant to this disease was tested in comparison with other varieties. Plants were incubated in the moist chamber 48 hours (instead of 24 as in previous tests) to provide conditions favoring a higher infection grade. Except for a single replication of Florigold, all varieties including Edisto, Banana and Rio Gold were killed by the fungus. It was concluded from this experiment that no commercial variety has adequate resistance to survive a severe epidemic of gummy stem blight. Consequently, screening of plant introductions for resistance to this disease was continued using a 48 hour incubation period. Approximately 1100 introductions and commercial varieties of Cucumis melo have been screened to date. Of the introductions screened P.I. 140471 had the lowest disease index and the fewest dead plants. Eighteen introductions which showed resistance in a preliminary screening test were included in a replicated test in the greenhouse. Severe damage from an insecticide used to control aphids, killed these plants and prevented the collection of accurate data. The experiment was repeated but a severe infection of the plants by powdery mildew, caused by Erysiphe sp., again prevented completion of the experiment.

2. Resistance of cucumber to gummy stem blight.

All commercial varieties of cucumber in stock at a major seed company were included in a replicated test. An incubation period of 72 hours was used to provide conditions for severe infection. The results from 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 1. P.I. 189225 had an infection index of 0.9 - 2.6 with a 48 hour incubation period (5). Under these circumstances

it appears that it would not be profitable to undertake the screening of cucumber introductions for resistance.

Table 1. 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.

3. Resistance of pepper to southern blight, caused by Sclerotium rolfsii Sacc.

The causal agent of this disease attacks many crops in the South and presents a very serious problem on peppers. Two methods of inoculating the plants were tested. The results of this test and the priority of other disease problems led to discontinuance of this research.

4. Resistance of cowpea chloritic mottle virus (CCMV).

In accordance with our proposal in the 1962 Annual Report to emphasize an increasing study of problems in the area of diseases of forage and field crops all of the introductions of Vigna spp. in the collection of the regional station were screened for resistance to CCMV. Twenty five introductions remained free of symptoms of the disease following inoculation with the virus. This work was conducted in cooperation with Dr. C. W. Kuhn.

5. Resistance of tomato introductions to root-knot nematode.

Scions of the variety 'Marion' were grafted to stocks of a number of Lycopersicon introductions which have been reported as resistant to root-knot nematodes. The grafted plants and ungrafted plants of the introductions and the varieties 'Nemared' and 'Marion' were planted in soil heavily infested by the cotton root-knot nematode, Meloidogyne incognita acrita Chitwood. The introductions and 'Nemared' proved highly resistant to this nematode (Table 2). The purpose of this experiment was to establish the resistance of tomato introductions to the specific nematode most common

in our plots. This was necessary since there are at least four species of root-knot nematode present in the region.

Table 2. Resistance of tomato introductions to the cotton root-knot nematode, Meloidogyne incognita acrita Chitwood.

Variety or P.I. No.	Total number plants	Mean rating[1/]
126928	3	0.00
126929	1	0.33
126944	3	0.33
128657	2	0.00
Nemared	4	0.00
Marion	4	4.00

1/ Rated on 1-5 scale

B. Field notes on resistance of introductions.

The lack of definition of symptoms of individual diseases, the lack of uniformity in the distribution of diseases over the field, and in a few cases the low incidence of diseases prevented an accurate field evaluation of resistance this season. It is becoming increasingly evident that accurate field evaluation of resistance cannot be obtained in unreplicated plots under the conditions at Experiment, Georgia.

C. Identification of diseases present on plant introductions.

Introductions growing in the nursery were examined frequently for the presence of diseases, particularily those which were not familiar. Three unfamiliar diseases were detected (1).

1. Anthracnose of Indigofera sp., caused by Colletotrichum dematium (Pers. ex. Fr.) Grove. This fungus is not new to the United States but it may represent a form distinct in its pathogenicity. All of the plants were killed before they produced seed.

2. A virus, apparently identical to the virus described by Kuhn (3) as causing a leaf mottling of peanuts, was isolated from 100% of the plants of Cassia occidentalis tested. The symptoms on Cassia occidentalis were a mild mottling of the young leaves. On Cassia leptocarpa, P.I. 279693, however, a severe tip-necrosis was noted in association with this virus (3).

3. A white bacterium, apparently a Pseudomonas sp. was isolated from seedlings of a watermelon introduction growing in the greenhouse. It was pathogenic.

D. Freeing introductions from seed-borne diseases.

1. All introductions of cowpea were grown, rogued frequently and treated with systemic and surface insecticides to reduce the incidence of virus diseases. Twenty-five seed samples from these plants were grown in the greenhouse where they exhibited a maximum of 12% of plants showing virus-like symptoms. The symptoms resembled those caused by cucumber mosaic virus, a common virus in this area. Since the virus concerned is already established in the commercial cowpea growing areas of the Southeast and a low percentage of the seed carry the virus, these seed will be distributed without restriction.

2. Seed-borne diseases of guar.

Seedlings from seed grown at Experiment, Georgia, were severely affected by Anthracnose (Table 3). The fungus was also detected in the seed by planting on V-8 agar and by germinating it on blotters in petri dishes. Seedlings from Oklahoma grown seed were not affected and the pathogen was not detected in this seed. Guar seed grown in Oklahoma is now being distributed without restriction.

Table 3. The number of guar seedlings affected by Colletotrichum dematium and the number of seed from which the fungus was isolated from samples of 50 seed each.

	Grown at					
	Experiment, Ga.			Stillwater, Okla.		
P.I. No.	Diseased seedlings	No. infected seed V-8	Blotter	Diseased seedlings	No. infected seed V-8	Blotter
263901	25	13	1	0	0	0
263875	15	4	1	0	0	0
179930	30	6	2	0	0	0

3. Peanut ringspot

Since this is the second consecutive season that this symptom failed to appear on peanut introductions, all peanut introductions except the original 19 showing ringspot are being distributed without restriction.

4. Leafspot of sesame.

Due to a severe epidemic of this disease in the regional station nursery last season the seed produced in 1962 was treated with streptomycin and sent to Dr. Murray L. Kinman for increase at College Station, Texas. Dr. Kinman informed us (personal correspondence) that the plants growing in his location were affected by bacterial leafspot, consequently seed from this planting will not be distributed.

E. Compilation of data on the resistance of plant introductions to disease.

The increasing number of publications citing resistance of plant introductions to disease demonstrates the value of plant introductions as breeding stocks. Publications in this field during 1963 include data on the susceptability of pepper to Verticillum wilt in two locations, two articles on sources of resistance to tobacco mosaic virus, two publications providing additional information on bacterial spot resistance of plant introductions, additional information on resistance of P.I. 264281 to potato virus Y and the reaction of cantaloupe introductions to the cotton root-knot nematode. These data will be included in the 1964 catalog.

II PROPOSED RESEARCH 1964

The following areas of research and observation will be investigated in 1964.

A. Screening introductions for resistance.

1. Resistance of Cucumis melo to Mycosphaerella citrullina.

The replicated test including introductions resistant in preliminary tests will be repeated in the early spring after additional preliminary screening test have demonstrated the absence of the powdery mildew fungus. The highly resistant introductions from the replicated tests will be planted in the field and inoculated with the pathogen several times.

2. Resistance of Vigna sp. to viruses.

a. CCMV - The introductions which remained symptomless when inoculated with CCMV will be placed in a replicated test. Those which remain symptomless and free of virus as determined by indexing will be recommended as sources of resistance for use by plant breeders.

Dr. B. B. Brantley, who has found no satisfactory resistance to this virus in his breeding lines, plans to use these introductions in his breeding program. Cowpea (southern pea) represents a 4.5 million industry in Georgia alone (1). It is also an important vegetable crop in most of the states in the Southern Region. The edible types are frozen, canned and shipped to fresh markets.

b. CMV - Cucumber mosaic virus (CMV) is the most common virus on cowpea in the Regional Station nursery and in commercial plantings in Georgia (6). A replicated greenhouse test on the effect of CMV on the yield of cowpea is now in progress in cooperation with Drs. Kuhn and Brantley. The results of this test will be compared to results of replicated field tests to determine the importance of the small percentage of seed transmission in introductions grown under conditions of frequent rogueing and the application of a systemic insecticide. If Dr. Brantley does not find resistance to CMV among breeding lines or commercial varieties the introductions will be screened for resistance.

B. Field notes of resistance.

The lack of progress in detecting sources of insect and disease resistance by this method demands a critical evaluation of the techniques used in the past. The following procedure will be followed:

1. Note taking on the reaction of individual introductions to disease and insects will be confined to cases of severe disease development with a reasonably even distribution over the field as detected by replicated susceptible varieties.

2. The reaction of introductions which are resistant to the disease in the field will be investigated under conditions of greenhouse screening tests. The resistance of a number of introductions of Cucumis melo to all available strains of Colletotrichum orbuculare (Berk & Mont.) v. Arx will be tested.

C. Research on new and unreported diseases.

1. Anthracnose of Indigofera will be investigated to determine if this pathogen represents a new pathogenic form.

2. Pathogens present on seeds of Citrullus vulgaris held in storage at the Regional Station will be investigated to determine the frequency of occurrence of the pathogenic bacterium. An attempt will be made to determine the relationship of this bacterium to bacteria previously described on C. vulgaris and other cucurbits in cooperation with a bacteriologist.

D. Production of pathogen-free seed from infected stocks.

1. All nursery plantings of introductions will be treated with a systemic

insecticide and rogued frequently. Introductions planted in screening tests will be observed for viruses. The specific virus present will be determined in plants showing virus-like symptoms by Dr. Kuhn when anti sera and other means of positive virus identification have been developed. Seed with a low percentage of an established virus will be distributed without restriction.

2. All guar introductions will be increased under conditions unfavorable to disease development and observed for diseases. If the plants are free of diseases or a low percentage of them is affected with an established disease the seed will be distributed without restriction.

3. New disease control practices will be used in the laboratory and nursery to improve the quality of seed distributed by the Regional Station. These will include: a. Treatment of all Cucumis and Citrullus seeds with HCl_2 before planting. b. Spraying Solanum melongena introductions with zineb to reduce damage by Phomopsis vexans.

E. Basic research on diseases of plant introductions

1. The gummy stem blight fungus. Variation of the pathogen in nature is very poorly understood. A number of isolates of the pathogen will be obtained from Georgia and Florida to compare the new isolates with isolate CSI from South Carolina now in use. This research is necessary to determine the practical value of any sources of resistance. In our screening tests an attempt will be made to obtain knowledge of the genetics or mechanism of variation in pathogenicity of the fungus to assist in selecting sources of resistance which may be expected to maintain their resistance in nature over a long period of time. Loss of ability to sporulate in culture will be investigated to develop improved methods for maintaining sporulating cultures for use in screening tests.

F. Identification and investigation of diseases of potential industrial crops

Experiments will be conducted to determine if the peanut virus found in Cassia occidentalis is seed transmitted. If it is seed transmitted an attempt will be made to obtain virus-free seed to determine the effect of the virus on yield. Other serious diseases of potential industrial crops will be identified as they appear in plantings at Experiment.

G. Compilation of information on the disease resistance of introductions from other research personnel

Lists of reports of disease resistance in introductions of Cucumis melo and Capsicum spp. will be compiled. Notes on the reaction of plant introductions to specific diseases and insects will be added to the seed catalog as they are received.

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