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, 1968

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

The Introduction, Multiplication, Evaluation and Preservation of New Plants for Agricultural, Industrial and Urban-Rural Uses.

2. COOPERATING AGENCIES AND PRINCIPAL LEADERS:

State Experiment Stations	Representatives
Alabama	*C. S. Hoveland, Chairman
Arkansas	*J. E. Bowers, Secretary
Florida	*G. B. Killinger
Georgia	*George Tereshkovich
Kentucky	*N. L. Taylor
Louisiana	*E. N. O'Rourke
Mississippi	*H. W. Bennett
North Carolina	*W. T. Fike
Oklahoma	*R. S. Matlock
Puerto Rico	*J. Velez Fortuno
South Carolina	*J. H. Martin
Tennessee	*W. E. Roever
Texas	*Eli L. Whiteley
Virginia	*T. J. Smith
Administrative Advisor	R. L. Lovvorn

U. S. Department of Agriculture

New Crops Research Branch, ARS	*J. L. Creech
	Quentin Jones
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	C. I. Harris
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 OR WORK AND PRINCIPAL ACCOMPLISHMENTS

Seed or vegetative stocks of 1014 new plant introductions representing 105 genera were added to the regional seedstocks collection in 1968. Native species of Vaccinium were collected in Wisconsin, Virginia, North Carolina, and South Carolina.

The regional station grew 3383 accessions for seed increase and preliminary evaluation. Seed of 28 new accessions of kenaf were increased in Florida and Puerto Rico for regional field studies in 1969. Evaluations of plant introductions maintained at the regional station were transferred to automatic data processing equipment, and a catalogue of available seedstocks was prepared and distributed to plant scientists at state stations and other cooperating agencies. Research workers in the South were supplied with 11,428 packets of seeds or plants for further evaluation and use in plant breeding and new crop development programs.

Field studies were conducted in North Carolina, South Carolina, Georgia, Florida, Alabama, and Texas to determine the best varieties and cultural requirements of kenaf. The varieties 'Everglades 71' and 'Everglades 41' were the most consistent in producing high yields. However, production of these and other varieties was unsatisfactory on nematode infested soils. Results from a study in Texas showed that stalk yields of available kenaf varieties can be increased significantly by use of nematicides. Screening kenaf introductions for nematode resistance was initiated in Georgia. Eighteen plants found to be free of nematodes in preliminary tests are being propagated for further testing.

Field studies of other potential chemurgic crops, including Lesquerella, Brassica, Crambe, Euphorbia, sunflower, Vernonia, Solanum spp., Mentha, and Foeniculum were conducted at one or more state stations. Five "wild" species of Solanum made good vegetative growth at the regional station, and 4 species produced an abundance of fruit. Samples of these were submitted to the Northern Utilization Laboratory for enzyme analysis. All states in the region participated in the evaluation of horticultural and agronomic plant introductions. Introductions found to possess useful characters and worthy of further testing are listed in Appendix A. Results from screening plants for new sources of disease resistance at the regional station are summarized in Appendix B.

Two new varieties of pickle-type cucumber 'Chipper' and 'Explorer', were released by Clemson University. The parentage of these varieties includes Cucumis sativus P.I's. 197087, 196289, and 220860. Both varieties have good resistance to downy mildew, powdery mildew, anthracnose, and angular leafspot plus tolerance to CMV and WMV.

Capsicum P.I's. 152225 and 159236, both resistant to tobacco-etch virus, were used at Auburn University to breed an etch-resistant Tabasco type pepper. The new variety will be released to growers in 1969.

Panicum coloratum P.I. 166400 was approved for certified seed production in Texas. This new forage grass, known in commercial channels as Kleingrass 'Selection 75', was evaluated and increased by the Soil Conservation Service for release to farmers and ranchers in central Texas.

A survey was made to determine the plant material needs of research workers in the Southern Region. Results of the survey were used by the New Crops Research Branch of ARS in conducting a plant exploration in Argentina, Uruguay, and Brazil.

The S-9 Technical Committee met at Mississippi State University July 16-17. Progress reports on new crops research given by each member are recorded in the Minutes, copies of which are available from the Coordinator. The next meeting of the S-9 Committee will be at the Puerto Rico Experiment Station July 9-12, 1969.

4. USEFULNESS OF FINDINGS:

Results obtained through this cooperative project from work at the regional station, at state experiment stations, by federal agencies, and by private enterprise are mutually beneficial to plant breeders and other plant scientists, and through them ultimately to the public. Desirable traits found in plant introductions can be used to develop new varieties and to further improve existing varieties. Through work at the regional station, seed of world collections of several economic crops is increased and maintained for future use. New information gained from cultural studies of kenaf and

other potential chemurgic crops will contribute to development of new crops and further diversification of agriculture.

5. WORK PLANNED FOR NEXT YEAR:

The regional station will continue to receive, evaluate, propagate and catalogue new plant materials. Screening studies will be continued to locate new sources of disease resistance. Greenhouse and laboratory facilities will be constructed for screening plants for insect resistance and to expand other lines of work at the regional station, Evaluation of horticultural and agronomic plant introductions and cultural studies of chemurgic species will be continued at state stations.

6. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR

Florida

Killinger, G. B. 1968. New agronomic crops for Florida. Sunshine State Agri. Res. Rept. Vol. 13, No. 4.

Georgia

Corley, W. L. Sept. 1967. Selected evaluations of ornamental pepper plant introductions and accessions. Ga. Agr. Exp. Stas. Res. Report 8.

Journal Series Papers

Burns, R. E. and D. G. Cummins. 1967. Stem characteristics of kenaf as affected by cultural practices. Bull. Ga. Acad. Sci. XXV:62.

Cummins, D. G., J. E. Marion, J. P. Craigmiles, and R. E.Burns. 1967. Oil content, fatty acid composition, and other agronomic characteristics of sunflower introductions. J. Amer. Oil Chem. Soc. 44 (10):581-582.

Hoveland, C. S. and E. E. Mikkelsen. 1967. Flooding tolerance of ladino white, intermediate white, persian, and strawberry clovers. Agron. J. 59:307-308.

Jellum, M. D., R. E. Burns, and D. G. Cummins. 1968. Seed oil composition of high amylose corn, lupines, and sunflowers. Ga. Sect. Amer. Soc. Agron. Ga. Agron. Abst. 11:16.

Kuhn, C. W., Grover Sowell, Jr., J.H. Chalkley, and H. F. Stubbs. June 1968. Screening for immunity to peanut mottle virus. Pl. Dis. Reptr. 52:467-468.

Massey, J. H. 1968. Response of Vernonia anthelmintica (L.) Willd. to spacing arrangement. Agron. J. Vol. 60. p. 413-414.

Minton, N. A. and E.D. Donnelly. 1967. Additional Vicia species resistant to root-knot nematodes. Pl. Dis. Reptr. 51:614-616.

7. APPROVED:

1-17-69
Date

C. S. Hoveland
Chairman, Technical Committee

1-20-69
Date

R. L. Lovvorn
Regional Administrative Advisor

APPENDIX A
1968 Annual Report Regional Project S-9, New Plants

Plant Introductions that Exhibited Desirable Characteristics in S-9 Regional Evaluation Tests, 1968

Name & P.I. No.	State reporting	Reported value
Agronomic plants		
Arachis burkartii		
262851	SCS	(Shows considerable promise as forage (legume for growing in mixtures of warm (season grasses
Arachis glabrata :		
262794	SCS	(Shows considerable promise as forage (legume for growing in mixtures of warm (season grasses
Arachis hypogaea		
268993	Ala.	(
269023	Ala.	(High yield, exceeded standard check
277187	Ala.	(varieties by 10% or more during 4 yrs.
288171	Ala.	(of testing
288185	Ala.	(
290589	Ala.	(
295178	Ala.	(
295310	Ala.	(
295721	Ala.	(High yield, exceeded standard check
295728	Ala.	(varieties by 10% or more during 1 yr.
298826	Ala.	(of testing
298847	Ala.	(
298869	Ala.	(
Arachis sp.		
262819	SCS	(Shows considerable promise as forage
262826	SCS	(legume for growing in mixtures of warm (season grasses
263392	SCS	(Good forage legume - grows well in a (grass sod
Brachiaria brizantha		
292182	SCS	(High forage yield - rapid recovery after
292183	SCS	(mowing
292187	SCS	(

Name & P.I. No.	State reporting	Reported value
Cenchrus ciliaris		
243199	SCS	(Highly rhizomatous for this species
253725	SCS	
Chloris gayana		
'MPWAPWA'	P.R.	(Drought tolerant
Digitaria decumbens		
299601	P.R.	(High forage yield - free from aphids
Digitaria milanjiana		
299655	SCS	(High forage yield - resistant to
299695	SCS	(yellow aphid
Digitaria pentzii		
299749	SCS	(High forage yield - resistant to
299752	SCS	(yellow aphid
299752	P.R.	(High forage yield - free from aphids
300935	Fla.	(High yield of forage
Digitaria setivalva		
299798	SCS	(High forage yield - resistant to (yellow aphid
299798	P.R.	(High forage yield - free from aphids
Eragrostis bicolor		
295689	SCS	(Winter hardy - early spring growth
Eragrostis curvula		
208994	SCS	(Good palatability for this species
Hemarthria altissima		
299993	Fla.	(High forage yield - long growing season
299994	Fla.	
Lespedeza serpens		
297385	SCS	(Prostrate growth - good reseeder - suitable (for roadside plantings

Name & P.I. No.	State reporting	Reported value
Lupinus elegans		
185099	Ark.	(Resistant to *Phytophthora megasperma* (var. sojae
Lupinus polyphyllus		
232580	Ark.	(Resistant to *Phytophthora megasperma* (var. sojae
Lupinus rothmaleri		
244461	Ark.	(Resistant to *Phytophthora megasperma* (var. sojae
Lupinus sp.		
316160	Ark.	(Source of sweet gene
Panicum coloratum		
166400	SCS	(Released as 'Selection 75' for forage (production in Texas
208943	P.R.	(Drought tolerant
Panicum maximum		
208399	P.R.	(Drought tolerant
259553	P.R.	(High yield of forage
Paspalum nicorae		
304003	Ala.	(
304004	Ala.	(Vigorous - leafy - excellent rhizomes
310128	Ala.	(
310131	Ala.	(
Trifolium alexandrinum		
251213	Ala.	(More winter hardy than other berseem (clovers
Trifolium hirtum		
287973	Ala.	(High forage yield
Trifolium ruppellianum		
234411	Fla.	(Reseeds itself well in bermuda grass sods

Name & P.I. No.	State reporting	Reported value
Vicia narbonensis		
170017	Ala.	(Genes for hard seedcoat - high seed (yield
Horticultural plants		
Capsicum annuum		
159236	Ala.	(Source of resistance to tobacco etch virus
Capsicum chinensis		
152225	Ala.	(Source of resistance to tobacco etch virus
Cucumis melo		
182953	Ky.	(
182959	Ky.	(
234607	Ky.	(Resistant to powdery mildew
293350	Ky.	(
300954	Fla.	(Source of resistance to powdery mildew
Cucumis sativus		
330628	Ark.	(Bush type plant
Lycopersicon esculentum		
273011	Ark.	(High content of soluble solids
280597	Tex.	(Germinates at low temperature
273444	Ala.	(Dwarf plant with extremely concentrated (set of fruit and concentrated maturity
298633	Ala.	(Earliest of all tomatoes tested
109831	Ky.	(
135907	Ky.	(
247089	Ky.	(Tolerant to red spider mite
285132	Ky.	(
285133	Ky.	(
Zea mays		
253730	Ky.	(Tolerant to dwarf mosaic virus

Name & P.I. No.	State reporting	Reported value
Ornamental plants		
Eurya ochnacea		
235502	S.C.	(May be substituted for ligustrum in (landscaping
Osmarea burkwoodii		
242241	S.C.	(Excellent dark green semi-dwarf plant
Polygonum capitalum		
307307	Fla.	(Good plant for ground cover
Rosa rugosa		
227432	S.C.	(Dense, glossy, leathery foliage -considered (useful for roadside and mass plantings

APPENDIX B
1968 Annual Report Regional Project S-9, New Plants

REGIONAL STATION PLANT PATHOLOGY REPORT FOR 1968

Grover Sowell, Jr.

1. Screening plant introductions for disease resistance

(a) In cooperation with Dr. H. B. Harris all introductions that showed resistance to Colletotrichum graminicola in greenhouse screening tests were re-tested in the field. Twenty-five of the 36 accessions were as resistant as 'Wiley' (disease index of 1 or less on leaves).

(b) Watermelon Mosaic Virus-2 (WMV-2)

In preliminary screening tests a few of the 65 varieties of watermelon screened showed some resistance. When the experiment was repeated, however, the resistance was not confirmed.

(c) Resistance of squash and pumpkin to powdery mildew

A local culture of a powdery mildew fungus was tentatively identified as Sphaerotheca fulginea (Schlecht.) Poll. Race 2. The conidia contained bodies identified as fibrosin bodies and occasionally produced forked germ tubes. This isolate was pathogenic on Cucumis melo #45 SJ but not on #6. All available Cucurbita pepo and Cucurbita moschata introductions were screened for resistance. No resistance was found in C. pepo introductions. Four C. moschata introductions were resistant in preliminary screening tests and in replicated greenhouse tests. A field test containing these introductions and all introductions of Cucumis melo which had been previously reported as resistant to powdery mildew was conducted in cooperation with W. L. Corley. C. moschata P.I. 181911 remained free of powdery mildew. P.I. 179925, P.I. 201254, and P.I. 211997 were given a disease index of 1 as compared to 4 for Butternut. Eighteen plant introductions and 2 varieties of Cucumis melo showed no symptoms of the disease. An additional 36 introductions and 2 varieties received a disease index of 1 (less than 20% of leaf area covered by fungus). The remaining 21 introductions which were previously reported as resistant were susceptible to race 2 in this test.

(d) Anthracnose of lima bean

The introduction from India which was highly resistant to anthracnose in greenhouse screening tests was not resistant in a field test. The pods of this plant introduction were as severely affected by the disease as were those of the susceptible variety.

(e) Southern blight and Rhizoctonia of peanut

Sclerotium rolfsii Sacc. was highly pathogenic on germinating seed of all 227 introductions tested. Rhizoctonia solani Kuhn was highly pathogenic on germinating seed of all but one introduction.

(f) Peanut leafspot

In cooperation with Dr. D. H. Smith tests were conducted to determine the effect of plant age, inoculum age, and inoculum concentration on infection of peanut by

Cercospora arachidicola. The effect of these factors could not be determined because of wide variations in infection between plants receiving the same treatment. Inoculation of a susceptible variety with 6000 conidia per ml. plus a wetting agent followed by incubation for 48 hours in a moist chamber with a low intensity of daylight resulted in uniformly moderate infection in successive tests.

(g) Bacterial spot of pepper

All introductions of Capsicum spp. which have not been screened previously for resistance to Xanthomonas vesicatoria are being screened. The objective is to locate superior sources of resistance.

(h) Gummy stem blight of watermelon and cantaloupe

All introductions of Citrullus spp. and of Cucumis melo which have not been screened for resistance previously are being screened. The objective is to locate superior sources of resistance.

2. The evolution of new biotypes of Colletotrichum graminicola

(a) Sorghum anthracnose

Last year sorghum anthracnose was observed on Dwarf Ladore for the first time on senescent leaves. This year a few lesions were observed on normal leaves. The pathogen was isolated from these lesions.

(b) The evolution of disease resistance and pathogenicity in a native plant-fungus model system.

Fragaria virginiana, one of the two native species of strawberry found in the Griffin, Ga. area, was selected as a model to study the evoluation of disease resistance. Ten plants were collected from each of two locations to determine single plant natural variation in susceptibility to leafspot diseases. Fungi, including several genera known to contain pathogens of strawberry were isolated. Ten plants of F. virginiana were collected in each of two locations in open fields near Griffin, Ga. Additional plants were collected in pine woods in an attempt to obtain plants of F. vesca.

3. New diseases

No new diseases were observed in the nursery this year. In cooperation with Dr. H. B. Harris Sclerospora sorghi (Kulk.) Weston & Uppal was reported from a commercial field. This is the first published (1) report of the disease in Georgia.

Work planned for next year

1. WMV-2 on watermelon

Plant introductions will be screened in the greenhouse. Introductions reported resistant in Florida will be tested in the greenhouse and field.

2. Resistance of Cucumis melo to powdery mildew

   Introductions resistant in 1968 field tests will be re-tested and detailed observations made on horticultural characteristics.

3. Rhizoctonia solani on peanut

   The resistant introduction will be tested in replicated greenhouse and field tests.

4. Peanut leafspot

   Several hundred introductions will be screened in replicated greenhouse tests. Those having resistance in the greenhouse will be planted in the field to determine their resistance.

5. The evolution of new biotypes of fungi, bacteria, and viruses

   In cooperation with plant breeders who are using disease resistant plant introductions we will investigate any attack on formerly resistant introductions or breeding lines derived from plant introductions.

6. The evolution of disease resistance and pathogenicity in a native plant-fungus model system

   Plant to plant variation in susceptibility to a common leafspot disease of native strawberries will be evaluated to determine if this is a suitable model system to study evolution of disease resistance.

7. Resistance of tomato to bacterial spot

   Preliminary work will be conducted with cultivars and previously reported sources of resistance to determine if a satisfactory screening technique can be developed.

Publications

1. Sowell, Grover, Jr. Downy mildew of sorghum in Georgia. Plant Disease Reptr. 52 (In press). January 1969.