

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, 1960

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

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

2. COOPERATING AGENCIES AND PRINCIPAL LEADERS:

State Experiment Stations

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

Representatives

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\*A. M. Davis  
\*G. B. Killinger, Chairman  
\*A. H. Dempsey  
\*E. N. Fergus  
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\*H. W. Bennett  
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\*J. A. Martin  
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\*Eli L. Whiteley  
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Development Divisions, A.R.S.  
  
Soil Conservation Service

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### 3. PROGRESS OF WORK AND PRINCIPAL ACCOMPLISHMENTS

#### Introductions Received

Seed or rootstocks of 1898 new accessions were received by the regional station during 1960. Two-thirds of these consist of peanuts, sorghum, and pepper. Approximately 600 introductions of Arachis were received. These include 188 accessions from Argentina, 100 from Nyasaland, and the South American collection made by Dr. W. C. Gregory. Four hundred seventeen accessions of Sorghum and 200 accessions of Capsicum were received last year. Most of the new Sorghums came from India, and the Capsicums were collected in South America. Other sizeable collections received during 1960 include 51 accessions of Sesamum, 54 accessions of Trifolium, 49 accessions of Cucumis melo, and 32 accessions of guar.

Seed of approximately 100 items introduced a number of years ago were added to the regional collection of seed stocks. J. R. Quinby supplied the regional station with seed of seventy lines of Sorghum, some of which were introduced as early as 1900; and seed of about thirty introductions of miscellaneous legumes were received from the SCS Nursery, Beltsville, Maryland.

Thirty-five Prunus accessions were added to the regional seedstocks collection as a result of the domestic exploration initiated during 1960 to collect fruit stocks near the Gulf coast. A number of other fruit plants were tagged for collection this winter. Horticulturists at state experiment stations in Alabama, Mississippi, and Louisiana participated in the collection of these fruit stocks.

#### Production and Distribution of Seed

Slightly over 3,000 introductions were grown for seed increase during 1960. Some of these were old stocks that were low in supply or low in viability. The regional station grew 1931 accessions, and 1095 were increased at other locations by contractual arrangements. Crops increased by contract include peanuts, sorghum, pepper, and Trifolium spp.

From the above plantings 1527 items not previously catalogued were added to the regional seed lists. In addition to the annual supplements to previous seed lists, complete catalogues of all sorghum, pepper, watermelon, cantaloupe, and winter forage introductions maintained at the regional station were compiled and distributed to plant scientists in 1960.

These cumulative lists added considerably to the requests for seed. During 1960 the regional station distributed 11,834 packets of seed, an increase of 38 percent over the number distributed the previous year. Research workers in the Southern Region were sent 6727 packets, and 5107 packets were shipped to plant scientists in other regions and abroad. In exchange, plant scientists in the South received 5006 packets of seed and plants from other regional and federal stations. Thus a total of 11,833 packets of seeds and plants entered the regional evaluation program conducted by cooperating stations in 1960.

## 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 in 1960. Several new varieties developed in part or entirely 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

An introduction of sideoats grama, Bouteloua curtipendula, P.I. 216244, was released under the varietal name Premier by the Texas Agricultural Experiment Station. This accession, collected in an arid region of Mexico during the drought period of 1953-54, was tested at seven locations in Texas and found superior to other strains in seedling vigor, drought tolerance, and forage yield.

Working with introduced lines of Sorghum arundinaceum, the Georgia Experiment Station developed a male-sterile Sudangrass. The cytoplasmic male-sterile was developed by backcrossing Sorghum arundinaceum, P.I. 156549, to cytoplasmic male-sterile Combine Kafir 60. The male-sterile line maintains a high level of sterility and produces high yields of both seed and forage. It has enabled plant breeders to develop F<sub>1</sub> hybrids suitable for commercial production. The Georgia Experiment Station now has one such hybrid that yields one-third more forage than do the best commercial varieties of Sudangrass now available.

The hard seed character of P.I. 121275, Vicia angustifolia, was transferred to Vicia sativa through an interspecies cross made at the Alabama Agricultural Experiment Station. After a series of backcrosses the hard seed characteristic has been stabilized in lines that have the desirable forage qualities of common vetch. These lines produce high yields of hard seed and show considerable promise for improvement of permanent pastures in the South.

More than 300 accessions of Trifolium spp. were evaluated by the Kentucky Agricultural Experiment Station where efforts are being made to improve red clover by crossing it with other species of Trifolium. To date, one such hybrid has been obtained by successfully crossing P.I. 204517, Trifolium diffusum, with red clover. Three accessions of Trifolium vesiculosum, P.I.'s 233782, 233816, and 234310, continued to show promise as a reseeding winter legume for winter pasturage in the Southeast. Excellent stands from natural reseeding were obtained in Alabama and Georgia. In a yield test at the Americus Nursery Branch Station, Americus, Georgia, P.I. 234310 and P.I. 233816 each produced more than twice as much dry forage per acre as did crimson clover.

In the evaluation of warm season legumes a number of wild Arachis accessions appeared quite promising in mixtures with sod-forming grasses. Two introductions of Arachis glabrata (P.I. numbers apparently lost) grew satisfactorily in mixtures with pangolagrass in Central Florida. Another accession of Arachis sp. appeared to thrive in a dense sod of Bahia grass at Gainesville, Florida and in mixture with Coastal Bermudagrass at Tifton, Georgia.

## Vegetable Crops

Screening of all Capsicum introductions for resistance to bacterial spot caused by Xanthomonas vesicatoria was completed at the regional station. Fifteen accessions were found to be sufficiently resistant to justify their use in pepper improvement projects where resistance to bacterial spot is an objective. Introductions that showed the most resistance are P.I.'s 163184, 163189, 163192, 173877, 182925, and 246331. P.I. 183925 was somewhat less resistant to bacterial wilt, but it produced much larger fruits than other resistant lines. Some of these bacterial spot resistant introductions have already entered the pepper breeding program at the Georgia Experiment Station. F<sub>2</sub> progeny from crosses involving the above introductions and desirable commercial varieties will be available for selection and backcrossing during 1961.

Resistance to tobacco etch virus, one of the most destructive virus diseases of pepper, was discovered in P.I. 264281 by A. A. Cook of the Florida Agricultural Experiment Station. This accession is also resistant to potato virus Y which is quite destructive on peppers in southern Florida and Puerto Rico.

Two new varieties of sweetpotato were released during 1960. They are Nugget, released by the North Carolina Agricultural Experiment Station, and Centennial, released by the Louisiana Agricultural Experiment Station. Nugget contains genes for wilt resistance from P.I. 153655. It is "field tolerant" to wilt and it expresses a "symptomless carrier" type of reaction to internal cork virus. Yields of this variety in North Carolina over a five year period were superior to those of Puerto Rico and several commercial varieties. Consumers in North Carolina have shown a preference for the Nugget variety over other sweetpotatoes that were available on the same market shelves.

The Centennial variety is an open pollinated seedling from a cross involving Unit 1 Porto Rico and an introduction from Cuba. It is the highest yielding variety yet released and it has excellent culinary quality for the table and for canning. It is somewhat resistant to stem rot, white rust, and internal cork.

Two new varieties of tomatoes were released. They are Marion, released by the South Carolina Experiment Station; and Indian River, released by the Florida Agricultural Experiment Station. Both carry genes from P.I. 79532, Lycopersicon pimpinellifolium, giving them resistance to Fusarium wilt. The pedigree of Indian River also contains P.I. 126445, Lycopersicon pimpinellifolium.

Resistance to southern blight was discovered in P.I. 126932, Lycopersicon pimpinellifolium, by Mohr and Watkins of the Texas Agricultural Experiment Station; and J. M. Walter of the Gulf Coast Experiment Station, Bradenton, Florida found P.I. 126410 to be resistant to four strains of potato virus Y. P.I. 128887 was resistant to three of the four strains investigated by Walter.

The regional station initiated a program to screen all introductions of Citrullus vulgaris and Cucumis melo for resistance to gummy stem blight.

Sixteen of the 430 watermelon introductions screened showed moderate resistance to this disease. Although the level of resistance is somewhat lower than is desired; P.I.'s 171392, 186975, 189225, and 255316 are sufficiently resistant to be of value to plant breeders.

An introduction of Cucumis melo, P.I. 182953, showed complete immunity to all strains of powdery mildew in Virginia. It has been used in developing new lines of cantaloupe that are highly resistant to powdery mildew. One or more of these will be available to commercial growers in the near future.

In the evaluation of lima bean introductions at the Tennessee Agricultural Experiment Station P.I. 164893, Phaseolus lunatus, was found to be almost immune to the Mexican bean beetle and P.I. 163552 was quite tolerant to leafhopper and the bean beetle. In the same studies P.I. 247701, a runner type shell bean from British Columbia, was found to be extremely productive and of high quality.

Five accessions of Hibiscus esculentus showed considerable resistance to rootknot nematode in South Carolina. Listed in order of highest resistance they are: P.I.'s 175567, 172674, 109215, 120833, and 178808. All of these were crossed with Clemson Spineless in an effort to transfer rootknot resistance to this highly susceptible but commercially desirable variety.

#### Ornamental Plants

More than thirty varieties of Coleus spp. introduced from England gained almost immediate acceptance by growers of pot plants in Florida and South Carolina. These are beautiful indoor pot plants, and they can be arranged into attractive border plantings for exterior use.

Three recent introductions appear outstanding for container production for interior decorations and for outdoor landscape use in tropical or subtropical regions. They are P.I. 249537, Ficus lucescens; P.I. 244611, Ficus malletocarpa, and P.I. 249505, Pittosporum undulatum. These are being propagated as rapidly as possible for distribution to nurserymen in Texas.

#### Plants for Industrial and Other Uses

During 1960 considerable effort was concentrated on the evaluation of plants that produce unusual oils, gums, fibers, and other products not presently available in commerce. The New Crops Research Branch in its investigation of plant resources of the world has provided chemists and plant scientists with an abundance of plants representing a wide diversity of materials in the plant kingdom. Results from chemical analysis by the Utilization Research and Development Divisions of ARS show that many of these plants, some of which have never been grown under cultivation, contain unusual but potentially valuable oils, waxes, gums, fibers, and products of pharmaceutical uses. Plants that appeared most promising from the standpoint of chemical composition have entered the regional testing program to determine their cultural requirements and productivity.

Sixty-one accessions representing thirty-three genera were tested in Texas, Oklahoma, and North Carolina. A number of other genera that appear promising for the production of specialty products are being evaluated in Louisiana, Florida, and South Carolina.

Crambe abyssinica, P.I. 237310, containing an erucic acid type oil, has been grown several years as a winter annual at Texas Substation No. 15 in the Lower Rio Grande Valley. Seed yields at that location have averaged about 700 pounds per acre. Slightly lower yields were obtained at Stillwater, Oklahoma. Most of the preliminary agronomic problems with this crop have been solved, and it is now at the stage where pilot plant processing procedures and markets should be developed.

Crotalaria juncea shows considerable promise in Texas for the production of paper pulp. Its possibilities for pulp have been discussed with the Champion Paper and Fibre Company. Gums contained in the seed of this plant may be of value in the paper manufacturing process. Day-neutral and short-day lines have been selected within this species. Day-neutral lines grow satisfactorily in the high rainfall area of eastern Texas.

Dioscorea, the chief plant source of the chemical precursors (genins) of cortisone, is now under evaluation in Florida and Louisiana. Certain seedlings of Dioscorea floribunda, P.I. 201783, planted during September 1957 on Everglades peat and harvested at 18 and 30 months after planting have given high tuber and diosgenin yields. More than 200 clones representing several species of Dioscorea have entered the screening program in Louisiana. Lines are being selected for high yields of diosgenin.

Tephrosia vogelii, a source of rotenone used in many insecticides, is under evaluation in South Carolina. Work with this plant was expanded to include a study of its mineral nutrition.

Although considered a vegetable crop, the most recent phase of research with okra has been directed toward the utilization of its mucilaginous property as a spreading agent in the manufacture of onion skin paper, as an addition to soups, and as a stabilizing agent in food products. More than two hundred acres of okra were processed in Louisiana for this purpose. Accessions that appear the most promising for this use are P.I. 249004 and 249620. P.I. 249004 produces extremely large pods with thick walls. Although late maturing, it appears quite promising for the manufacture of dehydrated gum. P.I. 249620, an early productive type, is being used to impart these qualities to other okra selections in South Carolina.

Due to difficulties in obtaining stands of several species, a depth of planting study of eighteen accessions representing twelve genera was conducted at the Texas Agricultural Experiment Station.

#### Other Activities

A ten-year report on the accomplishments of the S-9 "New Plants" Project during the period 1949 to 1959 was prepared.

The S-9 Technical Committee met at the Louisiana Agricultural Experiment Station, Baton Rouge, Louisiana December 1 - 2. Each committee

member present gave a detailed report on the progress of new crops research in his state or field of activity. These reports appear in the minutes of the meeting, copies of which can be obtained from the coordinator.

The National Coordinating Committee passed the following motion at its 1959 meeting:

"That the Agricultural Research Service be requested to provide leadership to work cooperatively with the Regional New Crops Committees and the State Experiment Stations in developing as rapidly as possible an adequately documented inventory of valuable germ plasm of food, drug, fiber, oil and other industrial crops presently being maintained through asexual propagation."

Inventory cards were prepared by the New Crops Research Branch, and work toward inventorying fruit and tree nuts crops maintained at state experiment stations was initiated.

#### 4. USEFULNESS OF FINDINGS

Increase of new plant material at the regional station will provide plant scientists with seed or vegetative stock of 1501 new introductions for further evaluation. A number of introductions were found to possess characters that merit their immediate use in plant breeding projects. Among these are four watermelon introductions with moderate resistance to gummy stem blight, six accessions of pepper that are highly resistant to bacterial spot, two introductions of Lycopersicon with resistance to potato virus Y, an accession of lima bean that is almost immune to Mexican bean beetle, and five accessions of okra with considerable resistance to rootknot nematode.

In addition to finding valuable new genes for improving certain crops, several new varieties containing introduced germplasm were released for commercial production. In areas where they are adapted these varieties should increase the efficiency of crop production.

Evaluation of promising new species should eventually result in the development of new crops for the production of unusual oils, gums, and specialty products. With progress made during 1960 one species, Crambe abyssinica, is now considered to be at a stage where processing procedures and markets should be developed. Seed yields have been quite satisfactory in certain areas, and most of the preliminary agronomic problems of Crambe have been solved.

#### 5. WORK PLANNED FOR NEXT YEAR

The regional station will increase and evaluate new introductions that were received since the last planting season. Sorghums that failed to mature seed at the regional station last year will be increased in Puerto Rico.

The ten-year report of accomplishments of the S-9 "New Plants" Project will be published as a Southern Cooperative Series Bulletin.

The domestic exploration to collect fruit plants near the Gulf Coast will be continued.

The project outline for Regional Project S-9 "New Plants" will be revised, placing more emphasis on new crops for industrial utilization. The Georgia Experiment Station will initiate a new contributing project on evaluation of plants for industrial uses.

## 6. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR

### Regional Station

\*Report of Accomplishments of Regional Project S-9 During the Ten-year Period, 1949 - 1959. To be printed as a Southern Cooperative Series Bulletin by the Georgia Agricultural Experiment Station.

Sowell, Grover, Jr. Bacterial spot resistance of introduced peppers. Pl. Dis. Rep. 44: 587-590. 1960.

Sowell, Grover, Jr. Bacterial spot resistance of introduced peppers. (Mimeographed) Pl. Intro. Sta., Experiment, Ga. 1960.

### Alabama

Donnelly, E. D., and Clark, E. M. Interspecific hybridization in Vicia. (Abstract) Proc. Assoc. Sou. Agri. Workers. 57: 60. 1960.

Greenleaf, W. H. Resistance levels to the bacterial leafspot disease in peppers. (Abstract) Proc. Assoc. of Sou. Agri. Workers. 57: 238 - 239. 1960.

Hoveland, C. S. Sorghum grass and perennial sweet sorgrass for Alabama. Auburn Agri. Expt. Stat. Prog. Rept. No. 78. 1960.

Hoveland, C. S. Ball clover. Auburn Agri. Expt. Stat. Leaflet 64. 1960.

### Georgia

Craigsmiles, J. P. The development, maintenance, and utilization of cytoplasmic male sterility for hybrid Sudangrass seed production. Jour. Amer. Soc. Agron. (In press).

\*Prepared by S-9 Technical Committee and Regional Station

North Carolina

Winstead, N. N., Goode, M. J., and Barham, W. S. Resistance in watermelon to Colletotrichum lagenarium races 1, 2, and 3. Pl. Dis. Rep. 43:570-577. 1959.

Puerto Rico

Sotomayer-Rios, A., Schertz, K. F., Woodbury, R., and Velez Fortuno, J. Taxonomic Description and Reproductive Behavior of Giant Pangola (Digitaria valida Stent) Jour. Agric. of the Univ. of Puerto Rico. Vol. 44, No. 2, 1960.

South Carolina

Anonymous. New Marion tomato released by South Carolina. Seedmen's Digest. p.16. Feb. 1960.

Texas

Anonymous. Premier sideoats grama. Tex. Agri. Expt. Sta. Leaf. 504. 1960.

Mohr, H. C. and Watkins, G. M. The nature of resistance to southern blight in tomato and the influence of nutrition on its expression. Proc. Amer. Soc. Hort. Sci. 74: 484-493. 1959.

7. APPROVED

January 7, 1961  
Date

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W. R. Langford, Coordinator  
Regional Project S-9

January 9, 1961  
Date

G. B. Killinger  
G. B. Killinger, Chairman  
S-9 Technical Committee

January 13, 1961  
Date

R. D. Lewis  
R. D. Lewis, Administrative Adviser