

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, 1962

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

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

Representatives

\*C. S. Hoveland  
\*A. M. Davis  
\*G. B. Killinger  
\*A. H. Dempsey  
\*W. H. Stroube  
\*J. C. Miller  
\*H. W. Bennett  
\*W. T. Fike  
\*R. S. Matlock  
\*Hassan Azzam  
\*J. H. Martin  
\*W. E. Roever  
\*E. L. Whiteley  
\*T. J. Smith

Administrative Advisor

R. D. Lewis (Retired)  
R. L. Lovvorn (Replacement)

U. S. Department of Agriculture

New Crops Research Branch, ARS. C. O. Erlanson  
Plant Introduction Investigations H. L. Hyland  
Crop Breeding Stock Investigations \* W. E. Whitehouse  
Chermugic Crop Investigations J. R. Haun  
Cooperative State Experiment Station Service W. C. Kennard (Resigned)  
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

New plants with industrial use potentials received increasing emphasis during 1962. Cultural studies of Crambe abyssinica, Crotalaria juncea, bamboo, Tephrosia, okra, Lesquerella, Dimorphotheca, and Vernonia were continued. Five other species that appeared promising from the standpoint of chemical analyses were planted at six locations for preliminary agronomic evaluation. These were Cassia occidentalis, P.I. 204366; Ipomea parisitica, P.I. 279698; Polanisia viscosa, P.I. 279699; Solanum aviculare, P.I. 280049; and Zaluzania discoidea, P.I. 279702.

Crambe abyssinica and Crotalaria juncea advanced to pilot plant studies to determine procedures and costs of harvesting and processing. Eight acres of Crambe abyssinica were harvested in southern Texas for pilot plant studies of the oil and meal. A few problems not previously encountered in growing this crop occurred during 1962. Late fall plantings in the Rio Grande Valley were killed by abnormally low temperatures during January. An April planting at Lubbock, Texas, was killed by Fusarium wilt, and a late summer seeding at Fayetteville, Arkansas, failed to mature seed before frost.

Crotalaria juncea continued to show promise as an annual paper pulp crop. Fifteen acres were produced for pilot plant studies in Texas. South Carolina reported finding 108 breeding lines of this species that had been in storage since 1943. Germination of the seed was excellent. This material proved similar to a Brazilian strain distributed last year for agronomic evaluation. Dry matter yields from test plots were in excess of 10 tons per acre, making this species potentially competitive as a source of paper pulp. No serious diseases or insects have been observed on Crotalaria juncea.

Evaluation of bamboo as an additional source of paper pulp was continued in South Carolina, Alabama, North Carolina, Louisiana, Texas, and Arkansas. A trial harvest of 456 canes from 1/16 acre in South Carolina yielded 2 1/2 tons of canes, the equivalent of 40 tons per acre. Difficulty in establishing new stands has been a major problem in the production of bamboo. Attempts are being made to start new plants in a greenhouse or lath-house before setting them in the field.

Strains of Tephrosia, developed in Puerto Rico for high rotenoid content, were evaluated for productivity at Clemson, South Carolina. The strain containing the highest percentage rotenoid produced 4240 pounds of dry matter per acre.

Cassia occidentalis, a promising new source of gum appeared to have the widest range of adaptation of the five species evaluated for the first time

in 1962. Satisfactory stands and growth were obtained at six locations. Yields of more than a ton of seed per acre were obtained from some of the plantings. No major problems were apparent in growing and harvesting this species. Ipomea parasitica and Polanisia viscosa, potential sources of unique seed-oils made satisfactory seed yields at Experiment, Georgia. Although yields were quite low at other locations due to poor stands, surviving plants of both species made satisfactory growth. Weed control appeared to be the major problem in growing Polanisia because the seedlings develop very slowly. Although Ipomea parasitica made a good seed crop on small plots, it would be difficult to grow and harvest on a large acreage. Seed pods shatter as they mature, and the plant should be trellised for maximum yields. Zaluzania discoidea did not flower until early fall, and only a few immature seed were obtained before frost. Solanum aviculare is of interest because of the steroids found in its leaves and young stems. Poor stands of this species were obtained at all six locations, and the Colorado potato beetle was a serious problem on some plantings. Plants that survived heached a height of 18 to 30 inches and produced few seeds.

#### Agronomic Crops

Forage crop development and breeding continues to be a major use of plant introductions, Through efforts of the Mississippi Experiment Station and ARS, P.I. 233812 resulted in the release of Frontier crimson clover. The new variety is superior to others in seed size, seedling vigor, and in late fall and winter growth. It matures one week earlier than other varieties, and it is equal or superior to them in forage and seed yields.

In Alabama F<sub>5</sub> generation selections from the cross, Vicia angustifolia, P.I. 121275 X Vicia sativa have been obtained that possess the vegetative characteristics of V. sativa with good seed yields, high percentage hard seed, and non-dehiscent pods. Vetch weevil (bruchid) damage has not been observed on this material.

Three accessions of Trifolium vesiculosum (P.I. 234310, P.I. 233782, and P.I. 233816) continue to show promise as a new winter forage crop. P.I. 234310 was released by the Georgia Experiment Stations for farm plantings under the varietal name Amclo arrowleaf clover. Some failures have occurred with this species because of difficulty in inoculating new seedings.

In Puerto Rico buffelgrass, P.I. 156546, is under increase for release to farmers. Yields have been comparable to those of Guinea grass. Sorghum verticilliflorum, P.I. 267328, has also been outstanding in forage yield studies in Puerto Rico.

In Florida P.I. 225957, Cynodon plectostachyum has replaced P.I. 224152, C. plectostachyum, in grazing trials. This introduction has performed well in plots and may develop into a good pasture grass. Two accessions of Digitaria, P.I. 279651 and P.I. 279652, appeared very promising because of their high forage yield and insect resistance.

## Horticultural Crops

### Vegetables

Introduced plant materials contributed to the development of a number of new vegetable crop varieties that were released in 1962. New sources of disease resistance were discovered in several other vegetable crop introductions. Some of these have already entered breeding programs in an effort to transfer valuable characters to commercial varieties.

Cucumis melo, P.I. 223637, which has considerable resistance to both powdery and downy mildew, was crossed with Honey Dew in the development of the new variety Floridew, a honey dew type melon released by the Florida Agricultural Experiment Station. Cucumis melo, P.I. 164756, and a selection from this introduction were found to be highly resistant to both downy mildew and Alternaria leafspot. F<sub>1</sub> hybrids with good eating quality and resistance to downy and powdery mildew were obtained from crosses of each P.I. 125922, 182187, and 234607 with Seminole. Two introductions of Cucumis melo (P.I. 136223 and P.I. 165525) were found to possess round fruit shape and monoecious flowering habit. P.I. 165525 was crossed with Hale's Best Jumbo in an effort to incorporate monoecious flowering into commercial types without effecting a change in fruit shape.

A total of 1369 introductions of Cucumis (1107 Cucumis melo, 234 C. sativus, and 28 Cucumis sp.) were screened for resistance to root-knot nematode, Meloidogyne incognita acrita. Forty three accessions were found to be resistant in preliminary tests.

Brassica oleracea, P.I. 261774 and P.I. 261769, were observed to be almost free of downy mildew caused by Peronospora parasitica. These have been crossed with commercial types and the F<sub>1</sub> progeny has shown a high degree of resistance to this organism.

In the evaluation of 20 accessions of Sechium edule, chayote, four were found to possess characters that could be of value in a breeding program. These four are: P.I. 271760, noted for its high yield of smooth contour, dark green fruits; P.I. 271765, noted for its medium size fruit with few spines and the highest yielding strain in the test; P.I. 273553, with smooth contour, pear shaped fruits; and P.I. 273559, which produces elongated, dark green, pear shaped fruit with few spines.

Okra continued to excite interest because of its possible multiple uses, viz, fiber for pulp, seed for gums, and immature fruit for food. From evaluation in Texas of more than 500 accessions of okra, P.I.'s. 249620, 248999, 251500, 169698, 169700, 169706, and 175561 were found to be desirable phenotypes for use as genetic stocks. Selections were made in 1962 from F<sub>3</sub> progenies resulting from crosses involving most of these introductions. An added character for dwarfness was observed in some of the selections.

Lycopersicon pimpinellifolium, P.I. 212408, which possesses multigenic resistance to a new biotype of Fusarium wilt discovered in Florida, is being

used in an all-out effort to develop commercial type tomatoes with resistance to the new form of wilt. Lycopersicon esculentum, P.I. 128887, known to be resistant to certain strains of potato virus Y, was crossed with Manalucie in an effort to combine resistance to potato virus Y with the disease resistance of Manalucie. Resistance to Grey leaf spot and Early blight of tomato was found in P.I. 250432, having a small bush with a heavy set of small fruit. P.I. 263725, resistant to Early blight but susceptible to Grey leaf spot, has good fruit type. These will be crossed and out crossed to commercial varieties. P.I. 79532, Lycopersicon pimpinellifolium; and P.I. 126445, Lycopersicon hirsutum, contributed to the development of the Floralou tomato, recently released by the Florida Agricultural Experiment Station.

A Pigeon pea, P.I. 218066, shows promise in Louisiana and North Carolina as a source of wildlife food and possibly a harvested crop for pigeon fanciers.

Screening of watermelon introductions for resistance to gummy stem blight was completed by the regional station. The highest level of resistance was observed in P.I. 189225.

#### Fruits

Evaluation of a large number of tropical and temperate fruits and nuts was continued in Puerto Rico. Among these are dates, loquat, letchi, rambutan, rubi, mangosteen, passion fruit, chirimoya, guanabana, grapes, and peaches. Profuse flowering and fruiting were observed on a few of the Aceituno trees planted in 1956. The best trees were selected for further evaluation. Temperate peach varieties did not flower well or produce a crop, but the Okinawa variety continued to show promise as a "dooryard" fruit at higher evaluations.

The new blackberry variety 'Williams' was released jointly by the North Carolina and Mississippi Experiment Stations. This variety resulted from a cross between Himolaya X Taylor.

#### Ornamentals

Eurya emarginata var. 'Microphylla'. P.I. 240914, is now being propagated for entry into commercial channels. A large nursery near Mobile, Alabama, reported this introduction to be an excellent plant for rock gardens and areas where low shrubs are required.

#### New Plant Materials Received & Distributed

Almost 2000 new accessions were received last year. About one-half of them were peanuts of which 900 introductions were received at one time from Rhodesia. Other large collections were peppers from Dr. Paul Smith's South American exploration in 1958, sorghums from Ethiopia, and Panicum maximum from South Africa. In addition to the large collection from abroad, 142 items were collected under the domestic fruit stocks collection project. Some of these have not been assigned P.I. numbers but are being held by the various collectors to make sure the material is viable and can be propagated.

As these stocks are propagated they will be transferred to LSU and P.I. numbers will be assigned them. A large number of other fruit stocks have been located as a result of publicity given the project by the Progressive Farmer.

In the seed production program 3587 accessions were grown for seed increase and preliminary evaluation. New materials catalogued last year totaled 975. From plantings during 1962 about 1500 more items will be added to the regional seed lists.

Requests from research workers for seed of introduced plant materials increase from year to year. The rising participation of southern research workers in the evaluation of plant materials maintained at the regional station is shown by the following statistics:

Year	No. of Individuals Evaluating S-9 Material	No. of packets of Seed Distributed for Evaluation
1951	115	5980
1956	162	7500
1961	245	14190

#### Other Activities

The outline for Regional Project S-9 "New Plants" was revised and approved. The following state and federal projects have been approved as contributing projects:

Oklahoma	Hatch 1057 "Introduction, Multiplication, Preservation, and Evaluation of New or Special Plants for Industrial and Agricultural Uses."
Texas	H-717 "Introduction, Multiplication, Preservation, and Determination of Potential Value of New Plants for Industrial and Other Purposes, and for the Preservation of Valuable Germplasm of Economic Plants."
North Carolina	H-196 "The Introduction, Evaluation, and Improvement of New Crops for Industrial and Agricultural Uses."
Puerto Rico	"The Introduction, Multiplication and Evaluation of New Plants for Agricultural and Industrial Purposes and the Preservation of Valuable Germplasm."
Florida	"Evaluation of Introduced Plant Species and Varieties for Economic Uses."
CRi2-1	Evaluation and Maintenance of Fruit and Nut Introductions
CRi2-5	Evaluation and Maintenance of Vegetable Introductions

- CRi2-10 (Rev.) - Evaluation, Development, Maintenance and Placement of Drug, Beverage, Cellulose (except bamboo), and Other Promising Crops for Industry.
- CRi1-11 Introduction, Sanitary Inspection and Inventory of Fruits and Vegetable Breeding Stocks for U.S. Research Purposes.
- CRi1-12 Introduction, Sanitary Inspection and Inventory of Field Crop (Cereals, Forage Plants, Cotton, Tobacco, Sugar Plants) Breeding Stocks for U.S. Research Purposes.
- CRi1-13 Introduction, Sanitary Inspection and Inventory of Specialty Crop (Drug, Oilseed, Cellulose, Beverage, Ornamental) Breeding Stocks for U.S. Research Purposes.
- CRi2-15 Evaluation and Development of New or Little-Known Introduced Ornamental Plants.
- CRi2-7 (Rev.) Evaluation and Maintenance of Forage and Range and Other Miscellaneous Field Crop Introductions.
- CRi2-8 (Rev.) Evaluation and Maintenance of Cereal Crop Introductions.
- CRi2-9 (Rev.) Evaluation and Maintenance of Cotton and Other Fiber Crop Introductions Used for Cordage Fiber.

The S-9 Technical Committee met at the Georgia Experiment Station, August 16-17, 1962. Detail reports presented by each committee member occur in the minutes, copies of which may be obtained from the Coordinator.

#### 4. USEFULLNESS OF FINDINGS:

The development of any new plant into an agricultural crop adapted to the south will strengthen the economy and improve the land use picture. Crops producing valuable industrial end-use products should be especially desirable in that they will not present new problems involving crops now in surplus.

Crambe has been developed to the stage of experimental commercial production. Entrance of this crop into trade will give farmers in the region to which it is adapted a new winter cash crop.

Improved varieties of horticultural crops should lead to greater efficiency in food production. Production of winter pasturage can be increased by the use of new high yielding forage legumes such as Frontier crimson clover and Amclo arrowleaf clover.

Locating and preserving valuable germplasm of deciduous fruits for propagation and preservation has been most successful. From this collection new and economically successful varieties may evolve, leading to development of a new fruit industry in the Coastal Plain area.

New sources of disease resistance and other valuable characters found in plant introduction during 1962 should lead to even greater improvement of present crop varieties. Increase of new plant materials at the regional station will provide plant scientists with seed or vegetative stocks of 1500 new accessions for further evaluation.

5. WORK PLANNED FOR NEXT YEAR:

Emphasis will be placed on determining range of adaptation, productivity, and cultural requirements of plants containing interesting chemical components. Chemical evaluation of plant materials will be made by the Utilization Research and Development divisions of ARS. The list of plants for field evaluation in the South will be revised annually.

The regional station will continue to receive, increase and catalogue new plant materials. Preliminary evaluations will be made as propagating stocks are increased. As seed or vegetative stocks are available for distribution lists of these materials will be circulated among plant scientists in the South and in the other three regions.

Projects contributing to Regional Project S-9 will be revised by agricultural experiment stations in Arkansas, Georgia, Louisiana, and South Carolina.

6. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR

Regional Station

Sowell, Grover, Jr. and G. R. Pointer. Gummy stem blight resistance of introduced watermelons. Plant Disease Reporter 46: No. 12 883-885. 1962.

Alabama

Donnelly, E. D. and E. M. Clark. Hybridization in the genus Vicia.  
Crop Sci. 2: 141-142, 1962.

Hoveland, C. S. Arrowleaf Clover. Auburn Univ. Agric. Exp. Sta. Leaflet 67, 1962.

Hoveland, C. S. Ball is rolling! Crops & Soils. Nov. 1962.

Hoveland, C. S. Gulf Improved Ryegrass Variety. Highlights of Agric. Res. Auburn Agric. Expt. Sta. Vol. 9, No. 3. 1962.

Hoveland, C. S. Ball Clover Acreage is up. Progressive Farmer. Oct. 1962.

Arkansas

Riggs, R. D. and M. L. Hamblen. Soybean-Cyst Nematode Host Studies in the Family Leguminosae. Ark. Agric. Expt. Sta. Reports Series 110. June 1962.

Davis, A. M. Sugarbeets - Have they a potential for Arkansas. Ark. Farm Res. Vol. XI No. 1. Jan-Feb 1962.

Mississippi

Knight, W. E. New Crimson Clover Named "Frontier". Mississippi Farm Res. Vol. 25, No. 7. July 1962.

Overcash, J. P. South Mississippi Plant Exploration. Mississippi Farm Res. Vol. 25, No. 2. Feb. 1962.

Overcash, J. P. and C. F. Williams. New Blackberry Outyields Others in Station Tests. Mississippi Farm Res. Vol 25, No. 1. Jan. 1962.

Texas

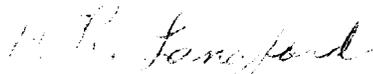
ACCO Press. Crambe: A new crop promise in South Texas. Houston, Texas. In press.

DuBeau, Norman. Uncommon crops with interesting potentials. A & M Press. College Station, Texas. August 1962.

Texas Agricultural Experiment Station Leaflet No. \_\_\_\_\_. Lynn, an early disease-resistant, dwarf-internode castorbean variety. In Press.

7. APPROVED

February 9, 1963

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

February 2, 1963

  
\_\_\_\_\_  
A. M. Davis, Chairman  
S-9 Technical Committee

February 11, 1963

  
\_\_\_\_\_  
R. L. Lovvorn, Administrative  
Advisor

SOUTHERN REGIONAL PLANT INTRODUCTION STATION

Supplement to the ANNUAL REPORT of Project S-9 for 1962

PLANT PATHOLOGY REPORT FOR 1962

I. ACCOMPLISHMENTS IN 1962

A. Screening introductions for resistance.

The preliminary screening test for resistance of Cyamopsis tetragonoloba to Alternaria leafspot was completed. A replicated test was conducted utilizing those introductions which were most resistant in the preliminary tests (less than 30% of the seedlings affected). These were inoculated and incubated by a similar technique to that previously reported (6). The following exceptions should be noted: (a) The inoculum was prepared by comminuting 4 ten-day-old cultures of isolate AC3 in distilled water, filtering through cheesecloth and making up the inoculum volume to 1 liter per 4 cultures. (b) Data was taken on the number of plants infected, the number of plants dead, and the infection grade based on percent of total plant area which was infected. The standard susceptible varieties Groehler and Texsel were as resistant as any of the introductions tested. Consequently, it was concluded that screening for resistance should be discontinued until such time as additional introductions are available.

A replicated test of 8 introductions of Cucumis melo, which demonstrated resistance to Mycosphaerella citrullina in preliminary tests was conducted using the technique of Sowell and Pointer (7). The plants were incubated in the moist chamber for 24 hours. Edisto was included as a susceptible, standard variety. P.I. 93800 and Edisto were superior to all of the other introductions when evaluated by infection index. This raised the question of the level of resistance present in commercial varieties of cantaloupe. A review of the literature failed to reveal a report of the resistance of Edisto to the pathogen. Personal communications with two cantaloupe breeders who have shown considerable interest in obtaining sources of resistance, indicated that Edisto is considered as being moderately resistant, based on field observations. All of the commercial varieties carried in stock by a major seed company were included in a second replicated test. The results of this test (Table 1) indicate that four of the commercial varieties were significantly more resistant than the six most susceptible varieties.

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

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

\* Means not followed by a letter in common are significantly different at the 1% level according to Duncan's multiple range test.

B. Field notes on resistance of introductions.

As reported (5) the low incidence, the lack of definition of symptoms of separate diseases and the lack of uniformity in the distribution of diseases over the field, prevented an accurate field evaluation of resistance.

C. Research on new or unreported plant diseases.

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

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

station. Neither the Oilseeds and Industrial Crops Research Branch of ARS or state experiment stations are conducting pathology research on this crop.

The causal organism of anthracnose of guar was established as Colletotrichum dematium (Pers. ex Fr.) Grove, according to the taxonomy of the genus proposed by Von Arx (1). This identification was confirmed by Dr. C. R. Benjamin. This species of which Colletotrichum capsici (Syd.) Butler & Bisby is a synonym, is common on pepper, Capsicum annuum in the United States. Spore measurements of Colletotrichum dematium from pepper and from guar demonstrated their morphologic identity. Isolates from pepper produced little or no infection on guar and vice versa, indicating that different forms are present on these two hosts. Similar inoculation tests with the fungus from Phaseolus lunatus proved that at least one form from another legume was distinct from the form from guar. The evidence by Desai and Prasad (2) also indicates that the guar pathogen does not affect other legumes. C. dematium was not found in the commercial fields of guar in Texas or in the plantings at experiment stations in Texas and Oklahoma. In 1961, however, a Colletotrichum sp. was found on experimental plantings of guar in Oklahoma (personal communication from R. S. Matlock). Nevertheless it seems inadvisable to distribute seed of introductions known to carry this fungus until the distribution of the fungus within the United States is more definitely known.

Alternaria leafspot caused by Alternaria cucumerina has been present in this country for many years (8). Its economic importance may have been exaggerated because of the difficulty of distinguishing diseases with similar symptoms. In the survey of guar plantings this year typical Alternaria leafspot caused by A. cucumerina was found only on a single introduction at one location in southern Oklahoma.

The bacterial diseases of guar were very severe in experiment station plantings in Texas and Oklahoma. They were not found in the few commercial fields which were examined. The destructiveness of these diseases indicates that they are of more potential danger to the crop than is Alternaria leafspot. Isolations from specimens from Texas and Oklahoma yielded two or three bacteria as follows:

- (1) Brilliant greenish yellow (10Y 9/9) colonies
- (2) Pale orange yellow (75YR 9/9) colonies
- (3) White colonies

The first two may be strains of the same bacterium. The first bacterium is apparently a Xanthomonas spp. and appears to be identical to the causal organism of the bacterial blight first observed at Experiment in 1960. This organism appears to be the most important of the group in terms of prevalence and destructiveness. The last two bacteria were each isolated from a single specimen. Preliminary pathogenicity tests in the greenhouse indicate that the three bacteria are pathogenic.

The Nickerson Color Fan based on the ISCC-NBS method of designating colors (4) was very valuable in research designed to associate each of the three

pathogens with definite symptoms on guar plants. This research has been only partially successful because of the close similarity of symptoms caused by different pathogens, particularly in the early stages of infection. The superiority of the ISCC-NBS method of designating colors over that currently used by pathologists was demonstrated.

The prevalence of seed-borne viruses in *Vigna* spp. introductions was investigated by growing in the greenhouse the entire collection of 429 introductions maintained by this station and examining the seedlings for virus symptoms. A minimum of 25 percent of the introductions showed virus symptoms or gave a positive reaction when indexed for viruses. The most common virus caused a symptom reaction of Early Ramshorn variety which is very similar to that of a virus reported as a strain of cucumber mosaic virus. A virus which causes the same symptom was isolated from commercial fields of *Vigna sinensis* in Georgia by Dr. C. W. Kuhn (personal communication). At least one other unidentified virus was isolated from *Vigna* sp. introductions. Consequently, no introductions were distributed as a precaution against the distribution of new viruses. An indexing technique was employed on all new introductions and introductions reincreased this year. The seed was planted in peat pots in the greenhouse and thinned to one plant per pot. At two weeks after planting the central leaflet from the youngest partially-expanded trifoliate leaf was removed from each plant and a composite leaf sample prepared from each introduction. The leaflets were placed inside a small piece of cheesecloth and were macerated in 5 ml. .01 M phosphate buffer by rubbing between the fingers. One-week-old *Vigna sinensis* of var. Early Ramshorn were rubbed with the saturated cheesecloth after the plants were dusted lightly with carborundum. All introductions, the extract from which produced symptoms on the tester plants, were planted in a separate area of the nursery. All introductions which indexed free of virus were planted in a separate area of the nursery, which was surrounded by a row of corn to partially interrupt insect flight. In addition insecticides and zineb were applied at one to two-week intervals.

Many introductions, particularly those which did not mature seed showed severe virus symptoms late in the season. Samples collected from the nursery by Dr. C. W. Kuhn produced red local lesions on *V. sinensis* tester plants indicating a similarity if not identity to one of the viruses which Dr. Kuhn has found in commercial plantings. It appears, therefore, that introductions are received by our station relatively free of viruses and become infected by a native virus while growing in the nursery.

In cooperation with Dr. C. W. Kuhn, peanut ringspot was investigated by planting in an insect-proof cage, seeds of introductions which were harvested from affected plants. Half of the plants received an application of K once a week in addition to the weekly application of soluble complete fertilizer which was applied to all plants. There was no relationship between the percentage of infected plants in the row from which the seed was harvested, and the percentage of infected plants in the greenhouse. Plants of Argentine variety included as a check also showed symptoms of ringspot at a high level of K. Attempts to transmit an agent responsible for the symptom by grafting

and dodder have been unsuccessful. Dr. R. O. Hammons reported (personal communication) that there was no recurrence of symptoms this year in the introductions which were adjacent to the affected introductions but showed no symptoms in 1961.

D. Restriction of seed distribution because of new or unreported diseases.

Cyamopsis: No introductions of this genus were distributed. Approximately 50 introductions grown by Dr. R. S. Matlock were found free of disease when inspected by the regional station pathologist, and will be distributed in 1963.

Vigna: No introductions of this genus were distributed.

Arachis hypogaea: Various groups of introductions within this species and the entire stock were withheld from distribution at various times during the year. No request for any of this material was received.

## II. PROPOSED RESEARCH 1963

A. Screening introductions for resistance.

(1) Resistance of Cucumis melo to Mycosphaerella citrullina. The variety Florisum released by Florida in 1962 (3) is reported as resistant to this disease. A replicated greenhouse test designed to test the resistance of this variety in comparison to other varieties which have shown resistance in regional station tests is in progress. These plants will be incubated in the moist chamber for 48 hours (instead of 24 as used in previous tests) to allow a more accurate comparison of the results with those obtained with watermelon. Dr. J. D. Norton of Auburn University who is working actively on breeding cantaloupes for resistance to this disease has urged the continuation of the screening of introductions (personal communication) for resistance to this disease.

(2) Resistance of Cucumis sativus to Mycosphaerella citrullina. Dr. W. C. Barnes has reported (personal communication) that gummy stem blight appears to become more acute each year. Apparently all of his breeding lines are highly susceptible to this disease. Of the three cucurbits commonly affected by M. citrullina, cucumber is generally considered to be the least susceptible to the disease. Therefore high levels of resistance may be found in commercial varieties. This has not been previously investigated under controlled conditions. A preliminary screening test will be conducted using all commercial varieties of cucumbers in stock at a major seed company. Replicated tests and screening of introductions will follow if the results of the preliminary test indicates that this research will be profitable.

(3) Resistance of Sorghum vulgare to Colletotrichum graminicola (Ces.) G. W. Wils. Dr. H. B. Harris of the Georgia station has expressed interest in

obtaining additional sources of resistance to this disease. Sart (P.I. 152945) is immune to this disease but is not a grain sorghum. Consultation with sorghum breeders has led to the conclusion that this problem should not be investigated at this time. It should be considered again in the future, however, especially if races of the fungus develop which are capable of attacking Sart.

(4) Resistance of pepper to Southern blight caused by Sclerotium rolfsii Sacc. The causal agent of this disease attacks many crops in the south and represents a very serious problem. Cultures of the fungus on sterilized oats are growing in the laboratory. Several methods of inoculation will be tested. If these tests indicate that a technique for detecting resistance can be developed, further research on technique and a screening program will be initiated.

(5) Diseases of Forage and Field Crops. Problems in this group will receive increasing study in 1963. This will be done in the following ways: (1) By increasing the amount of time spent reviewing the current literature. (2) By an increased number of personal contacts with agronomists at state experiment stations and at scientific conventions. If information obtained in this way reveals problems suitable for investigation at the regional station preliminary work will be conducted.

The following factors will continue to be used as a guide in selecting new research in screening introductions for disease resistance:

I Adequacy of facilities for the particular problem.

II Value of research.

1. Economic losses caused by the disease involved.
2. Probability of utilization of resistant germplasm by plant breeders.

III Probability of success in the research.

- B. Field notes on resistance of introductions to disease will be taken when the severity and uniformity of disease development justifies this.
- C. Research on new and unreported diseases of guar will be concluded and manuscripts describing these diseases will be prepared. Isolations from diseased plants in the nursery will continue to be made and diseases which appear to be new to the United States will be the subject of preliminary research.
- D. All Vigna sp. introductions will be grown in the field. A systemic insecticide will be applied to the plants and plants showing virus symptoms will be rogued frequently. In addition all introductions which were grown in 1962 and all new introductions will be grown in 1963 in an insect-proof cage, rogued frequently, and treated with a systemic insecticide. If the above techniques are successful in producing virus-free seed the seed will be

available for distribution in the fall of 1963. Experiments on methods of inactivating pathogens in and on guar seed will be conducted. The principle treatments will include hot water, mercuric chloride and streptomycin. The objective of these experiments will be to inactivate the pathogens so that present stocks of infected seed can be distributed.

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