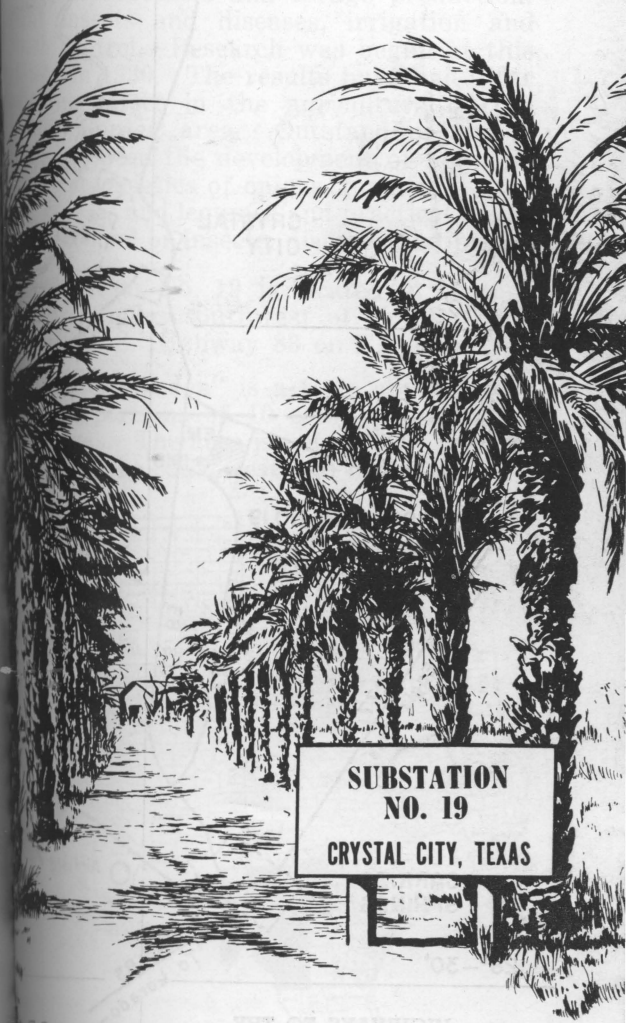
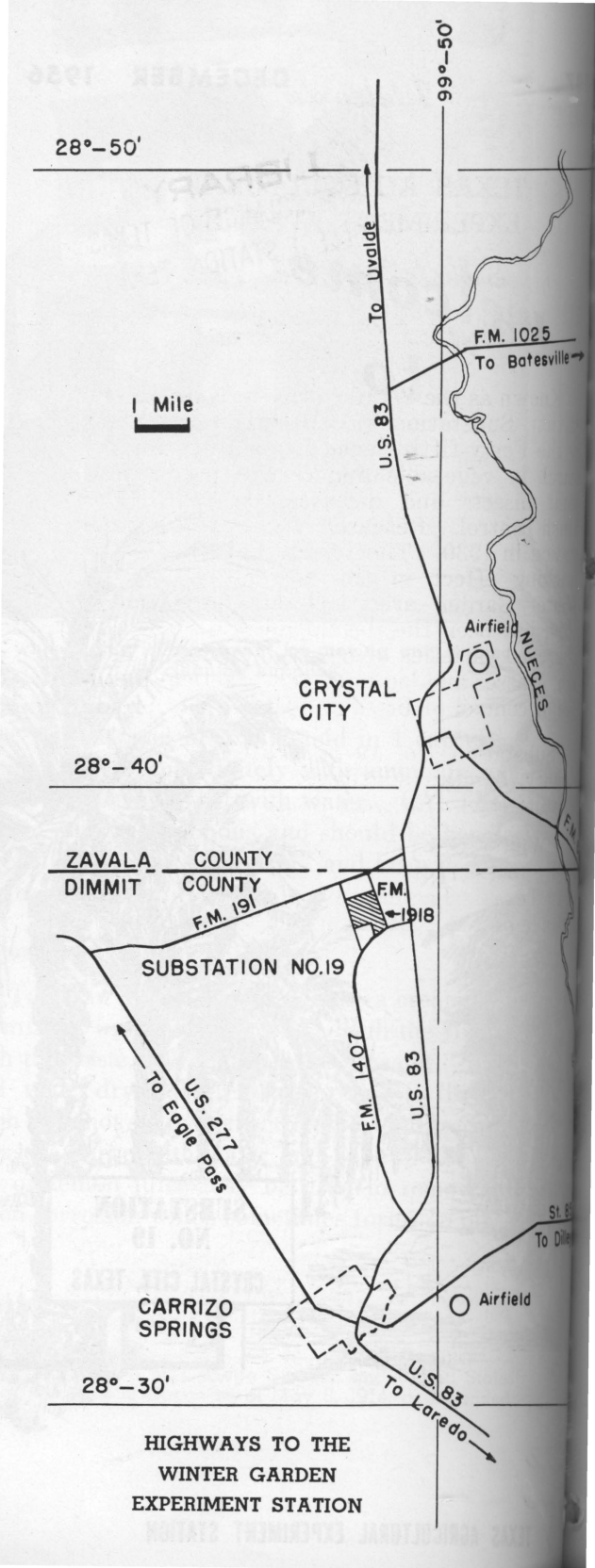
P-187 DECEMBER 1956

welcome to



TEXAS AGRICULTURAL EXPERIMENT STATION



HIGHWAYS TO THE WINTER GARDEN EXPERIMENT STATION

Welcome

to the

TEXAS AGRICULTURAL EXPERIMENT STATION

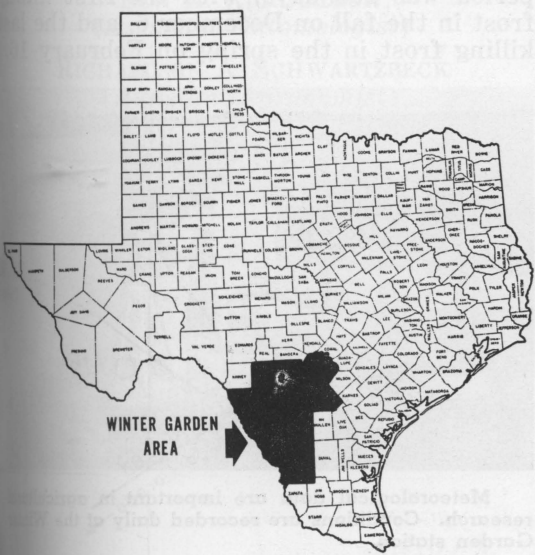
Substation No. 19

Crystal City, Texas

Known as the Winter Garden Experiment Station, Substation No. 19 was established by the Forty-fifth Texas Legislature for research in vegetable and forage production, plant insects and diseases, irrigation and brush control. Research was begun at this station in 1930. The results have had a far reaching effect in the agriculture of the Winter Garden area. Outstanding among them has been the development of new and improved varieties of onions, tomatoes, spinach, grasses and legumes and practical methods of control of insects, diseases and brush.

Substation No. 19 is located in Dimmit County, 5 miles southwest of Crystal City just off U. S. Highway 83 on FM 1918.

"Winter Garden" is a term applied generally to portions of 10 counties in Southwest Texas. The area is bounded by the Rio Grande on the southwest and lies south of a



line from Del Rio to San Antonio and mostly west of a line from San Antonio to Laredo. The term implies the growing of vegetables, melon and citrus crops during the winter. Although these crops are grown in other parts of South Texas during the winter, the Winter Garden counties usually are considered together, since they have in common such things as soils, climate and irrigation. The Winter Garden constitutes a land area of nearly 10,000,000 acres, with about 350,000 acres under irrigation.

Substation No. 19 includes 192 acres, with approximately 130 in cultivation and headquarters area, and 62 acres in native pasture. About half of the research by personnel of this station is conducted on farms throughout the Winter Garden area in cooperation with local farmers and ranchmen.

Many phases of research here are conducted in cooperation with commercial firms, other substations, field laboratories and departments of the Texas Agricultural Experiment Station and with the U. S. Department of Agriculture. Valuable research contributions have been made to agriculture in the area by these groups.

Weather records for a 25-year period show an average annual rainfall of 20.9 inches, an average maximum temperature of 84.7 degrees F., and an average annual minimum temperature of 59.7 degrees F. The average annual growing season during this period was 293 days, with the first killing frost in the fall on December 6, and the last killing frost in the spring on February 16.

Meteorological data are important in agricultural research. Conditions are recorded daily at the Winter Garden station.

Field days attract much interest from those who want to learn the newest progress in agricultural research at Substation No. 19.

Soils of the Winter Garden vary from fine sand to heavy clay. Soil on the station is mostly fine sand or sandy loam.

Visitors are always welcome to Substation No. 19. Special field days are held when crops are at appropriate stages of growth. The station's address is Star Route, Crystal City, and the telephone number is Crystal City DRake 4-3619.

Research personnel of the Texas Agricultural Experiment Station

BRUCE A. PERRY
(*Superintendent*)

GORDON A. BUFFINGTON
(*Assistant Horticulturist*)

BEN H. RICHARDSON
(*Assistant Entomologist*)

RICHARDSON A. SCHWARTZBECK
(*Assistant Agronomist*)

Agricultural Research Projects at Substation No. 19

FRUIT CROPS

Citrus Variety Adaptation

Research has been in progress for many years to evaluate citrus varieties for commercial production in the Winter Garden. These plantings have included grapefruit, oranges, satsumas, tangerines and tangelos. The tests have shown that early varieties of oranges, tangerines and tangelos produce satisfactorily in the area.

Particularly promising are Hamlin, Joppa and Navel oranges; Clementine tangerine and Mineola tangelo. Late varieties, which ripen after February 1, are not recommended because of the freeze hazard.

Navel Orange Rootstocks

This study began in 1950 to determine the quality, yield and fruit size of Navel oranges as influenced by different rootstocks. Basic physiological growth and dormancy characteristics in relation to cold-hardiness also are being studied. The trees are now coming into production and will soon yield information for recommendations.

A wide selection of rootstocks are tested to determine their influence on hardiness quality, size and yield of oranges.

Dates are tested at Substation No. 19 in the largest collection of varieties in the United States for production in the Winter Garden.

Date Variety Adaptation

A testing program has been conducted on Substation No. 19 for many years to evaluate different varieties of dates for the Winter Garden. The collection here consists of about 30 varieties and several desirable seedlings. This collection contains the largest number of different date varieties in the United States. Varieties best adapted to the area are Amir Hajj, Hayany, Khadrawy and Kustawy.

Grape Rootstocks and Varieties

Interest in the production of early table grapes in the Winter Garden has revived recently. Tests are underway to find root-

Grape rootstocks which are long-lived and can be grafted easily to productive varieties are sought in tests here.

stocks which will be long-lived and which can be grafted easily to varieties adapted in the area. Past experience has shown that the most popular table grape varieties on their own root system cannot survive long enough to become a profitable crop. When satisfactory rootstocks are found, grapes probably will be more widely planted.

Peaches, Plums and Nectarines

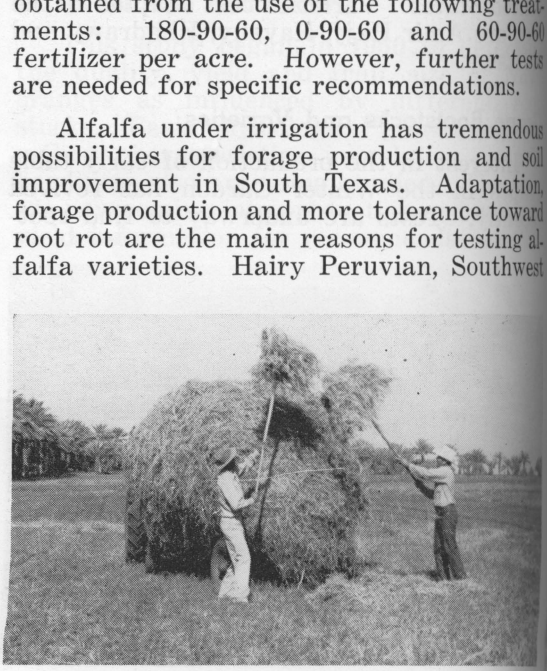
An orchard is maintained here for testing varieties of peaches, plums and nectarines which may be adapted to the mild winter weather and long, hot summers in this area. These fruit trees usually are short-lived in the Winter Garden, and no recent addition to the collection on the station appears better than the older varieties.

FIELD AND FORAGE CROPS

Alfalfa Fertilizer and Variety Testing

Tests here seek the best fertilizer treatments for alfalfa on various soil types of this area. Large increases in yields were obtained from the use of the following treatments: 180-90-60, 0-90-60 and 60-90-60 fertilizer per acre. However, further tests are needed for specific recommendations.

Alfalfa under irrigation has tremendous possibilities for forage production and soil improvement in South Texas. Adaptation, forage production and more tolerance toward root rot are the main reasons for testing alfalfa varieties. Hairy Peruvian, Southwest



Irrigated alfalfa tests at Substation No. 19 show it has tremendous possibilities for forage production *and soil building in South Texas.*

Common, African and Indian varieties have proved the most promising to date.

Annual Winter Legume Evaluation

In an effort to find new and better winter legumes for forage production and green manure, various species and varieties have been tested here each year since 1952.

Hubam and Floranna sweetclovers; California and Cogwheel bur clovers; Hairy, Purple, Lana or Oregon wollypod vetches; and Papago winter peas have been the most productive. None of the true clovers (*Trifolium* species) do well in this area.

A new sweetclover introduced from Israel through Substation No. 4 at Beaumont has proved to be almost as productive here as Hubam and Floranna. It is less stemmy and coarse than other legumes as it approaches maturity. More testing is necessary before it can be recommended fully.

Annual Summer Legume Evaluation

A rotation program in this area is inadequate without a legume. About 150 tests are underway to determine the adaptation, forage production and green manure value of annual summer legumes. Crotolaria, guar, sesbania, field peas and hairy indigo have proved the most productive thus far.

Hairy indigo, an annual summer legume which grows into a shrubby type plant, is relatively new in the area and has proved promising in the 2 years of testing at Substation No. 19.

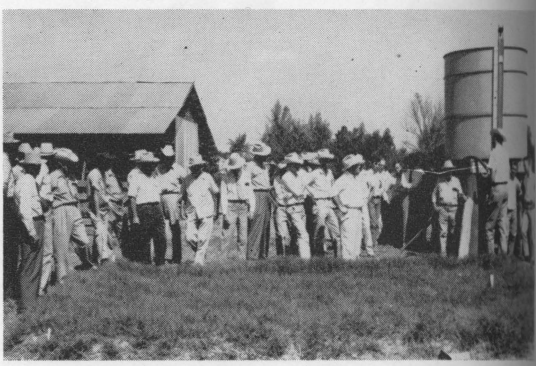
Hairy indigo is among annual summer legumes showing promise in tests here.

Fertilizing Oats for Winter and Spring Forage

A test was begun in 1954 to determine the most profitable rates of fertilization of oats under irrigated conditions. Air-dry forage yields of oats seeded at the rate of 1½ bushels an acre were increased from 1,160 pounds per acre without fertilizer to 5,650 pounds by application of a 180-60-0 fertilizer per acre. Sixty pounds of potash added to the high nitrogen and phosphoric acid rate reduced yields by 450 pounds, to 5,200 pounds per acre. Tests show best results are obtained when phosphoric acid is applied at planting time together with one-fourth to one-third of the nitrogen, and the additional nitrogen is applied in two or three supplemental applications.

Fertilization of Coastal Bermudagrass

Since nitrogen usually is the first limiting element in the production of grasses in this area, an experiment with Coastal Bermudagrass under varying nitrogen levels with and without irrigation seeks to determine the most profitable rate of nitrogen application. Total yields of the 1955 tests under irrigation ranged from 5,600 pounds air-dry forage per acre without fertilizer to 19,800 pounds where 600 pounds of nitrogen were applied. Yields during 1955 under dryland conditions ranged from 3,200 pounds of air-dry forage per acre where no fertilizer was applied to 4,300 pounds following an application of 30 pounds of nitrogen per acre, and 3,800 pounds where 60 pounds of nitrogen per acre had been applied.



Irrigated Coastal Bermudagrass fertility tests result in high forage yields and interest by farmers and ranchmen.

Seeding, Spacing and Height of Oats for Forage

Tests were conducted at this station during 1956 to determine the influence of seeding rate and row width on total forage production of oats. Forage production increased constantly as the seeding rate increased and as width between rows decreased. Usual rates of seeding in the Winter Garden vary from 1 to 1½ bushels per acre. Tests show that economically profitable increases in yield of 1,500 to 2,500 pounds of air-dry forage per acre may be obtained by increasing the seeding rate to 4 bushels per acre.

Greenhouse clipping experiments with oats indicate that early clipping or grazing young oat pastures should be avoided so that the plants may develop adequate root systems. Grazing should not begin until the oat plants are 10 to 12 inches tall. There was an 83 percent reduction in total yield per acre when clipped each time the oats were 3 to 4 inches tall. However, there was only a 20 percent reduction in yield where the first clipping was made when the oat plants were 3 to 4 inches high and each succeeding clipping at 10 to 12 inches in height.

Perennial Warm Season Grasses

A large grass nursery consisting of 70 native and introduced varieties and selections is maintained on Substation No. 19 to determine the adaptation and performance of various pasture grasses under Southwest Texas conditions.

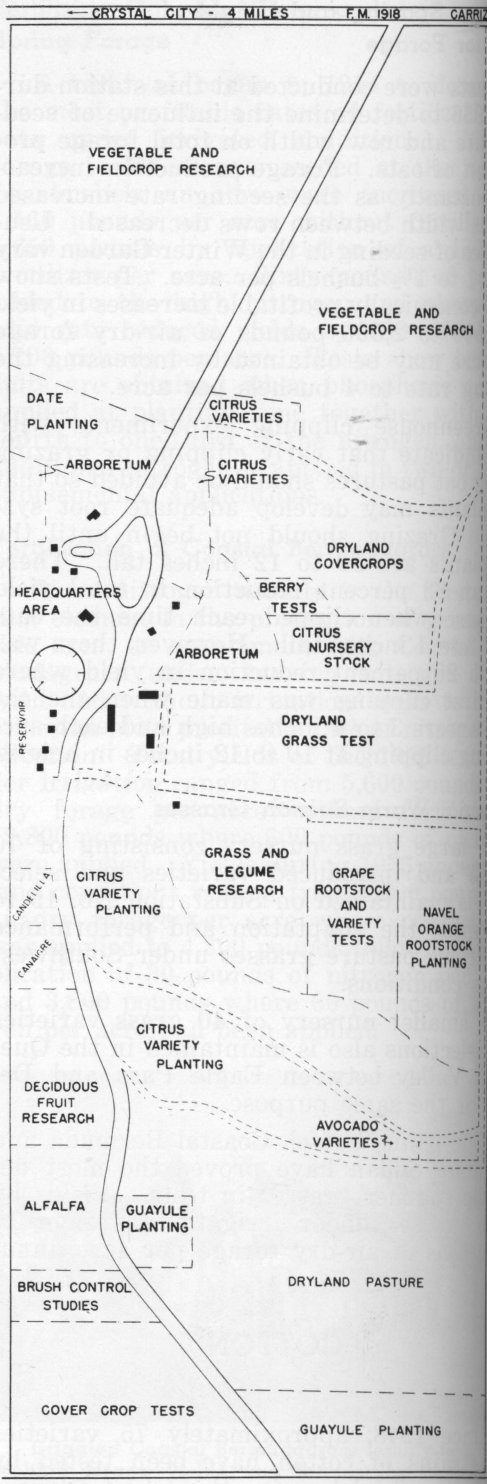
A smaller nursery of 40 grass varieties and selections also is maintained in the Quemado Valley between Eagle Pass and Del Rio for the same purpose.

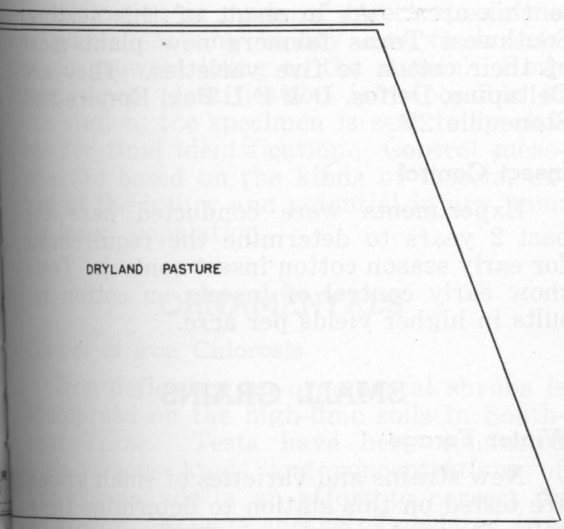
Blue panic, buffel, Coastal Bermuda and perennial Sudan have proved the most desirable summer grasses in tests. Yields by these grasses under irrigation average 10 to 14 tons of air-dry forage per acre annually.

COTTON

Varieties

Since 1948, approximately 75 varieties and strains of cotton have been tested by this station to determine those best adapted


← CRYSTAL CITY - 4 MILES
F.M. 1918
CARRIZO SPR
VEGETABLE AND FIELDCROP RESEARCH
VEGETABLE AND FIELDCROP RESEARCH
DATE PLANTING
CITRUS VARIETIES
ARBORETUM
CITRUS VARIETIES
DRYLAND COVERCROPS
HEADQUARTERS AREA
BERRY TESTS
CITRUS NURSERY STOCK
ARBORETUM
RESERVOIR
DRYLAND GRASS TEST
GRASS AND LEGUME RESEARCH
CITRUS VARIETY PLANTING
GRAPE ROOTSTOCK AND VARIETY TESTS
NAVEL ORANGE ROOTSTOCK PLANTING
CAMELLIA
CAMARGE
CITRUS VARIETY PLANTING
DECIDUOUS FRUIT RESEARCH
AVOCADO VARIETIES
ALFALFA
GUAYULE PLANTING
BRUSH CONTROL STUDIES
DRYLAND PASTURE
COVER CROP TESTS
GUAYULE PLANTING



TEXAS AGRICULTURAL
EXPERIMENT STATION
SUBSTATION NO. 19
CRYSTAL CITY, TEXAS

to this area. As a result of this testing, Southwest Texas farmers now plant most of their cotton to five varieties. They are Deltapine, Delfos, D & P L Fox, Empire and Stoneville 2B.

Insect Control

Experiments were conducted here the past 2 years to determine the requirement for early season cotton insect control. Tests show early control of insects on cotton results in higher yields per acre.

SMALL GRAINS

Winter Forage

New strains and varieties of small grains are tested on this station to determine their value for winter forage production and their resistance to diseases in Southwest Texas.

Irrigated tests during the past 3 years show that oats make more forage throughout the cool season than wheat, rye or barley. For early growth in the fall, Goliad barley, Arkwin oats and Alamo oats are recommended. The best mid-winter growth is made by Mustang and New Nortex oats, while Arkwin, New Nortex and Mustang oats continue to make excellent growth into early spring.

INSECTS

Identification

Insects must be identified correctly in order to apply the specific insecticides needed.

Insects are trapped and identified to determine specific insecticides for control.

Identification is made of insect specimens, or plants showing injury due to insects, which growers bring to the station. However, when identification is impossible at this station, the specimen is sent to specialists for final identification. Control measures are based on the kinds of insects, extent of the injury and potential injury from the insect population.

ORNAMENTALS

Control of Iron Chlorosis

Iron deficiency on ornamental shrubs is widespread on the high-lime soils in Southwest Texas. Tests have been conducted with various kinds and concentrations of iron compounds in an effort to correct its deficiency. Foliage sprays of chelated iron have been the most successful in correcting yellowing. Use of 5 pounds of iron material in 100 gallons of water brought about excellent greening. Unfortunately the good color lasts only 4 to 6 weeks.

Lawn Fertilizers

Application of trace element material together with nitrogen, phosphorus and potassium have been tested on St. Augustinegrass lawns. Results have varied somewhat, but were consistent enough to give reliable information. A complete fertilizer (nitrogen, phosphoric acid and potash) together with iron and zinc produced the best and longest-lasting green-up. In all cases, the addition of potash was beneficial in developing a better color even though the soil tests showed more than 480 pounds per acre of potash available.

Control of Rhodesgrass Scale

Chemical control of Rhodesgrass scale on lawns was begun when St. Augustinegrass was thought to be severely damaged by this widespread pest. Tests show parathion controls the scale in the crawler and young attached stages.

NEW AND SPECIAL CROPS

Candelilla-Wax

Studies are in progress with candelilla (*Euphorbia antisyphilitica*) plants as a

Candelilla plants are grown as a source of wax. Tests so far show about 2 percent wax content.

source of wax. Considered in the test are the percentage of wax in relation to the age of plants, and influence on wax by amount of irrigation water applied. Tests so far show about 2 percent wax content.

Canaigre-Tannin

Strains and variety tests of canaigre are underway for general adaptation and the yield of tannin under local growing conditions. Also being considered is information regarding cultural problems and conditions as they apply to commercial canaigre production in the Winter Garden.

Guayule-Rubber

Guayule research is conducted here to increase the yield of natural rubber from im-

An increase in natural rubber yield is sought from improved strains of guayule on test at Substation No. 19.

proved strains and hybrids. A small block of land on the station is maintained for testing guayule for adaptation and resistance to charcoal rot. Tests show climate and soils in the Winter Garden are particularly well suited for guayule production.

VEGETABLES

Breeding Onion Varieties

Essentially the entire South Texas onion acreage is planted to varieties originating from this project, which began as a cooperative USDA-Texas Agricultural Experiment Station effort. New varieties, both yellow and white Bermuda types, have been developed which are resistant to pink root. Also, Granex, a first-generation hybrid, has been developed for commercial production through the use of male-sterility. These new varieties and hybrids have enabled farmers to increase marketable yields greatly. Growers have produced yields ranging up to more than 800 bags per acre with Granex, compared with about 200 bags produced by varieties planted previously. Yields by other varieties developed and released here have been almost as spectacular. Research now in progress indicates that pink root-resistant Grano varieties can be made available to the growers in 2 to 3 years. With this development, hybrids between Bermuda and Grano onion types will be completely resistant to pink root.

Almost all the South Texas onion acreage is planted to onion varieties and hybrids developed and released at the Winter Garden station. Yields increased from about 200 to 800 bags an acre.

Varieties and strains of onions are field tested under irrigation at Substation No. 19.

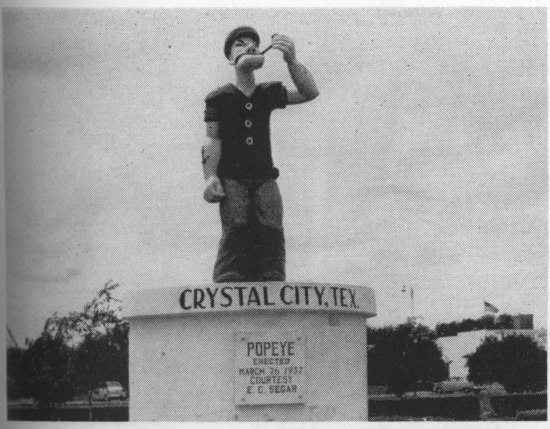
Breeding and Development of Cantaloupes

Experiments seek to develop disease-resistant cantaloupe varieties for commercial production in the Laredo-Winter Garden area. Special emphasis is being placed on resistance to both downy and powdery mildew. Breeding lines are being tested in both the spring and fall on the station, and a spring test is conducted in the Laredo area in cooperation with a commercial grower.

Breeding Disease-resistant Spinach

Experiments are in progress to develop a disease-resistant spinach variety adapted to mechanical harvesting and acceptable for commercial canning, freezing and the fresh markets. All domestic and foreign intro-

All foreign and domestic introductions of spinach are tested at Substation No. 19 for disease resistance.



A monument to the production of good spinach. Many widely planted varieties were developed at the Winter Garden station.

ductions of spinach are being tested on this station for sources of disease resistance. Diseases being considered are downy mildew, mosaic (cucumber virus), curly top and white rust. Early Hybrid 7, released in 1955, is resistant to mosaic and downy mildew. It is a semi-savoy (curled leaf) type suitable for freezing and canning. Some growers desire a more savoyed type for the fresh market. Savoy lines with resistance to both mosaic and mildew should be available soon. Other spinach is in the developmental stage with apparent resistance to both mildew and white rust. Success of this project should completely change the spinach production in Texas to disease-resistant varieties developed in this breeding program.

Lettuce Variety and Strain Test

Lettuce varieties and strains are evaluated at this station for commercial adaptation. New breeding lines are tested as they become available, primarily to find lettuce with improved quality.

Breeding Tomatoes

Development of tomato varieties for earliness, productivity, disease resistance and market acceptability for shipment and canning is of utmost importance to growers, packers and processors. A large number of breeding lines already have been developed in an effort to combine many of these qualities and are being tested in both spring and

Tomato breeding at Substation No. 19 is combining qualities desired for commercial production.

fall plantings on this station. Texto 1, released here in 1954, is early and productive. Weshaven, released in 1955, is productive and resistant to Fusarium wilt and gray leaf spot. Both diseases are widespread and do much damage where tomatoes are grown. Weshaven is satisfactory for both canning and shipping. In tests Texto 1 and Weshaven outyielded the most widely planted varieties by 50 to 100 percent. Both varieties have produced a higher percentage of larger fruit than the standard varieties.

Vegetable Variety Testing

Varieties and new lines of Southern peas are planted to test their yielding ability and quality for canning or freezing. The varieties of Southern peas most widely planted are California Blackeye No. 5 and Purple Hull 49. Two crops of peas per year may be harvested in the Winter Garden, but the main season is in the spring with planting time about March 1.

Sweet Corn

Sweet corn varieties also are tested at Substation No. 19. Sweet corn acreage in this area is unstable, and the crop is relatively minor. New methods of corn earworm control, and varieties which are damaged less by the worm should result in an acreage increase. Varieties which perform best in this area are Cheddar Cross, Calumet and Aristogold Bantam Evergreen.

Watermelons

Watermelon research the past few years has consisted mainly of testing promising new lines developed by breeders throughout the South and which need to be tested in a wide area. Black Diamond still is the most widely planted variety in the Winter Garden. Other varieties include Charleston Gray and Kleckly Sweet. Planting date for the main crop is February 10-20, with harvest beginning in May.

During the past 2 years, the acreage planted to early ice-box type watermelons has increased considerably. These melons are planted between January 25 and February 5. Since they mature in an extremely short season, they are on the market by April 15-20.

Fertilizer Requirement for Carrots

Experiments here for 3 years have shown that 40 pounds per acre each of nitrogen and phosphoric acid, will give the best yield of carrots. Tests are being conducted to find the best sources of nitrogen and the best method of application.

Vegetable Insect Control

Insecticide tests conducted on vegetable crops in the Winter Garden for the control of insects, has resulted in methods of commercial control of thrips on onions by use of organic chemicals. Tests during the 1954 and 1955 seasons showed onion thrips have developed resistance to certain chlorinated

Tests at this station have resulted in widely used commercial methods of insect control.

hydrocarbons. Tests in 1956 in the Winter Garden gave further proof of resistance.

Curly top virus disease has become of great economic importance to the growers of spinach, tomatoes, cantaloupes, cucumbers and other susceptible vegetable crops in this and other areas. The beet leafhopper, *Circulifer tennellus* (Baker), is the insect vector of curly top. Therefore, surveys of its most abundant summer host, Russian thistle, locally and in West Texas and Mexico, have become increasingly important. The population of the beet leafhopper in Russian thistle may determine the potential curly top infections for the following fall and winter vegetable season. These surveys are being conducted from this station.

STATE-WIDE RESEARCH

The Texas Agricultural Experiment Station is the public agricultural research agency of the State of Texas, and is one of nine coordinated parts of the Texas A. and M. College System.

The Main Station and headquarters are located at College Station, with 21 substations and 9 field laboratories located throughout major agricultural areas of Texas. In addition, 14 cooperating stations are owned by other agencies, including the Texas Forest Service, Game and Fish Commission of Texas, Texas Prison System, the U.S. Department of Agriculture, University of of Texas, Texas Prison System, U. S. Department of Agriculture, University of Texas, Texas Technological College and King Ranch. Some experiments are conducted on farms and ranches and in rural homes.

The Texas Agricultural Experiment Station is conducting about 375 active research projects, grouped in 25 programs which include all phases of agriculture in Texas.

Research results are carried to Texas farm and ranch owners and homemakers by specialists and county agents of the Texas Agricultural Extension Service.

ADMINISTRATION

R. D. LEWIS

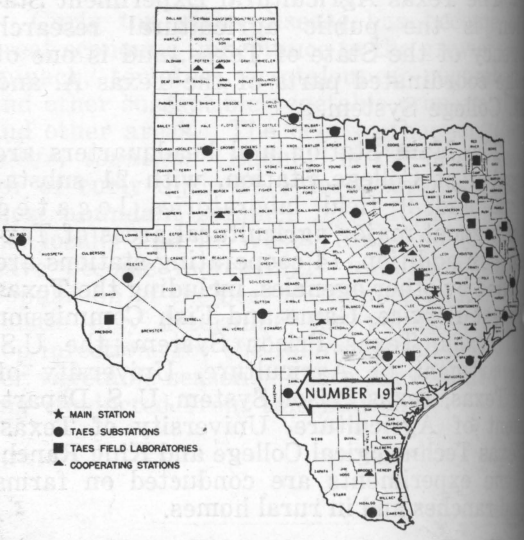
Director

R. E. PATTERSON

Vice Director

College Station, Texas

AGRICULTURAL RESEARCH seeks the WHATS, the WHYS, the WHENS, the WHERES and the HOWS of hundreds of problems which confront operators of farms and ranches, and the many industries depending on or serving agriculture. The workers of this substation, along with those of the Main Station and other field units of the Texas Agricultural Experiment Station, diligently seek to find solutions to these problems.



FOR BETTER LIVING

Today all people have a stake in agricultural research. The quality and quantity of food, feed and fiber available for their welfare are dependent on the information developed through organized research.

The Texas Agricultural Experiment Station concerns itself with problems confronting, and likely to confront, farmers and ranchmen, rural homemakers, farm groups and representatives of other organizations depending on or serving agriculture.

Agriculture up to now usually has kept abreast of demand. But continued agricultural research is necessary to point the way toward maintaining and improving our productive resources, improving quality, lowering costs of production, expanding markets, devising new and better methods for growing, processing and distributing farm and ranch products and toward better city and country living.

Researchers of the Texas Agricultural Experiment Station are dedicated to that aim. *Today's Research is Tomorrow's Progress.*