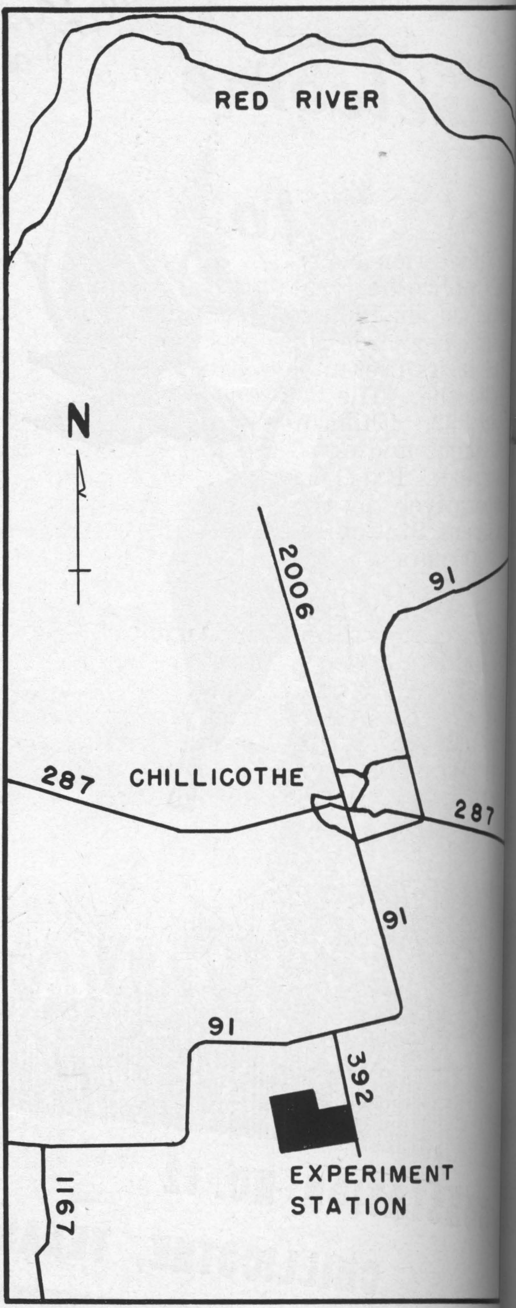
MP-179 SEPTEMBER 1956

SUBSTATION NO. 12
CHILLICOTHE, TEXAS

TEXAS AGRICULTURAL EXPERIMENT STATION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EXPERIMENT
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Welcome

to the

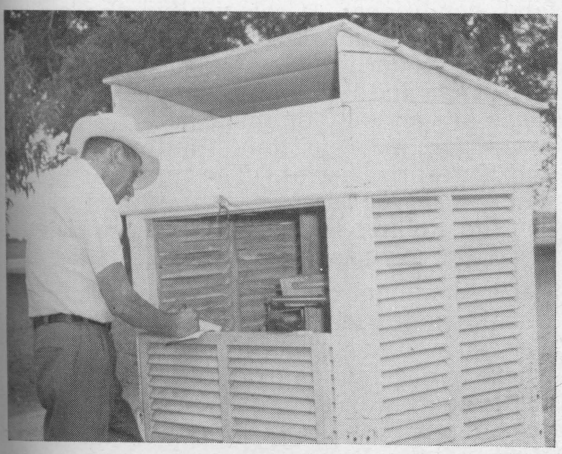
TEXAS AGRICULTURAL EXPERIMENT STATION

Substation No. 12

Chillicothe, Texas

Substation No. 12, generally regarded as the Chillicothe Experiment Station, was established in 1905 in Hardeman county for testing new crops and was moved nearby in 1916 to its present location 5 miles south of Chillicothe. The 252-acre tract is on Farm Road 392. Chillicothe is on U. S. Highway 287 about midway between Fort Worth and Amarillo. Experimental work is conducted cooperatively by the Texas Agricultural Experiment Station and the U. S. Department of Agriculture.

This station is on the Rolling Red Plains which extends from San Angelo, Texas, on the south, north into Oklahoma, and from the High Plains on the west to the West Cross Timbers on the east. Soils of the area are predominately of the Vernon, Foard, Abilene and Miles series. Soils on the station are Abilene and vary from sandy loam to clay loam.



Climatic conditions and their effect on growth of crops has been recorded at Substation No. 12 for nearly a half century.

Many visitors come to study plant breeding methods in use at Substation No. 12.

This station is 1,400 feet above sea level. Records over a 48-year period show an average annual rainfall of 24.41 inches with the peak rainfall in May and October. Very little rain falls from November through February. August is the critical month for crop production, and a good crop is usually produced if the summer drouth is broken by a rain prior to August 20.

Temperature records show a mean of 63.1 degrees, a maximum of 77.9 degrees and a minimum of 50.5 degrees. The average last killing frost in the spring is March 24, the first killing frost in the fall is November 11, and the average growing season is 231 days.

An irrigation well on the station is of great benefit to plant breeding research, but most of the experimental work is under dryland conditions. Geologically, the underground reservoir which supplies the water is new and underlies several thousand acres in Hardeman and Wilbarger counties. Recharge areas are close-by or immediately above the reservoirs and consist of sand of the Miles and Enterprise series. The reservoir is similar to others at scattered locations throughout the Rolling Plains, and wells which tap this reservoir are less than 100 feet deep.

Predominant crops of the area are cotton, wheat and sorghum in that order. Alfalfa also is well adapted to an extensive area where sub-irrigation exists. Minor crops include guar, sesame, oats, barley, Southern peas, mung beans, soybeans and castorbeans. Much of the Rolling Plains is unsuited for cultivation and cattle ranching is conducted on about 75 percent of the area.

When this station was established a half century ago the future of agriculture in the area was uncertain because the only grain crop was corn which failed frequently. An important part of the early work was testing crops newly introduced to the United States from foreign countries. This work resulted in the introduction of Sudangrass and the grain sorghums, feterita and hegari which stabilized agriculture in the region and allowed settlers to remain even during long periods of drouth.

Much of the cultivated land in the area has been farmed for more than 50 years and a deficiency in soil fertility is becoming apparent in some soils. Soil fertility work with the important crops is being conducted and part of the experiments are located on neighboring farms on sandy loam.

Unique sorghum research is conducted at Substation No. 12. The most complete nursery of forage and grain types of sorghum in the United States is maintained here. All newly introduced sorghum varieties continue to be tested at Chillicothe. Research with sorghum male-steriles over a 25-year period has resulted recently in a practical method for the production of hybrid sorghum seed which will result in 25 to 40 percent more grain per acre.

Reliable information on procedures in crop production and soil management is being collected and cultural and varietal experiments are being made with all the important crops in the area. Some attention is being given to vegetable and fruit production in home gardens and orchards, and to ornamental plantings of trees and shrubs.

Field days are held for various crops. Visitors are always welcome to Substation No. 12. The address is Route 2, Chillicothe, Texas, and the telephone number is 1621 F-3.

Personnel of the Texas Agricultural Experiment Station

J. R. QUINBY, SUPERINTENDENT
(*Agronomist*)

K. A. LAHR, *Assistant Agronomist*

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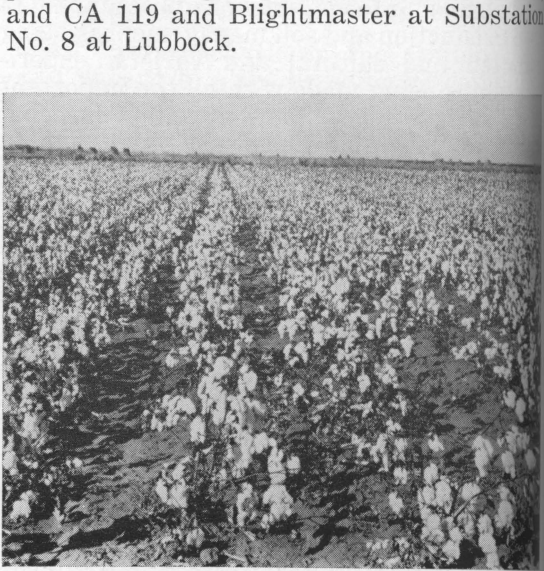
J. C. STEPHENS, *Agronomist*

Agricultural Research Projects at Substation No. 12

COTTON

Variety Evaluation

Cotton varieties differ in adaptation, in many characteristics that affect ease of harvesting and ginning, and in the characteristics of the lint produced. No single variety is best for all conditions, and farmers differ in their preferences. Seed of many varieties are offered for sale. An extensive test is conducted here to determine the characteristics of the varieties. The trend in recent years has been to storm-resistant varieties. There is little justification now for planting varieties which will waste in the field since several storm-resistant varieties are available. The varieties recommended for the Rolling Plains include Stormproof No. 1, Northern Star, Lankart, Western Prolific, Lockett 88, CA 119 and Blightmaster. Stormproof No. 1 originated at Substation No. 12, and CA 119 and Blightmaster at Substation No. 8 at Lubbock.



Three varieties of cotton which originated at the Chillicothe station have been planted for widescale production.

Breeding

Is is estimated that about 1 bale in 40 grown in the United States is of a variety which originated at Chillicothe. Three widely grown cotton varieties originated in the Substation No. 12 breeding blocks and were distributed as Mebane 140, Mebane 141 and Stormproof No. 1. They are grown under commercial names, and in recent years have occupied about 20 percent of the cotton acreage on the Rolling and High Plains. The varieties also occupy large acreages in Western Oklahoma. These three varieties now are being replaced by more improved varieties, and several of the newer varieties have one or more of the three station varieties in their parentage.

Breeding work is continuing, with the intention of obtaining an adapted variety which is storm-resistant but easy to harvest mechanically, sets a crop of bolls as early as possible to reduce insect damage, produces lint of acceptable quality under irrigation and under adverse as well as normal conditions. Cotton lint no longer than 15/16 of an inch is usually of the best quality on the Rolling Plains.

WHEAT

Variety Evaluation

There is an extensive plant breeding program with wheat at the experiment stations in the hard red winter wheat area. This work

The Chillicothe station is the source of foundation seed of several high quality and high yielding wheat varieties.

Important wheat varieties are kept pure by occasionally increasing seed from single heads.

has resulted in the development and release of numerous high yielding varieties with grain of excellent milling and baking qualities. Included among them are the full-season varieties Comanche, Westar and Concho and the early varieties Wichita and Crockett. All are recommended for the Rolling Plains.

Plant breeding programs must continue to overcome the new races of rust that continue to appear. The promising strains which originate elsewhere are tested at Chillicothe for adaptation. Usually the preliminary wheat nursery includes as many as 100 new strains and the advanced nursery about 50 strains which have survived elimination.

SORGHUM

Variety Evaluation

Grain sorghum may be planted in this area with equal chances for grain production at any time from April 1 to June 20. Recommended varieties include Combine Kafir-60, Combine Bonita, Redbine-58, Plainsman, Caprock, Martin and Combine 7078.

Nursery and Plant Introduction

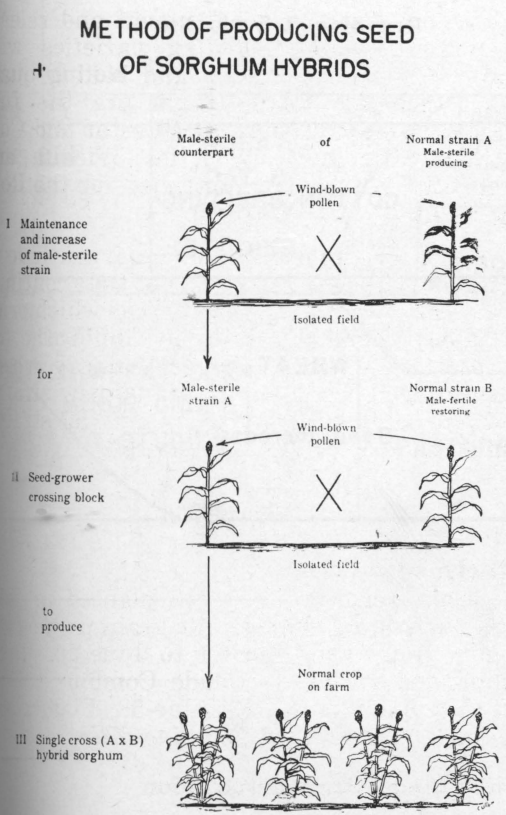
Sorghum varieties continue to be introduced from foreign countries by the U. S. Department of Agriculture. These introduc-

tions are grown first at Chillicothe and examined for characteristics which might be valuable in this country. A yellow endosperm type was found recently in Africa and introduced by the Nebraska Agricultural Experiment Station and the U. S. Department of Agriculture and is being bred into adapted varieties.

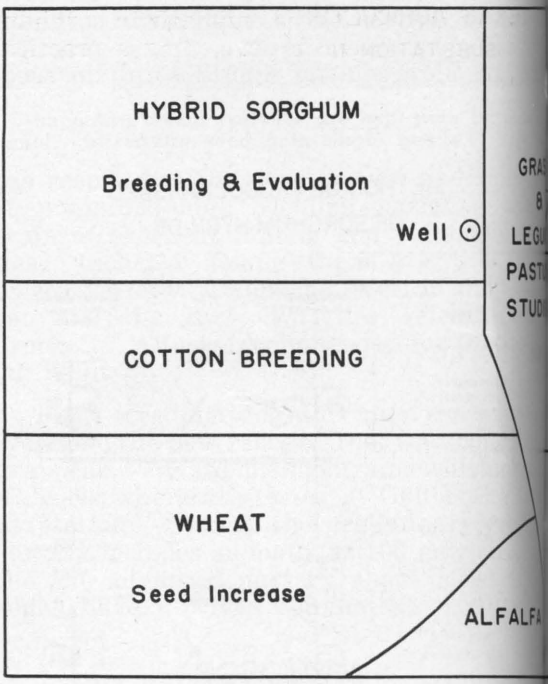
In addition to analyzing newly introduced varieties, old varieties are grown each year to keep them in existence. The sorghum nursery at Chillicothe contains about 500 varieties. Plant breeders throughout the world and seed analysts look to this nursery for seed true to name.

Sorghum Hybrid Breeding

In recent years, the emphasis in sorghum breeding has been on developing a practical method of producing hybrid sorghum seed,



A practical method of producing seed of sorghum hybrids was developed at Substation No. 12.


HYBRID SORGHUM
Breeding & Evaluation
Well
COTTON BREEDING
WHEAT
Seed Increase
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TEXAS AGRICULTURAL EXPERIMENT STATION

SUBSTATION NO. 12, CHILLICOTHE, TEXAS

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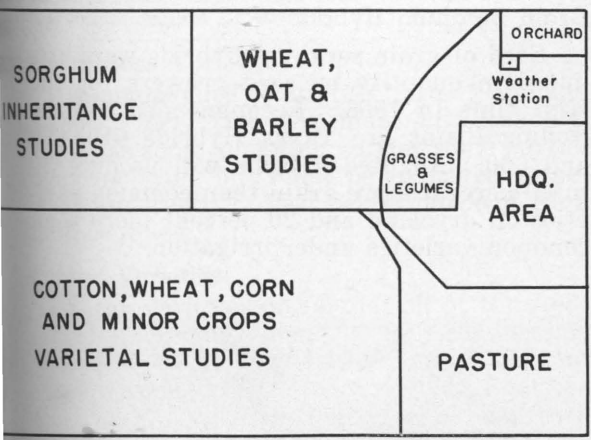


producing male-sterile seed parent lines and recognizing pollinators. The foundation seed program of the Texas Agricultural Experiment Station increased male-sterile seed parents in 1955 from foundation seed from the Chillicothe and Lubbock stations. Seed growers used these seed to produce the first commercial seed of Texas hybrids in 1956. Future plant breeding work seeks superior hybrids which will thresh better, resist lodging and have yellow grain with higher feeding value. Work is underway to produce Sudangrass hybrids and forage sorghum hybrids.

Sorghum Inheritance Studies

Familiarity with a plant species results in ideas that have practical applications. Varieties differ in many characteristics, including seed and glume colors, juiciness and sweetness of stalk, type of endosperm starch, duration of growth and height. Sorghum is a better crop in Texas because of a knowledge of the inheritance of many of these plant characteristics obtained from inheritance studies at Substation No. 12.

Grain Sorghum Hybrids

Seed of grain sorghum hybrids were produced in quantity by seed growers for the first time in 1956. Recommended for the Rolling Plains are Texas Hybrids 610, 620 and 660. Adapted hybrids will produce 30 to 40 percent more grain than common varieties on dry land and 20 percent more than common varieties under irrigation.

Heads of sorghum hybrids are checked in field research plots at Substation No. 12.

This first row of Sudangrass grown in the United States was at Substation No. 12 in 1909. It served as a foundation for seed to plant millions of acres of the valuable feed crop. The seed were brought from the Sudan region of Africa.

Sudangrass Varieties

Recommended varieties are Common, Sweet, Piper, Tift, Greenleaf and Lahoma. Each has some advantage under some particular condition, but must be managed somewhat differently if best performance of each is to be made.

Forage Varieties

Sorgo varieties on fertile soil of the Rolling Plains produce about 20 tons of silage or 5 tons of air-dry matter per acre. Recommended varieties are Honey, Sumac, Sourless and Atlas. Varieties which can be grown for both grain and forage are Combine Kafir 60, Combine Bonita, Texas Blackhul Kafir, Hegari and Early Hegari. June plantings result in high quality forage, but, like grain sorghums, sorgos and dual-purpose varieties can be planted successfully from April 1 to June 20.

MINOR GRAIN CROP TESTS

Grain sorghum is the most important grain for livestock feed produced in the area but small acreages of corn, oats and barley are grown.

Corn Varieties

Hybrid corn produces about 50 percent more grain than pure varieties such as Surcropper and Mexican June. Hybrids recommended for this area are Texas 28, Texas 30 and Texas 32.

Oat Varieties

Oats will winter-kill occasionally on the Rolling Plains, making winter-hardiness important in a variety. New varieties appear from time to time, and about 10 varieties are tested each year. Mustang and Bronco varieties are winter-hardy and are recommended for either fall or spring sowing. Alamo, a relatively new variety, is recommended for spring planting. All three varieties were developed and released by the Texas Agricultural Experiment Station in cooperation with the U. S. Department of Agriculture.

Barley Varieties

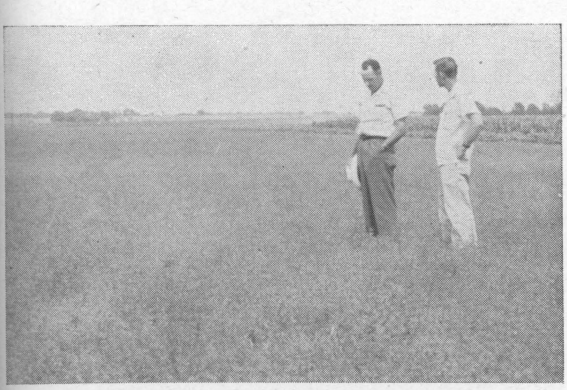
Barley occupies a small part of the acreage of the Rolling Plains sown to small grains, and a variety test is made each year at this station. Like oats, barley will winter-kill occasionally. Recommended varieties must be winter-hardy. Cordova is as good as any now grown. Barley is a preferred host plant of the chinch bug, and this insect increases to great numbers in the crop. Chinch bugs are a menace to the grain sorghum crop, therefore the production of barley on the Rolling Plains is not encouraged.

ALFALFA

Variety Evaluation

Alfalfa is an important dryland crop on parts of the Rolling Plains where four or five cuttings of hay may be produced each year. Hay yields on good land usually are about 5 tons per acre. The production of a seed crop reduces the number of cuttings for hay per season by one or two. Seed yields of 500 to 600 pounds per acre are common if insect control is effective and pollination is helped by a large bee population at the time of blooming.

Hay yields are about equal from several adapted varieties including Southwest Common, Buffalo, Ranger and Atlantic. Yields of new pasture alfalfa varieties which produce runners are less during the early years



Alfalfa is an important dryland crop and new varieties will undoubtedly appear since the spotted alfalfa aphid has invaded the United States.

after sowing than the common strains. Alfalfa wilt has not been recognized in this area and alfalfa stands, even of susceptible varieties, persist for many years.

Alfalfa is now being attacked by the spotted alfalfa aphid, a pest that has recently invaded this country. Some alfalfa varieties are tolerant to the insect and resistant plants can be found in many varieties. The advent of this insect may result in a change in alfalfa varieties now grown.

NEW OR MINOR CROPS

Guar

Guar is well adapted to the soils and climate of the northern Rolling Plains. It is a legume which is of some benefit to the soil on which it is grown. Seed yields of 500 to 1,000 pounds per acre are common, There is a local market for the seed which has a use in industry. Texsel is the variety commonly grown.

Mung Beans

Mung beans are the bean sprouts found in Chinese foods. The crop grows well on the northern Rolling Plains, and there is a market for Mung bean seed at Vernon. Two varieties, Oriental and Jumbo, are grown and they grow best from June and early July plantings. Yields on dry land are usually 400 to 500 pounds per acre. The crop must be harvested when barely mature since seed shatter from the pods if left too long in the field.

Safflower is one of the oil crops tested at Chillicothe in an effort to find new crops to plant on acres once planted to wheat.

Safflower

This member of the thistle family is an important oil crop in parts of India. It will grow at Chillicothe from early spring plantings and the crop matures in July. The seed contain about 30 percent desirable edible or paint oil and yields of 400 to 800 pounds per acre can be expected. Safflower can be sown and harvested with wheat machinery. It is not recommended at present since there is no local market, but is the most likely new crop grown here to substitute for wheat on retired acres. Obtaining a stand during the dry months of the spring is a hazard in the production of this crop.

Sesame

Sesame is drouth-resistant and may become an important crop in the future. The seed contain about 50 percent high grade edible oil and can be crushed on existing oil-extracting machinery. Shattering of the seed at maturity formerly discouraged the use of the crop, but recent plant breeding work has resulted in non-shattering strains. Rio is a new variety developed and released by the Texas Agricultural Experiment Station and the U. S. Department of Agriculture. Non-shattering strains can be threshed from windrows by a combine with an adjustment of cylinder speed to prevent damage to the seed. Yields of 500 pounds of seed per acre can be expected on dryland, and yields two or three times as great under irrigation.

Castorbeans

Castorbeans are adapted to the lighter soils of the area. The crop is not as drouth-resistant as cotton, therefore production in drouth years on heavy soils is likely to be low. A castorbean combine which harvests and hulls in the field has been developed and production can be completely mechanized. The crop can be grown profitably on dryland or under irrigation when the world price is sufficiently high to allow the local price to be above 6 cents per pound. Castorbean oil has many industrial uses. Yields at this station over a period of several years have been above 800 pounds of seed per acre. Yields under irrigation are higher.

Soybeans

Performance of soybeans in the past has been erratic, but recent plant breeding work has resulted in some new varieties which are shatter-resistant and produce good quality beans from June plantings. The Lee variety is recommended for trial plantings. The crop should be planted late and in an acreage large enough so rabbits will not destroy the entire planting. Yields of 800 to 900 pounds per acre may be expected on fertile soil.

Southern Peas

Southern peas (cowpeas) have been grown for many years as a soil-building crop and for shelled peas for the table. Chinese Red is the variety commonly grown for soil building and Blackeye, Cream and Purplehull are the common edible varieties.

FERTILIZERS

Fertilizer tests conducted on fine sandy soil near Substation No. 12 show that cotton and grain sorghum respond profitably to nitrogen, phosphorus and potassium applied in combination at or before planting time. The greatest response resulted from application of the first 30 pounds of nitrogen. After the nitrogen deficiency was satisfied, there was response to both phosphorus and potassium. Applications of 30 pounds each of nitrogen, phosphorus and potassium are recommended for cotton and sorghum grown on light sandy soils. Such an application has resulted in a 200 pound increase in lint yield of cotton and about 800 pound increase in sorghum grain

per acre. On light sandy soil, a dollar spent for proper fertilization of cotton has brought a return of about $4.00.

On heavier soils on the station, there has been no consistent response by cotton to any of the three major plant food elements. Applications of barnyard manure also have not been effective.

Wheat fertilizer test results have not been consistent on clay loam soil on this station. Plant growth response to phosphorus has been seen occasionally during vegetative growth, but grain yields have not been effected favorably, largely because phosphorus hastens the time of heading. Early heading recently has resulted in lower yields. Vegetative growth in the spring also has been affected by applications of nitrogen, but increases in grain yields have not been consistent.

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, the Game and Fish Commission of Texas, Texas Prison System, the U.S. Department of Agriculture, University of Texas, Texas Technological College and the 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.

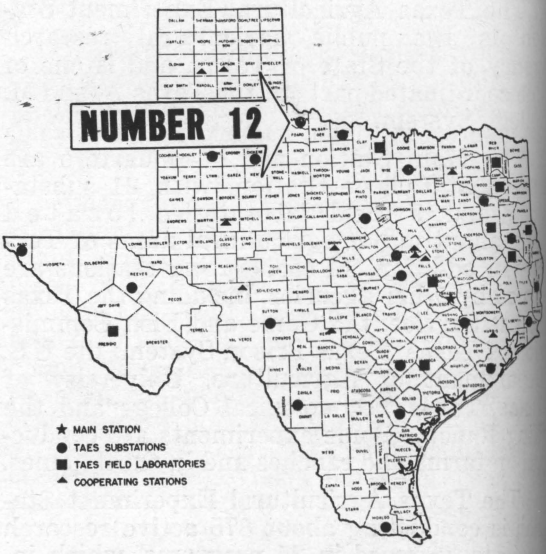
ADMINISTRATION

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, lowering cost of production, improving quality, expanding markets, devising new and better methods for growing, processing, distributing and utilizing 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.*