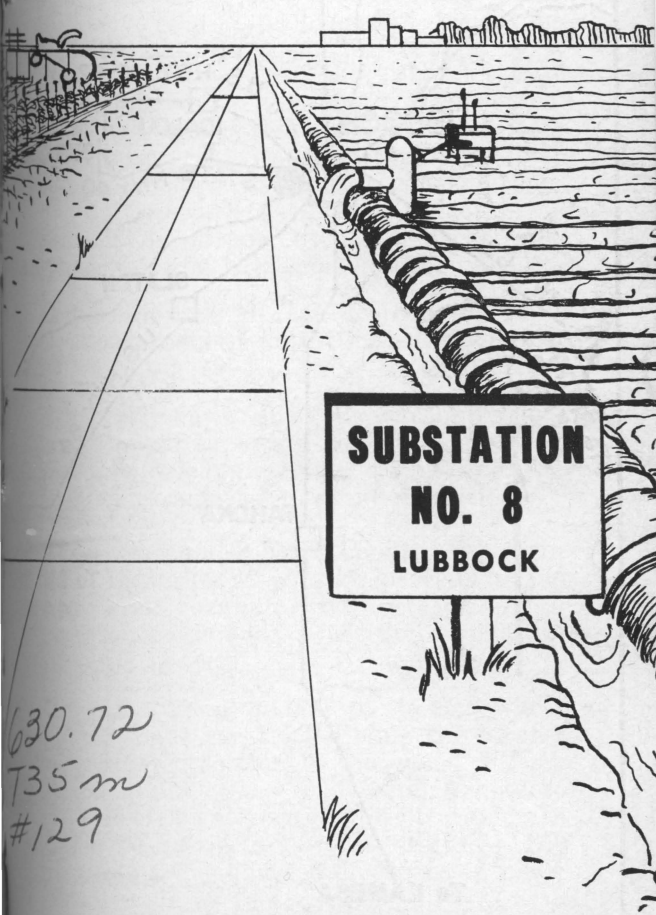
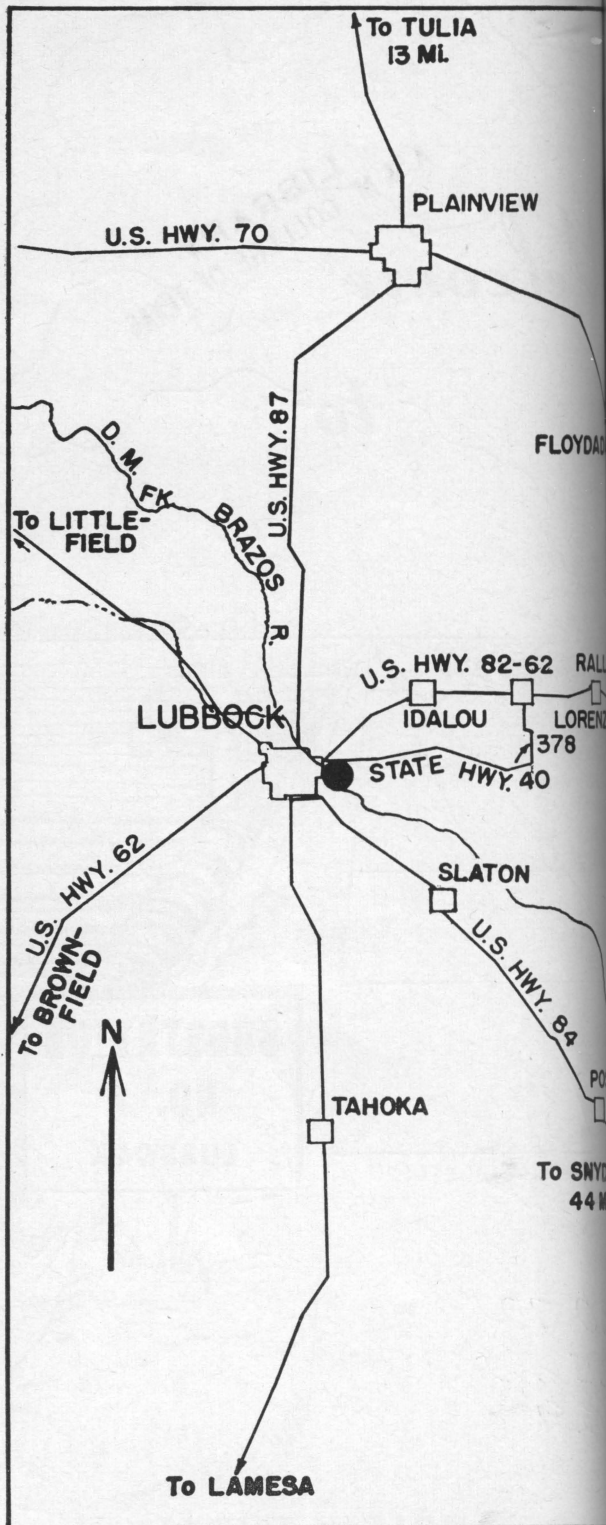
M.P. 129 MAY 1955

Welcome to



TEXAS AGRICULTURAL EXPERIMENT STATION


To TULIA
13 Mi.
PLAINVIEW
U.S. HWY. 70
U.S. HWY. 87
FLOYDADA
D. M. FK.
BRAZOS R.
To LITTLE-
FIELD
U.S. HWY. 82-62
IDALOU
LORENZO
378
LUBBOCK
STATE HWY. 40
SLATON
U.S. HWY. 62
To BROWN-
FIELD
U.S. HWY. 84
N
TAHOKA
To SNYDER
44 Mi.
To LAMESA

Welcome

to the

Texas Agricultural Experiment Station

Substation No. 8 — Lubbock, Texas

This station is located 3 miles northeast of the Lubbock county courthouse, at the junction of U.S. Highway 82-62 with Farm Road 40, in one of the major crop producing areas of Texas, the southern extension of the Texas High Plains.

Serving a comparatively new agricultural region, Substation No. 8 conducts research with emphasis on cotton and grain sorghum and closely related problems in irrigation and mechanization.

Substation No. 8 pioneered research and development of mechanical harvesting of cotton (stripper type), and the stormproof boll type cotton. Both are major contributions in the Lubbock area's current production of approximately 33 percent of the Texas and 10 percent of the U. S. cotton crop.

Cotton, the largest cash crop in the Lubbock area, produced an estimated income of $285,385,000 in 1954.

From early-day field trials, through selection and breeding, grain sorghum has been adapted to mechanical harvesting and the State's wide range of growing conditions.

This research also has been a big factor in Texas' production of over 60 percent of the nation's grain sorghum. On the Texas High Plains, sorghum holds a position similar to corn in the Midwest.

Irrigation from 38,000 to 45,000 water wells has made the High Plains the largest pump irrigated section in the world. Much research is underway to determine how to use water efficiently on different crops. In addition to projects on the station's 160 acres, tests are conducted on farms in nearby counties.

Elevation in the area ranges from 3,100 to 3,600 feet, with sudden temperature changes and a rather short growing season. Temperature extremes of 109 degrees to minus 17 degrees F. have been recorded. A 43-year average shows an annual precipitation of 18.44 inches, and a 40-year record gives an average growing season of 211 days. The average first killing frost in the fall is November 4, and the last killing frost in the spring is April 7. A 37-year record shows an average minimum temperature of 45.5 degrees, an average maximum temperature of 74.6 degrees and an average mean temperature of 60 degrees F.

Soils of the High Plains vary from fine sand to heavy clay. That on the station is largely of the Amarillo series.

Visitors are welcome. The station's address is Route 1, Lubbock, and the telephone number is Lubbock POrter 3-4542. Special field days are held when crops are at appropriate stages of growth.

Research projects in mechanization, irrigation and cotton insects are conducted in cooperation with the U. S. Department of Agriculture.

Donald L. Jones—*Superintendent*

Elmer B. Hudspeth, Jr.—*Agricultural Engineer (USDA-AERB)*

Robert E. Karper—*Agronomist*

Nicholas W. Kramer—*Associate Agronomist*

Harry C. Lane—*Assistant Plant Physiologist*

Willis L. Owen, Jr.—*Associate Entomologist*

Levon L. Ray—*Assistant Agronomist*

Earnest L. Thaxton—*Assistant Irrigation Engineer*

Agricultural Research Projects at Substation No. 8

AGRONOMY AND PLANT GENETICS

Cotton Breeding and Improvement

L. L. Ray and D. L. Jones

Development of varieties adapted to the area and to the stripper type mechanical harvester is the main objective. The earliest research and development of stormproof boll type cotton was done at Substation No. 8, and most experimental lines of cotton here are of the stormproof boll type.

Two stormproof boll varieties developed at the station—Stormmaster and C. A. 119—are widely planted in areas where mechanical strippers are used. Use of this type cotton with the mechanical stripper will save $20 to $30 per bale over hand harvest. Foundation seed are maintained and work continues toward improving the fiber quality and yield of these varieties.

Numerous lines of cotton are in various stages of development toward improved yield, plant type, earliness, lint percentage, fiber quality and disease resistance. Over 75 such lines are tested in replicated tests each year and several hundred are grown in progeny rows. Present emphasis is on the

Breeding and development of adapted varieties has changed cotton to a top income crop on the High Plains of Texas.

Stormproof cotton (top) stays on the stalk and yields as well as open boll type.

transference of tolerance of bacterial blight to adapted varieties. Foundation seed may be ready for release by 1957.

Several genetic studies must be made to conduct this breeding program properly. Intensive studies on date of blooming and period of boll maturity are yielding valuable information on heritable characteristics of cotton, including important fiber data.

Careful attention is given fiber quality, especially its strength and coarseness. Advances made to date indicate that lines with fiber superior to present varieties may be available for release in a few years. Also a 10 percent increase in oil content has been made by selection of high oil progenies in the Stormmaster variety.

Much attention is given to plant type. The C. A. 119 variety has very short fruiting limbs and fruits well off the ground, which makes it a good type plant for the mechanical stripper. Inheritance of the stormproof boll has been studied. Preliminary investi-

gations have been made in plant reaction to chemical defoliants. Male-sterility is being sought for possible use in making hybrids.

Evaluation of Cotton Varieties

L. L. Ray and D. L. Jones

Twenty-four established varieties of cotton are under both dryland and irrigation tests as part of the state-wide testing program. While yield is a major consideration in the choice of a variety, other important factors are involved. Essentially the cotton that fits the individual grower's practices is likely to return the most "take home pay." With mechanical harvesting (stripper type), a stormproof boll type should be used on the High Plains. Our tests show there are stormproof varieties which compare favorably in yield, lint percent, maturity and fiber quality with the open or normal boll types. Recommended stormproof types are: Western Stormproof, Lockett Stormproof 1, Macha, Stormmaster and C. A. 119. Eighty to 100 varieties and new strains are grown annually in the station's test.

Stormproof cotton and mechanical harvesters are a good combination.

Grass Seed Production and Adaptation Studies

E. L. Thaxton

This project is designed to determine the possibility of grass seed production under irrigation as an additional source of income. Dates and methods of planting, adapted species and harvesting methods are studied. Present results are not too encouraging for the use of grasses for a cash crop because of poor seed sets and difficulties in establishing and maintaining suitable stands.

Soybean Variety Test

E. L. Thaxton

Standard varieties and outstanding strains of soybeans selected from the breeding blocks are compared to provide information on yield, maturity, height and oil content. Ogden is now the highest yielding variety. Yields up to 30 bushels per acre may be expected under irrigation. At present soybeans are of little economic importance on the High Plains.

Special Crops—Castor Beans and Sesame

E. L. Thaxton

Varieties of castor beans and sesame are tested on different soil types for yield, oil content, quality and adaptation to mechanical harvesting.

Lack of mechanical harvesters and high water use result in a rather low net return and are two limiting factors at the present time.

Fertilizers for Cotton and Grain Sorghums

E. L. Thaxton

Responses in yield and quality of cotton and grain sorghum are studied with various rates of nitrogen, phosphorus and potassium applied in bands at the time the seed are planted. Part of the project includes a study of correlation between chemical composition and yields of plants grown in tests at Lubbock, Heckville, Aiken and Tulia.

No economic gain has been obtained in our tests from the application of fertilizers on cotton grown on the sandy loam or clay loam soils of the High Plains. The chief limiting factors at present are water and the short growing season.

The use of fertilizer to increase yields of grain sorghum is sound only when all other management practices — such as planting date, rate, variety and cultural methods — have been fully utilized. Usually two crops of 100 bushel-an-acre sorghum can be produced on the same location without the aid of commercial fertilizer. Then a 1 to 2 ratio of nitrogen and phosphorus is recommended on the sandy loam soils and nitrogen only on the clay loam soils.

At the present time there is only fair correlation of chemical soil tests and yield response to chemical fertilizers.

Influence of Cropping Systems on Yield, Soil Improvement and Soil Conservation

E. L. Thaxton

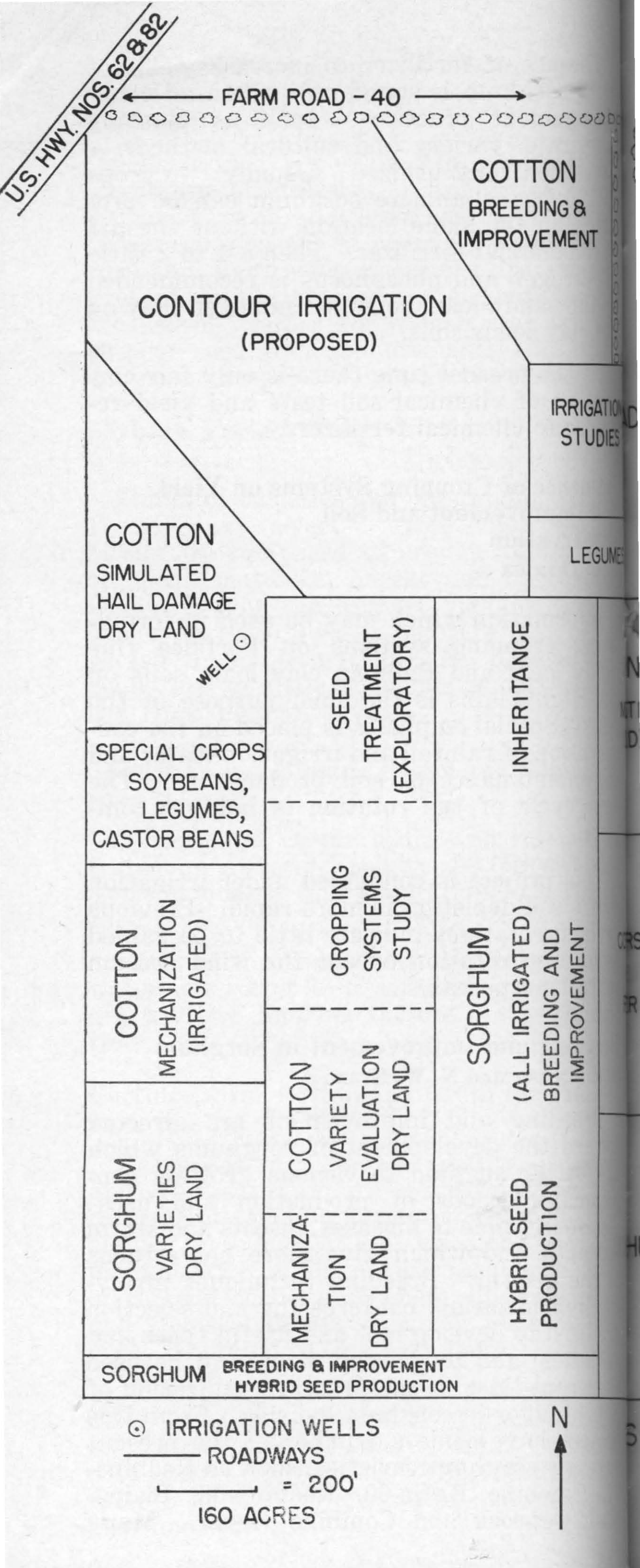
Information which may be used in formulating cropping systems on Portales fine sandy loam and Pullman clay loam soils on the High Plains is the chief purpose of the tests. Special emphasis is placed on the conservation of rainfall and irrigation water and the maintenance of soil productivity. The first cycle of the rotation is not yet complete.

This project is conducted under irrigation where soil depletion is more rapid. Previous dryland rotations indicate little to be gained from crop rotation except for wind erosion control purposes.

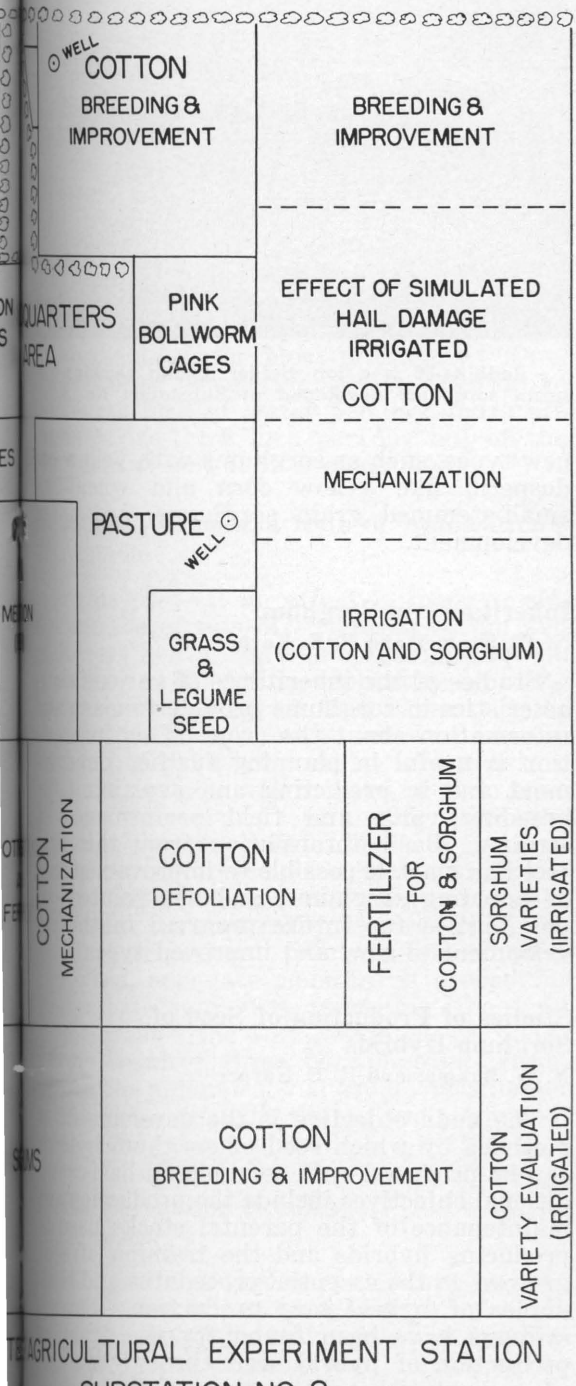
Breeding and Improvement in Sorghum

R. E. Karper and N. W. Kramer

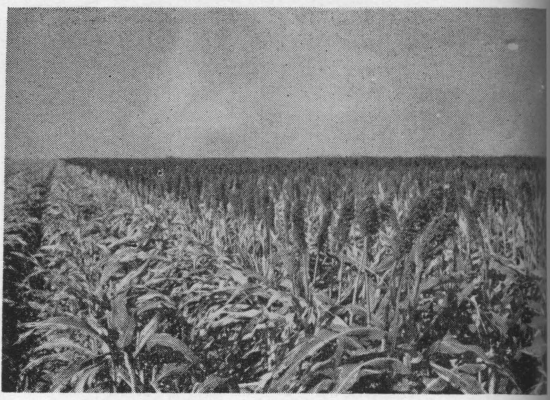
Breeding and improvement are directed toward the development of sorghums which are better adapted to various growing conditions, methods of production and uses; less susceptible to diseases, insects and storm damage; and which give more net returns to the grower. Breeding techniques involving hybridization, backcrossing and selection are used to develop new and useful types and varieties, and to develop strains to be used as parent lines in the practical utilization of hybrid vigor in sorghum hybrids. From this project have come a number of the present superior sorghum varieties, such as Redbine-60, Combine Kafir-60, Redbine-66, Plainsman, Caprock and Combine Hegari. Many



U.S. HWY. NOS. 62 & 82
FARM ROAD - 40
COTTON
BREEDING &
IMPROVEMENT
CONTOUR IRRIGATION
(PROPOSED)
IRRIGATION
STUDIES
LEGUMES
COTTON
SIMULATED
HAIL DAMAGE
DRY LAND
WELL
SEED
TREATMENT
(EXPLORATORY)
INHERITANCE
SPECIAL CROPS
SOYBEANS,
LEGUMES,
CASTOR BEANS
CROPPING
SYSTEMS
STUDY
COTTON
MECHANIZATION
(IRRIGATED)
SORGHUM
(ALL IRRIGATED)
BREEDING AND
IMPROVEMENT
COTTON
VARIETY
EVALUATION
DRY LAND
SORGHUM
VARIETIES
DRY LAND
MECHANIZATION
DRY LAND
HYBRID SEED
PRODUCTION
SORGHUM
BREEDING & IMPROVEMENT
HYBRID SEED PRODUCTION
IRRIGATION WELLS
ROADWAYS
= 200'
160 ACRES
N



AGRICULTURAL EXPERIMENT STATION
SUBSTATION NO. 8
LUBBOCK, TEXAS



Redbine-66 is a top yielder among combine-type grain sorghums developed at Substation No. 8.

new types, such as sorghums with yellow endosperm like yellow corn and wheat-like small-stemmed grain sorghums, are under development.

Inheritance in Sorghum

N. W. Kramer and R. E. Karper

Studies of the inheritance of various characteristics in sorghums provide fundamental information about the crop. This information is useful in planning further improvement and in predicting and explaining the breeding value and field performance of strains. Basic information from this project has made it possible to improve methods of breeding sorghums, and has pointed out possibilities for future progress in the development of new and improved types.

Studies of Production of Seed of Sorghum Hybrids

N. W. Kramer and R. E. Karper

The main objective is the development of methods by which seed of sorghum hybrids can be produced on a commercial basis. Additional objectives include the production and maintenance of the parental stocks used in producing hybrids and the training of seed growers in the essential procedures and techniques of hybrid seed production. Several systems have been found for the practical production of hybrid seed through the use of male-sterile seed parents. Tests show that yields of good hybrids are 25 to 40 percent greater than those of pure varieties of

similar adaptation. Seed production of hybrids was initiated in 1955.

IRRIGATION

Irrigation Water Management for Cotton and Grain Sorghum Production

E. L. Thaxton

Significant results have been obtained on the amounts of water used by cotton and grain sorghum and the level at which soil moisture should be maintained by irrigation to make the highest crop yields, and yet use the available water most efficiently. During the peak use period, cotton uses up to one-fourth inch of water per day and grain sorghum one-third inch per day out of the top 2 feet of soil, if it is available.

Irrigation: Time and Rate of Application

E. L. Thaxton

In this project, an effort is made to determine the effects of irrigating cotton and grain sorghum at various stages of growth. A uniform pre-planting application to bring the soil moisture up to field capacity is of prime importance. Cotton, indeterminate in its fruiting habit, can utilize soil moisture effectively over a wider range of time than sorghum. However, replenishing the moisture supply during middle July and the first half of August to coincide with the blooming and boll set period of cotton has proved profitable. This normally requires two post-planting irrigations. For maximum sorghum yield, adequate moisture is needed for the period from just preceding the boot stage through the soft dough stage. This usually requires three post-planting irrigations. The amount and adequacy of summer rainfall determine the timing and amount of post-planting irrigations.

Cotton Defoliation Studies

E. L. Thaxton

The tests are aimed at determining the chemicals and the rates and dates of application for defoliation of cotton in preparation for mechanical harvest. Until better chemicals are found, no blanket recommendation can be made on the use of defoliants for the High Plains.

Mechanization of Cotton Production, Harvesting and Processing

E. B. Hudspeth, Jr., L. L. Ray and E. L. Thaxton

These studies include all phases of cotton production with particular attention to planting methods and machines, weed control and certain phases of mechanical harvesting.

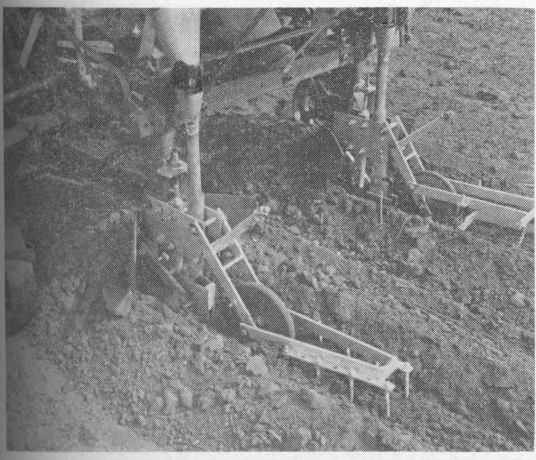
The project includes continuous studies of present-day farm and experimental implements which may reduce production costs. It is aimed at maintaining the Lubbock area's position as a low cost, profitable cotton production area.

Some of the mechanization problems and results of current studies are:

Crop Residue Management. The best preventive and control of soil blowing on cultivated land are keeping on the soil surface such natural materials as crops, crop residues or clods that resist soil movement. Studies are underway to compare different methods of seedbed preparation that will allow the crop residues to be left on the soil surface to aid in the control of wind erosion under both dryland and irrigation when cotton follows sorghum.

Planting. In the short growing season of the High Plains, failure to obtain and maintain a stand has proved costly. Significant procedures have been developed through studies of the proper depth of planting furrow, depth to cover seed, soil temperature, date and rate of planting, type of seed (fuzzy, machine or chemically delinted), as well as the planter equipment.

Planter equipment was modified at a cost of $10 to $29 per row. By using the modified equipment, a narrow-shielded seed furrow opener and a hollow rubber-tire press wheel to run over the seed before they were covered, farmers grossed $9 more an acre when the unit was used in irrigated cotton in 1953. The unit made possible a more shallow planting furrow and shallow covering of the seed, obtaining the objective of depositing the seed in warm, moist soil for germination. This procedure has proved extremely successful in eliminating replanting with the consequent loss of growing time and moisture.



The Hudspeth planting attachment developed at Substation No. 8 insures good stands of cotton and sorghum.

Plant Population Studies. Uniform stands of cotton averaging 40,000 plants per acre (4 or 5 inches apart) where no thinning is practiced, result in no loss of yield, grade or staple; suppress late season weed growth in the drill row; and increase the efficiency of machine harvesting. In stormproof cotton, machine harvesting is 94 to 95 percent efficient where plants are 12 inches apart, but 98 percent efficient where they are spaced 4 inches apart. There is a big reduction in stoppage of strippers because of large plants being pulled up in thin stands of cotton, and fewer stems are harvested in thick, uniform stands of cotton than in thin stands.

Field Storage of Burr Cotton. Tests show that storage of burr cotton on a well-drained and cleaned part of a field on the Texas High Plains is practical. Cotton stored in this manner should be dry and have a minimum of green bolls. Field storage could aid in eliminating congestion at the gin and will permit a farmer to have a smaller inventory of trailers.

Treatment Schedules for Control of Insects Attacking Cotton

W. L. Owen, Jr.

Studies are underway to determine the most economical schedule of insecticide applications for the control of cotton insects. Investigations are in two phases—early season for normal and early fruit set, and late season for boll protection. Major emphasis is on the time of application. Different insecticides also are compared.

Early season tests compare insecticide applications with infestations on plants in the pre-square and post-square stages of growth, with combinations of the two. Applications to different intensities of infestation show results which range from little differences in yields with low infestations, to more than one-half bale per acre gain because of the control of thrips and fleahoppers. Such insecticide applications hasten crop maturity, insure more satisfactory use of mechanical harvesters and produce cotton of better grade and stronger fiber.

Boll protection from comparatively light lygus bug and bollworm infestations may prove economical through improved grades. Control of heavy infestations shows gains of 120 to 480 pounds of lint per acre. Experiments show recommended insecticides of proper dosage are effective when applied at the proper time. They also show the interval between applications may be lengthened somewhat when dosages are increased slightly.

Interrelations and Control of Insects Attacking Legumes and Cotton

W. L. Owen, Jr.

Weekly records of injurious insect populations on legumes and cotton seek to determine if the use of legumes in cropping systems may result in added insect problems on cotton. The investigations also seek to determine the most economical control of injurious infestations on both legumes and cotton.

When the legumes are cut for hay at the proper time, little buildup in injurious insect populations occurs. If cutting is delayed un-

til heavy blooming takes place, or the legume is left to produce seed, heavy infestations may develop. Delayed cutting or seed harvesting may result in the migration of damaging infestations to cotton.

Lygus bugs and thrips are the most common insects involved. These insects are easily controlled with many of the organic insecticides now on the market. Control of infestations on legumes produce highly profitable increases in seed yields, and such control prevents migration to cotton.

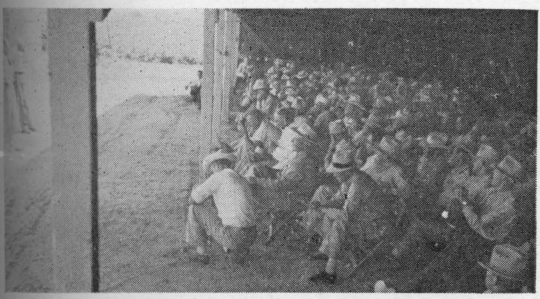
PLANT PHYSIOLOGY

Simulating Hail Damage to Cotton

H. C. Lane

Experiments are in progress to determine the effect on yield and fiber quality of injuries similar to hail injuries, such as the destruction of leaves, lateral and terminal buds, squares, flowers and bolls, stalk bruises and cutoffs. The injuries are made by hand to plants growing in the field. Yields and fiber analyses are used to measure results of the injuries.

Results indicate that hail injuries inflicted before July 1 in West Texas do not cause serious losses, providing a stand of plants remains alive. Hail falling after July 1 causes larger losses. Thus, there is a definite break in the time-loss curve.



High Plains farmers attend field day at Substation No. 8.

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, the U. S. Department of Agriculture, Texas Technological College and the King Ranch. Some experiments are conducted on farms and ranches and in rural homes.

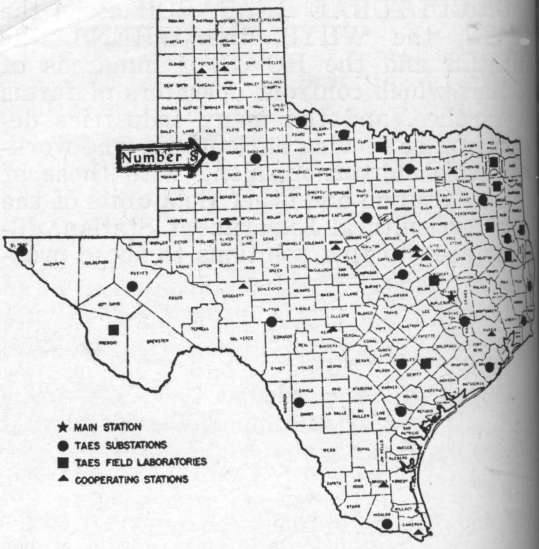
The Texas Agricultural Experiment Station is conducting about 350 active research projects, grouped in 25 programs which include all phases of agriculture in Texas.

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

Research pays--

It doesn't cost.--

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 cost 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.