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TEXAS AGRICULTURAL EXPERIMENT STATION-THE TEXAS A&M COLLEGE SYSTEM
R. D. Lewis, Director, College Station, Texas, June 15, 1950

SOME HISTORICAL HIGHLIGHTS OF THE TEXAS AGRICULTURAL EXPERIMENT STATION

Tad Moses, Editor

The main purpose of an agricultural experiment station is to study the problems which the farmer or ranchman cannot solve for himself. These then are the common problems of all agriculture as distinguished from the individual problems one can handle on his own acreage. In the early days, when new land was available for the taking, and the population of the State was small, it was relatively easy to evade certain obstacles, as for instance, the depletion of soil productivity, by bringing new land into cultivation. But, as the population increased, there grew up a demand for a more business-like method of dealing with agricultural problems.

The desirability of encouraging agricultural knowledge through aid from government was recognized early by some of our leaders. But it was not until the Morrill Act of 1862 that federal support was given to the establishment in each state of an institution to specialize in instruction in agriculture, engineering and military science. From the nucleus of these land-grant colleges also in time have come the two main supplementary fields -- agricultural research in 1887 through the Hatch Act and agricultural extension in 1914 through the Smith-Lever Act.

Provisions of the Morrill Act were accepted in 1866 by the Texas Legislature. The Agricultural and Mechanical College of Texas was established in 1871, and the next year was located at the present College Station in Brazos county.

Nine states had established agricultural experiment stations on their own by 1886, and a bill had been drawn to provide them with federal grants. Congress, on March 2, 1887, passed the Hatch Act which established the present system of state stations in connection with the land-grant colleges.

The Texas Legislature, on April 2, 1887, accepted the provisions of the Hatch Act. A subsequent bill designated the A&M College of Texas as the State's beneficiary. The board of directors of the College, on January 25, 1888, made the Station a division of the College. When the Texas A&M College System was created by its board of directors in 1948, the Station was made one of the parts thereof.

The purpose for which the Hatch Act was passed is shown in its Section 2, which is, in part:

"It shall be the object and duty of said Experiment Stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as furnished under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and water; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effect on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese, and such other researches and experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable. . ."

Early Research Projects

Actual work of the Station got underway in March 1888. Most of the first year was spent in getting ready. Shortly after a director was appointed, letters of inquiry were sent to many persons in different parts of the State, asking for suggestion about the work to be undertaken. Influential agricultural organizations were asked to send representatives to meet as an advisory body with the Station Council in outlining a plan of work.

After much deliberation, it was decided to take up the following subjects for investigation:

1. A study of the most practicable and economical method of feeding cattle for beef and for the dairy.

2. A study of the disease of the cotton plant known as cotton blight or root rot.

3. Testing varieties of fruit to ascertain which kinds are best adapted to the State, and help to designate the varieties by their proper names.

4. Testing grasses and forage plants, their adaptability to localities and their value for grazing and feeding.

5. Testing the effect of barnyard manure and commercial fertilizers for certain crops.

6. Testing the value of tile drainage for farm and garden crops.

7. Disinfection and inoculation of cattle to protect from Texas fever.

From these original 7 studies, the research investigations underway fanned out by 1950 into about 250 formal research projects and a large number of informal, short-time exploratory tests.

The staff the first year comprised 10 people besides the director, all of whom also had teaching assignments in the College. It had increased by only 1 member in 1898, to 16 in 1908, to about 75 in 1918, to about 100 in 1928 and to about 150 in 1938. The technical and clerical staffs now number nearly 400 men and women, including cooperative employees in teaching and extension and with the U. S. Department of Agriculture.

Field Units Established

Wide differences in climate, soil and other factors led to the establishment of field units over the State. The necessity for conducting research under a variety of conditions was an accepted fact in the mind of early Texas research leaders. Experiments have continued through the years at College Station, but as early as 1889 field tests were underway on the State Prison farms at Rusk, Huntsville and Harlem, on the farm of the then Prairie View Normal at Hempstead, and on the farm of the State Reform School at Gatesville. These locations are referred to in early publications as "branch stations." Tests also were underway at McGregor in 1890. Limited funds in 1891 forced the closing of all field work except that at McGregor.

Branch stations were recommended in both the 1890 and 1891 annual reports: "at least one station in the Black Waxy belt; one in the Wichita or Abilene country

wheat belt; one in the sugar belt, and one in the drier portion of West Texas for experiment under conditions requiring irrigation."

The term "substation" was first used in the annual report for 1893 to designate the location of field units. Funds were provided that year for the operation of three substations. Temporary substations were established at McKinney and Wichita Falls in 1893. Each lasted about 2 years. The first permanent substation was established in 1894 on 151 acres of land near Beeville.

Small grass and forage experimental units also were maintained in Texas during the early years by the U. S. Department of Agriculture. As is the policy now, the Station cooperated in these federal investigations. By 1900 such cooperative work was being done at San Antonio, Dallas, Abilene and Tyler. The USDA also cooperated in some of the projects at College Station.

After the Beeville station was established, there was constant pressure on the Texas Legislature to finance it adequately, and to establish substations in the other main geographical regions of Texas. "Until other stations are operated in several distinct sections, our work . . . must prove somewhat fragmentary and lacking in system and economy," it was argued in the annual report for 1899.

The passing years have witnessed the location of 44 agricultural experimental field units in Texas, 32 by the Texas Station, 11 by the U. S. Department of Agriculture and one by the Texas Technological College.

After a lapse of many years, the Station, in 1948, again encouraged on-the-farm type of research. This is being done particularly in Grayson county with the assistance of the Denton station, and from the Nacogdoches, Kirbyville and Tyler stations, the Vegetable Laboratory serving Milam and Robertson counties and the Titus County Dairy Laboratory. Citizens of these sections are well satisfied with the results of outlying research being done. Such a program was not so fruitful in the early years of the Station. For, states the 1900 annual report: "The early history of this Station with outlying experiments was a succession of failures in its efforts to conduct experimental investigations on land owned and controlled by others."

If only four reasons could be given for the success of outlying research as of now, whereas it formerly was a failure, the writer would list them as:

1. Ready means of transportation of personnel and equipment.

2. The "white-collar" men of science have proved themselves to farmers and ranchmen.

3. Farmers and ranchmen now are much more research-minded than they were 50 to 60 years ago.

4. Research now is much more thorough than it was prior to 1900.

In the order of establishment, the present 22 substations and 10 field laboratories now operating under the Texas Agricultural Experiment Station are:

Substations. Beeville, 1894; Tyler, 1902; Chillicothe, 1905; Angleton, 1909; Beaumont, 1909; Temple, 1909; Denton, 1909; Spur, 1909; Lubbock, 1909; Balmorhea, 1909; College Station, 1909; Nacogdoches, 1909; Sonora, 1916; Weslaco, 1923, Iowa Park, 1924; Winter Haven, 1929; Stephenville, 1940; Ysleta, 1942; Gonzales, 1946, Prairie View, 1947; Kirbyville, 1948; and Bluebonnet Farm, 1948.

Field Laboratories. Apiculture, College Station, 1922; Animal Disease, Marfa, 1930; East Texas Pasture, Lufkin, 1934; Tomato Diseases, Jacksonville, 1935; Plant Diseases, Yoakum, 1937; Sweet Potato, Gilmer, 1938; Fruit, Montague, 1938; Brazos River, College Station, 1940; Horticulture, Robertson and Milam counties, 1946; and Dairy, Mt. Pleasant, 1949.

Research at PanTech Farm near Amarillo is conducted cooperatively by Texas Technological College and the Texas Station.

There also are 11 field stations in Texas which are owned by the U. S. Department of Agriculture. The Texas Station cooperates in the research conducted at these locations. These field units are located near Big Spring, Greenville, College Station, Riesel, Amarillo, Encino, Brownsville, Waco, Brownfield, Kerrville and Brownwood.

These 43 field units occupy a total of 56,976 acres. Over half of this land is in the Bluebonnet and PanTech Farms, 17,483 and 16,000 acres, respectively.

Some of the TAES substations were originally established at other locations, but were moved to their present sites as better representatives of the soil and climatic conditions of the regions they were designed to serve.

Administration

The organization of the Station at first provided for a Station Council composed of the chairman of the faculty of the College, the agent of the board of directors and the director of the Station. This Council was abolished in 1890 and the immediate management of the Station, under the board of directors as the "governing board," was vested in the director.

From 1909 until 1913, control of the substations was under a board composed of the State governor, lieutenant governor and commissioner of agriculture. From 1913 until 1921, the Main Station was under the A&M College board of directors, but the substations were under a board of three "qualified voters" and the lieutenant governor.

Since 1921 the direction and control of both the Main Station and the field units have been under the A&M College board of directors through the director of the Station.

Directors

Dr. R. D. Lewis, the present incumbent, is the tenth director of Texas' agricultural research activities. He took office September 1, 1946, coming from Ohio State University where he had been head of the Department of Agronomy.

F. A. Gulley was the first director, and served 1888-90. George W. Curtis served 1890-92; J. H. Connell, 1892-1903; William D. Gibbs, 1903-04; John A. Craig, 1904-06.

Dr. H. H. Harrington was both president of the A&M College of Texas and director of the Station, 1906-08, and Station director alone, 1908-11. Vice Director J. H. Carson had much of the Station's administrative work during the period in which Dr. Harrington also was A&M's president.

Dr. B. Youngblood served as director, 1911-26, and A. B. Conner, 1926-44. Vice Director C. H. McDowell was acting director from January 1, 1945 until September 1, 1946.

Organization

The Station, under the supervision of a director and his administrative assistants, comprises the Main Station at College Station and the field locations previously cited. Sixteen subject-matter departments and three service groups form the functional units of the organization of the Main Station.

These departments are: Agricultural Economics and Sociology, Agricultural Engineering, Agronomy, Animal Husbandry, Biochemistry and Nutrition, Dairy Husbandry, Entomology, Floriculture and Landscape Architecture, Genetics, Horticulture, Plant Physiology and Pathology, Poultry Husbandry, Range and Forestry, Rural Home Research, Veterinary Medicine and Wildlife Management. Each department is administered by a head. Beginning in 1946, research in each department was coordinated with resident instruction and extension teaching in the Schools of Agriculture and Veterinary Medicine and the Texas Agricultural Extension Service.

The service groups are the Feed Control Service, State Chemist and State Entomologist.

Finances

The Hatch Act authorized the allocation to each state agricultural experiment station of a federal grant of $15,000 annually. The Station had no other funds until 1894 when $5,000 was appropriated by the State Legislature for maintenance of the Beeville and two temporary substations. Additional annual federal funds of $15,000 became available under the federal Adams Act of 1906.

The first sizable State appropriation was made for the 1909-10 fiscal year to equip and operate the expanded field-unit program. It was not until 1912 that the first State appropriation, $2,000, became available to the Main Station. Appropriations for both the Main Station and the field units increased steadily for several years.

Funds available to the Station in the fiscal year 1923-24 amounted to $324,000, being $30,000 federal funds under the Hatch and Adams Acts, and $294,000 State appropriation, of which $155,000 were for the field units and $139,000 for the Main Station.

Additional federal aid also came to the Station under the Purnell Act of 1925, the Bankhead-Jones Act of 1935 and the Research and Marketing Act of 1946.

The Research and Marketing Act of 1946 places great emphasis on cooperative research among the state stations and the U. S. Department of Agriculture, and requires that at least 20 percent of the funds appropriated thereunder be utilized in research on marketing of agricultural commodities.

Appropriations available to the Station for the current fiscal year, September 1, 1949 through August 31, 1950, amount to $1,678,766.79. Of this amount, federal appropriations account for $518,549.31 and State appropriations for $1,160,117.48.

Significant to the Station's operations for many years also have been the surplus funds of the Feed Control Service and the State Chemist. The Texas Legislature authorizes the Station to use these surpluses in the pursuance of its research programs.

A good deal of research at the field units has been financed through the sale of crops and livestock produced as by-products of research. Grants-in-aid by corporations and individuals to investigate specified problems also have become a significant factor in the overall research program and in the accompanying training of research workers.

Regulatory Services

The Texas Station is charged with certain regulatory services affecting the agricultural welfare of the State.

The Texas Feed Law became effective in 1905. As the Texas Station had made and continues to make studies of feeds, their composition and feeding value, and also is engaged in developing crops the products of which enter into the manufacture of feeds, the administration of this law was placed with the Feed Control Service of the Station.

Definitions of and chemical standards for special-purpose mixed feeds have been adopted, which assure the purchaser that such feeds are adapted to the purposes for which they are sold. Names, standards and definitions have been adopted after careful study and investigations.

The Texas Fertilizer Law was first enacted in 1899, revised in 1911 and codified in 1925. It was revised again in 1949. The State Chemist, operating through the Station, is charged with the administration of this law. The first bulletin relating to the Texas Fertilizer Law was published in May 1899, and similar bulletins have been issued annually since 1906.

Fertilizer control officials, fertilizer manufacturers and fertilizer technicians have met annually since 1925 for agreement upon a limited number of fertilizer grades to be sold within the State.

An Insecticide and Fungicide Law was passed by the Texas Legislature in 1943. The Commissioner of Agriculture at Austin is charged with the administration of the law and the State Chemist is charged with the analyses of certain specified samples of agricultural insecticides and fungicides. They are required to issue a joint annual report. The seventh such report was published in December 1949.

Apiary inspection work in Texas has been conducted by the State Entomologist attached to the Station since the passage by the State Legislature in 1913 of the so-called Foulbrood Law.

Contributions to Agricultural Knowledge

The Texas Station has good reason to be proud of its contribution to the store of agricultural knowledge. Some of its findings and new developments through the years are now commonplace practices by Texas farmers and ranchmen. These findings are used in the classrooms and have been given to the press and public in publications and articles.

At least five bulletins of "experiments and observations at the College" were printed in the early 1880's by the then Agricultural Department prior to the establishment of the Station. These are referred to in early records as the "old series" of bulletins. By numbers and titles, they covered: 1. "Preliminary Statements;" 2. "Pig Feeding; Tests of Age and Breed; Dairy Tests;" 3. "Effect of Salt in Pig Feeding; Notes on Grasses;" 4. "Acclimating Cattle (Texas Fever);" and 5. "Acclimating Cattle; Fertilizer Tests; Feeding Cooked vs. Uncooked Food for Cows and Hogs."

The Station has published 721 bulletins, 126 circulars, 56 miscellaneous publications, 1,253 progress reports, and innumerable articles have been written by staff members for farm magazines, scientific journals and daily and weekly newspapers.

Early Achievements

Results of the Station's study under the first seven projects undertaken resulted in every case in findings of inestimable value to Texas agriculture.

The first outstanding achievement of the Texas Station was the discovery of means of inoculating cattle to protect them against splenetic or tick (Texas) fever, in line with the seventh original study listed. This hastened by many years the now widespread production in Texas of purebred and grade beef and dairy cattle. Before this discovery, improved cattle brought into tick-infested areas from above the quarantine line, with few exceptions, died from this fever. Prior to the advent of systematic tick eradication on a zonal basis, beginning in 1919, hundreds upon hundreds of the best bulls in Texas at the time were brought to College Station for immunization against splenetic fever.

Continued progress has been made in developing better methods of feeding and balancing the rations of beef and dairy cattle, sheep, hogs and poultry, projects numbers 1 and 4. Accurate evaluations have been made chemically as well as through feeding trials of every important feeding stuff grown in Texas.

Texas beef cattle today bring good prices on the central markets as grass fat cattle, from cattlemen in other states as stockers and from Corn Belt operators as feeders. Texas cattle full-fed on Texas feeds have won many blue ribbons at the leading livestock expositions of the country. The present status of the cattle business in Texas represents progress due to results of these two original research projects.

A much more dismal picture regarding the quality of Texas cattle and the prices paid for them is portrayed in the annual report for 1888:

"More cattle are bred and shipped from Texas than from any other state in the Union, but a glance at the livestock market reports of Kansas City, St. Louis, Chicago and New York any day in the year almost, will show that the larger part of the Texas cattle sold in those cities command a low price per pound compared with the prices paid for beeves from the Central and Western States. The low valuation of the Texas cattle is due partly to their being inferior stock, but more especially to the poor condition in which the great bulk of these cattle are placed on the market."

Root rot is a disease of cotton that has cost cotton growers many millions of dollars each year. Its study was objective number 2. This study, in the third decade of the Station's life, yielded the definite information that the disease is the result of a fungus growth on the roots of the plant. Many other plants also were found to be susceptible to the disease. Later studies developed that this fungus

produces enlargements called sclerotia that will survive in the soil for several years without food, but the fungus itself must have for food the live roots of susceptible plants to survive for any great length of time. The fungus is known to attack more than 600 plant species, but it does not attack the grasses and grains and other monocotyledonous plants. Enough information has been assembled to enable the farmer to grow non-susceptible plants, or to follow rotations, including the sweetclovers, as the best known means of reducing the heretofore enormous losses caused by the root-rot disease.

Studies of tile drainage for farm and garden crops, project number 6, resulted in information by which farmers might drain their soils to advantage, or irrigate through systems of tile laid under the surface below plow-depth.

Studies with fertilizers, project number 5, pointed to the value of barnyard manure and of commercial fertilizers to increase crop yields and to improve the quality of the crops.

Studies with forage plants and grasses, project number 4, also have yielded great returns, particularly in the development of new and improved grain sorghums and Sudan grass. Since 1909 the Station has introduced and tested some 600 species of grasses and 270 legumes.

Many sections of Texas cannot compete in corn production with areas more favored with bounteous and seasonal rainfall, but Station-developed grain sorghums have equal feeding value with corn, and will produce large crops where corn usually fails. These sorghums and the windmill, more than any other factors, have made possible a diversified and dependable agriculture in West Texas, a region once designated on maps as part of "The Great American Desert." So widely are grain sorghums now grown that recently a large concern erected a $24,000,000 sorghum processing plant at Corpus Christi. The complete mechanization of the grain sorghum crop and the development of superior new varieties came from the application of genetic principles to the breeding of shorter but productive types that could be readily harvested by the combine.

The study with fruits, project number 3, resulted in early publications that gave valuable information as to varieties and means of propagation that were found adapted to the various sections of the State.

After 36 Years

A look back was taken in 1924 when in Circular 33, the Station summarized its accomplishments and endeavored to forecast the research needs of the near future.

Some of its better known accomplishments were listed as:

"Developed an experiment station system on a scale large enough to take care of the major agricultural problems of the State. This includes the establishment and operation of substations . . . so that the various problems of the several agricultural regions of the State might be studied . . .

"Developed the Texas Fever immunization process . . . This process revolutionized the cattle industry throughout the tick-infested regions of the world.

"Effectually administered the pure feed law of Texas, with the result that we have the highest quality of feeding stuffs of any state in the Union or country in the world . . .

"Developed and introduced the leading strains of grain sorghums now commonly grown in West Texas . . .

"Developed the fact that cotton is a drouth-resistant crop adapted to semi-humid and semi-arid conditions, with the result that a large territory in Northwest Texas, not infested by the boll weevil, has been brought into cotton growing.

"Introduced alfalfa into Northwest Texas.

"Introduced plants, including field crops, fruits, vegetables and ornamentals from practically every state in the Union and from foreign countries . . .

"Determined proper crop rotations and fertilizer practices for practically every section of the State.

"Determined, by digestive experiments, the feeding values of the principal feeding stuffs grown in Texas.

"Made, in cooperation with the Bureau of Soils of the U. S. Department of Agriculture, detailed soil surveys of 57 counties and areas, and reconnaissance soil surveys of 134 counties in the State.

"Determined the cause of pink root of onions, a disease which has caused serious losses to onion growers of the State, and developed methods for its control.

"Developed scientific studies of ranching in West Texas which tend to put the industry on a new basis of efficiency.

"Established and operated a wool and mohair scouring and grading plant, which has been of vast service to the Angora goat and sheep industries of Texas, by enabling the growers to perfect their breeding and to secure better prices for their wool and mohair."

Other examples, mentioned in Circular 33, of the services rendered Texas agriculture by the Station, include "the improvement of wool and mohair production in flocks of sheep and Angora goats based upon studies of the weights of fleeces and other hereditary characters in relation to environment; identifying one cause of the spread and developing measures for the control of cotton root rot . . . Still more examples are the development of principles relating to the differences in ability to germinate of different lots of cotton seed, under unfavorable conditions, and tending toward the ultimate development of hardier strains possessing unusual seedling vigor for use under the erratic climatic conditions so common in the State . . .

"Service to farmers and to agriculture in general by the dissemination of newly introduced or newly developed strains of plants and animals are numerous. Specific examples of service of this nature are the introduction into Texas in 1909 of Sudan grass, the value of the crop of which in the United States now amounts to fifteen million dollars; the introduction in 1909 of feterita, a crop which has been a valuable addition to the grain sorghums, the annual yield of which in Texas now amounts to more than forty million bushels; the development and distribution of Spur feterita in 1918, a superior selection of feterita which has now practically replaced the common strains in Texas; the development of the Nessberry, a valuable hybrid of dewberry and raspberry; the development of an unusually high-yielding peanut at Nacogdoches; the introduction and propagation of the Chinese elm which has proved to be a valuable tree for a large portion of the State; the introduction and propagation of the Arizona cypress, a valuable tree for West and Northwest Texas; the development

of a pedigreed strain of White Leghorn chickens based upon the actual results of high egg production; the distribution of pedigreed queen bees, and numerous other cases that might be mentioned."

Forerunner of the Soil Conservation Service

Some work on water conservation and erosion control by means of terraces was started at the Spur station in 1925. Within a year or two, the results of this work changed the ideas of scientists as to the benefits occurring in the western Cotton Belt from terracing the land and saving precious water. This work also developed startling information as to the soil losses taking place. Coupled with previous supplemental work that had gone on for a long time, these discoveries led to the formation of the present Soil Conservation Service of the U. S. Department of Agriculture.

The 62nd Year

Following are brief extracts from the annual report of the Station to the Texas A&M College System board of directors, through the System chancellor, highlighting activities and accomplishments during the 1948-49 fiscal year:

"At least one agricultural research center was operated in every major type-of-farming area in Texas.

"Bluebonnet Farm, the 17,000-acre agricultural research center at McGregor, became a going concern this year with projects in hereditable rate of gain in beef cattle, cross-breeding, sheep and goat breed improvements, mechanized harvesting, grain storage, insect control, oil seed crops and wool testing underway. Seed plots for the increase of newly developed seed types bred by the Station were also in operation. The size, location and soil variety scope of Bluebonnet Farm makes possible agricultural research on a more effective scale.

"A significant development in agricultural research was the selection of the Station as the cotton genetics research center for the South. Basic studies in cotton genetics necessary to the breeding of better American upland cottons were started. Primitive cottons from South and Central America have been collected and are being raised in our greenhouses for crossbreeding with modern upland strains. Studies designed to enable plant breeders to develop cotton to specifications with the same mathematical precision they now produce new grain sorghums and corn hybrids are underway.

"The Station last year received 12 gifts of needed materials, 17 cash grants-in-aid totaling $23,591.23, and the loan or gift of 33 purebred cattle for use in the beef and dairy cattle breeding projects.

"Field days were held at many of the research locations to acquaint farmers, ranchmen, teachers and other agricultural representatives with the objective and status of research in progress. Practically all of the research staff participated during the year in one or more short courses or other programs designed for the benefit of Texas agricultural people.

"One of the far-reaching meetings of agricultural workers last year was the cotton mechanization conference held in Lubbock and at the Lubbock station in October 1948. This belt-wide meeting was in itself a recognition of outstanding performance by Station personnel in developing mechanical strippers and other implements.

"The Station continued seeking new varieties, strains and hybrids of field and horticultural crops that will give higher yields or that are more resistant to insects, diseases and weather damage. Examples of such superior crops released for seed increase during the year are the new corn hybrids, Texas 26 and Texas 28, Quanah wheat and Mustang oats.

"A breeding project to develop a type of dairy cattle better adapted to the climate of Texas was started. Part of a South-wide research program, the Texas phase is to determine if and how the heat tolerance, insect resistance and better foraging ability of Brahman cattle may be introduced into our present dairy breeds.

"Research on range pastures was greatly expanded, particularly in the eradication and control of noxious brush and poisonous plants and in controlled grazing. Significant progress was made on methods for controlling soil losses by wind on the hard lands of the Panhandle and sandy lands of the South Plains. Studies were intensified on developing good drainage systems in the flat Coastal areas, and on irrigation in the Lower Rio Grande Valley and on the High Plains.

"Serious invasion of South Texas ranges by the Rhodes grass scale is being combatted by projects underway at the Weslaco and Winter Haven stations and on the King Ranch. A parasite imported to combat this scale has been successfully reared and its effects on the scale are now being tested.

"Development of mobile research units to conduct studies on a larger variety of lands under different conditions was a major step. Such units are now in operation in Grayson county, Nacogdoches county and in several counties centering around the Kirbyville station.

"Results of an experiment conducted at the Balmorhea station during the last 7 years indicate the possibility of significant improvement in beef cattle by proper testing and breeding procedures. This experiment is the first of its kind with beef cattle. Carcass types and the ability to make rapid gains were found to be highly heritable in the 800 young beef bulls handled in feeding periods averaging 130 days. Up to one pound difference in average daily gains was found between sire groups, and greater differences existed among individual animals. By mating high-gaining females, it is possible to produce a strain of beef cattle in which the rate of gain is well above that of unselected sires and dams.

"The evaluation of present and prospective herd bulls at Balmorhea is being followed closely by livestock breeders and scientists throughout the country. Because of its value to far West Texas cattlemen, this service is to be started this fall at Bluebonnet Farm to make it available to cattlemen in the central and eastern parts of the State.

"A similar project with sheep was initiated in 1948 at the Sonora station. Already significant results have been obtained. The experiment is designed to identify prospective sires that respond best to feed as reflected in body gain and wool production.

"A series of systematic experiments was initiated on the five principal soil types used in rice production. They have dealt with amounts and proportions of nitrogen, phosphorus and potassium, time and method of application, sources of nitrogen, condition of the soil at the time of application and other factors. Much of this work is being done on farms of cooperating owners. These experiments have given a significant increase in yield and net profits. The yield increases for the best treatments averaged four to six barrels of rice per acre on different soil types.

Practices based upon experimental results are being widely adopted by rice growers of the region.

"The Station, in cooperation with the U. S. Bureau of Entomology and Plant Quarantine, established a basic research laboratory at College Station to study the control of all pests attacking cotton. During its first year of operation, more than 400 new insecticides and insecticidal combinations have been tested. At least 50 appear promising for the control of one or more pests.

"Experiments have been conducted on timeliness of applications for seasonal control of cotton insects. When rainfall is normal, tests have proved that it is more profitable to control insects during the maximum fruiting periods of the plant rather than throughout the entire season. In very dry years, it has been found that control measures early in the season prove more profitable, especially on large acreages.

"Investigations concerning insects attacking both legumes and cotton showed that when the insects were controlled in legume seed crops, the yield was increased, and at the same time losses as high as 30 percent were prevented in adjacent cotton. When no control measures were applied, the injurious insects of legumes transferred to cotton and other crops and caused severe damage. Results of these field tests indicate that the new organic insecticides, when applied properly, will eliminate at least 90 percent of the existing insect damage done to cotton."

Cooperation from Other Agencies

Many of the research accomplishments mentioned have been carried out in cooperation with representatives of various bureaus of the U. S. Department of Agriculture and other agencies of the Federal Government. Other work has been done with the cooperation of the Extension Service and the School of Agriculture of the Agricultural and Mechanical College of Texas, on grants of funds from private business and associations, and in the field with the assistance of individual ranchmen and farmers.

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