

OFF CAMPUS RESEARCH 1887 - 1964



AGRICULTURAL EXPERIMENT STATION
KANSAS STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE • MANHATTAN

THE AUTHOR

If he doesn't see another job that needs to be done, this is the last in a series of publications by Dean Emeritus Leland E. Call.



DEAN LELAND E. CALL

Dean Call has been in emeritus status 19 years, which means he gets paid the same for fishing as for working. The last few years he has written several bulletins¹ for Kansas State University dealing with research before the

Hatch Act (he knew people who had been here then), at the various branch stations, and now this one on off-campus research.

There's no risk involved in saying that no living person knows so much about the subject matter of these publications as Dean Call. There's little risk involved in saying no one ever knew so much about the subject of Dean Call's publications.

One of the reasons is his over 58 years with Kansas State University; another is a mind as alert and searching as when he came to K-State. Perhaps more important, though you can't tell it by reading his bulletins, is that he made and helped make many decisions that led to the research he writes about.

Dean Call has served K-State in teaching, research and administration while advancing from assistant in agronomy in 1907 to Dean of Agriculture and Director of the Agricultural Experiment Station from 1925 to 1946, when he "retired" with the rank of Dean Emeritus.

He received the Bachelor of Science in Agriculture in 1906 at Ohio State University and Master of Science in Agriculture in 1912. After World War I, he served in the Army

1. Agricultural Research at Kansas State Agricultural College (KSU) Before Enactment of the Hatch Act (1887)—Bulletin 441.

A History of the Fort Hays, Kansas, Branch Experiment Station, 1901-1962—Bulletin 453.

50 Years of Research at the Colby Branch Agricultural Experiment Station—Bulletin 468.

First 15 Years of Research at the Mound Valley (Kansas) Branch Agricultural Experiment Station, 1949-1964—Bulletin 476.

A History of the Tribune, Kansas, Branch Experiment Station, 1911-1964—Bulletin 477.

Off-Campus Research by the Kansas Agricultural Experiment Station, 1887 to 1964—Bulletin 484. August 1965.

Educational Corps in France where he was in charge of farm crop instructional work at the University for the American Expeditionary Forces at Beaune, France.

Dean Call was on the Board of Directors of the Farm Credit Administration of Wichita from 1932 to 1942 and was on leave of absence as President of the Federal Land Bank of Wichita during 1934. That year the bank made more loans to the farmers of the Ninth Federal Land Bank District than at any equal period in its history.

Dean Call headed an agricultural mission to the Philippines May 14, 1946, for the United States Department of Agriculture. The mission was to assist the Department of Agriculture of the Philippine Islands develop an agricultural program for the war-torn islands. He returned from the mission in the fall of 1946.

In 1949 he was appointed Fulbright Visiting Professor in Agriculture at Silliman University, the Philippines, where he helped organize an agricultural program of instruction, research and extension.

The United States Government in the fall of 1951 asked Dean Call to return to the Philippines to assist with rehabilitation of the College of Agriculture of the University of the Philippines and to help organize agricultural research. He continued as Agricultural Research Advisor to the U. S. Overseas Mission in the Philippines until early in 1956 when he returned home via Indonesia, Australia, New Zealand, Fiji and Hawaii. He was accompanied by Mrs. Call on both the Silliman University and the U. S. Mission assignments.

In the summer of 1957 he spent three months in Iran as consultant with the International Cooperative Administration, as advisor to the College of Agriculture of the University of Tehran at Karaj.

Both in the Philippines and at Kansas State University, those who knew Dean Call best say his greatest genius was as a "developer of men."

How did he do it? He says it was simple. He gave them responsibility and let them know he was depending on them. —Lowell Brandner, Editor.

Acknowledgments

Valuable assistance was furnished by Dean and Director Emeritus R. I. Throckmorton. His suggestions and work on the section on experiment fields were particularly appreciated.

**OFF-CAMPUS RESEARCH
BY THE KANSAS AGRICULTURAL
EXPERIMENT STATION, 1887 to 1964**

by

LELAND E. CALL

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Off-Campus Research by the Kansas Agricultural Experiment Station, 1887 to 1964¹

by

Leland E. Call²

The Kansas Agricultural Experiment Station was organized as a department of Kansas State Agricultural College in 1887. It was authorized by the United States Congress to acquire and diffuse "useful and practical information on subjects connected with agriculture." It was supported financially at the beginning principally by a Federal appropriation of \$15,000 a year authorized under the Hatch Act. Early work of the Kansas Station was limited principally, due to lack of funds, to that that could be done on the campus and farms of the college at Manhattan. The value of the work received early recognition throughout the state. It was felt, however, much of the work, especially that with farm crops and horticultural plants, while applying to conditions in the Manhattan vicinity, did not apply so well to conditions in other sections of the state. Farmers in other parts of Kansas, especially western Kansas, wanted results of experimental work that would apply to their conditions.

Only two years after the station was established the editor of *Kansas Farmer*

magazine wrote as follows: "A friend sends a copy of a letter he addressed to Governor Humphrey suggesting a system of farm experiments in different parts of the State conducted by intelligent farmers under the direction of the State Agricultural College or the State Board of Agriculture. The suggestions are good, very good, but the Governor has no use for them, and the Legislature would no more think of appropriating \$10,000 for such a purpose than it would of passing the bill prohibiting the issuance of free railroad passes. The most niggardly appropriations are those for the benefit of agriculture" (1).

Two years later (1891) a bill was introduced into the Kansas Legislature authorizing establishment of an experimental farm in southern Kansas (2). The bill did not pass; however, the first record of experimental work conducted by the Station off campus was in 1891. It was a study of adaptability of sugar beets to Kansas conditions. The Fourth Annual Report of the Station stated: "Eighteen plots of sugar beets were grown on the Station grounds

1. Contribution No. 115, Office of the Dean, Agricultural Research, Teaching, and Extension, and Director, Agricultural Experiment Station, Manhattan.

2. Dean of the College of Agriculture Emeritus and Director of the Agricultural Experiment Station Emeritus.

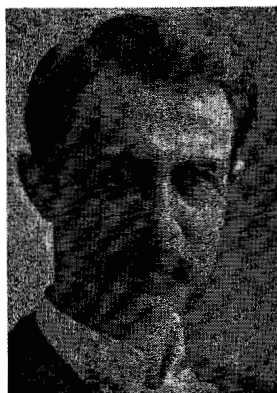


Fig. 1.—Dr. J. T. Willard, Station Chemist, and later Director of the Agricultural Experiment Station, under whose direction the first off-campus research was conducted in 1891. It consisted of cooperation with 360 farmers and gardeners in 56 counties to determine "how the state is adapted for sugar beet culture."

from seed of good strains. And 360 farmers and gardeners of the state in 56 counties grew beets for us, the object being to learn how the state is adapted for sugar beet culture" (3).

DEMAND FOR EXPERIMENTAL WORK APPLICABLE TOWESTERN KANSAS

Due no doubt in part to unfavorable weather for crops in the early 1890's, demands for experimental work more applicable to western Kansas continued. Wheat had failed. Railroads were providing free shipment of seed wheat to western Kansas. Farmers were interested in irrigation. A State Irrigation Association of farmers had been organized to promote irrigation, especially from deep wells. Reli-

able information, particularly applicable to those conditions, was urgently needed.

The Station had demonstrated its ability to secure facts useful to agriculture. It had won the confidence of the people. Demand for extension of the work was not surprising.

A State Board of Agriculture resolution was commented on as follows in an editorial in *Kansas Farmer* in 1893: "There have been frequent demands for the establishment of experiment stations in various parts of the State, and particularly in western counties. It is claimed and it is true that the conditions of agriculture, even in the central counties, are so different from those at Manhattan that methods which give good results at the college experiment station are entirely inapplicable over a large portion of the State. At the late meeting of the State Board of Agriculture a resolution was adopted asking that one or more substations of the State Experiment Station be established in western Kansas. . . . There is nothing to prevent the college from taking up any investigation in any part of the State and testing experimentally any question that is worthy of the necessary expenditures. This has been done as to sugar beets. . . . No doubt the money at the college available for experimental work is inadequate to the great amount that needs to be done. But if the Legislature desires to make other

and further provision for substation work, it may well place at the disposal of the college Station such amounts as is deemed necessary for this work" (4).

IRRIGATION EXPERIMENTS AT GARDEN CITY

The need to investigate problems of western Kansas, especially those pertaining to irrigation, appeared so urgent to the Board of Regents that it was decided, perhaps hastily and unwisely, to proceed with the work without awaiting legislative action to provide funds.

Action by the Regents apparently also lacked advance approval of the Station Council. The first reference to the matter appears in Board minutes for January 24, 1894: "Mr. W. R. Hopkins of Garden

City, by invitation, laid before the Board suggestions as to the desirability and feasibility of experiments in irrigation at Garden City" (5).

The Board passed two resolutions: First, "Upon motion by Regent Stratford, it was voted that the Experiment Station undertake experiments in irrigation at some point in western Kansas as recommended by the resolution of the State Board of Agriculture at its last meeting" (5).

Second, "Regent Secrest moved that a Committee of Three, one member of the Board and two members of the Station Council, be appointed to visit western Kansas and select the place for undertaking such experiments" (5).

The next day (January 25) further action was taken by the Board as follows: "The motion of Regent Secrest as to the location of the irrigation experiments being called up, was withdrawn and Regent Kelley moved that we undertake such experiments at once in Finney County and Decatur County. The motion carried. Upon motion by Regent Stratford, it was voted that Regent Street be appointed to select the place for the experiment in Decatur County and Regent Kelley, to select the place in Finney County, being authorized to contract for and execute a lease for the premises selected. Upon motion by Regent Wheeler, the estimates of the Station Council for expenses for the current quarter were approved, \$600 being



Fig. 2.—W. R. Hopkins, Garden City, Representative from Finney County in the Kansas Legislature 1891-1897, who "by invitation laid before the Board of Regents suggestions as to the desirability and feasibility of experiments in irrigation at Garden City."

asked for irrigation experiments" (6).

The next reference to the matter appears in Board of Regents minutes of April 6, 1894, as follows: "Regent Kelley presented the following report upon the location of experiments under irrigation at Garden City which, upon motion by Regent Stratford, was adopted in a form of a letter dated,* 'After looking over and considering the various locations offered, in my judgment the one suggested north of town and owned by the groceryman, Mr. Dunn, with a good reservoir already constructed and on high land, all things considered, was the best for our purpose and I accordingly leased ten acres of him, including reservoir and residence for ten years or less, at our option. We can abandon it any time sooner, if we get through with it. The house

* Date omitted in regents' minutes.

is suitable for occupancy for a man and small family. We will have to put in a pump and windmill. . . . Water there will be about 30 feet below the surface. Ground is in excellent state of cultivation. The supply of water and practicability of raising it for irrigating purposes is no longer an experiment there on the lower grounds; it is well demonstrated. While I think the ground on which this is located is 40 feet higher than the lower grounds, it seems that water can be reached by going only 15 feet deeper. Mr. Hopkins was to put the contract lease on record and mail the same to me but as yet I have not secured it. I will forward it as soon as it reaches me. That will end my individual connection with the matter. I believe the enterprise a feasible one and entirely practicable and the possibilities there immense. The water is underneath with

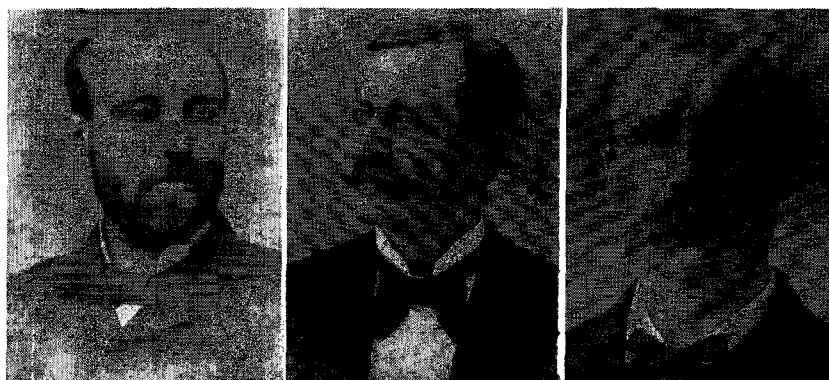


Fig. 3.—Members of a committee on irrigation of the Experiment Station Council who were "invited before the board for expression of their judgment as to such experiments." (left) G. H. Failyer, Professor of Chemistry; (center) E. A. Popenoe, Professor of Horticulture and Entomology; and (right) C. C. Georgeson, Professor of Agriculture.

an excellent soil on top. If the water can be put on top with an expense so small that it will not absorb the profit of cultivation, western Kansas will someday be the best part of the state.'

"Professor Failyer was called before the Board for a statement of plans in regard to a pump and windmill for the experiments at Garden City. Upon motion by Regent Stratford, it was voted that the Station Council be authorized to select and purchase the pump and windmill and necessary connections for the experiment at Garden City.

"Professors Failyer, Popehoe and Georgeson, the committee of the Council, upon experiments under irrigation, were invited before the Board for expression of their judgment as to such experiments. Upon motion by Regent Kelley it was voted that \$1,000 be allowed for assistance in the Garden City experiments" (7).

Apparently an expression of the Council relative to its judgement as to the value of such experimental work was not asked until after arrangements had been made for the work both at Garden City and in Decatur County.

IRRIGATION EXPERIMENTS AT OBERLIN, DECATUR COUNTY

Regent Street, who was appointed to locate experiments in Decatur County, reported as recorded in the Minutes of the Board of April 6, 1894, as

follows: "Regent Street as committee to locate irrigation experiments in Decatur County, made the following report which upon motion by Regent Hoffman was received and filed. 'I desire to make the following report relative to the location of an irrigation experiment in Decatur County. I have secured a tract of ten acres of fine land in good state of cultivation, located about one and one-half miles west of the business portion of the city. The same is plowed and fenced on the north and east. The depth of water is estimated at 65 to 70 feet. The land is owned by J. J. Folts, a prominent business man in the city of Oberlin, who will take a lease of the land at once. I consider this a very desirable location" (8). Following this report the Regents took the following action: "Resolved that the Board of Regents suggest to the Station Council that Regent Street be authorized to supervise the erection of a pump and windmill for the use of the experiment station to be located in Decatur County and that the appropriation of money (\$300) be subject to his order for this purpose and that when the water is in the reservoir ready for use on the soil, the Station Council take charge and control the same" (9).

The Board of Regents in their report for the biennium 1893-1894 reported as follows regarding the irrigation experiments: "The Station has recently, at the earnest re-

quest of interested persons in the western part of the state, undertaken experiments in irrigation. The limited means at the disposal of the Board made it necessary to confine these experiments in extent and locality. Two plants have been secured for trial of irrigation from wells by wind power, with design to cover all questions of water supply, adjusting to various crops, and effect of various modes of tillage and handling in connection with a study of climatic conditions. One of these at Garden City is in operation, with F. W. Dunn in charge of experiments, under the direction of the station council. A report of details will be given in the Annual Report of the station. The other at Oberlin is being put into shape for early operation next year. Both are under lease to the Board of Regents for ten years, if desired, the permanent improvements to revert with the land to the owners at the expiration of the lease. It seems very important that these experiments should be made as conclusive as possible, and the state may well devote means to these special investigations, as other states have done in similar cases, for more immediate results than can be gained by diverting a fair share of the annual fund of \$15,000 from line of experiments already undertaken requiring a long series of years to complete. The Board asks for the next two years \$5,000 for this work" (10).

The Board did not obtain

the \$5,000 requested of the Legislature for irrigation experiments and the 1895 Station report indicates that it was with much difficulty that the work started at Garden City and Oberlin was conducted during the year:

"Garden City—The report of 1894 details the plan for experiments upon a ten-acre plat leased for the purpose. The experiments have been carried forward during the past season with limited results. The well still gives trouble, in spite of various devices, from the presence of fine sand in the water-bearing stratum. The reservoir has been thoroughly reconstructed and puddled to prevent seepage and a full line of annual crops planned for has been cultivated. . . .

"Mr. F. W. Dunn, assistant in irrigation, has faithfully done the work assigned him, in caring for the crops and maintaining records of observations, but the expense of the work in comparison with the meagerness of results at present has made it seem unwise that he should be retained for another year. He has, in accord with the action of the Board, been relieved from duty after December 31, 1895.

"Oberlin — On account of lack of funds, little has been done at Oberlin. Efforts have been made to complete the well with only partial success, on account of lack of facilities. The reservoir has been completely ready for use when the water supply is secured. All has been under di-

rection of Hon. W. D. Street, President of the Board of Regents.

"What should be the future of these experiments is a problem worthy of further study by the Board. The expenditures, even when limited to the least possible, make a serious draft upon the Station fund given by Congress for the maintenance of a central station, where accurate and continuous work can be done. A few substations can easily dissipate the fund and give but crude results. The State Legislature at its last session, not only refused the aid asked for such special experiments, but in the act for promotion of irrigation prohibited all expenditure for experiments in agricultural irrigation. The Department of Agriculture of the United States earnestly urges the concentration of funds and energy upon the

work of central stations in every state. The repute of the Kansas Station, so excellent already, is likely to suffer in the multiplication of separate undertakings, remote from direct oversight of the Council and the Board. The public demand, so far, is rather for proof that water can be raised for garden irrigation than for full and accurate tests of irrigation methods and results. The former is provided for by the State Board of Irrigation" (11).

The conditions set forth in the Eighth Annual Report of the Station for 1895 discussed above resulted in the following action by the Regents (February 7, 1896): "Regent Daughters moved that the settlement of the Garden City matters be left to the judgment of the secretary (President Fairchild) with authority, after a visit to the place, to lease for experiments under the direction of the Council, or to give up to the owner of the land upon such terms as can be secured. Motion carried" (12).

FACTORS CONTRIBUTING TO FAILURE OF IRRIGATION EXPERIMENTS

The visit to Garden City was made as directed and the minutes of the meeting of the Board of April 1, 1896, contain the following: "The secretary reported that, as directed, he had visited the irrigation plant at Garden City and found the following circumstances to have interfered with successful management



Fig. 4.—President George T. Fairchild. President Fairchild in 1896 acting as Secretary of the Board of Regents, and at the direction of the board, visited the Garden City Irrigation Station and recommended its termination.

of the place: First, the location was unsatisfactory to the majority of the people interested; second, the owner of the land was anxious to secure the advantage to be gained at an early discharge of the lease; third, the near-neighborhood of an interested farmer with large flocks of turkeys, constantly intruding; fourth, the disposition of the people to care only for showy results rather than careful experiments; and fifth, local complications leading to disagreements. He had offered the place rent free with tools and seed to anyone who would agree to experiment in a series of crops deemed most likely to be profitable, and had found no one willing to take the place for less than \$30 a month and the produce. He had, therefore, given his decision in favor of discharging the lease and returning the place to the owner upon withdrawal of the injunction suit pending free of cost to the Board. The business had been transacted by Professor Mason and papers were presented showing the completion of the matter.

"On motion by Regent Daughters, the action of the secretary and Professor Mason as agents of the Board was ratified. Upon motion of Regent Hoffman, all experiments at Garden City are discontinued" (13).

While the work at Garden City was terminated at this time, the work at Oberlin was continued as indicated by Board action February 7, 1896:

"Upon motion by Regent Daughters, the Council was instructed to complete the well at Oberlin, erect a windmill and proceed with experiments" (14).

The Ninth Annual Report of the Station for 1896 contains the following information regarding the work at this irrigation field for the year.

"Oberlin—At this place a further attempt to secure a satisfactory supply of water was made early in the year. Under direction of Hon. W. D. Street, then a regent of the College, an excellent windmill was erected and some effort was made to enlarge the well to meet the power thus provided; but no adequate results were obtained. It seems that the Regents should take the contemplated action of withdrawing from its lease also" (15).

COOPERATION WITH STATE BOARD OF IRRIGATION

There had been established by legislative authority a State Board of Irrigation to promote irrigation in the state and to conduct demonstrations. At a meeting of the Board of Regents April 3, 1896, representatives of the State Board of Irrigation were invited to attend. The following minutes contain information relative to these meetings and of action taken: "Hon. W. B. Sutton and M. B. Tomlin of the State Board of Irrigation were invited to present the work of that Board. Hon.

W. B. Sutton, secretary, stated the progress made in establishing pumping stations and proposed, if the Board will put a competent man in charge, to make observations and records, to furnish the experiment station a plat of 52 acres at Oakley equipped with well, reservoir, and gasoline engine and will keep the same in fuel and repair for the year" (16).

At the second meeting the same day another resolution was adopted: "Mr. Tomlin of the State Board of Irrigation proposed that said Board should devote \$500 to be expended upon experiments with pumps and windmills under direction of Professor Hood, Superintendent of the Mechanical Department. Upon motion by Regent Dougherty the Superintendent of the Mechanical Department was authorized to conduct such ex-

periments, the above proposition being accepted" (16).

This resolution was followed by another. "Regent Daughters moved that the Station Council be authorized to take a lease of the irrigation plant at Oakley upon terms offered by the State Board of Irrigation for one year, and to provide for its use at once by securing a foreman at an expense not to exceed \$50 per month besides labor needed in planting and caring for the crops. Motion carried" (16).

IRRIGATION EXPERIMENTS AT OAKLEY

June 9, 1896, "The secretary presented a copy of the lease granted by the State Board of Irrigation of the Oakley plant which, upon motion by Regent Daughters, was approved" (17). The work conducted on the Oakley Irrigation Station during 1896 is presented in the Ninth Annual Report of the Station as follows:

"April 20, Mr. Isaac Jones, B. S., was placed in charge, under direction of a committee of the Council, with President Fairchild as direct correspondent and authority to the assistant. About 20 acres of prairie sod were broken, all being well cultivated with a disk harrow, one-third being thoroughly subsoiled. All was planted for experiment in garden crops, potatoes for tests of soil moisture, and in Kafir-corn, soy-beans, alfalfa, and other farm crops, although little was expected from the first year in the way

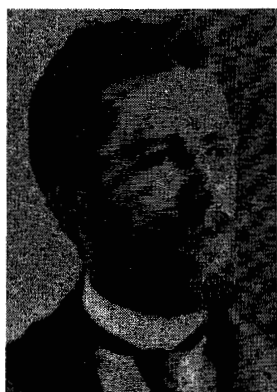


Fig. 5.—Professor O. P. Hood, Superintendent of the Mechanical Department of the College, under whose direction the State Board of Irrigation authorized the use of \$500 for experiments with pumps and windmills at Oakley.

of results. At best only a beginning could be hoped for, with the expectation of continuing experiments in after years if the state should decree. Accidents of various kinds to the machinery and delays in supplying gasoline and repairs limited use of the pump to less than one-third of the time during the growing season, so that no experiments in full irrigation were possible, and the well itself failed at last. Most of the crops suffered, as always in such sod ground, from inroads of insects innumerable, but some vegetables and a little forage were secured. The only results worthy of record are those from potatoes planted for tests of soil moisture. These will be embodied in a bulletin upon moisture in the soil, soon to be issued by the chemical division of the Station.

"In the fall, a test of varieties of winter wheat was planned with reference to adaptation to climatic conditions, with the hope that the results might be secured, whoever should have the place. The lease expired December, 1896. Future experiments will depend upon the legislature of 1897" (18).

The Legislature failed to appropriate for the support of the irrigation work and it appeared from a minute of the Board of Regents of January 14, 1897, that working conditions at the Oakley Station may not have been satisfactory: "President Fairchild reported upon the attitude of the

State Board of Irrigation as to the Station at Oakley" (19).

It was therefore decided by the Board of Regents to terminate all irrigation experimental work at both Oakley and Oberlin. The action of the Board terminating the work appears in two minutes of the Board as follows: First, April 7, 1897, "Regent Dougherty moved that the substations at Oakley and Oberlin be abandoned and also that action be postponed until tomorrow. The last motion carried" (20). Second, April 8, 1897, "The motion of Regent Dougherty to abandon the substations at Oakley and Oberlin was called up. The motion prevailed" (21).

Thus ended the first extensive effort of the Experiment Station to conduct experimental work off the Manhattan campus and farms. While valuable experience was gained from the projects, the value did not compensate for the effort and funds expended.

WHY EARLY IRRIGATION EXPERIMENTS FAILED

A number of factors appear to have contributed to the failure of the projects: First, the enthusiasm of the Board of Regents led the Board to obligate itself to undertake work without careful consideration and prior approval of the Station Council and without a carefully planned program of work. The enthusiasm of the Board was a result no doubt of the intense interest existing at the time in irrigation on the part of Kansas

people. Second, failure to await an appropriation of the legislature for financial support before starting the work. The project was financed by the Board from Hatch funds. This was of questionable legality. Furthermore, the \$15,000 of Hatch Funds then received by the Station from the Federal Government was inadequate in view of prior commitments for other work. Third, starting the project on too extensive a plan, both as to locations and intensity of work.

EXPERIMENTAL WORK IN IRRIGATION IN COOPERATION WITH THE UNITED STATES DEPARTMENT OF AGRICULTURE

Further off-campus experimental work with irrigation was undertaken by the Station when cooperation was entered into with the Office of Experiment Stations, United States Department of Agriculture. The character of the work undertaken was covered in a memorandum of understanding February 22, 1904. It was of two types, first, detailed studies of pump irrigation at the Fort Hays Branch Station and second, a study of the experience of farmers with irrigation in the Arkansas River Valley in the vicinity and west of Garden City.

The work conducted at the Hays station is reported in Bulletins No. 128 and No. 453 of the Kansas Agricultural Experiment Station.

The studies conducted in the Arkansas River Valley consisted of the nature of the valley, the supply of irrigation water, windmill irrigation, value of crops irrigated, cause of the failure of the irrigation canal above Ingalls, Kansas, and the construction of an irrigation plant at Sherlock, Kansas, reputed to have a capacity of 6,000 gallons per minute to irrigate a ranch of 1,000 acres.

These studies were undertaken primarily from the standpoint of evaluating work that had been done by practical irrigators and to arrive at the soundness of irrigation practices in use at the time. The studies were completed in one season, 1904, and were reported in the 18th Annual Report of the Kansas Agricultural Experiment Station (22).

OTHER EARLY EXPERIMENTS

In addition to the irrigation experiments reported above, several other types of experimental work were undertaken in the early days of the Station at points away from the Central Station at Manhattan. Some were in cooperation with the United States Department of Agriculture and others by the Station alone. The following are the most important ones:

1. Cereal investigations in McPherson County.
2. Range land improvement in Harper County.
3. Investigations relating to

the extermination of prairie dogs and gophers.

4. Feeding work horses.

Cereal Investigations in McPherson County

The Bureau of Plant Industry, United States Department of Agriculture, started experimental work at Halstead, McPherson County, with the aim of developing varieties of cereals, especially wheat, resistant to rust which would at the same time equal or surpass in yield the varieties then being grown. At the beginning, the work was in charge of Deane B. Swingle. Beginning in the spring of 1902, L. A. Fitz was put in charge; in the fall of 1903 experimental work was transferred from Halstead to McPherson. In the meantime, Mr. Fitz had been transferred to another station and H. F. Blanchard

was assigned direct charge of the work. At the end of the crop year of 1905, Mr. Blanchard was succeeded by Victor L. Cory who continued in charge of the experiments until the work was terminated in 1909.

The work, started by the United States Department of Agriculture, was at first only nominally cooperative with the Kansas Station. Active cooperation did not start until 1903. Then work at McPherson was closely coordinated with similar work at the Hays Branch Experiment Station. A cooperative agreement was entered into between the Station and the Federal department under the terms of which the Kansas Station was to assume the salary of the project leader at the Hays Station and the Department, the expense of the project leader at McPherson. The two agencies shared the expense of the operation of the project at both stations.

The McPherson Station was about 30 acres, one mile west of town.

Victor L. Cory reported on the work of the Station at McPherson: "The principal object of these experiments has been to find hardy, prolific varieties or strains of wheat, oats, barley and other small grains especially adapted to conditions in central and western Kansas. Variety testing has been conducted extensively and breeding and selection work has been employed to originate better types of grain and to improve the

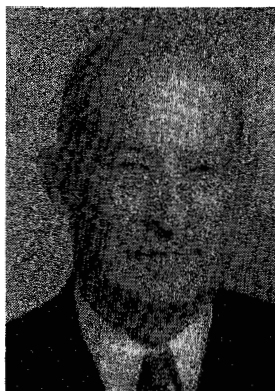


Fig. 6.—Leslie A. Fitz under whose direction the cereal investigational work at Halstead was conducted before it was moved to McPherson. Later Professor Fitz became the first head of the Department of Milling Industry at the College.

standard varieties. In addition, an experiment in rotations was instituted in 1905 to demonstrate the inadvisability of growing a crop continuously on the land. The demonstration of the value of good preparation of the seedbed and use of selected seed of the varieties best adapted to the conditions was of special importance locally. The distribution of seed of the best varieties has also been a feature of the work. . . .

Investigations were conducted at McPherson for six continuous years and many things of much value to the farmers of the State have been learned during this time.

1. It was demonstrated that the varieties of winter wheat of the Crimean or Turkey group which are widely grown in the State, are those best adapted to much of the largest portions of Kansas.

2. It was learned at that time that there is some difference in the various strains of this group of wheats and that apparently Kharkof gives the best results for the winter wheat area as a whole, though in certain locations and certain seasons other strains may be at least as good or maybe better" (23).

The work of the McPherson Station was terminated in 1909 and consolidated with the work at the Fort Hays Branch Experiment Station.

Range Land Improvement in Harper County

A study of the improvement of range land was undertaken

in Harper County in cooperation with the Division of Agrostology of the United States Department of Agriculture in 1901. The work was conducted on the farm of H. B. Waldon of Anthony. The experiments were conducted under two conditions: First, on cultivated land and second, on native sod. Various kinds of tame grasses were seeded. The work on native sod consisted of the renovation of depleted pastures in which disking the sod in preparation for seeding formed the basic treatment. The season was unfavorable and the results disappointing. The work was not continued after the first year.

Investigations Relating to the Extermination of Prairie Dogs and Gophers

Prairie dogs became so destructive in certain regions of western Kansas that the legislature in 1901 passed an act providing for the destruction of prairie dogs and gophers. Section 2 of the act states that "The board of regents of the Kansas Agricultural College is hereby authorized and directed to select some competent person to direct and conduct experiments for the purpose of determining the most effective and economical method of destroying prairie-dogs and gophers" (24).

Complying with the Act the Board of Regents employed Professor D. E. Lantz as a field agent to take charge of experiments under direction of the Station Council of the Agricultural Experiment Sta-

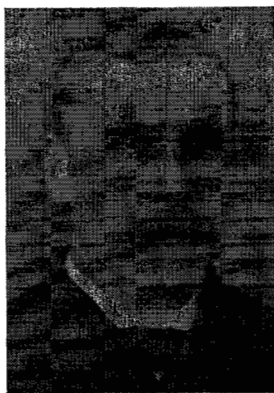


Fig. 7.—Professor D. E. Lantz, who, working under the direction of the Experiment Station Council, was employed by the Board of Regents in 1901 to conduct experiments in the eradication of prairie dogs and gophers. The methods of eradication that he developed were so effective that prairie dogs became almost extinct in Kansas.

tion. Actual experiments began in September, 1901. Suggestions by the general public pertaining to the problem were invited in a circular letter of inquiry published as press Bulletin No. 97 of the Agricultural Experiment Station. Every reasonable suggestion that was received was tested. Carbon bisulphide as an effective gas and strychnine as a poison were the only materials found to be entirely satisfactory. Poisoning with strychnine was found to be the most effective method of destroying gophers. Press bulletins No. 108 and No. 109 were published giving the results of these studies. The first, relating to prairie-dogs and the second, to gophers.

A formula for a poison, the chief ingredient of which was

strychnine, patented by David W. Staples of Craft, Oklahoma, was tested on the ranch of S. E. Carr of Haskell County. It was found to be so satisfactory that the Station entered into negotiations with Mr. Staples and purchased the right of its use. The Station prepared and distributed the poison, the first distribution beginning in January, 1902. It was sold at \$1.50 per one-half gallon can. A can was sufficient to moisten a bushel of grain and poison 100 to 150 acres if properly distributed; 3,250 cans were sold between January 15 and January 30, 1902. The demand for the poison steadily increased and the results were satisfactory. The Legislature of 1903 provided for continuing the experiments and preparing poisons to be sold to citizens of Kansas at the actual cost of material used—\$7,000 was appropriated by the Legislature to support the work for three years ending June 30, 1904, of which only \$6,200 was used. The 17th Annual Report of the Experiment Station for 1903-1904 stated: "The Board of Regents continued Mr. D. E. Lantz as the special agent in charge of the investigations. A new law makes it the duty of the township trustees to supervise the field-work of killing prairie-dogs, and a much higher percentage of effective work was obtained under the plan than when the distribution of the poison was left to the individual owners of the land. During the past year it is estimated that these

animals were destroyed on about 700,000 acres. In all, about three-fifths of the two and one-half millions of acres of land in the state formerly infested with prairie-dogs has been entirely reclaimed" (25).

The Station has continued the preparation and distribution of the poison. The distribution of the poison has been so extensive and its use so effective that the prairie dog has become almost extinct in the state.

Investigations Relating to the Feeding of Work Horses

An important line of off-campus experimental work conducted in the early days of the Station (1912) was investigations relating to feeding work horses. The location of Fort Riley, 15 miles west of the Central Experiment Station at Manhattan, provided excellent facilities for experimental horse feeding work. A large number of horses belonging to the United States Field Artillery were kept at the Fort and the work provided was uniform in character, each horse doing practically the same kind and the same amount of work.

The experiment conducted at the Military Reservation used 937 horses. The experiment was proposed and planned by Professor R. J. Kinzer, Professor of Animal Husbandry of the Kansas Station, and supervised by Dr. C. W. McCampbell, assistant in horse feeding experiments. The work was made possible through the interest and ac-

tive cooperation of the Secretary of War, the Secretary of Agriculture, and the Adjutant General and the Quartermaster General of the United States Army.

The objects of the experiment were: First, to make a direct comparison of the use of the various kinds of hay for horse feeding such as prairie, timothy, alfalfa and small grain hays; second, to find, if possible, a grain or mixture of grains that would take the place of oats in horse feeding, give the same results, and be more economical; third, to make a careful study of the influence of various grains and mixture of grains for standard horse rations.

A detailed report of the work and results obtained were published in Bulletin 186 of the Kansas Agricultural Experiment Station, December,



Fig. 8.—Dr. C. W. McCampbell, who, as Assistant in Animal Husbandry, supervised the horse feeding investigations conducted in cooperation with the Army at the Ft. Riley Military Reservation. 937 horses of the United States Field Artillery were used.

1912, entitled "Feeding Work Horses," and an abridged report was published in Circular 62 of the Kansas Agricultural Experiment Station, November, 1917, entitled "Feeding Work Horses."

DEMAND FOR A BRANCH STATION CONTINUES

The failure of irrigation projects to supply information desired relative to the use of irrigation water for crop production in western Kansas did not lessen the desire for information on this and other problems, especially those pertaining to dryland farming methods. Consequently, the demand for a branch experiment station in western Kansas continued. It was met first by the establishment of the Fort Hays Branch Station in 1901. Then by establishment of other Branch Sta-

tions at Garden City in 1907, Tribune in 1911, Colby in 1914, and an effort to establish a Station at Lakin in 1913. A fifth Branch Station was established in 1949 at Mound Valley to study problems peculiar to southeastern Kansas.

Fort Hays Branch Station

The Fort Hays Branch Experiment Station was established on the Fort Hays Military Reservation, which was no longer needed by the United States for military purposes. It was turned over to the Department of the Interior October 22, 1889, for disposal under the Act of July 5, 1884. The availability of this land was brought to the attention of the Kansas legislature by Representative Schlyer of Ellis County in February, 1895, when he introduced a concurrent resolution request-

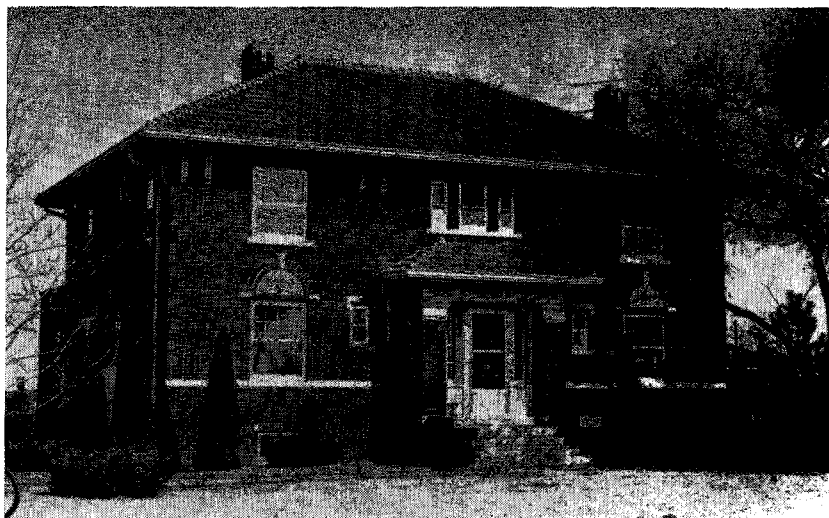


Fig. 9.—The superintendent's residence at the Hays Branch Experiment Station constructed in 1927 of brick and hollow tile.

ing congress to donate the Fort Hays Military Reservation to the State of Kansas to be used for three purposes: "First, for a branch of the Kansas Agriculture College, second, for a western branch of the Kansas State Normal School (at Emporia), third, for a public park." This resolution received favorable action by the Kansas Legislature. The resolution was laid before the Senate of the United States by the Vice-president. It passed the Senate February 26 and the House March 2, 1895. Congress adjourned March 4 and the bill failed to receive the President's signature. It was not until the 56th Congress that an act was finally passed donating the land to the State of Kansas. This act was signed by the President March 28, 1900. The act provided acceptance by the State of the reservation for the three purposes mentioned above.

The Kansas legislature accepted provisions of the act and approval was given by the Governor February 7, 1901. Full information relating to the establishment of the Station and details as to work conducted is contained in Bulletin No 453 of the Kansas Agricultural Experiment Station entitled "History of the Fort Hays (Kansas) Branch Experiment Station."

Garden City Branch Station

The Division of Dry-land Agriculture of United States Department of Agriculture in the early 1900's established in

the Great Plains area a number of Experiment Stations, known as Dry Land Experiment Stations, to study crop adaptation, cropping systems, the effect of different cultural methods on crop production and the adaptation of various practices to farming in this area. The stations, as a rule, were established in cooperation with the Agricultural Experiment Stations in the states. This was true in Kansas. The first cooperative work of this kind was started at the Hays Station in 1906. It was the opinion that conditions at Hays did not represent adequately conditions further south and west in Kansas and that another station should be started in southwestern Kansas. This study, also, was to be in cooperation with the Kansas Station.

The matter was brought to the attention of the Board of Regents and at a meeting July 17, 1906, the following action was taken. "Moved by Regent Fairchild that the Experiment Station cooperate with the government in experiments at Garden City if deemed advisable by the President of the College. Carried" (26). The investigation referred to was made by President Nichols in early September, 1906, and a decision reached to enter into the cooperative study. To provide facilities the College rented land near Garden City to establish a Branch Experiment Station. Steps taken to secure this land were reported in "The Industrialist" September

27, 1906: "President Nichols was in Garden City September 3 and leased 40 acres of farm land three miles northeast of the city for an Experiment Station. The government provides the funds to carry on the work, but the supervision will be in the hands of the College. The work will be in the nature of experiments in dry farming, to study the best methods to pursue, decide upon such grains and plants that will do well without irrigation and in effect to improve plants already grown here. Suitable buildings are to be erected at the Station and active work is to be commenced this fall in order to be ready for the

spring work. This Station will undoubtedly result in much good for the farmers of western Kansas and will add to the prominence and importance of Garden City" (27).

J. E. Payne was employed as the first Superintendent. The *Industrialist* October 6, 1906, reported his appointment: "J. E. Payne, 1897, has been selected to take charge of the Experiment Station at Garden City recently established and to be conducted by the United States Department of Agriculture and the College cooperatively, and Payne has gone out to start the work, though it is probable that he will be here much of the time

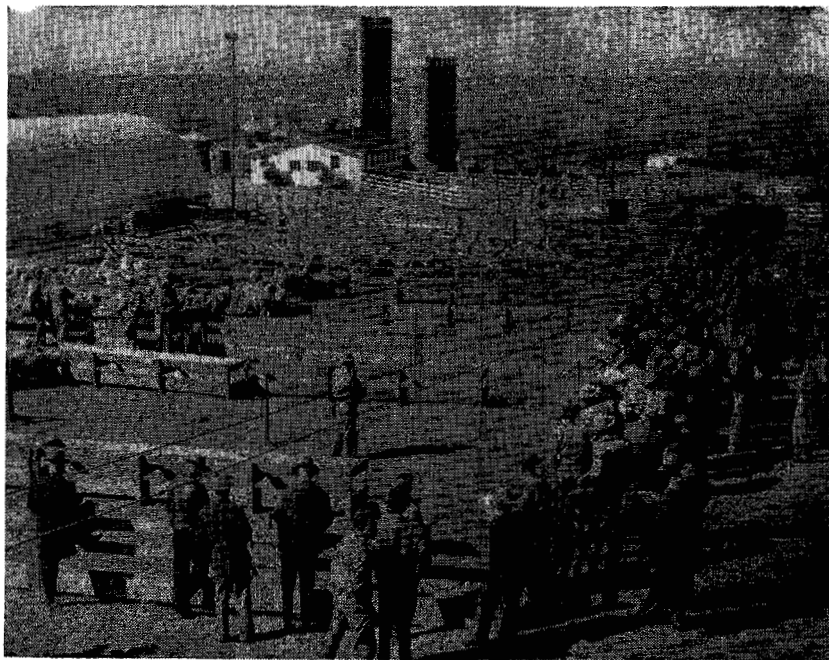


Fig. 10.—Visitors at the Garden City Branch Experiment Station on Lamb Feeders Day in 1950. About 600 lambs are fed annually at the Station.

this winter. He has had large experiences in the Great Plains and is especially well qualified for the new position" (28).

The land secured for the Station was county land about five miles northeast of the city. Three hundred and twenty acres were secured under lease from the Finney County Commissioners to the State Board of Regents. The lease, although not signed until June 21, 1912, was for . . . 99 years starting June 14, 1907. A detailed report of the history and work of the Garden City Experiment Station is contained in a publication of the Kansas Agricultural Experiment Station Report 7, June 1957, entitled "Fifty Years of Progress of the Garden City Branch Experiment Station."

Tribune Branch Station

The Tribune Branch Experiment Station was established in 1911. It was started primarily to study the problem of providing feed as a supplement to grass for winter grazing of livestock. At the time the Station was established west-central Kansas was a region devoted almost exclusively to grazing. The principal vegetation was buffalo and grama grasses. Only a few animals could be maintained when native grass was the only feed available. The importance of growing supplementary feed, especially for winter use, was recognized. The best kind of feed to grow and how best to grow it were

the questions. The need for such information was chiefly responsible for establishing the Station.

The matter was brought to the attention of the College in 1910 by Senator W. M. Glenn and Representative Clement L. Wilson, both of Tribune. A tract of land satisfactory for the Station was made available as a gift to the state by George W. Reid, a public-spirited citizen of Tribune. The farm was located midway between Tribune and Horace, 16 miles east of the Colorado state line. It consisted of 120 acres. The Station work was financed during the first two years from general state funds of the Agricultural Experiment Station and in subsequent years by direct appropriations of the legislature. A detailed report of the history and work of the Station is contained in Bulletin No. 477 of the Kansas Agricultural Experiment Station entitled "A History of the Tribune Branch Experiment Station, 1911-1964."

Colby Branch Station

The Kansas Legislature March 6, 1913, authorized a Branch Experiment Station near Colby in northwestern Kansas and appropriated funds for its support. At that time soil blowing was a serious problem in western Kansas and several thousand acres of land in the vicinity of Colby had been blowing for two or more years. Vegetation on large areas had been denuded,

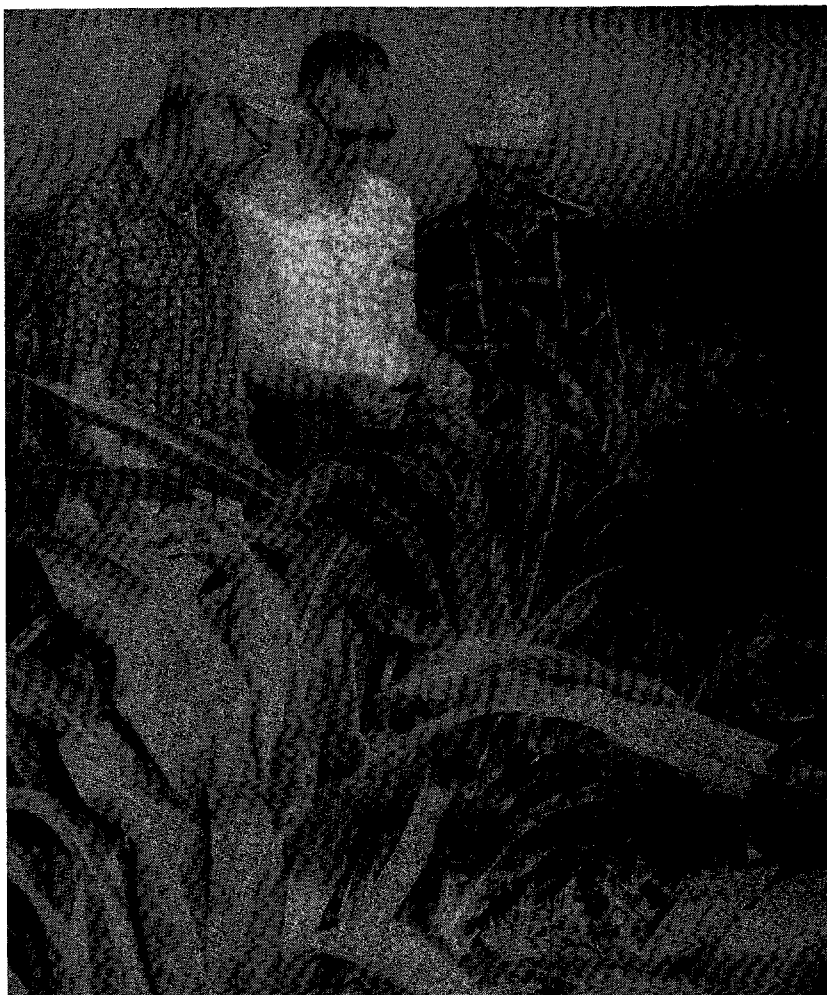


Fig. 11.—Director C. Peairs Wilson (center), Mr. Gwin (left) and Superintendent Stinson (right) inspecting corn performance tests on the irrigated farm at the Tribune Branch Experiment Station (1964).

groves of trees had been submerged by drifting soil and farm families had been compelled to move from the blowing areas. One of the objectives in establishing a Station at Colby was to determine what might be done to control soil blowing.

A farm of approximately 320 acres adjoining the city of Colby was purchased by the County Commissioners of Thomas County and deeded to the state for the Station. The farm extended east and west along U. S. Highway No. 24. When purchased approximate-

ly half the farm was cultivated and half was in buffalo and grama grass. The cultivated land was level to gently rolling, ideally adapted to experimental plot work. Ground water in supply adequate for pump irrigation was available at approximately 112 feet deep.

Cooperative arrangements were entered into immediately with the Division of Dry Land Agriculture of the United States Department of Agriculture to establish dry land agriculture investigational work similar to that at the Fort Hays and Garden City Branch Experiment Stations. A ten-acre fruit orchard on the farm at time of purchase was maintained and developed into an experimental orchard. A herd of grade and purebred Ayrshire cattle was started in

1915 and conducted primarily as a demonstration in breeding and management until 1959, when a sheep project was started. A detailed report of the work of the Station is contained in Bulletin No. 468 of the Kansas Agricultural Experiment Station entitled "Fifty Years of Research at the Colby Branch Agricultural Experiment Station."

Mound Valley Branch Station

Citizens of southeastern Kansas wanted a Branch Experiment Station in that part of the state. All other branch Stations were located in western Kansas, and climatic and soil conditions at Manhattan, where the central Station was located, were not representative of conditions in southeastern Kansas. Consequently when a tract of 242 acres of

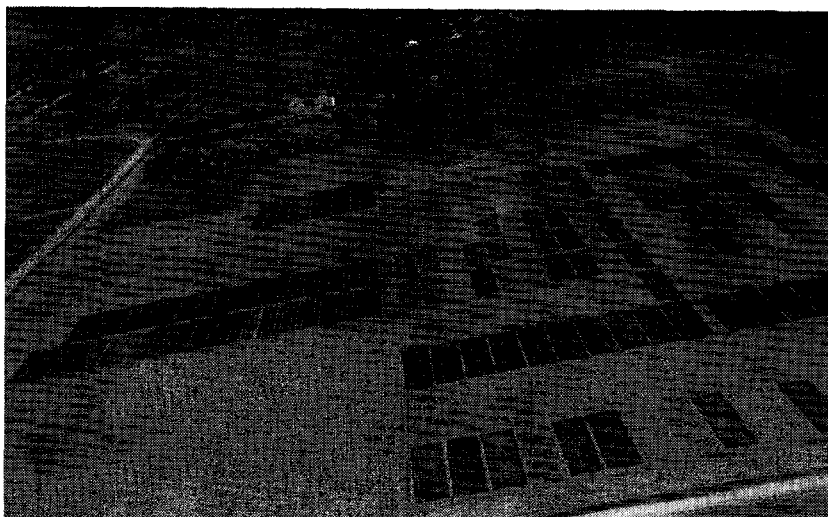


Fig. 12.—An aerial view of experimental plots at the Colby Branch Experiment Station. A farm of about 700 acres adjoins the city of Colby. "The cultivated land is level to gently rolling, ideally adapted to experimental plot work."

land near Mound Valley that had been an Air Force Auxiliary Landing Field was transferred, July 23, 1948, by the War Assets Administration to Kansas State College, a demand arose for the area to be developed as a Branch Experiment Station. Bills were introduced into the legislature of 1949 authorizing the establishment of the Station and appropriating money for its support. The appropriation became available July 1, 1949. The first step taken was to secure clear title to the air field land. The tract was in Labette County, three miles southwest of Mound Valley on the south side of Kansas Highway 96. A second step was to purchase an improved farm of 40 acres adjoining the air field land. Starting in 1956, 120 acres of additional land have been

rented, giving the Station control of 402 acres.

The research work at the Station has consisted of two major lines, soil fertility investigations and dairy nutritional problems. Dairy men in southeastern Kansas believed that crops grown in the area were deficient in some constituents for livestock production and that it would be necessary to correct the deficiencies before satisfactory results could be obtained. A project to study this problem was started in the fall of 1950. Identical twins have been used in much of the nutritional work. The first twins were purchased in 1952; in all, 87 pairs of twins have been used. The accumulation of twins makes the Station herd one of the largest, if not the largest herd of twin dairy cattle in the nation.

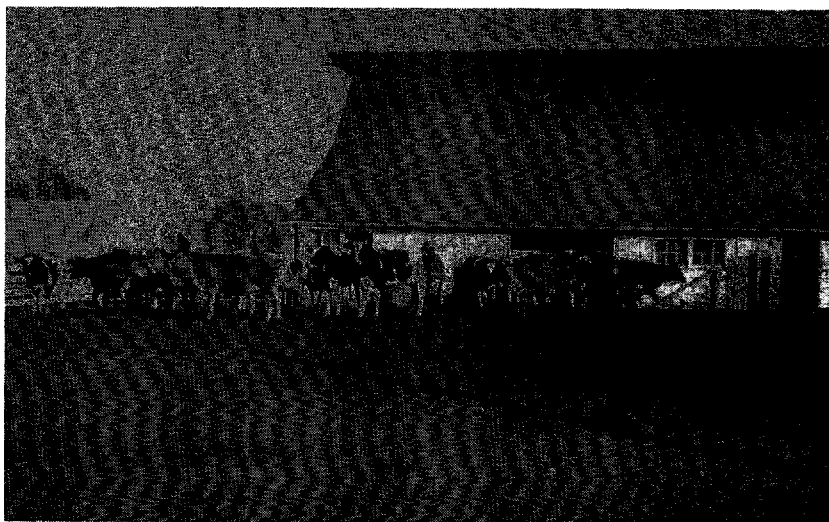


Fig. 13.—The dairy herd at the Mound Valley Branch Experiment Station. Identical twins have been used in much of the dairy feeding experimental work. "In all, 87 pairs of twins and 1 set of triplets have been purchased."

A detailed report of the work of the Station appears in Bulletin 476 of the Kansas Agricultural Experiment Station entitled "First Fifteen Years of Research at the Mound Valley (Kansas) Branch Agricultural Experiment Station, 1949-1964."

An Effort to Establish a Branch Experiment Station at Lakin

The Kansas Legislature March 3, 1913, authorized the establishment of a Branch Experiment Station near Lakin, Kearny County, and appropriated funds for its support.

The branch Station at Lakin was not established for the following reasons:

First, County Commissioners of Kearny County were reluctant to assume the financial obligations set forth in the act.

Second, County Commissioners and the College were unable to agree on a tract of land suitable for the Station.

Third, the College considered it inadvisable to start another Station less than 30 miles from the Garden City Branch Station.

FORESTRY EXPERIMENT STATIONS

The Legislature of 1887 passed "an Act to establish the Office of Commissioner of Forestry, prescribing the powers thereof, and to encourage the planting and growing of forest trees in the State of Kansas and making appropriations therefor" (29).

The Act provided that the Commissioner would procure through donation two tracts of land suitable for forestry. These tracts should be not less than 160 acres each and not more than three miles from a station on the Union Pacific and on the Santa Fe Railways, respectively. The first tract secured was a quarter section one mile west of Ogallah in Trego County on the Union Pacific line. Citizens of Dodge City, Ford County, on the Santa Fe line, offered to buy for the State any tract of land for sale within the three-mile limit of Dodge City. The city and county purchased 160 acres for \$3,200 two and one half miles east of Dodge City and deeded it to the State.

These Stations were established to grow and distribute forest tree seedlings to the public free except for shipping charges. In 1897 the position of Commissioner of Forestry was changed by the Legislature to that of Commissioner of Forestry and Irrigation. In 1907 the position of Commissioner of Forestry and Irrigation was terminated and two Commissioners of Forestry appointed, one for the Ogallah Station and one for the Dodge City Station. In 1909 the Legislature established a Division of Forestry under the supervision of a State Forester appointed by the Board of Regents of the College, which made supervision of the Ogallah and Dodge City Stations the responsibility of the College. Albert Dickens, Professor of Horticulture, was ap-

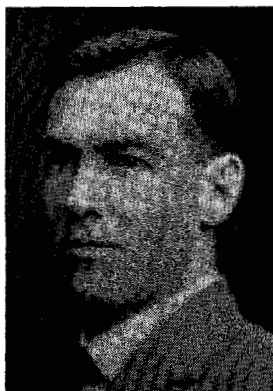


Fig. 14.—Charles A. Scott, who became Professor of Forestry at the College and State Forester in 1910. It was with his approval that the forestry work at the stations at Ogallah and Dodge City was terminated, the station at Ogallah closed and the Dodge City station devoted to other types of work.

pointed temporarily as forester. He was succeeded the next year (1910) by Charles A. Scott, professor of forestry at Iowa State College. Mr. Scott became a member of the faculty of the College. Forestry work of the State as reorganized in 1910 consisted of a state forester at the College at Manhattan, an assistant state forester in charge of forestry work at the Hays Branch Station and a foreman appointed by the Board of Regents at each of the forestry stations at Ogallah and Dodge City. The Stations had never received the financial support needed for creditable work. Furthermore, personnel appointments usually were more political than for merit. The Stations had failed to perform the services intended.

Establishing the Branch Experiment Station at Hays in 1901 and the highly creditable forest nursery there made unnecessary the continuation of forestry work at Ogallah and Dodge City. Consequently, as soon as management of those Stations became the responsibility of the College, steps were taken to discontinue forestry work at them. The station at Ogallah was closed in 1913 and the equipment moved to the Fort Hays Branch Station 30 miles east.

The Dodge City Station was converted from a forestry to a crop and dairy cattle experiment station. The College secured control of that Station in May, 1909.

The Station farm at Dodge City was not well adapted to experimental work and was conducted from the beginning more as a demonstration farm than as an experiment station. However, in addition to experimental work in testing crop varieties, two major experiments were undertaken: using salt to exterminate bindweed, and the influence of a good sire in improving progeny of grade dairy cattle.

December 29, 1913, one-tenth-acre plots were treated with salt at 25 and 50 tons an acre. April 28, 1914, applications of 5, 15, 25, 35, and 50 tons an acre were made; from 25 tons up killed the weed, but 15 tons or less per acre left from one to eight percent of the plants alive. By the fall of 1914 it was concluded that 10 tons of salt an acre were

sufficient to kill the bindweed, if small spots where weeds grew were re-salted.

A dairy herd was established in October, 1911, with two grade Ayrshire, two grade Jersey, and two grade Shorthorn cows and an Ayrshire bull, "College Marquis," whose dam had a record of 697 pounds of butterfat in 11 months. By 1916, the herd had increased to 10 milch cows and young stock, for a total of 24 head. Because the Dodge City farm was proving unsatisfactory for experimental work and because it was difficult to produce feed needed for the dairy herd, the Station was closed in 1917. Suitable livestock and equipment were transferred to the Garden City Station.

COOPERATIVE EXPERIMENTS AND SEED DISTRIBUTION

It was commonly believed in the early 1900's that the quality of seed wheat deteriorated after repeated plantings. Many in Kansas thought the Turkey wheat the Mennonites had brought from Russia and that had proven so well adapted to Kansas conditions had deteriorated, so it would be desirable to obtain new seed. That idea led the Legislature of 1907 to pass Chapter 389 of the Session Laws of 1907 which provided "that the Board of Regents of the State Agricultural College located at Manhattan shall thoroughly investigate the quality of seed wheat found in Europe and elsewhere, especially adapted



Fig. 15.—Three members of the Station staff chosen by the Board of Regents to utilize funds appropriated by the State Legislature of 1907 to investigate the advisability of importing seed wheat for planting in Kansas. Dr. C. W. Burkett (center), Director of the Station, who visited Turkey and Russia to investigate sources of seed wheat.

A. M. TenEyck (left), Agronomist, who spent the month of August 1907 investigating the quality of the wheat grown in the province of Alberta, Canada.

Dr. H. F. Roberts (right), Botanist, who spent the summer of 1907 in Europe investigating experimental work, especially wheat breeding in Rumania, Hungary, Germany, and Sweden.

to and desirable for sowing in Kansas," with a \$2,500 appropriation to cover the expense of the investigation.

First, C. W. Burkett, Director of the Agricultural Experiment Station, was sent on a four-month trip to Turkey and Russia to investigate sources of seed wheat supply and to arrange for seed wheat imports, if that seemed desirable. An account of some of his observations on the trip was published in Press Bulletin No. 164 of the Kansas Agricultural Experiment Station.

Second, Prof. A. M. Ten Eyck, head of the Department of Agronomy and Agronomist of the Agricultural Experiment Station, was sent, during August, 1907, to investigate wheat grown in the Province of Alberta, Canada. The results of his investigations were published in Press Bulletin No. 157 of the Kansas Agricultural Experiment Station.

Third, Prof. H. F. Roberts, Station botanist, spent the Summer of 1907 investigating experimental work with wheat, especially wheat breeding, in Roumania, Hungary, Germany, and Sweden.

No large importations of seed resulted from the investigations. Professor Ten Eyck found Canadian wheat too badly mixed to justify importing it. Director Burkett returned with small quantities of about 20 lots and varieties of Russian wheat seed that he considered worth testing experimentally. Professor Roberts' trip increased his enthusiasm for the wheat breed-

ing investigational work that he was doing and, no doubt, resulted, in part, in the development of several promising wheat selections that eventually resulted in the popular Kanred variety.

Facilities were not adequate to test state-wide adaptation of new importations and selections of crop plants. Director Burkett arranged to test his

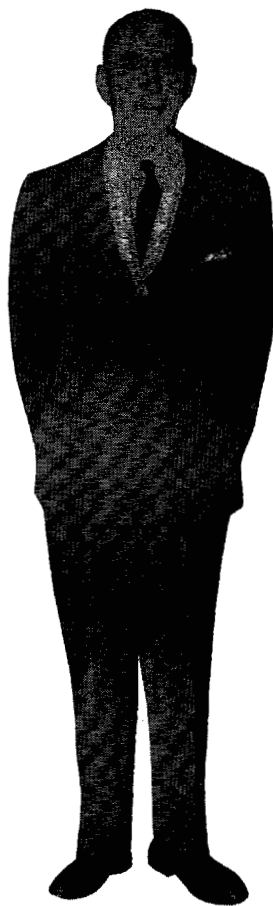


Fig. 16.—Dr. W. M. Jardine, appointed Professor of Agronomy and Agronomist of the Station in July, 1910.

importations at the central Experiment Station at Manhattan and at the Branch Experiment Stations at Hays, McPherson, and Garden City. Testing on a more extensive scale under farm conditions appeared desirable, and was endorsed enthusiastically by W. M. Jardine, who was appointed professor of agronomy and Station agronomist in July, 1910. He had been a USDA cerealist before coming to Kansas, and understood the importance of on-the-farm observations in evaluating new varieties of crop plants. Within six months after his appointment, the Board of Regents, December 20, 1910, ordered the President of the College to prepare for the consideration of the Board, at its January meeting, a plan for a series of outlying cooperative experiments (30).

The need for cooperative experimental work of this character was brought to the attention of the 1911 Session of the Kansas Legislature. It passed Senate Bill No. 372 as follows:

"Be it enacted by the Legislature of the State of Kansas:

Section 1. That the board of regents of the Kansas State Agricultural College are hereby authorized to investigate the present methods used in growing and distributing agricultural seeds in the state; to determine by experiments the methods of growing seed best adapted to different localities; to encourage farmers in the use of the best methods of seed production; to determine by investigation those localities most in need of improved seed and to aid such localities in securing desirable seed.

Section 2. For the purpose of carrying out the provisions of this

act the board of regents of the Kansas State Agricultural College are hereby empowered to employ special agents who shall be expert in seed production.

Section 3. For the purpose of carrying the provisions of this act into effect there is hereby appropriated, out of any funds in the state treasury not otherwise appropriated, the sum of \$7,500 for the remainder of the fiscal year 1911 and the fiscal year 1912 immediately available after this act is published in the official state paper, and the \$7,500 for the fiscal year 1913.

Section 4. This act shall take effect and be in force from and after its publication in the official state paper.

Approved March 14, 1911.

Published in official state paper March 25, 1911" (31).

The Board of Regents acted promptly to implement the act. June 15, 1911, it passed this resolution: "Upon recommendation of Dean Webster³ and Superintendent Miller, Mr.

3. Mr. Webster was Dean of Agriculture and Director of the Agricultural Experiment Station, and Mr. Miller was Superintendent of Extension.

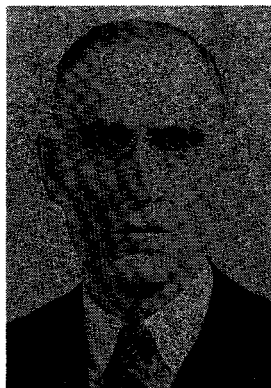


Fig. 17.—Mr. H. J. C. Umberger, appointed July 15, 1911, Assistant in Dry Farming in charge of cooperative experiments a portion of the year and to assist in institute work in western Kansas the remainder of the year.

H. J. C. Umberger was appointed Assistant in Dry Farming in charge of Cooperative Experiments a portion of the year and to assist in institute work in western Kansas the remainder of the year, the salary to be paid out of the department which he serves, at the rate of \$1,800 per year effective September, 1911, or as soon as Mr. Umberger can report for duty" (32).

Mr. Umberger's time was so fully occupied with his extension activities that he had little time for seed distribution and cooperative experimental work. Consequently, in 1912, C. C. Cunningham and B. S. Wilson were employed. Rapid progress was made under their direction and, by 1915, work was under way in all but six of the 105 counties of the state. Work that year consisted of 152 variety tests of corn, 72 variety tests of grain and forage sorghum, and 56 variety tests of wheat. In addition to variety testing, the

work had been expanded to include: Six date-of-seeding tests with wheat; 40 fertilizer tests with wheat, oats, corn, and alfalfa; and 91 miscellaneous tests in crop production. Improved varieties of crops were grown on 137 fields on Kansas farms to produce seed. Names of farmers who grew seed of the varieties were published. In 1915, over 100,000 bushels of seed grain of the various crops were listed and sent to those who inquired about seed for planting.

While seed distribution remained important during the early years, starting in 1918, it was gradually taken over by the Kansas Crop Improvement Association.

Station personnel in the early years arranged many ways to meet farmers to secure cooperators, chiefly by contacts made at farmers' institutes and at other farm meetings. Starting in 1914, with appointment of county agents, arrangements were

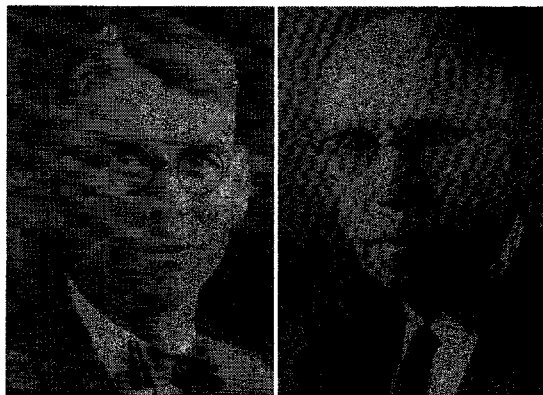


Fig. 18.—C. C. Cunningham (left) and B. S. Wilson (right), employed in 1912 to succeed Mr. Umberger as assistants in cooperative experiments.

made through them to secure farmer cooperators and to supervise on-the-farm work. The tests supplied both experimental information and demonstrations for extension work. With the help of the county agents, the work was greatly expanded. In 1947, 532 tests were conducted in 97 of the state's 105 counties. While great dependability could not be placed on the tests, they provided excellent opportunities for observation by farmers. Partly as a result of on-the-farm, state-wide testing, there is no instance on record of a mistake being made in Kansas in recommending a variety that had been adequately tested. Acceptance of new and approved varieties, by farmers, was accelerated by farmers personally observing new varieties as they grew in nearby test plots.

The need for cooperative experiments became less impor-

tant from an experimental standpoint with the establishment of branch experiment stations and a state-wide system of experiment fields. In 1953, it was decided that sufficient experimental data for all sections of the state were available to answer agronomic questions without cooperative experiments. Therefore, cooperative experiments, as conducted since 1911, were discontinued in 1953. During 1911-1953 work had been conducted in all counties of the state with a total of 22,073 cooperative tests. Included were 3,188 wheat variety tests, 1,881 wheat fertility, 1,002 oat variety, 3,656 corn variety, 3,288 sorghum variety, and 869 spring barley variety tests. The 22,073 tests may be grouped under 72 different classifications. Included are such less important tests as cotton variety, broomcorn variety, potato variety and fer-

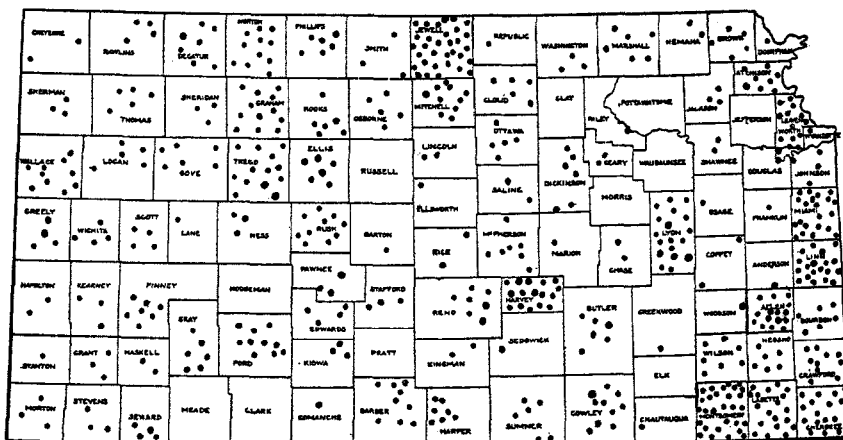


Fig. 19.—Map of Kansas showing location of cooperative experiments in 1915.

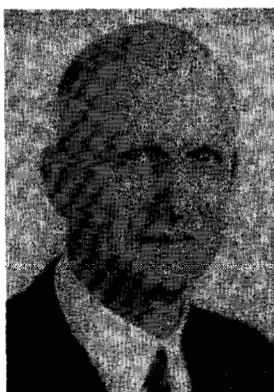


Fig. 20.—A. L. Clapp, in charge of cooperative experimental work from 1931 to its termination in 1953. He devoted only a portion of his time to the work.

tility, sugar beet fertility, artichoke variety, and melon and popcorn variety.

While cooperative testing appeared, by 1953, to have served its purpose from an experimental standpoint, the tests were still useful as demonstrations. Therefore, the Experiment Station continued to make available to the Extension Service seed of crop plants for demonstrations.

Financial Support

Cooperative experimental work was financed by a special appropriation of the legislature of \$7,500 a year for the first six years, 1911-1917; then it was supported by Station funds of the Agricultural Experiment Station allotted to the Department of Agronomy. The amount available ranged from a high of \$4,200 plus salaries to a low of \$2,500 plus salaries during the depression years of the 1930's.

Project Leaders in Cooperative Experiments

Name	Years Served
H. J. C. Umberger)	 1911
C. C. Cunningham)	
B. S. Wilson)	1912-1920
H. H. Laude)	
N. E. Dale)	1921-1922
H. H. Laude)	
R. J. Silkett)	 1923
H. H. Laude)	
C. R. Enlow)	1924-1927
H. H. Laude)	
C. O. Grandfield)	 1928
H. H. Laude)	
F. L. Timmons)	1929-1930
A. L. Clapp)	
F. L. Timmons)	1931-1933
A. L. Clapp)	
F. L. Parsons)	1934-1938
A. L. Clapp)	
H. D. Hollenbeck)	 1939-1943
A. L. Clapp)	
C. D. Davis)	1943-1945
A. L. Clapp)	1946-1953

Except for C. C. Cunningham and B. S. Wilson, most of those who worked with cooperative experiments devoted only a portion of their time to the work, having other experimental or teaching responsibilities.

EXPERIMENT FIELDS

The college depended until about 1924 on the central and four branch experiment stations and on cooperative experimental work with farmers for information upon which to base its recommendations pertaining to agronomic and horticultural problems. The stations were not sufficiently well distributed over the state to overcome variations in soil and climatic conditions. Cooperative experimental work lacked reliability. Other states were en-

countering the same problem. The Missouri Agricultural Experiment Station was attempting to solve the problem by locating a group of small experiment fields strategically in the state. After inspecting the Missouri fields, the Director and the Agronomist of the Kansas Station recommended that outlying experiment fields be established in Kansas.

The Legislature of 1923 appropriated \$6,000 a year for experiment fields in southeast Kansas. July 1, 1923, when the appropriation became available, five fields were started on five leading soil types. They were the first of what later became a series of experiment fields distributed over the state to study problems that could not be studied satisfactorily at the central station at Manhattan or at the branch experiment stations.

Subsequently, fields have been established as follows: northeast Kansas in 1932, primarily to study problems of the fruit and vegetable industries; south-central Kansas in 1932, to study agronomic problems; southwest fields in 1936, to study agronomic problems; north-central fields in 1942, to study agronomic problems; a bindweed field in 1942, to study control and eradication of bindweed; a sandyland field in 1952, to study problems peculiar to sandy soils; an irrigation field in 1952, to study agronomic and engineering problems of irrigation; a grassland field in 1952, to study problems of grass

utilization and management; a corn belt field in 1954, to study agronomic problems pertaining to the corn belt; the Newton field in 1960, to replace the bindweed field and to study agronomic problems of the area; work was started in 1962 leading to the establishment of a southeast Kansas horticultural field to study horticulture problems of the area, especially those of the pecan nut industry.

Plan of Operation

A uniform plan has been followed in operating all fields. No purchase of land or erection of permanent buildings was contemplated. The plan has been to locate a field of the proper size and desired character in an area where the problem to be studied existed. The field was usually on the farm of a progressive farmer who was interested in studying the problem and from whom the land could be rented at an annual cash rental with the privilege of renewal. The work was planned and carried out under a memorandum of understanding between the Agricultural Experiment Station and the owner of the land. Under this plan, a field could be closed and the work discontinued at any time it appeared desirable to do so. The farmer was usually employed at an agreed wage to do the farm work, to provide horse and tractor power, and to cultivate and harvest crops. The work was directed by a superintendent who was an employee of the

Station. The superintendent was responsible for the direction of all work, for most hand labor, and for keeping of all records. The Station furnished any machinery that was needed and that was not available on the farm. In a few cases, the Station built small inexpensive temporary buildings for office purposes and to house machinery owned by the Station and provided for the work.

As farm power machinery became available less dependence has been placed on farmer cooperators to furnish labor and equipment. Recently on most fields all equipment has been furnished by the Station and all labor furnished by the superintendent. This change has resulted in more money being invested by the Station in farm machinery and machine sheds. It has also resulted in less cooperation with farmers and more with municipalities and other government agencies.

Southeast Kansas Experiment Fields

Five fields were established in southeast Kansas primarily to study soil fertility and other agronomic problems of the region as follows:

(1) The Columbus Field — on the farm of W. H. Shaffer, R.F.D. 8, Columbus, one mile west and three miles north of Columbus High School. The field was started in 1924 when 20 acres were rented at \$5 an acre. It was operated by W. H. Shaffer until his death in 1939 and since by his son, D.

Shaffer, and son-in-law, Chalis Potter. It is the only original southeast Kansas field operated continuously since its establishment in 1923.

The soil type on the Columbus field was classified for the most part as Cherokee silt loam. The surface soil was five to seven inches deep and underlain by an impervious mottled red and yellow subsoil. The soil was level in topography and was known locally as "white ashy land."

(2) The Moran Field—on the farm of R. O. and J. T. Furneaux, two miles north and two miles west of Moran. Twenty-seven acres were rented in 1924 at \$5 an acre. When the appropriation for the support of the southeast Kansas fields was reduced from \$6,000 to \$3,000 annually during the depression of the 1930's, the rent for the field was reduced to \$100 and the rate of pay for labor reduced for the Furneauxs to 26 cents an hour, other labor was at 20 cents an hour, and horse labor was reduced to 10 cents an hour. Mr. Furneaux was advised that "these changes are made necessary because of the reduction in the appropriation for the next biennium."⁴

The field was operated by R. O. Furneaux until his death in 1941, and later by his son, John Furneaux, and his son-in-law, Frank Boyd, until the field was closed in 1943. The soil on the Moran field has been classified as

⁴Letter of R. I. Throckmorton to R. O. Furneaux, March 27, 1933.

Oswego silt loam, one of the leading soil types of southeastern Kansas. It occupies leveler areas than Summit silt loam, but like Summit, is one of the preferred corn soils of southeastern Kansas.

(3) The Fort Scott Field — on the farm of Harper Fulton, Fort Scott, three miles west and three fourths mile north

of Fort Scott. Rented were 23 acres at \$7 an acre. The field was operated by Harper Fulton from its opening in 1924 until it was closed in 1932 when funds for support of southeast Kansas fields were reduced 50 percent.

The soil was classified as Summit silt loam, commonly known as "black limestone soil," and considered one of the better corn soils of the region.

(4) The Parsons Field — on the farm of E. O. Volmer, Parsons, one mile east, three miles north, and one half mile east of Parsons. The field was established in 1924 and operated for nine years, until 1933 when appropriations were reduced. The area rented varied from 13 to 30 acres, at \$6 an acre. The soil has been classified as Gerald silt loam, one of the prevailing soil types of the region. The field was operated throughout the nine years by E. O. Volmer, who was paid at the prevailing rates an hour: man labor, 30 cents; man and team, 62½ cents; extra horse, 15 cents. Those rates included use of ordinary farm implements.

(5) The Rest Field — on land owned by R. W. Wing, Benedict, eight miles north of Altoona on U. S. Highway No. 75, established in 1924 with 30 acres rented at \$7 an acre; closed in 1931 when funds were reduced. The field was operated throughout by R. W. Wing. The soil was classified as Crawford silt loam. The surface soil was dark red underlain with a red subsoil and



Fig. 21.—I. K. Landon, superintendent of the southeast Kansas Experiment Fields 1924-1934. Mr. Landon was the first person employed in Kansas for experiment field work.

with limestone at three to four feet deep, locally known as "red limestone soil."

(6) The Thayer Field—1938 when appropriations for support of experimental work in southeastern Kansas were increased from \$3,000 to \$5,000 a year, a sixth field was established at Thayer. The fields at Parsons, Fort Scott, and Rest were not re-established, so three fields were operated from 1938 to 1944 when the Moran field was closed, leaving two fields in operation from 1944 to 1962. The Thayer field was closed in 1962, so the Columbus field was the only one operating in 1964.

The Thayer field was located first on the P. A. Robertson and Son farm, four miles north of Thayer on Highway 169. The field consisted of approximately 34 acres, with rental of \$5 an acre raised to \$6 in 1942, and \$7 in 1952. The memorandum of understanding with Mr. Robertson was terminated September 1, 1953, and a new memorandum entered into with G. L. Worley for nearby land owned by Mr. Worley.

Work on southeast Kansas fields has been agronomic: crop rotations and soil fertility studies, variety tests of alfalfa, soybeans, corn, sorghum, wheat, oats, flax, grasses, and miscellaneous crops.

A bulletin, "Soil Fertility Investigations at the Columbus Experiment Field, 1924-49," by F. E. Davidson and F. W. Smith, Kansas Agricultural

Experiment Station Bulletin 343, reports on some of the soil fertility investigations at Columbus.

Financial Support

The southeast Kansas fields have been supported by direct appropriations of the Legislature at \$6,000 annually from 1923 to the depression of the 1930's when, for the four years, 1934 to 1937, the appropriation was reduced to \$3,000 annually. Starting in 1938 and continuing until 1949, the appropriation was \$5,000 annually. In 1950, it was increased to \$10,000 where it is now (1964). Starting in 1952, the fields have been supported by a lump sum appropriation for all fields allotted by the Director of the Experiment Station.

Personnel

Superintendents of Southeast Kansas Experiment Fields

I. K. Landon	1924-1934
Floyd E. Davidson	1934-1949
Verlin H. Peterson	1949 to date(1964)

Northeast Kansas Experiment Fields

The 1931 Legislature appropriated \$10,000 a year to establish experiment fields in northeast Kansas, to study problems in fruit production, potato production, production of field crops, and the management of soils.

Four fields were established in 1932: Blair orchard, Atchison orchard, Newman potato field, and McLouth farm crop field.

The Blair Orchard— in Doniphan County one fourth

mile west of Blair and five miles west of Troy on U. S. Highway 36, on land owned by John Muench. The orchard planted in 1919-20 contained about 35 acres. The experimental work was conducted on the center 10 rows of trees in the orchard, about 10 acres.

The soil in the orchard was loessial, belonging to the Knox series, typical of the northeast Kansas orchard region, deep reddish-brown with a subsoil slightly lighter than surface soil. At no place in the orchard has any tightness in the subsoil or glacial remnants been found.

Experiments started in 1932 consisted of soil management studies embracing clean culture, sod culture, straw mulch, and commercial fertilizers. Four varieties of apple trees were used experimentally: Winesap, Delicious, Jonathan, and York. Other studies related to severity of pruning, rate of thinning, and harvest sprays; also the use of codling moth bait traps to determine proper spray schedules. The November 11, 1940, freeze injured trees to the point that experiments were discontinued to try to save the orchard. All trees were fertilized in 1941 with five pounds of sulphate of ammonia each. No other treatments were applied except additional fertilization and mowing to keep down weeds.

The superintendent reported that the November, 1940, freeze eliminated the six rows of York trees at the north end and killed most of the trees

in the two York rows in the center of the orchard. Most of those trees leafed out in the spring of 1941, but the leaves died during the growing season. Approximately one half of the Delicious trees also were injured by the freeze and several were killed. The bark on the trunk of some Delicious trees, which had appeared to be severely injured in the spring, began sloughing off about mid-season, revealing a soft mushy bark underneath. Evidently the cambium layer had not been completely killed, and retained enough life to form a new bark. Winesap and Jonathan trees suffered little apparent injury, although one Winesap tree, previously straw mulched, was injured so badly it was necessary to remove it at the end of the 1941 season (33).

In July, 1947, a contract



Fig. 22.—T. Russell Reitz, a graduate of Kansas State College with a major in Horticulture, who was appointed in 1932 the first superintendent in charge of all northeast Kansas experiment fields.

was consummated between Mr. Muench and the Station setting forth the responsibility of each party and agreeing that all the crops produced should be sold and the proceeds of such sales divided and paid one fourth to the Station and three fourths to the lease-operator.

Until the Doniphan orchard was developed, the Blair orchard also served for certain types of experimental work, such as disease-control studies, use of blossom-thinning sprays, and of different spray materials to control insect damage. As the Doniphan orchard developed, need for the Blair orchard declined; work at it was closed at the end of the 1952 growing season.

The Atchison Orchard—established January 1, 1932, with agreement that Experiment Station bear all expenses, supervision, material, and labor of growing a 12-acre experimental orchard on the farm of Matt Ernzen, 10 miles south of Atchison and 17 miles north of Leavenworth at the junction of highways U. S. 73 and K 75. All crops grown were the property of the owner but no rent was paid for use of the land; in 1939 one half the yield of fruit went to the owner and one half to the Station. Orchard work there was abandoned by the Station in October, 1941,

In 1931, when the orchard was planted, orchardists of northeastern Kansas had recently planted 1,500 acres of commercial orchards, and

other new orchards were anticipated.

Windbreak trees were planted on the south and west borders of the orchard. Part of the land was unsuited for experimental work, leaving slightly over nine acres for experimental planting; 286 apple trees and 42 cherry trees were planted. The apples consisted of three varieties of 78 trees each of Wine-sap, Jonathan, and Richared, and 52 trees of Grimes Golden. The cherries consisted of 21 trees each of Montmorency and Early Richmond varieties.

The experimental work consisted of tree-building experiments to obtain trees of the desired shape; spraying experiments and soil management studies; comparing red clover treatment, straw mulch, cover crops, and inter-crop treatments.

The orchard developed satisfactorily for eight years. After an abundant harvest in 1940, the trees made good vegetative growth and had a heavy set of blossom buds for the 1941 crop. Tragedy hit in November. October and early November passed with no cold weather to check physiological activities of orchard trees. Then November 10 to 15, temperatures were near zero. A minimum of 4° F. was recorded at Atchison November 14. The near zero temperatures were accompanied by a high north wind and a small amount of snow. The sudden change proved disastrous to nearly all fruit trees. Examination of the experimental or-

chard through the winter and following spring showed the destruction to be so extensive that the future use of the orchard for experimental purposes was destroyed.

The orchard was abandoned by the Station for experimental purposes in October, 1941. A detailed report of the work of the orchard is contained in Bulletin 301 of the Kansas

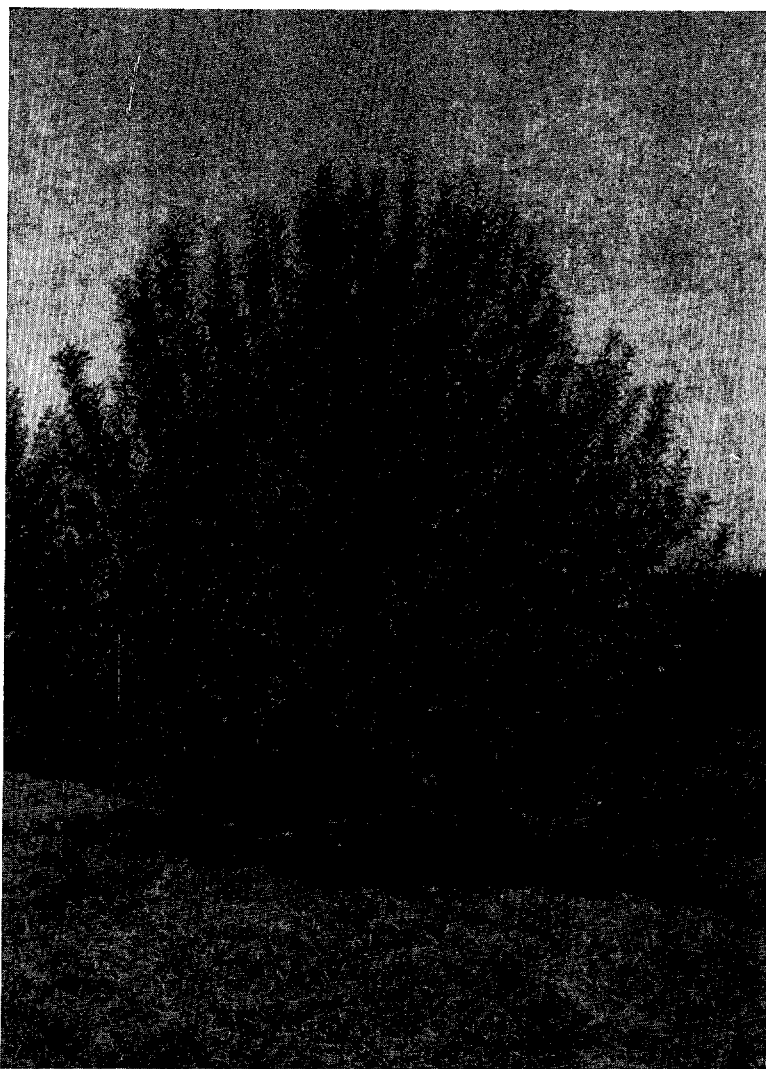


Fig. 23.—Tree number 71 in the Atchison orchard, 7 years old and bearing its first crop. This tree as well as most other trees in the orchard was killed by the 1940 November freeze.

Agricultural Experiment Station, May, 1942, entitled "The Atchison Experiment Orchard."

The Doniphan Orchard—A new experimental orchard to replace the Atchison orchard was planted in 1942 on the farm of V. M. and P. F. Dubach (Dubach Brothers) in Doniphan County one mile south of Blair and three miles west of Wathena. A memorandum of understanding December 20, 1944, provided for rental of approximately 15 acres,⁵ with all expenses in growing the orchard borne by the Station. When the orchard came into production, fruit harvested would be sold and the income divided, one half to the Dubach Brothers and one half to the Station.

The site selected was undoubtedly one of the best for orchards in northeast Kansas. It was chosen after considering soil, slope, water, air drainage, and exposure to prevailing winds. The orchard was planned to be both experimental and demonstrational, with these objectives: (1) Hardy rootstocks; (2) contour planting; (3) variety testing; (4) orchard soil management; and (5) pest control.

The original planting (1942) consisted of 538 apple trees. The orchard was planted on the contour. Ter-

aces were level and left open at the end. The trees were planted on top of the terrace ridges with a maximum planting distance of 50 feet and a minimum of 25 feet. Combined with a permanent ground cover, the terraces were reasonably effective in eliminating runoff and erosion.

A detailed report of the Doniphan orchard is contained in Bulletin 436 of the Kansas Agricultural Experiment Station, May, 1961, entitled "The Doniphan Apple Orchard."

The Newman Potato Experiment Field—in the Kansas River valley in Jefferson County, one mile south and one and one half miles west of Newman. In 1932, 12 acres of land were rented from R. Shirley, Grantville, Kansas, for \$12 an acre annually. Farm labor was provided by the owner and paid for by the Station; the superintendent supervised work and kept records.

The soil, a very fine sandy loam, was excellent for potatoes. The land had never grown potatoes, but had been cropped chiefly to wheat. It had been fertilized with barnyard manure and had grown legumes, chiefly alfalfa.

The experiments conducted consisted of rotations of potatoes, corn, and oats, and with alfalfa two years or with soil-improving crops such as annual sweet clover, rye, vetch, turnips, or cowpeas one year. Different combinations of commercial fertilizers also were used. Other studies con-

5. While the Memorandum of Understanding provided for the use of 15 acres, the area actually planted to orchard was approximately 33 acres of which approximately one half was selected for the experiment orchard, with the Dubach Brothers planting the rest of the area as a commercial orchard.

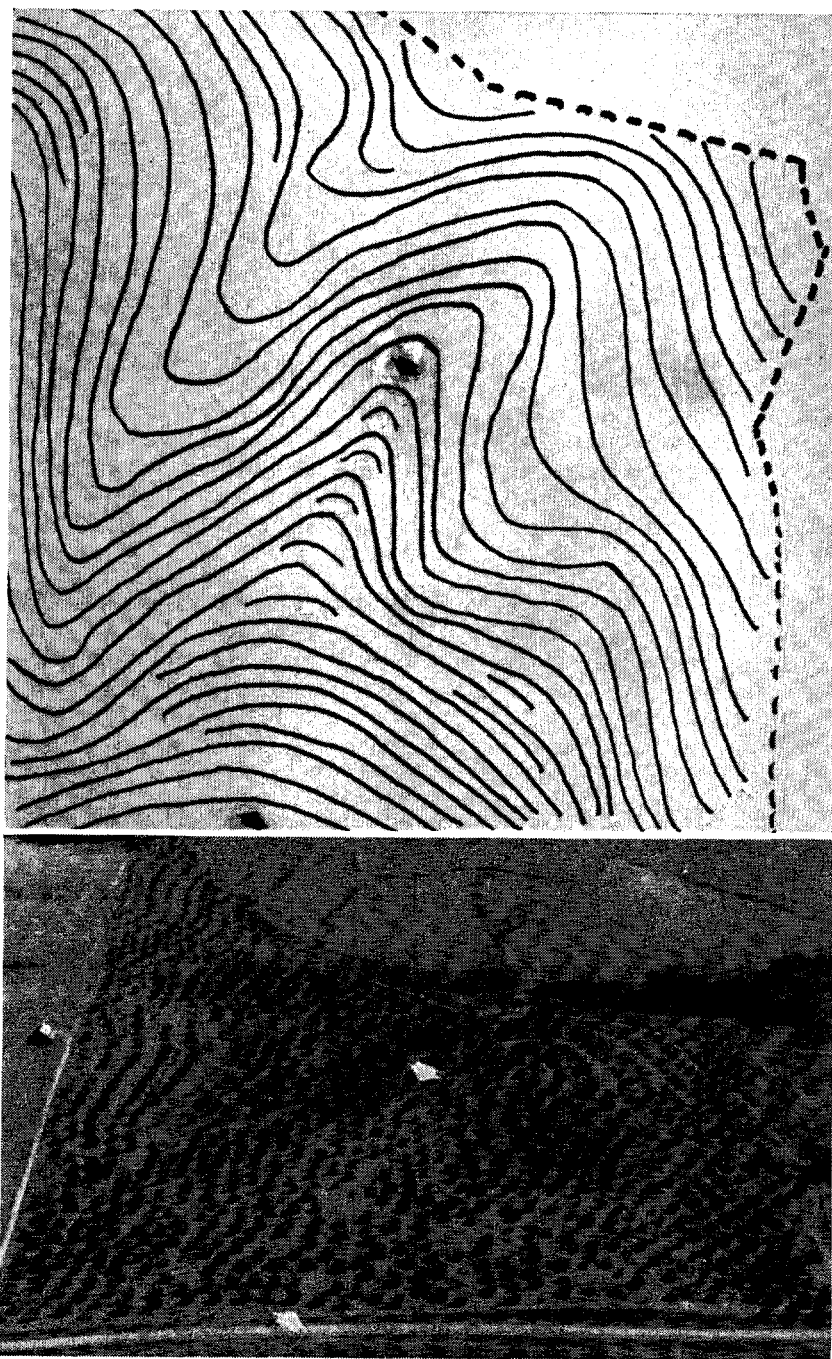


Fig. 24.—(Top) Contour map of the Doniphan Orchard; (bottom) an aerial view of the orchard.

sisted of date and depth of planting; effect of size of seed pieces used; straw mulches with and without nitrogenous fertilizers; potato variety tests; and potato diseases.

Potato scab developed in all plots and was so serious that it limited production in some portions of the experimental area. To study control of scab, areas most heavily infested were used only to study scab and other potato diseases. Three acres of additional land were rented in 1953 for experimental work to replace that used for pathological studies. The studies were directed by Dr. O. H. Elmer of the central station at Manhattan.

The Newman field started in 1932 was one of five financed from the annual appropriation of \$10,000 for northeast Kansas experiment fields, which was reduced to \$6,000 annually in 1934. The reduced appropriation, plus a succession of very poor crop years, made it necessary to discontinue the work on one field at the close of the 1939 season. The Newman field was one of the most expensive to operate and interest in potato production in Kansas⁶ was declining, so the Newman field was closed at the end of the growing season in 1939.

The Wathena Small Fruits Experiment Field—started in 1933 to conduct small fruit experiments, particularly with strawberries and raspberries,

on 3.6 acres of land of the Wathena High School in Doniphan County, without cost. The land, at the west edge of Wathena, was nearly level and well drained. Soil was black-gray loam of the Waukesha series. It was satisfactory but not typical of small fruit land of the region, which is loessial soil of the Knox series.

Experimental work was limited to three crops, strawberries and black and red raspberries. Principal problems with strawberries were to control insect pests, principally strawberry leafroller, and to maintain yield. Paul G. Lamerson of the Department of Entomology of the central station was stationed at the Wathena field to conduct experiments, primarily cooperative ones, with strawberry producers of Doniphan, Atchison, and Leavenworth counties. Fertility of soil is very important in strawberry production and various soil-building methods were tested at the Wathena field. Some of them were: number of crops of strawberries to expect from a field; value of different renovation methods; practicability of hand spacing of runner plants; limiting row width; value of winter mulch and others. Variety tests also were conducted to determine better varieties and to establish such varieties in commercial fields.

Two types of work were undertaken with black raspberries: (1) control of diseases, principally anthracnose, and

6. Irish potato production (acres harvested) declined in Kansas from 44,000 acres in 1932 to 26,000 acres in 1939, and to 2,300 acres in 1960.

(2) cultural practices affecting production. Anthracnose disease often decreased black raspberry yields a third to one half. Studies of the control of the disease were directed by the plant pathologists at the central station and consisted principally of work with Bordeaux sprays pertaining to dilution, time of application, and sticking agencies. Leaf spot disease was also studied. Cultural studies relating to problems affecting pruning, such as number of canes per hill, length of laterals, and height of topping, also were made, as were soil management with manure, cover crops, and mineral fertilizers, and preventing winter injury by cover cropping and regulating late cultivation; and variety testing.

The work on the Wathena Experiment Field was terminated in 1948.

The Mt. Airy Experiment Field. With the Wathena Field closed, soil more nearly representative of the type used for small fruit production in northeast Kansas was selected near the Mt. Airy grade school, one and one half miles south of Blair and four miles west of Wathena. The soil is loessial in origin, typical of the region and classified as the Knox silt loam. Four acres were leased July 1, 1949, from V. M. Dubach and P F. Dubach (Dubach Brothers) at \$25 an acre. The field was rolling in topography, subject to erosion, and required care-

ful handling to prevent serious soil loss.

The plan was to devote the field to experimental work with strawberries, raspberries, and grapes. Strawberry plantings were made in 1948. Plants were set on the contour in rows spaced at 3.5-foot intervals with plants about 24 inches apart in the rows. Additional plantings have been made each year since 1949. Twenty varieties of grapes were planted in 1949, on the contour, with 10 feet between rows. New varieties of grapes were added each year until approximately 61 varieties were being tested by 1954.

In the fall of 1953, an additional area of five acres, east of the grape arbor, was rented from Dubach Brothers. This area was used for vegetable insect investigational work and for a peach orchard. Ten varieties of peaches, five trees of each variety, were planted March 27, 1954. The trees were spaced 25 feet apart and planted on the contour, with the trees set on the crest of terrace ridges. Four varieties of black raspberries, 20 to 25 plants each, were planted in the spring of 1955, but abandoned in 1959 when the plants were found to be infected with crown gall.

The experimental work with strawberries has consisted of: spraying to control insects and diseases; variety testing; soil management studies; spraying to control diseases and insects; different methods of pruning; use of vigor-

ous rootstocks; and commercial fertilizer applications. The work with peaches consisted of: variety testing and commercial fertilizer tests. Starting in 1958, some vegetable variety test work has been undertaken.

Work pertaining to control of insects has been an important phase of the investigational work at the Mt. Airy field since 1949. The work was planned and directed by the staff in entomology of the central station, especially by Dr. R. L. Parker. Work was supervised by E. L. Eshbaugh who was stationed at Wathena and devoted most of his time to insect control experimental work in northeast Kansas.

The McLouth Experiment Field, devoted to experimental work with crops and soils, was located in Leavenworth County on Highway 92, four miles north and three miles east of McLouth, on land owned by J. R. Tullis of McLouth. It began January 1, 1932, with rental of approximately 25 acres for 10 years with privilege of renewal at \$5 an acre annual rental fee.

The soil classified as Shelby silt loam has been derived from glacial material and represents remains of a shallow or light till of glaciation from Kansas drift influenced by loessial material. It is slightly acid, low in phosphorus, lime, and organic matter. It is rolling in topography, susceptible to washing, and had to be terraced to control erosion.

The field was laid out in

two areas, separated by a pasture of approximately one fourth mile wide. The east field was used for crop rotations and soil fertility studies, and the west field for crop variety studies including oats, wheat, corn, soybeans, alfalfa, grasses, and popcorn. The fields supplied valuable information on varieties of crop plants adapted to northeastern Kansas and on desirable soil management practices. However, funds were not sufficient to support work on all northeast Kansas fields, so work on the McLouth field was discontinued in 1942.

Financial Support

The northeast fields have been supported by direct appropriations of the legislature—\$10,000 annually for 1932-33; from 1934 to 1949, \$6,000 annually. Starting in 1950, the work has been supported by a lump sum appropriation of the legislature as an item in the appropriation act of the University for experimental field work. The allocation of funds among fields is by the Director of the Station. In no year has the allotment been less than \$6,000.

Personnel

The Northeast Kansas Experiment Fields were administered by a committee appointed by the Director of the Agricultural Experiment Station. The committee consisted of the head of the Department of Agronomy, chairman, and heads of the Departments of Horticulture, Botany and

Plant Pathology, and Entomology. The committee method of management was discontinued after 1946 and the work directed by the department heads concerned under the direction of the Director of the Station.

T. Russell Reitz, a graduate of Kansas State College with a major in horticulture, was appointed the first superintendent in charge of work at all fields. He served from 1932 to 1935.

Erwin Abmeyer was appointed acting superintendent in 1935 and superintendent in 1936, and has served continuously since then. Mr. Abmeyer is a graduate of Kansas State College, also a major in horticulture. His long tenure, intimate knowledge of horticultural problems, and pleasing personality have contributed greatly to his success and have won him the respect and confidence of fruit growers

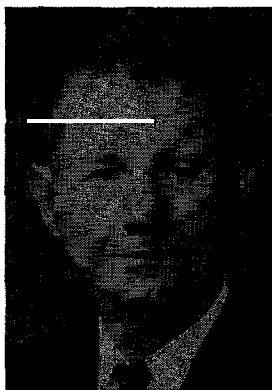


Fig. 25.—Erwin Abmeyer, who was appointed acting superintendent of the northeast Kansas experiment fields in 1934 and superintendent in 1936. He has served continuously since.

of the region. His annual reports prepared with meticulous care constitute a splendid record of his 30 years of service.

In 1934, Paul G. Lamerson was appointed assistant entomologist and stationed at the Wathena field. He worked closely under the direction of Dr. R. L. Parker, entomologist of the central station, in the experimental fruit insect control work.

E. L. Eshbaugh succeeded Lamerson as assistant entomologist in 1945. Mr. Eshbaugh continued to work under the direction of Dr. R. L. Parker until Doctor Parker retired in 1958.

During the operation of the Newman Potato Experiment Field from 1932 to 1939, Dr. O. H. Elmer of the Department of Botany and Plant Pathology of the central station personally supervised plant disease experimental work there. After that field closed he supervised the plant disease experimental work at other fields.

Publications Relating to the Northeast Kansas Experiment Field Investigations

1. Lamerson, Paul G. and Parker, Ralph L. 1939. Lead Arsenate Combinations and Nicotine Combinations as Control Measures for the Codling Moth During the Season of 1938. *Bien. Rept. Kans. St. Hort. Soc.* Vol. XLIV.
2. Lamerson, Paul G. and Parker, Ralph L. 1939. Control of the American Strawberry Leaf-roller During the Season of 1938. *Bien. Rept. Kans. St. Hort. Soc.* Vol. XLIV.
3. Parker, Ralph L. and Lamer-

son, Paul G. 1939. Lead Arsenate Combinations and Basic Copper Arsenate as Control Measures for the Codling Moth During the Season of 1939. *Bien. Rept. Kans. St. Hort. Soc. Vol. XLIV.*

4. Parker, Ralph L. and Lamerson, Paul G. 1939. Control of the American Leafroller During the Season of 1939. *Bien. Rept. Kans. St. Hort. Soc. Vol. XLIV.*

5. Lamerson, Paul G. 1934. The Apple Curculio in Northeastern Kansas. *Bien. Rept. Kans. St. Hort. Soc. 42:53-56.*

6. Parker, Ralph L. and Lamerson, Paul G. 1934. The Codling Moth and Factors Affecting Its Control. *Bien. Rept. Kans. St. Hort. Soc. 42:100-107.*

7. Lamerson, Paul G. and Parker, Ralph L. 1934. Arsenical Compound Substitutes for Lead Arsenate. *Bien. Rept. Kans. St. Hort. Soc. 42:93-98.*

8. Barnett, R. J. 1934. The Northeast Kansas Experiment Fields. *Bien. Rept. Kans. St. Hort. Soc. 42:35-38.*

9. Lamerson, Paul G. 1936. The Relation of Codling Moth Bait Traps to Proper Spray Dates. *Bien. Rept. Kans. St. Hort. Soc. 43:48-53.*

10. Parker, Ralph L. and Lamerson, Paul G. 1936. Substitutes for Arsenate of Lead Used as Sprays for Codling Moth Control During the Season of 1934. *Bien. Rept. Kans. St. Hort. Soc. 43:54-59.*

11. Parker, Ralph L. and Lamerson, Paul G. 1936. Substitutes for Arsenate of Lead Used as Sprays for Codling Moth Control During the Season of 1935. *Bien. Rept. Kans. St. Hort. Soc. 43:60-64.*

12. Parker, Ralph L. and Lamerson, Paul G. Substitutes for Lead Arsenate Used as Sprays for Codling Moth Control During the Season of 1936. *Bien. Rept. Kans. St. Hort. Soc. 44:115-121.*

13. Parker, Ralph L. and Lamerson, Paul G. Substitutes for Lead Arsenate Used as Sprays for Codling Moth Control During the Season of 1937. *Bien. Rept. Kans. St. Hort. Soc. 44:121-130.*

14. Barnett, R. J. The Atchison Experiment Orchard, Kans. Agr. Expt. Sta. Bul. No. 301.

15. Lamerson, Paul G. and Parker, Ralph L. Lead Arsenate Soybean Flour and Lead Arsenate Zinc Sulphate Combination Sprays for Codling Moth Control During the Season of 1940. *Bien. Rept. Kans. St. Hort. Soc. 46:81-90.*

16. Parker, Ralph L. and Lamerson, Paul G. Control of the Strawberry Leafroller During the Season of 1940. *Bien. Rept. Kans. St. Hort. Soc. 46:91-98.*

17. Lamerson, Paul G. Some of the Accomplishments of Fruit Insect Research in Northeast Kansas, 1932 through 1940. *Bien. Rept. Kans. St. Hort. Soc. 46:75-79.*

18. Lamerson, Paul G. and Parker, Ralph L. Effective Control of American Strawberry Leafroller. *Bien. Rept. Kans. St. Hort. Soc. 46:187-191.*

19. Parker, Ralph L. and Lamerson, Paul G. Lead Arsenate and Tricalcium Arsenate Combinations as Sprays for the Control of Codling Moth. *Jour. Econ. Ent. 36:205-210.*

20. Lamerson, Paul G. and Parker, Ralph L. New Insecticides in Codling Moth Control. *Kans. St. Hort. Soc. Newsletter Supplement.*

21. Parker, Ralph L. and Lamerson, Paul G. Lead Arsenate and Nicotine Combinations as Sprays for the Control of Codling Moth During the Season of 1948. Bureau of Ent. and Plant Quarantine, Part I. Agr. Research Admin., pp. 22-30.

22. Parker, Ralph L. and Lamerson, Paul G. Preliminary Report on the Biology and Control of the Strawberry Root Worms *Paria canella* (Fab.) and *Graphops pubescens* (Mels.). *Bien. Rept. Kans. St. Hort. Soc. 47:114-116.*

23. Parker, Ralph L. and Lamerson, Paul G. Codling Moth Control by D.D.T., Fixed Nicotine, and Lead Arsenate Combination. The Codling Moth Pool, Bureau of Entomology and Plant Quarantine (Mimeographed Publication), pp. 37-46.

24. Parker, Ralph L. and Eshbaugh, E. L. Codling Moth Control with D.D.T., Lead Arsenate, and Fixed Nicotine Combinations During 1946. The Codling Moth Pool, Bureau of Entomology and Plant Quarantine (Mimeographed Publication), pp. 44-57.

25. Barnett, R. J. Lessons from the Atchison Experimental Orchard. *Proc. Kans. St. Hort. Soc.* 47:31-37.

26. Parker, Ralph L. and Eshbaugh, E. L. Codling Moth and Red Spider Control in Northeast Kansas During 1946. **1946.** Results of Codling Moth Investigations. Part I. Entomology and Plant Quarantine, pp. 39-46.

27. Parker, Ralph L. and Eshbaugh, E. L. Codling Moth and Mite Control in Kansas with New Insecticides. *Jour. Econ. Ent.* 40: 861-864.

28. Abmeyer, Erwin. Scab Control Experiments, Blair Experiment Orchard, 1945. *Bien. Rept. Kans. St. Hort. Soc.* 48:76-79.

29. Eshbaugh, E. L. and Parker, Ralph L. Two-spotted Mite, Codling Moth, and Red-banded Leafroller Control During 1947. *Bien. Rept. Kans. St. Hort. Soc.* 47:122-132.

30. Eshbaugh, E. L. Codling Moth Control in Northeast Kansas During 1948. *Bien. Rept. Kans. St. Hort. Soc.* 50:38-41.

31. Eshbaugh, E. L. Codling Moth Control in Kansas During 1949. *Bien. Rept. Kans. St. Hort. Soc.* 50:124-126.

32. Abmeyer, Erwin. Northeast Kansas Experiment Fields: 1948 Experimental Results. *Bien. Rept. Kans. St. Hort. Soc.* 50:42-48.

33. Abmeyer, Erwin. Some Notes from the Northeast Kansas Experiment Fields in 1951. *Proc. Kans. St. Hort. Soc.* 51:101-105.

34. Lichstein, E. P., DePew, L. J., Eshbaugh, E. L. and Steesman, T. P. Persistence of D.D.T., Aldrin, and Lindane in Some Midwestern Soils. *Jour. Econ. Ent.* 53(1):136-142.

35. Filing, G. A. and Abmeyer, Erwin. The Doniphan Apple Orchard. *Kans. Agr. Expt. Sta. Bul.* No. 436.

South-central Experiment Fields

The Kansas Legislature in 1931 appropriated \$6,000 a year to establish crop and soil experiment fields in south-central Kansas. The appropriation was reduced to \$4,500

annually before the first year's appropriation became available, July 1, 1931. Three fields were established in the fall of 1931 and work started in the spring of 1932 at these places: Sedgwick field, 35 acres, known locally as the "Ten-mile Post Farm," on U. S. Highway 54, 10 miles west of Wichita, owned and operated by M. W. Reese, Goddard, Kansas; Kingman field, 30 acres, eight miles south and two miles east of Kingman, owned by Joe Birkenbaugh and operated by Claude Brand, Basil, Kansas, but relocated in 1941 on an area operated by Claude Brand on State Highway No. 17, seven miles south of Kingman; Pratt field, 35 acres, in Pratt County two miles north and one mile west of Pratt, owned and operated by Frank Schaffer, Pratt, Kansas. Work on the Pratt field was discontinued after two years when the 1933 Legislature reduced appropriations for fields from \$4,500 to \$3,000 annually.

The fields were rented for cash, with team and tractor work done by cooperating farmers. All records were taken and hand work was performed by field superintendents.

Work on these fields consisted of crop rotations in which different legumes were compared; use of commercial fertilizers, lime, manure, and green manure; various cultural methods; and variety tests of alfalfa, sweet clover, cowpeas, sorghums, soybeans, corn, oats, wheat, barley, flax, and pasture crops. The fields

provided an opportunity to test the value of combine sorghums being developed then.

The 1937 Legislature increased appropriations for the fields from \$3,000 to \$5,000 annually. The increase enabled work to be started on a third field, the Hutchinson field. It was started in 1938 on the farm of Walter Peirce, Jr., Darlow, Kansas, six miles south of Hutchinson and approximately six miles west of Darlow. The work undertaken on the Hutchinson field was less intensive than that on the Wichita or Kingman fields and was not carried out on any designated acreage. The work consisted largely of variety tests of the important field crops produced commercially by Mr. Peirce.

In 1949, a tract of land near Hutchinson, Kansas, belonging to the United States Government known as the High Frequency Director Finder Station, was declared Government Surplus Property and was acquired by Kansas for agricultural, educational, and experimental purposes. The area, 165 acres, was 6¼ miles south and 5 miles west of Hutchinson. July 12, 1949, a quitclaim deed between the United States acting by and through the Federal Farm Mortgage Corporation, Wichita, Kansas, and the State of Kansas — Kansas State College of Agriculture and Applied Science — transferred title of the property to the College under these conditions for 20

years each: (1) the premises shall be continuously used for educational and research activities; (2) the College shall file semi-annual reports with the War Assets Administration setting forth the way the property is utilized; (3) the College shall not re-sell any of the property without written authority, except that temporary buildings might be replaced by other structures having the same utility, and that in case of any national emergency declared by the President of the United States, the United States Government is to have full possession and use of the property provided that, if such use is required after the expiration of 20 years, the United States Government is to pay a fair rental for the entire portion of the premises so used.

The field was assigned to the Agricultural Experiment Station for experiment field work. During the first year, 1950, it was cropped uniformly to commercial crops rather than being used for experimental work, and work with Walter Peirce was terminated. The Wichita field was closed in 1951; the Kingman field, in 1952, and work on all south-central fields was transferred to the new farm near Hutchinson.

Personnel

Superintendents of South-central Kansas Fields

C. E. Crews	1932-1937
Clare R. Porter	1938-1943
Walter A. Moore	1943 to date (1964)

Southwest Experiment Fields

The 1935 Kansas Legislature appropriated \$3,000 for 1936 and \$4,000 for 1937 to establish experiment fields in southwestern Kansas. The first field to be established, the Meade field, was on the John Hiatt farm nine miles west and two and one half miles north of Meade. Plans for the field were completed during the winter of 1935-36 and field work started in the spring. The field's soil is Richfield silt loam, an important soil type in southwestern Kansas devoted principally to the production of wheat and sorghum. The field's elevation is approximately 2,766 feet, with gently rolling topography and known locally as "upland soil." Precipitation at Plains, Kansas, nearest weather station to the Meade field, was 18.88 inches for 25 years, 1910-1935. Driest year was 1910 with 9.25 inches; wettest was 1915 with 31.62 inches.

The Meade field was 40 acres divided into plots from one fortieth to one fifth an acre. Major emphasis was placed on the production of wheat, with sorghum production second in importance. The experiments planned for the field included extensive studies of the effect of different methods of soil management on moisture conservation and on crop yields of all farm crops adapted to southwestern Kansas.

Other studies consisted of preparing seedbeds for sor-

ghum grown continuously; width-of-row planting of sorghums; time-of-planting and variety tests of sorghum and corn; wheat variety tests; rate-of-planting tests of wheat; experiments with barley, oats, tepary beans, and cowpeas; spacing of sorghums as related to subsequent wheat production; methods of fallow for wheat; methods of seedbed preparation for continuous wheat; methods of seedbed preparation for wheat second year after fallow; and studies of adapting native grasses, such as western wheatgrass, buffalograss, sand drop seed, crested wheatgrass, and others.

The Dodge Field. —The second field established was the Dodge field (in 1937). It was a 40-acre tract in Ford County 20 miles south of Dodge City and three miles north of Minneola on U. S. Highway 283. It was on a field owned by G. P. Rooney of Dodge City and managed by his son, Bernard Rooney. J. A. Dill lived on the Rooney farm. Most of the farm operations on the Dodge field were performed by the Station superintendent with little or no assistance from the landowner.

Soil on the Dodge field was Richfield silt loam similar to that on the Meade field. It had a slope of less than one fourth of one percent and was well adapted to wheat and sorghums.

Precipitation at the Dodge field was slightly higher than that at the Meade field, averaging 20.18 inches from 1910

to 1930. The driest year was 1910 with 10.12 inches; wettest, 28.75 inches in 1950. The experimental work conducted on the Dodge field was similar to that on the Meade field.

Since most farm operations were performed by the field superintendent, considerable farm equipment and a machine shed to house it were purchased.

Since conditions on the Meade and Dodge fields were similar both as to soil type and climate, and information relative to other soil types of the area, especially sandy soils, was needed, the Meade field closed January 1, 1949, and the land returned to its owner.

Liberal Field.—After considering several southwest Kansas counties for an experiment field on sandy soil, a field was selected in Seward County, seven miles north of Liberal on U. S. Highway 83, on a farm owned by Roy E. Smith of Liberal and operated by Arbuthnot Brothers. The field was selected in the summer of 1949 and variety wheat tests were planted, but full operations started in 1950.

After attempting to operate the field through 1951, it became evident that it would be impossible to control soil blowing on sandy soils of southwestern Kansas without conducting farm operations on larger areas than the small plots of an experiment field. Consequently, the Liberal field was closed in 1951, and work started on larger areas with cooperating farmers. Cooper-

ating farmers in 1953 were Raymond Boles, four miles west of Liberal, wheat and milo fertility tests under irrigation; Clarence Ballard, nine miles south and 10 miles west of Meade, milo and forage sorghum fertility tests; Jack Bozarth, two miles south and six miles east of Liberal, milo fertility tests.

Operations on the Dodge field and cooperative experimental work with farmers continue (1964).

Personnel

Superintendents of the Southwest Kansas Fields
Andrew B. Erhart 1936-1945
M. C. Axelton .. 1946 to date (1964)

Mr. Axelton succeeded Mr. Erhart in 1946 when Mr. Erhart became project leader in dryland agriculture at the Fort Hays Branch Experiment Station.

North-central Experiment Fields

The Kansas Legislature of 1941 appropriated \$6,000 for 1942 and \$5,000 for 1943 to establish experiment fields in north-central Kansas. Two fields were established, 28 acres in Republic County, two miles west of Belleville, and 20 $\frac{1}{3}$ acres in Smith County, approximately one mile west of Smith Center. Both fields were adjacent to U. S. Highway 36.

The Belleville field was rented at \$5 an acre in 1942, with the rental increased to \$10.75 an acre in 1947. The rent paid for the Smith Center field was \$6.50 an acre.

The Smith Center field was

closed in 1949 and a field was established at Mankato, at the request of the legislator from Jewell County who insisted on a field in his county. The Mankato field was started with planting of wheat fertility and wheat variety test plots in 1949.

The Mankato field, 12½ miles west of Mankato on U. S. Highway 36 and 2½ miles south of Esbon, is often referred to as the Esbon Experiment Field. It is 23½ acres leased from J. K. Beachey of Kansas City, Missouri, at \$15 an acre.

North-central Kansas received moderate rainfall, averaging annually several inches less than in northeastern Kansas and several inches more than farther west in the state. Normal rainfall, 45-year average (1898-1942), has been 26.52 inches at Belleville and 24.56 inches at Burr Oak near Mankato. The driest year on record at Belleville was 1934 with 11.79 inches and 1936 with 12.38 inches at Burr Oak.

Experimental work on the north-central Kansas fields is agronomic. It has consisted of variety tests of sorghum, corn, wheat, barley, and other spring grains, flax, soybeans, alfalfa, and sweet clover; other work consists of fertility studies with alfalfa, corn, grain sorghums, wheat and oats; herbicide studies with corn, grain sorghums, and soybeans; date-of-planting tests with grain sorghums and soybeans; method of planting and date of planting grain sorghums; date of applying ni-

trogen to wheat; residual fertilizer effects on wheat; width of row and date of planting sorghums; sudangrass variety hay yields and other studies. The Belleville field was one of eight locations in Kansas selected for a sorghum phenology experiment to study the influence of temperature on the time required from planting to 50 percent bloom in six standard varieties of grain sorghum.

Personnel

Superintendents of North-central Kansas Fields

Robert F. Sloan	1942-1943
M. C. Axelton	1944-1946
Robert F. Sloan	1946-1960
Robert Morin	1960-1964
James E. Conger	1964

Bindweed Experiment Field

Field bindweed (*Convolvulus arvensis* L.) is a deep-rooted perennial plant recognized as the most serious weed pest in Kansas. It is found well distributed over the state, but occurs most extensively in west-central Kansas, with Ellis County as the center, and in central Kansas centered in Marion and McPherson Counties. The first experiments organized to control bindweed in Kansas were conducted in 1907 and 1908. The work was supported by an appropriation of \$1,000 made by the Kansas Legislature to the Kansas Agricultural Experiment Station in 1907. This beginning was followed by much more extensive work at the Fort Hays Branch Experiment Station in subsequent years. Intensive cultivation proved the most prac-

tical method of control at the Fort Hays (Kansas) Station where the land was fairly level and the rainfall comparatively light.

It appeared that intensive cultivation might not be so satisfactory for areas farther east where the land was more rolling and the rainfall heavier. The Kansas Legislature in 1941 appropriated funds for the establishment of an experiment field to study how best to control this weed in more humid regions. The field selected was 80 acres one half mile south of Canton near the McPherson-Marion county line and near the center of the heavily infested area of central Kansas. It had been poorly farmed with no effort to control bindweed. The entire 80 acres were completely matted with bindweed. The soil over most of the field was clay loam with tight subsoil that prevented good natural drainage.

The land was leased November 23, 1951, at \$9 an acre with renewal privilege. The lease was renewed September 18, 1958, at \$12 an acre rent. The lease was terminated and the field closed June 30, 1960.

The experimental work undertaken was of three general types: (1) Weed control by tillage; (2) weed control by crop competition; and (3) weed control by herbicides. While the work was primarily to eradicate bindweed, some work was to control other noxious but less troublesome weeds, such as dogbane (*Apocynum cannabinum* L.), John-

songrass (*Sorghum halepense* Pers.), Russian knapweed (*Centaurea picris* Pall), climbing milkweed (*Gronolabus laticris* Michx.), wild rose (*Rosa suffulta*), dandelion (*Taraxacum vulgare* Lam.), and other weeds.

Weed Control by Tillage. — Tillage methods studied included time of beginning cultivation, time of last seasonal cultivation, frequency of cultivation, frequency of hoeing, and use of various cultivation implements. In all tillage work, an effort was made to solve soil erosion problems resulting from intensive cultivation practices, which was accomplished, in part, by implements that left crop residue on the surface of the soil.

Four different dates of beginning cultivating were used: (1) Three weeks after bindweed growth started in the spring (April 20-25); (2) immediately after small grain harvest (July 10); (3) September 1; and (4) November 1. All plots in the experiment were cultivated with a duck-foot cultivator every two weeks during the growing season until bindweed was eradicated. Beginning cultivation immediately after small grain harvest resulted in eradication in two seasons with the fewest cultivations.

Experiments to determine best time to discontinue cultivation in the fall where a winter small grain, such as wheat, was to be seeded indicated that cultivation should continue to as late as October

1 under central Kansas conditions.

Nine different frequencies of cultivation were tested. Six treatments were based on emergence and top growth. The respective plots were cultivated 0, 4, 8, 12, 16, 20 days after each re-emergence of bindweed. Range of frequency of cultivation was from one that permitted no top growth to one that allowed top growth of 20 days. The other three treatments had uniform cultivation frequencies of (1) every two weeks, (2) every two weeks the first year and every three weeks thereafter, and (3) every three weeks. Cultivating 0, 4, 8, or 12 days after each re-emergence and continuing at regular intervals of every two weeks exterminated bindweed in two seasons with an average of 34, 25, 18, 16, and 21 cultivations, respectively. A frequency of allowing 12 days top growth eradicated the bindweed in two seasons with fewest cultivations.

Competitive Cropping. — Another method used in an effort to control bindweed was crop competition—a method thought to be more economical and less likely to cause soil erosion than continuous cultivation. Sudangrass, millet, soybeans, cowpeas, and listed sorghum proved unsuccessful as smother crops. The most successful smother crop was closely drilled sorghum. One year of intensive cultivation followed by intensive cultiva-

tion in the spring, then seeding to closely drilled sorghum resulted in complete eradication during the third year of treatment. Small grain has also been used as a competitive crop. Of the small grains, winter wheat proved best. Alternate fallow and wheat with intensive cultivation after harvest successfully eradicated bindweed in three years, while fallow one year, wheat two years, with intensive cultivation after harvest completely eradicated bindweed in four years.

Bindweed Control by Herbicides. — Extensive experimental work with herbicides was conducted, varying method, rate, and time of applying sodium chlorate; rate and time of applying borascu; rate of applying ammate; effect of urea compounds and mixtures of materials containing urea; comparison of commercial preparations of 2,4-D; effect of 2,4-D formulations; and cropping of land treated with boron compounds. The most practical and effective use of herbicides has been in combination with cultivation.

Bindweed on the Canton field was controlled to the point that areas suitable for experimental work were no longer available. Recently, the field has been used chiefly for studies of soils and field crop experiments. Consequently, when an experimental soil and crop field was established near Newton June 30, 1960, the bindweed field at Canton was closed.

Personnel

Superintendents of Bindweed Fields

Don E. Crumbaker

.....July 1 to October, 1942

V. F. Bruns1943-1947

Vernon W.

Woestemeyer1947-1951

Oliver G. Russ1951-1960

Sandyland Experiment Field

There is a large area of sandyland in southwestern Kansas much of which is adjacent to the Arkansas River valley. Some is too sandy to be farmed successfully and must be kept covered with vegetation to prevent blowing. Less sandy areas are reasonably productive when handled properly. How to handle them best is a question. An unsuccessful effort was made to study this problem in 1950 on sandyland near Liberal but the field was too small for successful wind erosion control practices.

A second effort was made in 1952 by establishing a sandyland experiment field in Stafford County. It was authorized by the Kansas Legislature in 1951. A suitable 120-acre farm was found three miles south of St. John in Stafford County at the intersection of U. S. Highways 281 and 50 south, owned by Stafford County as a "County Poor Farm." March 5, 1952, a memorandum of understanding was signed by the County Commissioners and the Experiment Station. The Station was to pay \$400 rental for 1952, then \$6 an acre annually.

Soils on the farm had been classified as Pratt loamy sand, hummocky phase, Pratt loamy

fine Sand, summocky phase, Carwile sandy loam, and Carwile loamy fine sand. The hummocky condition was caused by knolls of sand and lower areas of depression. During dry years, the low areas produced considerably less than the sandy knolls. The soil in the low areas is characterized by rather compact clay or claylike material, of variable thickness. It extends from the surface down two feet or more. Its permeability is inadequate for desirable water absorption.

In addition to improving the permeability in low places, was the problem of increasing organic matter content of the loose sandy surface soils. Tillage operations on the loose sandy soil must be minimum to prevent soil blowing.

Management of the field and the experimental work to be conducted was planned by a committee of agronomists appointed by the head of the Department of Agronomy. The committee emphasized methods of preventing soil erosion by wind: stubble mulch practices, adaptation of sub-tillage machinery, and suitable crop practices. Effectiveness of those methods was reported as follows by the field superintendent: "Use of stubble mulch or residue management, narrow stripping, use of narrow rows in grain sorghum production over the first few years has done much to stabilize soils on the field" (34).

While experimental work has consisted principally of methods of handling sandy

soils to prevent soil blowing, other experiments have been conducted, including, among others, variety tests of wheat, sorghum (grain and forage), sweet clover, sudangrass, castor beans, and native grasses; fertilizer tests with wheat, grain sorghums, castor beans, and warm-season grasses; rate-of-seeding tests with grain sorghums; seedbed preparation for wheat on grain sorghum stubble; clipping tests of sudangrass and alfalfa varieties; and sorghum phenology studies.

Personnel

Superintendents of Sandyland Field
Frank E. Lowry 1952-1956
Marvin

Lundquist .. 1956 to date (1964)

Irrigation Experiment Fields

Irrigation recently has increased rapidly in Kansas. In 1963, 6,766 farmers were irrigating 1,094,641 acres: grain and forage sorghum, 494,458 acres; wheat, 264,678 acres; corn, 193,651 acres; alfalfa, 75,684 acres; and sugar beets, 18,807 acres. Water was obtained chiefly from wells, streams, and dams.

Some of the earliest Experiment Station research was studying irrigation in southwest Kansas near Garden City and in northwest Kansas near Oberlin and Oakley. The Branch Experiment Stations at Garden City, Colby and Tribune also have studied irrigation. The early work was directed chiefly to well irrigation in more arid sections of the state.

Recent construction of flood control dams, chiefly in cen-

tral and eastern Kansas, has provided a new, important source of irrigation water. Utilization of such water presented new problems. To aid in their solution, irrigation districts have been organized. In the Kansas river drainage area five districts, organized between 1946 and 1963, embrace 80,950 acres:

Irrigation District	Acres
Kirwin	11,500
Kansas-Bostwick	49,000
Webster	8,500
Almena	5,350
Cedar Bluff	6,600
Total	80,950

Increased interest in irrigation, brought about in part by the organization of irrigation districts, resulted in a demand for an experimental field to study irrigation problems. A request for an appropriation for such a field reached the Legislature in 1951, when a bill appropriating \$50,000 annually for support of experiment field work stated that not more than \$7,500 should be used to establish an irrigation experiment field.

The first field was started in 1952, nine miles northwest of Concordia on the farm of Mrs. Ida Hanson, Jamestown. The field, 34.5 acres on the second terrace of the Republican River valley, was rented May 5, 1952. Beginning in 1954, rental was \$50 an acre with an adequate well and pump furnished. The agreement was terminated December 31, 1957, and the work moved to Courtland, Republic County, where ditch water from the Bostwick Irrigation District could be obtained.

The new 150-acre field, three miles west and two miles north of Scandia on the farm of George O. Faulkner of Belleville, was rented at \$16 an acre until 1962, when rental was increased an amount equal to the General Real Estate Tax and the Bostwick Irrigation District Special Tax, paid by the lessor for the tract the previous calendar year.

Initial objectives in establishing the irrigation fields were to obtain information useful to farmers developing irrigation enterprises in irrigation districts. Major studies have been on methods of irrigation, cultural practices, water requirements and use, and kind and variety of crops adapted to irrigation.

Management of the fields have been by the Agronomy Department with the cooperation of the Department of Agricultural Engineering.

The work has been financed by legislative appropriations for experimental field work with allocation of funds by the Director of the Station.

Personnel

Superintendents of Irrigation Fields

R. F. Sloan 1952-1953

W. W. Rasmussen 1953-1954

R. F. Sloan 1955-1961

Robert J. Raney 1964 to date

Agronomist

Robert J. Raney 1955-1964

Irrigation Engineer

R. E. Hanson 1953-1955

H. L. Manges .. 1956 to date (1964)

Corn Belt Experiment Field

The Corn Belt Experiment Field was established in 1954 as a result of the active interest of individuals and or-

ganized groups who recognized the need for crop and soil experiments in northeast Kansas. Corn's prominence in that area suggested the name, Corn Belt Experiment Field. The 200-acre field is 5 miles west and 3½ miles south of Hiawatha, near Powhattan, rented from Charles F. Bredahl for \$25 an acre.

The experiment field has level topography with a slope not exceeding 4 percent and is well suited to experimental work. The soil is primarily Grundy silty clay loam developed from fine-textured loess. The loess is normally five to six feet thick and overlies glacial till of the Kansas age. Precipitation (74 years) at Horton, the nearest reporting weather station, is 33.67 inches and is well distributed for corn production, with three fourths of the total during the six summer months, April through September.

Work was started in the spring, 1954, with emphasis on developing a legume program through breeding, selection and utilization. It consisted of Birdsfoot Trefoil variety test; pasture-type alfalfa test; red clover management studies; small-seeded legume and grass variety trials; northern Great Plains uniform sweet clover nursery and a wheat-legume rotation study. As work progressed, studies of legumes gave way to increasing production of corn, wheat, soybeans, sorghum and oats through the use of improved cultural practices, soil management, fer-

tilizers and improved varieties.

Specific studies conducted during 1963 were: variety tests of wheat, oats, winter barley, soybeans and bromegrass; fertility tests with corn, wheat, oats and grain and forage sorghums; variety and date-of-planting tests with corn, grain sorghums and soybeans; row spacing of soybeans; row spacing and plant density of corn and grain sorghums; variety and plant population of corn; chemical weed control in corn, sorghums and soybeans; methods of planting corn; crop rotations involving corn, oats, red clover, wheat and alfalfa; date of planting wheat; nurseries of corn, wheat, oats, soybeans and grain sorghums; a study of soil-borne mosaic in wheat; and a grain sorghum performance test.

The field is financed by a legislative appropriation for experiment fields, allotted by the Director of the Station.

Personnel

Superintendents of Corn Belt Field

C. E. Wassom	1954-1955
Leonard B. Hertz	1955-1961
Kenneth Snelling	1961-1962
R. F. Sloan	1963 to date (1964)

Newton Experiment Field

During World War II, the U. S. Government built a Naval Air Field (Wirt Field) near Newton. No longer needed for military purposes it was obtained by the city of Newton under a quitclaim deed August 27, 1959. The city of Newton desired to place management of the field under an agency

that would maintain it in an attractive condition and the University (Agricultural Experiment Station) desired to secure a tract of land in the region for an experiment soil and crop field. Negotiations began in 1958, even before the city acquired title to the land, for the use of the land for experimental purposes.

The University leased the land for 30 years, commencing January 1, 1960, with provision for earlier termination. Instead of cash rental the University agreed to maintain the premises in reasonable neatness; to maintain certain grass areas for runway purposes for the Newton air field; and to do nothing to interfere with the use of the land as an air field.

The land is two miles east of Newton; of the approximately 500 acres, 265 acres are cropland. The cropped land used for experimental purposes lies on each side adjacent to the concrete runway taxi strip of the air field. The field has an elevation of 1,527 feet and average precipitation of 30.13 inches.

The Newton field is directed by the Department of Agronomy. During its first year of operation (1960), work consisted primarily of improving the general appearance of the field, by mowing areas not cropped during 1959. The cropped land was planted to oats, grain sorghums and soybeans in the spring and summer of 1960. The first experimental plots were harvested in the fall of 1960. Experi-

mental work has consisted of wheat, barley, soybeans, oats, castor beans, corn, and sorghum variety tests; wheat fertility studies; fertilizer nutrition needs of forage and grain sorghums; influence of row width and date of planting on soybeans; residual effect of pre-emergent herbicides — simazine and Atrazine — on oats and alfalfa following corn; the value of special combine attachments furnished by the Hesston Manufacturing Company, Hesston, Kansas, when harvesting grain sorghums and soybeans, conducted in cooperation with the Department of Agricultural Engineering of the Station; and other soil and crop studies. Performance tests and observation nurseries for both grain and forage sorghum also have been conducted.

The field is supported by legislative appropriations for experiment fields with allocations made by the Director of the Station.

Personnel

Oliver G. Russ, who had been superintendent of the Bindweed Experiment Field until it was closed in 1960, was appointed superintendent of the Newton field July 1, 1960. He served until December 31, 1963. Then he became superintendent of the Mound Valley Branch Experiment Station. He was succeeded by Floyd Davidson who drowned while vacationing in Minnesota August 12, 1964.

East-central Kansas Experiment Field

The East-central Kansas Experiment Field was established in 1952 near Ottawa in Franklin County to provide for research with grasses and legumes for grazing. Results of the research should apply to east-central Kansas south of the Kansas river valley, east of the Flint Hills and north of Wilson, Neosho and Crawford counties. The work was to be primarily with cool-season grasses in grazing trials with beef cattle. Weight increases by beef cattle pastured on various grasses established and maintained at different fertility levels were taken. Limited studies also were made on fertilized wheat, and grass and oat nurseries were maintained.

The field was established on a 280-acre farm owned by the city of Ottawa, one mile west and five miles north of the city's center. The farm of 240 acres consisted of two tracts of 160 and 80 acres respectively, separated by township roads and diagonally from each other.

The original farm of 400 acres was purchased by the city of Ottawa with the hope that a Navy Air Base would be established. When the Navy Air Base was not located at Ottawa the city developed a local airport on 160 acres of the farm, leaving 240 acres that were leased from the city to Kansas State University (Agricultural Experiment Station) for an experiment field.

The lease between the city

and the University became effective March 5, 1952, and is to continue in force from year to year until terminated by either party. All buildings and fences constructed by the University may be removed at the option of the University when and if the lease is terminated. The University pays the city of Ottawa \$8 an acre annually for the 240 acres. All crops produced on the farm are the property of the University. The University may construct sheds, ponds and fences as needed and the city of Ottawa constructed a modern residence on the farm.

At the time the farm was leased by the University the buildings, all located on the larger tract, consisted of an old two-story house, an old barn, a garage, a corncrib, a hay shed and a farm shop. In 1954 the city dismantled the old house and erected a modern, one-story, five-room house at a cost of \$8,000. The house was made available to employees of the Station without cost. All other buildings were torn down except the barn and garage.

A 3,000-gallon cistern was built near the residence by the city of Ottawa in 1954. A pipeline 50 rods long was also built to carry water to the house and to a stock pond. The stock pond constructed on the larger tract in 1952 covered two acres and had a maximum depth of eight feet. A smaller pond was constructed on the 80-acre tract the same year. A pipeline from a pump at the larger

pond distributed water to the different pastures.

A windbreak consisting of Austrian pine, redcedar, burr oak, and hackberry was planted along the north side of the farmstead in 1960.

The farm is nearly level to gently rolling and is typical of the more productive upland in eastern Kansas. The soil has been derived from calcareous shales and is of the Woodson series. The surface soils are dark silt loam to silty clay loam with an extremely tight clay subsoil. Slow penetration of water has resulted in considerable sheet erosion on much of the land. Such erosion is materially reduced by a grassland type of agriculture such as planned for this field.

Precipitation at Ottawa has averaged 37.88 inches for 30 years; elevation is 915 feet above sea level.

During the first few years after the farm was acquired, adverse soil and climatic conditions dictated that work go toward establishing uniform stands of grasses and legumes for experimental purposes. During 1956-1960 the cool-season grass pastures consisted of smooth brome, smooth brome-alfalfa, tall fescue-alfalfa, orchard grass-alfalfa, and reed canary grass-alfalfa.

The smooth brome grass pasture was maintained at a high fertility level and different pasture mixtures were maintained at both high and low levels of fertility. High fertility fields received annual

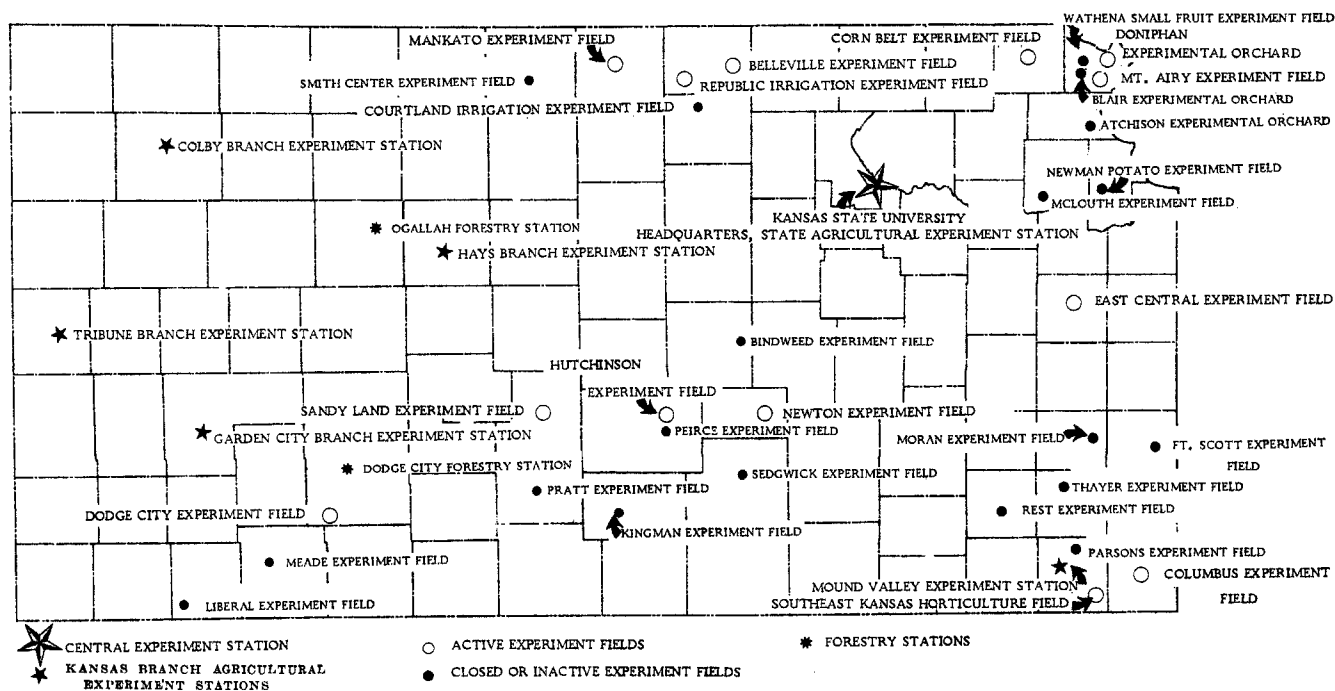


Fig. 26.—Map of Kansas showing location of the main experiment station, branch experiment stations, forestry stations and experimental fields, both active and closed. Work has been conducted on a total of 33 experiment fields, discontinued on 19 fields and is still active (1964) on 13 fields.

applications of 150 pounds of nitrogen, 150 pounds of phosphoric acid and 75 pounds of potash an acre. Low fertility fields received one third those quantities.

Fertilizer applications were changed in 1960 to one rate of 150 pounds of nitrogen, 75 pounds of phosphoric acid, and 25 pounds of potash an acre. In 1962 all fertilizer applications except nitrogen were discontinued.

The farm was divided for experiments in 1953 to 36 three-acre fenced pastures. Each treatment was replicated four times. Minimum stocking rate was one steer an acre. Weight gains of cattle were used to determine the relative value of each pasture. Cattle were weighed when turned in to the pasture, then each 28 days, and at the close of the grazing season. During 1960-1962 culm counts were made to determine effect of grazing on the stand of each grass used in the experiment.

First allocation of funds for East-central Kansas Experiment Fields was \$7,500 in 1951-1952 by the Director of the Station from the legislative appropriation of \$75,000 for experiment field work. The Legislature of 1953 made a special appropriation of \$5,000 for each year of the biennium as additional support of the field. Subsequent support has increased to \$18,000 in 1964-1965.

John E. Braum, a 1951 graduate of the College, was appointed superintendent of

the field in 1952, and has continued to date (1964).

Southeast Kansas Horticultural Experiment Field

Work leading to the establishment of a southeast Kansas horticultural experiment field was started in 1962 on a tract of land located in the flood plain of the Neosho River two miles east and one mile south of Chetopa, Kansas. Primary purpose of the field was experimental work with pecans in an area of native pecan trees. Most native pecan trees in Kansas are found in southeastern Kansas river valleys. A location in southeastern Kansas was also needed for other horticultural experimental work with black walnuts, Christmas trees, tree fruits, small fruits, and vegetables.

The field was provided by Frank Brewster, Jr., of Baxter Springs, who deeded 45 acres of land, mostly in the flood plain of the Neosho river, to Kansas State University September 10, 1962, for an experiment field.

The experimental work with pecan trees on the flood plain land consists of improving existing native trees through thinning, eliminating weed trees, fertilizer studies, insect and disease control, propagation studies including grafting techniques, rootstocks and variety adaptation.

Since the land deeded to the University was highly susceptible to flooding, it was not suitable for the headquarters of an experiment field. To

provide a more suitable location, the Station leased 20 acres of land more favorably located from the Frank L. Brewster estate at an annual rental of \$100. The September 1, 1962, lease continues from year to year unless terminated by either party after a one-year notice. All nut crops remain the property of the lessors, but all improvements constructed may, at the option of the Station, be removed when the lease terminates.

Research on the upland includes adaptation and management practices pertaining to tree fruit and small fruit production; a study of adapted vegetable varieties; cultural practices and establishing coniferous evergreens to determine adaptation; rate of growth; and other factors relating to the production of both nursery stock and Christmas trees.

The project during the first two years was financed as a project in the Department of Horticulture from the appropriation for organized research of the Agricultural Experiment Station; \$32,000 annually was allocated to support the work. Starting this year (1964-1965) the project has been organized as an experiment field supported from the appropriation for experiment fields with \$38,658 allocated by the Director.

The work has been directed by Don Meador, a graduate of the University of Missouri with an M. S. degree in horticulture who was appointed

in September, 1962. He was succeeded in 1963 by Jack Winzer, a graduate of Texas A & M College, also with an M. S. degree in horticulture.

Value of Experiment Field Work

The information obtained from experiment field work has been of inestimable value in the application of agronomic and horticultural investigational findings to the problems of different sections of the state that differ widely in climate and soil conditions. The studies supplement work of the central and branch experiment stations to provide sound recommendations on crop adaptation and soil management. The fields, located as they are throughout the state, enable farmers to visit those where conditions are most nearly representative of conditions on their farms and thus to arrive personally at decisions on varieties best adapted and soil management practices most applicable to their home farm conditions.

The results of the field work have been made known to the public through numerous publications of the Agricultural Experiment Station, by popular articles in the farm press, by technical articles in scientific journals, and by visits to the fields by interested farmers and others.

It is the custom to hold at each of the fields an annual field day at which time the public is invited to visit. Field days are held when results are most obvious and when scien-

tists of the central and branch stations can be present and assist the superintendent in explaining the work and in answering questions. A field day Report of Progress is usually prepared and distributed. The publications contain pertinent information. Attendance consisting principally of nearby farmers, interested town business men, newspaper and farm magazine men has varied, depending on weather and local interest, from a few to several hundred annually.

A measure of the high regard of the public for experiment field work is indicated by annual appropriations by the Kansas Legislature to support the work. Appropriations have increased from \$6,000 in 1923, to \$12,000 in 1934, \$31,000 in 1944, \$100,000 in 1954, and \$150,966 in 1964.

Experiment Field Appropriations Summarized

The first legislative appropriation for experiment field work in Kansas was made in 1923 to support experiment fields in southeast Kansas. Subsequent appropriations for additional fields have been made as follows: northeastern and south-central fields in 1932; southwest field in 1936; north-central fields in 1942; a sandyland field, an irrigation field, and a corn belt field in 1952; an east-central grassland field in 1952; the Newton field in 1960 and a south-

east Kansas horticultural field in 1964.⁷

Prior to 1950 the Legislature appropriated for each field individually. Starting in 1950 the Legislature made a lump sum appropriation for all experiment fields, with allocation of funds among fields made by the Director of the Experiment Station. Appropriations by years follow.

Year	Amount
1923-1924	\$ 6,000
1925	6,000
1926	6,000
1927	6,000
1928	6,000
1929	6,000
1930	6,000
1931	6,000
1932	22,000
1933	22,000
1934	12,000
1935	12,000
1936	15,000
1937	16,000
1938	21,000
1939	21,000
1940	21,000
1941	21,000
1942	32,000
1943	31,000
1944	31,000
1945	31,000
1946	31,000
1947	31,000
1948	31,000
1949	31,000
1950	39,000
1951	39,000
1952	75,000
1953	66,000
1954	100,000
1955	95,000
1956	97,300
1957	100,481
1958	103,872
1959	112,487
1960	117,061
1961	123,902
1962	129,041
1963	140,967
1964	150,966
1965	196,179

7. The southeast Kansas horticultural work was financed from the appropriation for organized research of the Experiment Station for 1962-1963. Its support from the experiment field appropriation began in 1964.

SOIL SURVEY

The Bureau of Soils of the United States Department of Agriculture early in this century started soil surveys of the United States. The first work undertaken in Kansas was in 1902 when the Wichita area, embracing about half of Sedgwick county and a small part of Butler county, was surveyed. Other areas surveyed early were: 1903, Parsons area, embracing about half of Labette county and the Russell county area, embracing about half of Russell county; 1904, Allen county area, embracing all of Allen county; and the Garden City area, embracing a small part of Finney county; 1906, all of Riley county; and 1910, a reconnaissance survey of the western half of Kansas. Survey work was done with the consent but without the cooperation of the Kansas Agricultural Experiment Station. The need for the Station to participate in the work was recognized. The Board of Regents meeting January 12, 1910, passed the following resolution: "Moved by Regent Taylor that in the estimation of the Board that the time has come when the College should undertake a soil survey of the state, and that the President be authorized to plan such a survey and to carry the work on as rapidly as funds of the College will permit" (35).

Funds were not available at the time for the College to engage in the survey, but a request was made of the 1911 Legislature for financial sup-

port for the work. Complying with this request, the Legislature enacted House Bill No. 494 authorizing the soil survey and appropriating money for the purpose.

The act follows:

"Be it enacted by the Legislature of the State of Kansas:

Section 1. That the board of regents of the Kansas State Agricultural College are hereby authorized to make a soil survey and soil analysis of the state of Kansas; and to conduct such cropping tests and other tests as shall establish the agricultural value of Kansas soils.

Section 2. For the purpose of carrying the provision of this act into effect there is hereby appropriated, out of any funds in the state treasury, not otherwise appropriated, the sum of five thousand dollars for the fiscal year 1912 and the sum of five thousand dollars for the fiscal year 1913.

Section 3. This act shall take effect and be in force from and after its publication in the official state paper.

Approved March 10, 1911.

The bill was published in official state paper, March 13, 1911" (36).

The funds appropriated under the act, \$5,000 for each year of the biennium, were not sufficient to enable the Station to accomplish much working independently, but a request was made of the Bureau of Soils for the work to be undertaken cooperatively. This request was granted and arrangements made whereby the Bureau would supply and pay the salary of the leader of the soil survey party, an assistant to be supplied and paid by the Agricultural Experiment Station of the College, and the two agencies to share in the expense of the field work.

KANSAS SOIL SURVEYS

Area	Date of Field Operations	Date of U.S.D.A. Publication	Personnel	
			U. S. Dept. of Agr.	Kansas Agr. Expt. Station
Wichita	1902	1903	J. E. Lapham, B. A. Olshausen	
Parsons	1903	1904	J. A. Drake	
Russell	1903	1904	A. W. Mangum, J. A. Drake	
Garden City	1904	1905	J. L. Burgess, G. N. Coffey	
Allen county	1904	1905	J. A. Drake, W. E. Tharp	
Brown county	1905	1906	J. L. Burgess, W. S. Lyman, W. E. Tharp	
Riley county	1906	1908	W. T. Carter, H. C. Smith	
Reconnaissance of western Kansas	1910	1912	G. N. Coffey, T. D. Rice & Party	
Reno county	1911	1913	W. T. Carter, A. L. Higgins, F. V. Emerson, A. E. Kocher	C. S. Myszka, H. C. Lint
Shawnee county	1911	1913	W. C. Byers	R. I. Throckmorton
Cherokee county	1912	1915	P. O. Wood	R. I. Throckmorton
Greenwood county	1912	1914	W. C. Byers	N. S. Robb, J. P. Stack
Jewell county	1912	1914	A. E. Kocher	R. I. Throckmorton, J. P. Stack, E. H. Smies
Montgomery county	1913	1915	F. V. Emerson, C. S. Wal-drop	
Cowley county	1915	1917	E. H. Hall, R. H. Hall, B. W. Tillman	
Leavenworth county	1919	1923	E. H. Smies	G. Y. Blair
Clay county	1926	1930	James Thorp	R. H. Davis, E. S. Lyons
Labette county	1926	1931	E. W. Knobel	R. L. Von Trebra, H. W. Higbee
Doniphan county	1927	1931	E. W. Knobel	R. H. Davis, H. W. Higbee
Wilson county	1927	1931	J. A. Kerr	J. T. Whetzel, H. W. Higbee

Kansas Soil Surveys (continued)

Area	Date of Field Operations	Date of U.S.D.A. Publication	Personnel	
			U. S. Dept. of Agr.	Kansas Agr. Expt. Station
Crawford county	1928	1931	M. H. Layton, J. A. Kerr, E. W. Knobel	H. W. Higbee, R. W. O'Hara
Johnson county	1928	1932	E. W. Knobel	R. H. Davis
Neosho county	1930	1935	M. H. Layton	R. W. O'Hara, C. E. Dornberger
Marion county	1930	1935	E. W. Knobel	R. O. Lewis
Woodson county	1931	1934	M. H. Layton	C. E. Dornberger
Bourbon county	1931	1935	M. H. Layton	C. E. Dornberger
Kingman county	1932	1938	E. W. Knobel	R. O. Lewis, C. E. Dornberger
Allen county	1935	1938	W. I. Watkins	W. H. Metzger, J. R. Latta
Saline county	1950	1959	A. J. Cline, J. T. Neill, O. W. Saffry	P. L. Brown, D. A. Dodge
Geary county	1955	1960	R. G. Dunmire, P. F. Wilson, N. L. Sodman	O. W. Bidwell
*Brown county	1955	1960	R. W. Eikleberry	
Ford county	1955	1963 ¹	D. A. Dodge, R. I. Tomasu, R. L. Haberman, J. B. Bauman, William Roth	
Republic county	1955	²	C. H. Atkinson, D. A. Gier	C. H. Atkinson ²
Finney county	1956	1963 ¹	R. F. Harner, R. C. Angell, M. A. Lobmeyer, D. R. Jantz	
Logan county	1956	1964	E. L. Bell, L. D. Linnel, C. M. Call, J. S. Hagihara, R. D. Davis	
*Reno county	1956	²	J. J. Rockers, L. W. Dowd, I. W. Ratcliff, Jr., Edw. Bouse	
Stevens county	1958	1961	H. P. Dickey, A. A. Eeds, L. A. Hecht, R. R. Lewis, W. R. Swafford, Q. L. Markley, R. E. Anton	
	1958	²	D. J. Thomas, William Roth	

Hamilton county	1958	1961	man, D. A. Gier C. W. McBee, E. L. Fleming, V. L. Hamilton, K. H. Sallee, E. K. Hogan, L. T. Hanson, E. H. Jensen
Greeley county	1958	1961	C. W. McBee, E. L. Fleming, K. H. Sallee, V. L. Hamilton
Stanton county	1958	1961	E. L. Fleming, C. W. McBee, V. L. Hamilton, K. H. Sallee
Haskell county	1959	²	R. F. Harner, V. L. Hamilton, H. P. Dickey, R. C. Angell
Hodgeman county	1958	²	R. L. Haberman
Scott county	1959	1963 ¹	K. H. Sallee, V. L. Hamilton
Seward county	1959	1963 ¹	H. P. Dickey, W. R. Swafford, Q. L. Markley
Harper county	1960	²	I. W. Ratcliff, Jr., L. W. Dowd
Wichita county	1960	²	V. L. Hamilton
Grant county	1961	²	H. P. Dickey, Q. L. Markley, W. R. Swafford, V. L. Hamilton
Kearny county	1959	1963	K. H. Sallee, V. L. Hamilton, C. W. McBee, E. L. Fleming
Morton county	1960	1963	H. P. Dickey, W. R. Swafford, Q. L. Markley

1. Manuscript submitted to Washington for publication.

2. Field mapping completed. Final soil correlation and manuscript in process.

3. Joint employee of United States Department of Agriculture and the Kansas Agricultural Experiment Station.

* Re-survey.

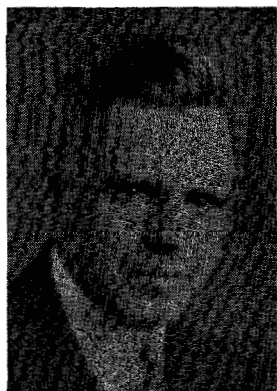


Fig. 27.—R. I. Throckmorton, the first employee of the Station in soil survey.

Because of limited funds, the College found it necessary to employ an assistant soil surveyor at the smallest possible salary. An application for the position was received from R. I. Throckmorton. Mr. Throckmorton had just completed work for the Bachelor of Science degree at Pennsylvania State College. He was employed July 1, 1911, at a salary of \$40 a month and expenses, with the understanding that he would not be required to teach.⁸ However, the need for an instructor in soils to replace a member of the staff, who desired to take sabbatical leave, occurred the first winter after Mr. Throckmorton was employed. He consented to serve as a substitute teacher. He became so interested in teaching that he developed into one of the most popular, competent, and devoted teachers of the institution.

⁸ It developed that Mr. Throckmorton was never paid less than \$50 a month.

The appropriation of \$10,000 made by the 1911 Legislature for the biennium of 1912-13 enabled the College to participate in the survey of five counties: Shawnee, Cherokee, Reno, Greenwood, and Jewell, and to issue four soil survey reports as follows: Kansas Bulletin No. 200, Soil Survey of Shawnee County; Kansas Bulletin No. 207, Soil Survey of Cherokee County; Kansas Bulletin No. 208, Soil Survey of Reno County; and Kansas Bulletin No. 211, Soil Survey of Jewell Country.

When the soil survey publications reached the public, some influential citizens interested in the sale of farm land felt that the surveys showed too much stony, rough, and unproductive land. They opposed the continuation of the work. The matter was brought to the attention of the 1913 Legislature. Consequently, when Senate Bill No. 802, that authorized appropriation for the support of the work of the College and contained an item of \$10,000 for soil survey, reached the Legislature, objection was raised to the item. The defeat of the item was accomplished by having inserted in Bill No. 802, Section 7, as follows:

"That Chapter 22 of the Session Laws of 1911 being an act entitled 'an act authorizing the Kansas State Agricultural College to make a soil survey of the state and making an appropriation therefor' be and the same is hereby repealed.

Approved March 12, 1913" (37).

Although legislative support for soil surveys was of short duration, it accomplished two

worthwhile purposes: (1) It enabled the Station to complete the survey of five counties and to publish the reports of four; (2) it resulted in the employment on the faculty of R. I. Throckmorton who became, after graduate study, one of the most successful teachers, researchers, and administrators of the institution.

Soil surveys were resumed in 1925 when, at the request of the College, the Legislature that year appropriated \$5,000 per annum for survey work. Work was resumed in cooperation with the Bureau of Soils. Appropriations for soil survey work were made for the next six years or until 1932 when they were again withheld due to the financial depression.

Between 1926 and 1932, these counties were surveyed: Clay, Labette, Doniphan, Wilson, Crawford, Johnson, Woodson, Neosho, Marion, Bourbon, Kingman, and Allen.

It was not until 1946 that funds again became available for the soil survey. From 1946 to 1950, \$5,000 was appropriated annually, then the

amount was increased to \$10,000 annually where it has remained (1964). Until 1952, money was appropriated by the Legislature as a separate item for soil surveys. Since 1952 the Director has allocated annually \$10,000 for soil surveys from appropriations for applied research. See below.

Since 1946, cooperation in soil survey work has been with the Soil Conservation Service of the United States Department of Agriculture and has been of two types: (1) Reconnaissance county surveys of physical land conditions affecting use, conservation, and management of land resources. Such surveys have been completed for the entire state and information published on a county basis for all but five counties. This information is of great assistance in community and county planning and in developing soil conservation programs. Work also has continued on basic soil surveys.

Since 1946, field mapping has been done chiefly by personnel of the United States Department of Agriculture.

SOURCE OF FUNDS FOR SUPPORT OF SOIL SURVEYS

Year	Annual Amount	Source
1912 and 1913	\$ 5,000	Legislative appropriation
1914 to 1925	No support	
1926 to 1931, inclusive	5,000	Legislative appropriation
1932 to 1945, inclusive	No support	
1946 to 1949, inclusive	5,000	Legislative appropriation
1950 and 1951	10,000	Legislative appropriation
1952 to 1964	10,000	Allocated annually from appropriation to the Station for applied research

The participation of the Kansas Station has been primarily in the nature of helping to prepare county soil survey work plans, aiding in initial programs, final inspection of county soil surveys, review of report manuscripts, and general coordination of the work of cooperating agencies. The work of the Kansas Station has been directed by Dr. O. W. Bidwell with the assistance of C. H. Atkinson, a joint employee of the Station and the United States Department of Agriculture.

In 1949, the Kansas Station began cooperation with the Bureau of Reclamation and the Bureau of Plant Industry, Soils, and Agricultural Engineering of the United States Department of Agriculture in making soil surveys to determine feasibility of irrigation using water from Kansas reservoirs. One such survey was made of the Kanopolis Dam area about 1950 in connection with the basic soil survey of

Saline County. As a result of this study, the soils of the area were classified as follows:

Class	Acres
I	27,434
II	11,122
III	3,586
Unsuited for irrigation	8,612

Two other soil surveys of reservoir areas are: (1) Webster unit on the South Solomon River consisting of 26,000 acres begun in 1949 and completed in 1950; (2) Scandia unit of the Bostwick project in the Republican River valley in Republic and Cloud counties, 21,000 acres, started in 1950 and completed in 1953.

Another detailed soil survey was made in 1951 and 1952 in the Kansas River valley between Wamego on the west and the Leavenworth County line on the east to determine areas suitable for irrigation. The field work was completed in 1952 and the map work in 1953 (85,000 acres).

ANAPLASMOSIS INVESTIGATIONS

A disease of cattle known as anaplasmosis caused severe losses in sections of southeastern Kansas starting about 1926. During the summer of 1928, it increased to such a magnitude that it became a serious economic problem. A cooperative project was started October 15, 1928, among the Kansas State Livestock Sanitary Commission, the Bureau of Animal Industry of the United States Department of Agriculture, and the Kansas Agricultural Experiment Station. Objective was

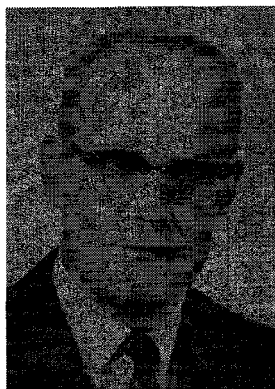


Fig. 28.—Dr. O. W. Bidwell, who directs the work in soil survey for the Kansas Station.

to investigate the nature of the disease and the best means of combating it. Special attention was given to the manner in which the disease was transmitted. The location chosen for the experimental work was Sedan, Kansas, in an area in which the disease was prevalent. It was considered best at the time not to move diseased animals into an uninfested area, such as Manhattan, where the Central Experiment Station was located.

Persons from the Station staff engaged in the investigational work were Dr. R. R. Dykstra, in charge, Dr. H. F. Lienhardt, Dr. C. A. Pyle, and Dr. H. Farley. Doctor Pyle was placed actively in charge of the station at Sedan where he served until July 1, 1935.

A barn was rented at Sedan to house experimental animals

and laboratory equipment. The barn was screened to exclude insects, and precautions were taken to prevent insects entering the barn with animals or people. Stanchions were built within the barn to accommodate 10 head of cattle. Six head were purchased locally, examined, and placed in the experimental barn. Five were mature cows (one with a two-year-old calf) and the sixth a Jersey bull calf aged four months.

The routine procedure in the beginning was to take temperatures twice daily, to examine blood smears, and to make blood cell counts and hemoglobin determinations once a week. It was also the practice, when convenient, to investigate and treat field cases of anaplasmosis. A detailed account of the experimental work undertaken and the results obtained may be found in Report No. 1 of the Kansas Agricultural Experiment Station, February, 1938, entitled "Studies in Anaplasmosis."

The Kansas State Livestock Commission withdrew from the project in 1931. July 1, 1935, all the experimental equipment was moved from Sedan and placed in the Central Experiment Station at Manhattan where cooperation continued with the Bureau of Animal Industry of the United States Department of Agriculture.

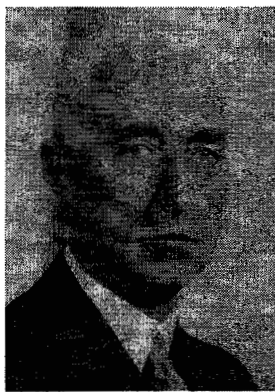


Fig. 29.—Dr. R. R. Dykstra, who headed the personnel of the Station engaged in Anaplasmosis investigational work.

REFERENCES

1. Kansas Farmer, March 7, 1889. p. 10.
2. Kansas Farmer, Feb. 11, 1891. p. 9.
3. Fourth Annual Report, Kansas Agricultural Experiment Station, 1891. p. IX.
4. Kansas Farmer, Feb. 8, 1893. p. 10.
5. Board of Regents Minutes, KSAC. Jan. 24, 1894. Book B, p. 31.
6. Board of Regents Minutes, KSAC. Jan. 25, 1894. Book B, p. 32.
7. Board of Regents Minutes, KSAC. April 6, 1894. Book B, pp. 37-38.
8. Board of Regents Minutes, KSAC. April 6, 1894. Book B, pp. 39-40.
9. Board of Regents Minutes, KSAC. April 6, 1894. Book B, p. 42.
10. Ninth Biennial Report, Board of Regents, KSAC. 1893-1894. pp. 12-13.
11. Eighth Annual Report, Kansas Agricultural Experiment Station, 1895. pp. XII-XIII.
12. Board of Regents Minutes, KSAC. Feb. 7, 1896. Book B, p. 105.
13. Board of Regents Minutes, KSAC. April 1, 1896. Book B, pp. 107-108.
14. Board of Regents Minutes, KSAC. Feb. 7, 1896. Book B, p. 105.
15. Ninth Annual Report, Kansas Agricultural Experiment Station, 1896. p. XIII.
16. Board of Regents Minutes, KSAC. April 3, 1896. Book B, pp. 110-111.
17. Board of Regents Minutes, KSAC. June 9, 1896. Book B, p. 115.
18. Ninth Annual Report, Kansas Agricultural Experiment Station, 1896. p. XIII.
19. Board of Regents Minutes, KSAC. Jan. 14, 1897. Book B, p. 127.
20. Board of Regents Minutes, KSAC. April 7, 1897. Book B, p. 130.
21. Board of Regents Minutes, KSAC. April 8, 1897. Book B, pp. 133-134.
22. Eighteenth Annual Report, Kansas Agricultural Experiment Station, 1905. p. XXVII.
23. United States Department of Agriculture, Bureau of Plant Industry, Bulletin 240.
24. Fifteenth Annual Report, Kansas Agricultural Experiment Station, 1902. pp. XXII-XXIII.
25. Seventeenth Annual Report, Kansas Agricultural Experiment Station, 1904. pp. XVII-XVIII.
26. Board of Regents Minutes, KSAC. July 17, 1906. Book B, p. 569.
27. Industrialist, Sept. 27, 1906.
28. Industrialist, October 6, 1906.
29. Laws of Kansas, 1887, Chap. CLX, pp. 226-229.
30. Board of Regents Minutes, KSAC. Dec. 20, 1910.
31. Laws of Kansas, 1911, Senate Bill No. 136, Chap. 301, p. 516.
32. Board of Regents Minutes, KSAC. June 15, 1911.
33. Abmeyer, Erwin, Tenth Annual Report Northeast Kansas Experiment Fields, 1941, p. 105.
34. Lundquist, Marvin, Sandyland Experiment Field Report, 1958, p. 1.
35. Board of Regents Minutes, KSAC. Jan. 12, 1910. Book C, p. 126.
36. Laws of Kansas, 1911, House Bill No. 494, p. 45.
37. Laws of Kansas, 1913, p. 31.