



Fig. 28.—The new greenhouse completed in 1954 was 56 by 100 feet and included eight thermostatically-controlled rooms 25 by 25 feet with connecting corridor. This greenhouse is used by the cereal and forage crop geneticists and by the entomologists and horticulturists.

Experimental Greenhouse.

An experimental greenhouse to provide facilities for plant geneticists, entomologists, and horticulturists was completed in 1953. The house was 100 x 56 feet. It consisted of eight thermostatically controlled rooms 25 x 25 feet with connecting corridor down the middle. This building provides facilities that enable the technical workers to grow plants under controlled conditions.

While the facilities discussed above constitute the major units of the physical plant, numerous other facilities have been provided: additional residences for the technical staff; experimental beef cattle barn; modernized stockyards; hay and storage sheds; additional experimental cattle sheds; packing sheds; hog houses; and additional pit, trench and upright silos. All service facilities such as tele-

phone, electric power and lighting, and sewage disposal have been modernized. The total cost of the physical plant exceeds \$325,000, of which less than \$100,000 was provided by direct appropriation of the Legislature. Most of the money came from fees obtained by the Station from the sale of livestock and agricultural products, the residue of experimental work. A small amount came from WPA and other relief grants made to the Station during the 1930's.

EARLY WORK AT THE STATION

Directions for the experimental work that should be undertaken at the Station were given in a resolution of the Board of Regents March 6, 1902: "Moved by Regent Fairchild that the superintendent at Hays be authorized to carry on such experiments

as the Station Council may direct, namely alfalfa, Macaroni wheat, emmer, barley, etc. Carried." (20) At the same time the Board of Regents authorized a survey of the lands of the Station.

The work undertaken the first year at Hays was more extensive than that indicated by the resolution of the Board. During the season the following crops were planted: five varieties of macaroni wheat on 15 acres; three varieties of sorghum in rows, 6 acres; sorghum sown thickly, 5 acres; mixed sorghum and kafir sown thickly, 5 acres; kafir sown thickly, 11 acres; barley, 25 acres; soybeans, 15 acres; cowpeas in rows, 6 acres; cowpeas for hay, 7 1/2 acres; alfalfa, 22 acres; brome grass, 4 1/2 acres; Kansas stock and other melons, 10 acres; peanuts and garvanzos, 1/2 acre. A grass garden containing 31 varieties of grass was laid out, and 3/4 acre set to trees and shrubs. All planting was made on sod ground. A portion of the area formerly used by the garrison as a garden was planted to potatoes, half of which was mulched. Smaller areas were planted to Jerusalem artichokes, three varieties of cowpeas, three of soybeans, and four each of corn, sorghum, kafir, rape, and penicillaria.

STATION WEATHER RECORDS

Precipitation, temperature, wind velocity, and evaporation records have been kept at the Hays Station since 1907. Rec-

ords of precipitation were taken first at the military reservation. They were started in 1868 and for 94 years (1863 to 1961) averaged 22.95 inches annually. Average precipitation through the growing season, April through September, is over 77 percent of the average annual precipitation. Average monthly precipitation increases in the spring until a maximum is reached in May or June. This is followed by gradual decrease to a low winter level.

Annual precipitation since Station records have been taken has ranged from 43.34 inches in 1951 to 9.21 inches in 1956. The total amount, the amount from each storm, and the distribution, especially during the growing season, are important. The unpredictable and extremely variable weather, especially rainfall, is the largest contributing factor in crop production.

Average annual snowfall over 62 years has been 19.5 inches. The most snow is received in February and March, averaging 5.0 and 4.5 inches, respectively.

Average annual mean temperature for 64 years, 1897 to 1961, is 54° F., with a mean maximum of 68° F. and a mean minimum of 40° F. Except for three years, daily maximum temperatures of over 100° F. were recorded each summer. Except for 1941, subzero temperatures were recorded each winter. The extremes were 117° F. July 13, 1934, and -24° F. February 7, 1895. The average date of the

last killing frost in the spring is April 29 and of the first killing frost in the fall, October 15. Through 59 years the frost-free period varied from 114 to 199 days.

IRRIGATION

Irrigation investigations at the Hays Station were started in 1903. The first work was in cooperation with the United States Department of Agriculture, covered by a memorandum of understanding dated February 22, 1904 (21). This memorandum described the work to be undertaken cooperatively both at the Hays Station and in the Arkansas River Valley near Garden City. Work at the Hays Station was done to determine:

(a) Cost of pumping water from a well and of its application to the land.

(b) Maximum amount of water that a well will furnish, by lowering the water level by pumping at different rates.

(c) Amount of water applied and yield of crops.

(d) Effect of irrigating in winter only.

Garden vegetables, potatoes, sugar beets, alfalfa and other field crops were irrigated when there was sufficient water.

A well was dug near Big Creek to a depth of 40 feet, and the water level rose to 24 feet. A Knowles pump was installed and operated with a J. I. Case traction engine and the regular thresher belt used. It was estimated that the pump had a capacity of 22,000 gallons per hour. Cost of the well with pump installed was \$865.65. A complete description of the project is given in Bulletin 128, Kansas Agricultural Experiment Station (22).

It was found that irrigation by centrifugal pump and traction engine was too costly to be practical for field crops under conditions that existed at that time. The cooperative irrigation experimental work was discontinued in 1909. However, the pump equipment was used later to irrigate the



Fig. 29.—Irrigation investigations were started in 1903 in cooperation with the U.S.D.A. A Knowles centrifugal pump was operated with a J. I. Case steam engine.

forest nursery and the vegetable garden.

A demonstration of the use of vitrified tile for supplying water underneath the surface to irrigate garden crops was undertaken in 1913 with little success.

Subirrigation. It was thought that deep-rooted crops such as alfalfa could be assisted materially in growth by raising the level of underground water by means of dams in streams. The alfalfa growing on the bottomland along Big Creek provided an opportunity to study this problem. A dam had been built in the early days of the Station to attempt to raise the water level in the valley. The dam held a maximum of five feet of water and backed water up the creek for nearly a mile. When the dam was washed out in 1924 a question arose as to whether it should be rebuilt. Ten test wells dug to

shale across the valley in 1926 showed that little water-bearing gravel existed in any well; consequently there could be little movement of water from the creek to surrounding bottomland. Water measurements in the wells over a period of five years showed little relationship between the position of the well in the valley and the height of the water in the well. The dam was not rebuilt,

A well that supplied the garden and nursery after the irrigation project of 1909 was discontinued provided a limited quantity of water. A more liberal supply was obtained by pumping the water from Big Creek. A dam was constructed across Big Creek in 1933 by the Civilian Conservation Corps, and a pump to irrigate the nursery installed above the dam. Some defects developed in the pumping outfit, which were corrected in 1935 when construction of a new bridge



Fig. 30.—A portable sprinkler system was purchased and put into operation in 1950.

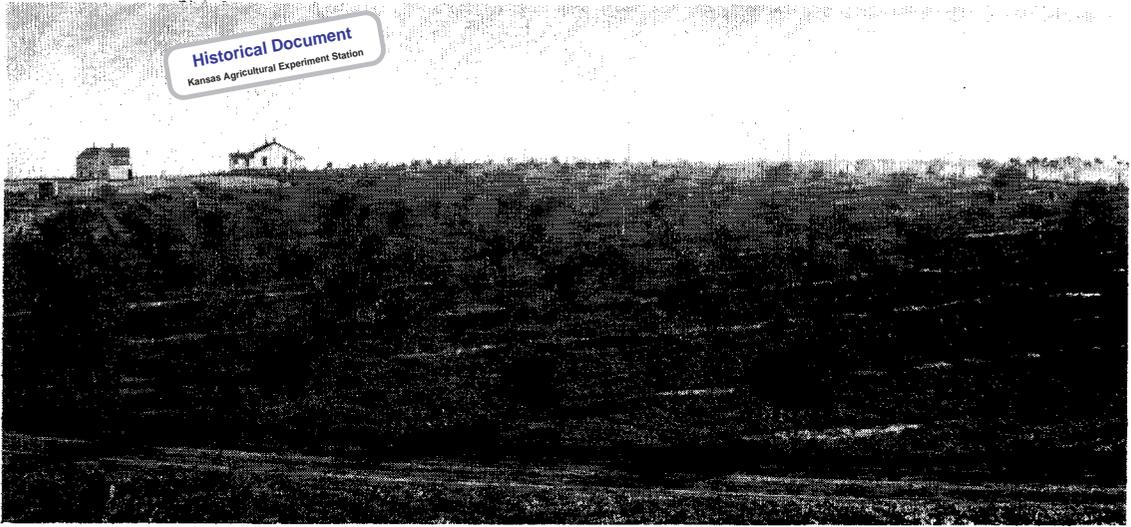


Fig. 31.—The first Station orchard as it appeared in 1906. It was planted in 1903.

across the creek on Highway U.S. 181 required the lowering of the water in the creek. A new suction line with a larger intake was also installed.

Irrigation water to save valuable forage plants under investigation in the forage crop nursery was provided in 1938 by a well completed in February of that year. A Fairbanks - Morse electric pump with a capacity of 125 gallons per minute was installed.

The drouth of the 1930's forcefully demonstrated the need for irrigation water to insure production of seed of improved varieties and to protect important types of investigational work, especially grasses and alfalfa, as well as to safeguard feed supplies. In 1942 a small dam of loose rocks was placed in the creek to create a pool from which water was pumped. Capacity of the pump was 900 gallons a minute and it irrigated about 50 acres. Until 1950 all irrigation was by flooding. In 1950 a sprinkler system was purchased and operated with

a Caterpillar tractor. This portable outfit supplied water to any part of the valley land adjacent to the creek. Irrigation water has been used principally to irrigate such crops as grass and certified sorghum for seed production. Since 1950 the system has been enlarged and it is used extensively for winter as well as summer irrigation.

FOREST PLANTINGS AND NURSERY

A forest nursery was one of the first projects started at the Station. In the spring of 1903, 1,000 deciduous forest trees, 4,000 cedar and pine trees, 300 fruit trees, and 500 vines were planted. It was recorded in 1904 that 32 percent of the evergreens grew and that some Austrian pines made a first-year growth of 12 to 15 inches without irrigation. Additional plantings made in 1905 consisted of 8,000 forest trees, 1,400 of which were black walnut and oak. About 2,500 were planted in the State Park.