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BUFFALOGRASS

The need of a grass to revegetate western Kansas and the importance of buffalograss for this purpose is set forth in the annual report of the superintendent of the Hays Station for 1940: "The need for revegetating vast areas of land in western Kansas has been apparent to many interested in the agricultural welfare of the state. The plowing up of thousands of acres of prairie land immediately following the first World War to grow more wheat, coupled with over-grazing, soil blowing and water erosion, have provided thousands upon thousands of acres where grass surface cover should be restored.

"Experimental work at the Fort Hays Experiment Station has determined after years of investigation that the native grasses, particularly buffalograss and blue grama, provide the most promising material from which to make selections for types suitable for this vast revegetative program.

"The inherent good qualities of buffalograss together with its valuable surface stoloniferous method of spreading, makes this a most useful species for western Kansas." (41)

Buffalograss, as found growing over the Great Plains, varied greatly and had tremendous possibilities for improvement. This was recognized by Leon Wenger, a grass specialist at the Station from 1937 to 1943. Upon his arrival at the Station he started to make field selections from buffalograss plants found growing in various parts of western Kansas, Texas, Nebraska, and South Dakota. At the height of this selection work more than 10,000 individual plants were growing in the Station breeding nursery. All of these plants had

Fig. 56.—Ten-acre field of buffalograss for seed production planted with cuttings from one high-yielding mother plant. Buffalograss has hardiness and the ability to persist in the face of drouth, heat, and other difficulties.

at least one generation of selection. Plants that had superior qualities were increased by growing them in larger blocks. Some of the superior selections when grown under irrigation produced as much as 2,400 pounds of seed and 3.69 tons of hay per acre.

A few of the superior selections were planted in 10-acre blocks. It was from one of these that the variety named "Hays Buffalo" was obtained. This variety was selected for adaptation to general use. Some of the selections had characteristics that adapted them to specialized uses. A type was selected and adapted to lawn purposes. This type had fine quality and a dense-leaved, short - growing turf characteristic of buffalograss found in northern Nebraska and the Dakotas. The southern types from Texas grew much taller, were more vegetative in character, and produced higher yields of forage. Since buffalograss is a dioecious plant, only female plants were started vegetatively for lawn purposes, thus eliminating the flaglike pollen stalks of the male plants.

Buffalograss produces its seed on stalks that grow close to the ground, making the seed difficult to harvest. Various methods of harvesting have been used at the Station, starting first by hand picking with forceps. The first method of collecting the seed mechanically was by using a pan attached to the cutter bar of a mowing machine. Much seed was lost with this method. Then a large home-made suc-

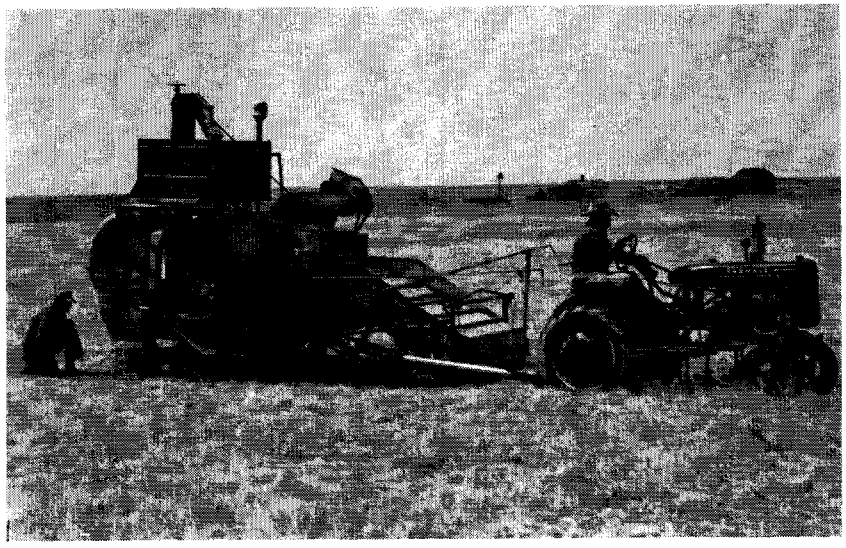

Fig. 57.—Harvesting buffalograss seed with combine developed at the Station. Buffalograss produces its seed on stalks that grow close to the ground, so is difficult to harvest.

tion sweeper having a 6-foot nozzle was mounted on an automobile chassis and propelled by a small truck. The sweeper and suction fan were operated by a gasoline motor. The outfit sucked up the seed satisfactorily but also gathered cow chips, gravel, cacti, etc. A rotating sweeper attached to the rear of a small combine was developed next. It proved too cumbersome and also collected trash.

A successful and satisfactory method of harvesting the seed finally was developed from a small combine harvester. This combine was rebuilt in the Station shops and was equipped with a remodeled cutter bar riding on the ground. A slatted canvas on the elevator platform elevated the cut material. This machine was used first August 15, 1941. It proved so successful that others interested in harvesting buffalograss seed adopted the plan and rebuilt their own combines. Much seed was harvested during the fall of 1941 and in other seasons whenever the weather favored the production of buffalograss seed.

Nature has endowed buffalograss seed with a natural dormancy that assures the perpetuation of the species under adverse conditions. The germination of newly harvested seed rarely exceeds 7 percent, making new seed unsatisfactory for planting. Under most conditions the seed increases germinability slowly, so it was necessary to develop some method to break the dormancy of the seed if buffalograss was to be reseeded successfully. Starting in 1938 Mr. Wenger

attacked the problem, and by 1941 had worked out a successful treating process. The seed was soaked in a 1/2 percent solution of saltpeter (potassium nitrate) for 24 hours, then chilled in a refrigerator at a temperature of 40° F. for six weeks. During this period the seed was resoaked twice at intervals of two weeks. The seed was dried immediately after being removed from the refrigerator. This treatment increased the germination from about 7 percent to some 80 or 85 percent, thus producing seed satisfactory for immediate planting.

After a successful experimental treating method had been developed, it became necessary to apply the results to commercial usage. This required large treating tanks, large refrigerators, and equipment for rapidly drying the seed after soaking and refrigeration. Through the assistance of the U.S. Army, with which the Station was cooperating in establishing grass on air fields, two 10,000-pound refrigerators were procured. Large vats of several thousand gallons capacity were built in the Station shops. A satisfactory drier was built after trial and error. When taken from the refrigerator the seed averaged 85 percent moisture. After drying, the moisture content was 14 to 16 percent.

World War II was under way and an acute need existed for buffalograss seed that would grow promptly. Air fields were being built throughout the Great Plains, one of the largest at Walker, about 30 miles from the Station. Great difficulty was being experienced with blowing soil damaging the propellers

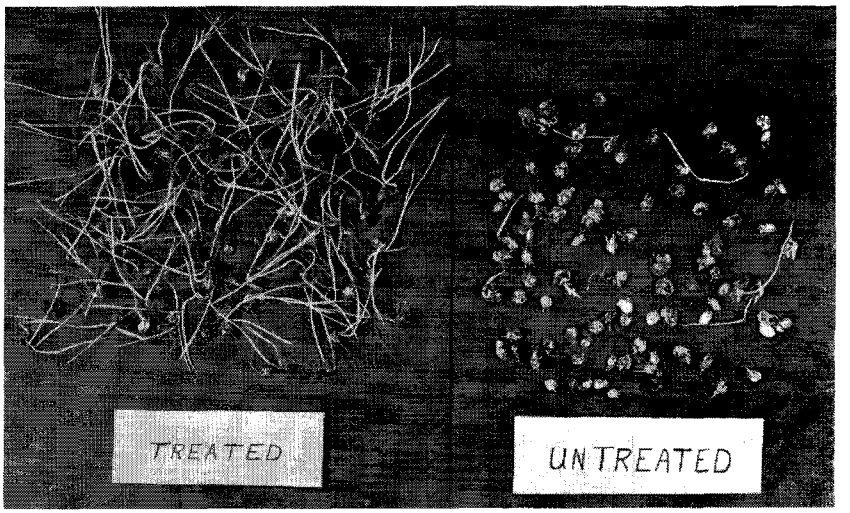

Fig. 58.—Comparison of germination of treated and untreated buffalograss seed. The natural dormancy of buffalograss insures the perpetuation of the species under adverse conditions.

Fig. 59.—Buffalograss seed under treatment in refrigerator to improve germination. This treatment increased the germination from an average of about 7 percent to 80 or 85 percent, producing seed satisfactory for immediate planting.

on the large B-17 bombers. Officers from the Walker Air Base came to the Station for assistance. It was recommended that the air field be sodded with buffalograss. The Army procured 60,000 pounds of seed, which was the first processed by the equipment at the Station. The seed for the Army was dried at the rate of 100 pounds of seed per hour, on a 24-hour basis. Later the equipment was used to process seed for the Station itself and for collectors, dealers, and processors. Seed for processing came not only from Kansas but from Colorado, Nebraska, and Texas. The first year 63,919 pounds were treated. By the end of 1950 a total of 534,763 pounds had been treated.

PASTURE MANAGEMENT STUDIES

An experiment was started in 1946 to study the effect of

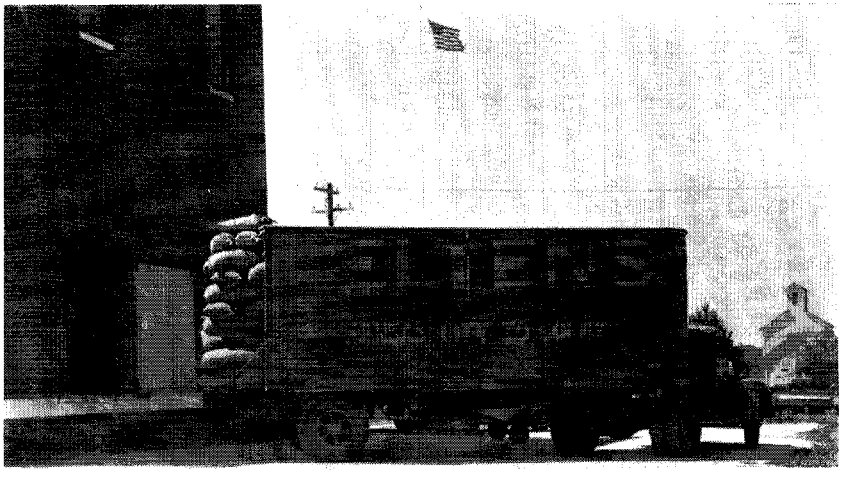

Fig. 60.—A transport load of treated buffalograss seed leaving the Station.

Fig. 61.—Station steers grazing on newly-seeded grass pasture. Intermediate wheatgrass proved the best in terms of livestock performance during years of good or above-average rainfall.

heavy, moderate, and light summer grazing on the native shortgrass range. It was enlarged in 1948 to compare late season protein supplementation with no supplementation on moderately grazed pastures, Plant cover and soil moisture determinations were made. Grazing investigations were expanded in 1948 when buffalograss, western wheatgrass, and intermediate wheatgrass were planted separately on three fields on a cultivated lowland site to compare the grasses as summer pasture for steers.

Grazing comparisons were made from 1949 to 1960. The intermediate wheatgrass pasture was abandoned in 1955 because of injury to the grass by drouth, and the buffalograss pasture was returned to cultivation in 1958 after heavy silting from a flood in June 1957. Intensity - of - grazing trials were conducted on the western wheatgrass until 1960. Intermediate wheatgrass proved the best in terms of livestock performance during years of good or above-average rainfall. Western wheatgrass appeared best as a long-term pasture, while buffalograss was the poorest on this lowland site.

Pasture and range research was expanded beginning in 1955. In addition to livestock performance, increased emphasis was placed on vegetation studies under the various systems of grazing. Studies initiated since 1955 include three intensities of winter grazing on native shortgrass range; summer grazing trials on four types of upland reseeded pasture; a comparison of cottonseed meal and sorghum grain as late season supplements on moderately grazed summer range; plot studies involving heights, date of mowing, date of burning, rates and dates of fertilization, and pasture weed control on both native and reseeded pastures; and range reseeding investigations that include date of planting, type of mulching materials for seedbed cover, and amount of mulching material needed for seedbed cover.

PROJECT LEADERS IN PASTURE MANAGEMENT

Name	Year appointed	Year terminated
F. B. Kessler	March 6, 1946	March 11, 1957
F. E. Meenen	March 5, 1945	June 16, 1951
J. L. Launchbaugh	October, 1955	To date

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BINDWEED INVESTIGATIONS

Bindweed, Convolvulus arvensis, a deep-rooted perennial noxious weed introduced in Kansas from Europe, probably in Turkey seed wheat and in garden seed, became well established in many parts of central Kansas about the time the Station was started. It proved so destructive to wheat and many other crops that cognizance of the problem reached the Legislature. The Legislature of 1907 included in House Bill No. 877 Miscellaneous Appropriations, under item No. 7, an appropriation of $1,000 "to be expended under the direction of the Board of Regents for experiments to exterminate bindweed."

The money appropriated un-

Fig. 62.—Visitors inspecting the bindweed project. The work consisted of controlling field bindweed by intensive cultivation, competitive crops, and use of sodium chlorate.

der this act was placed with the Department of Agronomy at the College at Manhattan; but since the problem was most acute in central Kansas, the work undertaken was directed through the Hays station. Since bindweed on the Station land itself was not extensive, it was decided to rent heavily infested bindweed land from private owners. A satisfactory field was secured, rent free, on the farm of Andrew Sander near Victoria, about 7 miles east of the Hays station. Mr. Sander was employed to look after the work required in carrying out the experiments.

The experiments consisted of 16 treatments of cropping and cultivation, carried out on 16 one-acre plots. Two general plans of extermination of bindweed were tried: (1) different cultural methods, and (2) the use of smother crops. As to results, Professor Ten-Eyck of the Department of Agronomy at the College reported: "It appears from the work of a single season that ordinary methods of destroying the bindweed by thorough cultivation has only resulted in more favorable conditions for growth by storing and conserving soil moisture and by providing an abundant supply of readily available plant food. Although the plants may be cut off and apparently destroyed, many times during the season, the live roots remain in the soil and quickly start new shoots again after each cultivation. There is some promise, however, that by winter plowing and the proper use of smother crops such as sorghum and kafir corn, the bindweed may be destroyed or at least weakened in vitality and greatly reduced in numbers. With a year or

two of such treatment and preparation, it may be possible to check the weed so that profitable crops of wheat and other grain may be grown on bindweed-infested land. . . . Small patches of bindweed may be destroyed by very frequent hoeing. In order that hoeing may be successful, however, it will be necessary to prevent the weed from making any growth of foliage. Young plants must be cut off just as soon and as often as they appear above the ground. The patch should be hoed regularly, say once a week, during the growing season. Again, the weed may be destroyed by poisoning the ground with salt or brine, by applying such a quantity that the soil will be "killed" so that nothing will grow on it for several years." (42)

Appropriations were not continued for bindweed studies and the work was discontinued after the second year; not, however, until unsuccessful attempts were made to smother the weed with heavy applications of straw. After the termination of this work limited studies were continued on the Hays Station land. An unsuccessful attempt to eradicate bindweed by grazing with sheep was undertaken in 1915 as reported on page 57. Small areas of bindweed were salted and large areas were cultivated intensively and planted to smother crops. Every precaution was taken not to spread the weed by carrying live roots on tillage machines from infested land to uninfested land.

It was not until cooperative work with the U.S.D.A. in the study of noxious weeds was started in 1935 that successfully planned and executed experimental work again was undertaken. The Department established cooperative projects with a number of stations, including Kansas at the Hays Branch Station. The work at Hays was coordinated with work in Idaho, Nebraska, Minnesota, and Iowa. F. L. Timmons was appointed as project leader at Hays. His salary was paid by the U.S. D.A. and operating costs of the project were paid by the Station.

The first work consisted of methods of controlling field bindweed by intensive cultivation, competitive cropping, and use of sodium chlorate. Detailed studies were made of the root system and root food reserves of the bindweed plant as affected by various treatments. In 1945 a chemical, 2,4-D, became available for experimental use as a herbicide. A large number of experiments indicated that while the chemical was effective, it would not give complete control unless combined with intensive cultivation and competitive cropping. Practical methods were soon developed where 2,4-D could be substituted for some of the cultivation operations, combining cultivation and competitive cropping to control the weed at minimum expense. These methods were best for controlling extensive infestations. An equally important problem was how best to prevent small

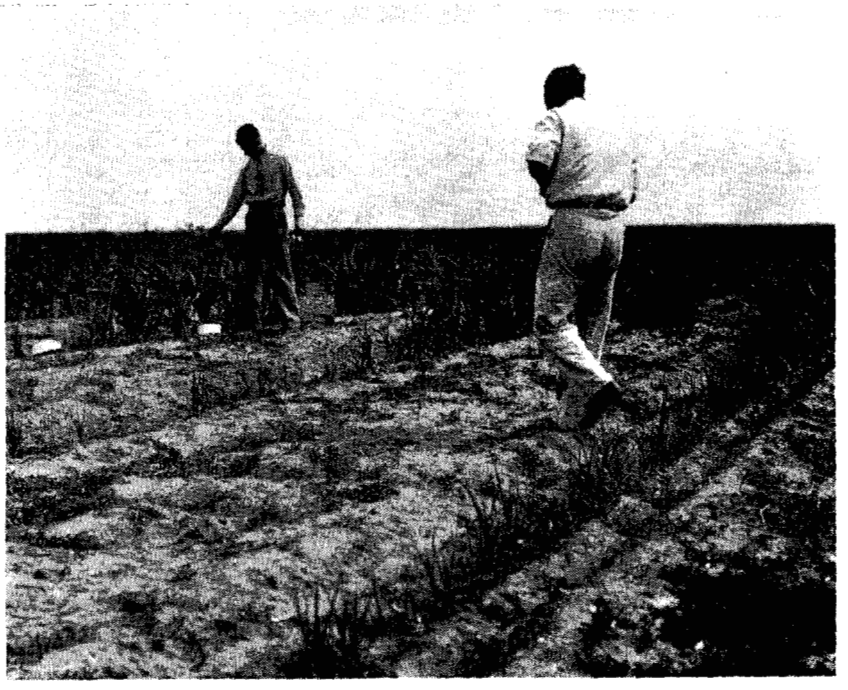

Fig. 63.—Sorghums unable to compete with bindweed.

patches of bindweed from spreading. A study was made of many sterilizing herbicides. Chlorinated benzoic acid compounds were found to be as effective for this purpose as sodium chlorate, and in many cases more effective.

Originally it was planned to study only the control of bindweed. Soon a study was undertaken of other serious weed species, Russian knapweed, hoary cress, and Johnsongrass. Studies were also undertaken for the control of weeds in growing crops, principally wheat and sorghum. A practical method of controlling broad-leaved weeds in growing wheat was developed. Also a pre-emergence chemical became available for weed control in sorghums. W. M. Phillips succeeded F. L. Timmons as project leader in 1948. He has directed the work since that time.

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