

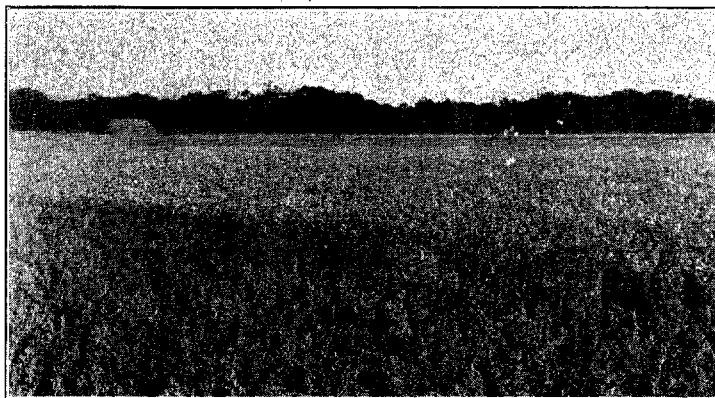
JULY, 1919

CIRCULAR No. 73

# AGRICULTURAL EXPERIMENT STATION

## KANSAS STATE AGRICULTURAL COLLEGE

FORT HAYS BRANCH STATION  
HAYS, KANSAS



## GROWING ALFALFA IN WESTERN KANSAS

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Alfalfa has been one of the most profitable crops grown on the bottom-lands of the Fort Hays Branch Station<sup>1</sup> where over three hundred acres are grown. A very satisfactory first crop is always secured even in dry years and usually two and occasionally three other crops are harvested. The total average annual yield is about two tons per acre. On stock farms it is especially valuable, not only because of its high feeding value but also because it will produce at least a small crop when other feed crops fail and in this way aid in carrying stock over winter that might otherwise be sacrificed on a cheap market.

The object of this circular is to encourage the growing of

<sup>1</sup> The experimental data on which this paper is partly based were secured in cooperation with the Office of Forage Crop Investigations, United States Department of Agriculture. The valuable assistance of Mr. R. E. Getty, in local charge of that work, is hereby acknowledged.

more alfalfa where it will likely succeed, to discuss its place on the western Kansas farm, and to point out some of the controlling factors in its successful production.

#### ALFALFA LAND

Alfalfa can be profitably grown in western Kansas only on creek and river bottoms where the sheet water is within 14 to 20 feet of the surface, or on fields so located as to catch and hold considerable surface run off. Many attempts to grow alfalfa on upland have been made at this station, but it has never returned a profit except in an occasional wet season. This failure cannot be attributed to lack of inoculation, since all western Kansas land seems to be well supplied with alfalfa bacteria. Neither are acid soils a cause of failure, since limestone enters into the composition of all soils in this region. The lack of moisture seems to be the chief factor which prevents growing alfalfa successfully on dry upland soils.

Farmers having bottom-land which is well drained, with a fairly open and deep top soil and free from hard-pan below, can be reasonably certain of growing good crops.

#### PREPARATION OF SEEDBED

Success in obtaining a stand of alfalfa depends upon good preparation of the ground and favorable moisture conditions at seeding time. Another requirement is a firm, clean, moist, and moderately fine seedbed. Most failures in securing good stands can be attributed to insufficient attention to one or another of these factors. Land that has been cropped in the usual way is usually too weedy. For this reason careful cultivation to destroy weeds for a year or two before seeding alfalfa is usually necessary. Unless there is a plentiful supply of available moisture and plant food the alfalfa will not grow rapidly enough or be strong enough to withstand weed enemies the first season.

One of the best ways to prepare ground for alfalfa is to summer fallow. The ground may be plowed any time during the spring or early summer. It should be cultivated sufficiently after plowing to prevent an excessive growth of weeds but not enough to get the soil so fine it will blow. A clean summer fallow insures less trouble from weeds, provides a good seedbed, and supplies the moisture that is so necessary in giving the young alfalfa a start.

The chief objection to summer fallow is the fact that a crop cannot be raised the year the land is fallowed. However, this objection is largely overcome by the greater certainty of securing a good stand. When one considers the cost of alfalfa seed and the value of a good field of alfalfa the objections to summer fallow will not seem so great.

Another method that gives satisfactory results in favorable seasons is to plow the ground immediately after harvest and work it sufficiently thereafter to get a compact seedbed free from weeds. The ground should not be worked so much that the top soil is finely pulverized and in danger of blowing. A very common cause of failure, where an attempt is made to grow alfalfa immediately after a small-grain crop, is plowing too late. As a result the ground is in poor physical condition and no moisture is stored in the soil to start the alfalfa. Another difficulty that frequently occurs is a loose seedbed caused by turning under a large amount of stubble and weeds. This objection can be largely overcome by plowing early or by discing the stubble immediately after harvest and plowing soon after.

Alfalfa can be started successfully on corn ground providing the season is favorable and the corn has been kept clean the previous season. The corn should be cut and the land cultivated in such a way as to prevent soil blowing during the winter. Sufficient cultivation should be given in the spring to kill any weeds that may start. Shallow plowing early in the spring may be advisable in some cases, especially if the land is weedy. Plowed land should be thoroughly compacted. A good way is to use a disk harrow weighted and with the discs set straight. A common drag harrow may be used but care must be taken not to get the soil fine enough to blow.

#### DATE OF SEEDING

Experiments at the Fort Hays Branch Station indicate that seeding in early May is generally best in western Kansas. Occasionally earlier plantings have made a stand. If such plantings are killed by frost or fail for other reasons there is still time to kill weeds and re-seed in May. Seeding should be done as soon after a warm spring rain as the ground can be worked. The moisture from such a rain gives the alfalfa a good start of the weeds and generally enables it to attain

sufficient size to withstand dashing rains which crust the ground. A dashing rain immediately after seeding usually necessitates re-working and re-seeding. This should be done as soon as possible. Persistent effort regardless of the cost in seed and work should be made to secure a small acreage of alfalfa on every farm where conditions are favorable for its growth.

#### **RATE AND METHOD OF SEEDING**

It is usually desirable to seed from eight to twenty pounds per acre, the exact amount depending on soil conditions and the quality of the seed. Alfalfa seed should be purchased early enough to permit a careful germination test by the buyer or the experiment station laboratory. The seed should be examined for objectionable weed seeds as well as for germination. All seed should be bought with a guarantee that it will pass a careful purity and germination test.

The method of seeding influences the quantity of seed to be used. If seeding broadcast by hand, or with a mechanical seeder, more seed must be used than if drilled, since much of it is never covered, or is covered too deeply. In such seeding 15 to 20 pounds per acre should be used. When seeding is done with an alfalfa drill having press wheels, as little as seven pounds may be sufficient, since it is covered uniformly and comes up quickly and evenly. Records show that the oldest and best stands of alfalfa on the large fields of the station were secured by drilling from six and one-half to fifteen pounds per acre. The average rate on these fields was about thirteen pounds per acre. Some of this was seeded with an alfalfa drill and some with a wheat drill. When a wheat drill is used the alfalfa seed may be mixed in the proper proportions with bran or similar material to secure the desired rate of seeding. Attachments for seeding alfalfa may be purchased for some grain drills. Care should be taken that the seed is covered just deep enough to be in the moist soil.

#### **NURSE CROPS**

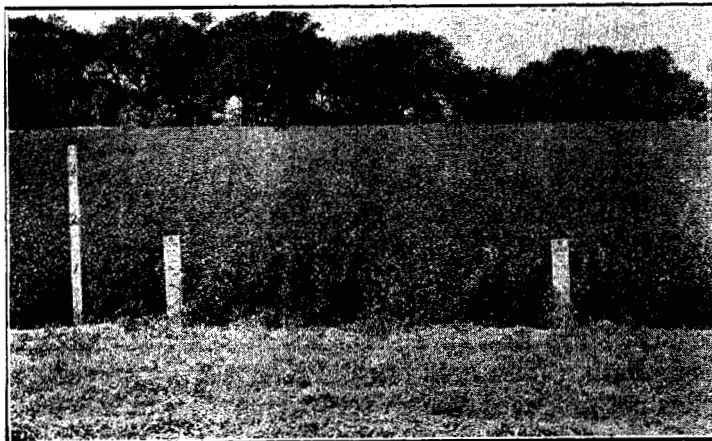
A nurse crop is as hard on young alfalfa as are weeds. Moisture being the limiting factor, there is seldom enough of it for both the alfalfa and the nurse crop. Nurse crops should therefore not be used in western Kansas.

**CLIPPING YOUNG ALFALFA**

Newly seeded alfalfa usually becomes weedy, even when planted on the most carefully prepared soil. If the weeds begin to choke out the young alfalfa it should be clipped. If on the other hand the alfalfa is able to hold its own with the weeds it is usually better not to cut it. If it seems desirable to clip it the cutter bar should not be run closer to the ground than seems necessary to kill the weeds. A light cutting may be left on the ground as a mulch.

**CULTIVATION**

During the past five years the Fort Hays Branch Station has tried cultivating alfalfa with every kind of machine available for such work and in no case have results sufficient to justify the expense been secured. (Fig. 1.) Weeds should be killed before seeding. After a good stand is once established, alfalfa can compete with most of the common weeds, excepting sandburs, bindweed, and crab grass. When a field of alfalfa has become too thin and weedy in this region, it is better to plow it up, crop the land for a few years, and then re-seed than to attempt to improve the stand by cultivation.



**FIG. 1.**—Plots of alfalfa at the Fort Hays Branch Station. The plot on the left has been cultivated each season, while the plot on the right has not been cultivated. There has been no material difference in yield

**TIME OF CUTTING ALFALFA**

Alfalfa should be cut as soon after the new shoots from the root crown begin to grow as weather conditions will permit. This is usually when the plants are fairly well in bloom. Too early cutting seems to thin and injure stands. Experiments both at Hays and Manhattan indicate that the yield of hay is as great and the stand is benefited when cut at the later stages of maturity. This is fortunate since it allows the farmer to put off alfalfa cutting when the cultivation of other crops or harvest demands attention.



FIG. 2.—Growing alfalfa in rows at the Fort Hays Branch Station. The results do not justify row planting

**SEED CROPS**

The Fort Hays Branch Station has had more failures than successes with alfalfa seed crops. Even alfalfa in cultivated rows has not produced enough seed to recommend this method of growing for this section. During the seasons of 1916 and 1917 several station fields gave promise of producing profitable seed crops, but grasshoppers and blister beetles came in swarms, destroying the bloom and cutting off the pods. Alfalfa is so valuable as a hay crop that it is usually better to buy good, Kansas grown seed than to try to produce seed under

ordinary western Kansas conditions. In favorable situations in northwestern Kansas and along the Arkansas River in southwestern Kansas good seed crops are frequently obtained.

**ALFALFA IN ROWS ON UPLAND**

The Fort Hays Branch Station began an experiment in 1913 to determine the value of seeding alfalfa in rows far enough apart to permit cultivation. A number of plots were sown with the rows varying from 12 to 42 inches apart. Plots sown broadcast in the usual way were included for comparison. The five-year average yields of all plots were practically the same. One cutting of one-half to one ton of cured hay



**FIG. 3.—Varieties of alfalfa in rows at the Fort Hays Branch Station**

per acre was usually obtained from these upland fields. When additional cuttings were obtained the yields were usually light and did not pay the cost of harvesting. These experiments indicate that alfalfa in rows (fig. 2) has no advantages over broadcast alfalfa on upland.

**VARIETIES**

Common Kansas alfalfa is the best variety for this region. Varieties of alfalfa (fig. 3) from all parts of the world have been tried on the Fort Hays Branch Station during the past five years. In no case has the average yield of any of these varieties exceeded the average yield of alfalfa grown from common Kansas seed.

INSECTS INJURIOUS TO ALFALFA

Alfalfa on well-established fields on the Fort Hays Branch Station has rarely been permanently injured by insects except in 1913, although the yield has occasionally been reduced. Grasshoppers are the most injurious to the crop. They can be controlled by scattering poison bran mash early in the morning,<sup>1</sup> This mash may be made as follows:

Bran .....	20 pounds
Paris green or white arsenic.....	1 pound
Sirup .....	$\frac{1}{2}$ gallon
Lemons or oranges.....	3
Water .....	3 $\frac{1}{2}$ gallons

Mix the dry bran and poison in a washtub or a tight box. Mix the sirup and the finely chopped pulp and peel of the fruit in the water. Pour the liquid over the mixture of bran and poison, stirring with a spade, a wooden paddle, or a shingle to dampen it evenly.

While fresh this wet mash flavored with fruit juice is very attractive to grasshoppers, but when dry or stale it is not eaten. The amount prepared by using 20 pounds of bran will sow three to five acres. It should not be sowed just before a shower, as the rain washes the poison from the bran, leaving it harmless. Little of the bait is eaten after the second day, even in damp weather. In case the grasshoppers are drifting in from adjoining fields, two or three applications may be necessary to control them.

Where bait is to be spread on fields of a few acres it can be carried in a pail on the arm; but when spread on large areas or on long strips on the edges of fields or pastures or along roadsides it should be carried in a tub or box on a sled or in an open buggy. One man can both drive and sow the bait.

It is good farm practice to seed grasshopper eaten borders, washed out ravines, and patches which have drowned out, to Sudan grass. Sudan grass not only makes good hay but also makes fine water-shedding material for topping out stacks of the second and third cuttings.

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<sup>1</sup> The value of turkeys, other poultry, and hogs in controlling grasshoppers in alfalfa fields is discussed on pages 11 to 14 of Kansas Agricultural Experiment Station bulletin 215, "Methods of Controlling Grasshoppers." Copies may be secured by writing to the station at Manhattan, Kan.



During recent years blister beetles have seriously interfered with the production of seed crops, but these insects have not reduced the stand of alfalfa. The picture on the front page shows in the foreground an area where blister beetles have cut off the alfalfa blooms. No other insects have so far seriously injured alfalfa in this part of the state.

#### DAMAGE BY RODENTS

Gophers and prairie dogs do great damage to alfalfa fields unless held in check. The most effective means of controlling these animals is to poison them with a poison bait recommended by the Kansas State Agricultural College and the United States Biological Survey. This bait is prepared and sold by the Kansas State Agricultural College. It may also be had at cost by applying to the Fort Hays Branch Station, Hays, Kan. If desired, the materials may be bought and mixed by the user. Directions for their preparation and use are as follows:

#### PREPARATION OF PRAIRIE DOG AND GOPHER POISON

Mix thoroughly 1 ounce of powdered strychnine (alkaloid) and 1 ounce of common baking soda (bicarbonate). Dissolve 1 heaping tablespoonful of dry laundry starch in a little cold water and add it to  $\frac{3}{4}$  pint of boiling water. Boil and stir until a thin, clear paste is formed. Slowly sift the mixture of strychnine and soda into the starch paste, stirring constantly to form a smooth, creamy mass. Add  $\frac{1}{4}$  pint of heavy corn sirup and 1 tablespoonful of glycerine, and stir. Add  $\frac{1}{10}$  ounce of saccharine, and again stir thoroughly. Pour this mixture while still hot, over 13 quarts of clean oats and mix until all the grain is coated.

If alkaloid strychnine is not available, the sulphate may be used, either powdered or in crystals, but it is necessary to vary the formula. Dissolve the strychnine in the boiling water before adding the cold starch. After the poisoned starch paste is clear, stir in the soda very slowly. Then add the sirup, glycerine, and saccharine as in the above directions and mix with the grain.

For mixing small quantities an ordinary metal washtub is convenient. For large quantities a tight, smooth box may be used, and the mixing done with a hoe or spade.

#### HOW TO USE PRAIRIE DOG AND GOPHER POISON

**To Poison Prairie Dogs.**—Each quart of the prepared bait is sufficient to treat about 50 prairie dog burrows. Scatter a teaspoonful of the poisoned grain on clean, hard ground near each occupied burrow, never on loose soil or in the holes. With reasonable care, cattle, sheep, or other livestock on the range will not be endangered.

**To Poison Gophers.**—Locate the run between the gopher mounds by the use of a wagon rod or similar small iron rod, pushing the rod into the ground repeatedly until the run is located. Take a blunt-ended broomstick about one inch in diameter and push it down where the wagon rod reached the run until it breaks into the run. Drop a teaspoonful of the bait through the hole thus made into the run. With the heel close the top of the hole made by the broomstick. Place bait between every two or three fresh mounds.