

Oklahoma Agricultural Experiment Station

STILLWATER, OKLAHOMA.

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ALFALFA.

SUMMARY.

1. Alfalfa is a great and valuable crop for Oklahoma, where there are as good alfalfa soils as are found in the world and as good yields are produced as anywhere.
2. The acreage of alfalfa should be greatly increased in Oklahoma. There are but few farms here that do not contain a few acres at least that will grow the crop profitably.
3. Select the best soil on the farm for the first trial, and try only a few acres at first.
4. Decide a year or two in advance of seeding time what field is to be seeded to alfalfa, and follow the best methods of cropping and preparation known.
5. Buy only the very best seed. Get a sample and test it before buying and purchase your seed a year before you expect to sow it unless you are sure you can get good seed just when you want it.
6. Twenty pounds of good seed to the acre is plenty and as low as twelve pounds is all that is used by many.
7. Seed either with the drill or by broadcasting. Conditions must be right for either to succeed.

8. Fall seeding and spring seeding are both followed in Oklahoma with good success. If the conditions are not right at seeding time, or turn out unfavorable after seeding, or while the plants are small, either may fail.

9. As a rule fall seeding is preferable in Oklahoma, particularly on the less adapted soils.

10. Take due care in harvesting the hay that half its value is not lost at that time.

11. Don't give up trying to raise the crop because you fail in your first attempt or even if the failure continues to the second and third attempts. Successful alfalfa raisers have stated that in instances they have failed as many as five times in getting certain fields started to alfalfa, and after they did get the field seeded, the returns from it would justify reseeding ten times if necessary.

INTRODUCTION.

Alfalfa has been designated the king of forage plants and no one is likely to challenge the statement if he is informed on the wonderful yields obtained from this crop; the palatability and high feeding value of the plant; its ability to build up and maintain soil fertility; the large volume of soil drawn upon by the plant for its nourishment through its extensive and very deep growing root system which enables it, when once established on suitable soil, to produce abundantly year after year without reseeding and other attention that is necessary for so many other crops; and last but not least, the marvelous monetary values which alfalfa is capable of returning when wisely utilized.

YIELDS.

According to the Twelfth Census, the average yield of alfalfa hay for 1899 in the United States was 2.5 tons per acre. On good alfalfa land, in favorable seasons, yields of six to eight tons of alfalfa hay per acre are not uncommon, and this without irrigation.

FEED VALUE.

Either as a hay or green forage, alfalfa is eaten greedily by all kinds of live stock, including poultry. It contains a high per cent of protein, which so many of our farm feeds lack in sufficient amount to

meet the demands of the animal system in nutrition. Hence alfalfa is a very valuable feed to use to balance up the ration of corn, Kafir corn, etc. In steer feeding experiments at this Station, in which alfalfa was fed in connection with the above feeds in comparison with corn meal and Kafir stover, about one-fourth less grain was required to produce a pound of grain with the steers receiving the alfalfa hay in their ration than was required by the steers not receiving any alfalfa. Hogs fed alfalfa hay with corn have produced three to four more pounds of gain from a bushel of corn than was produced by hogs getting straight corn. Reports are on record of butter fat being produced at a cost of seven cents per pound from common scrub cows fed on alfalfa hay and Kafir meal, reckoning the feeds at ordinary prices. The food nutrients contained in a ton of alfalfa hay are little below those in a ton of bran, either in amount or kind and on the farm, for practically all purposes, alfalfa can be used instead of bran. Every farmer knows the cost of a ton of bran and its high feeding value.

ENRICHES THE SOIL

On the roots of alfalfa can be found wart-like enlargements which are called nodules. These formations are caused by very minute plants called bacteria, which live in the soil and attach themselves to the roots of the alfalfa. Through the medium of these organisms, the alfalfa plant draws on the nitrogen of the air in the soil. All other plants such as the clover, cowpeas, beans, etc. that belong to the same family as alfalfa, feed on the nitrogen of the air in the same way. Such plants as corn, Kafir corn, cotton, castor beans, wheat, oats etc. have not this characteristic and the very small amount of nitrogen found in our soils must furnish them the necessary supply for their growth, and each crop harvested reduces this supply of nitrogen in the soil. On the other hand, with alfalfa, a crop harvested removes little, if any, of the nitrogen from the soil and generally leaves the surface soil richer in nitrogen. The importance of this statement is apparent at once when the fact is brought to mind that nitrogen is the plant food most commonly lacking in unproductive soils and that nitrogen is by far the most expensive of the elements purchased in commercial fertilizers to be used in supplying plant food.

STAYING QUALITIES

On suitable soil, the roots of alfalfa grow down into the soil ten to twenty feet, enabling them to use the supply of underflow water, and to draw upon soil for plant food that is out of the reach of the roots of ordinary plants. Alfalfa is a perennial and the longer it grows, the better it flourishes if it is on suitable soil. Fields of alfalfa twenty-five years old are in existence and are still producing maximum yields.

The plant is one of the first to show green in the spring and turns brown in the fall only when subjected to a hard freeze. Alfalfa is the greatest drought-resisting crop grown on the farm.

MONEY VALUE OF THE CROP.

During the season of 1905, some Oklahoma alfalfa raisers marketed their alfalfa at ten dollars per ton, baled, on board cars at their stations. One reports that the first crop of 1906 from seventy-five acres has been sold at the above figure and that he had a demand for ten times as much as he had to sell. These farmers report net returns per year of forty to fifty dollars per acre. Very few if any other farm crops give such net profit. The above reports are from fields of alfalfa on ideal soils but remunerative returns are obtained under less favorable conditions.

These few facts about the value of alfalfa are given to encourage more Oklahoma farmers to grow the crop and it is believed if they will investigate the possibility of the crop in this section, a few acres at least will be grown on almost every farm in Oklahoma. While in many cases, the returns will fall far short of the above records, the grower will usually find it well worth growing when compared with the returns of other crops grown on the same soil.

ALFALFA IN OKLAHOMA.

This crop is being grown in every county in Oklahoma and in some sections, a fair acreage is present. From many fields as large yields are obtained as are produced any place else in the United States without irrigation. On the uplands in Oklahoma, as elsewhere, the returns vary. Where the subsoil is hard and impervious, the yields are quite meager under unfavorable climatic conditions and the crop needs considerable nursing such as discing and harrowing, to keep the crab grass

from taking the field in a few years. On these upland soils with the hardpan subsoils which grow cowpeas to perfection, the farmer who is not willing to inform himself about proper methods and to give his alfalfa fields much attention and care, should grow cowpeas instead. But as has been indicated before, alfalfa is being grown on such soil successfully and profitably, but only in small areas.

YIELDS ON THE STATION FARM.

The soil of the experiment station farm on which the following yields of alfalfa were obtained is a clay loam underlaid by a very stiff, impervious subsoil of a hard-pan nature.

Yields of Field F, containing about four acres; cured hay for the season.

1902-1.76 tons hay per acre in 5 cuttings.
 1904-1.23 tons hay per acre in 5 cuttings.
 1904-3.13 tons hay per acre in 4 cuttings.
 1905-3.13 tons hay per acre in 5 cuttings.
 Average for four years, 2.31 tons of hay per acre.

In the spring of 1904 the field received an application of barnyard manure at the rate of 15 tons per acre. Every season, the field was disced from three to four times and harrowed. During 1903 and 1904, web worms damaged the crop.

Yields of Plats 1, 2, 3, and 4, Field E. The plats are on similar soil to that of Field F and have been handled about the same as that field. The yield is given for all the plats together.

1902-2.67 tons hay per acre.
 1903-3.27 tons hay per acre.
 1904-3.31 tons hay per acre.
 Average for three years, 3.08 tons of hay per acre.

Yield of Field H, containing about five acres;

1902-4.20 tons hay per acre in 5 cuttings.
 1903-2.88 tons hay per acre in 5 cuttings.
 1904-2.12 tons hay per acre in 5 cuttings.
 1905-2.27 tons hay per acre in 5 cuttings.
 Average for four years 2.69 tons per acre.

Barnyard manure was applied to this field in 1900-'01, and it was given the same treatment as was received by the fields previously mentioned. Other results will be given in a later bulletin, but those cited give a fair idea of what may be expected on upland where the subsoil

is a hardpan. The hay from all the fields mentioned above, obtained in the last two or three cuttings, contained varying amounts of crabgrass, so the yields given are not all alfalfa. Since the above results were obtained, some good bottom land has been acquired by the experiment station and alfalfa has already been seeded on some of it. In a few years, yields that will look better when compared with those of our best alfalfa growers can probably be reported.

FAILURES IN STARTING ALFALFA.

No other common farm crop gives the raiser so much trouble in getting it started and established as alfalfa. It is not an extravagant statement to say that five acres of alfalfa are seeded every year to every one that grows. Some observers have put it still stronger and have given the ratio as high as ten to one. While it is a fact that alfalfa is a hardy plant when it is well established, it is also true that it is one of the most delicate that the farmer grows. The young plant is tender and not capable of withstanding conditions that would not retard other common farm seeds and plants in the least. But many of the failures to get a start of alfalfa could have been obviated by properly preparing the seed bed, selecting good seed, and following other correct methods. It is worse than folly to attempt to start a crop by following slipshod methods.

THE SOIL.

Alfalfa can be found growing on a great variety of soils but it produces much better on some than others. A loamy surface soil, with good drainage, underlaid by a subsoil porous enough to allow the roots to penetrate readily, but not pure sand or gravel, is an ideal alfalfa soil. If the subsoil conditions are good, the surface soil may vary from a very heavy, stiff texture to a sandy loam, and after the crop is established it may do as well on one type of surface soil as on another of the types mentioned. When the surface is largely sand, it will be difficult to get the alfalfa started or keep it alive, no matter what the subsoil is like. The statement has been made that alfalfa will grow successfully on any soil that will produce a good crop of wheat or corn and while in a broad sense this is true, there are many exceptions. Alfalfa cannot withstand "wet feet" and for good results the soil must drain readily at least two

to three feet deep. If the surface is covered with water longer than two days, the crop will usually perish. Soils deficient in lime are not conducive to the most thrifty growth of alfalfa as they are apt to be sour which retards or prevents the development of the bacteria that live on the roots of the plant.

INOCULATING THE SOIL.

The bacteria that cause the nodules to form on the roots of alfalfa and that gather the nitrogen from the air so that the alfalfa may use it, are not present in like abundance in all soils. Any lack of their presence in sufficient abundance or development is generally due to improper physical conditions of the soil, as too sour a condition, improper aeration, etc. If these are corrected, the alfalfa bacteria which are probably present in all fields in Oklahoma, will develop and perform their function. It is doubtful if it is necessary to inoculate any soil in Oklahoma with the alfalfa bacteria. If an old alfalfa field on which the crop is flourishing is convenient, it is well worth the while to try the experiment and take some soil from that field and scatter it at the rate of 200 to 500 lbs. per acre on new seeding where difficulty has been experienced in getting a stand or good growth of the young plants.

THE SEED-BED.

This should be made by good deep plowing which should be done long enough before the seeding time to enable the soil to be thoroughly worked down, fully settled, and filled with moisture. As a rule, not less than two to three months should be allowed for this and many advocate six months to one year where unfavorable conditions exist, as during dry seasons and a poor soil. A loose open seed-bed, as on freshly plowed ground, or on a field not worked sufficiently after plowing, is quite sure to cause a failure of alfalfa seeded upon it. If for any reason the soil has not enough moisture in it to readily germinate the seed, alfalfa should not be seeded upon it until the moisture is present, unless good rains are sure to fall in a day or two after the seeding. Wait for months or years if necessary in order to get the soil in this condition. The seed-bed should not be hard but should be firm and settled and prepared like a garden and contain readily available plant food to start at once and vigorously the small and tender alfalfa plant.

PREPARING THE FIELD FOR SEEDING.

Here is where the farmer can use his ingenuity and control conditions more or less and assure the success of getting alfalfa started. Neglect at this point accounts for more failures in starting the crop than all other causes combined.

Commence early. Unless the soil happens to have had good previous cultivation and treatment, it is folly to attempt to prepare it in a month or a few months for alfalfa. The cultivation and cropping of the field should be planned one to three years in advance of the time of seeding.

PREVIOUS PREPARATION.

The field should be handled and cropped in such a way as to rid it of grass and weed seed to a large extent, and leave the soil well supplied with readily available plant food. If the soil is thin and poor or worn out, it should be enriched in some manner as by applying barnyard manure or growing and plowing under some such crop as cowpeas. After the manure is added, time enough should elapse before the seeding of the alfalfa to enable destroying the weed seed in the manure. If the soil is of a very stiff texture, or very open and loose and sandy, the adding of the manure or plowing under the cowpeas will aid in assuring the starting of the alfalfa. A failure is almost sure to result from attempting to seed alfalfa on poor, wornout soils without first supplying plant food to the soil in some way. And although alfalfa is called a "soil builder" manure may be applied with profit to the alfalfa crop growing on poor soil.

PLOWING AND HARROWING.

After plowing, the ground should be leveled and pulverized and kept free of weeds by repeated harrowing until seeding time. If the previous treatment has been good, wheat or oats are good crops to precede alfalfa seeding. The grain should be removed as soon as possible after harvest and the ground plowed at once. If anything delays the removing of the shocks or the plowing, it is well to give the ground a good discing and this can be done before the grain is removed. This is to keep down the weeds and hold the moisture. The plowing should not be delayed long. If the alfalfa is not to be seeded in the

fall, the ground can be planted to cowpeas or soy beans and cultivated. If these crops are kept well cultivated, usually it will not be necessary to plow again for the spring seeding, but a good discing in fall or winter will answer. If ground is to be plowed for spring seeding, it should be done in the fall or early winter.

TIME FOR SEEDING.

Alfalfa can be seeded successfully in the spring or in the fall in Oklahoma. For spring seeding, March or April are the preferable months and if the season is not backward, the earlier the better. If a freeze catches the plants while very small, many of them will perish but it is better to risk this than the heavy dashing rains that come later in the spring and the crab grass and weeds that bother more in late seedings. Fall seeding should be done from Aug. 15 to Sept. 15. Seedings a month later often succeed but there is much danger of the dry winter winds whipping out the plants or the freezes killing them. The earlier seedings may be damaged by grasshoppers. Fall seeding in Oklahoma is popular with many as it affords good opportunity to prepare the seed-bed and the crop is not apt to be troubled as much with weeds and crab-grass as spring seedings. The damage from grasshoppers is the drawback to fall seeding. As a rule alfalfa from fall seeding will produce a crop much sooner after planting than that from spring seeding. The condition of the soil and weather at time of seeding is of much more importance than any exact date and unless these conditions are favorable, the seeding should not be made until they are, even if it is necessary to wait a year or two years. Alfalfa seeding is too uncertain to risk it otherwise.

THE SEED.

Nothing but the very best alfalfa seed should be used. It should be free from all trash, weed seed, and shriveled alfalfa seeds, and be a bright golden color. In purchasing alfalfa seed, it pays to buy the best. The experiment station will test, without charge, samples of alfalfa seed sent by mail.

While twenty pounds is the usual amount used and recommended, many successful alfalfa raisers do not sow more than twelve to fifteen pounds per acre. Poorly prepared ground or other unfavorable condi-

tions can not be made up by a lavish use of seed. To use more than twenty pounds of good seed is a waste.

METHODS OF SEEDING.

Alfalfa seed should be covered only lightly with soil, not over one-half inch deep. Good rains falling on seed on the surface of well prepared soil have started the seeds which have lived and made a crop when the following weather conditions have been favorable. Any good wheat drill may be used if the seed is mixed with finely ground corn or a similar substance in order to enable regulating the feed. At this station two-thirds Kaffir meal is mixed with one-third alfalfa seed and the drill set for one and three-fourths bushels of wheat. The aim is to put on twenty pounds per acre. It is said that some wheat drills will drill alfalfa seed without this mixture. A short trial would determine the claim. The drill should be run very shallow and the shoe attachments will be found preferable to the discs or the hoes. The latter are not desirable for the purpose. The drill covers all the seed in moist ground but if a heavy dashing rain falls on a field so seeded, just after seeding or while the plants are very small, a poor irregular stand is quite sure to be the result. This is particularly true on a heavy soil that runs together badly. The same happening on a field of broadcasted alfalfa under like conditions will prove very injurious but not to the extent as on the drilled field. This is the only advantage that broadcasting has over drilling alfalfa. Broadcasting will succeed quite well if the surface soil is in ideal condition as to moisture, etc. and dry weather or heavy winds do not follow the seeding before the seeds are up or the plants have reached some size. Usually broadcasting should not be done until rain is falling or until it is very evident that a rain will fall shortly. In previous years this station favored drilling but for the past year it has practiced broadcasting with better success. The soil here is heavy and washes and runs together. In Oklahoma, nothing should be seeded with alfalfa for a nurse crop.

TREATMENT FOLLOWING SEEDING.

Many a good stand of alfalfa has been lost by not giving it proper care the first three years of its life, particularly the first year. It has been mentioned that the young plant is a tender delicate thing and it

is a fact that the crop is not fully established until it is three years old. Up to this age the crop should not be pastured at all. The weeds and grass should be kept down the first year by frequent mowing and never allowed to get over a few inches high. Don't wait until the alfalfa is large enough to cut for hay. Mowing the real young plants seems to make them take root better and grow more vigorously. Very close mowing is not advisable, particularly if the weeds or grass have got a start and become tall. On the uplands of Oklahoma, and some of the bottom fields, discing the alfalfa fields after they are a year old will aid very much in subduing the crabgrass and keeping it out of the field. During the first year, the smoothing harrow may be used to advantage. For the second and third years, the discing should be light and carefully done but after that the surface soil can be thoroughly stirred up by lapping the disc and running two inches deep if necessary. On the upland of the station farm, it is found necessary to disc the alfalfa fields three to four times a season in order to keep the crabgrass from running the alfalfa out. Usually the first discing is made just before the growth starts in the spring and then each cutting is followed immediately with the disc.

HARVESTING FOR HAY.

If the best quality of hay is to be obtained, the alfalfa should be cut just as it is coming into bloom, when about one-fifth of the blooms show. There are times when it should be cut before this. If the plants are turning yellow at the bottom and the leaves dropping off badly on the lower half of the stalks, or if a new growth is springing up from the crowns, the crop should be cut at once. The success of following cuttings depends upon getting the preceding crop off and out of the way. When the proper time for cutting has passed for several days, better cut a crop and let it get wet, rather than retard the following crop.

With alfalfa as with any other kind of hay crop, no definite specific rules can be given for curing the hay. The alfalfa leaves are a very valuable portion of the plant and when dried they drop off very readily and the crop must be handled to prevent this as far as possible. This can be accomplished by curing the hay largely in the windrow and shock. Don't leave the hay to dry and bleach in the swath; cure it in

the shock. Generally all hay that is cut in the forenoon should be put in the windrow or shock by that evening. And the next day it should all go in the shock if it is not dry enough to haul in. It will usually be if the hay is opened out in the morning if it is a little green. Alfalfa hay can be stacked or put in the mow much greener than any other hay crop. If the hay is not wanted for shipping to market, it is much better to put the hay up in so green a state that it will heat some in the mow or stack rather than have it bleached with a heavy rain after the crop is partly cured. Alfalfa that is well wilted can be put in the stack or mow and make good hay for the farm. This is provided that there is no dew or rain on the hay, for this condition is sure to produce poor hay. Alfalfa stacks should be covered with some material as prairie grass to turn the water.

GROWING FOR SEED.

While there is great profit realized in raising alfalfa seed, many farmers find it more feasible to buy their seed than to raise it. While the seed is grown successfully on a variety of soils, it does not do well on a very rich soil or a poor thin soil. Excessive rain produces undesirable conditions and on the other hand plenty of moisture is necessary. usually the second or the third crop is best to produce seed from. Alfalfa should be cut for seed when the greatest part of the seed-pods have turned brown. Then the crop must be thoroughly cured in the field and then stacked or threshed.

It is not to be supposed that in a brief bulletin like this, nearly all the important facts known about alfalfa raising could be given. Later an extensive bulletin giving the detailed results of experiments with alfalfa at this station is to be published. Meanwhile those wanting more extensive information are requested to write this experiment station. Good books and bulletins treating extensively of alfalfa raising are plentiful and available to farmers and these should be procured and studied. After all this is done, the alfalfa raiser will find that each case of seeding and caring for alfalfa calls for individual judgment.

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