

**TEXAS AGRICULTURAL EXPERIMENT STATION**

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Co-operative Forage Crop Investigations

BETWEEN THE

Texas Agricultural Experiment Station

AND THE

Bureau of Plant Industry, United States  
Department of Agriculture

**ALFALFA IN NORTHWEST TEXAS**

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## INTRODUCTION.

Owing to the recent development of Northwest Texas as an alfalfa growing region and the many vicissitudes experienced by the farmers of that section in the past two droughty seasons in preparing for and planting this crop, it is considered that a publication at this time setting forth such information as is available concerning the best methods of preparing for and planting alfalfa in this particular region will be acceptable. Such information is doubly needed at this time because of the influx of settlers who, even if experienced in the growing of alfalfa elsewhere, are at a loss to cope with the conditions without some additional knowledge of this region. These droughty conditions make it exceedingly difficult to secure a stand of alfalfa and call forth all the farmer's resources to secure the proper returns for his outlay in capital. This paper is written not only on the basis of five years' experimental work, but as well upon observations and practical experience in growing alfalfa as a farm crop in Northwest Texas.

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## THE REGION

Northwest Texas, generally speaking, comprises a section of about fifty counties lying immediately east of the State of New Mexico and about as large as the State of Oklahoma. (See Fig. 1.)

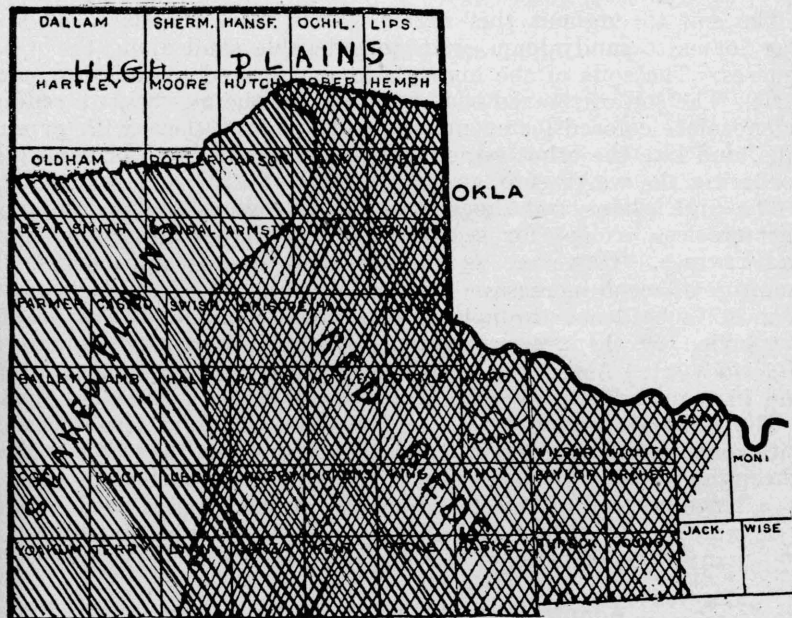


Fig. 1. Map of Northwest Texas showing the "high plains," "staked plains," and "red-beds" regions as described in this publication.

### Surface Features.

This territory is for the most part a gently rolling plain, varying in altitude from about 1000 feet in the southeastern part to approximately 4500 feet in the northeastern portion. The northern part of this region is traversed by the Canadian River, which offers drainage only to the immediate region through which it flows. The southern and southeastern portions are drained by the Red and the Brazos Rivers and their tributaries. The central portion is cut here and there by a canyon, but for the most part is drained by means of lakes where the water collects during wet periods and escapes later either by seepage or evaporation.

In the discussion of this paper this region may well be divided into three areas: namely, the "high plains," the "staked plains," and the lower lying "red-beds." The section north of the Canadian River, which comprises about eight counties, is known as the "high plains." That part south of the Canadian River and west of an irregular line drawn from Big Springs, Texas, north through

Goodnight, Texas, is designated as the "staked plains" region, and comprises about fifteen counties. This line is pretty definitely marked by an abrupt change in altitude, and is commonly known as the "cap-rock" of the plains. That portion of this region east of this line and south of the Canadian River is the "red-beds" region. In size it is about half of the section discussed in this paper.

### Soil and Plant Covering.

The soil throughout this region varies from the dark clays or clay loams to sandy loam, with considerable sand along the water courses. The soils of the high plains and staked plains differ very little. The soil of the red-beds region is for the most part a reddish or chocolate colored loam, interspersed here and there with gypsum hills, and like the other regions has considerable sand or sand hills bordering the water courses.

The high plains and the staked plains regions are for the most part treeless, except for scattering scrub timber along the rivers and ravines. However, as the cap-rock line is approached the quantity of scrub increases. The buffalo grass (*Bulbilis dactyloides*) is most in evidence throughout both these regions, with a smaller proportion of the grama grasses (*Bouteloua curtipendula* and *B. oligostachya*). Along the southeastern border of the staked plains and in the sandier soils quite a variety of other grasses are found.

The red-beds region is sparsely dotted with low scrub mesquit with considerable elm and other scrub timber along the water courses. Throughout the red-beds region is found a great variety of grasses. In a large portion of this territory the grama grasses predominate, with quite a sprinkling of buffalo grass, Muehlenbergia, bluestem, and many other grasses of less importance.

### Adaptability of Alfalfa to the Region.

If properly utilized alfalfa is without doubt the most profitable crop that can be grown in this region. Certain sections are adapted to the growing of hay; others for pasture and seed; but the farmer who is prepared to utilize his fields for any or all of these purposes will continue to get good returns regardless of droughty seasons. It is therefore of the utmost importance that the prospective grower bear the above suggestions in mind, for otherwise he will find alfalfa no more profitable than other crops during droughty seasons. In general, the high plains will produce only pasture; the staked plains, pasture and seed; while the red-beds region will produce pasture, seed, and hay.

## PREPARING THE LAND FOR ALFALFA.

### Objects in Preparing the Land.

When and how to prepare land for alfalfa is of great importance to any region, but especially is this so in Northwest Texas. Probably more failures in securing stands are due to lack of preparing the land at the proper time and in the right manner than to any other cause. Therefore the farmer who attempts to seed land to



his crop without first acquainting himself with its requirements stands a good chance of losing seed and labor. When and how to prepare the land for alfalfa is a very simple matter, if the farmer bears in mind the requirements for a good seed bed. His first and probably most important care should be the conservation of moisture. A second consideration, and one of scarcely less importance, is the securing of a firm seed bed with a surface mulch. Having observed these two points the farmer will experience little difficulty in getting a stand of alfalfa, even in the driest of seasons.

### **When to Prepare the Land.**

When to begin preparing the land depends altogether on whether the seeding is to be made in the spring or in the fall. If fall seeding is desired the land should be plowed not later than July 1st. It can be plowed with a reasonable degree of safety as late as July 15th; however, later plowing is not dependable because of the fact that the seed bed may not get enough rain after plowing to make it sufficiently firm for seeding with safety. If spring planting is desired the land should be plowed some time in November of the preceding season so as to allow ample time for the firming of the seed bed before spring. Early plowing prepares the soil to take in and hold a greater amount of moisture than would be obtained by late preparation. The fact that a firm seed bed can be had with certainty only by early preparation makes this method unquestionably superior to late preparation.

### **How to Prepare the Land.**

If prepared sufficiently early deep plowing is advisable in all cases. It enables the soil to take in and retain the greatest amount of the rains which generally come as run-off water and therefore gives a moist seed bed for planting. Sandier types of soil of course do not require as deep plowing as the darker adobe sorts, but in any case deep plowing is not objectionable if done early in the season.

Shallow plowing is advisable only when the preparation is done so late that there is some chance of its not having time to settle a firm seed bed. Shallow plowing does not allow the saving of as much water as deep plowing, and many times is less desirable than disking, because it has a tendency to loosen the seed bed more deeply than disking and if late in the season is fatal to successful seeding.

Disking over the field is preferable to either deep or shallow plowing if done late, provided the disking is sufficient to kill whatever vegetation there may be on the land. The disk harrow can be used to advantage after plowing until the vegetation gets so large that it will not be destroyed.

The smoothing harrow is an excellent tool so long as the vegetation is small. It not only kills small weeds but has a tendency to firm the seed bed and leave it in the best condition for planting. The smoothing harrow should be used freely except on the sandier soils where caution must be taken to prevent blowing.

## **SEEDING ALFALFA.**

### **Best Varieties of Alfalfa.**

Of about thirty-five different strains of alfalfa tested out in this region, the ordinary Texas, Kansas, and Oklahoma grown seed have proved to be the most satisfactory. Some few imported lots have given an indication of superiority, but not sufficiently great to justify the additional cost of imported seed. The Turkestan, which is so generally recommended for drought-resistance, has not proven equal to the native grown strains. Good, clean, new seed grown in Texas, Oklahoma, or Kansas is considered about the best for this region, and is therefore recommended.

### **When to Seed.**

Alfalfa in this section may be seeded either in the fall or spring. Whether it be fall or spring seeding it should be done early in the season. Early fall seedings (August 15th to September 15th) are most dependable and are less likely to be affected by weeds the following season. Early fall seedings, if on well-prepared land, will grow sufficiently large to go through the winter without killing. Late fall seedings are frequently partially or entirely destroyed by dry, cold winters. Spring seedings can be made as early as March. The small plants just coming through the surface soil or a few days old are seldom if ever injured by frost. If planted at this time they have an opportunity to make some growth before the spring weeds have germinated, which will give them great advantage in the succeeding growth.

If seeded with a drill, either in the fall or in the spring, it is most desirable to make the seeding immediately after a rain. This insures quick germination and leaves the land freshly cultivated and in such condition that it will not blow. If planted with a broadcast seeder or by hand it is best to have it done at early seeding time without waiting for rainfall. For if the seeding is delayed a second rain, which will be necessary for germination, may come too late in the season. Broadcast seedings should never be made immediately after a rain unless the land is harrowed and left until this mulch has dried out, for otherwise in drying out, as is inevitable, many seeds will be lost.

### **How to Seed.**

Alfalfa is either planted in close drills or broadcast. Whether seeding is done with a drill or with a broadcast seeder depends largely upon which of these two implements is more accessible.

Drilling is preferable for the reasons that it generally takes less seed to secure a stand and it is more dependable. Drilled seedings are less likely to be affected by baking before germination or by blowing afterwards, for the reason that a stand can be had without rain after seeding, which leaves the land in such condition that it will not crust or blow. If the soil is in good condition an ordinary wheat drill with grass seeder attachment can be used. It should be set as shallow as possible and should have fastened behind a

brush or chain drag to level the small furrows left by the drill so as to prevent subsequent loss of young plants by heavy rains. In case of rainfall sufficient to induce baking of the land before germination of the seed a harrow or a brush drag should be used just when the crust is forming. When it is certain that the field will crust deeply it is best to use the harrow freely even though many young plants are destroyed, for without it no stand will be secured.

If the crop is to be seeded broadcast the wheelbarrow seeder is about the best implement that can be used. This seeder is commonly sold on the market, and if properly attended will sow alfalfa seeds very satisfactorily. In seeding broadcast a rain is always necessary before the seed will germinate, and on this account one always takes the risk of having the land bake or crust. This crust is sometimes so thick as to prevent many plants from reaching the surface, resulting in a complete or a partial loss of the stand. Sandy soils crust more deeply than clays, because they contain less organic matter. This "baking" can be prevented, in a measure, by incorporating in the soil an abundance of organic matter, such as the plowing under of a millet or oats stubble, or some green crop, preferably a stubble crop, for it does not rot so quickly. If this stubble is plowed under early and not too deeply, and thoroughly cut with a disk harrow, the first settling rain will put the seed bed in excellent condition for planting.

### **Quantity Sown Per Acre.**

When seeded broadcast about 20 pounds per acre is usually the amount sown. A smaller quantity than this in broadcast seedings usually results in poor stands, for the quantity of seed will go a long way towards making up deficiencies in preparation of the seed bed. Close drilled seedings require smaller quantities per acre because of the fact that the seed is more evenly distributed over the field and at a more even depth, so that almost perfect germination is insured. About ten or twelve pounds have been found to give excellent stands, but where the conditions are not ideal greater quantities of seed are advisable as an insurance against poor stands. In the high plains region, and perhaps to a certain extent in the stake plains area, thinner seedings may be more profitable. Seedings at Amarillo at the rate of twenty pounds per acre were considered too thick to afford any hay, and quite likely thinner stands would have produced as much or more grazing.

### **CARING FOR THE FIELD.**

#### **Value of Clipping.**

There is at the present time some difference of opinion as to the value of clipping young fields of alfalfa, the point of contention being that clipping off the young plants in a dry time and before they have put out their first basal shoots will tend to destroy a very great number of them. After the plants have established crowns, however small, it seems reasonably safe that they can be clipped without injury. At any rate, when weeds are present in the field the clipping becomes necessary, and it is to be recommended in all

cases, for delay in checking the weeds at this time will result in the loss of many alfalfa plants. It has been frequently observed by the writer that when growth was checked on young or old fields to the extent that the plants began to drop their leaves, they were vastly benefited by clipping before all the leaves had fallen. Fields treated in this way have been observed perfectly green; whereas other fields without clipping were dry, and in some cases no doubt severely injured. The benefits of clipping are very strongly indicated by the green and thrifty condition of fields that have been eaten off but not over-pastured by hogs.

### **Value of Cultivation.**

In this region, which is comparatively dry, the cultivation of alfalfa is almost absolutely necessary. Young fields may be cultivated with a spike-toothed harrow, while older fields require the use of either the disk harrow or an alfalfa renovator. If the growth is reasonably good the renovator may be used safely the first season. The renovator does much more satisfactory work than the disk because the plants are not cut off below the ground. A cultivation early in the season before the crop has started growth and one later in the season after cutting are desirable. Fields that are pastured, of course, will require more cultivation than hay fields for the reason that cultivation lessens the damage done the soil by tramping.

### **GROWING ALFALFA HAY.**

The red-beds region is practically the only part of Northwest Texas which will produce profitable crops of alfalfa hay, barring the canyon bottoms and swales between hills in the plains regions.

### **Time Required for Hay Crop.**

Early crops require longer growing periods than later ones. The time required to grow a cutting of hay ranges from fifty to thirty days, depending on the advance of the season. From one to five crops of hay are had in this section, depending on the rainfall. A hay crop requires a longer growing period than a "clipping" since the latter is simply an immature hay crop.

### **When to Cut.**

Alfalfa ordinarily should be cut when the first blooms appear. If left until in full bloom quite a number of the lower leaves will be lost, and some delay caused in letting the new crop start out. When weather conditions are such that the growth of alfalfa is checked before the blooming period it should be clipped before it has dropped all its leaves. This will enable the alfalfa to recover and start out new growth without further rainfall. Alfalfa should never be cut for hay when it is wet, for there will be some difficulty in curing in this condition. In cutting alfalfa the juice from the stems has a tendency at times to form gum on the sickle and cutter bar, sometimes causing considerable trouble. If water is applied to

the sickle at intervals it will entirely remove this gum and thus give the sickle freer action.

### **Curing Alfalfa.**

Ordinarily alfalfa cut one morning can be raked into windrows the next, but in the case of heavy crops a little more time would likely be required. It is probably less difficult to escape sunburning if the hay be cured in the swath, for if raked into the windrow too soon, it will not be ready for baling until the exposed part has burned. In any case, it should be raked before it has sunburned. By curing in the swath and raking up just before it is ready to bale, a nice, sweet, green hay will be secured. Curing in windrows or cocks too often results in sunburning the outer hay.

### **Yields of Hay.**

New fields of alfalfa do not produce as much hay as older ones. After two or three years old the roots will have penetrated sufficiently deep to gather enough moisture to make fair crops of hay with a small amount of rainfall. The yield per cutting is very irregular, ranging from a "clipping" to about one ton per acre. The average season's yield as based on five years' experimental work and observation is about two and one-half tons per acre. The profitableness of the season's crop of course depends upon the number of times the field has been mown, for in this section it is always necessary to cut one or more times when the hay secured will not pay the expenses. It is therefore clearly seen that the growing of alfalfa for hay alone, except perhaps in certain favored sections, would not yield the farmer very much greater average returns than many other crops.

### **Storing and Marketing the Hay.**

The hay can best be stored, or marketed by putting it into bales. This can be done either from the field or from the stack, but less cost is attached to the operation when baling is done from the field, taking the hay directly from the windrow. A barn should be provided in which to put the baled hay immediately so as to avoid loss by bad weather. The cost of storing this hay is a small matter and may be regarded as insurance. It can be carried from this storing place to market when desired.

In this region a bale weighing about sixty pounds probably finds more ready market than any other size. Furthermore, bales of this size ordinarily press easily and load well into a car. In selling the hay the farmer should use great care in quoting the grade, especially if the buyer is not present. It is frequently the case that farmers quote intermediate grades of alfalfa as choice pea-green, with the result that on arrival at its destination the buyer refuses to accept it. This always results in considerable loss to the farmer. If the farmer knows the buyer and deals exclusively with him he will avoid much trouble and useless expense.

## **GROWING ALFALFA SEED.**

### **Profitableness of the Seed Crop.**

The production of a crop of alfalfa seed is exceedingly profitable because the expense incident to growing and handling it is even less than that of the hay that could be grown in the same period. A crop of two bushels of seed per acre is more profitable than two ordinary crops of hay. The growing of seed is therefore to be considered wherever fields of alfalfa are grown in this region. It appears that a certain amount of dry weather is necessary for the best seed production, and with an ordinary vigorous growth to start the crop, seed can most likely be secured with little difficulty.

### **Best Crop for Seed.**

The second crop is generally left for seed. In this region the first crop would undoubtedly in many cases give good seed yields. The crop to be left for seed will depend entirely on the growth made up to blooming time. If the growth is vigorous the crop should be left for seed, but if later rainfall causes the plants to start growth at the base it is best to mow it for hay for it will not likely produce a heavy seed crop. In such case the next crop may be left for seed if conditions are suitable. In the drier seasons it appears that the first crop, because of its vigorous growth, might produce good seed.

### **Time Required for Seed Crop.**

It generally requires about eighty to ninety days to mature a crop of seed, or about the period for two crops of hay. The time required for the heaviest yield depends on weather conditions up to the time of cutting, for if suitable weather is had the crop may be left to mature seed for some considerable time after the first pods are ripe without shattering.

### **Harvesting and Thrashing Seed.**

Harvesting should be done when the greatest number of pods are ripe and before too many have begun to shatter seeds. The seed crop can be harvested with an ordinary mower, but some carrying attachment to bunch the hay without shattering the pods is desirable. If this buncher attachment is used on an ordinary mower the crop can be left in windrows as dropped until thrashing time, if the weather permits. If no bunching attachment is to be had the crop can be raked with an ordinary sulky rake and left in the windrow. This raking should be done immediately after cutting, as the hay will be woody and will not mold. At thrashing time the hay can be carried to the thrasher with a buck rake, which probably shatters as few of the pods from the plants as any other machine that could be used in transporting the hay to the thrasher.

Thrashing can be done in from two to six days after cutting, depending on the weather, and with an ordinary thrashing machine, but a great many seeds are lost in the operation. The clover huller is decidedly better for thrashing alfalfa seed, as the operation is

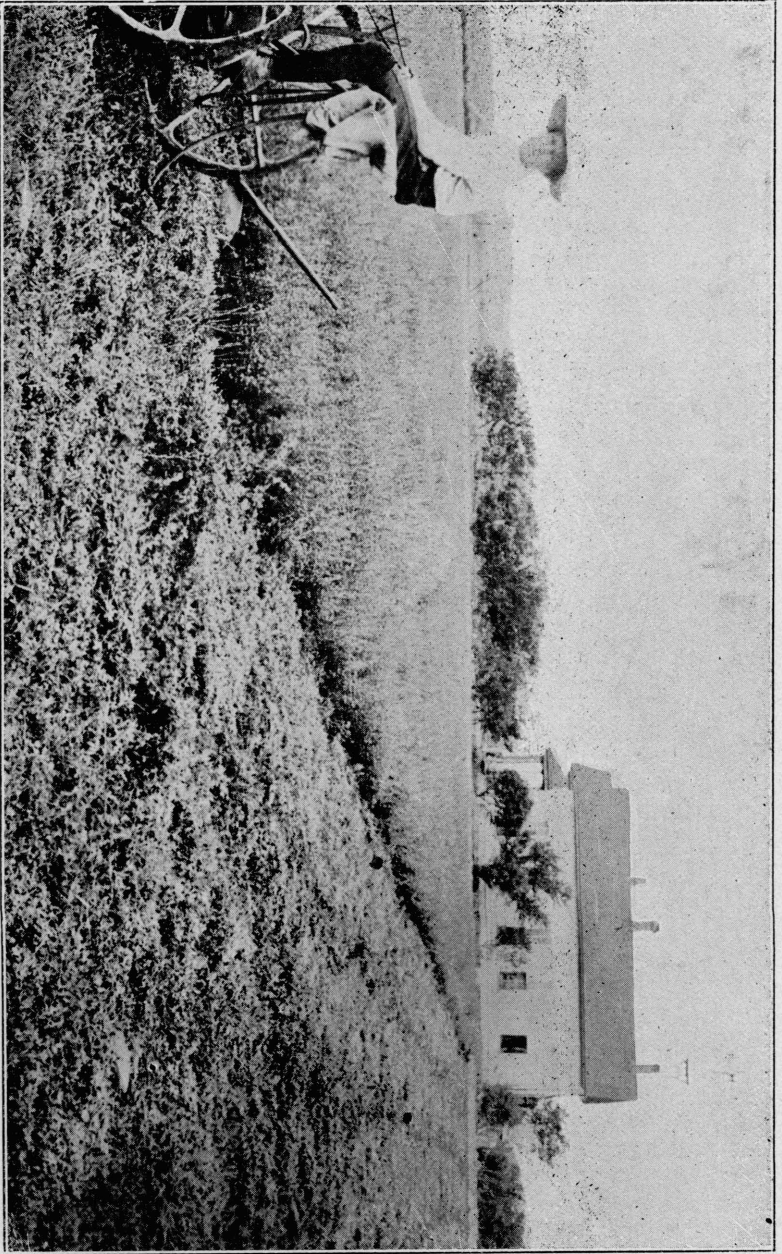


Fig. 2.—A typical growth of alfalfa at Chillicothe, Texas.

complete and very few if any of the seeds are lost. Ordinarily the price for thrashing seed in this region is \$1.50 per bushel, but considering the average price of \$10 per bushel for the seed it is a small item.

### **Seed Yields.**

The yield of seed varies greatly with the season and conditions. Yields of six bushels per acre have been had in this locality but more often from one to four. A yield of less than one bushel is not profitable, except when no hay crop can be secured. Plot yields at the Chillicothe Station during 1910 gave from two to four bushels per acre. Other fields in the same section yielded from one to four bushels per acre, showing conclusively that seed production in this locality is one of the most profitable resources of this crop.

## **PASTURING ALFALFA.**

### **Advantages of Pasturing.**

The pasturing of alfalfa is desirable in this region not only because many fields will afford pasture only but because any field will afford perhaps a greater amount of feed by grazing than from cutting the crop. During the last two seasons observations as to the amount of feed secured from alfalfa by pasturing with hogs as compared to that received by cutting indicated that from four to six times more feed would be had by pasturing. These observations may overestimate the value of grazing, but that some considerable additional growth is made by pasturing is obvious. Another consideration in favor of grazing, especially with hogs, is the fact that in this locality the farmer will sometimes get a fair seed crop from his pasture. At any rate, where grazing is practiced the crop is harvested with little cost to the grower, which in itself is an item where doubtful hay crops are had. Furthermore, in pasturing one returns to the soil much plant food that would otherwise be carried away from the farm.

### **When to Pasture.**

Alfalfa fields can be pastured lightly the second season. The extent to which pasturing can be done the second season depends altogether upon the amount of growth produced the first year and the conditions during the first year of pasturing. After fields are well established they can be pastured as early in the spring as any green stuff is produced. This pasturing can be continued throughout the season if a reasonable amount of rainfall is had. If the alfalfa becomes very dry it is a good plan to take away a part or all of the hogs, or other live stock, so as to give it a chance to produce growth. Pasturing requires exceedingly good judgment, especially if the season is dry and the amount of growth small, for unless great care is taken to prevent over-pasturing the stand will be injured.

### **What to Pasture.**

The conditions are such in this region that undoubtedly greater



## SUMMARY.

Northwest Texas has recently developed into an alfalfa growing region. A knowledge of the peculiar conditions is necessary for successful results.

Northwest Texas comprises about fifty counties, and may be divided into the "high plains," the "staked plains," and the "red-beds" regions.

In preparing the land the prospective grower must bear in mind the importance of conserving the moisture and of having a well settled, firm seed bed with a surface mulch.

Texas, Oklahoma, and Kansas grown seed will give the best results. Turkestan is not as good as native grown strains. Early fall seedings (August 15th to September 15th) are most dependable. Alfalfa can be most safely planted with a drill. Twenty pounds of seed per acre insures a stand if the land is in good condition.

It is best to clip young fields of alfalfa often the first season, especially if weeds are present in the field. Cultivation is necessary for the best growth of alfalfa in this region.

From thirty to fifty days is required for growing a crop of alfalfa hay. Alfalfa should be cut when the first blooms appear. In this region it is best to cure alfalfa in the swath. Curing in windrows in this region too often results in sunburning the outer hay. About two tons per acre is considered the average yield of hay in this section. The farmer should use great care in quoting the correct grade of his hay.

A seed crop of alfalfa is very profitable. The second crop is generally left for seed. From eighty to ninety days are required to mature a good seed crop. Thrashing is best done with a clover huller. The ordinary thrashing machine wastes many seeds. Yields of from one to four bushels per acre have been had in this locality.

Many fields will afford pasture when no hay crop can be secured. Additional crops of seed may be had from hog pastures. Exceedingly good judgment must be used in pasturing alfalfa. The growing of young animals should become a profitable industry even where grain feed is scarce.