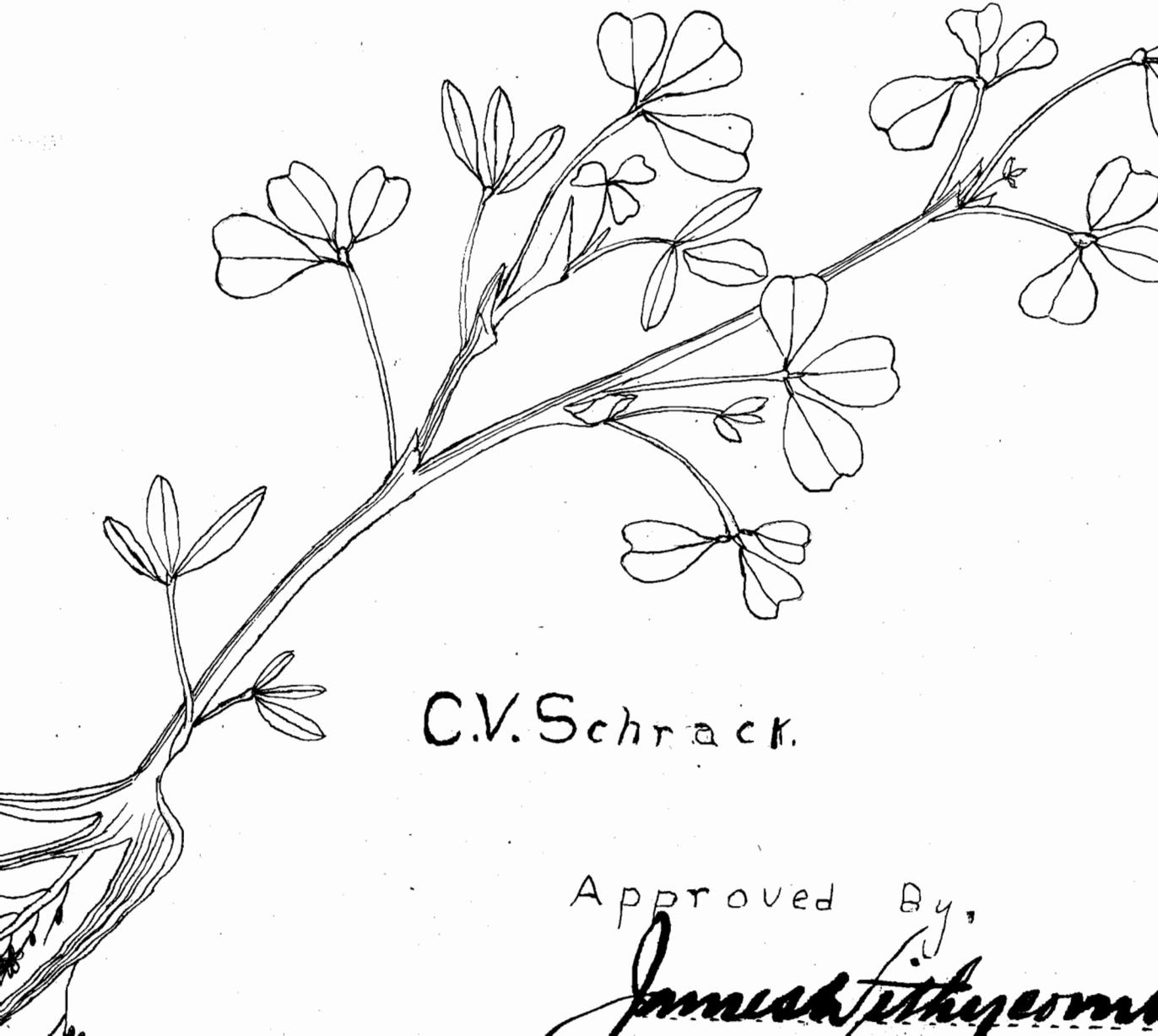


# ALFALFA, ITS HISTORY AND CULTIVATION FOR PRODUCTION



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## ALFALFA, IT'S HISTORY AND CULTIVATION FOR PRODUCTION.

Alfalfa is one of the oldest of cultivated forage plants. It was cultivated by the Greeks, Romans, Egyptians, and other nations of the East before the beginning of the Christian era. It is a native of the southern and western portion of Asia. It was early introduced into Spain and later into the South American countries and Mexico by the Spaniards.

In the year 1820 it was introduced, and tried in the State of New York. In 1853 it was brought from Chili to California and now flourishes throughout the arid and semi-arid West as, perhaps, in no other country in the world.

Alfalfa is well adapted to higher and drier regions, perhaps, because of it's drought resisting qualities. From California it rapidly spread eastward and is now grown in every state and territory in the United States. Its high feeding value and adaptation to a great variety of soil and climatic conditions, have made it deservedly popular wherever it has been grown. Before going further, it may be well to say a word about its appearance and some of its characteristics.

### Description and General Characteristics.

The generic name *Medicago* comes from the Greek word *Medike*, indicating that the plant was introduced into Europe from Media in Asia. Alfalfa is often called Lucerne; though it is now generally known by the former name. Being a perennial will live for many years under favorable conditions.

The stems of alfalfa are somewhat coarser than those of red clover and when in the early stages of growth, have but a single main stem. When the stems are cut off and the plant grows older more stems shoot up from near the ground. Where old plants have been cut off many times, the number of stems becomes very great. The crown of the plant (in such cases), has been found to be eighteen inches in diameter, with as many as three hundred and fifty stems. The compound leaves of alfalfa have three leaflets. They are somewhat longer and much narrower than those of red clover, and are toothed more or less around the apex. When in a healthy condition the plant body is characterized by a deep green color.

The blossoms are small in size pink or purple in color and borne in loose clusters or racemes on the smaller stems and branches. The seed pods are spirally twisted when ripe, and contain several bean shaped seeds, yellowish brown in color, and one half larger than red clover seed.

Like other leguminous plants, alfalfa has a long tap root, which throws out many small branches, and it is this peculiarity that enables it to penetrate the earth to depths of 15 to 20 feet, and gather supplies of food from the untouched subsoil.

This great root system and the unusual depths to which it penetrates, enables the plant to gather food, and moisture from depths not reached by ordinary plants. Great quantities of mineral food are brought near the surface and when the roots decay, the soil is left with many tube like channels, through which water and air may freely pass. This may be considered a positive benefit to soils of a close texture.

Alfalfa has the power of assimilating free nitrogen of the atmosphere through the agency of bacteria, which are contained in tubercules or nodules on the roots. These nodules contain millions of bacteria which live on the plant juices and during their process of development supply the plant with available forms of nitrogen which they have the power to form from an unlimited supply of air.

This power gives alfalfa a double value as a farm plant, because it enriches the soil with available nitrates for the use of succeeding crops.

Owing to the fact that alfalfa produces large crops, it draws extensively on the mineral plant foods of the soil. Thus, where alfalfa is grown it will be only necessary to supply the soil with the mineral plant foods. As a matter of fact it will respond well to liberal applications of mineral fertilizers.

#### Types of Soil and Situation for Alfalfa.

The beginner in alfalfa culture should be careful to select a piece of ground that is well situated as a home for his crop. It will always do best on deep loams with open subsoil and natural drainage.

One of the peculiarities of alfalfa is its remarkable root development. Its power to remain in the soil and yield abundantly is chiefly dependent on its root growth. For these reasons it is folly to sow alfalfa on any soil where rock approaches near the surface. It is equally useless to attempt raising alfalfa on land where the subsoil is so compact that the roots can not penetrate near the water which may be at considerable depths.

Elevated situations are preferable, but we may find high lands having a hard pan or very gravelly subsoil. Numerous investigations prove that good results can be secured on almost any soil provided that there is good drainage.

Good drainage is absolutely necessary for alfalfa, because the root system must be permitted to penetrate deeply into the soil before securing its best development. Where natural drainage is imperfect, deep, artificial underdrainage may take its place.

Under ordinary conditions, alfalfa should never be put on low bottom lands, where grasses naturally do well, because the situation is more than likely to be too wet. Lands subject to overflow are unfit for alfalfa.

While alfalfa needs water in large quantities it will never do its best where the water table comes to a level near the surface of the ground.

Under favorable soil conditions where the water table is at a depth of five to ten feet, the roots will strike down and approach sufficiently near and obtain moisture sufficient for all general plant purposes. Formerly, it was the accepted theory that because alfalfa required an abundance of water, it was advisable to sow it on low, wet soil. Later investigations have proved this to be a mistake, and where it has been tried it has invariably ended in failure.

A deep, porous, loamy soil with a gravelly or moderately open subsoil provides ideal conditions for alfalfa growth. Rich river and creek bottoms not subject to prolonged overflows, are admirably suited to the needs of the crop. The crop may not

be injured severely by overflows that come at seasons of the year when growth is practically dormant provided that the water does not stand on the land for long periods. If the land is a heavy compact clay and the water can only leave it through surface evaporation, the roots are subject to conditions favorable for their decay, and may be unable properly to carry out their functions.

On sandy, loamy, or alluvial bottom lands that drain well, overflows may come even when the growth is vigorous and unless there is too large a deposit of sediment and unless the water remain on the land longer than three days, serious injury is not likely to follow.

Alfalfa will succeed on a variety of soils, grading from sandy to heavy clay, although with unfavorable soil conditions, it becomes difficult to establish a good stand. The crop will not thrive alike on all soils. A deep fertile sand or clay loam, abundantly supplied with the mineral elements of plant food is the most favorable soil for alfalfa culture.

Soil having a large acid content but deficient in lime is unfavorable for alfalfa growth. This may be overcome in a measure by the application of lime and to neutralize the acid.

#### The Seed.

The first requisite in getting a stand of any crop is good seed. Not only should alfalfa seed be of good quality and strong in vitality and germination, but it should be clean and absolutely free from fowl seeds.

Alfalfa seed is expensive and the cost of a failure to get a stand is so great that many planters are discouraged by an unsuccessful trial while others hesitate to make an attempt.

Those familiar with alfalfa seed can usually recognize seed of low vitality. New seed of good quality is characterized, by a bright clear color, while seed which is old or injured by wetting or heating, has a dull color which indicates impaired vitality. Seed which is shrunken is likely to contain a percentage of seeds of low vitality which will not germinate and grow under ordinary conditions.

One can only determine the vitality of seed by testing its percentage of germination. A convenient and common method, is to place the seeds between two heavy wet pieces of blotting paper.

After the fifth day the blotters may be removed and the germinated seeds counted. If necessary the papers may be moistened and returned to accommodate other seeds not germinated. At the end of the tenth day this work may be discontinued and the percentage of germination determined.

If one is successful in getting a large percentage of germinated seed the first four or five days; it is quite evident that the seed is strong and vigorous. On the other hand if the seed is very slow in germinating, it is quite likely to be low in vitality and may not germinate when planted, except under the most favorable soil conditions. The best seed should show a germination of 90%.

A low percentage of germination which may be from six to ten days in taking place, indicates a mixture of good and poor seeds. This kind of seed may safely be sown, but more seed will be required per acre to secure a stand.

A thorough examination of the seed for impurities should not

be neglected and if weed seeds are found to be present the alfalfa seed should be thoroughly cleaned before sowed.

Those sowing alfalfa for the first time are cautioned against buying old seed. Moderate age however is no serious defect. Seed six years old has been known to show a percentage of germination of 93%. A German experimenter kept alfalfa seed bottled in nitrogen gas for seventeen years, and when tested at the end of this time showed a germination of fifty six percent.

The quality of seed depends on how it is handled and harvested. Good, plump well ripened seed will keep ten years without great deterioration. Shrunken seed will show a low percentage of germination at any time in its age.

#### Amount of Seed to Sow.

The quantity of seed to sow on an acre of land is a question of considerable importance. This will depend wholly upon the quality and vitality of the seed.

The majority of successful growers have sown twenty to thirty pounds of seed per acre, but if the seed is of the best kind this would be grossly extravagant. A pound of alfalfa seed contains about 210,000 seeds and if 90% of them germinate, twenty pounds would give 3,780,000 per acre or 88 per square foot. After nine tenths of the young plants have perished from over crowding we will still have a stand sufficient for all general purposes.

From these facts we can see why so many men differ widely in their opinions of how much seed to sow. As low as eight to ten pounds per acre have frequently been used with success.

## Preparation of the Seed-bed and Seeding.

Next to good seed (regardless of weather conditions) the seed-bed is the most important factor in establishing a successful stand of alfalfa. The idea of a proper seed-bed has been studied and discussed much in the last few years, yet the principal involved in the preparation of a seed-bed, and its condition at seeding as related to a favorable environment for germinating the seed and starting the young plants are not yet fully understood by many planters.

The soil for alfalfa must be free from weed seeds and a fine deep seed-bed must be provided. It is not worth while to attempt to grow alfalfa on land that has not been thoroughly cultivated, and the preparation of the land should begin from one to two years before it is intended to sow the crop.

Alfalfa plants, while young, are delicate and easily smothered by weeds. Clean culture is therefore quite necessary. The seeds are small and must have a fine seed-bed in order that germination and early growth may be facilitated.

Since the crop is to remain in the same situation for a number of years it will pay well to give careful attention to the preparation of the soil. A full stand of plants is essential and to secure that, as well as a strong early growth, a good seed-bed is indispensable. This point can not be too strongly emphasized.

The time of seeding alfalfa does not seem to be of much importance so long as there is sufficient moisture to give the plants a good start. Generally, however, it will be best to sow some-

time during the early spring in order that the plants may develop a good root system before dry weather begins. After it is once established the crop can stand very severe heat and extreme dryness.

7 The condition of the soil beneath the seed should be firm and in good connection with the subsoil. This affords favorable conditions for supplying the young plants with moisture, and the mellow covering over the seed permits the air and heat to reach the seed from above. These three factors--moisture, air, and heat--are essential in the germination of the seed. If these are lacking, the seed will never germinate, nor alfalfa plants develop.

The moist surface above the seed allows the young plant to push its way readily into the sunlight, when it throws out its green leaves and through the action of heat and light, assimilation begins. As the plant grows, it establishes its roots deep in the soil and becomes able to withstand drouth and unfavorable weather conditions.

The seed may be sown alone or with a half seeding of oats or barley as a nurse crop. The idea of using nurse crops is to protect the alfalfa until it gets a start, and to hold the weeds in check.

The nurse crops under all conditions should be cut before they mature; certainly when they are in the early dough stages, because if left to ripen they will draw most of the soluble plant food and moisture out of the soil.

The nurse crop should be cut for hay soon after it heads out so as to give the alfalfa full possession of the soil before the hot weather sets in. If the nurse crop is permitted to mature,

the alfalfa will be shaded too long and will not develop sufficient strength to bear the sudden exposure to hot weather. Where the ground is free from weed seeds it will usually be best to sow alone, but where weeds are likely to be troublesome a nurse crop should be sown.

#### Inoculation.

While many of the principles connected with soil inoculation are not well understood, it is generally recognized as necessary to add cultures of desirable bacteria to soils where they do not exist.

Lands which have never grown alfalfa may not contain these bacteria and before alfalfa will grow well it is necessary to supply the bacteria by inoculating the new lands. This may be accomplished in one or two ways; either by means of artificial cultures, or by the use of soil from fields where alfalfa has been successfully grown.

Perhaps the method of soil inoculation is the more certain. In fact it has been tried with uniformly good results. If infected soil is carefully spread and mixed with the soil by cultivation before the alfalfa is sown, it is sufficient to inoculate the new land.

Alfalfa belongs to that family of plants able to gather a large part of their nitrogen from the atmospheric nitrogen. This is carried on through enlargements, on the feeding roots, called nodules or tubercules.

Root tubercules of alfalfa and other leguminous plants are essentially fertilizer factories engaged in the manufacture of nitrogen. This is a fertilizer material which when bought in

the form of commercial fertilizers costs about fifteen cents per pound.

When the germs necessary for causing tubercles to develop on the seed, the roots of alfalfa have no tubercles. The proper germs which we may designate as alfalfa germs are usually absent from the sandy and the other soils.

Alfalfa does not produce nodules as freely as clover and some other leguminous plants. It will be impossible to discover them by pulling up the roots. To see them it is necessary to take a shovel or spade and dig deeply into the soil, lifting the roots gently and separating the earth. The nodules will appear as little white round balls on the feeding roots and occasionally on the main tap root.

A leguminous plant without tubercles is a parasite that no farmer can afford to provide for. Such plants depend entirely upon fertilizers for their expensive nitrogen or draw it from the earth, thus impoverishing the soil.

In soils where alfalfa germs are absent, the farmer has it in his power to cause tubercles to develop on roots of alfalfa and thus force the plants to provide their own nitrogenous food and to enrich the land in nitrogen.

When alfalfa provides its tubercles without the aid of man, we may properly speak of the process as natural inoculation. Experiments on a number of soils and observations of young alfalfa plants in a number of localities, have lead to the conclusion that the alfalfa germ is wanting, or no present in sufficient quantities in the clay and sandy soils deficient in lime.

Where these soils predominate the necessary germs must be supplied by the process of artificial inoculation. The material used for inoculating alfalfa may be soil from a field where alfalfa or bur clover has in recent years been grown and supplied with root tubercles, or it may be a concentrated patent material manufactured in the laboratories of the United States Department of Agriculture.

#### Fertilization.

While alfalfa gathers its own nitrogen, it is found to be often beneficial to make an application of nitrate of soda when the plants are quite young.

Alfalfa is an extensive consumer of plant foods, and in fields where it has grown for many years the soil may with profit be enriched.

Land plaster is quite beneficial to all leguminous plants on most of our Western Oregon Soils. When applied it should be placed on the land each spring not later than April first. Under conditions where the crop is rich and the crop making a healthy luxuriant growth, the land plaster should never be applied.

#### Cutting Alfalfa for Hay.

The harvesting of alfalfa for hay does not present unusual difficulties. The first cutting comes early in June; a time when its water content is large and the weather usually wet.

When a few blooms appear over the field, we have the proper time for cutting the alfalfa when it will make the best hay of all general purposes of feeding.

Alfalfa should be cut for hay when ten per cent of the plants are in bloom. Certain growers may prefer to wait until a later period, but it is decidedly not best to permit a large percentage of the plants to bloom. If this is done the hay will be poor in quality. The plants will be heavy, coarse, woody and lacking in palatability, while the future crops are likely to be injured, by this method of harvesting.

The alfalfa, if permitted to come into full bloom before cutting, has very little value as a food stuff, not to speak of the permanent injury to the meadow. The alfalfa should be given a fair chance to form a crown or head in the fall, in order that the roots may be thoroughly protected.

After the first cutting of the second season, in order to destroy the weeds and split the crown, a disc should be run over the field.

Under these conditions good judgment should be used. It is important that the disc be set very straight so it will not have a slicing movement, or the crowns of the alfalfa may be cut off and the crop for the following year be badly damaged or totally destroyed.

The condition of the field may be further improved by working over with a good drag harrow after the disc, as it will be more certain to kill out weeds and undesirable grasses.

#### Curing Alfalfa Hay.

Alfalfa hay is scarcely more difficult to cure than clover or vetch. A larger percent of the nitrogenous compounds is in the leaves and for this reason it is important that the hay should

be handled in such a manner as to prevent any serious falling off of the leaves. This means that the process of handling should be completed before the hay is thoroughly cured.

After alfalfa is cut it should be left to wilt for several hours. It should then be placed in large shocks. These should be seven or eight feet in diameter at the bottom and as high as they will stand. Under these conditions it is possible to cure alfalfa only partly, but it will shed rain very well at this time.

When it becomes impossible to twist water from the stems, alfalfa is in an ideal condition for making hay. In order to increase the palatability, a little salt may be added when the hay is placed in the mow, but this is not at all essential.

Under favorable conditions alfalfa may be taken directly from the windrow, but this can only be successfully accomplished under exceptional weather conditions.

In our climate where there is invariably more or less moisture in the air, the hay may be left in the windrow or shock from six to ten days without thorough curing. Should it become necessary to leave it in the field for any great length of time, the hay will inevitably become more or less damaged from loss of leaves in the process of handling.

When possible, it is always best to put it up in a semi-green condition so that an attractive green appearance and an appetizing odor may be preserved, and in order that the leaves, be secured for the nourishment of live stock during the winter.