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John George Haney

FOR MORE AND HARDIER
ALFALFA
IN THE
NORTHWEST

THE DAWN OF A NEW ERA

Agricultural Extension Department
International Harvester Company of New Jersey
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FOR MORE AND HARDIER ALFALFA

IN THE NORTHWEST

**Alfalfa now being successfully grown in every county where
tried intelligently.—The value of this crop is not
appreciated.—Alfalfa and corn with
live stock means prosperity
for the Northwest**

By J. G. HANEY*

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While alfalfa is one of the oldest known agricultural plants, it is apparently just beginning to be recognized and its true value appreciated in the western hemisphere. The land devoted

J. G. Haney

to alfalfa in the United States at present is between five and six million acres or an area about equal to the small state of New Jersey. It seems strange to those who are familiar with this wonderful plant that as late as the beginning of the twentieth century it should come, as it does as an agricultural revelation.

Alfalfa is successfully grown in every state in the Union and in most of the provinces of Canada. It is grown below sea level in the valleys of California and on altitudes of more than eight thousand feet in the mountains of Colorado.

It is quite safe to assert that alfalfa can be grown successfully wherever small grains are now being grown in the northwest.

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History

The alfalfa plant is designated by many different terms—alfalfa and lucern (the latter being the French name) are the most common. It has been cultivated as a forage crop for more than twenty centuries. It is believed to be a native of the central district of western Asia and is still found in an apparently wild condition in the regions of the south Caucasus.

It was introduced into Greece at the time of the Persian war, about 470 B. C. The Romans carried it from Greece to Italy. From Italy it was introduced into Spain and the south of France. It was carried from Spain to Mexico at the time of the Spanish invasion, and thence to the west coast of South America. It was brought from Chili to California in 1854, and from there it spread over the arid regions of the Pacific coast where it is now cultivated almost to the exclusion of other forage plants. It was introduced into the state of New York as early as 1820, but is not yet grown extensively in the eastern states.

Grimm Alfalfa

Grimm alfalfa is a very hardy strain, adapted to growing in the Northwestern states where conditions seem too severe for the common alfalfa. The seed of this variety was brought to Minnesota from Germany in 1857, by a German farmer named Grimm.

Professor W. M. Hays, while with the Minnesota Agricultural Experiment Station about 1890, found Mr. Grimm growing this alfalfa and at once began calling attention to its hardiness and excellence for Minnesota conditions. Professor Hays stated that at one time they had advised farmers it was not worth while to attempt growing alfalfa in the Northwest as conditions were too severe for it. Mr. Grimm had never heard of this advice and in his twenty-five years' experience with alfalfa had not yet discovered that it was not adapted to Minnesota conditions. A. B. Lyman, of Excelsior, Minn., was one of Mr. Grimm's neighbors and perhaps the first to recognize the hardiness and value of this alfalfa, and has been very active in extending its growth. So valuable is this variety that when possible to secure the seed it should be grown in the northwest in preference to all others.

Varieties

While there are numerous varieties of alfalfa, and more are being added each year by selection and introduction, for the Northwest, the Grimm alfalfa is proving to be all that could be desired. This variety is so well adapted that no one need hesitate to plant it, or wish for anything better.

Alfalfa seed from Montana also gives very good satisfaction in most of the Northwest. It is probable that this seed is a

**A good root system on a 4-year-old alfalfa plant from
Northern Minnesota, Polk county**

descendent of Grimm or from a source which renders it hardy. While it is not to be expected that much can be accomplished in

acclimating alfalfa in a short time it is very reasonable to expect that seed which is produced in the Northwest will be more hardy than seed from a Southern climate.

The alfalfa plant is so old and has undergone so few changes in the centuries past that the only hope of procuring hardier varieties is in introducing them from regions with climatic conditions similar to ours. The question of hardiness is so important that it is considered useless to attempt to grow alfalfa in northern Minnesota or North Dakota from seed of the varieties common to the principal alfalfa regions. Grimm alfalfa holds first place as to hardiness, while seed from Montana and Canada, and from the varieties known as Baltic and Turkestan, seem to give satisfaction in about the order named.

Uses and Value of Alfalfa—Feeding Value

Alfalfa, either green or in hay, as feed for all kinds of farm animals, is the most highly nutritious and palatable that can be raised in the Northwest. The following table from Farmers' Bulletin No. 339 shows its value as compared with several other kinds of feed:

Digestible Nutrients in Alfalfa and Other Forage Crops

Kind of Forage	Dry Matter in 100 pounds	Protein in 100 pounds	Digestible nutrients in 100 pounds	
			Carbohy- drates	Ether Extract
	Pounds	Pounds	Pounds	Pounds
Green Alfalfa	28.2	3.9	12.7	0.5
Fresh Clover	29.2	2.9	14.8	0.7
Alfalfa Hay	91.6	11.0	39.6	1.2
Clover Hay	84.7	6.8	35.8	1.7
Timothy Hay	86.8	2.8	43.4	1.4
Cowpea Hay	89.3	10.8	38.6	1.1
Wheat Bran	88.1	12.2	39.2	2.7
Shelled Corn	89.1	7.9	66.7	4.3

The following table indicates the actual feeding value of eight different kinds of feed, based on the amount of digestible nutrients contained in them. It will be noted that the value of alfalfa hay is slightly more than double that of timothy, and the equal of corn.

Actual Feeding Value of Different Feeds Based on Amount of Digestible Nutrients

Feed	Value per ton	Feed	Value per ton
Fresh Alfalfa	\$ 7 00	Timothy Hay	\$ 9 80
Fresh Clover	5 96	Cowpea Hay	19 76
Alfalfa Hay	20 16	Wheat Bran	22 80
Clover Hay	14 12	Shelled Corn	20 16

For Dairy Cows

Alfalfa is particularly valuable as a feed for dairy cows. When properly cured, it has more nearly the effect of good June pasture than any other feed. It will be noted that wheat bran is worth only slightly more than alfalfa hay, and when the palatableness of the hay is taken into consideration, this

**"The Proof of the Puddin'" Cows like alfalfa
A scene which should be more familiar in the Northwest**

difference also disappears. The dairyman feeding bran with the ordinary roughages such as prairie hay, millet, timothy, or corn fodder, could well afford to exchange one-half of his bran for an equal number of pounds of good alfalfa hay.

For Beef Cattle

For fattening beef cattle, alfalfa certainly has no equal as a roughage. A large cattle feeder once told the writer that alfalfa hay would save him one-half his corn when compared with other kinds of roughage. It is generally figured that it will require 1,000 pounds of grain to produce 100 pounds of beef with mature cattle and the ordinary roughages such as prairie hay, corn fodder, or millet. When good alfalfa hay is fed with corn, the amount of grain required will be reduced nearly one-half. This same fact holds true with the feeding of all classes of live stock. The alfalfa balances the ration to such an extent that less other

feed is required to make a given gain. This is particularly true with young stock, which require a large amount of the growth producing element, protein.

It is remarked that a field of alfalfa is a hog's idea of heaven, and the way they respond in gain and thriftiness while pasturing on alfalfa, indicates that this must be practically true. The Kansas Experiment Station has shown that an acre of alfalfa will produce 776 pounds of pork during a season. This calculation was made by deducting the probable gain due to a small amount of grain which was fed while they were on the pasture. It is possible to winter mature hogs on good alfalfa hay and only a very small amount of grain. This fact should appeal

Alfalfa and corn is all they care for

very strongly to the farmers of the northwest as there is such a long period that the brood sows must be kept up and fed.

The last cutting of alfalfa should be saved for the hogs as it is usually cut greener and contains a larger percentage of leaves. Alfalfa pasture is the very first green thing on the farm in the spring and remains green all summer. Every farm in the northwest should be equipped so as to keep over a dozen brood sows. There is no great expense connected with building a hog house in which the pigs could be farrowed in early March and be ready to begin making use of the alfalfa pasture as soon as it is large enough. By the first of September they are just the right size to turn into a field of early flint corn which they would convert

into ham and bacon at the least possible expense to the farmer. At the same time they would be putting this ten acres of land into such shape that if seeded to wheat the succeeding year, the yield should be twice or three times the average of the state. This plan is gaining in favor very fast in the northwest and is a profitable one.

Alfalfa, both green and as hay, is also fed to horses. When beginning to feed alfalfa, care should be taken that horses do not eat more of it than is good for them, as it is so much richer than other hays. If the precaution is taken to limit the amount fed, and also to reduce the grain ration to about one-half, no injurious effects will be noticed. Alfalfa hay alone is too rich a

**Spring pigs on alfalfa pasture, J. D. Bacon farm, Grand Forks, N. D.
What methods more wise could the farmer combine than
raising alfalfa and fattening swine. (Silo and
winter stock shed in background)**

feed for horses and cattle. There should always be some grain or roughage such as corn, oats, corn fodder, prairie hay, or millet, fed with it. When fed exclusively, it is liable to produce coarseness, especially in colts.

The value of alfalfa for sheep is attested by the fact that the alfalfa regions of Colorado are full of sheep feeding quarters, where large flocks from the mountain ranges are fattened.

Alfalfa is a great poultry feed, either eaten green from the fields in the summer time, or chopped and fed in the winter. Chopped hay or meal mixed with a small amount of grain, put into a barrel or tub, and hot water poured over it and allowed to steam for a few hours, will be eaten as greedily as green feed

in the summer time and will have a good effect in maintaining the egg production.

As a bee plant, alfalfa is almost the equal of sweet clover. This is a fact that is not fully appreciated, but the heaviest yields of honey per stand are secured in alfalfa regions. The honey is of excellent quality as is evidenced by its standing in the markets. Bees also have a very beneficial effect on the seed-producing quality of the alfalfa as will be noted later.

While the most important use of alfalfa is in producing hay, it nevertheless has a place in the pasture mixture. Owing to the fact that it is liable to produce bloat, it is unsafe to pasture cattle or sheep on an exclusive alfalfa pasture; but this difficulty apparently disappears when the alfalfa is sown with other grasses. Alfalfa roots so much more deeply than the grasses, that it will grow among them and be very little affected by their crowding. In the northwest, brome grass, timothy, western rye grass or orchard grass, may be sown with alfalfa with excellent results. About five pounds of alfalfa and the usual amount of grass seed should be sown to the acre.

REQUISITES OF SUCCESSFUL ALFALFA GROWING

Alfalfa, when well established, is one of the most vigorous and persistent of agricultural plants. It will endure weeds, dry

Sheep are profitable in the Northwest — Alfalfa and sheep,
a good combination

weather, and other unfavorable conditions to a remarkable degree. It will also crowd into the edges of alkali spots further than most other plants. It, however, responds readily to the favors of soil and climate and because of its great value as a crop should be given favorable conditions to start in. A deep, firm, fertile, well-drained, moist soil, rich in lime, reasonably free from weeds, and inoculated, will generally insure success.

Alfalfa roots very deep and for this reason it is advisable to have a soil into which the roots may penetrate and which also contains moisture. It will produce as much on a thin, dry soil as any other crop, but when there is a chance for it to reach permanent moisture through ten to thirty feet of good soil, it will, once established, go on producing crops every thirty to forty days during the growing season with very little regard to climatic conditions. The roots of alfalfa penetrate dry soils or dry gravel beds very slowly and often the poorer portions of a field will be found to be underlaid by such material. On such soils thin seeding will succeed much better than thick, because the roots of a few plants will find moisture to penetrate deeper and perhaps go through the dry strata while many plants in a thick seeding would not be able to do so.

The Preparation of the Seed Bed

The preparation of a seed bed is essential mainly as a means of storing moisture. When the rainfall is under twenty inches, the land should be plowed ten inches deep and summer-fallowed or, if the soil would drift from such treatment, a thin planting of corn may be grown on the land to prevent drifting. If it is not necessary to consider storing moisture it is preferable to precede the alfalfa by a cultivated crop, such as corn, potatoes, or beans. If possible the land should be manured.

A Firm Seed Bed Essential

Alfalfa requires a firm seed bed. For this reason it is not advisable to plow the land immediately before seeding, as it is almost impossible to get the soil sufficiently firm again.

In western Kansas, herds of cattle are rounded up and driven over the fields to pack the soil after plowing it. If, in order to get the land leveled up and in shape to seed, it is necessary to plow just before seeding, this plowing should be as shallow as possible, and packer, roller, and harrow used to make it solid again. Before seeding, the surface of the field should be provided with perfect drainage by the use of leveler, grader, and plow. Ditches may be made broad with sloping banks, so as not

to interfere with seeding or mowing. Alfalfa will not grow where water stands and freezes over it in winter or gets stagnant in summer.

If good surface drainage is provided so that the crowns of the plants have plenty of air and the soil is sweet, there need be very little concern as to how deep it is to the water table. In regions of plentiful rainfall it is advisable to plant alfalfa on land having good natural drainage.

The land seeded to alfalfa will not need to be prepared again for six to ten years, hence, three or four times as much work can well be put on it in preparation for alfalfa. A satisfactory preparation made on the I H C farm at Grand Forks, N. D., in 1913, was as follows:

The land was in wheat in 1912 (should have been fall plowed but we did not get the farm until March), was manured during the winter, double-disked as early as possible, plowed as soon as dry enough (about the middle of May), and plow followed by Campbell sub-surface packer and harrow. Wild oats started so the land was double-disked ten days later, and harrowed the second day after disking. As the land was rather cloddy and no rain fell, a frog-foot roller was used. A land leveler was then run both ways as the field was full of dead furrows and back furrows from previous forty years' plowing. The land leveler was followed by the peg-tooth harrow.

About ten days later another fine crop of weeds was double-disked and the harrow used later. The middle of June the field was harrowed and rolled again with a frog-foot roller, just previous to seeding with the grain drill. The single disk drill loosened up the surface sufficiently for a soil mulch. Except in a few dead furrows which were filled with loose, dry dirt, the seed was put in moist soil about one inch from surface. Regardless of the fact that there was not a rain of one-half inch at any one time previous to July 1st, and the rainfall for the season was as follows: April, 1.08 in.; May, 1.52 in.; June, 1.21 in.; July, 2.86 in., we have a good, thrifty stand of alfalfa. The field is even and in fine condition and should continue to yield for ten years, though we will doubtless not leave it down that long.

Time of Seeding Alfalfa

There is little doubt that for the Dakotas and Minnesota, alfalfa should be seeded in the spring. Under favorable moisture conditions, in South Dakota and southern Minnesota alfalfa might be successfully seeded after winter rye or wheat, though not without considerable risk from dry weather and early frost.

The cost of alfalfa seed, and the importance of securing a good, strong growth the first year, warrant giving it full possession of the soil for the entire season. Sharp frosts may injure or even kill young alfalfa, hence it is advisable not to seed until such danger is past.

In case the land is known to be rather foul, it should be double-disked early, and all weeds kept down by harrowing or disking until the middle of June or even later. This overcomes the weeds and puts the soil in good shape. There is danger, however, in seeding later than July 1st, that dry weather will damage the alfalfa.

Amount and Method of Seeding

There are more alfalfa seeds in one pound than there are plants on the average acre of alfalfa that is three years old. This indicates that it is not a question of pounds of seed, but of securing good seed, and providing conditions that will make the seed grow to strong, vigorous plants.

Only good, strong, acclimated seed should be sown—Grimm alfalfa holds first place as to hardiness, and Montana grown seed seems to give satisfaction in nearly every instance. There is undoubtedly a great difference in seed, though perhaps not so much as some advertisements would indicate. The experiment stations should be consulted as to kind and source of seed, and samples submitted to them for purity and germination tests.

In the dryer sections on a properly prepared seed bed, five pounds of seed per acre sown with a grain drill has given an ample stand. Eight to twelve pounds is usually recommended for average conditions if the seed is drilled in; if sown broadcast, one-half more seed should be sown. If a grass seeder is not available to use on the drill, the seed should be mixed with some other fine material to give it bulk and prevent leaking and drilling too thick.

Owing to variations in drills, a measured quantity of the mixture should be put in the drill and the area of land seeded by this amount noted, so as to be certain that the proper amount of seed is being put on. Fine screened sawdust, bran, cornmeal, or parched millet may be used. Inoculated dirt is used when dried in the shade, but is rather hard on the drill. Two parts of bran to one of seed, with drill set at one-half bushel of wheat per acre, should seed about the right amount.

Alfalfa seed should not be planted very deep—the depth depending somewhat on the soil. If the seed bed is in proper condition, sufficiently solid, and moist, one inch should be deep enough. The seed bed should be so solid that the drill

wheels do not sink in more than an inch, which will admit of regulating the depth of the disks accurately. The seed should not be sown unless the moisture in the soil is within one inch of the surface—it is a waste of seed and work to plant in a dry soil. Press wheels for firming the soil on the seed in the drills are very important. Where there is any considerable amount of alfalfa or grass to be seeded on a farm, there should be one small drill, preferably eight-foot, equipped with grass seeder and press wheels. One team will handle this drill and a more careful job can be done.

Seeding in Rows so as to Cultivate

A quite popular method of seeding, especially in the dryer sections for seed production, is to plant in rows 24 to 30 inches

Alfalfa in rows — 7 weeks old from seed — I H C farm

apart, so that the alfalfa may be cultivated between cuttings. This method requires the same conditions as to seed bed, etc., as thick seeding. The seeding may be done with the small grain drill by simply putting cardboard or boards over the feed

cups which it is desired to have closed. By using a grain drill, there are several rows, depending on the size of the drill, exactly the same distance apart—only the joint rows varying according to the care in driving. This admits of using a large cultivator the same width as the drill. Beans, sorghum, and many other crops may be seeded the same way.

Anything that is liable to deprive the young alfalfa plants of moisture or plant food should be treated as a weed, whether it be wild oats, pigeon grass, oats, barley, wheat, or what not. Under favorable conditions of soil and moisture, a nurse crop may not interfere with successfully starting alfalfa, but those who have sown alfalfa often, prefer seeding alone. If a nurse crop is sown, it should be seeded very thin—half the usual amount, and should be cut early before maturing. Beginners had better seed alfalfa alone.

Treatment after Seeding

Dashing rains and drying winds are to be feared after seeding. The former may run the soil together over the seed, and cover it

**Mowing alfalfa planted in rows and cultivated, 70 days from seed,
I H C farm, Grand Forks, N. D.**

so deeply that it cannot get out. Dry winds may take the moisture from the soil before the roots have taken hold sufficiently and the plant be killed. Rain followed by a bright sun and wind often crusts the soil so that the alfalfa cannot push through—it will be found curled up under the crust. A roller, weeder, or harrow may be used to break the crust, though such methods are not often satisfactory.

Generally a fair crop of weeds may be expected to start along with the alfalfa. Alfalfa, when once established, is a very vigorous, hardy plant, but when young it is not so, and must be given every advantage possible. As soon as the weeds are seen

to be getting ahead of the alfalfa and are four to six inches high, the mower should be run over it to clip the weeds back. The mower should not be run too close to the ground. The alfalfa will usually branch from very close to or just under the ground after the first cutting, but it is not advisable to cut too close unless it is necessary to do so to get the weeds.

When to Mow Alfalfa

The mower must be used every two to four weeks during the first summer. This is one of the imperatives of success. If alfalfa is not mowed often, it grows tall and spindling, often tries to bloom and produce seed, turns yellow, and dies. Mowing prevents this, and the strength of the plant is used in root growth, instead of in trying to bloom and produce seed.

What is a Stand

Be very slow about condemning the stand of alfalfa. Quite often, regardless of mowing, what appeared to be a good stand will seem to have disappeared by fall. Be very careful right here. Many good stands of alfalfa are plowed up because they do not appear to be what they are. Just leave it until the next spring is well advanced. If there is one plant to each square foot, there is a surprise awaiting. Where alfalfa has not been previously grown, there are good reasons why it may not appear to amount to much for the first two or three years. Thin patches may be thickened up the second or third year by disk-ing and reseedling them.

Don't Cut or Pasture in Late Fall

In the Northwest, one of the most common mistakes made after a stand is secured, is to leave the field bare by late cutting or pasturing. Alfalfa must have a good heavy blanket in the winter. There should be a growth of eight or ten inches left for protection. It should not be cut later than twenty or thirty days before the date of the first killing frost.

So many conditions may affect the late growth that it would be impossible to state definitely the date, or the length of time before frost, when cutting is advisable, but it is very essential that there be a good protection for winter. For this reason, pasturing must be done very carefully. Alfalfa should not be pastured at all until the third year, and then not late in the fall. If it is pastured too close, coarse manure or rotted straw should be spread over it for protection. This can be raked off if found to be too heavy, but harrowing in the spring so as to evenly distribute the manure will usually be all that is necessary.

Inoculating Soil for Alfalfa Growing

There is no doubt but that a share of the difficulty in starting alfalfa is due to the absence from the soil of a sufficient number of virile nodule-forming bacteria peculiar to the alfalfa plant, but it must be remembered that these bacteria grow or live on the alfalfa roots, and that their presence in no way affects the starting of the alfalfa plant. The same conditions—a sweet, fertile soil, moisture, and warmth—which are necessary to the starting of alfalfa, also promote the growth of these bacteria.

These nodule-forming bacteria are essential to the alfalfa, and in most instances, unless the land has grown alfalfa, artificial inoculation should be resorted to. Inoculation is so essential, that the first field planted on the farm, or a part of it at least, should have an application of alfalfa bacteria. It is because of the absence of sufficient bacteria in the soil that very often an apparently good start of alfalfa is slow in gaining headway, requiring two or three years as previously referred to.

Sweet clover, either white or yellow, apparently has the same kind of bacteria in the root nodules as alfalfa, hence in localities where sweet clover grows wild, inoculation does not seem to be necessary. In localities where sweet clover does not grow, and alfalfa is not grown to any extent, artificial inoculation should be resorted to.

Methods of Inoculation

There are two sources of securing inoculating material. The most convenient method is by using the pure cultures. These are put up in cans, boxes, or bottles, and after manipulating according to directions the seed is simply moistened with the preparation and allowed to dry, just previous to seeding. When properly handled, this method is satisfactory and good results are obtained.

A second method is to secure soil from an old alfalfa field that is known to be inoculated, or from where sweet clover grows. About 300 pounds of soil per acre if carefully distributed—either drilled in or sown broadcast and harrowed in is sufficient. The dirt must be dried for drilling, but it must not be exposed to the sun, or the bacteria will be killed. The fertilizer attachment for drills is very convenient for this purpose. When sown broadcast by hand, it should be sown only on cloudy days or after sundown, and harrowed in immediately. This should be done just before seeding. Unless the soil is very easily obtained and work is no consideration, the pure cultures will be found most convenient.

A One Best Method of Starting Alfalfa

Personal talks with several hundred farmers of the Northwest who have had experience with alfalfa show that they agree in many respects as to the best methods, which may be summarized as follows:

Apply ten or more loads of good manure per acre on good clean land, fall plow, and use packer or disk, but do not get surface too fine. Disk early in spring, to conserve moisture and keep weeds down. Continue such treatment until the middle of June. Potato land is preferable to either stubble or corn ground, and need not be fall plowed. However, well rotted or fine manure should be applied and thoroughly disked in. If weeds get started during wet weather, plow as shallow as possible and thoroughly pack and harrow before seeding. Sow eight to twelve pounds of good Grimm or Montana seed, alone, June 1st to 15th, and keep weeds cut close the first year.

Good Seed Important

It has been so clearly demonstrated by the Experiment Station and many individual farmers that it is not safe to plant any but the hardy varieties of alfalfa, that it is not worth while for any one to do any further experimenting in this regard.

A great deal of seed is adulterated and contains the seeds of noxious weeds. The State Experiment Stations and Department of Agriculture maintain laboratories for testing the purity and germination of seeds and there are ample laws to protect the purchaser. Dealers or farmers advertising seed are usually willing to submit samples which may be sent to the Experiment Stations or Department of Agriculture where their purity and vitality will be determined free of charge. These samples should be asked for early so that there will be ample time for tests to be made. The dealer should be told that these samples are to be submitted for test and if they prove to be all right, you should see to it that you get seed similar to the sample which was sent you.

It is sometimes considerable trouble to the dealer to furnish these samples, and to obviate this, he may ask seed inspectors to examine his stock and issue a certificate of such examination which should be sufficient guarantee to the purchaser. Seed for the Northwest must be of the hardy varieties, of strong germination, and free from adulterations and noxious weeds.

Making Alfalfa Hay

Alfalfa hay is no harder to cure and handle than red clover; in fact, the stiffer stems make it somewhat easier to dry and it is less liable than the clover to damage in appearance by light rains or heavy dews. There are no mysterious signs or acts to be mastered in the handling of alfalfa hay. It has been found by analysis that the feeding value of the hay is greatest at the time when about the first one-tenth of the blooms have appeared. The hay becomes woody quite rapidly as it gets older and the digestibility of it naturally decreases.

Side Delivery Rake in an Alfalfa Field

At the Colorado Experiment Station it was found that the cutting affected the protein as follows:

Stage of Maturity	Protein, per cent.
Coming in bloom, about one-tenth,	18.5
Half in bloom,	14.6
In full bloom,	12.9

It is also noticed that when alfalfa is cut early, the next crop starts more readily than if cut later. The appearance of tillers or buds in the crown is an indication of time to cut, but this must not be considered alone as they are always present. Alfalfa six weeks old from seed will show these buds fully developed and ready to start growth as soon as the main stems are cut off. The stage of maturity and condition of weather are essential factors in determining the time to cut.

Curing Alfalfa Hay

The leaves of alfalfa contain nearly four times as much protein as the stems, a ton of dried alfalfa leaves containing as much protein as 2,800 pounds of bran, hence every effort should be made to cure the alfalfa in such a way as to save all the leaves possible. The method of curing will vary with the condition of the crop, ground, and weather. When alfalfa has made a slow

growth, and the ground and weather are dry at the time for cutting, there is no difficulty in curing. Often, under these conditions, it is safe to rake within a few hours after mowing, and stack a few hours after the alfalfa has been put in the windrows. When alfalfa has made a rapid growth and is rank and succulent, and the weather and ground are damp, the problem of curing is a difficult one. It is easy to dry the leaves, but the stems will contain much moisture after the leaves are too

The hay stacker and sweep rakes save labor in handling alfalfa

dry. Alfalfa hay should become so dry before stacking that when a handful of stems are twisted together, no water can be squeezed out.

If the weather is very unfavorable and continues wet so that the hay cannot be dried, it may be stacked wet, if the precaution is taken to put fifteen to twenty pounds of salt or air-slacked lime per ton in the stack as it is put up. In fact, it is probable that the hay will be damaged much less by heating in the stack than by molding in the shock or windrow. When stacked wet or green, the hay may turn a dark brown and will often have an odor almost as strong as plug tobacco, but it is relished by stock and apparently has lost very little of its feeding value.

In handling more than 200 acres of alfalfa in southeastern Kansas, where the rainfall was 36 inches and alfalfa makes 4 to 5 crops a year, in five years only a small portion of one cutting on a small field was lost entire. A part of this was overflowed and the ground was so soft for nearly a week after the rains that it was impossible to get on the fields. As a general practice, the hay was stacked within a reasonable length of time after it was cut, whether it was dry or not. Hay left in the windrow or cocked for a week or ten days during wet weather will mold very badly. If put in a stack it will go through a heating process which destroys all the mold and leaves the hay in a very palatable condition for stock. It is not advisable to put wet or green hay in the mows or sheds because if there is not free access to

The motor baler handles alfalfa economically

air, spontaneous combustion is liable to occur. A number of large barns have burned from this cause, although the occurrence is rare.

When a heavy rain occurs immediately after cutting, the hay should be raked as soon as the top is dried off. Then as soon as the surface of the ground is dried somewhat, the windrows should be turned over. It is not advisable to cock hay on wet ground as it will dry out much more readily in windrows. In any case do not be discouraged because the hay has gotten wet. Stack it up and build a fence around it and your cattle and hogs and everything else will go through the fence to get to it.

When there is any large amount of alfalfa hay to be loaded and put in the barns, the hay loader should of course be used. In this case the hay must be allowed to cure in the windrow. The swath loader is not practical for alfalfa as there is too great a loss of leaves if the alfalfa is left in the swath until cured,

The balanced grapple fork for unloading wagons is preferable to slings or any other device. The side delivery rake, of course, gives the best satisfaction for windrowing the hay to be taken up with the hay loader. On large fields, the stacking is usually done in the field and the sweep rake and stacker used to handle the hay. The hay is taken out of the windrow or cock with the sweep rakes. This reduces the work to the minimum and if the stacking is carefully done and the stack topped with green alfalfa or slough grass, there is not a great deal of waste.

As a general thing, the first cutting is the only one there is any trouble in curing. In handling wet alfalfa hay some farmers make a practice of putting a couple of feet of dry straw at the bottom, then alternating a load of alfalfa hay and straw until the stack is complete. The wet or green alfalfa will impart its taste and odor to the straw and the stock will eat the straw almost as readily as the alfalfa.

Another method of curing green or wet alfalfa hay when a large barn is available is to spread the hay out about 2 or 3 feet deep over the floor. It will not heat to speak of, and after this is dried, the next cutting can be put on top of it. Stack bottoms of brush or rails should always be built to stack on, as this saves a lot of hay. Cock covers of canvas are used by many and give excellent satisfaction in protecting the hay while curing in the cock.

TREATMENT OF OLD ALFALFA

Cultivation

There is a possibility of weeds and grasses coming in to some extent, but these can be overcome largely and the yield of alfalfa increased by cultivation. Those who are not accustomed to handling alfalfa will be greatly surprised at the amount of cultivating that can be done on an alfalfa field to its advantage. Fields that have been pastured and apparently thinned out, can be disked both ways with a sharp disk set to cut to its full extent, then harrowed, and the crop be greatly benefited by the treatment.

It would appear to those who have never tried it that such treatment would destroy the alfalfa, but it will not. In the drier section of the alfalfa regions it is a quite common practice to disk and harrow the alfalfa after each cutting to destroy weeds and conserve moisture. Besides the disk harrow there is a tool made expressly for this purpose, known as the "alfalfa renovator." This is similar to the disk harrow except that spikes take the place of disks. The spring tooth harrow is

also a very valuable tool for cultivating the alfalfa and it is claimed by many that the spring teeth will dodge around the plants and do the cultivating without injuring the crowns to the extent that the disk harrow does.

Old fields of alfalfa should at least have a cultivation with disk and harrow in the spring as soon as the ground is dry enough. If possible, such cultivation should be before there is any growth started. Occasionally, fields are seeded too thick and it is desired to thin them. This can be done by running furrows through the alfalfa with a sulky plow, one to two feet apart, and then cross-harrowing until the ground is level again. One-half to one-third of the plants can be cut out in this way. In the seed-producing regions this is quite often a good practice.

Old alfalfa fields respond very readily to applications of well rotted barnyard manure. This should be applied during the fall or winter and disked and harrowed in in the spring. The applications should be light and frequent so as not to be raked up with the hay crop. There is perhaps no crop grown on the farm that will give better returns for the labor expended in such treatment than alfalfa.

Alfalfa a Soil Renovator

The first comment usually made on seeing for the first time, the enormous roots of old alfalfa is, "It certainly must loosen up the soil." This is true. Alfalfa roots have been dug out that have penetrated the soil 30 feet. On the College farm in Kansas the writer helped dig out a plant just six months old from seed, and it had penetrated the soil six feet. Alfalfa six weeks old from seed at the I H C farm, Grand Forks, N. D., had penetrated 29 inches. The total length of these plants was 42 inches, or just one inch per day from the time the seed was planted.

To those not familiar with it, the extent of the alfalfa root system is almost unbelievable. Certainly no one will doubt the beneficial effect of the decaying of these large roots in the soil. As the larger part of the alfalfa root system is below the feeding range of ordinary plants, the surface soil is resting and really gaining in fertility during the time it is in alfalfa. Alfalfa is a great silent subsoiler, equal in efficiency to tractors or dynamite.

Alfalfa as a Seed Crop

The fact that alfalfa seed has sold in the vicinity of twenty cents a pound for a number of years, makes the production of seed very attractive. The true Grimm alfalfa has been selling at \$1.00 a pound and there seems to be as keen a demand

as ever. There certainly is a great profit in alfalfa seed at these prices and there is no reason why the production should not be increased. Alfalfa does not always seed regularly, the reasons for which are somewhat hard to give.

It is noticeable that it seeds heaviest during hot, dry seasons. Too much rainfall seems in some way to hinder the formation of the seed. For this reason it is probable that the seed-producing area will remain in the drier or so-called semi-arid regions. However, this year (1913), seed seems to be forming well in northern Minnesota and the northern part of North Dakota.

There is no doubt but that the seed production is influenced to a considerable extent by the number of bumble bees or honey bees which may visit the blossoms. Experiments conducted by Prof. C. B. Waldron at Dickinson, S. D., show this very conclusively. The anthers and stigma of the alfalfa flower are enclosed in glumes which apparently do not always open voluntarily. A light hail storm, heavy winds or the threshing of the blossoms by the wings of bees or any other means, may cause them to open so that they may become fertile and produce seed. If these glumes do not open and allow the pollen to come in contact with the stigma during the receptive period, the bloom drops off and there is no seed pod formed.

In portions of the West, and in South Dakota, artificial means are resorted to, to trip the flowers. This is done by a revolving reel or by hanging a 2 x 4 under a buggy so that it will just strike the flowers and then driving over the field at a rapid pace. This feature of seed production is as yet not fully worked out. When it is, it may be possible to increase the amount of seed produced.

What Crop to Leave for Seed

What crop to leave for seed is an open question, but it is probable that in the northern part of the United States, the first should be left. The second crop is liable to be too late in maturing to give the alfalfa sufficient chance for making growth enough to protect it during winter. The alfalfa should be carefully watched and if it is seen that many of the flowers are falling off and not forming pods, the field may as well be cut for hay immediately and avoid further retarding the succeeding growth. The proper time to cut the seed crop must be determined by observing the pods. As they do not all ripen at once, it is impossible to delay the cutting until all are ripe.

The length of the season might also determine the time of cutting to some extent. When about three-fourths of the pods are a golden brown is perhaps as safe a rule as any to go by.

The usual method is to cut with a mowing machine, using a clover buncher attachment to gather up the crop. The binder is also used by taking off the binder attachment and allowing the alfalfa to be thrown off loose onto the bundle carrier until good sized bunches are collected. The self-rake is also a very satisfactory means of collecting the seed.

In many instances the crop may be too short for anything but the mowing machine and if it is not possible to get a clover buncher, it may be cut and raked similar to hay. The raking should be done soon after cutting so that there will be the least possible amount of shattering due to driving over the crop.

It is a general practice to leave the seed crop in windrows until thoroughly dry, then thresh immediately. If this is not possible, the alfalfa may be stacked in long, narrow stacks, but great care should be taken that it is so dry that it will not heat in the stacks as this will damage the seed. A good bottom of brush or poles should be built on which to stack the alfalfa so that it will not draw dampness from the ground.

Threshing Seed

The clover huller or special alfalfa huller, of course will give best results in threshing, but the ordinary separator is used to a large extent. If corrugated teeth are put in the concaves and these set up close and the machine fed rather slowly so that any pods which are not at first broken open will come back through the tailings elevator into the cylinder again, a satisfactory job can be done. After threshing, the seed should be run through a fanning mill to put it in good shape. If there are a considerable number of pods still unthreshed, these may be run through an ordinary feed grinder with the burrs set so as not to crack the alfalfa seed, and in this way practically every seed recovered.

It is probable that the growing of alfalfa seed will be greatly increased, now that the practice of planting it in rows and giving some cultivation has been resorted to. For seed production it appears that the ordinary sowings are too thick; that when individual plants are isolated and given a chance they produce as much as an ounce of seed. The best method is doubtless that which has been previously described under "Methods of Seeding."

Transplanting Alfalfa

One would hardly suppose that a plant with such a root system as alfalfa has, could be easily transplanted, but it is transplanted with good results and the practice has gained consider-

able favor in South Dakota. Year-old plants are usually transplanted, having been taken up in the fall and kept dormant until time to transplant. On the I H C farm at Grand Forks, 4,000 plants were set May 9th, 1913. These plants were year-olds, raised by A. B. Lyman, of Excelsior, Minn. The plants were dug, or plowed up, May 6th, put into bushel baskets, and shipped by express.

The land had already been prepared and the rows marked out with a small plow three and one-half feet apart. With a hoe or spade, holes were opened for the plants about two and one-half feet apart in the row, the plants set by hand, and not watered. The plants were set a little deeper than they grew previously. Notwithstanding the very dry weather, a quite satisfactory percentage of the plants grew. Adjacent to the transplanted acre, we put out an acre, drilling the seed with garden seeder, rows three and one-half feet apart. When these plants were

**Grimm alfalfa plants transplanted—second growth first year —
just beginning to bloom**

five weeks old, we took enough to replant what did not start on the transplanted acre. We did this just after a rain, and took no more precautions than we would in handling cabbage plants—in fact, handled them similarly, but, as the soil was moist, did not water them after planting.

Nearly all of the young plants transplanted, grew, which was not expected. The transplanted plants made a slow growth up to July 1st. Some of them began blooming and were cut off about June 25th. By July 25th, there was a much heavier growth and all the plants were again cut, except three rows

which were left for observation. These made a big growth and seeded heavily. August 15th, some ripe seed was collected and planted and now a second generation is growing. Many of the plants were over two feet high and when collected made a bunch that could no more than be spanned by the thumb and fingers of one hand.

For seed production, this system has gained much favor in the drier sections. A machine for transplanting is being perfected at the South Dakota Agricultural College. Prof. N. E. Hanson was first to transplant alfalfa, and is a very strong advocate of this system. The growth that will result from a single plant, when cultivated and given the use of five or six square feet of soil, is very remarkable. Every farmer not familiar with alfalfa should secure 100 Grimm plants and set them in a corner of the garden and give careful cultivation. Single plants have produced more than an ounce of seed.

ALFALFA ENEMIES

The Enemies of Alfalfa are Few

Alfalfa is subject to leaf spot or what is commonly called rust. This does not occur frequently, but when it does, it should receive prompt attention. The first warning is the appearance of small black spots on the leaves. Later these leaves turn yellow and the patches in the field where this starts become larger, and the growth is greatly retarded. Bloom seldom appears after rust has gained any headway. The remedy is very simple and easily applied—mow the alfalfa as soon as possible after the rust appears, and remove the cutting.

There are other alfalfa diseases, but they are infrequent and of little consequence. Occasionally, young alfalfa is damaged by the blister beetle, and grasshoppers are apt to cause some damage. The blister beetle and the grasshopper can be destroyed by spraying with Paris green. Grasshoppers are easily killed by use of a "hopper dozer" and poison baits, which are fully described in many of the bulletins published.

Squirrels and pocket gophers often damage alfalfa by throwing up mounds of dirt which interfere with harvesting. These animals can be poisoned. The gophers are fond of potatoes, sweet potatoes, or apples and the presence of strychnine in these does not seem to deter them from eating the fruit. Take an ordinary potato and cut it into small pieces somewhat smaller than for planting purposes, or use small potatoes. With a thin knife slit the piece of potato and insert into this slit a crystal of sulphate of strychnine about one-half the size of a grain of wheat.

Sulphate of strychnine can be bought of any druggist, in small bottles. The 25-cent size will furnish enough strychnine to kill the gophers on 100 acres.

It is well to prepare the potato bait as above described, a few hours before it is to be put out. Evening is probably the best time to distribute the poisoned potatoes as the gophers work during the night or early morning. Sharpen an ordinary broom stick or old fork handle at one end. If there is a great deal of this work to be done, a tool may be made for the purpose, on which there is a place to set the foot to press it into the ground.

With the sharp stick, find the newest made mounds and by pushing the stick into the ground, locate the runway. The pieces of potato should be small enough to drop through the hole made by the stick, into the runway. It has been found best to leave these holes open as the gopher will be attracted by the light and thus discover the bait more readily.

By going over the fields a few times, a week or so apart, it is possible to get rid of practically every gopher in the field. This had better be done early in the spring as the gophers are more hungry then and will eat the bait more greedily. Occasionally a gopher will not get enough to kill it and he will not touch the bait again. If after two or three applications of different baits, he still continues operations, it may be possible to get him in a trap. This method is so successful that there is absolutely no excuse for permitting an alfalfa field to be overrun by gophers.

In the western part of the country the prairie dog may cause some trouble. These are easily destroyed by the use of carbon bisulphate or poison, directions for using which will be given on inquiry.

PLOWING UP ALFALFA

One of the first questions asked by those who are not familiar with alfalfa is as to how such a strong rooted plant can be destroyed when once established.

Under ordinary circumstances, alfalfa will doubtless produce for ten years, although for the sake of rotations it should be sown more frequently. With a good sharp gang plow, plowing 3½ to 4 inches deep, there is little or no difficulty in plowing it up. It will require perhaps one-fourth more power if the stand is quite thick. Alfalfa is usually pastured for a year or so before it is plowed up. This weakens the plants to some extent and the field is more easily plowed up. If the ground is wet when plowed and is worked down, it is not uncommon for a good many plants to continue growing. This may be overcome by plowing the alfalfa up after the last cutting in summer when

the land is usually dry and leaving the ground for some time without working down.

Another practice is to plow the ground only about three inches deep and then immediately harrow with a peg tooth harrow. This will drag out practically all the roots. After they have been exposed for a week or ten days, the land may be plowed six to eight inches deep and these crowns turned under. They are very rich in fertility and should not be raked off the field. If the ground is to be put into small grain, they of course would not interfere very greatly with the seeding and may be left on the field.

ALFALFA IN ROTATION

Alfalfa is not considered adapted to use in rotations, but there is very little ground for this assumption. It is just as easy to start as red clover, and if the ground is inoculated and in proper condition it will make as much growth as red clover. Once alfalfa is well established, it is hardly considered practical to plow it up for at least five years.

Being a very deep-rooted plant, alfalfa is able to draw on the food supply deep in the soil. This fact renders it more beneficial than any other crop as it allows the surface fertility to accumulate for succeeding crops. There are on record many instances of the increase in crops following alfalfa. Reports from the northwest show the yields of crops following alfalfa to be greatly increased, in many cases doubled, depending on the length of time the alfalfa was allowed to remain on the field.

As the price of alfalfa and clover seed is practically the same, there is little doubt but that as good or better results will be secured by sowing alfalfa in a rotation as are secured with red clover.

Sweet Clover

There are two varieties of sweet clover that are gaining favor as hay and pasture crops, the white and the yellow flowered. These plants are closely related to alfalfa, but they are biennials, that is, a single plant lives only two years. However, the sweet clovers are such persistent seed producers, the seed of such high vitality, and the young plants so vigorous, that when once established, it appears to live from year to year. The ordinary methods of mowing it at random along the roadsides or on abandoned or unoccupied lots or fields, has little apparent effect.

Sweet clover is considered by most farmers as a bad weed. It, however, has long had friends who have learned its value, and recently, especially in the drier sections and on poor soil, it

is gaining much favor as a pasture and hay crop. The fact that it has a rather repulsive odor and taste, and that stock do not eat it to any great extent are the faults usually placed against it. However when stock are confined to sweet clover pasture, they soon learn to like it and fatten very rapidly, and there seems to be no trouble from animals bloating on clover as there often is with alfalfa. In Colorado, along the railroads, there are many plants of sweet clover that have been eaten off by range cattle. In feeding value, alfalfa and sweet clover are very nearly equal.

The white sweet clover seems to give best satisfaction for both hay and pasture. For hay, the plants must be cut early—about the time the first blooms appear. At this time the repulsive odor and taste are not so noticeable as at later stages of growth. Early cutting is best, because a second growth will come immediately and produce a second cutting or a seed crop. The yield of hay is reported to be equal to or greater than alfalfa. The handling of a seed crop is somewhat more difficult than alfalfa, as it shatters very badly. It is also essential that sweet clover be cut high—about four inches—the first time or there is danger of killing many of the plants.

The requirements of sweet clover as to preparation of seed bed, method of seeding, amount of seed per acre, etc., are practically the same as for alfalfa. It is not probable that sweet clover will be found better than alfalfa, where the latter can be grown successfully, but in the drier sections or on land that does not grow alfalfa readily, it certainly is worth while making a trial of sweet clover. The agricultural papers lately have published many instances of successful trials of sweet clover. For lack of space these are not reproduced here.

SUMMARY

1. Alfalfa is being grown successfully in every part of the northwest, but is not fully appreciated.

2. Farmers are rapidly coming to realize that live stock must be raised on every farm, and that alfalfa is the surest and best feed to be raised.

3. Alfalfa is not difficult to grow—will withstand more heat and drouth than red clover the first year, and when well established on good land will produce crops for many years, almost regardless of weather conditions.

4. The requirements of the alfalfa plant are easily met when its nature is understood. The very small seed, producing a single tap root, requires: a firm seed bed so that the moisture may be brought near the surface; manure for plant food; and

soil from an old field, or pure culture to inoculate the soil.

5. Grimm alfalfa holds first place as to hardiness. Montana is a close second. Only hardy northern grown seed is successful in Minnesota and the Dakotas. Do not experiment with southern grown seed.

6. Alfalfa growers agree on essentials. Precede alfalfa by a cultivated crop, potatoes best—and manure land. Plow deep the year previous to conserve moisture. Fall plow and manure. Spring plowing should be very shallow, and packer used to firm the soil. Disk and harrow to kill weeds until the middle of June. If there is plenty of moisture one inch below surface of soil, drill eight to twelve pounds of seed per acre alone, or with three pecks of beardless barley. If season is dry, cut barley for hay before mature. Clip weeds every two weeks, but not so late as to leave field bare. If seed is sown broadcast, use sixteen to twenty-four pounds per acre.

7. Cut the alfalfa for hay when one-tenth in bloom. Never cut or pasture so late that there is not a good growth for winter protection. Save the leaves as they are richer than bran.

8. Try alfalfa in rows for seed production—give frequent cultivation. Transplanting alfalfa has gained much favor—is worthy of a careful trial.

9. Old alfalfa fields need cultivation, disking, renovating, or cultivating with spring-tooth harrow. Manuring alfalfa is profitable—try it. It is not safe to pasture cattle or sheep on alfalfa, but an alfalfa field is a hog's idea of heaven.

10. Alfalfa excels every other crop, in yield, in feeding value, as a drouth resister, as a soil enricher, is not as difficult to grow as clover and gives double the yield. After you have failed as often with alfalfa as you have with wheat, try sweet clover. Do not expect to know all about this new-old crop at once. It is necessary to *grow* into growing it, but make a beginning and *Grow Alfalfa*.

ALFALFA LITERA

0 000 930 389 3

The following is a partial list of available alfalfa literature.
Write some of these addresses for such literature as they issue
on the subject:

- North Dakota Agricultural College Bulletin, 95-3, Fargo, N. Dak.
University of Wisconsin, Circular 35, Madison, Wis.
The Pennsylvania State College, State College, Pa.
Agricultural Experiment Station, Bulletin 113-181, Wooster, Ohio
Agricultural Experiment Station, Geneva, N. Y.
University of Missouri, Bulletin 106-40, Columbia, Mo.
Agricultural Experiment Station, Bulletin 94-120-133-141, Brook-
ings, S. Dak.
The University of Minnesota, Bulletin 6-18, University Farm, St.
Paul, Minn.
Michigan Agricultural College, Bulletin 271, East Lansing, Mich.
Agricultural Experiment Station, Circular 36, Lafayette, Ind.
Iowa Experiment Station, Bulletin 137, Ames, Iowa
University of Illinois, Bulletin 76-134-146, Urbana, Ill.
Agricultural Experiment Station, Bulletin 155-176, Manhattan, Kans.
"Alfalfa" Farmers' Bulletin 194-339
Utah State Bulletin No. 126
U. S. Department of Agriculture, Washington, D. C.
"Alfalfa Growing in Illinois," Bulletin No. 18, H. A. McKeene, Spring-
field, Ill.
"Alfalfa on Every Farm"
"Alfalfa in the Corn Belt"
Press Page No. 1
" " " 2
"For Better Crops"
"Alfalfa Growing in Northwest"
"For More and Hardier Alfalfa in Northwest"
Alfalfa Studies (for Schools)
Lecture Notes for Alfalfa Charts
IHC Agricultural Extension Department, Harvester Bldg., Chicago, Ill.
"Alfalfa Production," H. G. Bell, Middle West Soil Improvement
Committee, Chicago, Ill.
"Alfalfa—The Money Crop of the Northwest." The Northwestern
Line, Chicago, Ill.
"Alfalfa in America" (480 Pages, \$2.00), Jos. E. Wing, Mechanics-
burg, Ohio
"The Book of Alfalfa," F. D. Colburn (344 Pages, \$2.00), Topeka,
Kans.
"How to Grow Alfalfa in Western Michigan," The Western Rural
Router, Grand Rapids, Mich.

For Information on Inoculation, write, Bacteriological Laboratory,
East Lansing, Mich.

Note: If we can help you in any other way feel at liberty to
write us.

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