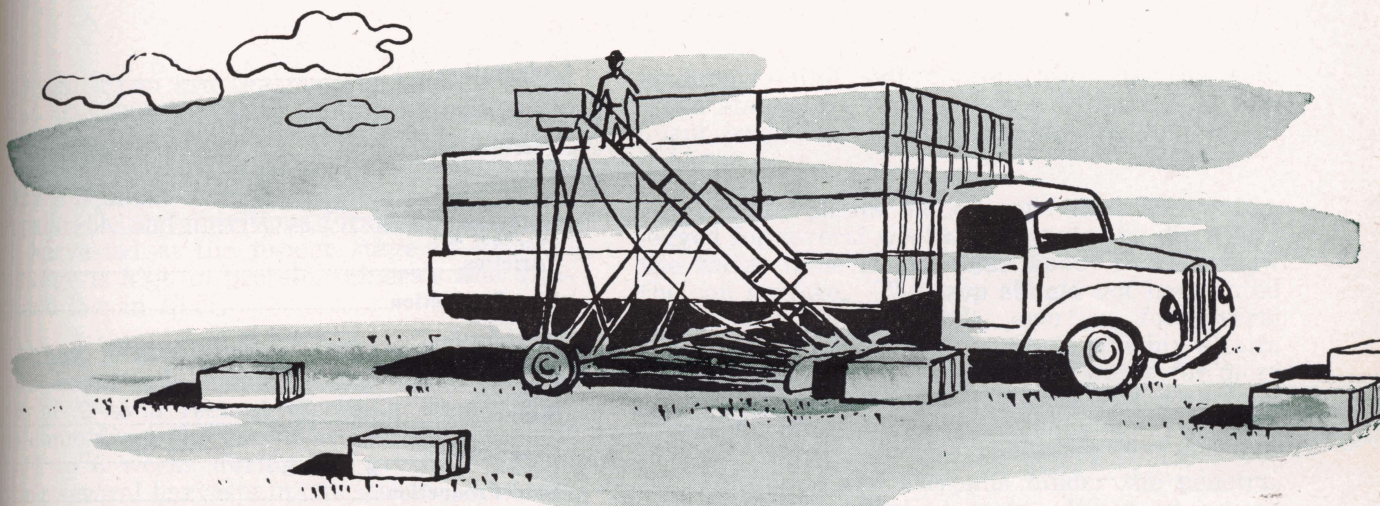

Alfalfa... for forage and seed

TEXAS AGRICULTURAL EXTENSION SERVICE

J. E. HUTCHISON, DIRECTOR, COLLEGE STATION, TEXAS

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ALFALFA . . . *for Forage and Seed*

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TEXAS A. & M. COLLEGE SYSTEM

HAY AND SEED are the most important products of over 300,000 acres of alfalfa in Texas. The crop also is dehydrated, grazed, fed as green-chop, put up as silage and used as a honey crop and for soil improvement. Alfalfa is one of the most palatable and nutritious forage crops grown when harvested at the proper stage of growth. The forage is high in protein, minerals and vitamins and low in fiber.

Alfalfa is a perennial legume with purplish flowers borne on slender stems that reach a height of 2 to 3 feet at blooming time. New stems come from the crown or base of the plant every 4 to 6 weeks during the growing period, allowing several harvests in one season. The taproot may reach a 20 to 30-foot depth in permeable soil. Nodules on the smaller roots contain bacteria that take nitrogen from the air and fix it in the nodules.

ADAPTATION

Area. Texas is divided into three regions—A, North Texas, B, Central Texas and C, South Texas (Figure 1) to permit clearer discussion of varietal adaptation and management practices. Figure 1 also shows the irrigated and nonirrigated production areas. Irrigated production is concentrated in the Rio Grande and Pecos River valleys and in the High Plains. Two major nonirrigated production areas are along the Red River on bottomland and land with a relatively high water table and in the Blackland and Grand Prairies. Some alfalfa is grown on bottomland along the Brazos, Colorado and Trinity rivers and other streams in the eastern half of the State.

Soil. Alfalfa grows best on deep, fertile, medium-textured soils that are alkaline and well drained. It is not practical to attempt alfalfa production on deep, coarse sands of low fertility. Soils of low fertility that are otherwise suitable require large amounts of fertilizer. Acid soils must be limed before alfalfa grows satisfactorily. Soils infested with cotton root rot or with a high population of root knot nematodes should be avoided.

Highly saline soils, those with an excess of soluble salts, prevent satisfactory alfalfa production unless proper treatment is given before seeding. Established alfalfa plants are moderately salt tolerant, but seedlings often are killed by medium-to-high salt concentration in the soil. Some stands are obtained on saline soils by frequent irrigation until the plants are well established.

Alfalfa plants die on soils that are waterlogged for several weeks. They usually die where the water table is less than about 3 feet below the soil surface. The crop should not be planted in bottoms that ordinarily overflow for several days during the growing season; growing alfalfa plants often die when covered by water for more than 24 hours. Dormant plants can withstand longer flooding.

Hardpans and claypans hinder the penetration of water and plant roots. When such pans are more than 3 feet below the soil surface, alfalfa may grow satisfactorily, provided the soil does not become water-logged from rainfall or too much irrigation. Plowpans are compacted layers usually less than 12 inches below the soil surface which result from cultivation and heavy equipment. The plowpans may be broken up temporarily by chiseling or ripping during seedbed preparation sufficiently to allow establishment of a stand. Roots of established plants will tend to keep the soil open.

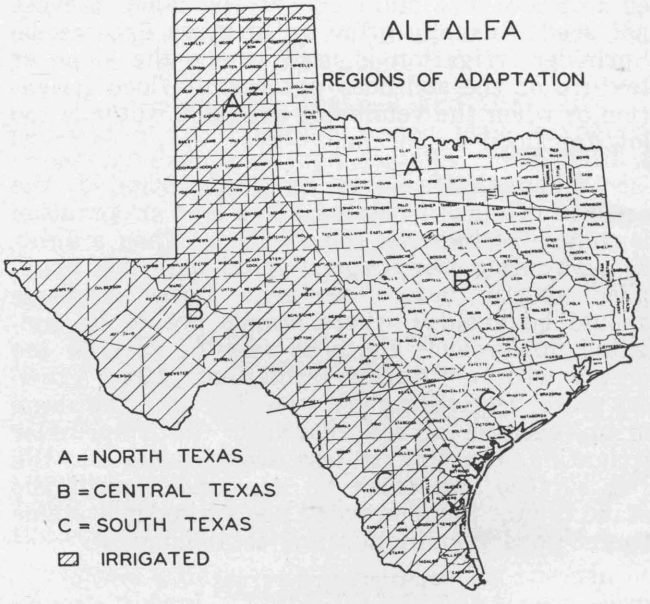

Figure 1. Alfalfa produced in the shaded areas usually is grown under irrigation.

LAND PREPARATION

Proper seedbed preparation is necessary to obtain good stands. The ideal seedbed is mellow but firm enough that the soil particles are in close contact with the seed. Since most alfalfa in Texas is seeded in the fall, seedbeds generally are prepared during the summer. Small grains or other crops that could be harvested before midsummer should precede alfalfa to allow time for seedbed preparation and settling before the alfalfa is seeded. Where moisture is limited, results may be better if no crop is planted the previous fall or spring.

The seedbed should be prepared when the soil is almost dry. The preparation usually consists of breaking and then repeated disking until the desired condition is obtained. Spike-tooth harrows often are used with disking to break up clods. Chiseling or ripping to break up a plowpan may be necessary. After the last disking or harrowing, the soil should be firmed with a cultipacker or similar roller. Then weeds may be controlled by light disking until planting time. After planting, repeat the cultipacking or rolling.

Where wind erosion is a problem, alfalfa may be seeded into a dead stubble of sorghum, Sudangrass or small grain. If cultivation is necessary to control weeds, use implements that allow shallow, subsurface tillage with the stubble left on the soil surface. Weedy growth also may be controlled with chemicals. Cultipacking or rolling should follow tillage.

Preparation for irrigation must be a part of seedbed preparation when the alfalfa is to be flood irrigated. Proper land grading, construction of levees or borders and provision for drainage pay dividends in higher yields and lower labor costs. Low, broad levees are best, for they may be crossed with machinery and may be seeded to allow maximum use of the land. Levees not seeded usually grow up in grass and weeds. Sprinkler irrigation is used where the slope or texture of the soil does not permit flood irrigation or when the volume of available water is too low for flood irrigation.

When alfalfa is to be flood irrigated, the seedbed often is irrigated after land preparation is completed to settle the seedbed. Then a light-to-heavy irrigation, depending on the need, is applied shortly before seeding. Loose seedbeds should be avoided where stands are to be irrigated up, because the seed may be covered too deeply with soil during irrigation. Many growers prefer no flooding after seeding until the stand is up, because of soil crusting. With sprinkler irrigation, crusting is less troublesome for the soil surface can often be kept moist until the stand is up. Some growers use sprinkler systems to get good germination and establishment.

FERTILIZATION

Alfalfa feeds heavily on phosphorus, potassium and calcium (lime). A ton of alfalfa hay contains roughly 45 pounds of nitrogen, 12 pounds of phosphoric acid and 45 pounds of potash. Once established, the plants usually are able to get their supply of nitrogen from the air. Failure to supply needed phosphorus, potassium and calcium results in low-producing plants and loss of stand. A soil test before seeding and every 2 to 3 years thereafter is the best way to determine the grade and amount of fertilizer required.

Phosphorus is needed for alfalfa production on East, South and Central Texas soils and on a few West Texas soils. Potassium is needed in East Texas. Upland sandy loam soils in East Texas require lime as do some sandy loam and clay soils on the Gulf Coast Prairie.

Barnyard or poultry house manure is excellent for alfalfa, because it supplies organic material and plant nutrients. The manure should be applied far enough in advance of seeding that it will be well incorporated with the soil. Barnyard manure likely to contain seed of noxious weeds should not be used.

For Establishment. Fertilizer should be drilled into the soil 3 to 4 inches deep with a drill attachment at seeding time. It should be placed in a band below the seed or 2 to 3 inches to the side and below. Fertilizer may be broadcast and worked into the soil ahead of seeding, but this method encourages more weed growth, phosphorus fixation by lime and more of the nitrogen and potassium may be lost by leaching. Lime should be applied during or preceding seedbed preparation. Fifteen to 20 pounds per acre of actual nitrogen applied at seeding time stimulates seedling growth. More than this amount on fertile soils encourages weed and grass growth.

For Maintenance. Alfalfa stands maintained for several years should receive the required phosphoric acid and potash once a year. These may be drilled in or applied as a topdressing in early fall, late winter or early spring. When the fertilizer is topdressed, the soil surface may be scratched or tilled to permit partial incorporation.

Some alfalfa growers in East Texas use large amounts of fertilizer to establish and maintain stands on the upland loam and sandy loam soils. These growers apply fertilizer at the rate of about 25-100-100 per acre at the time of or just prior to seeding in the fall. In March and after each cutting, the plants are topdressed with 30 pounds per acre of actual nitrogen. After the last cutting in the fall and following rains, established stands receive an application of about 25-100-150 per acre. Some stands are reported to have lasted 10 years with such fertilizer treatment.

SEEDING

Certified alfalfa seed always should be used. Good-quality seed are necessary for good stands and the small additional cost usually is repaid many times.

Time. Fall seedings are best in Texas when moisture is available for germination and growth.

Weeds and weedy grasses usually are worse in spring seedings, more seedlings are lost from disease and spring plantings do not yield a full crop the first growing season. If spring seeding is necessary, it should take place in late winter or early spring.

The best dates for fall seeding are September 1 to 30 in the High Plains; October 1 to 15 in Central Texas; and October 15 to November 15 in the Lower Rio Grande Valley. Plantings made too early often fail because of hot, dry weather. Late plantings in Northwest Texas may be killed by cold weather before the seedlings become established.

Method. Alfalfa may be seeded with an alfalfa drill, a grain or grassland drill equipped with a small seed hopper or with a cultipacker-seeder. Broadcasting the seed is less desirable because the seed often are neither distributed evenly nor covered at the time of seeding. Broadcast seed may be covered by a light harrowing, disking or dragging. Regardless of the method, the soil should be firmed around the seed with a cultipacker or roller after they are planted. In areas where uniform stands are difficult to get, some growers divide the seed into two lots, planting half in one direction and the other half across the first seeding.

Rate. Seeding rates necessary for good stands depend on the soil, condition of the seedbed and seed quality. In the eastern half of the State and where alfalfa is to be irrigated, 15 to 20 pounds per acre usually assure a good stand. Nonirrigated seedings in the western half of the State may be made at the rate of 12 to 15 pounds per acre. Poor seedbed conditions justify increasing the seeding rate by 2 to 3 pounds per acre. When alfalfa is seeded into established stands of Johnsongrass, 10 to 15 pounds per acre is a satisfactory rate.

Depth. Alfalfa seed must be in moist soil to germinate, but young seedlings often cannot emerge if planted too deep. The seed should be covered ¼ to ½ inch in heavy soils and from ½ to ¾ inch in sandy loam soils.

Inoculation. Alfalfa seed always should be inoculated with the proper strain of bacteria just before seeding. Many growers prefer to use twice the recommended rate of inoculant suggested on the container. Some add 3 to 4 tablespoons of molasses to the water needed to moisten 100 pounds of seed. This helps the inoculant stick to the seed. Another practice is to add about 2 quarts of cottonseed meal per 100 pounds of seed to provide a better medium for the bacteria until the plants begin to nodulate.

Inoculated seed should be kept shaded and planted as soon as possible after inoculation. Seed inoculated 24 hours previous to planting should be re-inoculated before seeding and seed treated with chemicals for disease control should be planted within 2 hours after inoculation.

Nurse Crops and Companion Crops. Nurse crops are not recommended for use with alfalfa in Texas, except under special conditions. The nurse crop competes with the alfalfa seedlings for light and moisture. Occasionally, light-rate seedings of barley or oats are made to protect the alfalfa seedlings where wind erosion is a problem. In some instances, oats or wheat are seeded into established stands of alfalfa to help control winter weeds. A few growers in South Texas have seeded oats and alfalfa together under irrigation, grazing the oats during the winter and utilizing the alfalfa after the oats disappeared. Alfalfa may be seeded into established stands of Johnsongrass to increase forage yield and quality and to fill in gaps in the stand. In irrigated pastures in the higher altitudes alfalfa is grown with cool-season perennial grasses, such as bromegrass, perennial ryegrass and orchardgrass.

Reseeding Old Stands. Most attempts to improve old stands by overseeding fail. The seedlings are killed by competition from established plants for moisture and sunlight and by diseases to which the younger are more susceptible. Stands should be plowed up when they become thin, weedy and unproductive. Before such stands are plowed up, they often are grazed.

Usually good stands and growth are doubtful if an old stand is plowed up and the area reseeded immediately. This is due partly to a buildup of diseases and insects. Best results usually are obtained by growing nonlegume cultivated crops on the land 2 to 4 years before reseeding alfalfa.

IRRIGATION

Alfalfa requires ample soil moisture to a depth of at least 6 feet for best production. The plant roots will not push through dry soil to find water. Only enough water should be applied to wet the top 6 feet of soil. A 3-inch irrigation wets relatively dry clay soil to approximately 1½ feet and a sandy soil to about 3 feet.

The moisture in the soil and the depth of penetration of irrigation water may be determined by examining soil samples taken with a soil probe or auger at various depths and locations. Unusually dark-green leaves and slow plant growth are other indications of limited moisture. When the plants wilt, irrigation has been delayed too long.

Too much irrigation water may be more harmful than applications that are too small. Excess amounts leach nitrogen from the soil and often raise the water table to a point that damages the plant roots. Alfalfa roots grow downward until they strike saturated soil. When the water table is raised, the submerged portions of the roots rot and the plants are weakened.

Many growers wet the soil during the winter or early spring. During the growing season, deep loam soils usually are irrigated once per cutting, generally as soon as the hay crop has been re-

moved. On sandy loam soils and soils where water does not penetrate readily, two or more irrigations per cutting may be needed. Irrigation should be applied far enough ahead of cutting for the soil surface to be dry, thereby preventing mold and difficulty in curing.

VARIETIES

Varieties of alfalfa popular in the United States are divided into four groups; common, Turkistan, variegated and nonhardy. The common group includes Southwestern, Kansas and other common varieties that have developed in the western states. The Turkistan group includes all imported strains of Turkistan, such as Hardistan, Orestan and Nemastan. These alfalfas are shorter growing and more spreading than the common varieties. Varieties in the variegated group include Grimm, Cossack, Baltic and Ladak, all more winter-hardy than the common varieties. The nonhardy group includes the Peruvian, Indian, African and Arabian varieties. These varieties grow upright, make quick regrowth after cutting, have a long growing season and are damaged easily by low temperatures.

Southwestern Common. This variety originated from a Chilean introduction and has developed through a natural process of the stronger plants surviving climatic conditions under which they have been grown over a period of years. For this reason, seed from different sources may vary in quality and plants may vary in type. Certified seed or seed purchased from a reputable source should be used. Southwestern Common is not classed as a winter-hardy variety, but it seldom winter-kills in Texas. The variety is adapted to the entire State but generally produces less in South Texas than the nonhardy varieties.

Barstow Common. Barstow Common alfalfa was developed from an introduction of Turkistan alfalfa planted near Grandfalls, Texas, in 1892 by John T. Sweatt. Seed from this planting was distributed in the area and the variety has been grown since that time in relatively pure form. Barstow Common is slightly more winter-hardy than Southwestern Common.

TABLE 1. AVERAGE HAY YIELDS IN TONS PER ACRE FROM ALFALFA AT THREE LOCATIONS

Variety	Chillicothe	Brazos River Valley Laboratory	Raymondville
	1954-55	1950-54	1950
Southwestern Common	2.66	2.79	5.46
Oklahoma Common	2.32	—	—
Buffalo	2.21	1.99	—
Caliverde	2.10	—	—
Chillicothe Common	2.10	—	—
Kansas Common	2.02	—	—
Atlantic	2.02	2.70	4.76
Pilca Butta	1.97	2.63	4.25
Williamsburg	1.85	2.78	—
Sevelra	1.76	—	—
Narraganset	1.48	—	—
Nomad	1.40	1.76	—
Du Puits	1.34	—	—
Rhizoma	1.30	—	—
Indian	—	2.83	6.65
African	—	2.56	5.92
Hairy Peruvian	—	—	5.92
Ranger	—	2.08	—

Buffalo. Buffalo was selected from Kansas Common at the Kansas Agricultural Experiment Station in cooperation with the U. S. Department of Agriculture. This variety begins growth later in the spring than Southwestern Common in Central and South Texas, and its use is limited primarily to North Texas.

Ranger. Ranger was developed at the Nebraska Agricultural Experiment Station in cooperation with USDA as a synthetic variety from Cossack, Turkistan and Ladak alfalfas. It is more winter-hardy but more susceptible to leaf diseases than Buffalo. Its only use in the State is for seed production in North Texas.

Lahontan. Lahontan is a synthetic variety developed primarily from Nemastan selections by USDA in Nevada. It is highly resistant to the stem nematode and bacterial wilt and is about 75 percent resistant to the spotted alfalfa aphid. Lahontan is more winter-hardy than Southwestern Common and begins growth later in the spring. Limited experience with this variety indicates that about 10 percent less yield can be expected from Lahontan than from Southwestern Common in the North and Central Texas regions and about 20 percent less yield than the adapted nonhardy varieties suggested for South Texas. The variety likely will increase in importance in Texas in direct relation to damage by the spotted alfalfa aphid.

Hairy Peruvian. Hairy Peruvian was introduced into the United States through USDA in 1899. It has coarser stems and larger leaves than Southwestern Common, grows more upright with less branching and in South Texas begins growth earlier in the spring and grows later in the fall. The stems and leaves are hairy. Hairy Peruvian is not sufficiently winter-hardy to survive winter temperatures in Central and North Texas but it is satisfactory for South Texas.

African. African is a nonhardy variety selected from an Egyptian introduction made by USDA. The stems and leaves generally are larger than those of Southwestern Common and Hairy Peruvian and usually fewer in number than on the Common. This variety begins growth earlier in the spring, grows later in the fall and usually produces more forage in South Texas than the other two varieties. African frequently makes some growth during warm periods in the winter in extreme South Texas. Use of the variety is confined generally to South Texas because of its lack of winter-hardiness. Numerous strains of African are sold, some of which are undesirable.

Indian. Indian was introduced from India by USDA. It has much the same growth habit,

tem and leaf characteristics as African, although it is slightly less winter-hardy.

Pilca Butta. Pilca Butta was introduced from Australia as a "dryland" alfalfa, but it has failed to demonstrate superiority in drouth tolerance over adapted varieties. In Experiment Station tests at Chillicothe, College Station and Raymondville in the Lower Rio Grande Valley, Pilca Butta produced less forage than the commonly used varieties in those areas.

Creeping Types. Nomad and Rhizoma have been available as "creeping" or "pasture-type" alfalfas, but during several years of Experiment Station tests they have shown little or no tendency to creep. Although the creeping type alfalfas are variable as to plant type, they usually produce fine stems, small leaves and low hay yields.

Other Varieties. Other new varieties that are available but not recommended in Texas are Atlantic, Williamsburg, Narraganset, Vernal, Sevelra, Nemastan, Du Puits and California Common 49.

Figure 1 shows three regional divisions of Texas made to permit clearer discussion of adaptation.

North Texas. Southwestern Common is suggested for forage and certified seed production in this area. Buffalo and Ranger are suggested primarily for production of certified seed for sale in States to the north where these varieties are used widely. Both have produced more seed but less forage than Southwestern Common in tests on the Chillicothe Station. Both are more winter-hardy, especially Ranger, than Southwestern Common and begin growth later in the spring. Buffalo is resistant to bacterial wilt and could be substituted for Southwestern Common for forage production if the disease becomes a problem.

Table 1 shows the hay yields of several varieties at Chillicothe. Southwestern Common produced about 2.5 tons of hay per acre during dry years and 6 to 7 tons during years of favorable rainfall.

Central Texas. Southwestern Common is suggested for consistent forage production in this region. It sometimes produces slightly less forage than the nonhardy Indian and African varieties, but these and other nonhardy varieties are occasionally winter-killed by low temperatures even in the southern part of the Central Texas region. Yields of Caliverde, which is resistant to common leaf spot and downy mildew, have compared favorably with those of the higher producing varieties in Experiment Station tests at the Brazos River Valley Laboratory near College Station.

South Texas. Indian, African and Hairy Peruvian are suggested for forage production. Indian and African usually produce slightly more forage than Hairy Peruvian, but the stands may not last as long, especially when the stands are cut in the prebloom stage for dehydration. Chilean, similar to Hairy Peruvian, could be used when seed of these three varieties are not available. Yields obtained in Experiment Station tests with irrigation in the Lower Rio Grande Valley are given in Table 1. Up to 10 cuttings per year may be obtained in the Lower Rio Grande Valley with adequate moisture and fertility.

HAY PRODUCTION

Any alfalfa hay producer wants to obtain the largest yield of high-quality forage within reasonable operation cost and stand survival. Growers should learn how to make good-quality hay and maintain stands, but this knowledge can be gained only through experience. Temperature, humidity and season vary so much from one area to another that specific recommendations do not fit all conditions.

High-quality alfalfa hay is fine stemmed, leafy, green and free from weeds, grasses or other foreign material. Good-quality hay can be produced from alfalfa cut at the right stage and cured properly, if the stand is pure and dense. Hay from thin stands contains coarse stems, weeds and grass. Details on alfalfa hay quality and standards are given in USDA Farmers Bulletin 1539 and USDA Handbook of Official Hay and Straw Standards, both available from the Superintendent of Documents, Washington 25, D. C.

Stage to Cut. Established stands of alfalfa should be cut in the one-tenth to one-fourth bloom stage. Harvest at this stage gives the best compromise between yield, quality and maintenance of stand. A field is at the one-tenth bloom stage when flowers are present on one out of 10 stems.

Figure 2. Established stands of alfalfa should be cut in the one-tenth to one-fourth bloom stage to give good yields of high-quality hay and to maintain a good stand. New stands should be cut for the first time after they reach the one-half bloom stage.

Figure 3. Alfalfa hay is ready to bale when the moisture content is below 20 percent. Baling hay that is undercured results in musty, moldy hay that may be a fire hazard when stored. Hay that is overcured loses many of its leaves during baling.

The first cutting on new stands should be delayed until the plants are in the one-half bloom stage.

In general, the earlier the stage of growth at harvest, the higher the quality but the lower the yield; the later the stage of growth at harvest, the higher the yield but the lower the quality. Hay cut in the prebloom stage is higher in carotene or vitamin A, has a higher percentage of leaves and the stems are finer. However, continued cutting at this stage shortens the life of the stand. Following cutting and in the spring, alfalfa plants make regrowth for about 3 to 4 weeks on food reserves stored in the roots. After this time, the plants manufacture more food material than needed for growth and the root reserves begin to rebuild. The food reserves start building up again in the roots about the time the plants reach the bud stage, and the buildup continues rapidly until the plants reach the one-tenth to one-half bloom stage, or until new shoots arise from the crown. Therefore, continued cutting in the prebloom stage keeps the food reserves depleted in the plant roots, weakens the plants and results in loss of stand.

Fall and spring are critical growth periods. In North Texas and in most of Central Texas, the last cutting should be made at least 30 days before the first expected killing frost. This will permit the plants to build up food reserves in the roots, from which vigorous new growth can come the following spring. In South and Central Texas alfalfa may make some growth several times during warm periods in the winter. This tends to exhaust the root reserves and often leaves the plants in a weakened condition for spring growth. In this case, the first cutting in the spring should be delayed until the plants have reached the one-half bloom stage.

Curing. Proper curing preserves the green color and saves a high percentage of the leaves. The leaves contain two-thirds to three-fourths of the protein. Green color indicates palatability, freedom from damage and relatively high carotene or vitamin A content. Leafiness and color are determined largely by the method of curing and weather conditions during curing. Overcuring results in loss of leaves, color and dry matter. Undercuring may result in moldy, dark hay and excessive heating in storage.

Alfalfa usually is left in the swath until thoroughly wilted and then raked into small, compact windrows where curing is completed. Thorough wilting in the swath speeds curing, but the hay should be put into windrows before the leaves begin to shatter. Hay cures more rapidly in small windrows. Heavy crops should be put in single windrows, but it may be desirable to make double windrows in light crops. The windrows may be turned with the rake for uniform drying if necessary.

Hay crushers are used in some areas to hasten curing. These machines pick up hay from the swath or immediately behind the cutter-bar and crack the stems as they pass between rollers that are under tension. Some tests in the midwestern states indicate that curing time may be reduced 30 to 50 percent by crushing the stems, thereby saving more leaves, color and carotene. Hay crushers have been used in Texas on a limited basis, but they may be useful in areas where high humidity delays curing. California workers report that crushing hay has failed to improve quality and that the operation is slower and more expensive than the conventional method.

When alfalfa is cut at the proper stage, it contains from 70 to 80 percent moisture. Under good curing conditions it usually drops to 50 to 60 percent by the time it is ready to windrow. Ordinarily it is safe to bale when the moisture has dropped below 20 percent. Hay stored too wet will heat. A thermometer, placed in a pipe which can be pushed into the hay, may be used as a partial guide to safe storage in buildings. When the temperature of the hay rises slowly to 180 to 200 degrees F., it should be watched carefully. Temperature readings should be taken at least daily. If the temperature continues to climb rapidly above 180 degrees, the hay should be removed from the building to guard against fire.

Artifically curing hay in barns is a common practice in some states where field curing is difficult, but this method has been used little in Texas. With this method, hay generally is cured to 40 to 50 percent moisture in the field. Then the loose hay is placed in the barn, which has a system of air ducts built on the floor. A fan forces fresh air through the hay, taking out excess moisture. Baled hay and chopped hay also may be dried in this manner.

Chopped Hay. With this method, thoroughly cured hay is picked up with a field chopper that cuts it into 3 to 4-inch lengths and blows it into trucks or trailers. Then it is stored. The major

dvantages of chopped hay are: (1) it is easy to ed; it may be self-fed; (2) less forage is lost om waste because the stock refuse fewer stems; 3) it requires less storage space than baled hay; 4) the expense of baling is eliminated, and haul- g and labor costs may be reduced. The main isadvantage of chopped hay is that more com- ete curing is necessary before it can be stored afely.

DEHYDRATION

Dehydration offers growers near dehydra- ion plants another market for their alfalfa. The lfalfa usually is bought standing on the basis f hay yield and price. Roughly, about 1,000 cres are required for efficient operation of a de- ydration unit during an average season. For ehydration, alfalfa usually is cut in the prebud r bud stage. Normally, only one or two cuttings er year are taken for dehydration from a field, ith the remainder harvested for hay. The cut- ings taken for hay after one or more harvests in he early stage desired for dehydration should be elayed until the plants reach one-half bloom. his helps offset the drain on food reserves in he roots caused by prebloom cuttings.

PASTURE

Alfalfa provides grazing of excellent quality nd palatability. The most common practice is o graze during the fall and winter after the hay eason, although some stockmen pasture pure tands of alfalfa throughout the growing season. lfalfa is one of the most desirable pasture plants or hogs.

Grazing Management. To avoid damage to he stand, fall growth in North and Central Texas hould be grazed only after cold weather begins. razing the first growth in early spring may pre- ent rapid regrowth and reduce total grazing. Con- inued, close grazing usually kills alfalfa plants. heep generally damage alfalfa more than do cat- le and hogs.

Alfalfa to be grazed throughout the growing eason should be divided into blocks for rotation razing. Portable electric fences are excellent or rotation grazing purposes. Rotation grazing permits the most production from the pasture and gives the stand the best chance for survival. For- age on one block should be grazed off rapidly and he stock moved to another block. A regrowth eriod of 30 to 35 days should be allowed after ach grazing. A pasture divided into 11 blocks llows 3 days of grazing and 30 days for recov- ery; six blocks permit a 6-day grazing period and a 30-day recovery period. Some dairymen prac- tice strip grazing or daily ration grazing, allow- ing 1 day of grazing for the herd. Good grazing management reduces waste of forage from tramp- ling and allows uniform day-to-day grazing qual- ity.

Bloat. Bloat is an ever-present hazard when cattle and sheep graze alfalfa. Following are pre- cautions to help avoid bloat: never turn hungry animals into a lush growth of alfalfa before giv- ing them a fill of dry grass hay; animals unac- customed to grazing alfalfa should graze for very short periods until they become used to it; dry grass hay, salt and water should be available at all times; and holding the animals on grass pas- ture at night often is helpful. Mowing strips of alfalfa to provide dry feed and overseeding al- falfa with an adapted annual grass, such as small grain or Sudangrass, helps reduce bloat. Animals normally do not bloat when grazing a mixture containing 50 percent grass.

SILAGE

Alfalfa silage is a feed of excellent quality, though relatively little of it is used in this man- ner in Texas. The yields are not high enough to justify growing it for silage, but putting it in the silo is the best way to save forage when weather conditions are unfavorable for hay making. Sil- age is sometimes made from first cuttings that are unusually weedy and would make poor-quality hay. Alfalfa for silage should be cut in the one- tenth to one-fourth bloom stage. It should be finely chopped, ¼ to ⅜ inch, and packed thor- oughly in the silo.

Alfalfa must be wilted or a preservative must be added to allow proper fermentation and silage of acceptable quality. Using a preservative is considered more desirable than wilting in Texas. Preservatives and the amount of each to use per ton of alfalfa are: molasses (50 percent sugar), 60 pounds; ground shelled corn or small grain, 150 pounds; corn and cob meal, 200 pounds; and sodium metabisulfite, 8 to 10 pounds.

If a preservative is not used, the crop should be cut and wilted to a moisture content of 60 to 70 percent before it is chopped and put in the silo. Wilting requires one or more extra field opera- tion, which increases the cost of the silage, but less nutrients are lost through leaching in the silo.

GREEN-CHOP

The green-chop method of feeding, originally known as soiling, often is referred to as "green- feeding." Alfalfa utilized in this manner is cut, chopped, blown into trucks or trailers and hauled to feed bunks, where it is unloaded mechanically or by hand. This method of feeding usually is limited to larger operations and requires a fairly high investment in equipment.

Advantages of the green-chop method are: forage losses are kept to a minimum, with little loss from trampling or refusal; alfalfa stands are subjected to less damage than when grazed; no inside fences are required; and stock may be kept under close observation.

Major disadvantages are: considerable in- vestment in equipment is required; equipment breakdown is a problem; irrigation is almost a

necessity to provide a continuous supply of forage; when fields are too wet harvesting equipment cannot operate or the soil may be damaged by the machinery; and bloat may be a problem, though it is less than when alfalfa is grazed. Alfalfa to be fed green-chop should be cut at the one-tenth to one-fourth bloom stage, as for cured hay.

SEED PRODUCTION

Alfalfa seed production is most dependable in the semi-arid sections of Texas, where from May to September it is relatively hot and dry. Seed production in the State is concentrated in the Rolling Plains, the southern part of the High Plains, the western part of the Edwards Plateau and in the Mountains and Basins areas. Few alfalfa stands in Texas are utilized for seed production alone.

Stand Management. The first crop of alfalfa usually is harvested as hay and the second crop is left for seed production, since dry, clear weather favors seed production. In dry springs, the first crop is sometimes left for seed production. Without irrigation, the third crop may fail to develop properly for seed production because of drouth in midsummer. Vigorous plants are necessary for good seed production, but excessive vegetative growth tends to reduce blooming. The hay crop harvested before a seed crop is taken should reach the one-half bloom stage before cutting, to permit maximum storage of food reserves in the roots. Cloudy, cold weather during the blooming period is not favorable for setting seed.

Other important considerations in producing alfalfa seed are insect and weed control and pollination. Insects that damage the alfalfa flowers or prevent normal development should be controlled. Weed control is important for three reasons: the weeds compete with the alfalfa plants for moisture and plant nutrients; weed seed contaminate the alfalfa seed and may be impossible to separate; and weeds flowering at the same time as alfalfa may be more attractive to bees resulting in poor alfalfa pollination.

Bees are considered essential in alfalfa seed production. They trip the flowers and transfer pollen from one plant to another. Honey bees do an effective job if enough are present. Generally, two to six colonies per acre are required, depending on the area and the amount of flowers on the plants. The fewer other plants blooming in the area that will attract the bees, the fewer hives per acre are needed.

After a field intended for seed production begins to bloom, it should be watched carefully to determine whether the seed pods are being set. If a high percentage of the blooms are falling and seed pods are not forming, the seed yield will be low and the crop should be cut for hay. The quality of the hay will be desirable if it is cut at once. When rains cause the plants to put out new growth at the crown, the crop should be cut for hay because the seed yield will be relatively low.

Harvesting Seed. Several methods may be used to harvest alfalfa seed. One of the most common methods is to mow and windrow the plants when two-thirds to three-fourths of the seed pods are brown. The plants should be windrowed while damp and tough enough to prevent excessive loss from shattering. After the plants have dried, they are picked up and threshed from the windrow with a combine equipped with a pick-up attachment. About the only disadvantage to this method is the danger of high winds rolling the windrows, tangling the plants and causing loss of seed from shattering. A variation of this method is to leave the alfalfa in the swath to cure. Then it is picked up and threshed with a combine.

Occasionally the plants are cut with a binder, bound into loose bundles and put up in small shocks to cure. Then the cured plants are threshed from the shock or hauled to the thresher. The plants are cut when two-thirds to three-fourths of the seed pods are dry.

A third method is to combine the seed from the standing plants after they have been sprayed with a chemical to kill the foliage. The commonly used chemical is dinitro general applied by airplane at the rate of 1 to 3 pints in 10 to 15 gallons per acre of diesel oil. The rate depends on the density and height of the plants. Two pints of the chemical in 5 to 7 gallons per acre of oil often do an effective job. For application with ground equipment, 1 to 3 pints of dinitro and 15 to 20 gallons of oil are used, with enough water added to make the total volume 35 to 50 gallons per acre. In heavy, dense growth, a second application may be desirable to kill lower foliage left from the first air or ground application.

The chemical should be applied when the seed pods are one-half to two-thirds brown. Combining should begin when the leaves are dry, which usually is 3 to 5 days after spraying. Threshing should be completed within 8 to 10 days after application, because losses from shattering usually become excessive after that time. Seed harvested in this manner contain more moisture than when the plants are cured before threshing, and they may need to be dried more carefully.

Caution: Dinitro is poisonous to man and livestock; precautions given on the container should be observed; the forage or straw to which the material has been applied should not be fed to livestock.

Any combine in good condition will thresh alfalfa satisfactorily when it is properly adjusted and operated. Proper adjustment is essential to prevent loss of seed and damage to seed. Too high a cylinder speed damages many seed. Uniform and proper machine load is important. Prop-

combine adjustment information for threshing alfa should be found in the operator's manual, it may be obtained from the dealer from whom combine was purchased.

OTHER USES

Alfalfa as an Annual Hay Crop. Alfalfa owth is limited to one season where cotton root is severe. One of the nonhardy varieties, ch as Indian, African or Hairy Peruvian, may ovide good yields of higher quality forage than n be obtained from any other forage crop own in the area. Spring seedings of these va- ties would be necessary in the North Texas gion and in the northern part of Central Texas.

In some areas long-lived alfalfa stands do not into the cropping system. In such cases, al- lfa could be used as an annual or a short-term rennial. Some stockmen in the North Texas gion on Blackland and Grand Prairie upland ils are seeding Southwestern Common alfalfa nd haying or grazing the stand as long as it sts.

Alfalfa for Soil Improvement. Alfalfa is an cellent soil-improving crop. In rotation studies nducted at the Iowa Park Station for 12 years, e greatest increase in acre-value of crops pro- ced occurred when cotton and grain sorghum llowed 2 years of alfalfa. The per-acre value crops produced in a 3-year rotation of alfalfa, tton and oats was about 20 percent higher than a rotation of cotton, oats and grain sorghum. t the Brazos River Valley Laboratory corn fol- wing 2 years of alfalfa produced about 50 per- nt more than continuous corn and 28 percent ore than corn following winter peas. Alfalfa rotation with corn increased grain yield about s much as an application of 60 pounds per acre nitrogen at planting time.

ALFALFA CULTIVATION

Tests show that cultivating drilled or broad- st stands of alfalfa as long as the stand is good nd the plants are making good growth offers no dvantage. Where the soil has been compacted y grazing livestock or machinery, or where heavy ilt deposits were left by overflows or irrigation, ome tillage may be desired. Alfalfa stands of- en are tilled to work fertilizer into the soil. Al- lfa tillers or harrows are probably the best im- lements to use because they do not rip out the lants.

WEED CONTROL

Cultural. Several management practices help control weeds. Good-quality, weed-free seed of an adapted variety should be planted in a well-prepared seedbed that is relatively free of weeds. Fertilization and harvest management practices that result in a dense, vigorous stand should be followed. Clean cultivated row crops in rotation with alfalfa are helpful in controlling weeds.

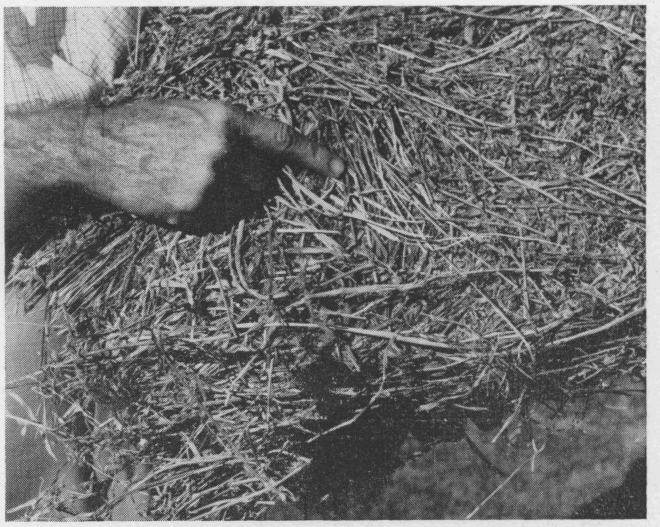

Figure 4. High-grade alfalfa is free of weeds and grass. It is leafy, green and has pliable stems.

Mowing weeds in seedling stands reduces competition for moisture, plant food and light. The mower should be set high enough that the young alfalfa plants are not disturbed. If possible, the weeds should be mowed before they produce seed. When the alfalfa plants are about as tall as the weeds, mowing should be delayed until the alfalfa is in the one-fourth bloom stage.

Chemical. Chemicals should be used for weed control on seedling alfalfa only as an emergency measure in an attempt to save the stand. Alfalfa seedlings should be 4 to 6 inches high before the chemical is applied. When temperature and humidity are high, the plants are most likely to be damaged, and the lowest rate suggested should be used.

Seedling annual broad-leaved weeds, such as pigweed, lambs quarter and morningglory, and winter annuals such as chickweed, may be controlled in seedling alfalfa by using amine salts of DNPB at ¾ to 1 ½ pounds in 20 to 40 gallons per acre of water.

In established alfalfa, winter annual weeds such as chickweed, henbit and yellow rocket, may be controlled with the amine salts of DNPB at the rate of 1 to 2 pounds in 20 to 40 gallons per acre of water. The same rates may be used to control some summer annual weeds in early spring. DNPB should be applied when the alfalfa is dormant, or nearly so.

Winter annual grasses, such as rescuegrass, cheat and ryegrass, may be controlled in established stands with CIPC at the rate of 1 to 4 pounds in 20 to 40 gallons per acre of water. For best results the CIPC should be applied in midfall to early winter, or when the grass seedlings are first observed.

Caution: DNPB is poisonous to man and livestock. Precautions given on the container should be observed; forage on which the material is applied should not be fed to livestock.

Information on the control of Johnsongrass and Bermudagrass in alfalfa may be obtained from your county agricultural agent.

INSECTS

The most important insects attacking alfalfa in Texas are the spotted alfalfa aphid, pea aphid, grasshoppers, three-cornered alfalfa hopper, alfalfa caterpillar, lygus bugs and thrips. The spotted alfalfa aphid currently is the most serious threat to alfalfa and may destroy stands if not controlled. The insect sucks sap from the plants, causing the leaves to turn yellow and the lower ones to drop off. The insect secretes honeydew in which molds develop. For descriptions and control information on insect pests of alfalfa, see your county agricultural agent.

DISEASES

Two types of disease attack alfalfa. The root diseases may kill the plants, causing reduced stands and yields, while the foliage diseases that attack the leaves and stems lower the yields and quality of forage.

Cotton Root Rot. This probably is the most destructive of all the alfalfa diseases in Texas, for the fungus causing this disease may attack the plants at any stage from seedling to maturity. This disease is more active in warm weather and is recognized by the circular spots of dead or dying plants. The bark of infected taproots rots and dies, and the plants can be broken off at the soil surface with ease. Frequently the brownish, fuzzy strands of the fungus can be seen on the affected roots. No effective control is known. However, incidence of the disease may be reduced by growing nonsusceptible crops, such as grasses for one or more seasons. Root-rot infested land should be avoided in alfalfa production. Alfalfa grown on infested soil should be handled as an annual hay crop.

Seed Rot and Seedling Blight. These diseases often cause poor stands. They are referred to as "damping off," and they are caused by soil-inhabiting fungi and molds which may live in the soil for several years. Growth of these organisms is favored by cool, wet weather. Affected seedlings show soft, rotting tissue, that soon dries out and causes death of the small plant. To guard against these diseases, the alfalfa seed may be treated with Arasan, Dithane, Z-78, Parzate or Spergon dust at the rate of 8 ounces per 100 pounds of seed. Seed treated with these chemicals may be inoculated with nitrogen-fixing bacteria if the seed are sown within 2 hours after inoculation.

Blackstem. Blackstem occurs in Texas mostly during the spring, for it is most serious in cool, humid climates. The disease may occur on any part of the plant from the upper taproot to the seed pods, and it results in irregular, dead spots on stems and leaves which gradually enlarge and merge with other dead spots until the stem is girdled entirely. Plants usually are not killed, unless the disease spreads to the crown. Sanitation is important in reducing losses because the fungus overwinters on old hay on the ground and old growth from the previous year. If the disease is serious, the hay crop should be harvested before loss of leaves to allow new growth under more disease-free conditions.

Other Leaf Diseases. These include leaf rust, downy mildew and common leaf spot. Alfalfa leaf rust is recognized by reddish-brown, raised spots on the leaves and sometimes on the stems. Common leafspot may cause considerable loss of leaves, as yellowing and dropping of leaves occurs on infected plants. Downy mildew causes the leaves to curl and turn yellow and the underside of the leaf becomes covered with a purplish, felt-like growth.

If damaging infestations of these diseases occur, the plants should be cut before leaf loss becomes serious to allow new growth under more disease-free conditions.

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