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EC183 Alfalfa in Nebraska

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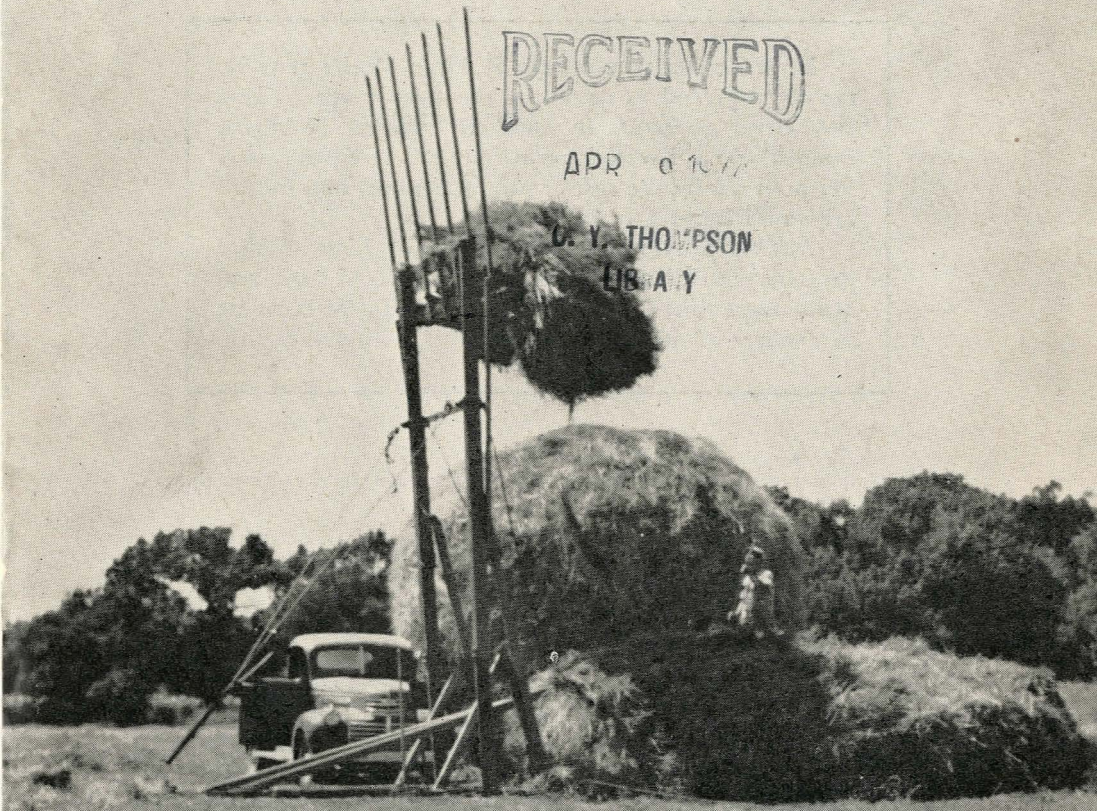
ALFALFA *in* NEBRASKA



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COOPERATING

In Nebraska where corn is king, alfalfa may be rightly regarded as queen of the farm crops. These two crops go hand in hand in making Nebraska famous as a livestock growing and feeding state. Without alfalfa the cost of producing beef and butterfat would be greatly increased.

Alfalfa provides an abundance of high quality proteins which balance the carbohydrates of corn, and at the same time it provides great amounts of carotene as a source of vitamin A, an essential to animal health.

Photograph, page 12, courtesy of Soil Conservation Service—Research.

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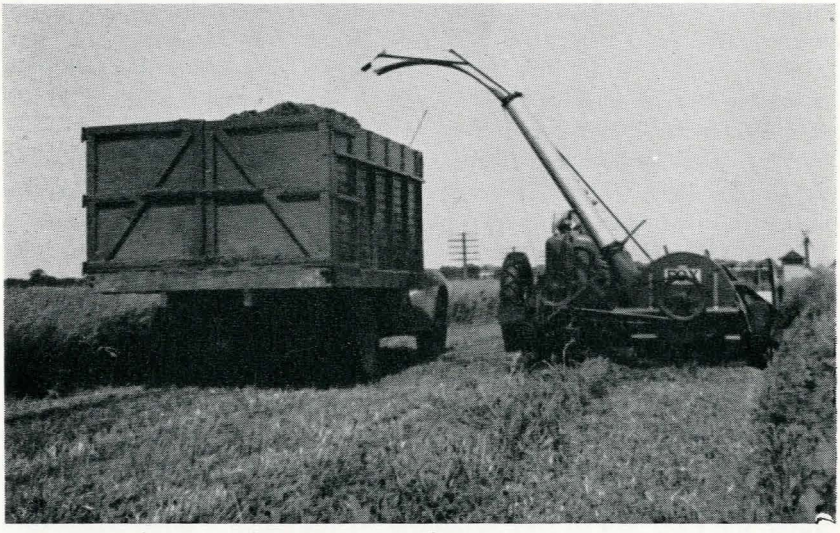
Alfalfa in Nebraska

D. L. Gross

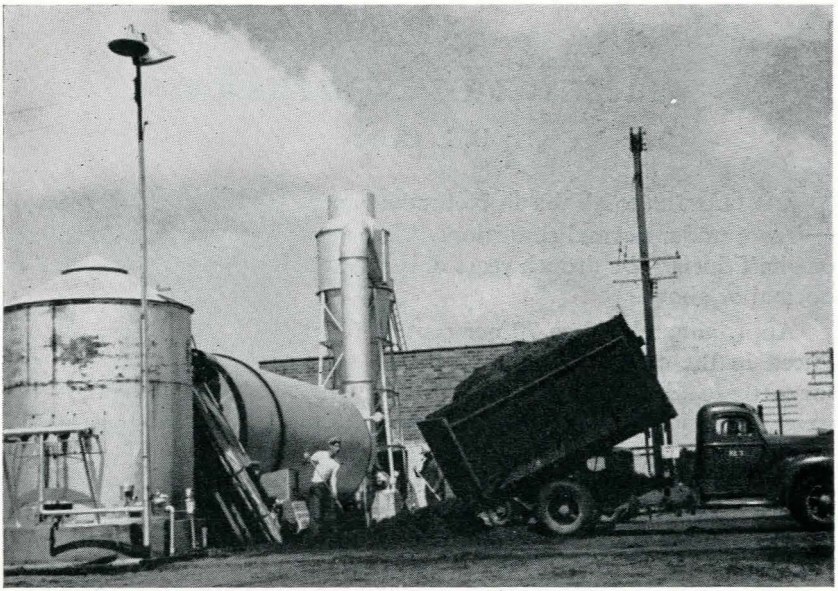
Land planted to alfalfa in Nebraska ranges up to a million acres or more under normal conditions. This acreage was reduced by about one-half during the drouth years of the 1930's, but has now returned to normal or above.

Approximately 60 to 70 per cent of Nebraska's alfalfa crop is produced in the eastern one-fourth of the state, where it is used chiefly for cattle feeding. In the Mid-Platte area where alfalfa is grown on sub-irrigated land, three counties, Dawson, Buffalo, and Hall, produce about 10 per cent of the state's crop. About 9 per cent is produced under irrigation in the Upper-Platte valley, chiefly in Scotts Bluff county. In the Mid-Platte area much green alfalfa is sold to the dehydration industry for conversion into meal. Grinding of sun-cured hay is also extensive in this area. Most of the meal is shipped to commercial feed mixers. Some of the alfalfa grown in the eastern area of the state also goes to the dehydrators.

Alfalfa production in other parts of the state is increasing where irrigation is expanding.



Field chopping alfalfa preparatory to dehydration.



Chopped alfalfa being unloaded at dehydration plant.

YIELDS AND WATER REQUIREMENTS

Soil moisture is the chief limiting factor in alfalfa production in Nebraska. On the dry land of western Nebraska it is usual for but one crop to be harvested, amounting to about one ton or less per acre. On subirrigated land in central Nebraska, four crops are commonly harvested, yielding from three to six tons per acre annually. On nonirrigated land in eastern Nebraska with normal rainfall, good stands of alfalfa will yield three or four tons per acre.

Deep root system. On deep soils alfalfa roots may penetrate to a depth of 35 feet. The alfalfa may exhaust all of the available subsoil moisture to a depth of 25 feet and a portion of the water to a depth of 35 feet. Where an abundance of deep subsoil moisture is present alfalfa may produce good yields for a considerable period, even though rainfall is below normal. It is usually not advisable to replant alfalfa on nonirrigated land from which a previous stand of alfalfa has removed the deeper subsoil moisture. Except on very porous soils the replenishment of moisture in the deeper subsoils may take many years.

It has been estimated that in eastern Nebraska, alfalfa may use as much as nine inches of water for each ton of hay produced. In Scotts Bluff county, studies indicate that alfalfa used about six inches of water for each ton of hay produced in that area. This varies with temperature and relative humidity.

SOIL REQUIREMENTS

In addition to soil moisture, a thrifty growth of alfalfa depends upon the fertility elements present in the soil. On eroded land where there is little available soil nitrogen it may be necessary to supply this element when establishing new stands. After the plants are well started they will provide their own nitrogen. In some soils lime and phosphate may need replacement if good stands and yields are to be obtained. Fields which have not recently supported a vigorous stand of alfalfa or sweetclover may be devoid of the special type of bacteria which live on the roots of these legumes and enable them to increase the nitrogen content of the soil. These may be supplied by seed inoculation. Inoculum is available at most seed stores.

NUTRIENTS IN ALFALFA

Alfalfa is grown chiefly for its protein and carotene. These elements are essential to successful livestock feeding. The protein balances the carbohydrates fed in the form of grain, fodder, and other feeds low in protein. Carotene is a source of vitamin A, essential to the health and productivity of animals. Another element, phosphorous, is an important constituent in good alfalfa and is insufficient in alfalfa grown on phosphorous deficient soil. Such alfalfa is less palatable and has a reduced feed value. Dairy animals give less milk when fed rations deficient in phosphorous and other minerals.

The relative amount of protein and carotene in alfalfa hay is greatly influenced by weather conditions at haying time. Heavy rains on mowed alfalfa may remove much of the protein and all of the carotene. Carotene is also lost from hay in the barn or stack and may be almost entirely gone at the end of one year. Alfalfa properly stored as ensilage retains its carotene due to the exclusion of air.

HARVESTING

Alfalfa is ready to mow when the plants are at the one-tenth bloom stage, or when new shoots appear at the crowns. Mowing systematically prior to this stage tends to weaken the alfalfa roots, and destroy the stands. Mowing after this time tends to produce coarse hay with a reduced protein percentage.

The first crop of alfalfa is usually the largest one and at the same time is the one most likely to be damaged by rain. For this reason it is good practice to use the first crop for silage. If this method is used, and if the alfalfa is ensiled properly there is practically no loss of protein or carotene.

Studies of labor, machinery and power costs show field chopping to be more economical than other methods.

As already stated, rains on mowed alfalfa greatly reduce its feeding value. A careful study of weather forecasts, and promptness in haying operations reduce losses. In good haying weather, alfalfa mowed in the morning may be ready to stack by noon of the following day. In humid or rainy weather the time necessary for curing is indefinite.

Alfalfa crusher. Limited study of the "hay crusher," which mows and crushes the alfalfa stems in one operation, indicates that the use of this machine may help to overcome the problem of weather damage. Preliminary data indicate that on warm windy days alfalfa mowed and crushed in the morning may be ready to stack by mid-afternoon of the same day, as compared to a day and a half, or more, for non-crushed alfalfa. Further studies of this machine are necessary before definite recommendations can be made as to its practical use.

Preservation of the leaves. It has been determined that about 75 per cent of the protein in alfalfa is in the leaves. The same is true of carotene. Hay-making studies show that the leaves are best conserved when the hay is partially cured in the swath, followed by final curing in small windrows. The hay must then be handled before it is so dry that the leaves shatter easily. Alfalfa is said to be ready to stack when its moisture content is reduced to 30 per cent. It may be placed in the barn at about 25 per cent moisture content.

Field Chopping

This method of handling alfalfa has not been thoroughly studied. Cost studies indicate that chopping is more economical in labor, machine, and power costs than other methods. Since chopped hay packs more closely it is advisable to stack or store it at a moisture content slightly lower than is acceptable for long hay. Quite commonly the chopped hay is blown or elevated into a snow-fence ring which is pulled upward as the stack rises and removed when the stack is completed. The stack is usually left flat on top since there is little water penetration into this type of hay.

When chopped hay is to be placed in barns it is advisable to chop the hay in the longest lengths possible without causing the chopper to clog. This coarsely chopped hay is less likely to heat than finely chopped hay. Chopped hay has a greater density than long (unchopped) hay, and thus mow floors may need reinforcing if any great quantity of this type of hay is to be stored. When chopped hay is stored in barns, packing is not advisable since this may cause heat damage.

Baling

Field baling, much of it on a custom basis, has become widely popular in recent years. Baling facilitates storage and makes the hay more salable. The quality of the baled hay, however, has been highly variable. Custom baling is not always conducive to timeliness, result-

Baling reduces storage space requirements and facilitates sale of the hay.

ing in the hay being baled when it contains too much or too little moisture. This failure to bale when the hay is at the proper stage may result in much shattering of the leaves, or possible heat damage and consequent loss of carotene. Storage of bales in large open air stacks reduces palatability and feeding value of the exposed bale surfaces.

Stacking

When long hay is stacked it is important that the stacks be as tall as is practical with the machinery used. It is generally true that the taller the stack, the less percentage of spoilage in the stack. Stacks with vertical sides absorb less rainwater than stacks with sloping sides.

ALFALFA EXTRACTION

Studies are under way to determine the practicability of extracting protein and carotene from green alfalfa. There are indications that these two essential feed elements might eventually be marketed in convenient containers. Such a method would overcome the weather hazard now responsible for tremendous losses of these two elements.

ALFALFA FOR PASTURE

Alfalfa has long been considered an ideal pasture for hogs. More recently the use of alfalfa pasture for cattle has increased. When cattle or sheep are grazed on alfalfa the following precautions should be taken to minimize the danger of bloat:

1. Animals must not be hungry when turned on alfalfa.
2. The cattle must have access to dry feed at all times.
3. Water and salt must be readily available in or near the pasture.

Alfalfa is commonly used as a mixture with bromegrass in pastures. A common rate of seeding is three to four pounds of alfalfa to twelve

Cattle may be grazed on pure alfalfa provided that proper precautions are taken to reduce the danger of bloat.

pounds of bromegrass per acre. This amount of alfalfa provides sufficient nitrogen to keep the bromegrass growing vigorously. If this pasture mixture is grazed continuously, however, the alfalfa gradually disappears, after which the bromegrass becomes stunted in growth, low in protein, and generally unpalatable. If, on the other hand, this type of pasture is divided into separate areas and these grazed alternately the stand may remain vigorous for a long time.

ALFALFA FOR SOIL IMPROVEMENT

Experiments have shown that a good stand of alfalfa may add as much as 200 pounds of nitrogen to the soil during the first full season of growth. There is evidence that the alfalfa continues to add important quantities of nitrogen in subsequent years. Corn yield records show that under irrigation in central Nebraska as many as four successive 100-bushel crops of corn can be produced following old stands of alfalfa. Corn uses about one and one-half pounds of nitrogen for each bushel produced. One-half pound of this is in the stalk and may be returned to the soil.

As many as four consecutive 100-bushel crops of corn have been obtained on irrigated land newly broken from old alfalfa stands.

ALFALFA FOR SILAGE

Alfalfa is being used increasingly for silage, particularly for dairy cows. Practically all of the protein and carotene are preserved when alfalfa is properly ensiled.

Alfalfa taken directly from the mower and placed in the silo without a preservative, produces ill-smelling unpalatable ensilage due to the presence of excessive amounts of water. Green alfalfa may contain as much as 80 to 85 per cent water which causes improper fermentation, and may cause the silo to burst. Mixing dry fodder, shelled corn, or ground ear corn with the alfalfa reduces the percentage of water, thus favoring proper fermentation. However, good silage is made without these additions if the alfalfa is dried to about 65 to 68 per cent water (slightly wilted) before ensiling.

When ear or shelled corn is used as a preservative, about 200 pounds are used with each ton of green alfalfa. When chopped dry fodder is used as an absorbent, the amount used should not be sufficient to cause the ensilage material to fall apart easily after being compressed into a ball with the hands. Too much dry material prevents thorough packing and causes molding.

The use of the first crop for ensilage is recommended since this crop is most often damaged by rain.

ALFALFA SEED PRODUCTION

Nebraska is one of the leading alfalfa seed producing states. Seed is produced in all parts of the state with the most concentrated production in the southwestern counties. The set of seed varies greatly from year to year, due to weather and insect conditions. The producer must watch the field closely to determine whether the seed set is sufficient to warrant harvest as such or whether the crop should be cut for hay. The price of seed is also a factor in this determination.

Spraying or dusting the alfalfa with DDT, chlordane, chlorinated camphene, or other materials to destroy grasshoppers and other undesirable insects tends to increase seed yields, provided pollinating insects are in abundance. Such sprays should not be applied after the alfalfa has reached the one-fourth bloom stage since this would destroy the pollinating insects necessary for a good seed set. Up-to-date recommendations on insect control should be obtained from the Department of Entomology, College of Agriculture, Lincoln, Nebraska.

Alfalfa seed is ready to harvest when about two-thirds of the pods are black or brown. One method of harvesting is to mow the crop and permit it to cure in the swath. When well cured it is threshed with a pick-up combine. This method largely eliminates the danger of blowing and scattering the seed, often encountered when the crop is cured

in the windrow. However, the windrow method of curing is more common where high winds are less frequent. When the seed is to be threshed with a huller the seed plants are commonly partially cured in the windrow and finally in small cocks which can be delivered to the machine intact, reducing loss of seed by shattering.

DISEASES OF ALFALFA

There are several diseases which affect the growth of alfalfa. In Nebraska wilt is the most prominent. This is a bacterial disease which shuts off the normal flow of nutrients from the roots to the top, eventually causing death of the plant. This disease is most prominent in the third year of the stand. It is most destructive on irrigated land and other locations where soil moisture is relatively plentiful. Much wilt is found on nonirrigated land in extreme eastern Nebraska. The disease may be identified by peeling the outer bark from the alfalfa roots. The under surface of healthy roots is white, while that of the diseased plant is light brown in color. Diseased plants have a stunted appearance. The disease may be communicated from one plant to another by the mower. The sickle bar and the sickle should be thoroughly dried or disinfected before moving from a diseased field to a disease-free field. This disease is best controlled by using disease-resistant varieties.

Leaf spot is another troublesome disease of alfalfa in Nebraska. This disease causes the leaves to turn brown and drop from the plants. Practical control of this ailment has not been determined.

INSECTS

Both injurious and beneficial insects are found in alfalfa. The beneficial insects are those which trip the flowers and carry pollen from one flower to another. This favors cross pollination and the maintenance of plant vigor of the resulting progeny, as compared to self-pollination which tends to reduce progeny vigor.

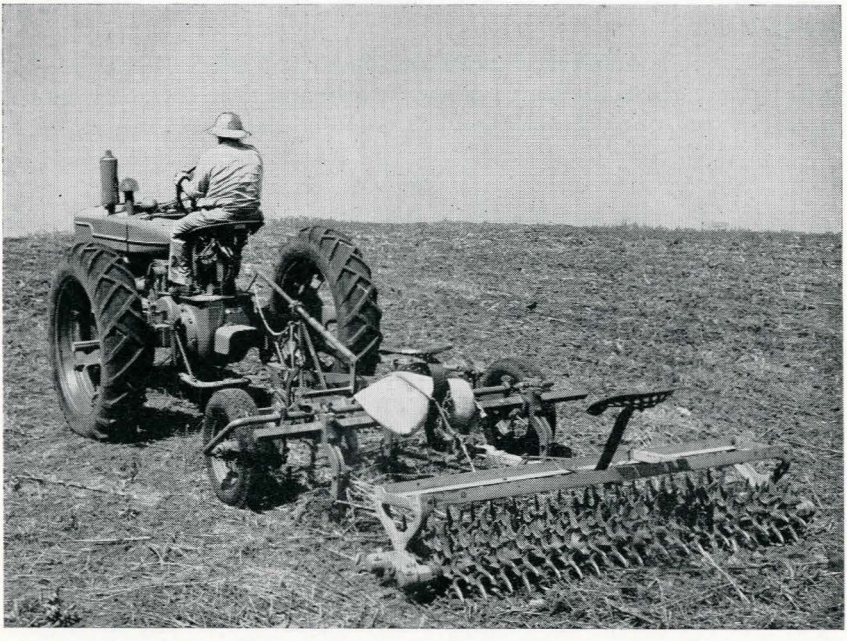
Leaf cutter, alkali bees, bumble bees, and honey bees are listed as beneficial insects. Of these, the honey bee is least efficient except when present in large numbers, and when pollen from other sources is not available. Studies indicate that honey bees located near an alfalfa field will fly long distances to obtain sweetclover pollen in preference to alfalfa pollen.

Since bumble bees and other wild bees make their home in the soil, consideration has been given to the propagation of these beneficial insects by providing an acreage of undisturbed ground near the alfalfa fields. Studies over a number of years would no doubt be necessary to determine the feasibility of this practice.

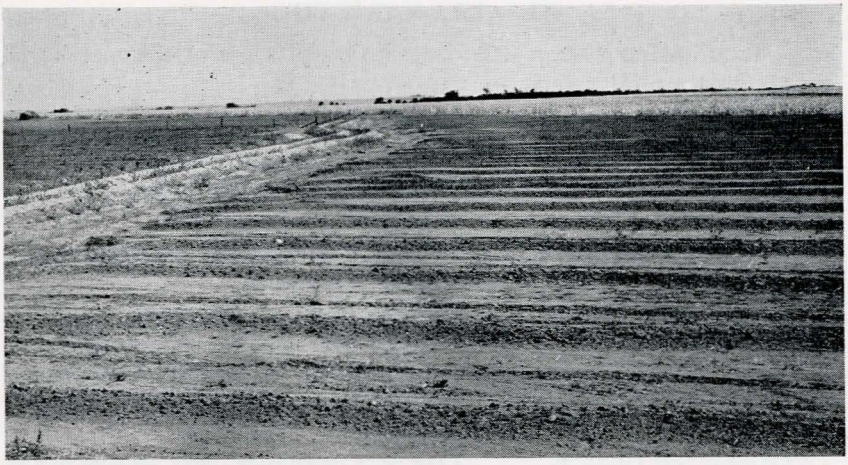
Injurious insects include the grasshopper, lygus bug, chalcis fly, leafhopper, alfalfa weevil, and cut worm. Of these, grasshoppers and lygus bugs are most destructive in Nebraska. The lygus bug attacks the developing flower buds, stopping their development. The chalcis fly lays eggs in the newly developing seed and the resulting larvae devour the inside of the seed. The leafhopper punctures the leaves and causes yellowing.

SEEDING PRACTICES

Alfalfa may be seeded in early spring, early summer, or early fall. April is the best month for spring planting. Alfalfa planted in May usually encounters much weed competition. When planting is done in June it is important that the land be worked early in the spring to warm the soil and promote weed growth. Several successive weed crops may then be destroyed before planting time about June 10. This method of planting is especially recommended in central and western Nebraska. Fall seedings should be made in late August or in early September.



Stubble mulch seedbed preparation conserves soil moisture and reduces erosion. The treader packs the soil over the seed.



This field is bordered for irrigation and is ready for seeding to alfalfa.

Seed beds should be mellow and firm. Small grain stubble worked with a subtiller makes an ideal seed bed since residues are kept at or near the surface where they will reduce run-off and erosion. This method is particularly recommended on sloping land. Where residues are not present, a heavy coating of barnyard manure may be used as a substitute.

Ten pounds of seed per acre is the commonly recommended rate of seeding. The seed should be inoculated. A few pounds of bromegrass seed sown with the alfalfa tends to reduce erosion and improve soil structure. Where alfalfa is irrigated the "border method" is recommended. Details of border construction and use may be obtained from Extension Circular No. 180. The seed bed should be thoroughly packed after seeding.

ALFALFA VARIETIES

The following gives a brief description of some of the more commonly grown alfalfa varieties:

Ranger:	Wilt resistant, winter hardy, good yield of hay, excellent seed producer.
Hardistan:	Wilt resistant, winter hardy, good hay yield, poor seed producer.
Nebraska Common:	Subject to wilt, winter hardy, good hay and seed producer.
Ladak:	Wilt resistant, winter hardy, produces a heavy first crop but recovers slowly, recommended in western nonirrigated areas where only one crop is commonly produced.
Grimm and Cossack:	Low wilt resistance, very winter hardy, excellent hay and seed producers, many-colored flowers.
South Dakota No. 12:	This is a trade name applied to Nebraska and South Dakota Common alfalfa.
Buffalo:	A wilt resistant alfalfa, selected from Kansas Common, less winter hardy than Nebraska Common.
Arizona:	Common alfalfa produced in the southwestern states. Not winter hardy in Nebraska.
Argentine:	South American Common alfalfa, not winter hardy in Nebraska.
Kansas and Utah Common:	Similar to Nebraska Common but less winter hardy.
Turkistan:	Importation from Asia, wilt resistant, similar to Hardistan.

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