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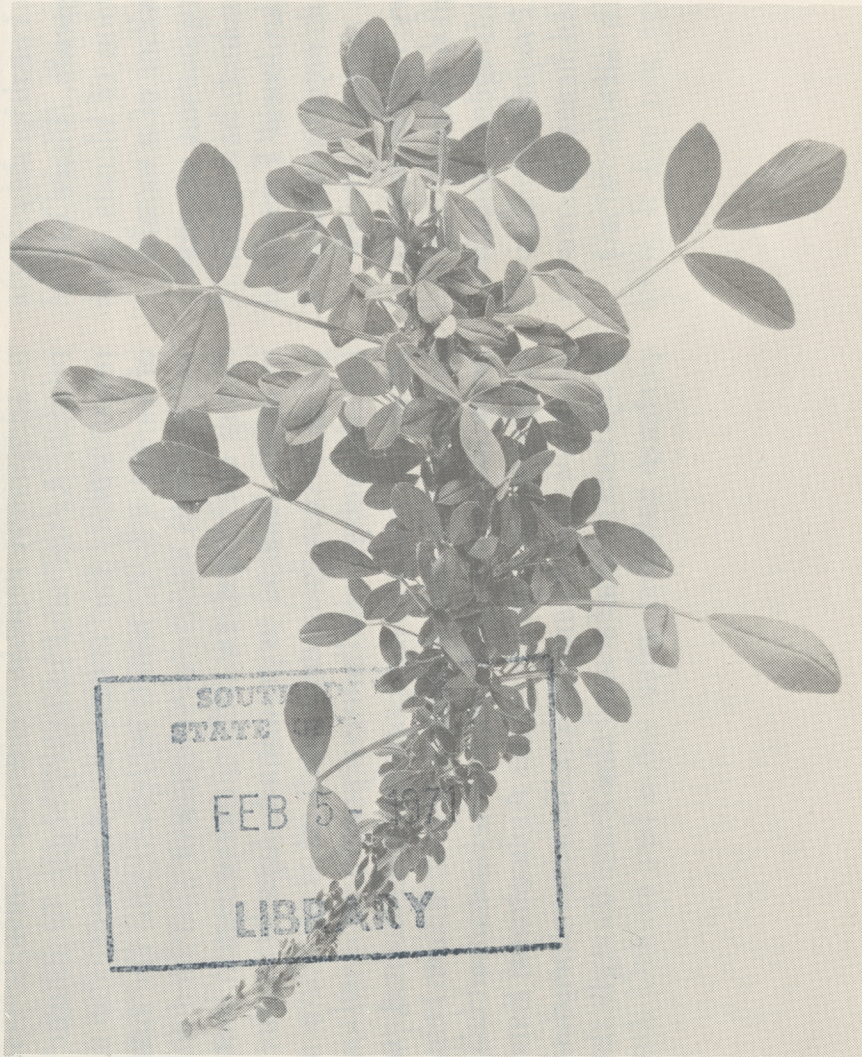
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Alfalfa for Varieties South Dakota



COOPERATIVE EXTENSION SERVICE
SOUTH DAKOTA STATE UNIVERSITY
U. S. DEPARTMENT OF AGRICULTURE

Alfalfa Varieties for South Dakota

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VARIETAL SELECTION

South Dakota farmers and ranchers have an increasing number of alfalfa varieties from which they can select the ones most suitable for various conditions. A decision as to which variety is best suited to a particular agricultural operation or purpose is often difficult. But it is the first of a series of necessary decisions for most profitable management of this valuable legume species. Being able to select the most suitable variety is one variable over which the producer has complete control. Research indicates use of recommended varieties alone can increase alfalfa production 7% in South Dakota.

This Fact Sheet provides guide lines for selecting satisfactory varieties as well as describing varieties most frequently used in South Dakota. Other aspects of management are discussed in Fact Sheet, "Alfalfa Management."

PERSISTENCE

Most alfalfa fields are seeded with the intention of using the stand for 5 or more harvest years. If the plants do not remain alive and healthy, the crop cannot be productive. Persistence, or ability of alfalfa plants to survive the desired length of time in our rigorous South Dakota environment, is therefore an essential aspect of variety selection. Persistence of established stands is a complex trait greatly influenced by management. Certain varieties, however, are genetically incapable of surviving even under the best of management practices whereas others have the potential to survive after quite abusive management. Desirable alfalfas possess four important attributes contributing to persistence: (1) winter hardiness, (2) drought tolerance, (3) disease resistance, and (4) insect resistance.

WINTER HARDINESS

Air temperatures often drop to -20°F or below in many parts of South Dakota during the coldest weeks of our winters. Such temperatures, especially in the absence of an adequate cover of snow, will kill all plants of the more tender varieties of alfalfa. Alternating warm and cold periods in late winter or early spring cause plants to lose their dormancy and start to grow—only to then be frozen back by low temperatures. This is especially destructive to perennial crops. Hardy varieties have a better chance of surviving such periods of stress. Although they

may be severely weakened, the plants remain alive. With proper management they will recover and the field will retain a high level of productivity.

DROUGHT TOLERANCE

Almost every field of alfalfa in South Dakota needs more water than it gets during some part of its life cycle and most fields are under moisture stress during much of the growing period each year. The ability to enter dormancy and tolerate drought is characteristic of some varieties. Forage production may be scant during these periods but crowns and roots of the plants remain alive and begin new growth when sufficient moisture is again available. Drought tolerance and winter hardiness are related traits. High mortality occurs in all but the most hardy alfalfa varieties in years in which late summer and fall drought is followed by winters with very low temperatures and no protective cover of snow.

DISEASE RESISTANCE

Many diseases attack alfalfa and reduce both the quantity and quality of forage. Some diseases are more apt to kill the plants than others. Bacterial wilt is a major problem in the decline of alfalfa field stands in many areas of the state. Resistance to bacterial wilt is important and fortunately a number of well adapted resistant varieties are available for use in South Dakota. Such varieties should be selected in preference to those which are not resistant even though the alfalfa is to be included as a short term stand in a rotation. Wilt susceptible plants may be killed when very young, while the use of resistant varieties lets you retain the field if you change plans. This gives you more flexibility in your farm management program.

Several fungi cause root and crown rots of alfalfa. Some are found primarily on water logged soils but others occur on drier sites and are very common in fields which are several years old. Unfortunately, no varieties are known to be more resistant than others to most of these disease organisms. Still other fungi, bacteria, and viruses infect the leaves and the stems of alfalfa plants. While they may not directly kill alfalfa, they weaken the plants causing reduced yields. Some adapted varieties possess a limited amount of resistance to the more important of these diseases. No variety has a very high level of resistance to more than a few of them.

INSECT RESISTANCE

Grasshoppers probably cause more economic loss to alfalfa in South Dakota than any other insect. Unfortunately all varieties seem equally susceptible to their attack. The potato leafhopper is another insect found throughout the state. It consistently infests alfalfa year after year in July and August. Leafhoppers cause a yellowing of foliage and leaf drop, thereby reducing both quantity and quality of the forage. While no variety is immune to leafhoppers, some varieties are less likely to develop the yellowing symptom and may also possess properties which limit build-ups in population of the insect.

Both the alfalfa weevil and the pea aphid are destructive in localized areas within South Dakota. The weevil is most serious in Lawrence County and adjacent counties near the Black Hills. The pea aphid is widespread throughout the eastern half of South Dakota but creates major problems in alfalfa production in the southeastern part of the state during cool moist springs. Both of these insects can cause complete stand loss in newly seeded fields. Alfalfa varieties are available which are resistant to each of these pests. Other insects are also of considerable consequence in alfalfa production in South Dakota but currently no varieties possess even moderate resistance to them.

USE OF ALFALFA

Alfalfa may be used for harvested forage, pasture or as a soil-building crop. In South Dakota the most important form of harvested alfalfa is field cured hay. Whether the crop is to be harvested mainly for hay or whether the emphasis is on its use as pasture should be considered when selecting the proper variety.

Hay

To be suitable for a hay crop, alfalfa varieties must be capable of sustaining high quality forage yields at the maximum level of production the environment permits. Hay-type varieties usually are erect in growth, begin growth rapidly in spring and after cutting, and enter fall dormancy later than pasture-type varieties. Although those alfalfas we refer to as being of the hay-type may also be used for pasture, they were developed primarily for hay production and when pastured should be rotationally grazed.

Pasture

Pasture-type alfalfas characteristically are less erect, slower in recovery after cutting, and enter dormancy earlier in the fall than varieties bred for hay production. Pasture types also tend to be finer stemmed, less productive and to have higher frequencies of yellow and variegated flowers than hay varieties. Usually they have deep set crowns with extensive rhizomes or laterally spreading root systems.

Their growth habit fits in well with that of most cool-season grass species and they are most often used in mixtures with adapted grasses. Because of this and other hereditary factors, pasture-type varieties are less apt to incite bloat in ruminants than are the hay-type varieties. A wide selection of alfalfas in both categories is available for use in South Dakota.

Soil Building

Alfalfa is a good soil builder because it adds organic matter when plowed under, thus increasing fertility and improving soil structure. Since the amount of organic matter added depends largely on the amount of foliage plowed under, a variety that produces at least one large crop of forage is satisfactory. Some rank-growing varieties that produce a large crop the seeding year or only survive one winter and produce heavy tonnage the second year are adapted for this use. They would not be suitable for hay or pasture.

ALFALFA CROP TERMINOLOGY

Confusion sometimes results during discussions of crop production simply because of imprecise understanding of the terms used. Some definitions which are generally accepted and have proven useful follow:

Variety. A variety is a group of cultivated plants of the same species which are distinguished by any significant character and when reproduced retain their distinguishing features. "Travois" alfalfa, for example, is a variety which may be distinguished from other alfalfas by its characteristics of root-proliferation, growth habit, flower color and hardiness. Different classes or types of varieties are recognized on the basis of their mode of reproduction and procedures for seed increase.

Synthetic Variety. A synthetic variety of alfalfa consists of advanced-generation progenies derived and reconstituted from the same set of selected clones (a group of plants descended by vegetative propagation from a common ancestor) or seed lines, produced and maintained under conditions specified by the originator. Most improved alfalfa varieties in use are synthetics. Dawson, Ladak 65, Rambler, Teton, Travois, and Vernal are all synthetics recommended for South Dakota. Teton alfalfa is a 4-clone synthetic. The four parental plants are maintained by the South Dakota Agricultural Experiment Station and are propagated by stem cuttings when needed. The resulting plants (propagules) obtained from each parent is a clone. Each propagule of a clone is genetically identical to every other propagule of that clone and to its parent plant.

The clones are interplanted in an isolated seed production field in South Dakota from which "breeder seed" or "Syn.-1" seed is harvested. Breeder seed is sown in isolated production fields and "Founda-

tion" or "Syn.-2" seed harvested. This in turn is advanced another generation to obtain "Certified" or "Syn.-3" seed which is retailed to farmers and ranchers for forage production.

Hybrid. An alfalfa hybrid consists of first-generation progenies resulting from a controlled cross-fertilization between two selected clones or seed lines, or between a clone and a seed line. It differs from a synthetic variety in that the synthetic has several clones and/or lines that each produce pollen and the mixture of pollen fertilizes all the clones and lines. With a hybrid only one clone or line produces pollen, the other is male sterile and does not produce pollen. The seed then is developed on the male sterile plants that were fertilized by pollen from the pollinator. Although production of hybrid alfalfas was first proposed over 25 years ago, the genetic and reproductive limitations of the species effectively prevented their development. Recent discovery of cytoplasmic male sterility and restorer mechanisms in alfalfa which are similar to those used in corn and sorghum has permitted commercial production of alfalfa hybrids. The fact that a variety is a hybrid is no guarantee that it is superior to a synthetic variety. More information is needed about yield potentials and areas of adaptations of hybrids as contrasted to synthetics.

Blends. Some seed firms offer blends which are simply mechanical mixtures of seed of two or more varieties or strains of alfalfa. For example, a blend might consist of 10% by weight of seeds of a non-hardy strain, 70% South Dakota Common and 20% Vernal. Seed of the non-hardy strain would germinate and grow rapidly, thereby impressing the observer with the vigor of the stand in the seedling stage. The majority of the seed being South Dakota Common reduces the cost and the addition of Vernal prolongs stand life and increases productivity. At best, a blend of this type would not be superior to pure Vernal and probably would be considerably inferior to Vernal.

Blends are often sold at prices considerably in excess of that warranted by the contents. There are no legal restrictions on the composition of blends. It therefore is possible for the merchandiser of a named or numbered blend to vary its composition at any time. Blends of known composition which have been evaluated by the South Dakota Agricultural Experiment Station have not been superior to recommended varieties.

Proprietary Variety. A proprietary variety is bred and developed by a private individual or firm in contrast to those developed by the public agencies such as experiment stations and USDA. Proprietary varieties may be synthetics or hybrids. Industry has recently assumed the dominant role in alfalfa variety development in the United States.

Brand. A brand is a mark, word, or words used to designate the producer, manufacturer or distributor of the contents of a container. Brands are used by alfalfa seed producers and distributors to achieve recognition and identification of the product by the potential seed purchaser. Brands are of considerable value in advertising and retailing of seed. A brand does not designate a variety of alfalfa and may be used with more than one crop species.

Certified Seed. The best assurance of obtaining seed that is not mixed with inferior varieties or strains is to purchase officially sealed and labeled certified seed of a specific and adapted variety. It is important to have certified seed of the right variety. The certification tag and seal are designed to protect varietal purity and identity. Certified seed of a specific variety is noteworthy for its consistent performance from lot to lot and from year to year. However certified seed can vary to some extent from lot to lot, in such characteristics as germination and content of weed seeds and other crop seeds within the minimum standards set for certification.

Quick Recovery Types. Alfalfa varieties have different genetic capacities for the time necessary to start regrowth after cutting as well as in their rate of regrowth. Varieties with a minimal time requirement between cuttings are sometimes described as "quick recovery types." DuPuits is an example of a variety with such characteristics. Quick recovery types tend to lack hardiness and should be selected with care. While claims are frequently made that these varieties are superior to Vernal in forage yield ability, this has not been evident in experiment station trials in South Dakota.

Alfalfa Variety Recommendations

Performance testing of perennial crops such as alfalfa is a slow and expensive process. In the past, when public agencies were the only source of new varieties, it was possible for the Agricultural Station to adequately evaluate each new synthetic prior to its release. As the seed industry began to assume greater responsibility for variety development, the numbers of varieties to be tested increased and the time interval between variety development and seed merchandising decreased. In 1962, a test program was started in South Dakota to permit a company to enter a proprietary variety in experimental trials for a nominal fee. Although similar test programs with corn and sorghum had proved popular, interest and participation in the alfalfa program was so limited that it has been discontinued. As with other commercially developed crops, the policy of the Agricultural Experiment Station is not to make specific recommendations for proprietary alfalfa varieties even though they may perform satisfactorily.

VARIETIES OF ALFALFA

Some varieties are better adapted for use as hay and others for pasture. A summary of the varietal characteristics for 13 varieties is given in Table 1. Each is described in more detail below.

Hay-Type Varieties

Common. The term "Common Alfalfa" is sometimes loosely used to describe any alfalfa that is not a named variety. The term may refer to seed that is locally produced or seed of unknown origin or which fails to meet certification standards.

Strains of common alfalfa are identified by the state of origin: South Dakota Common, California Common, etc. Characteristics of common alfalfa are not sufficiently distinct for a strain to be considered a variety. Common alfalfas usually are erect with narrow crowns and mostly purple flowers. They may be susceptible to bacterial wilt.

Common alfalfa is adapted to areas where climatic conditions are similar to those of the state of origin unless diseases or insect problems are present. Those evolved in cold climates are more winter hardy than those that evolved in warm climates.

Because of variability from lot to lot and lack of assurance of superior germ plasm, "common" alfalfa strains are not recommended.

Cossack. Cossack was introduced from Russia in 1907 by USDA. Its characteristics are similar to those of Grimm. Cossack is slightly less susceptible to bacterial wilt, is slower to recover after cutting, and has a higher percentage of yellow and white flowers. It produces stemmy coarse hay, is susceptible to most common foliage diseases and is, therefore, not recommended for South Dakota.

Dawson. This is a hay-type alfalfa released by USDA and the Nebraska Agricultural Experiment Station. It is suitable for use wherever Ranger has proved to be satisfactory. Dawson is wilt resistant and yields as much forage as Ranger in the absence of destructive levels of insects or diseases. The superiority of Dawson is based on its resistance to spotted alfalfa aphids, pea aphids, potato leafhoppers and common leafspot disease. Dawson is recommended for use in South Dakota wherever aphids are a major problem.

Fremont. Fremont was bred and released by the Wyoming Agricultural Experiment Station. The variety is a synthetic from three clones selected from old fields in that state plus one clone from each of the varieties Ranger and Turkestan.

Fremont is wilt resistant, winter hardy and has a high seed yield potential in the area where it is adapted. It has been intermediate to above average among the better adapted varieties in forage yield in Wyoming and western Nebraska. It has not performed as well in South Dakota and is not recommended here.

Grimm. Grimm was introduced from Germany into Carver County, Minnesota in 1857. It underwent natural selection in Minnesota.

Grimm is fine stemmed and leafy and makes high-quality hay. Most flowers are purple. It is susceptible to bacterial wilt; it cannot be expected to yield well where this disease is common and, therefore, is not recommended for forage crop production in South Dakota.

Ladak. Ladak was introduced from northern India in 1910 by USDA. It yields as well as Vernal and Ranger in the first cutting of the season, but produces less hay in the second and third cuttings. It recovers slowly after cutting.

Ladak has a semipro-cumbent habit of growth; it becomes dormant during prolonged periods of summer drought and goes into dormancy early in the fall. It has a low level of resistance to bacterial wilt. Ladak is very winter hardy and is recommended primarily as a one- or two-cut variety in the drier areas of South Dakota.

Ladak 65. Ladak 65 is a Ladak-type alfalfa with additional wilt resistance developed by the Montana Agricultural Experiment Station. It is a synthetic variety composed of 49 clones selected from irrigated fields in northern Montana which had been planted with certified Ladak for 10 or more years prior to the time of selection.

Ladak 65 is adapted to the same areas as Ladak and recommended for use in South Dakota. There appears to be no difference in their forage yields in the first 3 or 4 harvest years. After 5 or 6 years of hay production under irrigation, Ladak 65 produced significantly higher yields than Ladak due to its higher level of bacterial wilt resistance.

Ranger. Ranger, released in 1942, was developed by the Nebraska Agricultural Experiment Station and USDA.

Ranger is resistant to bacterial wilt and is a good forage and seed producer. It recovers more quickly after cutting than Ladak or Cossack—about as quickly as Grimm. Ranger is susceptible to leaf spot diseases.

Plants vary in habit of growth—some are upright; others are semi-upright. Flower color varies. It is sufficiently winter hardy for use as a hay crop anywhere in South Dakota under normal conditions, but is not now recommended since better varieties are available.

Team. Team is the product of six cycles of selection for alfalfa weevil resistance by USDA. It has an upright growth habit with fall dormancy similar to Cherokee (a North Carolina variety) and Saranac (a New York variety). Team also possesses some resistance to common leafspot and to pea aphids.

Certified seed of Team was first offered for sale in 1970. It has not yet been recommended for use in

Table 1. Summary of alfalfa variety characteristics.

Variety	Forage ¹ yield potential	Type	Winter hardiness	Diseases ²		Insects ²			
				Bacterial wilt	Leaf spots	Potato leafhopper	Spotted aphid	Pea aphid	Alfalfa weevil
Common	?	?	?	?	?	?	?	?	S
Cossack	Medium	Hay	Hardy	S	S	S	S	S	S
Dawson*	Medium	Hay	Hardy	R	R	R	R	R	S
Fremont	Medium	Hay	Hardy	R	S	S	S	S	S
Grimm	Medium	Hay	Hardy	S	S	S	S	S	S
Ladak*	Medium	Hay	Hardy	S	S	S	S	S	S
Ladak 65*	Medium	Hay	Hardy	R	S	S	S	S	S
Rambler*	Low	Pasture	Very hardy	R	S	S	S	S	S
Ranger	Medium	Hay	Hardy	R	S	S	S	S	S
Team	?	Hay	?	S	R	S	S	R	R
Teton*	Low	Pasture	Very hardy	R	R	S	S	S	S
Travois*	Low	Pasture	Very hardy	R	R	S	S	S	S
Vernal*	High	Hay	Hardy	R	S	S	S	S	S

*Recommended for use in South Dakota.

¹Based on 3 cut harvest schedule for 3 or 4 year stands.

²S=Susceptible; R=Resistant.

South Dakota because of insufficient data to determine its winter hardiness.

Vernal. Vernal is a synthetic variety developed by Wisconsin Agricultural Experiment Station and USDA, and released in 1953. Fifty percent of the germ plasm in the variety was derived from six Cossack plants. The other half of the parentage was from five plants selected from fertile hybrids between wild alfalfa and tame alfalfa (Kansas Common and Ladak).

Vernal is an outstanding forage producer in the North Central States. It has fine stems, leafy, dark-green foliage, and broad crowns. It makes only a moderately rapid recovery after cutting, and goes into dormancy early in the fall. It is highly resistant to bacterial wilt, and is tolerant to leaf spot and to yellow leaf blotch.

It is winter hardy and is the best hay variety for South Dakota.

Pasture-Type Varieties

Rambler. Rambler was developed at the Experimental Farm, Swift Current, Saskatchewan. Ladak and Siberian from South Dakota were the principle stocks used in the original crosses. It was licensed for sale in Canada in 1955.

Rambler was selected for its root proliferating, wilt resistant and winter hardiness characteristics. It may be described as being creeping-rooted with low-set crown, comparatively drought resistant, very winter hardy, more resistant to bacterial wilt than Ladak but less resistant than Vernal. It is as susceptible to common leaf spot and blackstem as Ladak, Ranger, and Vernal.

Plants of Rambler have persisted well under grazing in grass mixtures in Canada and in solid stands in South Dakota. Rambler yields less forage than Ranger or Vernal, but more than Teton or Travois. It resembles Teton in that recovery after cutting is slow and

most forage is obtained from the first cutting. It produces about 60% as much seed as Ladak.

Rambler is recommended for use in tame pastures, or for interseeding in tame or native grassland. Seed is in extremely short supply.

Teton. Teton, developed by the South Dakota Agricultural Experiment Station, was released in 1958. It was developed primarily for grazing alone or in grass mixtures.

Teton has a low, wide crown with aggressive development of rhizomes (underground stems). It is more dormant than Ladak after the first harvest and in the fall. The highest forage yield is obtained in the first cutting of the season. It yields less than other varieties where droughts are not serious problems. This variety has moderate resistance to bacterial wilt, common leaf spot, and field infection by two *Fusarium* species causing root rots.

Teton has been more persistent than other varieties in South Dakota grazing trials. Teton alfalfa withstood 7 years of heavy grazing at Cottonwood, Highmore, and Brookings before experiments were discontinued. It has withstood 14 years of heavy grazing at Eureka in an experiment that is still in progress. It is recommended for use in tame pastures or for interseeding in tame or native grasslands.

Travois. Travois was developed by the South Dakota Agricultural Experiment Station and released in 1962. The variety is a synthetic of 10 clones derived by individual plant selection and progeny testing. The parentage of these clones can be traced to Siberian-Ladak and to remnants of populations introduced into South Dakota by N. E. Hansen. It was developed primarily for grazing alone or in grass mixtures.

Travois characteristically exhibits a decumbent growth habit, aggressive root proliferation, winter hardiness, wilt resistance, predominantly yellow and variegated flowers and sickle-shaped seed pods. It has the ability to produce stem buds on laterally spreading

roots at distances which sometimes exceed 36 inches from the mother plant. Both forage and seed yields of Travois have been below those of the better hay varieties. The first cutting contributes a relatively high proportion of the total annual forage yield because of the delayed recovery after cutting and marked fall dormancy. It is recommended for use in tame pastures or for interseeding in tame or native grassland.

Proprietary Varieties. There are numerous good varieties on the market that were developed by commercial companies. The South Dakota Agricultural Experiment Station and the Cooperative Extension Service do not make a recommendation for or against these varieties.

Some produce one good cutting, others produce

several. Some are winter hardy and will persist for years, others may kill out in a year or so. Seed of proprietary varieties should be purchased only from local sources with reputations for a high level of merchandising integrity.

Read these Fact Sheets for additional information on stand establishment, and management of alfalfa grown alone or when mixed with grass:

- Alfalfa Weevil and Its Control
- Alfalfa Management
- Interseeding for Pasture and Range Improvement
- Planting Tame Pastures and Hayland
- Grazing Management Based on How Grasses Grow
- A Pasture System for You
- Planting Tame Pastures and Hayland
- Chemical Weed Control in Pasture, Range and Hayland

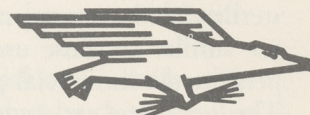
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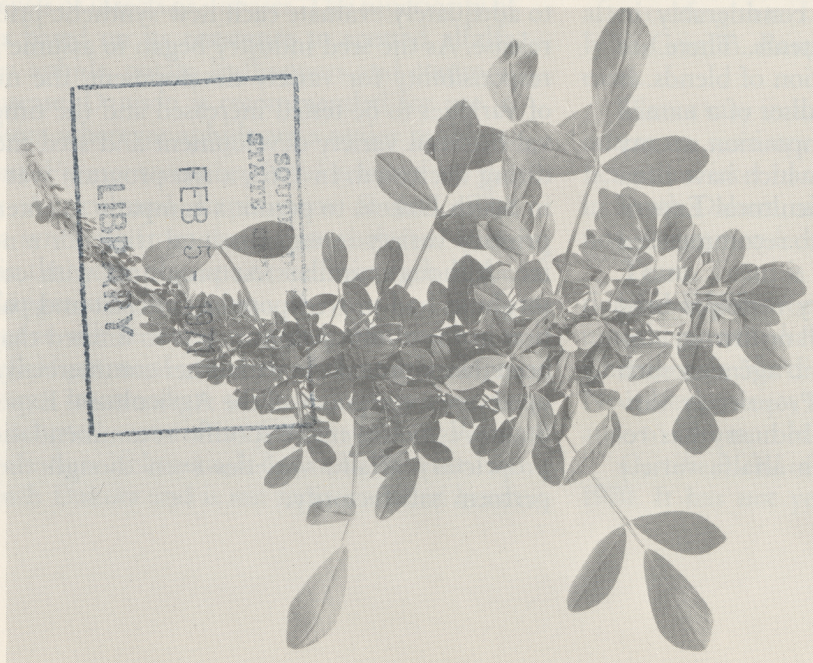
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