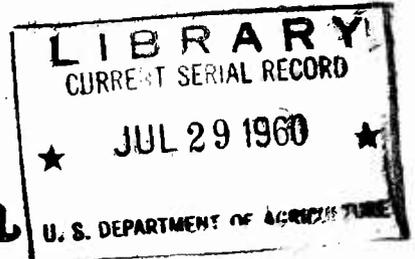


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# **Alfalfa Varieties** **in the United States**

*7a*  
Agriculture Handbook  
No. 177

*5b*  
Agricultural Research Service  
U.S. DEPARTMENT OF AGRICULTURE

ALFALFA is grown on about 30 million acres throughout most of the United States. Consequently, the crop is subjected to a wide range of climatic, disease, and insect conditions. Choosing an adapted variety and planting good seed are prerequisites to profitable production. Many varieties have been developed that are resistant to certain diseases and to insects, that are winter hardy, and that respond to certain management requirements. Therefore, it is important that seed to be planted should be adapted to a given area. This can be done if growers will check the varietal identification on the seed tag and select suitable varieties. Buying certified seed is one of the best assurances of obtaining seed true to variety name. For additional information on alfalfa varieties, growers should consult agronomists from their State agricultural experiment station or alfalfa specialists in other agencies of the State.

Resistant varieties should be planted in areas where bacterial wilt, spotted alfalfa aphid, and stem nematode are serious production problems. The following varieties are resistant to—

<i>Bacterial wilt</i>		<i>Spotted alfalfa aphid</i>	<i>Stem nematode</i>
Buffalo	Ranger	Cody	Lahontan
Caliverde	Teton	Lahontan	
Cody	Vernal	Moapa	
Lahontan	Zia	Zia	

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# Alfalfa Varieties in the United States

By C. H. HANSON, *research agronomist*, C. S. GARRISON, *agriculturist*, and H. O. GRAUMANN, *agricultural administrator*, *Crops Research Division, Agricultural Research Service*

It is generally believed that alfalfa originated in southwestern Asia. Historical accounts indicate that it was first cultivated in Persia (Iran). From there it was taken to the Mediterranean countries and finally to South America and North America. The first attempt to grow alfalfa in the United States was recorded in Georgia in 1736. It was not until about 1850, however, when alfalfa was brought to California from Chile, that the crop was grown successfully. From California it spread eastward and northward. Alfalfa is now grown throughout most of the United States.

A major step leading to winter-hardy varieties for the Northern States was the introduction of Grimm alfalfa from Germany in 1857. Grimm was slow to receive recognition for its winter hardiness. In fact, commercial recognition of alfalfa varieties in the United States did not occur until about 1892. Other notable events associated with early improvements in the performance of alfalfa on American farms were the introductions of alfalfa from Turkistan (1898), Siberia (1902), northern India (1910), and Egypt (1924).

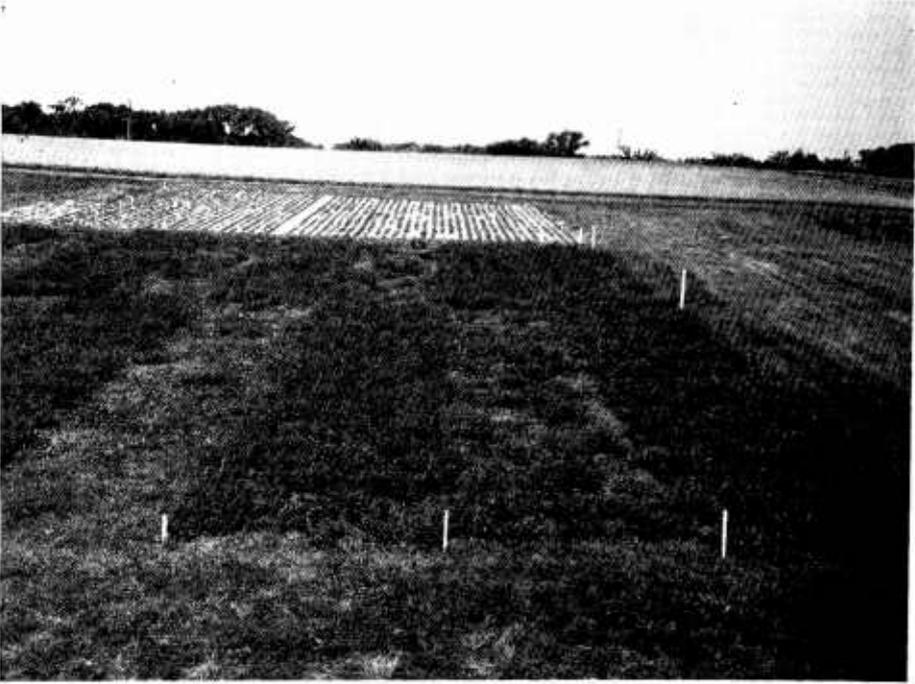
## BREEDING IMPROVED VARIETIES

A period of improvement through breeding began with the release of the varieties Atlantic, Ranger, and Buffalo in 1940, 1942, and 1943, respectively. Since then, breeders have developed and released many varieties with such specific characters as resistance to diseases and insects. State and Federal personnel have closely cooperated, working through the Alfalfa Improvement Conference.

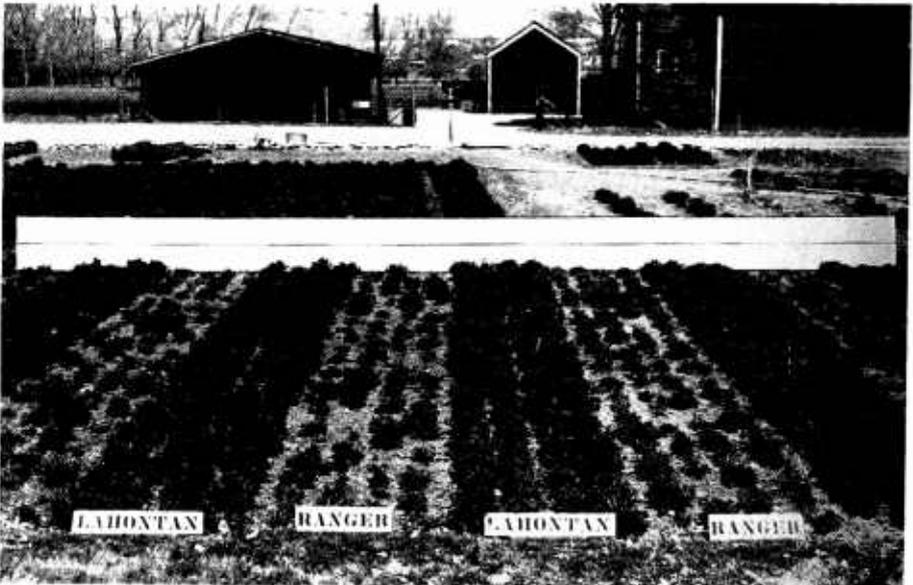
The present era also emphasizes the increased interest in fundamental research. Studies on the inheritance of forage and seed characters and of disease and insect resistance, breeding procedures, cytogenetics, and physiology are laying the groundwork for continued progress in alfalfa improvement.

A recent and significant trend is an increased interest on the part of private industry in the field of alfalfa breeding.

However, despite the development of new varieties in the 1940's, lack of sufficient seed of these varieties for farm use was cause for concern. In 1948 the National Foundation Seed Project was established to overcome this obstacle. This project was responsible for increasing the seed obtained from the plant breeder and then channeling this seed into State seed production programs. Closely associated with the establishment of the National Foundation Seed Project was a major shift of seed production into the irrigated areas of the Southwest. With improved cultural practices, seed yields of more than



Four-year-old plots of alfalfa varieties that show differences in resistance to bacterial wilt: Left to right in foreground—Rhizoma, Ranger, Narrangansett, and Vernal. (Courtesy Wisconsin Agricultural Experiment Station.)



DN-1797

Differences in stand of Lahontan and Ranger alfalfas at Reno, Nev., as a result of varietal susceptibility to stem nematode.

1,000 pounds per acre are common. Ample quantities of high-quality seed of most improved varieties are now available to the farmer.

## GERM PLASM USED IN DEVELOPING VARIETIES

Nature has provided three principal stocks of alfalfa from which all varieties in the United States are derived. These basic stocks are the two species *Medicago sativa* and *M. falcata* and an intermediate stock known as variegated alfalfa. Variegated alfalfa is believed to have resulted from natural crossing between the two species, followed by natural selection. Some scientists have placed variegated alfalfa in a species by itself and called it *M. media*.

*Medicago sativa* is purple flowered, narrow crowned, and erect. Strains of this species vary greatly in winter hardiness, but as a group they are less hardy than *M. falcata*. The latter is yellow flowered and decumbent, and has widely branching roots and a deep-set crown. *M. falcata* is extremely winter hardy. This species yields considerably less forage and seed than *M. sativa*. The variegated alfalfas found in nature provided the principal sources of germ plasm for the first hardy varieties.

Plant breeders have continued to hybridize and recombine the numerous types in the three basic stocks found in nature in order to develop varieties that meet the changing needs of the American farmer. From 10 to 15 years are usually required to develop and test a variety before its release. Varieties have been released in less than 10 years, but this shorter period for testing is usually done in an emergency, such as the one created by the advent of the spotted alfalfa aphid.

## CERTIFIED SEED AND REQUIREMENTS TO PRODUCE IT

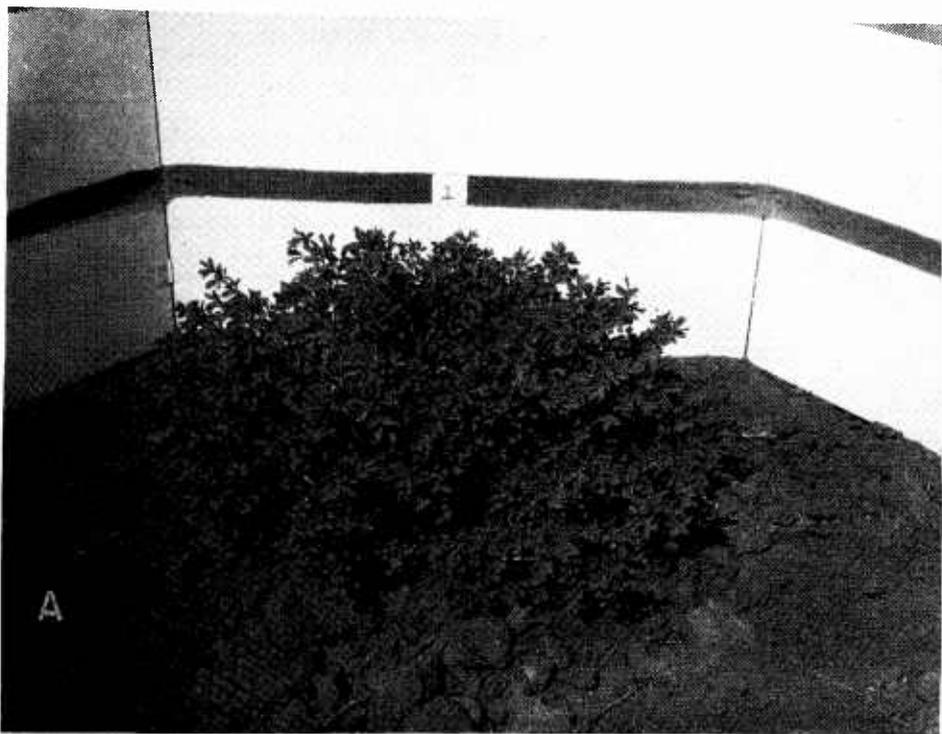
Certified alfalfa seed offers safeguards for obtaining seed true to variety name, since alfalfa varieties cannot be distinguished by seed characters. Certification also provides safeguards for such factors as number of generations of increase, volunteer plants, isolation, viability, and mechanical purity. Certified seed is grown from authentic planting stock. It is true to variety name and of good seed quality.

In the United States, seed certification is a responsibility of the officially designated State agencies or organizations. Forty-one of the State certification agencies are members of the International Crop Improvement Association (ICIA). The ICIA has published a set of minimum standards for the certification of all crops of interest in Canada and the United States.

Each State certifying agency has developed and published requirements for growing certified alfalfa seed, where this crop is included in the certification scheme. These standards equal or surpass those prescribed by the ICIA for alfalfa. As certified seed conforms to reasonably uniform standards, seedsmen and farmers not located in the seed-producing areas can have equal confidence in seed of an alfalfa variety that is certified by different certification agencies.



Comparison of spotted alfalfa aphid infestation on seedling plants of Buffalo (left) and Cody (right) in Kansas: *A*, Seeded Sept. 24, 1958, and photographed 10 weeks later; *B*, the same plots during the spring of 1959, showing the reduced stands in Buffalo caused by the spotted alfalfa aphid. (Courtesy Kansas Agricultural Experiment Station.)



Representative growth of Teton (A) and Grimm (B), a typical hay-type alfalfa: Teton plants tend to be semierect and broad-crowned, in contrast to the more erect, narrow-crowned Grimm. (Courtesy South Dakota Agricultural Experiment Station.)

## Classes of Certified Seed

Four classes of certified alfalfa seed are recognized: Breeder, foundation, registered, and certified seed.

*Breeder seed* is seed or propagating material produced by the originating or sponsoring breeder or institution, so grown and managed as to maintain the original varietal characteristics.

*Foundation seed* is produced in fields planted with breeder seed and so handled as to maintain the genetic identity and purity of the variety. Foundation seed production is carefully supervised or approved by representatives of an agricultural experiment station. It is the source of all certified seed, either directly or through the registered class.

*Registered seed* is the progeny of foundation seed so handled as to maintain varietal identity and satisfactory genetic purity. This seed is suitable for seeding to produce certified seed.

*Certified seed* is the progeny of foundation or registered seed so handled as to maintain varietal identity and satisfactory genetic purity.

Breeder and foundation seed of the older varieties, such as Grimm, Ladak, and Cossack, have not been maintained. For older varieties, the most authentic lots of certified seed are used as planting stock.

## Eligibility for Certification

### Varieties Selected

Generally, only those alfalfa varieties that are approved by a State agricultural experiment station and accepted by a certification agency are eligible for certification. Certified seed of an alfalfa variety that has not been accepted by the certifying agency in a seed-producing State can be produced for export to other States under the special interagency certification standards. The interagency certification standards provide for the participation of two or more agencies in performing the services required to certify a lot of seed. For example, agency A could request agency B to supervise the production, harvesting, processing, and laboratory testing of certified seed of an alfalfa variety not yet approved by agency B. Agency A would send its own certification tags to agency B to be attached to the packaged seed that meets the prescribed alfalfa standards.

### Land Requirements

Before land will be approved for production of foundation, registered, or certified alfalfa seed, specific requirements have to be met with regard to the previous crop practices. To be eligible, the land must not have grown or been planted to alfalfa for the previous 4 years, to produce foundation seed; for the previous 3 years, to produce registered seed; and for the previous year, to produce certified seed.

### Isolation of Fields

A field to be eligible for the production of foundation, registered, or certified alfalfa seed must have the minimum isolation distances

shown below from alfalfa fields of any other varieties or from fields of the same variety that do not meet the varietal purity requirements.

Seed class:	Isolation distance from fields of—	
	Less than 5 acres	5 acres or more
	Rods	Rods
Foundation.....	80	80
Registered.....	40	20
Certified.....	20	10
Between different seed classes of same variety.....	10	10

### Seed Standards

Foundation, registered, and certified alfalfa seed must meet minimum requirements of 99 percent pure seed and of 80 percent germination and hard seeds. Tolerances for other crop seeds and for weed seeds are 0.10 percent each for foundation seed; 0.10 and 0.20 percent, respectively, for registered seed; and 0.50 percent each for certified seed.

### Regions of Adaptation

Three alfalfa regions have been established in the United States for the purpose of classifying varieties as to hardiness and of defining the areas where foundation, registered, and certified seed may be grown.

(1) The *northern alfalfa region* includes the States and parts of States located between the Canadian boundary and the 40th parallel, except in the extreme west, where the southern boundary is the California-Oregon State line.

(2) The *central alfalfa region* includes States and parts of States between the California-Oregon State line and the 40th parallel in California and south of the 40th parallel and the southern boundary of Nevada, Utah, and Colorado, the 36th parallel in Oklahoma, and the southern boundary of Missouri, Kentucky, and Virginia.

(3) The *southern alfalfa region* includes all States and parts of States below the southern boundary of the central alfalfa region.

### Seed Grown Outside Region of Adaptation

Specific standards have been established for producing certified seed outside a variety's designated region of adaptation. The requirements are: (1) Only the certified class of seed can be grown; (2) either foundation or registered seed must be used as planting stock; and (3) seed fields are limited to stands not exceeding 6 years of age. Field research tests, comparing certified seed produced in northern and central regions with seed of the same varieties produced in the Southwest, have not shown any significant differences in forage production when these standards were met.

### Foundation Seed Project

The National Foundation Seed Project was organized in 1948 by the U.S. Department of Agriculture. Its purpose is to assist the foundation seed organization of State agricultural experiment stations to build up and to maintain adequate quantities of foundation seed for use in producing registered and certified seed of varieties

having interregional adaptation. Alfalfa varieties included in the project are Atlantic, Buffalo, Narragansett, Ranger, and Vernal. The National Foundation Seed Project cooperates with 38 State agricultural experiment stations, the International Crop Improvement Association, the American Seed Trade Association, and the State foundation seed organizations and certification agencies.

The Project is guided by a 16-member planning conference that includes representatives from each of the cooperating agencies or groups. Varieties for foundation seed are recommended by the regional forage crops technical committees. Arrangements for producing and distributing foundation seed within each State are the responsibility of the State foundation seed representative. Each representative is appointed by the respective State agricultural experiment station director.

## VARIETAL DESCRIPTIONS

The varieties most commonly grown in the United States are described in tables 1, 2, and 3. A glossary of terms used in connection with alfalfa varieties is given on p. 28.

TABLE 1.—Principal varieties of alfalfa of U.S. origin, including those recently released

Variety	Origin	Genetic stocks used for maintaining variety	Characteristics	Winter hardiness	Area of adaptation	Estimated 1958 acreage <sup>1</sup>	
						1,000 acres	Percent of total
African-----	Introduced in 1924 from Egypt. Seed sent to USDA Field Station, Bard, Calif., as F.C. 31370 Hegazi alfalfa, where seed of selected plants surviving several years was increased as African.	Certification begun in 1945. Breeder seed maintained by Calif. and Ariz. Agr. Expt. Stas.	Extremely nondormant; grows late in the fall and early in the spring; recovers quickly after cutting. Short-lived, stands seldom last more than 3 years. Upright in habit of growth, stems somewhat coarser than Common alfalfa.	Nonhardy----	Deep South and Southwest.	623	2.0
Atlantic-----	A composite of many lines, developed by the N.J. Agr. Expt. Sta. through a program of maternal line selection in stocks tracing to more than 100 varieties and strains from North America, Europe, and Asia. Some of these strains were of <i>Medicago falcata</i> origin.	Breeder seed maintained by the N.J. Agr. Expt. Sta.	Vigorous, high-yielding; plants variable in growth habit. Dark-green foliage; flowers light purple with other colors and shades found occasionally. Not resistant to the bacterial wilt organism but somewhat tolerant.	Hardy, but somewhat less hardy than Ranger or Grimm.	Northeastern States to North Carolina and west to Mississippi River where bacterial wilt is not a serious factor.	406	1.3

See footnotes at end of table.

TABLE 1.—Principal varieties of alfalfa of U.S. origin, including those recently released—Continued

Variety	Origin	Genetic stocks used for maintaining variety	Characteristics	Winter hardiness	Area of adaptation	Estimated 1958 acreage <sup>1</sup>	
						1,000 acres	Percent of total
Atlantic—Con.	Originally tested as 3 synthetics (A65, A66, and A67), which were later combined in equal proportions to form Atlantic. Released for seed increase in 1940.						
Buffalo.....	Developed by USDA and the Kans. Agr. Expt. Sta. from selections of an old line of Kansas Common. Although not inbred, it was closebred, with attention being given to bacterial wilt resistance and seed and forage productivity. Tested as A-11 and named in 1943.	Breeder seed maintained by Kans. Agr. Expt. Sta.	Somewhat more upright and slightly quicker to recover than Kansas Common. Purple-flowered and in other respects very similar to Kansas Common. Resistant to bacterial wilt.	Moderately hardy and similar to Kansas Common.	Overlaps southern limit of Ranger and extends farther south than Ranger. Grown in a 400-mile-wide belt, with Kansas as the center of the belt.	2, 679	8. 7
California Common 49.	Selected from California Common by the Calif. Agr. Expt. Sta. Re-	Basic stocks consist of a number of lines maintained	Similar to California Common in appearance and performance in the	Similar to California Common.	Areas of Southwestern U.S. where dwarf is a major	( <sup>2</sup> )	( <sup>2</sup> )

Caliverde-----	leased in 1949.  Developed at the Calif. Agr. Expt. Sta. by crossing California Common with Turkistan and backcrossing to California Common. Released in 1951.	by Calif. Agr. Expt. Sta.  Breeder seed obtained by compositing equal amounts of seed from parent clones in an isolated crossing block. Parent clones maintained by Calif. Agr. Expt. Sta.	absence of dwarf disease. Tolerant to dwarf virus disease. Susceptible to bacterial wilt.  Habit of growth similar to California Common but slightly more winter dormant. Light- to dark-purple flowers, with an occasional white-flowered plant. Produces higher quality hay than California Common when common leaf spot infection occurs. Resistant to bacterial wilt, pseudopeziza leaf spot, and downy mildew.	disease.  Slightly more hardy than California Common.	Central Valley of California.	51	. 2
Chilean 21-5----	Strain of Arizona Chilean developed in Arizona.	None-----	Similar to Arizona Common.	Nonhardy----	Deep South and Southwest.	32	. 1
Cody-----	Selected from Buffalo. Released in 1959 by Kans. Agr. Expt. Sta. and USDA.	Breeder seed obtained by growing the 22 parent clones in an isolated crossing block. Clones maintained by Kans. Agr. Expt. Sta.	Similar in growth characteristics to Buffalo. Has high degree of resistance (antibiosis and tolerance) to spotted alfalfa aphid. Bacterial wilt resistance approaches that of Buffalo.	Moderately hardy, like Buffalo.	Similar to Buffalo.	(2)	(2)

See footnotes at end of table.

TABLE 1.—Principal varieties of alfalfa of U.S. origin, including those recently released—Continued

Variety	Origin	Genetic stocks used for maintaining variety	Characteristics	Winter hardiness	Area of adaptation	Estimated 1958 acreage <sup>1</sup>	
						1,000 acres	Percent of total
Common-----	Consists of regional strains that evolved from natural selection in States west of Mississippi River. Characteristics not sufficiently distinct to be considered as varieties. Parentage traces largely to introduction from Chile about 1850. Strains identified by State of origin. Examples: Arizona, Oklahoma, Utah, or Kansas Common. In Arizona and California, Common alfalfa is frequently referred to as Chilean alfalfa. Seed lots failing to meet certification standards are sometimes marketed as "Common" alfalfa.	None-----	Common alfalfas differ principally in winter hardiness, the degree of hardiness depending on conditions where strain evolved. Plants upright with narrow crown and purple flowers. Susceptible to bacterial wilt.	Varies with environmental conditions in State of origin.	Areas where climatic conditions are similar to those in State of origin, and where bacterial wilt is not present.	8, 097	26. 3

Cossack-----	Introduced into the U.S. from Russia in 1907 by USDA.	No single source of seed being used for increase, resulting in differences among seed lots.	Similar to Grimm, but slightly less susceptible to bacterial wilt and slower to recover after cutting. Also has higher percentage of yellow and white flowers.	Much like Grimm.	Northern States.	258	. 8
Grimm-----	Introduced from Germany into Carver County, Minn., in 1857 by Wendelin Grimm. Underwent further natural selection in Minnesota.	No single source of seed has been used for seed increase, resulting in variation among lots for growth habit and cold resistance.	Fine-stemmed and leafy, hay of high quality. Variegated flowers, but most flowers similar to Common alfalfa. More resistant to foliar diseases than Turkistan alfalfa. Yields well in absence of bacterial wilt.	Very hardy--	Northern States where bacterial wilt is not a factor.	2, 620	8. 5
Hairy Peruvian.	Introduced into the U.S. from Peru in 1899 by USDA. Hairy and smooth forms introduced, but hairy forms perform better.	None-----	Characterized by rapid growth, quick recovery after cutting, and ability to grow during short days after growth of more hardy varieties has ceased. Not drought resistant. Generally yields less and lower in quality than African. Pubescent (hairy) leaves and stems give the foliage a grayish appearance.	Nonhardy----	Deep South and Southwest.	30	. 1

See footnotes at end of table.

TABLE 1.—*Principal varieties of alfalfa of U.S. origin, including those recently released*—Continued

Variety	Origin	Genetic stocks used for maintaining variety	Characteristics	Winter hardiness	Area of adaptation	Estimated 1958 acreage <sup>1</sup>	
						1,000 acres	Percent of total
Ladak-----	Introduced in 1910 from northern India by USDA.	No single source of seed used for seed increases, resulting in variation among seed lots.	Semiprocumbent habit of growth. Yields exceptionally well in first cutting of season, but inferior to most varieties in second cutting. Becomes dormant during prolonged periods of summer drought and in early fall. Recovers slowly after cutting. Less susceptible to bacterial wilt than Grimm.	Very hardy---	Northern Great Plains.	983	3.2
Lahontan-----	A 5-clone synthetic developed by USDA and Nev. Agr. Expt. Sta. Parent plants selected from Nemastan. Released for seed increase by the experiment stations of Nevada and California in 1954.	Breeder seed obtained from 5 parent clones grown together in an isolated seed production block. Seed from 5 clones is mixed in equal proportions. Maintained by	Upright habit of growth with quick recovery following cutting. Purple-flowered. Resistant to bacterial wilt, stem nematode, and spotted alfalfa aphid. Very susceptible to foliar diseases.	Similar to Buffalo.	Western States where bacterial wilt, stem nematode, and spotted alfalfa aphid are problems.	226	.7

Meeker Baltic	Traces to seed of Baltic alfalfa purchased about 1915 by grower near Meeker, Colo. Named by the Colo. Agr. Expt. Sta.	Nev. Agr. Expt. Sta. Breeder seed maintained by Colo. Agr. Expt. Sta.	Similar to Baltic and Grimm. Produces high yields during first few years, but loses its stand very rapidly in presence of bacterial wilt.	Hardy	Similar to Grimm.	50	2
Moapa	Developed by USDA and the Nev. Agr. Expt. Sta. Released jointly by these two agencies and the agricultural experiment stations of Arizona and California in 1957. A synthetic variety consisting of 9 spotted-alfalfa-aphid-resistant plants selected from African, 7 of the plants from a 6-year-old field.	Breeder seed obtained from 9 parent clones growing in an isolated crossing block. Clones maintained by Nev. Agr. Expt. Sta.	Growth characteristics quite similar to African. Resistant to the spotted alfalfa aphid in field tests. After release, a new biotype of the aphid was discovered. Four of the 9 parent plants were moderately susceptible to this race in cage tests. The new biotype was still not a problem on Moapa under field conditions when this bulletin was issued. More resistant to bacterial wilt than African but less resistant than Ranger.	Nonhardy	Deep South and Southwest. Similar to African.	(2)	(2)

See footnotes at end of table.

TABLE 1.—Principal varieties of alfalfa of U.S. origin, including those recently released—Continued

Variety	Origin	Genetic stocks used for maintaining variety	Characteristics	Winter hardiness	Area of adaptation	Estimated 1958 acreage <sup>1</sup>	
						1,000 acres	Percent of total
Narragansett...	Developed at the R.I. Agr. Expt. Sta. Mass selection from stocks consisting principally of crosses between <i>M. sativa</i> and <i>M. falcata</i> , Canadian Variegated, Cossack, Grimm, and Ladak. Named in 1946.	Breeder seed maintained by R.I. Agr. Expt. Sta.	Vigorous. Plants vary from spreading to upright in growth habit. Wide crowns and dark-green foliage; flower color predominantly blue, but ranges from yellow to purple with many of a greenish-blue shade. Very susceptible to wilt. Appears better adapted than most varieties to imperfectly drained soils in New York.	Very hardy...	Northeastern and North Central States where bacterial wilt is not a problem.	450	1.5
New Mexico 11-1.	A synthetic strain developed in New Mexico consisting of 6 lines—4 from New Mexico Common, 1 from Buffalo, and 1 from A14 (a Virginia strain). De-	Breeder seed maintained by N. Mex. Agr. Expt. Sta.	Begins growth a little earlier in the spring, more resistant to green pea aphid, recovers from cutting somewhat quicker, and yields more than	Similar to New Mexico Common.	New Mexico and possibly other areas of South-west.	35	.1

Nomad-----	veloped by N. Mex. Agr. Expt. Sta. Seed increase begun in 1955.	Planting stock maintained by Burlingham & Sons.	New Mexico Common in New Mexico tests.	Hardy-----	Possibly on range lands.	(2)	(2)
Ranger-----	Developed from persistent alfalfa plants that were first found growing on a dryland farm in Klamath County, Oreg., in 1941. E. F. Burlingham & Sons later purchased farm and increased seed of selected plants.	Seed of the 5 basic strains maintained by Nebr. Agr. Expt. Sta. Mixed in the following proportions to produce breeder seed: A110—45 percent, A111—8 percent, A116—13 percent, A117—24 percent, A119—10 percent.	Plants vary in habit of growth from decumbent to upright. Flower color variegated. Good seed producer, about equal to Grimm. Quicker recovery after cutting than Ladak or Cossaek and about equal to Grimm. Quite susceptible to leaf spot diseases but more resistant than Turkistan. Slightly more susceptible to leafhopper yellowing than Grimm but more resistant than Turkistan. Resistant to bacterial wilt.	Very hardy---	Northern Great Plains and eastward.	10, 934	35. 5

See footnotes at end of table.

TABLE 1. *Principal varieties of alfalfa of U.S. origin, including those recently released*—Continued

Variety	Origin	Genetic stocks used for maintaining variety	Characteristics	Winter hardiness	Area of adaptation	Estimated 1958 acreage <sup>1</sup>	
						1,000 acres	Percent of total
Sevelra.....	A selection from an old stand in dry-land area of southern Idaho. Stand traced to plantings of <i>M. sativa</i> and <i>M. falcata</i> . Grown on the Seven-L Ranch since 1918.	Maintained by Seven-L Ranch.	Habit of growth very variable—upright to procumbent. Flower color extremely variegated. Some plants show considerable rhizome development under dry-land conditions. Reported to be drought resistant.	Somewhat less hardy than Ranger.	Best performance obtained in Western States.	( <sup>2</sup> )	( <sup>2</sup> )
Talent.....	Traces to introduction by USDA from southern France. Mass selection at Oreg. Agr. Expt. Sta. First certified seed harvested in 1948.	Maintained by Oreg. Agr. Expt. Sta.	Similar to Du Puits in growth characters but less hardy. Susceptible to bacterial wilt. Moderately resistant to stem nematode in Oregon.	Less hardy than Du Puits.	Pacific Northwest.	5	0.014
Teton.....	Developed by S. Dak. Agr. Expt. Sta. from plants in an old stand tracing to a cross of Turkistan alfalfa	Breeder seed obtained from interpollination of 4 parent clones; maintained	Has low, wide crown with aggressive rhizome development. Highest forage yields obtained in first cut-	Very hardy...	Appears adapted to dry areas of the northern Great Plains.	( <sup>2</sup> )	( <sup>2</sup> )

Vernal-----	<p>from Tashkent (<i>M. sativa</i>) and a yellow-flowered Siberian strain (<i>M. falcata</i>) collected near Semipalatinsk. Four plant selections made after 2 generations of intercrossing and progeny testing. Released in 1958.</p> <p>A synthetic developed by Wis. Agr. Expt. Sta. and USDA. Released in 1953. 50 percent of germ plasm in variety derived from 6 Cossack plants, the remainder from crosses between selected plants of Ladak, Kansas Common, and a diploid stock of <i>M. falcata</i>.</p>	<p>by S. Dak. Agr. Expt. Sta.</p> <p>Breeder seed maintained by Wis. Agr. Expt. Sta.</p>	<p>ting of season. Tends to be moderately dormant after cutting. Becomes dormant early in fall. More persistent than other varieties under close grazing in South Dakota tests. Resistant to bacterial wilt, common leaf spot, and field infection caused by <i>Fusarium oxysporum</i> and <i>F. roseum</i>.</p> <p>Outstanding in production of forage under hay and grazing management in North Central States. Fine-stemmed, leafy, dark-green foliage and broad crowns. Similar to Cossack in recovery after cutting and fall dormancy. High level of winter hardiness and resistance to bacterial wilt. Tolerant to leaf spot and yellow leaf blotch.</p>	Very hardy---	Northern States.	2, 199	7. 1
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See footnotes at end of table.

TABLE 1. *Principal varieties of alfalfa of U.S. origin, including those recently released—Continued*

Variety	Origin	Genetic stocks used for maintaining variety	Characteristics	Winter hardiness	Area of adaptation	Estimated 1958 acreage <sup>1</sup>	
						1,000 acres	Percent of total
Williamsburg---	Mass selection from Kansas Common at the Eastern Virginia Research Station, Williamsburg, Va. Seed increase in Western States begun in 1947.	Breeder seed field maintained by Va. Agr. Expt. Sta.	Similar to Kansas Common in growth characteristics, except that it recovers somewhat more quickly after cutting and appears to have greater resistance to crown-rotting organisms occurring in Coastal Plains area of Virginia and North Carolina. Good seed producer. Susceptible to bacterial wilt.	Similar to Kansas Common.	Mideastern States where bacterial wilt is not a problem.	159	0.5
Zia-----	Synthetic variety consisting of 4 lines developed by N. Mex Agr. Expt. Sta. from New Mexico Common, Turkistan, and Lahontan. Named in 1958.	Maintained by N. Mex. Agr. Expt. Sta.	Resistant to spotted alfalfa aphid. Higher yielding and more resistant to bacterial and fusarium wilts than New Mexico Common.	Similar to New Mexico Common; more hardy than African.	New Mexico and possibly other areas.	(2)	(2)

<sup>1</sup> From "Expected Varietal Trends in Forage Crops," compiled in 1958 by J. M. Saunders, Federal Extension Service, U.S. Department of Agriculture. Adjustments were made for missing States in that report.

<sup>2</sup> Estimated acreage comprises less than 0.01 percent of the total U.S. acreage.

TABLE 2.—*Varieties of alfalfa of foreign origin*

Variety	Origin	Genetic stocks used for maintaining variety	Characteristics	Winter hardiness	Area of adaptation	Estimated 1958 acreage <sup>1</sup>	
						1,000 acres	Percent of total
Alfa -----	Swedish selection from a Flamand-type alfalfa. Distributed for testing under the names "Alfa" and "Scandia," marketed as Alfa variety.	Maintained in Sweden.	Similar to Du Puits. Vigorous-growing variety, quick to establish, but susceptible to bacterial wilt. Winter hardiness in United States being determined.	Somewhat more hardy than Du Puits.	Similar to Du Puits.	(2)	(2)
Canadian Variegated.	Introduced into Ontario about 1871 from Lorraine, France. No attempts made to improve this variety beyond natural selection, which eliminated the less hardy plants. First known as Ontario Variegated.	Not known ----	Similar in appearance to Grimm. Forage yields comparable to Grimm in humid Northern States, but inferior to Grimm in northern Great Plains. Susceptible to bacterial wilt.	Very hardy ---	Northern and Northeastern States where bacterial wilt is not a factor.	(2)	(2)

See footnotes at end of table.

TABLE 2.—*Varieties of alfalfa of foreign origin*—Continued

Variety	Origin	Genetic stocks used for maintaining variety	Characteristics	Winter hardiness	Area of adaptation	Estimated 1958 acreage <sup>1</sup>	
						1,000 acres	Percent of total
Du Puits-----	Developed by Tourneur Freres of Coulommiers, France, and released to European farmers in 1937. Received for testing in U.S. in 1947.	Maintained in France.	Vigorous growing Flemish variety with quick recovery after cutting. Upright in growth, dark-green, and relatively stemmy. Moderately resistant to certain foliar diseases. Susceptible to crown rots and bacterial wilt.	Moderately hardy.	Northeastern U.S. and Northern States in areas where winters are not severe and long-lived stands are not required.	666	2.2
Ferax-----	Developed at the University of Alberta, Canada. Selected from 30 strains and varieties by maternal-line selection. Registered by the Canadian Seed Growers' Association about 1946.	Maintained in Canada.	High seed-setting capacity, but similar to Ontario Variegated in forage production. Susceptible to bacterial wilt.	Very hardy---	Northern States where bacterial wilt is not a problem.	( <sup>2</sup> )	( <sup>2</sup> )

Pilca Butta..	Strain from Australia. First tested in the U.S. about 1940.	Not known.....	Upright growth habit, similar to Common alfalfas. Susceptible to bacterial wilt.	Nonhardy---	Southern States	(2)	(2)
Rambler.....	Developed through hybridization and selection for creeping-rooted characteristics at the Experimental Farm, Swift Current, Saskatchewan, Canada. Ladak and Siberian ( <i>M. falcata</i> ) were principal stocks used in original crosses. Licensed for sale in Canada in 1955.	Maintained in Canada.	Creeping-rooted; low-set crown. Drought resistant and winter hardy, resulting in longevity under Saskatchewan conditions. Creeping-root character results in increase in density if a poor stand is obtained originally or if some killing occurs. Persists well with grass. Most forage obtained in first cutting. Yields less forage and seed in U.S. than Vernal and Ranger. More resistant to bacterial wilt than Ladak but not as resistant as Vernal or Ranger.	Very winter hardy.	Northern Great Plains.	(2)	(2)

See footnotes at end of table.

TABLE 2.—*Varieties of alfalfa of foreign origin*—Continued

Variety	Origin	Genetic stocks used for maintaining variety	Characteristics	Winter hardiness	Area of adaptation	Estimated 1958 acreage <sup>1</sup>	
						1,000 acres	Percent of total
Rhizoma . . . . .	Developed at the University of British Columbia, Vancouver, Canada, from a cross between a yellow-flowered variety of Don and Grimm.	Maintained in Canada.	In British Columbia extensive underground development of crown branches, but in eastern Canada and U.S. less extensive development. Similar to Narragansett in habit of growth. Variegated flowers, many of which are yellow or yellowish green. Very susceptible to bacterial wilt.	Very winter hardy.	Northern States where wilt is not a problem.	6	0.02
Socheville . . . . .	Northern France . . . . .	Not known . . . . .	Very similar to Du Puits.	Similar to Du Puits.	Similar to Du Puits.	(2)	(2)
Turkistan . . . . .	First introduced into the U.S. in 1898 from Turkistan (now southern U.S.S.R.). Seed importation continued until about 1929.	do . . . . .	Purple flowers. More spreading growth habit and finer-stemmed than Common. Low seed yields. Grown at one time in central and	Turkistan alfalfas vary in cold resistance, but most lots are as winter	Great Plains . . . . .	(2)	(2)

			northern Great Plains in bacterial-wilt-infested areas. Replaced by improved varieties. Moderately resistant to bacterial wilt but very susceptible to leaf spot diseases.		
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				hardy as Grimm.	
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<sup>1</sup> From "Expected Varietal Trends in Forage Crops," compiled in 1958 by J. M. Saunders, Federal Extension Service, U.S. Department of Agriculture. Adjustments were made for missing States in that report.

<sup>2</sup> Estimated acreage comprises less than 0.01 percent of the total U.S. acreage.

TABLE 3.—Varieties of alfalfa of U.S. origin that have been replaced, or largely replaced, by improved varieties

[The estimated acreage of each in 1958 did not exceed 0.02 percent of the total alfalfa acreage]

Variety	Origin	Genetic stocks used for maintaining variety	Characteristics	Winter hardiness	Estimated 1958 acreage <sup>1</sup>	
					1,000 acres	Percent of total
Baltic-----	Name given in 1906 to seed from winter-hardy stand discovered near Baltic, S. Dak. Presumably came originally from northern Europe.	No established source of seed. Different seed lots may be variable.	Similar to Grimm. Susceptible to bacterial wilt.	Hardy-----	( <sup>2</sup> )	( <sup>2</sup> )
Hardigan-----	Selected from Baltic at the Mich. Agr. Expt. Sta. Released in 1920.	None-----	Similar to Grimm in growth habit. Somewhat higher in yields of forage and seed, but somewhat less winter hardy. Dark-green foliage. Very susceptible to bacterial wilt.	Hardy. Similar to Grimm.	( <sup>2</sup> )	( <sup>2</sup> )
Hardistan-----	Name given by Nebr. Agr. Expt. Sta. in 1928 to strain that was traced to a field in Dawson County, Nebr.	None-----	Resistant to cold and bacterial wilt. Replaced by more productive varieties.	Hardy-----	( <sup>2</sup> )	( <sup>2</sup> )
Indian-----	Introduced from India by USDA in 1913. Seed sent to USDA Field Station, Bard, Calif., where selected plants were increased for commercial seed production.	Breeder seed maintained by Calif. Agr. Expt. Sta.	Similar to African but generally less productive in Southwest.	Nonhardy----	5	0.016

Kaw-----	Imported as Provence from France in 1912 by a commercial seed firm. Resembled Turkistan alfalfa. Since it was different from other importations from Provence, France, it was given the name of Kaw by Kans. Agr. Expt. Sta.	None-----	Winter hardy and resistant to bacterial wilt. Replaced by improved varieties.	Hardy-----	(2)	(2)
Nemastan-----	Introduced from Turkistan by USDA. Named in 1943.	None-----	Resistant to stem nematode, highly susceptible to the leaf spot diseases. Replaced by Lahontan.	Hardy-----	(2)	(2)
Orestan-----	Name given by the Oreg. Agr. Expt. Sta. to an alfalfa originally introduced in 1929 by USDA from Turkistan, Asia.	None-----	Similar to some of the better lots of commercial Turkistan alfalfa. Replaced by more disease-resistant varieties.	Hardy-----	(2)	(2)

<sup>1</sup> From "Expected Varietal Trends in Forage Crops," compiled in 1958 by J. M. Saunders, Federal Extension Service, U.S. Department of Agriculture. Adjustments were made for missing States in that report.

<sup>2</sup> Estimated acreage comprises less than 0.01 percent of the total U.S. acreage.

## GLOSSARY OF TERMS COMMONLY ASSOCIATED WITH ALFALFA VARIETIES AND STRAINS

- Approved origin.*—Used by Oklahoma Crop Improvement Association to designate qualifying seed lots of common alfalfa known to be of Oklahoma Common parentage.
- Argentine.*—Alfalfa from Argentina. About 1935, considerable seed was imported from Argentina, mostly from the area south of Buenos Aires. Experimental tests indicated that seed lots from Argentina were variable in winter hardiness and generally yielded less than locally adapted varieties.
- Arizona Chilean.*—Same as Arizona Common.
- Bam.*—An introduction of *Medicago sativa* from Iran that is resistant to the spotted alfalfa aphid. Not winter hardy.
- Barstow.*—Strain or variety found in southwestern Texas. Not winter hardy.
- Blend.*—Generally used to indicate a mechanical mixture of seed of different origins or varieties.
- Brand.*—A designation used in merchandizing to identify the manufacturer or distributor of a product, not the product itself. Generally synonymous with trademark. The same brand may be used by the owner for one product or more than one product. Should not be confused with variety name.
- Breeder seed.*—Seed of a variety furnished by the plant breeder for seed increase. See "Seed Certification."
- Certified.*—See section on "Certified Seed and Requirements To Produce It" for definition and for description of certified seed classes.
- Clone.*—The vegetative increase of a single plant. Usually accomplished in alfalfa by rooting stem cuttings in sand, vermiculite, or similar rooting media.
- Common alfalfa.*—Includes the ordinary purple-flowered alfalfa from which numerous regional strains, differing principally in winter hardiness, have developed through natural selection in the Western States.
- Creeping-rooted.*—Having the capacity of producing adventitious stem buds at enlarged points along the length of lateral underground roots. This form of root proliferation was first discovered in a strain of *M. falcata*.
- Cross-pollination.*—The pollination of a plant by pollen of a different plant. In nature, alfalfa is cross-pollinated by bees.
- Dakota No. 12.*—A variety name once used in merchandising strains of Common alfalfa. No longer recognized as a variety name by Federal Seed Act for alfalfa seed shipped in interstate commerce or by certain States.
- Diploid.*—Having two (haploid) sets of chromosomes.
- Don.*—A Canadian diploid variety of *M. falcata*.
- Flamande.*—Generally used as a descriptive term for a group of similar varieties and strains originating in northern France. This group includes Du Puits, Ile de France, Chartainvilliers, Alfa, W 268, Socheville, and others.
- Flemish.*—Used to describe naturalized alfalfas of the Flamande type found in northern France.
- Foliar.*—Pertaining to leaves.
- Grower affidavit.*—A signed statement of a grower, establishing to the best of his knowledge the varietal designation of a specified seed lot sold by him. Tests indicate that seed lots with grower affidavits cannot always be depended on as being true to variety name. The practice of obtaining grower affidavits is being discontinued.
- Hegazi.*—A name associated with the original introduction of African alfalfa from Egypt.
- Hunter River.*—A naturalized strain of alfalfa in Australia. Not winter hardy.
- Hybrid.*—Genetically defined as the product of a cross between individuals of unlike genetic constitution. The legal definition given by Federal Seed Act of August 9, 1939, follows: "The term 'hybrid' means the first generation seed of a cross produced by controlling the pollination and by combining (1) two, three, or four inbred lines; (2) one inbred or a single cross with an open-pollinated variety; or (3) two varieties or species, except open-pollinated varieties of corn (*Zea mays*). The second generation and subsequent generations from such crosses shall not be regarded as hybrids. Hybrid designations shall be treated as variety names."
- Hybrid vigor.*—The increased vigor often exhibited by hybrid individuals. Also called heterosis.

*Imported seed.*—See “stained seed.”

*I.V.P.*—Abbreviation for “inspected varietal purity.” Used in seed merchandising to pinpoint the advantages of buying certified seed.

*Labeling of seed as to variety designation.*—Some State seed laws require that agricultural seed shall be labeled as to kind and variety, or, if the variety is unknown, labeled as “Variety Unknown.” However, most State seed laws, as well as the Federal Seed Act, do not require that the variety name be shown on the label. If it is shown, however, it must be truthful.

*Lucerne.*—The common name for alfalfa in some foreign countries.

*Marlborough.*—A naturalized strain of alfalfa in New Zealand.

*Nonhardy.*—Used to describe alfalfas that are generally very erect in growth habit, recover quickly after cutting, have a long growing period, and are very susceptible to low temperatures. The varieties African, Indian, and Hairy Peruvian are examples.

*Pollination.*—Transfer of pollen from the anthers to the stigma.

*Polycross.*—A term used to describe a type of experimental cross for measuring the combining ability of clones—has no commercial usage. Polycross seed is obtained from a clone permitted to outcross with other selected clones growing in an isolated nursery. Clones are usually replicated to obtain random cross-pollination among clones.

*Provence.*—Strain of alfalfa grown in southeastern France.

*Region of adaptation.*—Region to which a variety is generally adapted for forage production. Regulations for the production of foundation, registered, and certified seed classes of a specified variety are based in part on the area defined as the variety's “region of adaptation.”

*Rhizomatous.*—Having underground stems or crown branches (rhizomes), as in *M. falcata* and to a lesser extent in the variegated alfalfas. The number and length of rhizomes of a variety appear to be roughly associated with the proportion of germ plasm of that variety tracing to *M. falcata*. Only a limited degree of rhizomatous development is found in the Common alfalfas.

*Sand lucerne.*—A variegated alfalfa grown in Europe. There is some evidence that varieties such as Grimm, Baltic, and Canadian Variegated arose through natural selection from the Sand lucerne of Europe.

*Scandia.*—Name of a Flemish strain introduced from Sweden. Now identified in the United States as the variety “Alfa.”

*Semipalatinsk.*—A yellow-flowered, winter-hardy, and drought-resistant strain of *M. falcata* collected in Siberia in early 1900's.

*Siberian.*—Usually used with reference to *M. falcata*.

*Sickle alfalfa.*—Sometimes used in Europe as common name (translated) for *M. falcata*. Sickle refers to shape of the pod, as in beans. Not coiled as in *M. sativa*.

*Sirsa No. 9.*—A nonhardy strain from United Provinces, India, used experimentally in United States. Has resistance to spotted alfalfa aphid.

*Species.*—A group of individuals so much alike that it may be reasonably assumed that they arose from a common ancestor. The Common alfalfas are classified in the species *M. sativa*. The variegated alfalfas (resulting from crossing between *M. sativa* and *M. falcata*) are generally included in *M. sativa*, although some scientists prefer to place the variegated alfalfas in a species by itself, calling it *M. media*. Varieties that are purely *M. falcata* are not commercially important in the United States.

*Stained seed.*—Indicates importation. The Federal Seed Act of August 9, 1939, requires that alfalfa seed from foreign countries be stained before it is permitted entry into the United States. Ten percent of the seed from any country other than South America or Canada must be stained red. Alfalfa seed from any of the countries of South America must be stained 10 percent orange red, and seed from Canada 1 percent violet.

*Synthetic.*—Used to describe varieties produced by combining several lines or clones, and permitting natural pollination to occur for one or more generations. A numeral is usually used to indicate the number of generations since synthesis. Thus, Syn. 1, Syn. 2, and Syn. 3 indicate that the seed is from the first, second, or third seed generation after the lines or plants were combined.

*Tetraploid.*—Plants with four (haploid) sets of chromosomes. *M. sativa* is a tetraploid species.

- Turkistan*.—Alfalfa (*M. sativa*) imported from Turkistan. Flower color is similar to that of the Common alfalfas, but the growth is generally somewhat shorter and more spreading. Selected plants from the Turkistan alfalfas have been used as a source of resistance to bacterial wilt, the stem nematode, and the spotted alfalfa aphid. These alfalfas are generally very susceptible to foliar diseases.
- Variegated*.—Used with reference to winter-hardy alfalfas that have originated from crosses between purple-flowered *M. sativa* and the yellow-flowered species *M. falcata*. Variegated means multicolored flowers. Vernal is a typical variegated alfalfa. Such varieties as Narragansett, Ranger, Ladak, Meeker Baltic, and Grimm are also in the variegated group but contain fewer yellow-flowered individuals.
- Variety*.—A group of strains or a single strain that can be differentiated from another group or strain. It is generally accepted that before its release, a new variety must have shown superiority over existing varieties in the area of intended usage.
- Verified origin*.—The U.S. Verification Service verifies the origin or place where seed was grown, without regard as to variety, purity, or germination. Each package of such seed bears the U.S. Verification tag.
- Viking*.—A very winter-hardy, variegated variety developed at Saskatoon, Saskatchewan.
- Yellow-flowered alfalfa*.—Generally used with reference to *M. falcata*, although there are several *Medicago* species with yellow flowers. Also used with reference to Siberian alfalfa.