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Alfalfa Varieties for Iowa

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Agricultural Experiment Station, Iowa State College of Agriculture and Mechanic Arts, Floyd Andre, director, Ames, Iowa.

SUMMARY

Adequate information on the adaptation of alfalfa varieties is essential if their most effective utilization is to be realized. A brief description of the more important varieties now available has been given.

Forage yields from strain trials at Ames, Iowa, have been presented on the basis of performance for 2, 3 and 4 crop years, respectively. Several varieties including Ladak, Atlantic, Cossack, Buffalo, Ranger, Grimm and certain strains of Common have produced satisfactory yields in central Iowa when harvested for 2 crop years after establishment. Of the newer varieties, Atlantic appeared to have a slight superiority over Buffalo and Ranger for short-term stands.

Where stands were harvested for 3 years, there was little choice among five varieties: Ladak, Ranger, Cossack, Atlantic and Buffalo. Grimm was slightly less productive and the Common strains were inferior to Grimm.

For long-term stands, harvested for 4 years or more, the superiority of wilt-resistant varieties became apparent. Buffalo and Ranger produced the highest yields, with Ladak only slightly less. Because of more rapid recovery after cutting, Buffalo and Ranger have an advantage over Ladak. In northern Iowa, Ranger would be the best choice, for Buffalo has shown somewhat more winter injury in unfavorable seasons. Several experimental synthetic varieties, now being widely tested, showed superior performance in forage production and wilt resistance.

Recommended cultural practices stress the planting of alfalfa on well-drained soils, and the generous use of lime and phosphate fertilizers where needed. Adequate seedbed preparation helps to insure good stands with less seed, and the cultipacker-seeder or similar method of planting means firm contact between seed and soil, as well as shallow coverage.

New seedings may be clipped in late summer without damage, but fall cutting or grazing of new stands is hazardous. If three cuttings per year are harvested, the last cutting should be timed so

that root reserves in the plants are at a high level when cold weather stops growth.

Seed production possibilities in Iowa are limited, because of climatic conditions, as compared with more favorable irrigated regions. However, adequate control of destructive insects, sufficient populations of pollinating insects and minimized mechanical losses in harvesting are all important factors in increasing seed yields.

Alfalfa Varieties for Iowa[1]

By C. P. WILSIE[2]

Alfalfa has been called the queen of all forage crops. In Iowa, this recognition is well deserved, for no other forage legume or grass produces such an abundance of highly nutritious roughage for feeding livestock. Compared with red clover, alfalfa has produced 25 percent greater yields of forage over a 20-year period in experiments on Webster and Clarion soils in central Iowa. Under acid soil conditions in eastern and southern Iowa, red clover may outyield alfalfa, but on most Iowa soils it would appear economically sound to apply the lime, phosphate and other soil treatments necessary for successful alfalfa production.

In 1950, more than a million acres of alfalfa were harvested in Iowa, while the acreage in the five states including Nebraska, Minnesota, Wisconsin, Illinois and Iowa, totaled more than 6 million. The alfalfa acreage in Iowa has doubled during the past 20 years, and it is believed that even a much greater acreage devoted to this crop would be highly desirable.

Choice of varieties has been an important factor in determining success or failure. Sixty years ago there was no commercial recognition of alfalfa varieties in the United States, while today many varieties and strains are known. To obtain information of value in helping growers to select varieties best suited to various local soil and climatic conditions, field trials of alfalfa strains have been conducted for many years at the Iowa Agricultural Experiment Station. This testing program must be a continuous process for, as cropping systems change and losses from insect pests and diseases become serious, new varieties are needed. The prevalence of bacterial wilt in recent years has stimulated the development of wilt-resistant varieties. For Iowa, and the north central region in general, while resistance to wilt is highly important, other characteristics may be equally essential for dependable forage production. These include a high degree of winter hardiness, relative freedom from leaf and stem damage by insects and diseases, rapid recovery after cutting, ability to compete with weeds and grasses, and ability to produce high yields of forage and seed.

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[1]Project No. 1048 of the Iowa Agricultural Experiment Station.
[2]Professor of Farm Crops, Agronomy Department.

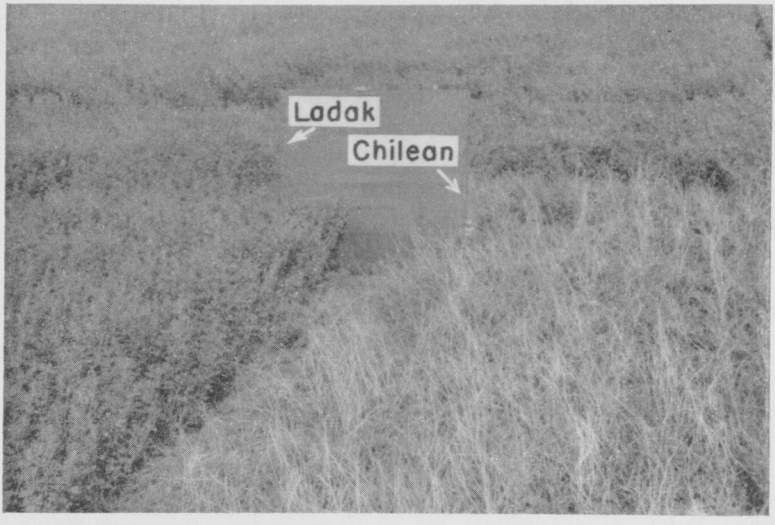

Fig. 1. Winterhardiness of alfalfa is essential under Iowa conditions. Plot of Ladak (left) shows no winter injury while Chilean (right) has suffered a nearly complete loss of stand.

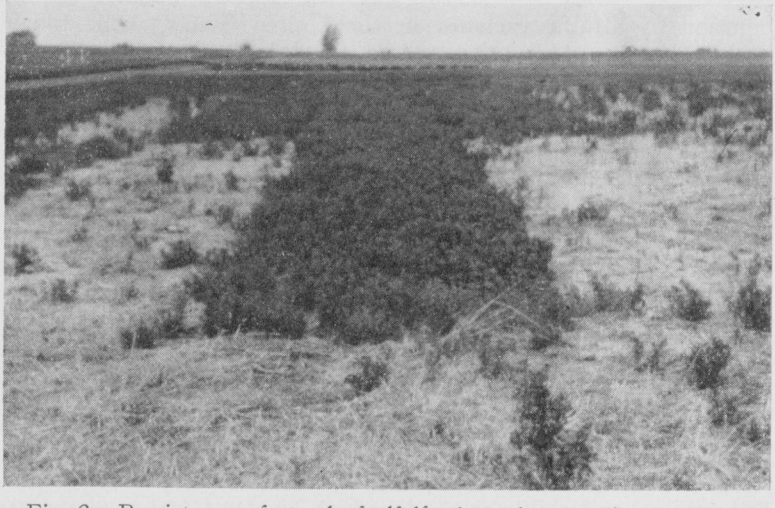

Fig. 2. Persistence of stand of alfalfa depends on resistance to bacterial wilt. After 6 years, plot of Ranger (center) still has excellent stand, while susceptible Grimm (left) and Kansas Common (right) have been replaced by weeds.

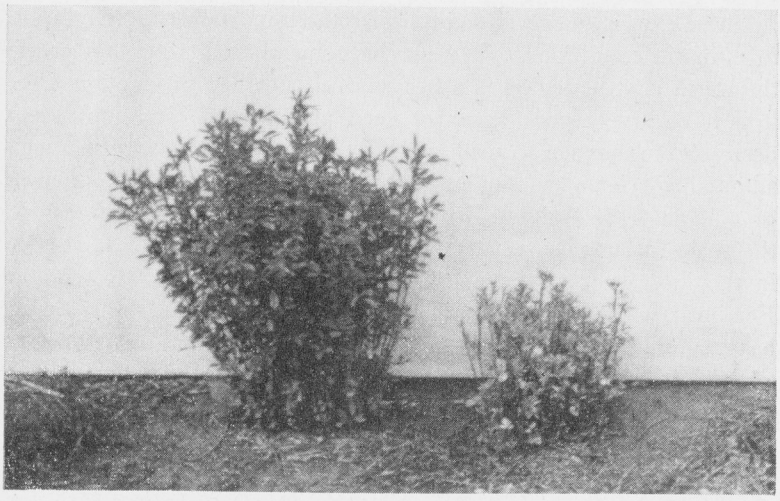

Fig. 3. Healthy plant (left) shows good recovery 20 days after cutting, while short, stunted plant, infected with bacterial wilt (right) will produce little forage and may be dead by the time the next cutting is made.

Some of the new strains, developed in alfalfa breeding programs, have wide adaptation to climatic and soil conditions, yet their performance is influenced considerably by certain factors of the environment. Ranger, for example, is highly wilt-resistant and can be grown from coast to coast, best adapted roughly to a region north of 40° latitude. This region includes Iowa and extends as far south as the Nebraska-Kansas boundary. The performance of Ranger, however, is considerably more outstanding in many of the drier western areas than it is in the more humid eastern areas. Buffalo, a variety developed from Kansas Common and highly wilt-resistant, is best adapted in a belt extending across the country between 35° and 42° latitude, or approximately as far north as central Iowa and as far south as central Oklahoma. It has been grown with some success considerably farther north, in New York, Ontario, Minnesota, Saskatchewan and Alberta, yet it is not considered to have a high degree of winterhardiness in those northern areas. In central Iowa, Buffalo has equalled Ranger in production of forage during the past 10 years, but it appears to suffer more winter injury than Ranger in parts of northern and northeastern Iowa.

These examples serve to emphasize the importance of adaptation to climatic conditions. It must be remembered, too, that while the north central region is a heavy alfalfa forage production area, it is a relatively poor area for seed production. It might seem desirable to have a considerable number of new varieties well adapted to specific regional areas, but the increase and maintenance of adequate seed supplies in specialized seed production areas in the western states, presents a most difficult problem. Experience in the increase and distribution of Ranger illustrates this point. For practical reasons, therefore, it appears highly desirable to have a minimum number of new varieties of wide regional adaptation. This should facilitate an orderly increase and distribution of seed to the major forage producing areas, through regular commercial channels.

ALFALFA VARIETIES NOW IN PRODUCTION

A brief description of the principal varieties now available will furnish informational background useful in the comparison of strains in yield trials.

LADAK

In 1910 this variety was introduced from Kashmir, in northern India, where it was growing at elevations of from 5,000 feet to 12,000 feet above sea level. Probably originating as a hybrid between the yellow-flowered *Medicago falcata* species and the purple-flowered *Medicago sativa* species, Ladak had a high proportion of yellow flowers when first grown in the United States. Because of natural crossing with other varieties through a number of generations, although still variegated, it now is largely purple flowered. Grown first at Redfield, South Dakota, Ladak was found to be extremely winterhardy and somewhat drouth resistant. Other characteristics include its semi-prostrate growth habit, slow recovery after cutting, early fall dormancy and exceptionally heavy first crop. While not particularly resistant to wilt, it does have considerably more tolerance than Grimm or strains of Common alfalfa. Under Iowa conditions, Ladak has been consistently the highest yielding variety for more than 20 years. Only in recent years has it been surpassed by Buffalo and Ranger in 4- and 5-year stands, where wilt has been severe.

Fig. 5. Ladak, one of the highest yielding varieties of alfalfa, is surpassed by Ranger in long-time stands on wilt-infested soils.

COSSACK

Seed gathered from plants growing wild on the dry steppes of Voronesh Province in Russia furnished the source material for Cossack alfalfa. It was introduced into the United States in 1907, and tests in South Dakota soon showed its superior hardiness and yielding ability. Cossack grows more erect than Ladak and has better recovery after cutting. For many years Cossack was extremely popular in Iowa but this popularity waned primarily because an adequate supply of pure seed became difficult to obtain. Cossack usually is more persistent than Grimm, but in general characteristics it is similar. It is now practically impossible to distinguish between the two varieties when grown in adjacent field plots.

GRIMM

A seed lot introduced from Germany into Carver county, Minnesota, by Wendelin Grimm in 1857 furnished the ancestral material from which the present variety, Grimm, was developed. This variety began to attract attention approximately 40 years later, because of its ability to withstand the severe Minnesota winters. The winterhardiness of Grimm may be due in part to its hybrid ancestry, as indicated by the variegated flowers, and in part to the effect of natural selection that took place through many generations under severe climatic conditions. Grimm soon became the most important variegated alfalfa in the United States and Canada. It is known for its excellent root development, winterhardiness, good recovery after cutting, good seed production and ability to compete with weeds and grasses. Because of susceptibility to bacterial wilt, it is not long-lived, but still is highly useful in stands to be harvested for not more than 2 years.

BALTIC

While the exact history of Baltic alfalfa is unknown, it is believed to have had a yellow-flowered variety in its ancestry. The name *Baltic* was taken from a small town in South Dakota where this variety was grown successfully for 10 years before being introduced into commercial production. Baltic is similar to Grimm in many characteristics, including susceptibility to bacterial wilt. A strain known as Meeker Baltic has been grown rather extensively in Colorado.

HARDIGAN

This variety traces to selections of Baltic made at Michigan State College for high seed production and desirable forage characteristics. Hardigan shows little flower variegation, is adapted to the same general regions as Grimm and Baltic, and like them is susceptible to bacterial wilt.

TURKISTAN

Introduced into the United States in 1898, the Turkistan alfalfas are known for their resistance to cold and to bacterial wilt. They have a shorter and somewhat more spreading habit of growth than Grimm, are somewhat slow in recovering after cutting, have an

Fig. 4. In the fourth crop year, Buffalo (left) is still highly productive, while Grimm (right) shows serious depletion of stand caused by wilt.

early fall dormancy, and are susceptible to many of the leaf and stem diseases.

Two improved strains have been developed, Hardistan, adapted to Nebraska but a poor seed producer, and Orastan, adapted to Oregon conditions. In breeding programs a number of selections from Turkistan alfalfa have been found which carry a high degree of wilt resistance.

RANGER

A synthetic or multiple-strain variety, developed by the U. S. Department of Agriculture and the University of Nebraska, Ranger traces to a number of strains selected from Turkistan, Cossack and Ladak. In the north central states, especially in

Iowa, Ranger's superiority lies in its wilt resistance. It does not produce more forage than a number of other varieties, unless the stands of such varieties as Grimm, Cossack or Ladak, become depleted by wilt. In plant type and flower color, Ranger is highly variable. It is similar to Grimm in recovery after cutting, but does not have the competing ability of Grimm in association with grasses. It is good in seed setting ability. In the humid areas Ranger is rather susceptible to leaf and stem diseases. In northern Iowa, Ranger does not seem to be quite as winterhardy as Ladak.

BUFFALO

Selected for a high degree of wilt resistance, as well as for seed and forage productivity, Buffalo traces back to an old line of Kansas Common which had been growing in Kansas for 45 years or more. In general, it has the flower color, growth habit and lack of early fall dormancy characteristic of the Common alfalfas. Buffalo is adapted to the same general area as Kansas Common, but also is successful somewhat farther north. It has shown superior performance in forage yields and persistence in field stands. In central Iowa, over a period of years, it has been equal to Ranger, although it is not recommended in the northern part of the state.

ATLANTIC

Developed in New Jersey, from selections having a wide genetic background, Atlantic is a vigorous and high yielding variety. For 2-year meadows it has produced as well as any variety under Iowa conditions, usually showing a slight superiority over Ranger and Buffalo. It has little resistance to bacterial wilt, yet is somewhat more persistent than Grimm under central Iowa conditions.

NARRAGANSETT

Developed in Rhode Island through mass selection for persistence and high forage yields, this variety has shown considerable promise in the midwest as well as in the eastern states. While it is too early to predict just what its adaptation in the north central region may be, it appears likely that it will be useful in short rotations where a high level of wilt resistance is not required.

TALENT

Released just recently by the Oregon Agricultural Experiment Station, Talent alfalfa was developed from an introduction from France obtained in 1931. For 20 years this strain has undergone considerable natural selection in Oregon. It is a high yielding variety, which recovers quickly after cutting and grows late in the autumn. Talent is now being tested for winterhardiness in Iowa but no recommendation can be made at this time.

RHIZOMA

Developed at the University of British Columbia from a cross between a yellow-flowered alfalfa and a variegated variety, Rhizoma is characterized by having a deep-set crown and ability to spread by producing rhizomes or underground stems. Tests in eastern Canada have shown that rhizome development is not very pronounced in that part of Canada, but Rhizoma has produced good pasture yields. In western Canada tests have shown that Rhizoma is susceptible to bacterial wilt. In preliminary trials in Iowa it has yielded somewhat less than Ranger or Buffalo.

VIKING

A Canadian variety, developed at Saskatoon, Saskatchewan, Viking is winterhardy and an excellent seed producer. Under Iowa conditions its performance has not been satisfactory.

FERAX

Another Canadian variety, Ferax, was developed at the University of Alberta for high seed yields. It is poorly adapted to Iowa climatic conditions and is quite unsatisfactory in forage production.

COMMON ALFALFA

The original seed of Common alfalfa is believed to have been brought from Spain to Chile. After it was grown for many years in Chile, this variety was introduced to California in 1850. Common alfalfa spread eastward from California, and through the years has been modified by natural selection. After being grown in widely separated areas having different climatic conditions, for many generations, strains adapted to those areas have evolved. Now there are many strains of Common alfalfa, designated by the

name of the areas where they are grown, such as California Common, Utah Common, Dakota Common, and Kansas Common. Marked differences exist among these regional strains, especially with regard to winterhardiness and fall dormancy. In general all strains of Common alfalfa, when grown in the northern states, tend to grow later in the fall than do Ladak, Cossack and Ranger.

STRAIN TRIALS

Field trials of alfalfa strains were conducted using either broadcast plots or multiple row (3- to 5-row) plots, approximately 5 feet by 20 feet in size, with three to six replicates of each variety. To insure firm contact between the seed and the soil the cultipacker was always used following seeding, and usually the whole experimental plot was seeded with an early maturing variety of oats planted at the rate of 1½ to 2 bushels per acre. Unless moisture appeared to be limiting growth, the oats crop was harvested for grain and an additional clipping in August aided in weed control.

During the year after establishment, three crops were harvested for forage, cutting when the alfalfa was in early bloom. Yields were computed in tons per acre at 12 percent moisture. When data on persistence of stands was an important consideration, trials were continued for 4 to 6 years. A summary of forage yields for two field trials, each conducted for a period of 4 years or more after establishment is given in table 1.

TABLE 1. SUMMARY OF FORAGE YIELDS OF ALFALFA STRAINS IN TWO TRIALS HARVESTED FOR 4 CROP YEARS AT AMES, IOWA.

Variety or strain	Tons per acre per year at 12 percent moisture
Buffalo	3.80
Ranger	3.76
Ladak	3.68
Cossack	3.45
Grimm	3.36
Kansas Common	3.18
Dakota Common	3.14
A 204 (experimental synthetic)	4.22
Significant difference at 5% level	0.20

Of all named varieties in the tests, highest yields were obtained from Buffalo, Ranger and Ladak, with Cossack and Grimm producing only a little less. The better recovery habits of Buffalo and Ranger would appear to make them a logical choice (as compared with Ladak) where bacterial wilt is severe and persistence is essential. Wilt was not serious in

TABLE 2. SUMMARY OF FORAGE YIELDS OF ALFALFA STRAINS IN FOUR DIFFERENT TRIALS HARVESTED FOR 3 CROP YEARS AT AMES, IOWA.

Variety or strain	Tons per acre per year at 12 percent moisture
Ladak	3.36
Ranger	3.33
Cossack	3.34
Atlantic	3.32
Buffalo	3.29
Grimm	3.17
Kansas Common	3.02
Viking (Canadian)	2.92
Ferax (Canadian)	2.50
A 204 (experimental synthetic)	3.78
A 206 (experimental synthetic)	3.69
A 216 (experimental synthetic)	3.63
A 220 (experimental synthetic)	3.69
Significant difference at 5% level	0.13

these trials until the third crop year.

An experimental synthetic variety, A-204, produced 20 percent more forage on the average, than was produced by Buffalo, Ranger, Ladak and Grimm, indicating considerable promise for some of the new varieties now being developed by breeding.

If alfalfa stands are to be harvested for not more than 3 crop years, the factor of wilt resistance becomes slightly less important. Yield results for varieties harvested for 3 years are presented in table 2.

Differences among the standard varieties were small, although Kansas Common produced somewhat less than Ladak, Ranger, Cossack, Atlantic and Buffalo. Two new Canadian varieties, Viking and Ferax, did not prove to be well adapted to Iowa conditions. Four experimental synthetic varieties yielded more forage than did any of the named varieties.

ALFALFA FOR SHORT ROTATIONS

The use of alfalfa in 4- and 5-year rotations is becoming increasingly important in the north central states. Because of the value of alfalfa in helping to maintain high yields of corn and other grain crops, more and more growers plan their rotations so that alfalfa can be grown on all of the rotation crop land, leaving the stand for 2 crop years only. Under such conditions, bacterial wilt damage usually is not serious and may influence forage yields but little. A summary of yields for six field trials, each continued for 2 crop years, is given in table 3.

Ladak, Atlantic and Cossack outyielded other varieties, but Buffalo, Grimm, Ranger were not far behind. Both Oklahoma and Kansas Common produced satisfactory yields in these trials in central Iowa, although preliminary data from northeastern Iowa

TABLE 3. SUMMARY OF FORAGE YIELDS OF ALFALFA STRAINS (SIX TRIALS) HARVESTED FOR 2 CROP YEARS AT AMES, IOWA.

Variety or strain	Tons per acre per year at 12 percent moisture
Ladak	3.59
Atlantic	3.42
Cossack	3.36
Buffalo	3.25
Oklahoma Common	3.22
Grimm	3.20
Ranger	3.17
Kansas Common	3.16
Arizona Common	0.70
A 224 (experimental synthetic)	3.58
A 225 (experimental synthetic)	3.50
A 226 (experimental synthetic)	3.41
Least significant difference at 5% level	0.10

indicate that they are less dependable than Grimm or other variegated varieties in that part of the state.

The three experimental synthetic varieties in these trials included A 224, a low-crown spreading type originating through the recombination of four strains, one from Iowa, one from Pennsylvania and two from Nebraska. This variety produces a wide and deep-set crown which may prove to be a desirable feature in promoting recovery after grazing or cutting, as well as lessening winter injury due to heaving. None of these experimental varieties is available for distribution at the present time, although it is likely that one or more of them will be increased for distribution within a few years.

The comparative performance of all strains and varieties in these trials, as related to the age of the stand, is shown by another method in table 4. Ladak has been taken as a standard, because of its consistent high yields, and is rated 100 percent. Other strains are listed with forage yields expressed in percentage of Ladak. It is brought out clearly that the varieties Ranger and Buffalo have no advantage for short-time stands, but are greatly superior for long-time stands. This advantage begins to be expressed during the third harvest year and probably is due primarily to their resistance to bacterial wilt. Also it may be noted that some of the new experimental varieties are consistently high producers of forage, with a superiority over Ladak evident even in the first harvest year.

STRAINS NOT ADAPTED TO IOWA

The unsatisfactory performance of Arizona Common, or Arizona Chilean as it is often called, should be noted. Grown in the

TABLE 4. SUMMARY OF FORAGE YIELDS OF ALFALFA STRAINS BY INDIVIDUAL HARVEST YEARS, EXPRESSED IN PERCENTAGE OF THE YIELD OF THE LADAK VARIETY.

Variety or strain	Forage yield expressed in percent of Ladak*			
	1st year harvest	2nd year harvest	3rd year harvest	4th year harvest
Ladak	100	100	100	100
Buffalo	97	90	105	142
Ranger	92	93	109	138
Atlantic	99	97	102	.....
Grimm	91	94	92	76
Cossack	94	99	94	67
Kansas Common	90	92	77	41
Dakota Common	95	97	83	24
Oklahoma Common	94	86	.....	.....
Arizona Common	21	26	.....	.....
Viking (Canadian)	88	99	87	99
Ferax (Canadian)	79	78	77	95
A 204 (experimental synthetic)	115	119	118	129
A 206 (experimental synthetic)	114	119	114	.....
A 216 (experimental synthetic)	111	116	113	.....
A 220 (experimental synthetic)	110	111	119	.....
A 224 (experimental synthetic)	100	97	.....	.....
A 225 (experimental synthetic)	99	96	.....	.....
A 226 (experimental synthetic)	92	94	.....	.....

*Data are given for yields of varieties only where direct comparison with Ladak could be made.

mild Arizona climate for many years, where growing conditions extend into the very late autumn, this strain has not made any selection for winterhardiness. Consequently, when such a strain is grown in Iowa, severe winter injury is likely to occur, leaving a depleted stand that cannot produce a good yield of alfalfa. In the same category, although there are marked differences in the degree of winterhardiness, are California, New Mexico, Texas and Utah Common. Even Washington or Oregon Common cannot be recommended, unless it is known that such strains have been grown for many generations in the areas of those states having severe winter temperatures.

Other nonhardy varieties unsuitable for Iowa farms are Peruvian, Arabian, South African, Provence (Southern France), Argentine and Indian strains. Many of these strains are highly prolific in warm climates, and in southern Arizona and California may produce 6 to 10 crops per year. But for the northern states, there is little or no place for such varieties not only because of

their extreme lack of winterhardiness but also because they have proved to be highly susceptible to bacterial wilt.

Recent interest in the use of alfalfa for green manuring has been stimulated by the increasing losses in sweetclover caused by infestations of the sweetclover weevil. Alfalfa has been used but little as an annual green manuring crop in Iowa. There are few data available on the value of alfalfa as compared to red clover or sweetclover plowed under at the end of the first season. Research is now under way at the Iowa Agricultural Experiment Station to obtain information on this problem, including determination of the comparative growth, both tops and roots, of nonhardy southern strains as well as northern hardy varieties.

CULTURAL PRACTICES

While alfalfa is grown successfully on many soils in Iowa, certain requirements are essential. Adequate surface drainage and underdrainage are necessary in order that the plant's deep and extensive root system can develop and function normally. Acid soils must be limed, preferably several months in advance of planting. Lime serves a two-fold purpose—it supplies calcium, so essential for normal growth of alfalfa, and corrects soil acidity.

Alfalfa has responded profitably to phosphate fertilizer on 60 to 80 percent of Iowa soils. On some soils potash fertilizer may be needed for best growth. Soil tests furnish the best guide for specific fertilizer recommendations.

Inoculation of seed with the proper nodule-forming bacteria is recommended, unless the field has grown good crops of alfalfa or sweetclover recently.

ESTABLISHING STANDS

A firm, well-prepared seedbed is good insurance against wasting high-priced seed. For early spring seedings, a companion crop of oats, barley or flax may be used. Early maturing varieties of oats, such as Cherokee and Mindo, are preferable to the more aggressive, heavy-stooling Clinton or Benton. The seeding rate of oats should be not more than 1½ to 2 bushels per acre. Late summer seedings made from August 10 to September 1 are sown without a companion crop.

Seeding rates for alfalfa in Iowa vary from 10 to 15 pounds per acre. If high quality seed is used and the seedbed thoroughly prepared, 8 to 10 pounds of seed per acre should produce a full stand. Seed should be planted from ½ to ¾ inch in depth, and may be sown with a grass seeder attachment on a grain drill, a cultipacker-seeder, or one of the more ordinary broadcast seeders. If seed is broadcast it is a good practice to use a cultipacker just prior to and just after seeding. This is essentially the same principle employed in the use of the more specialized implement, the cultipacker-seeder.

ALFALFA-GRASS MIXTURES

Experiments have shown that on relatively level lands, when used for hay only, pure stands of alfalfa usually yield as much or more forage than is produced by any kind of alfalfa-grass mixture. On sloping soils, where erosion is serious and especially where the crop is used for both grazing and hay, the addition of some grass to the alfalfa seeding is desirable. A good mixture for hay is 8 to 10 pounds of alfalfa plus 3 to 6 pounds of bromegrass or timothy. If grown primarily for grazing, a mixture of 6 pounds of alfalfa and 8 to 10 pounds of bromegrass is preferred. Under Iowa conditions no other grass equals bromegrass for use with alfalfa pasture mixtures.

MANAGEMENT OF ALFALFA STANDS

New spring seedings may be clipped the latter part of August, if growth is heavy or if weeds are prevalent, but should not be clipped or grazed after September 1. Plants should be allowed to make a good growth in the fall so that food reserves in the roots will be at a high level when winter comes. This is true for new seedings as well as established stands.

Alfalfa usually produces three crops of hay each year under Iowa conditions. The crop should be cut when in the 1/10- to ¼-bloom stage, or if bloom is scarce, new growth at the crown may be the best indication of approaching maturity. It is a good rule to allow 40 to 45 days between cuttings. Experiments have shown that the root reserves are at a low level about 20 days after the tops have been removed. This means that cutting should be avoided between September 10 and October 10. If top growth is removed then, renewed growth will result in a low level of root

reserves just about the time cold weather arrives and growth stops. The last cutting should be made before September 10 or after October 15 to favor overwintering without stand losses.

SEED PRODUCTION

Climatic conditions are not favorable for consistent high seed yields in Iowa, but a number of growers have learned how to make seed production a profitable enterprise. The second crop is the one usually saved for seed. Destructive insect control by the use of insecticides has resulted in marked increases in seed yields. DDT dusts or sprays are effective for control of lygus bugs and leafhoppers, while Toxaphene may be used for grasshoppers. Specific recommendations on time and rate of application of insecticides should be based on population counts, and growers should consult their County Extension Director and/or the Department of Entomology, Iowa State College, for assistance on specific insect problems.

Pollinating insects may not be sufficiently numerous to produce a high yield of seed. Wild bees including bumblebees and leafcutter bees are more efficient than honey bees in tripping alfalfa flowers and promoting cross-fertilization. While in California it has been demonstrated that heavy concentrations of honey bees (5 to 10 colonies per acre) pay handsome dividends in increased seed yields, no such marked increases have been obtained to date in the north central states.

The seed crop should be cut when ½ to ⅔ of the pods are brown and black. Threshing from the windrow usually is better than direct combining. Careful adjustment of the combine is important, and threshing should not be done until the windrows are thoroughly cured and dry. Cylinder speed must not be too high or seed will be damaged. Every effort should be made to save all the seed. Recleaning can be done effectively with good stationary cleaning equipment.