

A Guide for Selecting Alfalfa Varieties for Irrigated Stands in Wyoming

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Introduction

Alfalfa varieties released in recent years offer greatly improved levels of disease resistance and potentially higher yields than older varieties. Newer releases may be more expensive than most older varieties, but the selection of high-quality seed is an important step in alfalfa production. Even so, fluctuations in alfalfa seed inventories create opportunities to negotiate favorable discounts on varieties with moderate to high levels of resistance to diseases. This is particularly important for producers who intend to establish long-term, irrigated stands. A stand maintained for more than three years is considered long-term.

Variety selection criteria should include climatic adaptability, yield potential, and at least moderate levels of resistance to pests or diseases when appropriate. The presence and severity of diseases varies by region^c, soil type, climatic zone, and cultural practices. Price and availability of seed also vary.

Alfalfa Varieties May Perform Differently

Alfalfa varieties range widely in yield potential, climatic adaptability, persistence, disease resistance^c, price, and availability of seed. Alfalfa hay quality, on the other hand, relates more to plant maturity, environmental conditions, and cultural practices during and after harvest, than to inherent characteristics among varieties. Minor differences in forage quality among some varieties have been documented, but the economic advantages are seldom impressive. Even so, plant

breeders are constantly working to improve forage quality characteristics of alfalfa.

Yields Vary Among Varieties

With intensive management, some hay growers have regularly produced at least 5 tons per acre from older varieties. Most hay producers are now seeking higher-yielding, more persistent varieties. Many of the multiple-pest resistant varieties in Tables 2 and 2A are adapted to climatic conditions in Wyoming and have greater yield potentials than Ranger. Yields vary considerably among newer varieties, but some out perform Ranger from 5 to more than 25 percent.

Location years (Loc Yrs) in Tables 2 and 2A indicate the number of years each variety has been tested at a location. Alfalfa variety yield trials conducted by UW are normally established during the spring, but yields are not monitored until the following year. Yield evaluations are normally taken for three years beginning about 13-14 months after establishment. At the end of the trial, varieties have produced hay for four growing seasons and have been exposed to three winters. In irrigated trials, hay-type varieties that demonstrate better than average yields during a three-year period normally also demonstrate good persistence. Certain varieties of pasture or grazing-type alfalfa also demonstrate excellent long-term persistence, particularly when sprinkler-irrigated and where diseases are not present. However, many of the pasture-type varieties have little to no disease resistance and tend to be lower-yielding due to a fall dormancy rating of 1 or 2.

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What Are Fall Dormancy Ratings And Winterhardness Indexes?

Fall dormancy (FD) ratings of alfalfa relate to autumn regrowth or plant height on a scale of 1 to 9 (Tables 1 and 3). A rating of 1 indicates minimal regrowth and a high level of fall dormancy. A rating of 9 indicates considerably more autumn regrowth and non-dormancy. Ratings in Table 3 correspond to those reported by the National Alfalfa Variety Review Board.

Winterhardness is the adaptability of a variety to persist and yield in an environment with cold winters. With older varieties, fall dormancy has been linked to winterhardness. Varieties with high levels of fall dormancy tended to be more winterhardy. Depending on location, production strategy, and water resources, FD ratings of 1-4 have been considered suitable in Wyoming. Previously, varieties that were strongly fall dormant also tended to produce considerably more top growth during spring and early summer when compared to growth produced during the remainder of the season. They were considered to be preparing much earlier for winter by producing less top growth during late summer.

Plant breeders may have broken this linkage^a with some varieties released since 1989. Consequently, some of the newer releases appear to have the autumn yield advantage of less dormant varieties while maintaining the benefit of increased winterhardness^a. Vendors making this claim normally provide a winterhardness index (WHI) in addition to the FD rating. Table 3 contains only FD ratings because this trend is a recent development.

All varieties of alfalfa continue to photosynthesize, but become cold hardened when temperatures decline during early fall^f. Cold-hardening conditions a plant to survive temperatures as low as 23-24 degrees Fahrenheit for short periods. Top growth declines in response to colder temperatures and shortened day length because increasing amounts of carbohydrates are partitioned for storage as energy reserves in the roots and crowns to ensure survival during winter. Even highly fall-dormant varieties produce some late-season top growth until subjected to a hard freeze (23-24 degrees Fahrenheit) for several hours. Non-dormant varieties may produce more top growth during this period, but a decrease in fall dormancy is normally associated with a reduced ability to survive winters. So, until demonstrated otherwise for a particular variety, the relationship between fall dormancy and winterhardness is shown in Table 1.

If a WHI is unavailable, the relationship demonstrated is the preferred approach for predicting winterhardness. For older varieties, FD ratings not greater than 3 are probably a wise choice when a stand cannot be fall-irrigated (late August or early September), particularly if the stand will not be snow-covered during the winter.

Table 1. Relationship of fall dormancy to winterhardness.

	<u>Variety</u>	<u>FDR</u>	<u>WHI</u>
Very dormant	Spredor	1	9
Very winterhardy			
Dormant	Wrangler	2	8
Dormant	Ranger	3	7
Moderately dormant	Fortress	4	6
Moderately dormant	Deseret	5	5
Moderately winterhardy			
Moderately dormant	Lahontan	6	4
Non-dormant	Mesillia	7	3
Non-dormant	Moapa 69	8	2
Very Non-dormant	CUF 101	9	1
No winterhardness			

Varieties with FD ratings of 3 and 4 should be suitable for lower elevations if irrigation is possible by late August or very early September. Ideally, the harvest of stands irrigated this late in the season should be delayed to early October. Weather and logistics may dictate otherwise, but the survival of any stand of alfalfa in Wyoming will be enhanced when third-cutting regrowth is harvested after plants have cold-hardened and night temperatures hover around 23-24 degrees Fahrenheit. This normally occurs about October 1-15 at elevations of 5,500 feet or lower.

Even varieties with FD ratings of 4 and 5 appear to thrive at high elevations when the stand is snow-covered for most of the winter. Alfalfa stands insulated by snow at high elevations appear to be stressed less than exposed stands at much lower elevations. Numerous varieties with FD ratings of 4 (and at least two with a FD rating of 5) have survived winters at Afton, apparently due to snow cover.

Major Considerations When Choosing Varieties

Note many varieties in Tables 2 and 2A consistently out yield Ranger. Also, note that Ranger has almost no resistance to diseases (Table 3). Three pathogens that may impact alfalfa stand life^c and yield performance in long-term stands in Wyoming are stem nematode (SN), Phytophthora root rot (PRR), and Verticillium wilt (VW). Disease severity varies throughout Wyoming, but increasing numbers of varieties have at least moderate (or better) resistance to each of these potential problems.

Prepare a short list of high-yielding varieties from Tables 2 or 2A. Focus on trials located at elevations similar (within 500-700 feet) to areas to be planted to alfalfa on your operation. See Table 2B for elevations of trial locations. Don't be unduly concerned if some trials are located at latitudes that differ from your farming or ranching operation. Remember that elevation, soil type, availability of water,

frequency and duration of irrigation, soil fertility, disease resistance, and harvest management practices will have more influence on the performance of varieties than will latitude in Wyoming. Next, rank these varieties on the basis of disease and pest resistance (Table 3) to the three diseases mentioned above. Top-ranking varieties will be those with high levels of resistance for any disease (PRR, SN, or VW) that has been, or is likely to become, a problem on a particular site. And finally, note fall dormancy ratings (and winterhardiness indexes if available) for each variety and rank again in accordance with environmental conditions most prevalent at your site. This approach should produce a list of several varieties that represent a good choice for your operation. Varieties finally chosen may depend on price. The list you have created is your “shopping list.”

Use your “shopping list” to do some comparative pricing. Seed prices are usually negotiable. Periodic excesses in seed production create excellent opportunities to purchase varieties with superior levels of disease resistance. Remember that seed companies have invested considerable resources to improve yield potentials and disease resistances of proprietary varieties.

What Is An Alfalfa Blend?

Seed dealers frequently offer various blends, each composed of two or more varieties, marketed with a designated brand name. A blend may contain either public or proprietary varieties or both. A bag of blended seed is normally stamped “VNS” (variety not specified), particularly when proprietary varieties are involved. An indication of fall dormancy or level of disease resistance of a blend will only be as reliable as the dealer. Blends are not certified by the National Alfalfa Review Board and do not appear on the annual list published by the Certified Alfalfa Seed Council. Blends are not evaluated in university alfalfa yield trials because the components and the relative proportions may differ by region or marketing season.

Blends should be “area adapted” with some indication of level of resistance to diseases and an acceptable fall dormancy appropriate to the region. And while it is true that blends can be somewhat less expensive than proprietary varieties, there will be more assurance of quality control when blends are purchased from a well-established dealer with a local reputation. Vendors use blends to market excess seed inventories of older, discontinued, or inferior varieties. Blends may contain good varieties that have been marketed for several years, but are being replaced with newer, improved, multiple-pest resistant releases.

The Plant Variety Protection Act regulates what varieties may or may not be identified in a blend. The proprietary components of a blend cannot be revealed without permission from the company with proprietary rights. Public varieties in a blend can be identified. Conceivably, an alfalfa

producer could tailor a blend for local conditions by purchasing and mixing several adapted varieties prior to planting.

What About Ranger Alfalfa?

Some farms and ranches in Wyoming continue to use Ranger, a variety adapted and used throughout Wyoming since release in the early 1940s. Ranger, a dormant to semi-dormant variety with resistance to bacterial wilt, is well-adapted to alfalfa-producing areas of Wyoming. Experienced hay producers frequently compare the yield potentials and levels of disease resistance of new varieties to Ranger. Consequently, Ranger normally appears as a check in UW variety trials.

Most varieties tend to out-yield Ranger (Tables 2 and 2A), which has no documented resistance to economically important diseases in Wyoming (Table 3). Ranger has declined in popularity, but will persist if maintained under a favorable program of soil fertility and harvest management, particularly if diseases are not present. Unfortunately, when PRR, VW, or SN are a problem, a long-term stand of Ranger may decline more rapidly than a stand of a more resistant variety.

Ranger for short-term stands is favored by some producers. Vernal alfalfa, an older variety familiar to some Wyoming hay producers, is similar to Ranger, but tends to be somewhat more winterhardy due to deep-set crowns.

Always Plant Inoculated Seed!

Roots of an alfalfa plant nodulate when inoculated with an effective strain of *Rhizobium melioli*. Nodules convert (fix) atmospheric nitrogen to a form available to the plant. Most alfalfa seed sold in Wyoming is pre-inoculated prior to bagging. Inoculation and expiration date will be indicated on a tag sewn into the top seam of the bag. Incidents have occurred in recent years where seed was apparently bagged and planted without inoculation. This may occur when seed is purchased from a neighbor who produced the seed or when the seed was pre-inoculated, but became ineffective due to long-term storage or extended exposure to temperatures above 80 degrees Fahrenheit. Lack of inoculation is seldom a problem in soils with a history of alfalfa production. Even so, stand failure or unacceptable performance might occur when uninoculated seed is sown in a field that has never been in alfalfa production. Play it safe. Plant inoculated seed!

“Multileaf Alfalfa”: Are Multifoliolates of Higher Quality?

Quality differences among varieties of alfalfa for a particular cutting are usually quite slim when harvested at the same time or in the same stage of maturity at the same

location. This assumes, of course, that all varieties in a trial are subjected to uniform conditions of soil fertility and irrigation on a uniform soil type. Quality differences are possible, but usually minor, even when some varieties mature more rapidly than others.

For the most part, a stand harvested in bud stage or early flowering produces hay with lower fiber, higher crude protein, and greater digestibility than when harvested in an advanced stage of maturity. Even so, some varieties are exhibiting slight gains in quality due to plant breeding efforts to increase the number of leaflets per leaf.

Leaves on a “normal” alfalfa plant are mostly trifoliolate (TF, three leaflets per leaf). So-called “multileaf” (ML) varieties are more correctly termed multifoliolate and may exhibit four to seven leaflets per leaf. Degree of expression of the multifoliolate trait varies widely among varieties. Expression of the trait also tends to be greater on immature plants, particularly during early spring and early fall. A few varieties with limited ML expression demonstrate impressive yields and high levels of disease resistance. In the past, varieties with an extremely high degree of ML expression tended to be lower yielding^b when compared to TF varieties. Many ML varieties command a high price for seed and are marketed on the basis of higher quality.

So far, claims for improved forage quality among ML types have been weak. A recent study demonstrated that varieties with low expression (5-15 percent of the plants) showed no advantage in forage quality when compared to TF varieties^c. Only varieties with high expressions (60-70 percent) of the ML trait had significantly better forage quality. Forage yields in this particular study were not different between TF and ML types. There are, however, some rather high-yielding varieties that exhibit some degree of the ML trait. The same report also indicated that “with cultivars currently available, timing of harvest has a greater and more consistent influence on forage quality than does genetic improvement in leaf concentration.”

Continued improvement in ML varieties is likely. For the present, a good strategy is to choose alfalfa varieties on the basis of yield potential, fall dormancy, winterhardiness, and disease resistance. Hay quality continues to be related more to harvest management than to variety.

Summary Of Tips For Choosing An Alfalfa Variety!

1. Plant disease-resistant varieties. For long-term stands (more than three years), select alfalfa varieties with at least moderate or better levels of resistance to *Phytophthora* root rot, stem nematode, and *Verticillium* wilt. If diseases have been or are likely to become a problem, choose varieties with high levels of disease resistance. This is particularly important for long-term irrigated stands, but is also

appropriate for dryland stands when abundant seed inventories present an array of good varieties at competitive prices.

2. Plant adapted varieties. Stands planted in areas of the state that do not have the benefit of snow cover for most of the winter or which cannot be fall-irrigated (late August or early September) should be planted to varieties having a fall dormancy rating not greater than 3. If a stand will normally be fall-irrigated, or will be covered with snow during December and January, varieties with fall dormancies of 4 might be a possibility because seasonal and late-summer yields will generally be greater.

3. Plant varieties that out perform Ranger.

4. Plant INOCULATED SEED!

5. What about a multileaf variety? It's true that some multileaf varieties demonstrate impressive yields and high levels of disease resistance. Multileaf types also tend to bring premium prices and are marketed on the basis of higher quality. Evidence for higher quality is mixed and not particularly impressive in most instances. All varieties of alfalfa, both trifoliolate and multifoliolate, have to be harvested prior to early bloom to achieve quality levels considered to be dairy quality hay. At this time, a wise strategy is to choose an alfalfa variety on the basis of yield potential and disease resistance and then focus on harvest management to achieve quality.

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ADDITIONAL RESOURCES

Wyoming alfalfa variety performance trials for 1993 and 1994. University of Wyoming, Department of Plant, Soil, and Insect Sciences, Laramie. In: Crop Variety Evaluations, 1993/1994 Reports.

Verticillium Wilt. University of Wyoming, Cooperative Extension Service. B-777R.

Phytophthora Root Rot of alfalfa. University of Wyoming, Cooperative Extension Service. B-791R.

Biology and control of the Alfalfa Stem Nematode. University of Wyoming, Agricultural Experiment Station. B-761R.

Alfalfa Varieties. Certified Alfalfa Seed Council, P.O. Box 1017, Davis, California 95617-1017. 1994-95 Edition.

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