

Selection of Alfalfa Varieties in New Mexico

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Guide A-135

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Selecting the best variety to plant is one of the most important decisions alfalfa producers make each year. Choosing the most suitable variety for yield, quality, and stand longevity within each production area can potentially reward the producer with forage production gains of 15–30%. Selection of the best alfalfa variety is complicated because over 300 varieties are available, and varieties best suited for warmer production areas will differ from those selected for high-elevation production areas.

UNIVERSITY VARIETY TRIALS

Historically, alfalfa producers have been encouraged to select new varieties based on results from university variety trials conducted at local Agricultural Science Centers. Only varieties that have been tested in trials over multiple years should be considered because this reflects stand persistence, fall dormancy, and pest resistance. Variety selection should depend on

- yielding ability superior to currently grown varieties,
- moderate to high disease and insect resistance,
- adaptability within the production area(s), and
- excellent forage quality.

Current information on adapted alfalfa varieties with their fall dormancy and pest resistance ratings for Agricultural Science Centers at Alcalde, Artesia, Farmington, Las Cruces, Los Lunas, and Tucumcari are given in tables 1–6. The alfalfa varieties described in these tables were selected for superior yield performance at each location over multiple years. Producers should determine which Agricultural Science Center has the most similar growing conditions to their farm and select a group of alfalfa varieties from that location to plant in on-farm variety trials.

ON-FARM VARIETY TRIALS

Differences in a farm's soil, climate, and management practices should encourage each producer to conduct their own variety trial using a limited number of varieties. For a comparison, new varieties should be planted in addition to the producer's current alfalfa in an on-farm variety trial (OFVT). Individual OFVTs should consist of test strips (1 to 5 acres in size) grown under each producer's specific field and management conditions. These OFVTs allow producers to evaluate the relative performance of new varieties and make the most profitable choice for each farm.

ALFALFA VARIETY SELECTION FACTORS

The major factors to consider when selecting an alfalfa variety include yield potential, stand persistence, winter hardiness, pest (disease and insect) resistance, and forage quality.

Yield Potential

Yield potential is the most important factor influencing net profits because most alfalfa production costs are fixed. If a new variety provides a 5% improvement in yield (i.e., 0.25 tons, assuming 5 tons

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per acre), and production costs are fixed regardless of the variety, this will result in a \$30 per acre increase in net profits, assuming a sale price of \$120 per ton.

Stand Persistence

Stand persistence is the ability of plants to survive field conditions over time. It is strongly influenced by winter hardiness, harvest frequency, and pest resistance. To determine stand persistence, calculate the number of plants per square foot in a selected area within each alfalfa field over a 3- to 5-year period. Producers should replace alfalfa fields when the stand has less than five plants (or 40 stems) per square foot. Higher stand persistence will increase how long a field can be harvested before it must be replanted. This will increase the time available to recover the costs of stand establishment, thus reducing production costs.

Winter Hardiness and Fall Dormancy

The winter hardiness of an alfalfa variety depends on its ability to survive cold temperatures, become dormant in the fall, and resist root and crown diseases. The best indication of winter hardiness is stand persistence ratings in the spring following a severe winter. After a severe winter, varieties without winter hardiness will suffer freeze damage and plant death, reducing stands and slowing spring growth of the remaining shoots.

Fall dormancy refers to a variety's tendency to stop growth in the fall and is an indirect measure of winter hardiness (table 7). Varieties with a fall dormancy rating of 1 are very dormant and those with a rating of 9 are very non-dormant. Very dormant varieties may possess excellent winter hardiness and stand persistence, however, spring and fall growth in these varieties will be severely reduced. Non-dormant varieties begin growth earlier in the spring and continue growth later in the fall. Producers should select varieties with sufficient dormancy to survive winter conditions and prevent premature spring growth, while optimizing growing season forage production. Alfalfa varieties categorized by fall dormancy ratings for New Mexico's Agricultural Science Centers are shown in tables 1–6.

Disease and Insect Resistance

Anthraxnose, bacterial and fusarium wilt, and phytophthora root rot are major diseases of alfalfa in New Mexico. Moderate to high levels of disease resistance will increase yield by reducing seedling death, and increase stand density and persistence. A good disease management strategy is to select alfalfa varieties with the highest levels of resistance to diseases occurring in each production area.

Insect resistance may substantially affect yield, forage quality, stand persistence, and production costs. Control alfalfa weevils; stem and root knot nematodes; and blue, pea, and spotted alfalfa aphids for stand persistence, high forage quality, and yield. Using resistant alfalfa varieties is an important tool in insect management (tables 1–6). Other tools that affect insect control include crop management (i.e., proper fertility and harvest practices) and an integrated pest management program. Producers should select high-yielding alfalfa varieties that have the highest level of pest resistance (insect and disease) available for pests identified in their production area.

An alfalfa population with a resistance rating of moderate (mr) is needed to prevent economic losses from a given pest. Resistance ratings describe the percentage of resistant plants in the population to a particular pest. For example, a rating of moderate resistance indicates 15–30% resistant plants in the population. A complete list of definitions for alfalfa resistance levels is provided in tables 1–6.

FORAGE QUALITY

High quality alfalfa hay generally possesses the following characteristics.

- greater than 19% crude protein
- greater than 40% leaves by weight
- greater than 60% green color
- greater than 20% of leaves cling to stems
- less than 31% acid detergent fiber
- less than 40% neutral detergent fiber
- less than 5% foreign material

Ultimately, market conditions and intended use (i.e., livestock class) will influence the desired level of forage quality. The best recommendation for high quality alfalfa hay is to maintain healthy stands and make good management decisions.

Alfalfa producers should consider that climate, location, and harvest management have a much greater effect on forage quality than variety selection. Although selection can be important, yield potential should not be compromised. Choosing new alfalfa varieties that meet or exceed quality standards is difficult because

- differences among varieties are relatively small compared to other factors that influence forage quality,
- forage quality is difficult to measure, and
- methods of measurement vary among laboratories.

Cultural and management practices such as cutting schedules, maturity, weed control, baling conditions, stand density, irrigation scheduling, and fertilizer application and rates are major factors influencing forage quality. Most research indicates that the optimum balance between yield and forage quality occurs at 10% bloom. Cutting alfalfa at pre-bloom results in high quality hay, but generally reduces stand life because the crop doesn't have an opportunity to replenish root reserves for subsequent forage regrowth.

Harvesting at an appropriate maturity stage is important because fiber increases and digestibility and mineral content decrease as the alfalfa crop matures. In addition, producers should avoid turning windrows unless absolutely necessary. Leaf retention during baling is important to maintaining forage quality since the digestibility and nutrient content of alfalfa leaves is greater than the stems. Baling under higher humidity (often at night) helps with leaf retention.

Weed control also is an important component in forage quality management. Weeds often lower forage quality and may contain toxic chemicals or other noxious properties (e.g., sandbur). Weeds also may indicate less-than-optimum alfalfa management and a decline in stand density.

ACKNOWLEDGMENT

Fall dormancy and pest resistance ratings were obtained from the Certified Alfalfa Seed Council publication, *Fall Dormancy and Pest Resistance Ratings for Alfalfa Varieties, 1996-97 Edition*, P.O. Box 1017, Davis, CA 95617-1017, tel. 916-752-0572, email: www.alfalfa.org.

TERMINOLOGY

adaptation—process by which varieties change in relative performance in response to different environments.

resistant—crop that is able to avoid, inhibit, or restrict the activities of a specific disease, insect, or environmental stress.

susceptible—inability of a crop to avoid, suppress, and/or retard a specific disease, insect, or environmental stress.

variety—subdivision of a species for taxonomic classification. A variety can be differentiated by at least

one chemical, morphological, physical, or other characteristic from other varieties. A variety also is true-breeding and uniform in its variations.

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Table 1. Fall dormancy and pest resistance ratings of adapted alfalfa varieties with superior performance from the Agricultural Science Center at Alcalde.

Variety	Company	Fd ¹	Pest resistance ^{2,3}									
			An	Bw	Fw	Pr	Vw	Ba	Pa	Sa	Sn	Rn
Archer	America's Alfalfa	5	r	mr	hr	r	mr	r	hr	hr	r	—
Cimarron VR	Great Plains	4	hr	hr	hr	r	r	mr	hr	hr	r	mr
Jewel	Wilbur-Ellis	4	r	hr	r	hr	r	—	r	r	—	—
Legend	Cenex/Land O'Lakes	4	hr	hr	hr	hr	r	—	r	lr	—	—
WL 322 HQ	W-L Research	4	mr	hr	hr	r	r	r	hr	hr	lr	—
WL 317	W-L Research	3	r	hr	hr	hr	r	—	hr	r	r	—

¹Fd = fall dormancy rating (refer to table 7)

²An = anthracnose
Bw = bacterial wilt
Fw = fusarium wilt
Pr = phytophthora root rot
Vw = verticillium wilt
Ba = blue alfalfa aphid
Pa = pea aphid
Sa = spotted alfalfa aphid
Sn = stem nematode
Rn = root knot (southern) nematode
 — = no data available

³s = susceptible (0–5% resistant plants)
lr = low resistance (6–14% resistant plants)
mr = moderate resistance (15–30% resistant plants)
r = resistance (31–50% resistant plants)
hr = high resistance (> 50% resistant plants)

Table 2. Fall dormancy and pest resistance ratings of adapted alfalfa varieties with superior performance from the Agricultural Science Center at Artesia.

Variety	Company	Fd ¹	Pest resistance ^{2,3}									
			An	Bw	Fw	Pr	Vw	Ba	Pa	Sa	Sn	Rn
630	ICI Seeds	4	mr	hr	r	r	mr	mr	r	mr	mr	—
DK 169	Dekalb	6	—	r	r	mr	mr	lr	r	hr	r	—
DK 189	Dekalb	8	hr	mr	hr	r	mr	r	r	hr	mr	r
Express	Union Seed	6	r	mr	mr	hr	mr	r	hr	hr	r	lr
Rio	Great Plains	7	hr	r	hr	hr	—	hr	hr	hr	mr	r
Tahoe	Northrup King	6	hr	mr	hr	hr	r	r	hr	hr	r	r
Wilson	Public	6	—	r	r	—	—	—	—	r	mr	mr
WL 320	W-L Research	4	mr	r	r	r	mr	mr	mr	r	mr	—
WL 414	W-L Research	6	r	r	hr	hr	r	hr	hr	hr	r	r
WL 525 HQ	W-L Research	8	—	mr	hr	hr	—	hr	hr	hr	r	hr

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hr = high resistance (> 50% resistant plants)

Table 3. Fall dormancy and pest resistance ratings of adapted alfalfa varieties with superior performance from the Agricultural Science Center at Farmington.

Variety	Company	Fd ¹	Pest resistance ^{2,3}									
			An	Bw	Fw	Pr	Vw	Ba	Pa	Sa	Sn	Rn
Cimarron VR	Great Plains	4	hr	hr	hr	r	r	mr	hr	hr	r	mr
Dart	AgriPro	3	r	hr	hr	hr	r	—	r	—	—	—
Key*	Great Plains	4	hr	hr	hr	hr	hr	mr	hr	hr	mr	mr
Total + Z*	America's Alfalfa	3	hr	hr	hr	hr	hr	s	r	mr	mr	—
WL 252 HQ*	W-L Research	2	hr	hr	hr	hr	r	lr	r	mr	r	—
WL 323	W-L Research	4	hr	hr	hr	hr	r	—	r	mr	hr	—

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²An = anthracnose
Bw = bacterial wilt
Fw = fusarium wilt
Pr = phytophthora root rot
Vw = verticillium wilt
Ba = blue alfalfa aphid
Pa = pea aphid
Sa = spotted alfalfa aphid
Sn = stem nematode
Rn = root knot (southern) nematode
 — = no data available

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mr = moderate resistance (15–30% resistant plants)
r = resistance (31–50% resistant plants)
hr = high resistance (> 50% resistant plants)

* indicates only 2 years of testing.

Table 4. Fall dormancy and pest resistance ratings of adapted alfalfa varieties with superior performance from the Agricultural Science Center at Las Cruces.

Variety	Company	Fd ¹	Pest resistance ^{2,3}									
			An	Bw	Fw	Pr	Vw	Ba	Pa	Sa	Sn	Rn
5715	Pioneer Hi-Bred	8	hr	lr	hr	r	lr	hr	hr	hr	—	—
DK 166	Dekalb	6	—	r	r	mr	mr	lr	r	hr	r	—
DK 189	Dekalb	8	hr	mr	hr	r	mr	r	r	hr	mr	r
Doña Ana	Public	7	lr	mr	mr	r	—	—	r	mr	—	—
Express	Union Seed	6	r	mr	mr	hr	mr	r	hr	hr	r	lr
LM 455	Lohse Mill	6	lr	r	hr	r	mr	mr	hr	hr	r	—
Mede	Union Seed	5	r	mr	hr	r	mr	r	r	hr	—	r
Tahoe	Northrup King	6	hr	mr	hr	hr	r	r	hr	hr	r	r
Wilson	Public	6	r	r	—	—	—	r	mr	mr	—	—
WL 516	W-L Research	8	lr	mr	hr	hr	—	hr	hr	hr	mr	—

¹Fd = fall dormancy rating (refer to table 7)

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r = resistance (31–50% resistant plants)
hr = high resistance (> 50% resistant plants)

Table 5. Fall dormancy and pest resistance ratings of adapted alfalfa varieties with superior performance from the Agricultural Science Center at Los Lunas.

Variety	Company	Fd ¹	Pest resistance ^{2,3}									
			An	Bw	Fw	Pr	Vw	Ba	Pa	Sa	Sn	Rn
630	ICI Seeds	4	mr	hr	r	r	mr	mr	r	mr	mr	—
Archer	America's Alfalfa	5	r	mr	hr	r	mr	r	hr	hr	r	—
Cimarron VR	Great Plains	4	hr	hr	hr	r	r	mr	hr	hr	r	mr
Pecos*	America's Alfalfa	7	mr	mr	hr	r	r	mr	r	r	mr	hr
LM 455*	Lohse Mill	6	lr	r	hr	r	mr	mr	hr	hr	r	—
LM 459*	Lohse Mill	5	lr	r	hr	r	r	mr	hr	r	r	r
Rio	Great Plains	7	hr	r	hr	hr	—	hr	hr	hr	mr	r
WL 323*	W-L Research	4	hr	hr	hr	hr	r	—	r	mr	hr	—

¹Fd = fall dormancy rating (refer to table 7)

²An = anthracnose **Ba** = blue alfalfa aphid
Bw = bacterial wilt **Pa** = pea aphid
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hr = high resistance (> 50% resistant plants)

* indicates only 2 years of testing.

Table 6. Fall dormancy and pest resistance ratings of adapted alfalfa varieties with superior performance from the Agricultural Science Center at Tucumcari.

Variety	Company	Fd ¹	Pest resistance ^{2,3}									
			An	Bw	Fw	Pr	Vw	Ba	Pa	Sa	Sn	Rn
630	ICI Seeds	4	mr	hr	r	r	mr	mr	r	mr	mr	—
Arrow	America's Alfalfa	3	mr	hr	hr	hr	r	—	r	—	mr	—
Cimarron	Great Plains	4	hr	hr	hr	mr	lr	hr	mr	—	—	—
Cimarron VR	Great Plains	4	hr	hr	hr	r	r	mr	hr	hr	r	mr
Doña Ana	Public	7	lr	mr	mr	r	—	—	r	mr	—	—
Fortress	Northrup King	4	—	r	r	hr	r	—	r	hr	hr	—
Wilson	Public	6	—	r	r	—	—	—	r	mr	mr	—

¹Fd = fall dormancy rating (refer to table 7)

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Pr = phytophthora root rot **Sn** = stem nematode
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³s = susceptible (0–5% resistant plants)
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hr = high resistance (> 50% resistant plants)

Table 7. Fall dormancy ratings for alfalfa varieties.

Rating	Description	Production areas*
1	Very dormant	} Northern third of New Mexico
2	Dormant 1	
3	Dormant 2	
4	Moderately dormant 1	} Middle third of New Mexico
5	Moderately dormant 2	
6	Semi-dormant	
7	Moderately non-dormant	} Southern third of New Mexico
8	Non-dormant	
9	Very non-dormant	

* Based on elevation and latitude. Adapted from Carlson (1995).

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