PICKING A VARIETY THAT WINS IN THE LONG RUN

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Alfalfa is an important cash crop in the intermountain areas of northeastern California where alfalfa is produced in the higher elevation mountain valleys of Modoc, Lassen, Plumas, and the eastern portions of Siskiyou, Shasta, and Sierra Counties. Elevations in these alfalfa producing areas range from 2500 to 5000 feet with a growing season of 80 to 180 days, depending largely upon elevation. The weather during the season is generally warm during the day and cool at night. The area is noted for the production of high quality, high-test alfalfa hay, but yields generally are limited by the cool temperatures and short growing seasons. The alfalfa varieties best suited for these high elevation areas are different than the varieties adapted to the warm long season alfalfa areas in the remainder of the state. Intermountain growers, like alfalfa growers elsewhere, make variety selections based on yield, stand persistence, crop quality, and seed price.

YIELD. The economics of crop production forces growers to be concerned about the yield potential of their selected varieties. Many of the costs associated with crop production are fixed costs, like the costs of stand establishment, land rent/ownership, and equipment ownership. Increased yields afforded by the selection of an improved variety essentially spread these costs over greater amounts of hay, which lowers the cost of production per ton of hay produced. Restated, it simply costs less *per ton* to produce high yield hay, particularly if the increased yields are the result of a single change to a new variety.

STAND PERSISTENCE. Actually, it is the yield of the crop over the total years of production that determines the profitability of the crop. As noted above, the cost of alfalfa stand establishment is relatively fixed for a given farm operation. The impact of establishment costs on overall profitability depends largely on the number of years that the crop is in production. The longer the stand life, the more years available to recover the cost of establishment. Generally, growers in the intermountain area would like to maintain stands for 5 years or more, with a stand life of 7 years perhaps typical. Failure to meet these goals, means that the establishment costs will be spread over just a few growing seasons and the total cost of production *per year* will be high.

Stand life refers to the need to maintain minimum average crop stands greater than 5 to 6 plants per square foot. Fields with stands below these levels will have marginally reduced yields and, perhaps more important, will suffer losses in hay quality. Sparse stands produce stemmy, low-test hay, and offer greater opportunities for weed invasion. With the high cost of growing and putting-up hay, growers cannot afford to continue to farm fields when poor stands result in low yields or reduced quality hay.

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The most important varietal factor in maintaining adequate stands in the intermountain region is winter hardiness. Most of the intermountain area is subjected to months of sub-freezing winter temperatures. To make things worse, these cold temperatures often occur without the benefit of an insulating blanket of snow on the ground. Accordingly, varieties without good winter hardiness suffer plant winter kill and stands may be reduced to sub-economic levels during only one or two years of production. Of course, crop stands can be affected by other factors such as disease or cultural mismanagement; but if a variety is not sufficiently winter hardy, optimum management of other production factors will not necessarily prevent winter stand loss.

A major component of winter hardiness is plant dormancy. Dormancy refers to a variety's tendency to cease growth in the fall as temperatures drop and begin growing again in the spring as soil temperatures begin to rise. Plants that are winter dormant are much less susceptible to winter kill. Plant dormancy can also affect yield negatively. The yield of third or forth cutting alfalfa will be lower with varieties that go dormant early in the fall and first cutting yields will be down with varieties that wait excessively long to begin growth in the spring. There is an additional complication: if varieties begin growth too early in the spring they can be hit by late spring frosts that can severely damage first cutting yields and quality. So the selection of a variety with the proper dormancy is a compromise. Varieties should be selected that are sufficiently dormant to assure good winter survival and to prevent premature spring growth. But varieties should not be selected that are so dormant that valuable growing days are lost in both the spring and the fall. The varieties that have produced the highest yields with adequate winter survival in the intermountain region have tended to be in the dormancy classes 3 and 4. These classes are based on industry standards for fall re-growth. On this scale, the dormant variety Vernal is classified as a 2, while less dormant varieties similar to Ranger are classified as a 3, and semi-dormant varieties similar to Saranac are grouped in class 4.

PEST AND DISEASE RESISTANCE. The yield performance and stand life of an alfalfa variety are assumed to be related to the pest and disease resistances of the cultivar. However, many areas in the intermountain region are not plagued by all of the serious disease and pest problems that can significantly limit alfalfa production in other regions. For this reason, it is not uncommon to see a variety with very little pest or disease resistance perform very well in yield studies conducted by the University in the intermountain area. This does not mean that pest and disease resistance is not important - it only indicates that a review of experimental yield results may not show the whole picture. In specific field situations varietal pest and disease resistance may be critical. For example, high phytophthora root rot resistance may not be needed in the very well drained soils common to the Tulelake area, but high phytophthora resistance is required in the wet, poorly drained fields in some intermountain production areas. Likewise, stem nematode resistance may not be generally important in the region, but such resistance is critical to successful alfalfa production in fields that have stem nematode infestations. Pest and disease resistances that may be critical in specific fields include bacterial wilt, verticillium wilt, phytophthora root rot, fusarium wilt, anthrancnose, and stem nematode. For information on the relative resistance of varieties to pests and diseases consult local seed sales representatives, area Farm Advisors, or the variety listing supplied by the Certified Alfalfa Seed Council.

HAY QUALITY. The quality of hay produced is critical to the sale price of the alfalfa hay. Growers need to match the quality of the hay produced with the demands of the market in which they choose to sell. For example, dairy quality hay demands a premium price but must also meet exacting test quality standards. Ideally, varieties should be selected to meet such criteria. Unfortunately, it is not that simple. Many factors other than variety have an affect on the quality of hay produced. Factors such as crop stand and cutting schedule have a great impact on the quality of alfalfa hay. Generally, hay cut at an earlier maturity is of higher quality than more mature hay. As mentioned above, hay quality will decline as plant stands are reduced. Irrigation and fertilizer management, weed control, and pest and disease management all can have major impacts on hay quality. Because of confounding effects of all these factors, it is extremely difficult to measure the small differences that exist in quality between the different varieties. One variety may produce the highest quality hay under one set of conditions, but it may not perform as well as other varieties when grown under different management.

This is not to say that quality differences among varieties do not exist - only that such differences are generally small and very difficult to measure. Accordingly, little unbiased information is available to growers to segregate one variety from another on the basis of quality. The best recommendation on quality is to maintain good plant stands and to match the cultural and cutting management of a field to the growth characteristics of the variety selected.

SOURCES OF INFORMATION. Company seed sales representatives are a ready source of information about specific alfalfa varieties. Growers should not hesitate to ask specific questions about variety dormancy groups, pest and disease ratings, and about relative yield and quality performance in their area. Performance information can be gleaned from reports of university conducted research, providing the tests were conducted under similar climatic conditions and management. Remember, the closer to home, the more likely research information will apply to a specific set of local conditions. The University of California has for years conducted alfalfa variety evaluations at the Intermountain Research and Extension Center at Tulelake and many smaller variety tests have been conducted by Farm Advisors in the major alfalfa producing valleys throughout the intermountain area. Area Farm Advisors would be happy to provide growers and seed handlers with the pertinent performance results form these studies.

VARIETIES VERSE BRANDS OR BLENDS. The statements made in this discussion refer primarily to recognized alfalfa varieties. Other good performing alfalfa seed can also be purchased as trade name brands and/or as blends of various varieties. Like recognized varieties, there are good performing blends and brands and poorer performing blends and brands. The dilemma in dealing with such material is that there is no certainty that the material tested and reported on in experimental trials will be the same as the material or blend marketed under that trade name in the future. Growers should make certain when purchasing blends or brands that the seed has the same cultivar make-up as the seed that was previously used successfully.

SEED PRICE. Of course it would be foolish to pay more money for seed of a variety that did not perform better than seed of a less expensive cultivar. On the other hand, it only takes a small difference in performance to pay for a large difference in seed cost. For example, a grower would be money ahead to pay an extra dollar a pound for seed of a new variety, even if the new variety only produced an extra 1/3 of a ton per acre per year for a 5 year period (about a 5% increase in yield). The seed would cost an extra $20.00 per acre up front, but would, on the average, return a $300.00 per acre increase in net profits over the life of the stand.

In conclusion, growers should select a variety that will allow them to produce the highest yield of high quality alfalfa possible. Growers should pick from varieties with growth characteristics and pest and disease resistances suitable for their area. Information about variety yield performance and persistence in experimental trials, as well as, information on variety dormancy characteristics and pest disease resistances can be obtained from local Farm Advisor offices. Growers are encouraged to plant test strips of selected new varieties to see how the variety will perform under their field and management conditions. Time and money spent on selecting the most suitable variety will be rewarded with higher yields and reduced production costs.

The information in Table 1 is a six-year summary of a 46 entry alfalfa variety trial conducted at the Intermountain Research and Extension Center at Tulelake. It was planted in June 1986.

Table 1 Six year yield summary. 1986 northern California mountain valley regional 46 alfalfa variety and brand trial. Planted 6/24/86, Intermountain Research & Extension Center, Tulelake, Siskiyou County. <TU1861Y1.Y66>

Entry	Yield in dry tons per acre, rank in parenthesis								
	1986	1987	1988	1989	1990	1991	Average 1986-1991		% of Vernal
Centurion	3.08(4)	8.67(1)	8.24(17)	8.23(3)	8.52(10)	8.51(10)	7.59(1)	A	109.2
Webfoot (80-16 PCA3)	2.93(14)	8.15(7)	8.48(3)	8.27(1)	9.04(2)	8.40(20)	7.55(2)	AB	108.5
WL 316	2.92(15)	8.17(5)	8.28(12)	8.17(6)	8.98(3)	8.39(22)	7.48(3)	ABC	107.6
360 II Brand	2.91(17)	8.23(3)	8.18(25)	8.12(10)	8.85(9)	8.60(5)	7.48(4)	ABC	107.6
Blazer	2.91(18)	8.16(6)	7.86(40)	8.13(9)	8.98(4)	8.73(2)	7.46(5)	ABCD	107.2
Champ (RS 3309)	2.86(25)	8.10(9)	8.38(7)	8.03(16)	8.86(8)	8.53(9)	7.46(6)	ABCD	107.2
Epic	2.98(10)	7.97(22)	8.25(15)	8.09(12)	8.68(15)	8.70(3)	7.45(7)	ABCD	107.0
5444	2.75(33)	8.12(8)	8.49(2)	8.24(2)	8.64(20)	8.36(23)	7.43(8)	ABCDE	106.9
Hax 85 Brand	2.92(16)	7.90(28)	8.25(16)	8.14(7)	9.05(1)	8.30(28)	7.43(9)	ABCDE	106.8
WL 320	2.64(40)	8.02(17)	8.41(6)	8.20(5)	8.96(5)	8.30(27)	7.42(10)	ABCDE	106.7
Vortex	2.70(36)	8.04(14)	8.27(13)	8.20(4)	8.77(12)	8.53(8)	7.42(11)	ABCDE	106.6
Big 10	3.07(6)	8.08(11)	8.19(23)	7.97(21)	8.74(13)	8.42(17)	7.41(12)	ABCDEF	106.5
Armor	3.04(9)	7.95(23)	8.18(24)	7.85(31)	8.89(6)	8.55(7)	7.41(13)	ABCDEF	106.5
Sparta	2.94(13)	8.03(15)	8.20(20)	8.04(15)	8.88(7)	8.36(24)	7.41(14)	ABCDEF	106.5
Anchor	2.66(39)	8.04(13)	8.78(1)	7.99(19)	8.28(36)	8.47(15)	7.37(15)	ABCDEF	106.0
Excaliber	3.28(1)	8.39(2)	8.27(14)	8.14(8)	8.51(27)	7.64(41)	7.37(16)	ABCDEF	105.9
Atra 55	2.85(26)	8.05(12)	8.13(26)	8.06(13)	8.59(25)	8.50(13)	7.36(17)	ABCDEF	105.9
526	2.88(23)	8.02(18)	8.31(10)	7.97(22)	8.48(30)	8.51(11)	7.36(18)	ABCDEF	105.8
MK 85632	2.88(21)	8.09(10)	8.22(19)	7.94(24)	8.66(17)	8.21(34)	7.33(19)	ABCDEF	105.4
DK 135	2.98(11)	8.19(4)	8.35(9)	7.92(25)	8.41(32)	8.13(36)	7.33(20)	ABCDEF	105.4
Flint	2.76(32)	7.73(37)	8.42(5)	8.00(18)	8.58(26)	8.40(21)	7.32(21)	ABCDEF	105.2
X2	2.79(31)	7.86(31)	8.12(28)	7.79(35)	8.69(14)	8.58(6)	7.30(22)	ABCDEF	105.0
WL 315	2.69(37)	8.00(20)	8.37(8)	7.76(37)	8.50(28)	8.50(14)	7.30(23)	ABCDEF	105.0
DK 120	3.05(8)	7.92(25)	7.93(38)	7.87(29)	8.65(19)	8.41(18)	7.30(24)	ABCDEF	105.0
Peak	2.84(27)	7.89(29)	8.08(32)	7.96(22)	8.78(11)	8.26(31)	7.30(25)	ABCDEF	105.0
Drummor	3.06(7)	7.70(39)	8.11(30)	7.90(27)	8.66(16)	8.33(25)	7.29(26)	BCDEFG	104.8
WL 225	2.95(12)	7.78(35)	8.10(31)	7.85(32)	8.59(24)	8.42(16)	7.28(27)	BCDEFG	104.7
Vector	2.89(20)	8.02(16)	8.47(4)	7.95(23)	8.25(37)	8.09(37)	7.28(28)	BCDEFG	104.6
Commander	2.73(34)	7.98(21)	8.20(21)	7.89(28)	8.44(31)	8.33(26)	7.26(29)	BCDEFGH	104.4
WL 83-2	3.12(2)	7.85(32)	7.90(39)	7.85(33)	8.60(23)	8.27(30)	7.26(30)	BCDEFGH	104.4
360 D Brand	2.84(28)	7.91(27)	8.11(29)	7.85(34)	8.48(29)	8.29(29)	7.25(31)	CDEFGH	104.2
Oneida VR	2.88(22)	7.91(26)	8.05(33)	7.68(40)	8.41(33)	8.40(19)	7.22(32)	CDEFGHI	103.8
532	2.60(42)	7.82(34)	8.13(27)	7.91(26)	8.63(22)	8.21(33)	7.21(33)	CDEFGHI	103.7
X1	2.50(45)	7.62(40)	7.82(41)	7.86(30)	8.65(18)	8.76(1)	7.20(34)	CDEFGHI	103.5
5432	2.61(41)	7.89(30)	8.31(11)	8.05(14)	8.10(38)	8.20(35)	7.19(35)	CDEFGHI	103.4
GT 58	2.57(24)	7.71(38)	8.19(22)	8.09(11)	8.35(35)	7.78(38)	7.17(36)	DEFGHI	103.0
X3	2.25(46)	7.61(41)	7.98(36)	7.74(38)	8.63(21)	8.66(4)	7.14(37)	EFGHI	102.7
Brute Brand	2.71(35)	8.00(19)	8.22(18)	8.02(17)	8.37(34)	7.41(43)	7.12(38)	FGHI	102.4
OAC Minto	2.58(43)	7.50(44)	7.94(37)	7.57(44)	7.97(40)	8.50(12)	7.01(39)	GHIJ	100.8
Meteor	2.90(19)	7.82(33)	8.02(34)	7.64(42)	7.86(41)	7.72(40)	6.99(40)	HIJ	100.5
Vernal	2.67(38)	7.54(42)	7.78(42)	7.46(45)	8.04(39)	8.24(32)	6.96(41)	IJ	100.0
Derby	2.80(30)	7.94(26)	7.66(43)	7.78(36)	7.81(42)	7.74(39)	6.95(42)	IJ	100.0
Mission 123 Brand	2.81(29)	7.30(45)	8.00(35)	7.64(41)	7.66(43)	7.49(42)	6.82(43)	JK	98.0
VS26	3.08(5)	7.73(36)	7.42(45)	7.60(43)	7.44(45)	7.22(45)	6.75(44)	JK	97.0
DuPuits	2.55(44)	7.54(43)	7.66(44)	7.73(39)	7.45(44)	7.24(44)	6.70(45)	K	96.2
Pike	3.09(3)	6.62(46)	7.16(46)	6.95(46)	7.08(46)	6.88(46)	6.30(46)	L	90.5
GRAND MEAN	2.84	7.90	8.13	7.91	8.47	8.23	7.25		106.2
% CV	10.3	4.0	2.7	3.7	4.0	3.8	5.6		
LSD (.05)	0.41	0.47	0.30	0.41	0.48	0.44	0.23		
(.01)	0.54	0.59	0.40	0.54	0.63	0.58	0.31		

To convert dry tons per acre to hay at 12% moisture, multiply by 1.136.

Entries that are followed by the same letter are not significantly different from each other at the 5% level, according to the Duncan's Multiple Range Test.