

1995-1996 Alfalfa Yields of Five Varieties Planted October 1994 on the Colorado River Indian Tribes Reservation

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Abstract

*Five alfalfa varieties (CUF 101, SW 14, SW8210, Pioneer 5888, and a grower selection primarily from CUF 101 and noted as Baldwin Select) were planted in October, 1994, into large plots (0.75 acres) to obtain actual field harvest data. Eight harvests were taken during 1995, and seven thus far in 1996. Varietal hay yields were very similar in 1995 until mid summer, when area soil temperatures reached above 100 °F at the four inch depth for a period of about 6 weeks. During the summer months of both years Baldwin Select significantly outyielded other varieties tested. Statistical differences in accumulated hay yields were noted beginning in August 1995 and have continued during 1996. Baldwin Select was the highest yielding variety during 1995 (103.3% of CUF 101), followed by CUF 101 and Pioneer 5888, both which averaged 1.16 tons/acre per harvest. SW 14 and SW 8210 yielded about 550 total lbs/acre less than CUF 101 during 1995. Baldwin Select has also been the highest yielding variety in 1996 thus far, yielding 113.6% of CUF 101. SW 8210 has been second (107.6% of CUF 101), followed by SW 14 (102.7% of CUF 101), with CUF 101 and Pioneer 5888 again being almost equal in yield at 1.14 tons/acre per harvest. For 1995-1996 combined, Baldwin Select has yielded 108.2% of CUF 101, followed by SW8210 (101.9% of CUF 101). CUF 101, Pioneer 5888 and SW 14 are very similar in overall tonnage. Alfalfa varieties have been very similar in relative feed value when tested. Yellowing from *Empoasca* spp. leafhoppers was greatest during the 1995-1996 winter on varieties with fall dormancy ratings of 9 or greater. Baldwin Select has yielded \$121/acre more hay than CUF 101, and SW8210 has yielded \$44/acre more hay than CUF 101 thus far in this trial.*

Introduction

A number of alfalfa varieties have become available for the low desert alfalfa producing areas in Arizona in the past several years. Few, if any, yield comparisons of some varieties have been completed under local conditions, with most testing involving small plots. This trial was designed to evaluate and compare the yields and quality of several alfalfa varieties that had not previously been tested in Arizona using grower conditions and management.

Methods and Materials

Five alfalfa varieties (CUF 101, SW 14, SW 8210, Pioneer 5888, and a grower selection from locally grown plants, primarily CUF 101, and hereafter referred to as Baldwin Select) were planted October 24, 1994, with a Great Plains Solid Stand 14 Drill. Plots were replicated four times in a randomized complete block design and were 27 ft wide by

approximately 1250 ft long in a field that had previously been in alfalfa. Seeding rate for most varieties was approximately 23 lbs/acre, but was 30 lbs/ acre for SW14 and 17 lbs/acre for Pioneer 5888. Field was basin flood irrigated, with initial irrigation on October 25.

Harvest plot sizes were 27 ft wide by 1,222 ft long. Plots were harvested 8 times during 1995 (once per month from March-October) and seven times thus far in 1996 using standard grower operations. After cutting and raking, but before baling, ends of windrows were marked with straw so that determination of actual alfalfa hay by variety could be made. After baling, bales and partial bales from each plot were counted and recorded, as were bale weights by variety. Exceptions to this have been the July 1995 harvest, when whole bale numbers only were recorded and an average weight of 135 lbs/bale was assigned to all bales, and the April 1996 harvest when whole bale numbers were recorded and the average weight by variety from the previous harvest was used for calculations. For all other harvests a minimum of two bales per plot were weighed. If the weight difference between the two bales was more than 5 lbs, a third bale was weighed so a plot bale weight average could be calculated for each plot. Hay yields per acre were then calculated.

Hay quality was determined at three harvests: August 1995; January 1996; and June 1996. Two bales per plot were sampled using a Utah sampler. Samples were then combined from the replicates for a composite sample of each variety. Samples were then analyzed using near infra red (NIR) by Stanworth Crop Consultants, Blythe, CA.

Hopperburn yellows caused by feeding of *Empoasca* spp. leafhoppers was rated in January 1996 prior to harvest.

Economics of yields were calculated by obtaining the local average high price for alfalfa hay on the baling date and multiplying price/ton by yields for each date. Each date was used rather than an average as varieties differ in their yields from month to month and year to year.

Results

1995 Hay yields were not statistically different for any of the harvests until the fifth cutting in July (Table 1). Baldwin Select had statistically more hay tonnage on this harvest, the following two cuttings (August, September), and for 1995. Statistical differences did not exist between varieties for the October harvest. Accumulated yields for 1995 ranged from 9.63 tons of alfalfa hay per acre for Baldwin Select (103.3% of CUF101) to 9.04 tons/acre for SW14.

SW8210 yielded more hay than other varieties early in the year, but hay yields decreased during the summer months in comparison with other varieties, coinciding with six weeks of area soil temperatures reaching above 100°F at a depth of 4 inches. A similar summer drop off for SW8210 was also noted in the University of California alfalfa variety trial at Holtville, CA, where SW8210 was first or second highest yielding of 48 alfalfa entries during April, May and June cuttings, but then dropped to 31st, 32nd and 38th in July, August and September, respectively, in the first year of production (Putnam et al., 1995).

1996 Baldwin Select has outyielded other varieties (accumulated yields, data not shown) through August 1996 (Table 1) followed by SW 8210 in average yield. Both varieties have increased in average yield/acre from 1995 as has SW 14, while CUF 101 and Pioneer 5888 have decreased in average yield/harvest from 1995. Baldwin Select has yielded 113.6% of CUF101 while SW 8210 yield have been 107.6% of CUF 101 through August. Statistical differences in yield between varieties have been noted at almost every harvest in 1996. Highly significant differences exist between varieties for average 1996 yields though August.

1995-1996 combined Baldwin Select has had the greatest yields thus far, averaging 1.249 tons/acre/harvest (108.2% of CUF 101), followed by SW 8210 which has averaged 1.177 tons/acre/harvest (101.9% of CUF 101). The other varieties are very similar in average yield for the first 15 harvests, ranging from 1.151 to 1.155 tons/acre.

Quality Alfalfa quality characteristics (percent protein, total digestable nutrients, acid detergent fiber and relative feed value) for the varieties are shown in Tables 2 and 3. No practical differences between varieties for the quality aspects existed and no variety was consistently high or low at harvests sampled for any of the characteristics listed.

Yellows/Hopperburn Significant differences did exist between varieties for percentage of leaflets exhibiting hopperburn yellows (Table 2) caused by feeding of the potato leafhopper complex (*Empoasca* spp.). Varieties of dormancy class 9 or higher (CUF 101, Baldwin Select) had significantly more hopperburn yellows than other varieties, which all have dormancy ratings of 8.

Economics Economic value of alfalfa varieties (Table 3) is very similar to accumulated yields. Baldwin Select has produced \$121 per acre more hay than CUF 101, followed by SW 8210 (\$44/acre more hay). The other varieties have produced tonnage worth approximately \$1,565/acre (\pm \$6) thus far.

References

Putnam, D., G. Peterson, L. Teruber, S. Orloff, L. Gibbs, K. Taggard, and D. Kirby. 1995. 1995 Alfalfa Cultivar Forage Production and Fall Dormancy Trial Results. University of California Agricultural Experiment Station - Cooperative Extension, Agronomy Progress Report, No. 250.

Table 1. Mean Alfalfa Variety Yields (lbs/acre), 1995 and 1996.

Variety	Month of harvest										Mean	
	March ¹	April	May	June	July	August	September	October	October	October	Ton/acre	Ton/acre
Baldwin Select	2,048a	2,514a	2,753a	3,424a	3,030 c	2,745 c	1,307 c	1,402a	1,402a	1,402a	1.206b	1.206b
CUF 101	2,455a	2,463a	2,657a	3,235a	2,807 b	2,547 b	1,166 bc	1,315a	1,315a	1,315a	1.165a	1.165a
Pioneer 5888	2,359a	2,540a	2,826a	3,326a	2,852 bc	2,415ab	1,009ab	1,340a	1,340a	1,340a	1.167a	1.167a
SW 14	2,129a	2,486a	2,578a	3,165a	2,852 bc	2,417ab	1,075 bc	1,391a	1,391a	1,391a	1.131a	1.131a
SW 8210	2,340a	2,631a	2,820a	3,202a	2,627 a	2,326a	813a	1,331a	1,331a	1,331a	1.131a	1.131a

Variety	Month of harvest								Mean Tons/Acre	
	January	March	April	May	June	July	August	August	1996	1995-96
Baldwin Select	1,263a	2,818 b	2,375 b	3,169a	3,931 c	2,628 b	1,988 b	1,988 b	1.298 c	1.249
CUF 101	1,213a	2,575a	2,055ab	2,964a	3,414a	2,205a	1,573ab	1,573ab	1.142a	1.155
Pioneer 5888	1,170a	2,681ab	1,945a	3,097a	3,484a	2,268a	1,317a	1,317a	1.140a	1.154
SW 14	1,183a	2,665ab	2,056ab	2,994a	3,373a	2,440ab	1,717ab	1,717ab	1.173ab	1.151
SW 8210	1,185a	2,807 b	2,391 b	3,235a	3,734 b	2,226a	1,634ab	1,634ab	1.229 b	1.177

¹ Means in columns followed by the same letter are not significantly different at the $p \leq 0.05$ level for all 1995 data, and January, April, and May 1996. All other means are at the $p \leq 0.01$ level (Co-Stat 2.0)

Table 2. Percentages of Leaflets Expressing *Emposaca* spp. Leafhopper Yellows, Protein and Total Digestible Nutrients, 1995-1996.

Variety	Mean % Yellows	Percent Protein (100% Dry Matter)			% Total Digestible Nutrients (90% D.M).					
		Aug. 95	Jan. 96	June 96	Aug. 95	Jan. 96	June 96	Average		
Baldwin Select	68.75 c	21.2	21.1	20.7	19.0	20.4	55.9	57.3	51.8	55.0
CUF 101	65.00 c	21.0	22.9	22.1	19.5	21.1	55.7	58.1	52.1	55.3
Pioneer 5888	37.50ab	21.7	21.9	21.3	19.2	20.9	56.0	57.2	51.9	55.0
SW 14	41.25 b	21.3	21.9	21.9	18.8	20.7	55.7	59.0	51.2	55.3
SW 8210	27.50a	21.3	23.7	22.8	19.3	21.4	55.2	57.9	51.3	54.8

¹ Percent protein derived using Kjeldahl analysis, as leafhopper yellowing may have altered color values that NIR may utilize in analysis.

² Averages of NIR samples only.

Table 3. Percentages of Acid Detergent Fiber, Relative Feed Value of Alfalfa Varieties, and Value(\$/acre) 1995-1996.

Variety	Percent Acid Detergent Fiber (100% Dry Matter)			Relative Feed Value			Value per acre (\$)			
	Aug. 95	Jan. 96	June 96	Aug. 95	Jan. 96	June 96	Average	1995	1996	Total
Baldwin Select	27.0	22.4	33.1	178.0	214.8	143.3	178.7	832	857	1,688
CUF 101	27.2	19.4	32.6	177.2	221.0	146.5	181.6	810	756	1,567
Pioneer 5888	26.8	20.7	32.9	179.0	210.6	146.8	178.8	815	755	1,570
SW 14	27.3	21.0	33.9	172.6	217.8	138.8	176.4	785	774	1,559
SW8210	28.0	17.9	33.8	172.8	228.0	139.5	180.1	794	817	1,611