

Yield Comparisons of Alfalfa Cultivars and Experimentals at Maricopa and Yuma, 1986 to July, 1987.

Mike Ottman, Steve Smith, Barry Tickes and John Harper

ABSTRACT

This study is part of an ongoing effort on evaluate alfalfa cultivar performance at various locations in Arizona. Forage yields of 25 alfalfa cultivars and experimentals were measured at the Maricopa and Yuma-Mesa Agricultural Centers. During the time period reported, many of the newer cultivars were more productive than the popular cultivar CUF 101 . Selection of alfalfa cultivars should be based upon fall dormancy, pest resistance, seed cost, and yield potential.

MATERIALS AND METHODS

Entries for these 4 trials were solicited from originators in 1986, with a maximum of three entries per source. Promising experimentals were requested in addition to commercial cultivars so that yield information would be available for those experimentals that eventually become commercially available. From this initial request, 25 cultivars and experimentals were chosen for evaluation at the Maricopa and Yuma-Mesa Agricultural Centers. Only 4 of the 25 entries differed between locations.

A partially balanced 5 x 5 lattice with 4 replications was used at each site. Seed was planted in 6 inch rows in plots 3 feet wide and 17 feet long on a Casa Grande sandy loam on October 3, 1985 at Maricopa and on a Superstition Sand on September 24, 1985 at Yuma-Mesa. The plots were surrounded by the alfalfa cultivar 'Lew' at Maricopa and 'CUF 101' at Yuma-Mesa. Approximately 250 lbs P₂O₅/A was applied preplant.

The plots were hand-harvested and fresh weights recorded. Thus, the plots were not subjected to wheel traffic from harvest equipment, as occurs in commercial alfalfa production. At the Yuma-Mesa, yields were obtained from only four selected cuts per year (2 spring, 1 summer, 1 fall). This is highly correlated with the total yield obtained from all cuttings based on studies conducted in the Imperial Valley by the University of California. The plots were generally cut at an early to mid-bloom stage of growth.

The plots were subjected to the normal pressure from the Egyptian alfalfa weevil, aphids, thrips, leaf hoppers, alfalfa caterpillar, and beet armyworm; these pests were controlled as needed. Downy mildew, Stemphylium, and common leaf spot were observed but probably did not limit yield. The seedling alfalfa at the Yuma-Mesa was sprayed at the 2-3 trifoliate stage with 2, 4-DB amine to control various broadleaf weeds. During the peak consumptive-use periods of the late spring and summer, irrigation water was applied 2 to 3 times per cutting at

Maricopa and approximately once per week at Yuma Mesa. Plant growth at Maricopa was excellent, but water stress was suspected during the summer at Yuma Mesa.

RESULTS AND DISCUSSION

Forage yields are presented in Table 1a and 1b for Maricopa and Table 2 for the Yuma-Mesa. Definite conclusions should not be drawn from 1-1/2 years (as opposed to 3 years) of alfalfa yield data, since many cultivars lose their productivity over time. Nevertheless, some observations and comments can be made.

Some of the entries in these trials are obviously not adapted to our relatively mild winter conditions, that is, they are too dormant (e.g., Agri-Pro experimental (entry 14-Maricopa), Native Plants Inc. experimentals (entry 16, 18), 'Ladak 65' (entry 9-Yuma) and Pioneer Brand 581 (entry 23)).

Lew (entry 5) was developed by the University of Arizona for stem nematode resistance and vigor and is one of the better entries at this point in the trial. Seed of Lew, however, is not readily available. Lew-NR (entry 12) refers to seed obtained from a five-year-old stand of Lew at Chuck Lakin's in Avondale which was subjected to intense stem nematode pressure. Lew-NR may possibly have improved stem nematode resistance over Lew.

CUF 101 (entry 25) is the most popular commercial cultivar in Arizona at the present time; it was released in 1976 by the University of California for resistance to the blue alfalfa aphid. However, many of the newer cultivars may be more productive than CUF 101. UC Cibola (entry 2) is similar to CUF 101 except that it was bred for resistance to root knot nematodes. This cultivar was released by the University of California for the Palo Verde Valley.

Plant Genetics, Davis, California, is new to the alfalfa seed business; they are the source of Armona (entry 3), Mecca (entry 7), Madera (entry 14-Yuma), and Maricopa (entry 24). Mecca is the best suited of these cultivars to the conditions in the low-elevation desert valleys of Arizona; it requires well-drained soil conditions.

Northrup King markets Pierce (entry 13), Sundor (entry 4), and Condor (entry 17). Sundor is recommended where Maxidor was grown, and Condor may suit those who grew Pierce. Sundor is one of the higher yielders to date in the Maricopa and Yuma studies. Agri-Pro is the source of Sapphire (entry 6-Maricopa) and Granada (entry 9). These cultivars yield near CUF 101 in both tests.

Arizona Common (entry 6-Yuma) is available from a local source; it is popular in Yuma. The seed was very poor quality and was replanted to obtain an adequate stand. The relatively low yields obtained in the April cuttings suggest this entry has more dormancy than desired and has contributed to a lower yield than CUF 101 to date.

WL Research, Inc. originated WL 516 (entry 11) and WL 605 (entry 22). WL 605, the more non-dormant of the two, is performing particularly well at Maricopa. Pioneer Brand 5929 (entry 15), a familiar cultivar in Arizona, is one of the top-yielders at both sites.

Valley Seed/Arizona Grain markets Valiant (entry 18-Maricopa); it is proving to be a very productive cultivar. Hayden Large Leaflet (entry 18-Yuma) is a selection for larger leaflet size from Hayden by the University of Arizona.

Alfalfa yield trials need to be conducted over several locations and years to characterize the productivity of alfalfa cultivars adequately. Nevertheless, our trials suggest that many of the newer cultivars may be higher-yielding than CUF 101, commonly planted because its seed is inexpensive.

Selection of alfalfa cultivars should not be based on seed cost alone. Dormancy, pest resistance, and yield potential should also be considered. For example, assume: (1) seed cost of cultivar A = \$1/lb and cultivar B = \$2/lb; (2) seeding rate = 30 lb/A; (3) hay yield of cultivar A = 8.0 T/A and cultivar B = 8.4 T/A, a 5% difference; and (4) the value of the hay is \$80/T, then the difference in seed cost of \$30/A can be recovered by increased yield in 1 year. Therefore, inexpensive seed may cost extra in the long run. The difficulty, of course, is to choose the most productive alfalfa cultivar for a given condition. Hopefully, trials such as the present one will help growers make this decision.

Table 1a : Alfalfa variety trial at the Maricopa Agricultural Center, Maricopa, AZ 1986 -
 Investigators: M. J. Ottman (Extension Agronomist), S. E. Smith (Assistant Professor of
 Plant Sciences), and John Harper (Pinal Co. Agent), Univ. of Arizona.

Location: Maricopa Agricultural Center, Maricopa, AZ.

Soil Type: Casa Grande sandy loam.

Experimental Design: Partially balanced 5 x 5 lattice with 4 replications.

Plot Size: 3 ft. x 17 ft. = 51 ft²

Planting Date: October 3, 1985

No	Source	Entry	Forage Yield (lbs/plot) 1986 ^{1/}								
			02/14	3/27	5/01	6/05	7/10	8/14	9/11	10/17	12/16
1	W-L Research	Experimental	12.8	17.4	25.1	29.2	22.6	18.6	10.5	10.8	9.7
2	Univ of CA	UC Cibola	13.3	17.1	25.1	27.5	21.3	18.4	10.5	11.1	10.0
3	Plant Genetics	Armona	12.7	17.6	24.8	27.3	21.9	18.1	9.6	10.2	8.5
4	Northrup King	Sundor	14.3	17.9	26.0	29.1	22.6	19.1	10.4	11.0	10.6
5	Univ of AZ	Lew	12.7	17.1	27.0	31.8	23.8	20.7	11.9	12.2	11.6
6	Agri-Pro	Sapphire	11.4	17.1	25.4	29.2	22.7	18.4	9.8	10.3	9.7
7	Plant Genetics	Mecca	12.8	17.5	26.0	30.1	24.2	20.5	11.2	12.1	10.8
8	Nat. Plants Inc	Experimental	10.3	16.4	25.2	28.7	22.8	19.1	10.1	10.5	8.6
9	Agri-Pro	Granada	12.3	17.1	24.7	27.4	22.0	17.8	9.4	10.0	9.7
10	Cal/West	Experimental	14.3	18.7	26.6	30.6	23.3	19.0	10.2	10.6	10.2
11	W-L Research	WL 516	12.2	16.6	23.7	27.0	22.4	18.9	10.5	10.7	9.4
12	Chuck Lakin	Lew-NR	12.6	17.1	25.9	30.6	23.7	20.3	11.6	12.8	12.0
13	Northrup King	Pierce	12.0	17.2	25.7	30.0	23.8	19.4	10.4	11.0	9.8
14	Agri-Pro	Experimental	6.4	17.3	24.3	25.5	20.7	16.7	8.3	9.0	6.7
15	Pioneer	Pio.Brnd 5929	11.4	15.6	24.7	28.3	23.7	19.8	10.8	11.5	10.7
16	Nat. Plants Inc	Experimental	6.7	15.0	23.6	26.7	21.9	18.1	9.5	9.3	6.4
17	Northrup King	Condor	11.9	15.6	24.2	27.9	23.0	19.2	10.1	11.2	9.4
18	Valley Seed	Valiant	13.4	17.0	24.9	28.4	23.5	19.5	10.8	11.7	10.4
19	Nat. Plants Inc	Experimental	7.6	13.9	22.7	25.5	21.4	17.9	9.2	9.6	7.7
20	Cal/West	Experimental	12.8	17.7	26.0	29.2	22.0	18.6	9.9	10.1	9.1
21	De Kalb	DK-187	12.8	17.3	25.7	28.8	22.5	18.2	9.8	10.3	9.0
22	W-L Research	WL 605	14.1	18.3	26.1	29.7	23.3	19.2	10.2	10.7	10.1
23	Pioneer	Pio.Brnd 581	7.5	13.6	22.0	25.4	20.8	17.8	9.7	9.6	6.5
24	Plant Genetics	Maricopa	11.6	17.3	24.3	25.9	22.4	18.7	9.8	9.8	8.1
25	Univ. of CA	CUF 101	12.6	16.3	24.3	28.7	22.1	19.2	10.2	11.0	10.8
	FLSD .05		1.52	1.34	1.24	2.18	1.28	1.04	0.77	0.79	0.97
	FLSD .01		2.02	1.78	1.65	2.90	1.71	1.38	1.03	1.05	1.30
	CV (%)		7.9	4.9	3.0	4.7	3.5	3.4	4.6	4.5	6.3

^{1/} Yields reported on a fresh weight basis.

Table 1 b: Alfalfa variety trial at the Maricopa Agricultural Center, Maricopa, AZ 1986 -
 Investigators: M. J. Ottman (Extension Agronomist), S. E. Smith (Assistant Professor of Plant Sciences), and John Harper (Pinal Co. Agent), Univ. of Arizona.
 Location: Maricopa Agricultural Center, Maricopa, AZ.
 Soil Type: Casa Grande sandy loam.
 Experimental Design: Partially balanced 5 x 5 lattice with 4 replications.
 Plot Size: 3 ft. x 17 ft. = 51 ft²
 Planting Date: October 3, 1985

No	Source	Entry	Forage Yield (lbs/plot) 1987 ^{1/}				Total	% of CUF 101
			03/20	04/24	06/04	07/01		
1	W-L Research	Experimental	20.1	28.0	28.9	27.1	261	101
2	Univ. of CA	UC Cibola	20.9	26.8	29.4	26.0	257	99
3	Plant Genetics	Armona	21.3	26.4	28.1	25.4	251	97
4	Northrup King	Sundor	21.9	27.6	30.1	26.3	267	103
5	Univ. of AZ	Lew	21.2	29.0	31.0	27.1	277	107
6	Agri-Pro	Sapphire	22.3	27.4	29.1	24.8	258	99
7	Plant Genetics	Mecca	22.2	28.6	33.3	27.7	276	107
8	Nat. Plants Inc.	Experimental	21.4	25.5	29.4	24.3	252	97
9	Agri-Pro	Granada	21.8	26.7	28.6	24.5	252	97
10	Cal/West	Experimental	23.2	27.6	30.8	26.2	271	105
11	W-L Research	WL 516	20.1	25.6	29.3	24.6	251	97
12	Chuck Lakin	Lew-NR	21.2	29.0	31.1	26.6	274	106
13	Northrup King	Pierce	22.9	28.3	31.7	27.1	269	104
14	Agri-Pro	Experimental	18.8	23.7	26.0	21.2	225	87
15	Pioneer	Pio Brnd 5929	21.9	28.5	31.0	27.7	266	103
16	Nat. Plants Inc.	Experimental	19.2	24.0	25.8	23.2	229	88
17	Northrup King	Condor	20.5	27.3	30.7	26.7	258	99
18	Valley Seed	Valiant	21.3	28.4	30.0	27.5	267	103
19	Nat. Plants Inc.	Experimental	18.8	24.3	28.4	23.4	230	89
20	Cal/West	Experimental	20.9	27.2	30.4	25.7	259	100
21	De Kalb	DK-187	21.8	27.3	30.1	26.3	260	100
22	W-L Research	WL 605	21.9	27.7	30.7	27.6	269	104
23	Pioneer	Pio Brnd 581	20.4	24.0	25.4	22.2	225	87
24	Plant Genetics	Maricopa	20.1	25.8	28.7	24.6	247	95
25	Univ. of CA	CUF 101	21.5	26.9	29.5	26.1	259	100
	FLSD .05		1.78	1.21	2.68	1.55	3.7	
	FLSD .01		2.37	1.62	3.57	2.07	4.9	
	CV (%)		5.1	2.8	5.6	3.7	3.1	

^{1/} Yields reported on a fresh weight basis.

Table 2: Alfalfa variety trial at the Yuma-Mesa Agricultural Center, Yuma, AZ, 1986 -

Investigators: M. J. Ottman (Extension Agronomist), S. E. Smith (Assistant Professor of Plant Sciences), and B. R. Tickes (Yuma Co. agent), University of Arizona.

Location: Yuma-Mesa Agricultural Center, Yuma, AZ

Soil Type: Superstition sand.

Experimental Design: Partially balanced 5 x 5 lattice with 4 replications.

Plot Size: 3 ft x 17 ft = 51 ft²

Planting Date: September 24, 1985.

Forage Yield (lbs/plot) ^{1/}

No.	Source	Entry	1986				1987		Total ^{2/}	% of CUF 101
			4/19	5/20	8/20	11/11	4/17	5/20		
1	W-L Research	Experimental	20.9	23.5	9.1	8.8	17.2	23.0	104.8	103
2	Univ. of CA	UC Cibola	19.5	22.4	11.3	9.3	13.0	20.9	98.8	97
3	Plant Genetics	Armona	19.9	23.3	10.9	9.2	16.7	20.1	102.6	100
4	Northrup King	Sundor	22.2	25.0	10.1	8.6	15.4	18.8	102.5	100
5	Univ. of AZ	Lew	21.1	23.8	11.1	10.0	15.7	21.1	105.2	103
6	Local seed source	AZ common	17.8	22.6	11.6	10.0	12.8	21.0	98.2	96
7	Plant Genetics	Mecca	19.4	24.1	11.0	9.5	14.7	21.8	102.9	101
8	Nat. Plants Inc.	Experimental	19.3	21.5	8.4	8.3	14.2	18.6	92.6	91
9	Montana St. Univ.	Ladak 65	13.6	14.9	5.9	4.0	10.8	15.5	67.0	66
10	Cal/West	Experimental	21.9	24.9	9.7	9.0	16.8	20.5	105.3	103
11	W-L Research	WL 516	19.5	23.2	10.5	9.2	14.9	21.4	101.1	99
12	Chuck Lakin	Lew-NR	20.3	23.1	11.1	10.2	14.7	23.5	105.2	103
13	Northrup King	Pierce	20.2	23.2	9.7	8.5	13.9	21.3	99.2	97
14	Plant Genetics	Madera	19.1	22.7	10.3	8.5	16.0	21.7	100.8	99
15	Pioneer	Pioneer Br 5929	21.4	24.5	10.7	9.9	16.4	22.1	107.4	105
16	Nat. Plants Inc	Experimental	19.4	21.2	7.8	7.7	15.9	19.6	94.0	92
17	Northrup King	Condor	19.6	22.8	9.0	8.3	15.6	20.8	98.4	96
18	Univ. of AZ	Hayden Lg Lf.	17.6	21.3	11.2	10.3	14.1	19.9	96.7	95
19	Nat. Plants Inc.	Experimental	19.6	22.2	9.4	7.6	15.6	20.8	97.6	95
20	Cal/West	Experimental	20.4	22.8	9.2	8.5	16.0	20.8	100.2	98
21	De Kalb	DK-187	19.6	23.3	8.8	8.3	17.1	21.1	100.6	98
22	W-L Research	WL 605	21.0	22.8	9.1	8.2	15.3	20.7	99.6	97
23	Pioneer	Pioneer Br 581	18.6	21.4	9.5	8.0	15.7	21.0	96.7	95
24	Plant Genetics	Maricopa	20.1	24.7	11.0	8.8	18.4	20.1	105.5	103
25	Univ. of CA	CUF 101	20.2	23.9	9.5	9.1	16.0	21.2	102.2	100
	FLSD .05		1.78	1.92	1.31	1.03	3.19	2.32	3.13	
	FLSD .01		2.37	2.55	1.74	1.37	4.26	3.09	4.17	
	CV (%)		5.5	5.3	8.1	7.2	12.7	6.9	4.7	

^{1/} Yields reported on a fresh weight basis. ^{2/} Yield total from four selected cuts (2 spring, 1 summer, 1 fall) is highly correlated with the yield total obtained from all cuttings based on studies conducted in the Imperial Valley by the Univ. of California.