

Alfalfa Variety Trial in Southeastern Arizona, 1995

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Abstract

Twenty one alfalfa varieties with Fall Dormancy ratings of 8 or 10 were tested in a replicated small plot trial on the Safford Agricultural Center. The leading variety after four years of cuttings is Mesa (formerly known as 84D92, from MBS, Inc). Since this was the last year of the study, stand counts and stem counts were taken and reported in this report. Heat units with thresholds of 77° F and 40° F are included for each cutting in the study.

Introduction

This is the fourth and last year of this study, the better varieties from this trial will be placed in the following study along with several new varieties that seem promising. The harvest of this trial marks the 20th year of continuous alfalfa variety testing in Graham county.

Materials and Methods

Twenty one alfalfa varieties with fall dormancy ratings ranging from 8 to 10 are included in this test. Meteor variety, with a fall dormancy rating of 6 was used in buffer areas between the replicates.

Crop History

Location: Safford Agricultural Center
Elevation: 2950 feet above sea level
Soil type: Pima clay loam variant
Planted: 24 September 1991
Herbicide: None
Fertilizer: 300 pounds per acre of 16-20-0, preplant
Insecticide: None
Irrigation: Border, 13 irrigations (ca. 89 acre inches)
Harvest strategy: Harvest at ca. 10% bloom but be flexible around summer storms
Plot size: 2.5 feet by 20 feet
Replicates: Four

Plots were cut by hand using a Jari mower and raked and weighed immediately to prevent loss of moisture. Weights were converted to dry weight at 12% for reporting purposes.

Results and Discussion

Yield results by cutting from the 1995 harvest are shown in Table 1. It can be noted that the first cutting is missing. Weevil damage was so severe that the first cutting was sacrificed. A University of California variety, UC 329, performed very well, especially excelling in the last four cuttings. This can be partially explained by the stand and stem counts in Table 3. UC 329 was number 1 in number of crowns per square foot and number 4 in the number of stems per square foot. These results would indicate that UC 329 has better persistence over time than most of the other varieties, but the results of the four year summary, in Table 2, still placed UC 239 as number 9. Yolo likewise performed well in the fourth year, but its overall standing was number 10. Mesa and Mecca varieties performed well over the four year period with an average yield over 8 tons per acre. This is 0.6 tons per acre per year or 2.4 tons per acre over the four year period more than the old standard, Cuf 101. This means these varieties would be worth more than \$240 per acre over the life of the stand.

It can be noted at the bottom of Tables 1 and 2 that the heat units per cutting and per year are listed. The number of heat units for the first cutting has averaged over 1500 heat units and the average number of heat units for 6 cuttings was 7050 heat units. This leaves an average of 1108 heat units per cutting. This compares to 990 heat units per cutting reported by Doorenbos and Kassam (1) and 1234 heat units per cutting reported for two sites in Texas by Sanderson, Karnezos and Matches (2). Whether heat units can be used to define the optimal cutting time is still in question. More work needs to be done in this area.

Another area of interest is whether stand (crown) counts or stem counts can be used to determine whether the stand is good enough to keep. Undersander and Cosgrove (3) in research in Wisconsin indicated that stem count could be used to estimate yield potential. Table 3 shows the crowns per square foot and stems per square foot and shows their correlation to 1995 yields. The correlation to both parameters is quite low, but the probability that the correlation is zero is significant and highly significant for crowns and stems, respectively. Thus our data indicates that stems per acre are more highly correlated to actual yields than crowns per acre. The ordering of the varieties is the same as shown in Table 1. Figure 1 shows the cutting yields of each variety during the 1995 season plotted against the stems per acre observed at the end of the season. The curve is essentially flat indicating little relationship between stem count and yield. Figure 2 shows dry matter yield *potential* vs stems per square foot. This curve flattens off starting between 50 and 60 stems per square foot and that is where our curve starts. This indicates that none of our varieties had reached the point where the number of stems per acre was limiting production, even though our visual observation and the incursion of weeds in some plots manifested the opposite. More work must be done in this area, also.

References

1. Doorenbos, J. and Kassam. 1979. Yield response to water. FAO Irrigation and Drainage Paper #33. FAO Rome.
2. Sanderson, M.A., T.P. Karnezos and A.G. Matches. 1994. Morphological development of alfalfa as a function of growing degree days. J. Production Agriculture, Vol. 7, no. 2, pp. 239-242.
3. Undersander, D. and D. Cosgrove. 1994. Excerpt of "Alfalfa stand assessment: Is this stand good enough to keep?" in Alfalfa Talk, Vol. 14, no. 3. Certified Alfalfa Seed Council, Davis, CA.
4. Clark, L.J., E.W. Carpenter and R.E. Cluff. 1995. Alfalfa variety trial in southeastern Arizona, 1994. Forage and Grain, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-103, pp.5-7.

Table 1. Fourth year yield summary for 22 alfalfa varieties grown at 2950 feet above sea level in Southeastern Arizona. Yields are in tons per acre corrected to 12% moisture, ranks are in parentheses. (Graham county, Safford Agricultural Center. 32° 49' S. Latitude)

Variety	Cut 1 21 Apr	Cut 2 22 May	Cut 3 26 Jun	Cut 4 26 Jul	Cut 5 5 Sep	Cut 6 16 Oct	Total	% of Cuf 101
UC 329	--	1.62 (2)	1.57 (1)	1.87 (1)	1.56 (1)	1.35 (1)	7.97 a	147.1
Yolo	--	1.64 (1)	1.46 (2)	1.56 (2)	1.05 (17)	0.89 (3)	6.61 b	122.0
Mesa	--	1.51 (3)	1.34 (3)	1.45 (3)	1.35 (3)	0.92 (2)	6.57 b	121.3
Mecca	--	1.48 (5)	1.32 (4)	1.42 (4)	0.97 (19)	0.77 (7)	5.96 bc	110.0
ABI 9194	--	1.43 (7)	1.23 (8)	1.32 (8)	1.19 (10)	0.73 (10)	5.89 bc	108.7
Madera	--	1.41 (8)	1.26 (6)	1.21 (13)	1.19 (8)	0.73 (9)	5.82 bc	107.4
Maricopa	--	1.34 (9)	1.17 (13)	1.28 (10)	1.31 (4)	0.70 (13)	5.80 bc	107.0
PGI 8633C	--	1.22 (13)	1.20 (10)	1.41 (5)	1.20 (7)	0.72 (12)	5.75 bc	106.2
Pierce	--	1.22 (14)	1.28 (5)	1.31 (9)	1.12 (14)	0.76 (8)	5.69 bc	105.1
GT13R Supreme	--	1.27 (10)	1.20 (11)	1.38 (6)	1.11 (15)	0.70 (14)	5.66 bc	104.4
Pioneer 5929	--	1.44 (6)	1.17 (12)	1.25 (12)	1.18 (11)	0.60 (19)	5.64 bc	104.1
Falcon	--	1.10 (20)	1.22 (9)	1.13 (18)	1.36 (2)	0.81 (6)	5.62 bc	103.7
Cibola	--	1.20 (15)	1.24 (7)	1.26 (11)	1.04 (18)	0.82 (5)	5.56 bc	102.6
Pioneer 5888	--	1.51 (4)	0.99 (17)	1.03 (20)	1.27 (5)	0.66 (16)	5.45 bc	100.7
Cuf 101	--	1.19 (16)	1.05 (15)	1.33 (7)	1.12 (13)	0.72 (11)	5.42 bc	100.0
UC 342	--	1.19 (17)	1.05 (14)	1.16 (16)	1.09 (16)	0.87 (4)	5.35 bc	98.8
Meteor	--	1.24 (12)	0.98 (18)	1.21 (14)	1.15 (12)	0.67 (15)	5.26 bc	97.0
Sundor	--	1.11 (19)	0.90 (21)	1.11 (19)	1.19 (9)	0.65 (18)	4.96 cd	91.5
Condor	--	1.07 (21)	0.96 (20)	1.02 (21)	1.22 (6)	0.65 (17)	4.92 cd	90.8
UC 340	--	1.26 (11)	1.04 (16)	1.18 (15)	0.88 (20)	0.53 (21)	4.89 cd	90.2
Pioneer 5715	--	1.05 (22)	0.57 (19)	1.15 (17)	0.79 (22)	0.57 (20)	4.54 cd	83.7
Arabian	--	1.12 (18)	0.71 (22)	0.80 (22)	0.86 (21)	0.47 (22)	3.97 d	73.2
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Average		1.30	1.15	1.27	1.15	0.74	5.60	
LSD(05)		0.32	0.25	0.24	0.46	0.26	0.82	
CV(%)		17.3	15.6	13.4	28.2	24.6	10.3	
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Heat units (77/40)	1527	704	999	982	1402	1148	6762	

1. Values followed by the same letter are not significantly different at the 5% level of probability.

Table 2. Four year yield summary for 22 alfalfa varieties grown at 2950 feet above sea level in Southeastern Arizona. Yields are in tons per acre corrected to 12% moisture.

Variety	Fall Dormancy Rating	1992 Yield Average	1993 Yield Average	1994 Yield Average	1995 Yield Average	Four Year Yield Average	Percent of Cuf 101
Mesa (84D92)	8	9.64 (1)	8.99 (4)	7.89 (8)	6.57 (3)	8.27 a	108.9
Mecca	9	8.79 (6)	9.21 (5)	8.12 (4)	5.96 (4)	8.02 a	105.5
Pioneer 5929	9	9.15 (8)	9.33 (1)	7.83 (9)	5.64 (1)	7.99 a	105.1
ABI 9194		8.98 (15)	8.56 (10)	8.50 (1)	5.89 (5)	7.98 a	105.0
Falcon	8	9.36 (3)	8.59 (8)	8.09 (5)	5.62 (12)	7.91 a	104.1
Maricopa	8	9.49 (2)	8.56 (9)	7.75 (11)	5.80 (7)	7.90 a	103.9
Madera	8	9.08 (13)	8.78 (6)	7.82 (10)	5.82 (6)	7.87 a	103.6
UC 340		9.16 (7)	9.31 (2)	8.05 (6)	4.89 (20)	7.85 a	103.3
UC 329		8.28 (4)	8.69 (7)	8.29 (2)	7.97 (1)	7.84 a	103.1
Yolo	8	8.87 (17)	7.64 (19)	8.13 (3)	6.61 (2)	7.81 a	102.8
Pierce	8	8.52 (20)	8.44 (11)	8.00 (7)	5.69 (9)	7.66 a	100.9
Pioneer 5888	8	9.27 (5)	8.30 (15)	7.62 (12)	5.45 (14)	7.66 a	100.8
Sundor	9	8.80 (19)	9.24 (3)	7.56 (14)	4.96 (18)	7.64 a	100.5
Mecca II (8633C)	9	8.88 (16)	8.23 (16)	7.60 (13)	5.75 (8)	7.62 a	100.2
Cuf 101	9	9.10 (11)	8.41 (13)	7.46 (16)	5.42 (15)	7.60 a	100.0
Cibola	9	8.81 (18)	8.40 (14)	7.47 (15)	5.56 (13)	7.56 a	99.5
GT13R Supreme	8	9.12 (10)	8.09 (17)	7.24 (18)	5.66 (10)	7.53 a	99.0
Pioneer 5715	8	9.07 (14)	8.43 (12)	7.29 (17)	4.54 (21)	7.33 a	96.5
UC 342		9.12 (9)	7.30 (21)	6.93 (19)	5.35 (16)	7.18 a	94.4
Meteor	6	8.28 (21)	5.14 (22)	6.41 (22)	5.26 (17)	7.00 a	92.1
Condor	8	9.10 (12)	7.39 (20)	6.51 (21)	4.92 (19)	6.98 a	91.8
Arabian	10	7.88 (22)	7.92 (18)	6.90 (20)	3.97 (22)	6.67 a	87.7
Average		9.01	8.30	7.62	5.60	7.63	
LSD(05)		1.03	1.67	1.21	0.82	0.87	
CV(%)		8.06	14.2	11.3	10.3	8.11	
Heat units (77/40)		7533	6585	7359	6762	7060	

1. Values followed by the same letter are not significantly different at the 5% level of probability.

Table 3. Stand and stem count at the conclusion of the study and their correlation to the last year's yields.

Variety	Crowns/ sq ft	Stems/ sq ft
UC 329	5.17 (1)	95.3 (4)
Yolo	4.84 (3)	101.5 (1)
Mesa (84D92)	4.42 (8)	91.1 (7)
Mecca	3.75 (19)	70.6 (19)
ABI 9194	4.34 (11)	98.7 (2)
Madera	4.42 (9)	85.7 (12)
Maricopa	4.83 (4)	88.6 (9)
8633C (Mecca II)	4.00 (15)	76.1 (15)
Pierce	4.67 (6)	94.3 (5)
GT 13R Supreme	4.66 (7)	85.3 (13)
Pioneer 5929	3.92 (17)	89.5 (8)
Falcon	4.17 (13)	73.4 (18)
Cibola	4.75 (5)	88.0 (10)
Pioneer 5888	4.42 (10)	96.0 (3)
Cuf 101	5.08 (2)	92.5 (6)
UC 342	4.00 (16)	75.1 (16)
Meteor	4.19 (12)	87.0 (11)
Sundor	2.92 (22)	53.2 (22)
Condor	3.42 (20)	62.3 (21)
UC 340	4.00 (14)	83.1 (14)
Pioneer 5715	3.83 (18)	74.8 (17)
Arabian	3.17 (21)	69.8 (20)
Average	4.22	83.3
LSD(05)	1.20	28.3
CV(%)	20.1	24.4
Correlation with 1995 yields		
Correlation (r)	0.25	0.34
Probability	0.017*	0.0013**

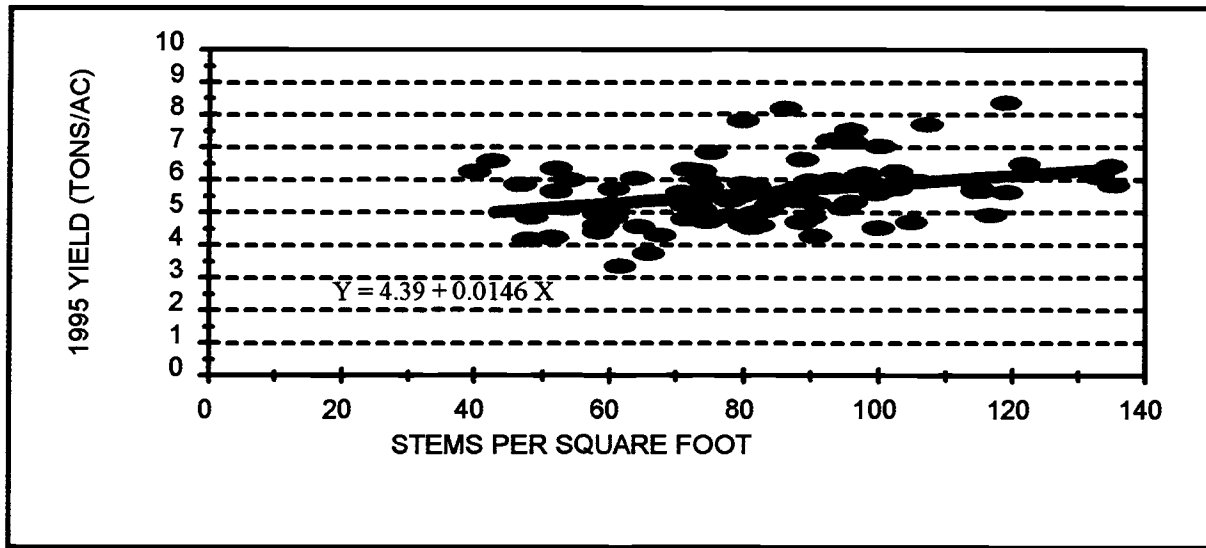


Figure 1. Yields of all plots vs stems per acre in 1995.

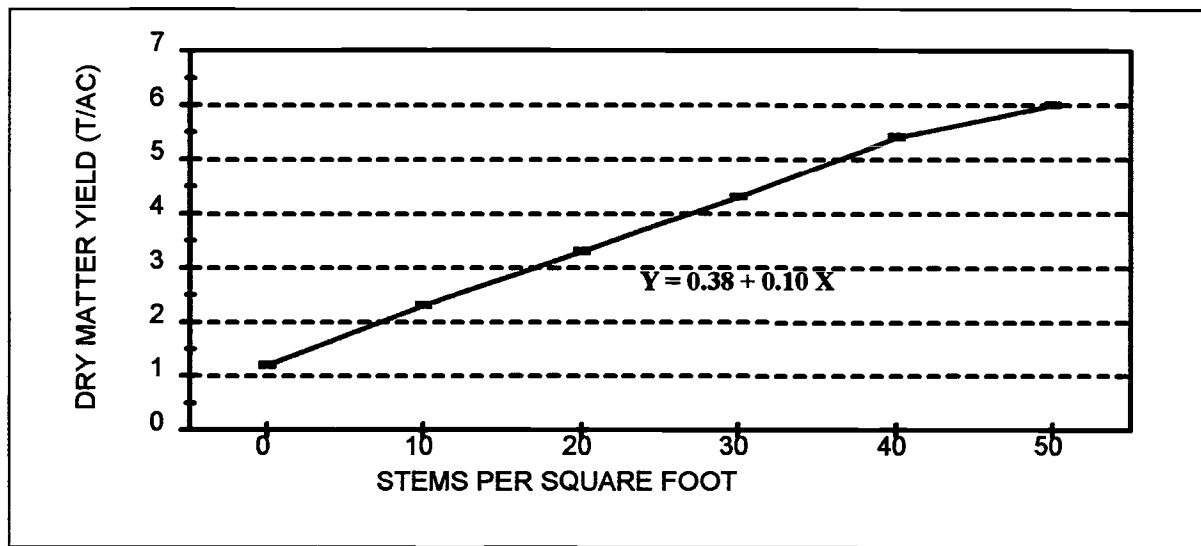


Figure 2. Plot from Undersander and Cosgrove data.