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Location: Stephenville

EVALUATION OF ALFALFA VARIETIES FOR YIELD AND PROTEIN

OBJECTIVE:

To evaluate yield and quality potential of alfalfa varieties under limited irrigation and to identify problems in alfalfa production in the West Cross Timbers.

PROCEDURE:

Alfalfa variety testing began in 1976 when a test of eleven varieties was seeded on June 21, but was destroyed by simazine in March 1978, and re-seeded on a more severely eroded Windthorst fsl soil on June 8, 1978. A second test was seeded on non-eroded Windthorst fsl soil on April 27, 1978.

All seedings were made under similar conditions. Fertilizer at the rate of 0-160-120 lb/ac (N-P_2O_5-K_2O) and 3 qts./ac of Balan were broadcast and incorporated before seeding. Inoculated seed were hand sown at the rate of 16 lbs/ac. Sprinkler irrigation was used to insure a stand.

Irrigation was applied immediately after harvest and 14 days later at the rate of 2 acre-inches per application except in 1980. Irrigation was increased in 1980 to provide 2 acre-inches approximately 1, 10, and 20 days after cutting.

Harvests were generally made at 10% bloom except where insect control or rainfall was a complication. A 34-inch swath of the 6 x 12 foot plots was cut at two inch height, weighed, and dried at 70°C to determine dry matter yields.

RESULTS AND DISCUSSION:

Dry matter yields of the original alfalfa planting are shown in Table 1. On non-eroded Windthorst fine sandy loam in 1977 five varieties produced about equally at the upper production level. Only Mesa-Sirsa and Lew produced less than seven tons per acre. The spring 1978 harvest of this test found only NK 919 and Oklahoma Common still in the higher yield levels. When this test was relocated to an eroded Windthorst fine sandy loam soil, no differences in yield were significant at the first harvest on August 16, 1978. The variety Cap ranked highest in yield in both years of first harvest indicating that it establishes well and gets off to a fast start. The competitive yield of LRS in 1977 and 1980 could be important since this Arizona experimental line has shown recovery from Cotton Root Rot due to survival of lateral roots. In 1980 LRS, Oklahoma

Common, and NK 919 were in the highest yield group while in both 1979 and 1980 Hayden was in the lowest yield group.

The second group of varieties, shown in Table 2, did not produce significantly different yields the year it was established. Olympic, Liberty, and NCMP11 were among the highest yielding alfalfas in both 1979 and 1980.

The effect of an eroded soil compared with a non-eroded soil may not be as important as other unknown factors. The only available measure of this soil difference is in the yields of Cap where it was grown on each soil in 1979 and 1980. Yield was greater on the non-eroded Windthorst fsl by 29% in 1979 but only 5% in 1980.

Protein content of alfalfa harvested in 1977 is shown in Table 3. Oklahoma Common, WL-306, and NK 919 tended toward higher contents while Mesilla, Mex-Son and Hayden tended to be lowest in protein content at a specific date. WL-306 was significantly higher in protein content than Mesilla and Mex-Son using the season mean. There were significant differences among dates of harvests.

Although water requirements were not studied, it is evident that satisfactory yields can be achieved with 15-20 acre-inches of sprinkler irrigation water (Table 4). Most irrigation water was applied in July, August, and early September. Farmers now growing irrigated peanuts could probably produce 6-8 tons/acre of alfalfa with the same amount of water. This will be investigated further.

Few real problems occurred in these tests. The alfalfa weevil which generally appears in the Stephenville area about March 21 is the most recurring and consistent problem. By about April 21-May 1 populations are high enough to require chemical control or harvesting. Generally, harvesting has been effective in controlling the weevil. Harvest is usually premature by only 7-10 days. The three highest yielding alfalfas in the April harvest of 1979 and 1980, i.e. Liberty, NCW 22 and NCMP11, have resistance (or tolerance) to the alfalfa weevil. This indicates the value of weevil tolerance under high weevil population.

Other insects have been a problem at least once. Those include grasshoppers, thrips, and fall armyworm in 1979 and blister beetles in 1980. Thrips prevented further harvests after August 1980 so they sould be controlled.

Table 1. Dry matter yields of eleven alfalfa varieties grown under irrigation at Stephenville.

	Tons Oven-Dry Forage Per Acre [1]				
	Windthorst fsl		Windthorst fsl (eroded)		
Variety	1977	1978*	1978**	1979	1980
Cap	8.01a [2]	1.10bcd	1.21a	4.00bcd	6.47bc
NK 919	7.75ab	1.32ab	1.02a	4.11bc	6.65ab
Moapa-69	7.71abc	1.02cd	0.96a	3.82cde	6.50bc
LRS	7.70abcd	1.18bcd	1.09a	4.01bcd	6.82ab
Okla. Com.	7.70abcd	1.49a	1.07a	4.54a	7.15a
Hayden	7.44abcde	1.01cd	1.02a	3.60e	5.95c
WL-306	7.19bcdef	1.27abc	1.08a	4.29ab	6.39bc
Mesilla	7.11cdef	1.28abc	1.15a	4.47a	6.26bc
Mex-Son	7.09ef	0.91d	1.05a	3.72de	6.38bc
Mesa-Sirsa	6.68f	1.05bcd	1.11a	3.54e	6.51bc
Lew	6.64f	1.12bcd	1.07a	3.82cde	6.22bc

[1] Harvest Dates for 1977: 4/7, 4/26, 6/22, 7/18, 8/15, 10/7, 11/12
;for 1979: 4/26, 6/7, 7/10, 8/17
;for 1980: 4/30, 6/3, 7/2, 9/5, 10/28

[2] Means within a column not followed by the same letter are significant at the 0.05 level, Duncan's New Multiple Range Test.

*Before destruction of stand by simazine ** One cutting in August due to late seeding date.

Table 2. Dry matter yields of eleven alfalfa varieties and breeding lines grown at Stephenville under irrigation on Windthorst fsl soil

Variety	Tons Oven-Dry Forage Per Acre**		
	1978	1979	1980
Arc	3.23	5.65de**	7.73a
NCMP11	3.42	6.56a	7.73a
NCW 22	3.37	6.05bcd	7.61a
Liberty	3.23	6.32ab	7.49a
Apollo	3.30	5.90bcde	7.47a
Olympic	3.42	6.22ab	7.28a
Cody	3.14	5.70cde	7.02a
Vangard	3.33	6.05bcd	6.96a
Victoria	3.24	5.54ef	6.90a
Cap	2.94	5.17f	6.78a
Trident	3.30	6.09bc	6.75a

*Harvest Dates for 1978: 7/18, 8/18, 10/5; for 1979: 4/25, 6/6, 7/9, 8/10; for 1980: 4/29, 6/2, 7/1, 7/28, 9/4, 10/27.

**Means within a year not followed by the same letter are significantly different at the 0.05 level, Duncan's New Multiple Range Test.

Table 3. Protein percentage of alfalfa varieties harvested in 1977 1/

Variety	Harvest Date					
	5/26	6/22	7/18	8/15	10/7	Mean
Mesilla	13.4	15.8	14.7	15.7	17.3	15.4b*
NK919	14.2	17.1	14.9	16.4	18.5	16.2ab
Okla. Com.	15.1	18.2	14.7	16.8	16.8	16.3ab
Moapa-69	14.7	16.1	16.2	16.8	18.0	16.4ab
Cap	14.8	16.5	15.1	17.5	16.7	16.2ab
Mex-Son	13.9	16.0	14.1	16.4	16.7	15.4b
Lew	14.9	17.2	14.8	16.3	16.0	15.8ab
LRS	14.5	16.4	14.4	17.2	17.7	16.0ab
Hayden	14.8	16.3	14.6	15.2	17.4	15.6ab
WL-306	15.2	18.3	15.4	15.9	17.8	16.6a
Mesa-Sirsa	14.4	17.1	15.9	15.1	18.0	16.0ab
Mean	14.5c	16.8ab	15.0c	16.3b	17.4a	

1/ Average of four replications

*Means not followed by the same letter are significantly different at the 0.05 level, Duncan's New Multiple Range Test.

Table 4. Acre-inches of rainfall and irrigation received by alfalfa variety tests at Stephenville*

	Year		
	1977	1979	1980
Irrigation	16.5	4	20
Rainfall	19.8	22.5	15.5
TOTAL	36.3	26.5	35.5

*Includes rainfall received within 30 days prior to harvest through final harvest