TOP MANAGEMENT OF IRRIGATED ALFALFA PRODUCES TOP YIELDS

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Alfalfa is a high yielding, high quality, perennial forage. Yields exceeding 11 tons of forage and 4,000 pounds of crude protein per acre are being obtained in a Kansas State University study in south-central Kansas (Table 1). But alfalfa removes plant nutrients from the soil in large quantities--up to 64 pounds of phosphorus per acre (147 lbs/a P_2O_5) and 500 pounds of potassium per acre (602 lbs/a K_2O) annually (Table 2).

Several management factors contribute to high alfalfa yields. One of the most important is variety. The variety chosen must have a high yield potential like the Kanza variety in the Kansas study (Table 3). Time of cutting also is important in yield (Table 4). The first cutting in south-central Kansas should be about mid-May, varying somewhat with early or late initiation of spring growth. From the first cutting on, the crop reaches 1/10 bloom about every 28 to 30 days, so five cuttings are usual with a sixth cutting possible in some years. But the first cutting should not be too early or it depletes root reserves. On the other hand, late cutting clips off regrowth for the next cutting. So cutting either too early or too late slows regrowth for the next cutting and reduces yield.

Another high-yield factor is minimized harvest loss. Leaves lost during harvest reduce both the quantity and quality of the crop. Because much of the crude protein is in the leaves, every effort should be made to save all material that is cut.

Irrigation has increased the acreage of alfalfa in south-central Kansas tremendously. Water needed depends on the weather; as much as 7 acre-inches has been needed to produce one cutting. That amount usually is a combination of rainfall and irrigation. Proper timing of irrigations can also help control summer annual grasses. Watering two to three days before harvest on sandy soils allows the topsoil to dry out at harvest so weed seeds are less likely to germinate before alfalfa regrowth has a chance to shade the soil surface and retard weed growth. Also watering just before harvest assures moisture for rapid regrowth.

Proper fertilization, of course, is highly important for top yields. The initial soil test values for the alfalfa management study at the Sandyland Experiment Field were:

pH	P lb/a	K lbs/a
7.2	18	259

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Those amounts of plant nutrients in the soil are not enough for maximum yields. More P_2O_5 and K_2O are needed. Even though the soil test results show that alfalfa should respond to potassium fertilizer, there has been no response to date to applications up to 160 lbs/a K_2O annually. However, annual soil tests of plots where no potassium has been applied show much less exchangeable potassium (about 90 lb/a) in the soil than when soil tests were taken before the study was initiated. Apparently the mineralogy of the sandy soil of the test site has been releasing enough potassium to supply the high yielding alfalfa so far. Also, soil tests taken at different times of the year are not strictly comparable on this sand suggesting winter release of K. Response to applied P_2O has been tremendous. 120 lbs/a P_2O_5 has produced the highest yields and has increased the P soil test slightly. Soil tests indicate that 80 lbs/a of P_2O_5 applied annually maintains P content of the soil. Less than 80 lbs/a P_2O_5 has lowered soil available P levels. Split applications of 80 lbs/a P_2O_5, 40 lbs early spring and 40 lbs after the third cutting, have shown no benefit over single 80 lb P_2O_5 applications once each year.

One of the treatments studied was 320 lbs/a P_2O_5 applied once before the study started--before alfalfa was seeded. Other treatments have included the heavy initial preplant applications plus annual applications of P_2O_5. Yields from plots receiving no annual P_2O_5 but receiving 320 lbs/a P_2O_5 preplant yielded significantly less in 1978 and 1979 than plots receiving annual 120 lbs/a P_2O_5 applications. Highest yields have resulted from an additional late fall cutting, after frost, on the high P treatment areas. Removal of fall regrowth has not been detrimental to the alfalfa to date.

With increasing costs of production, producers must project individual costs to determine profitability of alfalfa production. Markets vary depending on the weather and prices of other sources of protein. Prices have ranged from $30.00 to $65.00 per ton during a marketing year in central Kansas. So far, our yields have been high enough to make alfalfa production profitable at those prices.

In summary, management tips for top alfalfa yield include selection of a variety with high yield potential, harvesting at the proper time, minimizing harvest losses, irrigating when needed, and proper fertilization. The forage yields, crude protein yield, nutrient removal, and soil test data from our study are shown in the following table.

TABLE 1

HIGH YIELD IRRIGATED ALFALFA - KANSAS

JIM BALL AND GEORGE TENEYCK

SANDYLAND EXP. FIELD, KANSAS STATE UNIVERSITY

FERTILIZATION, LB/A			KANZA VARIETY					
---------P_2O_5-----		K_2O	YIELD*, T/A			PROTEIN, LB/A		
PRE-PLANT	ANNUAL	ANNUAL	1977	1978	1979	1977	1978	1979
0	0	0	8.1	7.7	8.9	3040	2718	3503
0	40	80	9.3	9.3	10.0	3585	3266	3831
0	80	80	9.3	9.7	10.6	3566	3466	4270
0	120	80	9.6	10.6	11.0	3732	3858	4416
0	120	0	9.6	10.5	10.5	3779	3907	4371
0	120	160	10.0	10.6	11.5	3752	3799	4495
320	0	80	9.4	9.9	10.0	3613	3623	4160
320	120	80	9.8	10.6	10.6	3723	3803	4342
320	120	80**	9.6	11.6	11.3	3635	4081	4459

* 15 PERCENT H_2O, AVERAGE ALL CUTTINGS (5).

** ADDITIONAL CUTTING IN LATE FALL.

TABLE 2

HIGH YIELD IRRIGATED ALFALFA NUTRIENT REMOVAL - 1979 KANSAS

JIM BALL AND GEORGE TENEYCK

SANDYLAND EXP. FIELD, KANSAS STATE UNIVERSITY

FERTILIZATION, LB/A				NUTRIENT REMOVAL, LB/A				
---------P_2O_5-----		K_2O	YIELD, T/A					
PRE-PLANT	ANNUAL	ANNUAL	15 % H_2O	N	P	P_2O_5	K	K_2O
0	0	0	8.9	561	38	87	352	424
0	40	80	10.0	613	42	97	388	467
0	80	80	10.6	683	52	120	428	516
0	120	80	11.0	707	59	136	438	528
0	120	0	10.5	699	63	146	373	449
0	120	160	11.5	719	62	141	441	531
320	0	80	10.0	666	49	121	398	479
320	120	80	10.6	695	63	146	426	513
320	120	80**	11.3	714	64	147	428	516

** ADDITIONAL LATE SEASON CUTTING.

KANZA VARIETY.

TABLE 3

ALFALFA VARIETY AFFECTS YIELD - 1979, KANSAS

JIM BALL AND GEORGE TENEYCK

SANDYLAND EXP. FIELD, KANSAS STATE UNIVERSITY

FERTILIZATION, LB/A			YIELD, T/A			
---------P_2O_5-------		K_2O	0.1 BLOOM		FULL BLOOM	
PRE-PLANT	ANNUAL	ANNUAL	KANZA	MARATHON	KANZA	MARATHON
0	0	0	8.9	7.4	6.4	6.8
0	40	80	10.0	9.8	8.4	7.3
0	80	80	10.6	10.3	8.9	9.0
0	120	80	11.0	10.6	9.6	8.8
0	120	0	10.5	10.0	9.4	8.8
0	120	160	11.5	10.3	9.2	8.5
320	0	80	10.0	9.8	8.4	7.6
320	120	80	10.6	9.7	9.0	8.6
320	120	80**	11.3	10.8	10.4	10.3

** ADDITIONAL LATE SEASON CUTTING.

TABLE 4

CUTTING DATE AFFECTS ALFALFA YIELD AND NUTRIENT REMOVAL - 1979 KANSAS

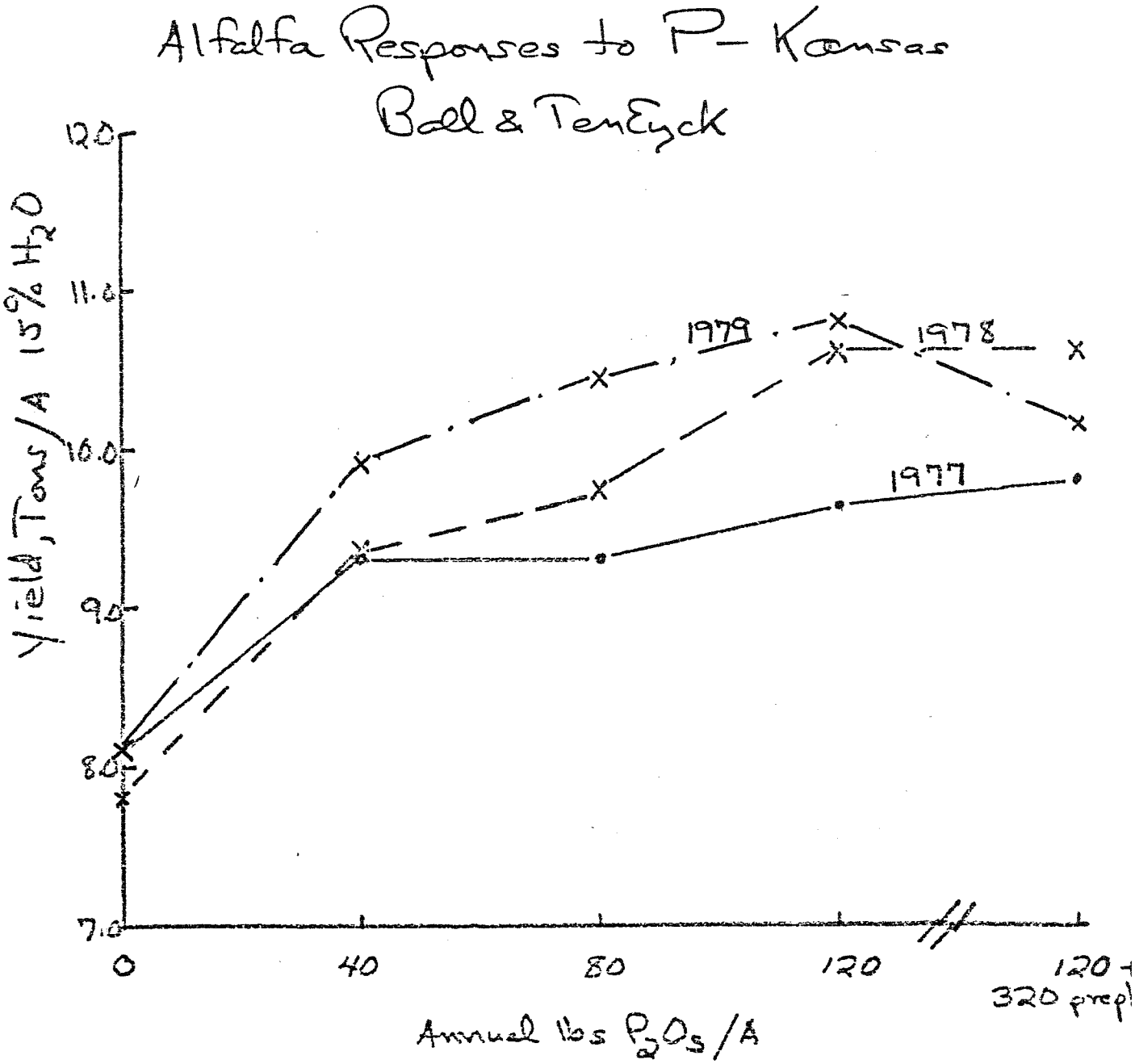
JIM BALL AND GEORGE TENEYCK

SANDYLAND EXP. FIELD, KANSAS STATE UNIVERSITY

Fertilization, lb/a			Yield, T/A 15 % H_2O			K Removal, lb/a		
P_2O_5 Pre-plant	P_2O_5 Annual	K_2O Annual	0.1 Bloom	Bud	Full Bloom	0.1 Bloom	Bud	Full Bloom
0	0	0	8.9	7.0	6.4	352	268	237
0	40	80	10.0	8.4	8.4	388	333	353
0	80	80	10.6	9.1	8.9	428	337	354
0	120	80	11.0	9.6	9.6	438	374	376
0	120	0	10.5	9.0	9.4	373	349	345
0	120	160	11.5	9.1	9.2	441	339	410
320	0	80	10.0	8.7	8.4	398	354	387
320	120	80	10.6	9.0	9.0	426	366	361
320	120	80**	11.3	10.0	10.4	428	353	423

** Additional late season cutting.

Kanza variety.


Alfalfa Responses to P – Kansas
Ball & TenEyck
Yield, Tons/A 15% H2O
12.0
11.0
10.0
9.0
8.0
7.0
1979
1978
1977
0
40
80
120
120+
320 prop
Annual lbs P2O5/A