

1976
FIELD DAY REPORT

NORTH
MISSOURI
CENTER

S PICKARD

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*To be issued as a separate handout
at the field day.

The North Missouri Center is a 1600-acre unit located seven miles west of Spickard on State Highway C in Grundy County. It is operated by the College of Agriculture at the University of Missouri-Columbia. The superintendent of the Center is Larkin Langford.

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SOIL FERTILITY RESEARCH WITH FORAGE CROPS

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All fertility studies with forage crops at the North Missouri Center are related to "Feed the Plant" approach to forage production rather than the "Fertilize the Soil" procedure followed for rotated crops. One set of plots in the reed Canarygrass Fertility study was brought up to "soil test" with lime, superphosphate and potash and then topdressed by selected N, P, K topdressings for a comparison with topdressings without applying basic or corrective treatments before making the seedings.

A. Effect of Topdressing Fertilizers on Yields of Tall Fescue And Reed Canarygrass

Topdressed fertilizers in these studies consisted of 3 levels of N, 4 levels of P₂O₅ and 4 levels of K₂O in all combinations. (N = 0, 100, 200 split, P₂O₅ = 0, 30, 60, 320 (rock phosphate), K₂O = 0, 50, 100, 150). The combinations make a total of 48 different treatments.

Yields T/A 1975

<u>Selected Treatments</u>	<u>Tall Fescue 2 cuts</u>	<u>Reed Canarygrass 3 cuts</u>	<u>Reed Canarygrass Basic Plus Topdress 3 cuts</u>
0 + 0 + 0	0.4	0.9	---
100 + 0 + 0	1.5	1.9	---
200 + 0 + 0	1.8	2.4	3.8
0 + 30 + 0	0.9	1.2	---
100 + 30 + 0	1.9	1.9	---
200 + 30 + 0	3.3	3.8	3.8
0 + 30 + 100	0.6	1.1	---
100 + 30 + 100	2.0	1.9	---
200 + 30 + 100	3.0	4.3	4.5
0 + 30 + 150	0.9	1.4	---
100 + 30 + 150	2.4	2.3	---
200 + 30 + 150	4.0	4.3	4.5
0 + 60 + 150	1.2	1.1	---
100 + 60 + 150	2.3	2.5	---
200 + 60 + 150	4.1	4.5	4.7
200 + 320* + 100	3.8	4.1	---
200 + 320* + 150	4.3	4.1	---

*1,000 lbs rockphosphate topdressed on tall fescue March 1971 and on reed canarygrass March 1972.

Yields of both grasses were increased by using 200 lbs N in split applications (100 lbs March, 100 lbs after 1st cutting). In the case of tall fescue there was carry over effect from the 200 lbs N. No N carry over was noticed on the reed canarygrass this year. Reed canary tends to out-yield tall fescue and for this reason could probably make use of a higher N rate than fescue. Observations from this study and of grazing management problems suggest 80 lbs N in March and an additional 80 lbs in June could give optimum forage yields in relation to soil moisture conditions.

Phosphorus topdressed at 30 lbs P₂O₅/A was adequate for both grasses. Rock phosphate supplied enough P for highest yields. In the case of K₂O, 100 lbs was adequate for the reed canarygrass but 150 lbs was indicated for the fescue. The reed canarygrass is growing on a soil containing larger amounts of exchangeable K than the soil where the fescue is planted. These soil differences will be evaluated at the termination of the studies. All forage was removed in these studies. Under pasture conditions smaller amounts of P₂O₅ and K₂O would be indicated. These studies are being supported by Farm Land Industries.

B. Establishing Red Clover in Stands of Pasture Grasses

In February 1976 certified Kenstar red clover was applied by a brilliant seeder at 8 lbs/A on the zero N plots of the above two studies. Good stands of red clover were obtained on all plots. However, different rates of growth were observed depending on the amounts of P₂O₅ and K₂O that had been topdressed during the previous 5 years with fescue and 4 years on the reed canarygrass plots. The table below shows the concentrations of P₂O₅ and exchangeable K the seedling red clover plants found in the upper four inches of the differently treated plots.

Depth Inches	Tall Fescue				Reed Canarygrass			
	0+30+0		0+30+50		0+30+0		0+30+50	
	P ₂ O ₅	E _x K	P ₂ O ₅	E _x K	P ₂ O ₅	E _x K	P ₂ O ₅	E _x K
0-1	207	220	292	406	242	360	312	556
1-2	102	142	74	153	87	256	102	394
2-3	45	135	61	200	34	230	53	288
3-4	32	134	43	199	34	221	59	325

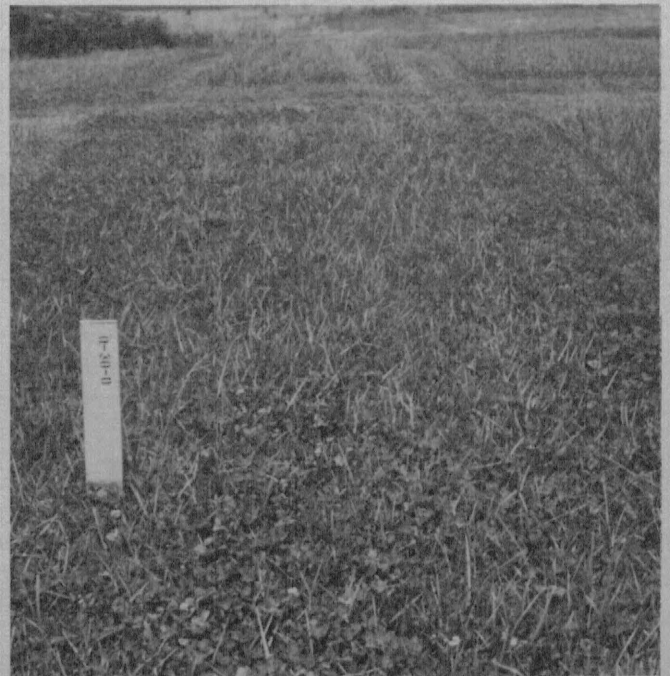
Phosphorus and Exchangeable K Soil Test Values
Where Nitrogen was also Topdressed - 200 + 30 + 50

Depth Inches	Fescue		Reed Canarygrass	
	<u>P₂O₅</u>	<u>E_xK</u>	<u>P₂O₅</u>	<u>E_xK</u>
0-1	62	110	59	175
1-2	70	105	25	165
2-3	43	100	25	150
3-4	28	90	18	150

For best results 80 lbs superphosphate should be drilled with red clover seed if red clover were to be interseeded in these grass stands. The addition of 200 lbs N/A produced the last three years an average of 3.7T/A and 4.4T/A by the fescue and the reed canarygrass respectively. These yields have used most of the topdressed P₂O₅ and K₂O thereby leaving relatively low P₂O₅ and E_xK concentrations in the surface inch of the plots.



RED CLOVER overseeded on fescue in February 1976 on plots getting 0+0+0 for five years.



RED CLOVER overseeded on fescue in February 1976 on plots getting 0+30+0 for five years.



RED CLOVER overseeded on reed canarygrass in February 1976 on plots topdressed with 0+30+0 for four years.

C. Renovation of Reed Canarygrass Sod with Legumes Topdressed with Phosphorus and Potassium

Reed canarygrass plots planted in April 1972 as part of a previous reed canarygrass establishment study were disked to reduce the stand by one-half in April 1974. Blocks of Victoria (creeping) alfalfa, Dawn birdsfoot trefoil, and common red clover (Kenstar variety not available) were band seeded with 80 lbs of superphosphate/Acre with a drill. The blocks of each legume were large enough to permit the following treatments with three replications:

Main Blocks - fertilizers topdressed annually in fall

- | | |
|-----------------|-----------------|
| 1. 0 + 30 + 100 | 3. 0 + 60 + 100 |
| 2. 0 + 30 + 200 | 4. 0 + 60 + 200 |

Sub plots consist of nitrogen treatments topdressed on plots containing reed canarygrass-legume mixtures and on reed canarygrass alone - the legume having been removed by use of a herbicide. These subtreatments are as follows:

1. 0 N on grass-legume mixture.
2. 50 lbs N on grass-legume mixture after first cutting.
3. 0 N on reed canarygrass alone.
4. 50 lbs N on reed canarygrass alone.

These treatments will permit the determination of effective N fixation by the three legumes; also the rates of P_2O_5 and K_2O and the soil test values necessary to produce optimum yields of the mixtures.

Three tons per acre of limestone were worked into the plowed surface when the reed canarygrass was planted on these plots in

April 1972. A pilot study close by is being used as an indicator when to topdress additional limestone on these plots.

The soil test values at the beginning of these reed canary-grass legume studies in April 1974 were as follows:

Depth	P ₂ O ₅		OM %	Ca Lbs/A	Mg Lbs/A	E _x K Lbs/A	pHs	N.A. me/ 100 gms	CEC
	P ₁	P ₂							
0-3"	29	38	3.2	6570	930	239	6.1	3.3	24
4-6"	20	26	3.1	4470	910	177	4.9	7.8	23

The yields in 1975 in T/A produced by the various treatments are given below. A dry summer reduced the effectiveness of the N applied after the first cutting.

Topdressings

		<u>0+30+100</u>	<u>0+30+200</u>	<u>0+60+100</u>	<u>0+60+200</u>	<u>Avg</u>
(Reed Canary alone)	0N	1.4	1.2	1.4	1.2	1.3
	50N	1.7	1.6	1.8	2.0	1.8
(Reed Canary + alfalfa)	0N	3.6	3.0	3.9	4.0	3.6
	50N	4.2	3.1	3.5	4.1	3.7
(Reed Canary + red clover)	0N	4.5	4.7	5.4	4.3	4.7
	50N	5.0	4.6	5.3	5.3	5.1
(Reed Canary + trefoil)	0N	3.1	3.3	3.4	3.5	3.3
	50N	<u>3.4</u>	<u>3.0</u>	<u>3.5</u>	<u>3.2</u>	3.3
	Avg.	3.4	3.1	3.5	3.5	
Avg. Legume mixtures only		4.0	3.6	4.2	4.1	

The data to date indicate that 50 lbs N/A on the grass-legume mixtures has not increased total yields. However, data by harvest dates may eventually indicate an advantage of applying some N after first cutting due to increased June and July growth of reed canarygrass. Rainfall distribution in June and July has not been favorable for early summer growth in 1975 and 1976. Conditions were more favorable in 1974.

So far the initial 3T/A limestone in the upper three inches have been adequate for good growth of the legumes.

The results of this study will also give us some data regarding the amount of limestone needed when interseeding legumes into stands of pasture grasses.



RED CLOVER in reed canarygrass, 0+30+200 top-dressed in fall, 50 lbs. N after 1st cutting.



TREFOIL in reed canarygrass, 0+30+200 top-dressed in fall, 50 lbs. N after 1st cutting.

SMALL GRAINS RESEARCH

Louis Meinke, Dale Sechler, J. M. Poehlman and Paul Rowoth

Small grains research at the North Missouri Center involves wheat and spring oats primarily. Small grain was grown in variety evaluation trials and in some double cropping experiments during the 1975-76 season.

Wheat breeding efforts are concentrated on developing high yielding varieties of soft red winter wheat which will tolerate the usual production hazards in the area. Short, stiff-strawed, fertilizer responsive varieties which are resistant to hessian fly and diseases such as Septoria, rust, mildew and smut are desired. New hard as well as soft wheat selections from surrounding states are evaluated, along with new selections from the Missouri breeding program, in the outstate variety trials. Forty varieties and strains (10 hard and 30 soft) were grown in replicated trials at Spickard in 1975-76. Some performance data is shown in Table 1.

Oat breeding efforts are concentrated on the development of high yielding, lodging, and disease resistant varieties. Forty selections, 13 of which are already in commercial production, were evaluated at Spickard in 1975-76. Barley yellow dwarf virus disease greatly reduced the yields of susceptible varieties. Otee, Pettis, Trio and Chief are established varieties with BYDV tolerance and yielded well.

Varieties of wheat differ in maturity and therefore the date at which soybeans might be seeded in the stubble. Four varieties of wheat (varying in range of maturity) were seeded and each harvested at 3 moisture levels to determine the effect on wheat yield and quality. Soybeans were seeded in the stubble immediately after each harvest to evaluate the effect of time of planting on soybean performance. Several crops will be necessary to provide meaningful data.

Descriptions of small grain varieties adapted to Missouri are found in current UMC guides.

Table 1. Missouri Wheat Variety Tests, 3-Year Average, 1974-76

Variety	Spickard only*	Average over Spickard, Columbia, Mt. Vernon, Portageville locations							
	Yield bu/A	Yield bu/A	Test Wt lb/bu	Date Hded	Ht. In.	Lodg. %	Leaf rust %	Hessian fly %	Mildew %
<u>Hard Wheat</u>									
Danne	40	31	59.3	5/8	38	32	60	71	41
Parker	39	33	60.7	5/10	40	24	24	3	28
Centurk	48	38	59.2	5/11	40	32	11	43	15
Sage	46	33	59.9	5/14	40	28	6	75	18
Cloud	37	28	59.9	5/15	41	31	7	69	24
<u>Soft Wheat</u>									
Arthur 71	38	34	59.7	5/8	36	20	11	2	0
Abe	40	35	58.6	5/8	36	15	7	2	0
Oasis	41	35	59.1	5/8	37	16	9	3	0
Doublecrop	37	31	59.7	5/3	36	15	13	18	0
Stoddard	49	37	59.7	5/9	41	14	12	7	17
Hart	57	42	57.8	5/10	37	16	17	3	22
Coker 68-15	55	37	59.6	5/7	35	12	13	22	27
McNair 4823	54	40	58.5	5/13	36	11	7	24	9

*Data from Spickard is for the 1974-75 and 1975-76 seasons only since bird damage was severe and uneven in the 1973-74 nursery.

NO-TILL SOYBEANS

C. M. Woodruff and Louis Meinke

The field was used for double cropping wheat and soybeans and wheat and corn in 1974 and 1975. There was a relatively uniform stand of volunteer wheat growing on the field this spring. There were some perennial and annual broadleaf weeds growing in the volunteer wheat.

The field was sprayed with Banvel K on May 13 to kill the broadleaf weeds. The field was fertilized with 0-60-60. The fully headed wheat was mowed with a sickle mower on May 26, and 53 lbs./A. of Williams soybeans were planted with a Buffalo slot planter the same day.

Two broadcast herbicide treatments were used: (1) 30 gal. water, 2 pt. Paraquat, 1/3 pt. X-77, 1 gal. Amiben per acre and (2) 2 lbs. Lorox 50 wp was substituted for the Amiben.

ROW CROP HERBICIDE DEMONSTRATION

L. E. Anderson

Only herbicides recommended by the University of Missouri Agricultural Experiment Station are included in the demonstration. No cultivation or tillage has been used to supplement herbicide performance. Consequently the weed control or suppression observed under the various treatments is due to activity of the herbicide alone.

It will be noted that few herbicides used alone provide satisfactory weed control - this is because some products are adapted to control grassy weeds while other herbicides may be more specific for broad-leaved weed control. For that reason herbicide combinations generally perform more satisfactorily than a herbicide used alone.

Individual plots include four 82-foot rows with the stake located between the two middle rows. The plot area covers three square rods.

SOYBEAN DEMONSTRATION
Herbicides
1976

<u>Plot No.</u>	<u>Herbicide</u>	<u>Rate/Acre</u>	<u>Amt/Plot</u>
PPl 1	Amex	2.0 lb.	36 cc
2	Basalin	1.0	18 cc
3	Cobex	0.5 lb.	18 cc
4	Lasso	2.5 lb.	42 cc
5	Tolban	1.0 lb.	18 cc
6	Treflan	1.0 lb.	18 cc
7	Treflan + Sencor	0.75 + 0.5 lb.	13 cc + 10 gr
PPl + 8	Vernam	3.0 lb.	27 cc
Pre 9	Treflan + Amiben	1.0 + 2.0 lb.	18 cc + 70 cc
10	Treflan + Furloe	1.0 + 2.5 lb.	18 cc + 42 cc
11	Treflan + Lorox	1.0 + 1.0 lb.	18 cc + 18 gr
12	Treflan + Sencor	1.0 + 0.5 lb.	18 cc + 10 gr
Pre 13	Amiben	3.0 lb.	108 cc
14	Dyanap	4.5 lb.	81 cc
15	Lasso	2.5 lb.	42 cc
16	Lasso + Dyanap	1.5 + 3.0 lb.	28 cc + 54 cc
17	Lasso + Furloe	1.5 + 2.5 lb.	28 cc + 42 cc
18	Lasso + Lorox	1.5 + 1.0 lb.	28 cc + 18 gr
19	Lasso + Sencor	1.5 + 0.5 lb.	28 cc + 10 gr
20	Lorox	2.0 lb.	36 gr
21	Maloran	2.0 lb.	36 gr
22	Modown	2.5 lb.	27 gr
23	Sencor	0.75 lb.	14 gr
24	Surflan + Lorox	1.5 + 1.0 lb.	16 gr + 18 gr
Post 25	Basagran	1.0 lb.	18 cc
26	Dinoseb	2.0 lb.	48 cc
27	Tenoran	1.5 lb.	27 gr
28	2,4-DB	0.2 lb.	8 cc

Planted May 25

Sprayed May 26

CORN DEMONSTRATION
Herbicides
1976

<u>Plot No.</u>	<u>Herbicide</u>	<u>Rate/Acre</u>	<u>Amt/Plot</u>	
PPl	1	AAtrex + Sutan +	1.25 + 3.0 lb.	13 gr + 36 cc
	2	Bladex + Sutan	1.25 + 3.0 lb.	14 gr + 36 cc
	3	Eradicane	4.0 lb.	48 cc
	4	Sutan +	4.0 lb.	48 cc
Pre	5	Prowl	2.0 lb.	36 cc
	6	AAtrex	2.5 lb.	27 gr
	7	AAtrex + Lasso	1.5 + 1.5 lb.	15 gr + 27 cc
	8	AAtrex + Ramrod	1.0 + 3.0 lb.	11 gr + 40 gr
	9	Amiben + AAtrex	1.5 + 1.5 lb.	54 cc + 15 gr
	10	Banvel + Lasso	0.25 + 1.5 lb.	4.5 cc + 27 cc
	11	Bladex	3.0 lb.	32 gr
	12	Bladex + Lasso	2.0 + 1.5 lb.	20 gr + 27 cc
	13	Lasso	2.5 lb.	45 cc
	14	Lasso + Lorox	1.5 + 0.75	27 cc + 14 gr
	15	Princep	2.5 lb.	27 gr
Post	16	AAtrex	2.5 lb.	27 gr
	17	Banvel + AAtrex	.25 + 1.5	4.5 cc + 15 gr
	18	Banvel	.25 lb.	4.5 cc
	19	Bladex	3.0 lb.	32 gr
	20	Evik	2.5 lb.	27 gr
	21	Outfox	2.5 lb.	175 cc

Planted May 12

Sprayed May 13

GRAIN SORGHUM DEMONSTRATION
1976

<u>Plot No.</u>	<u>Herbicide</u>	<u>Rate/Acre</u>	<u>Amt/Plot</u>
1	Ramrod	4 lb	53 gr
2	Ramrod-AAtrex	2 lb + 1 lb	26 gr + 14 gr
3	Milogard	2.5 lb	35 gr
4	Igran	3 lb	42 gr
5	Igran + AAtrex	2 lb + 1 lb	28 gr + 14 gr
6	Igran + Milogard	2 lb + 1 lb	28 gr + 14 gr
7	Experimental	-	-
8	Check	-	-

Planted June 14

Sprayed June 15

SOYBEAN VARIETIES IN NORTH MISSOURI

R. D. Horrocks and C. G. Morris
 Department of Agronomy, University of Missouri

Knowledge of agronomic performance of soybean varieties is valuable as an aid in selecting varieties. In recent years a large number of new soybean varieties and blends have been released, mostly by commercial companies, and knowledge of strong and weak points of each variety and blend is needed. It is for this reason that the state-wide soybean evaluation program was initiated in 1974. The following tables present the performance of varieties in north Missouri during 1974-75.

Average performance of soybean varieties evaluated at the North Missouri Center near Spickard, Mo. (Grundy Co.) during the two-year period 1974-75.

Brand-Variety	Acre Yield (Bu)	Lodg- ing Score* (1-5)	Plant Height (In)	Ma- turity Date
2-Year Average				
Amsoy 71	33.0	1.1	32	**
SRF 200	35.1	1.1	31	**
Pontiac	34.3	1.0	28	**
Teweles XK585	33.1	1.0	32	**
Wayne	32.7	1.0	33	**
Woodworth	39.2	1.0	34	**
SRF 307P	36.1	1.3	33	**
Cherokee II	36.2	1.1	32	**
Williams	37.1	1.0	34	**
Calland	37.4	1.0	33	**
SRF 350	36.6	1.1	32	**
Washington II	36.3	1.0	33	**
Cutler 71	35.5	1.1	33	**
Peterson 125	39.8	1.0	33	**
Teweles XK351	39.9	1.3	35	**
Clark 63	36.3	1.0	35	**
Teweles XR70	42.4	1.0	34	**
Bonus	38.7	1.0	33	**
SRF 400	35.8	1.0	34	**
SRF 425	37.8	1.0	36	**
Mitchell	38.3	1.5	35	**
SRF 450	35.3	1.1	35	**
Average	36.7	1.1	33	

*1 = No lodging; 5 = complete lodging

**Maturity date not available.

Average performance of soybean varieties evaluated at the Lynn Douglas farm near Edina, Mo. (Knox Co.) during the two-year period 1974-75.

Brand-Variety	Acre Yield (Bu)	Lodg- ing Score* (1-5)	Plant Height (In)	Ma- turity Date
Amsoy 71	35.1	1.0	32	9-11
SRF 200	35.3	1.1	32	9-11
Cherokee II	31.4	1.0	28	9-17
Teweles XK585	36.5	1.5	29	9-23
Wayne	37.3	1.5	32	9-26
SRF 307P	41.8	2.3	33	9-27
Woodworth	38.7	1.3	31	9-28
Pontiac	39.4	1.0	28	10-01
SRF 350	37.8	2.3	32	10-02
Williams	42.6	1.1	31	10-03
Washington II	37.2	1.1	30	10-04
Calland	38.4	1.1	32	10-04
Peterson 125	40.4	1.6	31	10-05
Cutler 71	39.0	2.0	34	10-06
SRF 400	40.3	1.6	32	10-06
Clark 63	36.2	2.0	33	10-06
Teweles XR70	40.4	1.3	33	10-06
Teweles XK351	41.1	2.6	35	10-07
Mitchell	45.1	2.5	32	10-08
Bonus	33.8	1.6	34	10-08
SRF 425	41.3	2.8	33	10-08
SRF 450	43.8	4.1	31	**
Average	38.8	1.8	32	

*1 = No lodging; 5 = complete lodging

**Maturity date not available.

Average performance of soybean varieties evaluated in Grundy and Knox counties during 1975. Locations were North Missouri Center near Spickard, and Edina.

Brand-Variety	Acre Yield (Bu)	Lodg- ing Score* (1-5)	Seed Quality Score (1-5)	Plant Height (In)	Ma- turity Date
Mitchell	46.8	2.3	1.0	33	**
Peterson 3125	42.9	1.6	1.8	33	**
Wayne	36.6	1.5	1.5	32	**
Williams	40.6	1.1	1.5	30	**
A72-512	39.0	2.5	1.7	34	**
Clark 63	40.4	1.8	1.3	33	**
Clemens Exp. 6	33.9	2.1	1.5	32	**
NK Multivar 80	40.1	1.1	1.8	31	**
Teweles XK585	34.8	1.5	1.6	30	**
Teweles XR70	39.8	1.3	1.7	31	**
Amsoy 71	35.4	1.0	2.6	32	**
Calland	38.1	1.1	2.6	31	**
Clemens Exp. 5W	34.9	2.3	1.8	32	**
Peterson 3105	35.3	1.0	1.6	31	**
Peterson 2120T	37.8	1.5	1.3	31	**
Peterson 3120X	33.3	1.3	1.8	30	**
Teweles XK351	38.5	2.1	2.7	34	**
Teweles XK262	39.8	1.0	1.3	32	**
Agripro 25	37.1	1.0	2.1	29	**
Funks G-3272	35.2	1.1	2.0	32	**
Funks G-3333	36.9	1.3	1.6	30	**
Peterson 125	39.1	1.6	2.3	31	**
SRF 307P	39.2	2.1	2.0	31	**
Washington II	34.8	1.0	2.3	31	**
Clemens Exp. 113	38.9	1.1	2.2	30	**
Clemens 9L-75	39.0	1.3	2.2	33	**
SRF 350	40.4	2.3	1.1	33	**
Woodworth	40.3	1.3	1.6	31	**
Agripro 27	39.3	1.0	2.0	32	**
Clemens Exp. 85	38.6	1.6	1.6	31	**
SRF 200	34.8	1.1	2.0	33	**
Clemens Exp. C736	35.6	1.0	1.6	32	**
Cutler 71	35.9	1.8	1.5	32	**
Landers L23-432	37.7	1.5	1.6	31	**
NK 3409 Exp.	38.3	1.6	2.2	32	**
SRF 400	41.5	1.6	1.1	32	**
SRF 425	42.4	2.6	1.0	34	**
Beeson	31.3	1.0	2.2	30	**
Bonus	39.0	1.6	2.1	33	**
Cherokee II	33.9	1.0	2.0	30	**
Clemens Exp. 1	32.5	1.8	2.5	31	**
Clemens CX327	37.6	1.0	1.5	30	**
Clemens Exp. B-G	39.3	1.1	2.0	32	**

(Continued on next page)

Grundy and Knox County data (Continued).

Brand-Variety	Acre Yield (Bu)	Lodg- ing Score* (1-5)	Seed Quality Score (1-5)	Plant Height (In)	Ma- turity Date
Clemens Exp. 66	37.3	1.1	1.5	31	**
Clemens Exp. 5T	32.3	1.8	1.8	30	**
Pontiac	37.3	1.0	2.1	29	**
SRF 450	38.5	4.1	1.5	32	**
Agripro 35	38.6	1.5	1.6	31	**
Clemens Exp. 93	34.5	1.0	1.8	32	**
Average	37.7	1.5	1.8	31	

LSD(.05)*** 3.6

*Lodging Scores: 1=No lodging; 5=all plants lodged.

**Maturity Date--Frosted before plants had reached stage where 75% of pods had turned color.

***Differences between varieties greater than the given least significant difference (L.S.D.) can be considered due to varieties 19 out of 20 times grown.

FORAGE MANAGEMENT

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Management of forages is the sum total of practices used to establish, produce, harvest and utilize forages. The two factors most commonly thought of as management are fertilizer application and rotational or controlled grazing. But they are only two of a long list of interlocking practices, all interacting to influence the final result.

The first step in forage management is the selection of the proper seeding mixtures and species to provide feed for the livestock enterprise. Usually these selections should contain one grass and one or two legumes. Shotgun mixtures are sometimes competitive with one another during establishment, and almost always present problems in utilization. So keep seeding mixtures simple.

Selection of the proper species usually involves the fundamental questions of
(A) What grasses and legumes are adapted to the soils and climate of the area.
(B) What to use for winter feed (C) Which forages will furnish the quality needed for adequate animal performance.

Performance of Cows and Calves Grazing Orchardgrass, Tall Fescue and Fescue - Red Clover. 3-Year Average.

	Orchardgrass	Fescue	Fescue & Red Clover
Calf Weaning Wt. (lbs)	429	351	426
Cow ADG	0.58	0.02	0.58
Cow Conception Rate (%)	90	72	92

-P. U. 1975 Beef-Forage Research Day Proceedings

Summer pastures need to be productive in periods that usually offer some hazard as to moisture (usually lack of) and high temperatures. Cool season grasses are at their production "low level peak" during this period.

Feed Produced Between May 17 and August 18. Agronomy Farm UMC. 1971.

	Tall Fescue	Fescue & Red Clover	Fescue - Trefoil
Lbs D. M. per A.	334	1644	3547

Fescue, while more drought tolerant than orchardgrass, reed canarygrass, timothy, or bromegrass has lower animal acceptance during the summer than the others.

Daily Gain of Calves During Summer Grazing Period - Miller-Purdue Field Day Report
1951 - 3-Year Average.

	Orchardgrass	Fescue	Brome
ADG	0.65	0.55	1.01

A choice of some legume as a companion to the grass during the summer period offers some opportunity. Quality is improved and usually higher intake by the animal occurs. Legumes also produce more during this period. A grass legume mixture will usually produce about the same as a grass that has been fertilized with 70 to 90 pounds of nitrogen per acre. At the University of Missouri Forage Systems Research Center grass-ladino pastures produced about 80 percent as much feed as grass fertilized with 100 pounds of nitrogen annually. The higher quality of the legume pasture was reflected by the increased gain of the calves grazing the pastures.

Carrying Capacity and Animal Performance of Cows and Calves at FSRC

	Fescue & Ladino	Fescue + 100 lbs N.	Fescue + 200 N
Calf Gain	319	290	282
Carrying Capacity (Cow days per A)	152	185	203

Alfalfa, red clover, ladino, alsike, sweet clover and birdsfoot trefoil are about the extent of the legumes available for pasture use. Each has its strong points and weakness. The choice will be influenced by soil type, competitive ability of the plant, bloat hazard, type of beef enterprise and other factors.

Birdsfoot trefoil and red clover are probably the outstanding choices for use as a pasture legume. Red clover has not been thought of as a legume to use in permanent pasture during the past several decades but newer long lasting varieties plus new techniques of establishment make this versatile species a promising pasture legume.

Warm season grasses and especially the summer annuals such as sudangrass, sorghum-sudan crosses and pearl millet may be used for summer forage. They produce well but production costs are very high. They also compete for corn and soybean land.

Fall and winter pasture problems are easier solved than summer problems especially for beef cows. It's probably easier for one to be "wintering cattle than summering cattle". Tall fescue is widely used for this purpose in Missouri. During the fall period it is more palatable and animal performance on fescue at this time is very similar to other grasses. However, our research indicates that a fescue-legume mixture is highly desirable even during the fall and winter months. If an appreciable amount is to be stockpiled, it is essential that the pasture be rested during August and September.

Be prepared to seed on time -- early, timely seeding is essential to establishing a stand. Timeliness is especially critical when seeding on undisturbed sod.

Excellent stands can be obtained by seeding in January and February on frozen ground. The soil does not necessarily need to be honeycombed. New seedlings occasionally are injured by a "late freeze" but this is usually less of a threat than seeding too late. Late seedings lack soil contact for good germination, and summer stress kills many undeveloped seedlings.

SEEDING RATES AND MIXTURES

Use certified legume seed. Don't take a chance with inferior seed. Certified seed insures varietal purity and proven performance. When possible match the right legume with the proper grass. Trefoil and alfalfa are much easier to establish in bluegrass, orchardgrass or timothy than fescue. Usually ladino or red clover are a better choice to use with fescue because of their aggressive seedling nature.

Seedlings of some legume species are more aggressive than others, and when mixed with less aggressive ones they interfere with establishment. Ladino and red clover are much more aggressive than trefoil or alfalfa and are easier to establish in thick, heavy stands of grass.

Establishing legumes in heavy fescue or bromegrass stands is more difficult than in most other grasses. Legumes can be established much more easily in bunch grasses such as orchardgrass or timothy. Also, legumes can be easily established in bluegrass because of its lack of height even though it is a rhizomous species.

The rate of seeding is determined by the method of sowing.

	Broadcasting on undisturb- ed soil	Broadcasting on tilled soils	Drilling on prepared seedbed
R.C.	10 lbs	8 lbs	6 lbs
Ladino	1½	1	½
Alfalfa	10	8	6
Trefoil	8	6	4
Lespedeza	25	20	15

Don't forget to inoculate. Numerous seedings fail because of poor legume inoculation. Use moisture to apply the inoculum to the seed. Mixing the dry inoculum with the seed without moistening the seed will fail more times than it will succeed.

Fertility. It is my judgement that determining economical fertilizer rates for forages is the most difficult management decision that a rancher faces.

It is necessary to fertilize pasture if high forage production is desired. Farmers know what fertilizer will do and admit that fertilized forages produce more. But in Missouri only one pasture acre out of 14 is fertilized - why?

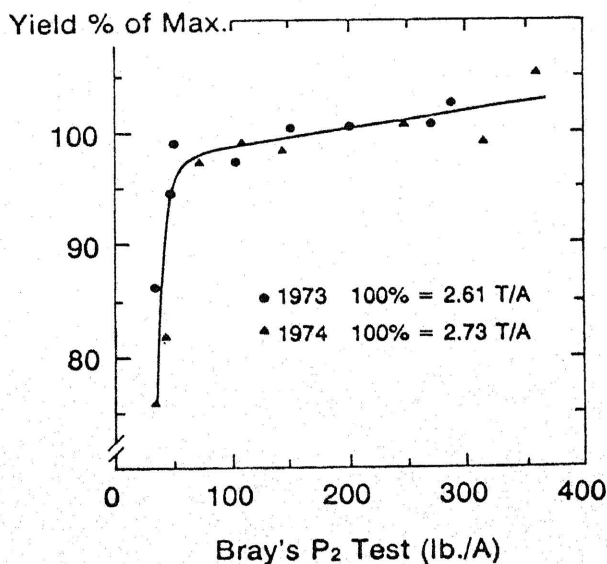
One of the reasons is that if forage production is doubled, livestock numbers must be doubled. It is estimated that for each one dollar spent to improve pastures, an additional \$10 needs to be invested in livestock. So obviously financing is part of the problem.

Still another factor is the unfavorable seasonal distribution of cool season grasses, 60-70% of their growth potential occurs before July 1. Most of this growth must be harvested and stored in order to be utilized.

Our data would indicate that a legume should be used in place of nitrogen if at all possible. Although slightly higher carrying capacity was achieved with 100 lbs of nitrogen per acre, the cost was about \$19 per added cow month of carrying capacity. The fertilizer cost for this added production amounted to \$228 per cow per year! In addition, the cows grazing the grass-nitrogen pastures produced a calf 30 pounds lighter than from the grass-legume one and it took longer for her to rebreed.

To determine the amount of phosphorus and potassium to use requires considerable judgement. However, it would seem that farmers are not using enough soil tests to make their decisions. It is a necessity to know what level is present in the soil before a rational decision can be made. The forage recommendations given on the Missouri soil test reports are based on type of forage, yield goal, if it is to be used as hay or pasture, the residual in the soil and our research as it relates to response curves.

Yield Response of Legume to Soil Levels of Phosphorus.



Crop Residues

Much has been said about the use of crop residues as a source of beef cattle feed. For many years farmers grazed stock fields and there were few agronomic implications. Most of the manure and the coarse residues were left in the field and trampled into the soil. In recent years, more and more farmers have been collecting the residue into large stacks or bales and completely removing them from the field. This does have drastic implications from the standpoint of soil structure, soil erosion and fertility costs. There is some research that shows that erosion is 30 percent greater on fall plowed land where the corn stalks have been removed. A ton of corn stalks will contain approximately 15 pounds of nitrogen, 6 pounds of phosphate and 40 pounds of potash. At today's prices that is about \$6.30 per ton or about \$18.90 per acre. This cost must be added to baling, mowing, feeding, and other costs when determining the economics of winter cattle on crop residues.