# Forage Research in Texas

Departmental Technical Report No. 81-12

Department of Soil and Crop Sciences

SR - 0050

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Project: H-6443 Workers: F.M. Rouquette, Jr.

Location: Overton

# MINERAL COMPOSITION OF FORAGES GRAZED AT DIFFERENT INTENSITIES

### **OBJECTIVE:**

Evaluate the influence of level of forage availability on mineral content of selected forages.

## **PROCEDURE**:

Paddocks composed of common bermudagrass-crimson clover-ryegrass Coastal bermudagrass, Pensacola bahiagrass, and common weeping lovegrass were grzed at two or more levels of forage availability. Coastcross I bermudagrass was grazed at only the medium intensity. The heavily grazed paddocks had approximately 250-300 kg/ha available forage throughout the grazing period. The medium grazed paddocks had approximately 1000 kg/ha available forage; whereas, the lightly grazed paddocks had approximately 2500 kg/ha available forage throughout the grazing period. Forage samples for chemical analyses were taken to ground level from all paddocks. The mineral analyses, therefore, were expected to estimate the status of available forage rather than consumed forage. Forage samples were dried, ground, and prepared for mineral analysis by dry ashing. Phosphorus was determined by the phosphomolbydate blue color method. The other minerals assayed, potassium, calcium, iron, zinc, manganese, magnesium, and copper were determined via atomic absorption.

### **RESULTS AND DISCUSSION:**

Percent phosphorus content of the forages tested is presented in Table 1. Phosphorus content was highest in the clover-ryegrass and in the immature Coastcross I bermudagrass, and lowest in weeping lovegrass. Forage from the lightly grazed paddocks was generally lower in percent phosphorus than forage from the other stocking rates. Percent potassium of forage followed a trend similar to that of phosphorus (Table 2). Potassium level of Coastcross I was considerably higher than that of the other forages (Table 3). However, the influence of grazing pressure did not appear to have the same effect as previously shown for phosphorus and potassium.

Percent iron, zinc and manganese are presented in Tables 4, 5, and 6, respectively. Bahiagrass had relatively high contents of zinc and manganese. The heavily grazed forages appeared to have slightly higher concentrations.

of minerals than the lightly grazed forages. Table 7 presents the magnesium status of those forages tested. Both lovegrass and Coastal had less concentration of magnesium than the other forages. The influence of season did not appear to have a significant effect on level of magnesium. Percent copper in the forages is shown in Table 8. The absolute levels of copper were lower than the other minerals tested. Coastcross I bermudagrass consistently had higher concentrations of copper; whereas, Coastal bermudagrass had some of the lowest copper levels.

	Common- Crimson- Ryegrass			Co	Dastal	lavot	-%- Coast- cross Bahia			Love- grass	
Date	H	M	L	H	<u>M</u>	L	M	_ <u>H</u>	L	H	L
2-24	.38		.42	-	a ang pana	1.5		bse <u>p</u> art	1.9. <u>8</u> 98.9	abard .	
3-11	.40	.34	.38	Ite-s	a 91 <b>-</b> 6 3	1 - 1		1 10 0	6	-	-
3-24	C LVBB	.36		noonit Ar Train			6 no 22 b	201 <u>-</u> 1	adry_ is fail	.24	.22
4-7	.34	.33	.33	.b	-		ting e <del>r</del> tibe	a s <del>a</del> ll		.22	.19
4-23	.34	.40	.41	.28	.35	.36	.52	.28	.26	.22	.18
5-7	.42	.29	.28	.26	.27	.26	.31	.26	.26	.22	.14
5-19	.29	.33	.26	.31	.28	.26	.15		.27	.24	.16
6-4	.24	.24	.18	.24	.22	.19	.22	.20	.19	.10	.12
6-17	.20	.15	.14	.20	.18	.15	.16	.16	.16	.08	.08
7-2	.21	.19	.18	.26	.24	.19	.36	.22	.25	.19	.17
7-16	.17	.17	.15	.22	.22	.13	.25	.16	.19	.11	.10
7-28	.22	.20	.22	.29	.27	.21	.30	.22	.21	.18	.17
8-13	.22	.20	.20	.21		.20	.31	.24	.21	.17	.15
8-26	.20	.19	.20	.23	.22	.19	.30	.20	.20	.16	.12
9-15	.17	.19	.13	.23	.17	.19	.27	.14	.17	.10	.08
10-1	s <del>4</del> 1d	.26	toi=ao	.24	.23	.19	.34	.27	.22	.18	.16
10-15	-		1.9133 	.17	.22	.19	.36	.22	.24	.18	.16
10-28	00 <b>-</b> 00	-	-	.22	.25	.18	.28	.25	.20	-	.15
11-12	-	-	-	.16	.12	.18	.22	.20	.22	. 199 <u>D</u> ech	.17
11-24		al 6 <del>4</del> 2 -			-		na i <del>t</del> ik s	nis <del>'</del> ,	odi <del>e</del> da	.12	.12

Table 1. Phosphorus content of forage utilized at different grazing pressures.

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- 990 - 990		Common- Crimson- Ryegrass			pastal	isti	-%- Coast- cross	Bal	nia		Love- grass	
Date	H	M	L	Н	M	L	M	H	L	H	L	
2-24	6.7	-	4.4	-	-	-	_	-	-	e1. –	-	
3-11	2.9	3.8	4.7	-	-	-	· · -	<u>197</u> -	ui-		-	
3-24	1-4	3.0	-	-	-		-	-	-	1.5	2.	
4-7	3.7	2.6	2.8	-			-	< <u>-</u>	<u> </u>	1.5	1.	
4-23	5.3	3.2	3.1	2.9	2.6	2.6	6.0	2.1	2.7	1.4	1.	
5-7	2.7	2.8	2.4	2.0	2.3	2.1	5.3	2.2	2.3	1.7	1.	
5-19	2.1	2.1	2.8	2.4	2.3	2.1	4.6	ði-,	2.5	1.6	1.	
6-4	2.1	2.4	1.7	2.0	2.0	1.9	2.3	2.1	2.9	1.5	1.	
6-17	1.7	2.4	1.5	2.1	2.1	2.4	2.4	2.1	1.7	1.2	1.	
7-2	2.3	2.0	2.1	2.2	2.4	1.8	5.3	1.8	2.1	1.3	1.	
7-16	2.3	2.3	1.8	2.2	2.0	1.7	4.0	1.8	2.1	1.3	1.	
7-28	2.1	1.9	1.8	2.4	2.2	1.9	3.6	1.8	1.8	1.1	1.	
8-13	2.4	2.4	2.5	2.5	- 2 -	2.4	4.0	2.7	1.8	1.4	1.	
8-26	2.0	2.1	2.3	2.3	2.4	2.1	4.6	2.0	1.9	1.2	1.	
9-15	1.8	2.5	2.6	2.2	2.1	2.0	3.6	2.0	1.7	1.1	1.	
10-1	<u>s -</u> "	3.0	05-	2.1	2.1	1.9	3.6	2.3	2.0	1.3	1.	
10-15	-	-29	04	2.0	2.0	1.8	2.8	2.2	2.1	1.4	1.	
10-28	-	9 <b>6</b> -	10-	1.8	1.5	1.7	2.8	1.9	1.8	_	1.	
11-12	-	12-	04	0.9	0.8	1.6	2.8	1.9	1.6	-	2.	
11-24		-	-	-		-	-	-	-	1.0	1.	

Table 2. Potassium content of forage utilized at different grazing pressures.

-eval aasig		Common- Crimson- Ryegrass		C	pastal		-%- Coast- cross	Bahia		Love- grass	
Date	H	M	L	H	M	L	M	H	L	H	L
2-24	.36	-	.37	-			-	6.7	-		13. <b>-</b>
3-11	.44	.50	.35	-		-	-	5.6	8. <del></del> 6	6. H	
3-24	-	.56	-	-	-	-	-	-	0.70	.44	.35
4-7	.75	.43	.47	-	-	-	-	8.00	2.6	.35	.37
4-23	.43	.50	.38	.30	.31	.26	.47	.56	.35	.29	.30
5-7	.38	.35	.31	.27	.29	.26	.56	.47	.29	.29	.30
5-19	.34	.35	.36	.26	.29	.26	.50	8.H.	.27	.29	.31
6-4	.34	.39	.38	.27	.27	.23	.43	.42	.29	.31	.28
6-17	.36	.41	.36	.30	.29	.29	.43	.40	.28	.40	.40
7-2	.31	.31	.33	.24	.26	.27	.35	.34	.25	.33	.32
7-16	.31	.40	.39	.26	.27	.23	.42	.32	.24	.32	.26
7-28	.29	.37	.35	.24	.24	.26	.45	.36	.25	.34	.33
8-13	.29	.35	.35	.20	-	.23	.33	.39	.23	.30	.25
8-26	.30	.34	.32	.25	.25	.25	.47	.34	.25	.26	.20
9-15	.28	.31	.33	.26	.26	.27	.49	.36	.25	.22	.18
10-1		.28	а <b>н</b> а	.25	.27	.23	.45	.30	.36	.23	.25
10-15		-	-	.23	.30	.25	.44	.40	.29	.26	.31
10-28	-	-	9 –0	.28	.30	.28	.35	.27	.30		.31
11-12	-	ð . <del></del>	e ,=	.27	.25	.29	.47	.30	.33	-	.40
11-24	0. <del>.</del>	-	-	-		-	-	-	-	.35	. 39

Table 3. Calcium content of forage utilized at different grazing pressures.

	Common- Crímson- Ryegrass			C	Coastal			Bahia		Love- grass	
Date	H	M	L	H	М	L	M	Н	L	Н	L
2-24	.006	.009	.010	_	_	<u>_</u> 2	_	-	· 0 <u>0</u> 0.		15-25
3-11	.006	.006	.002	-	-	-	-	800.	Cast.	<u>60</u> .	1 <u>–</u> 3
3-24	1	.006	-	<u>2</u> 0.0	_	0 i 40.	a. p <b>4</b> 00	010.	010	.002	.001
4-7	.005	.004	.005	<u>2</u> (()	_30	0 91	0. 1 <u>2</u> 00.	600.	4 LO.	.002	.0005
4-23	.008	.002	.009	.015	80	.010	.002	.001	.019	.002	.001
5-7	.005	.014	.002	.012	.010	.007	.001	.002	.012	.002	.0005
5-19	.002	.004	.004	.015	.009	.012	.002	e <u>a</u> s,	.020	.001	.001
6-4	.012	.006	.005	.013	.002	.007	.002	.001	.010	.002	.001
6-17	.002	.004	.010	.005	.004	.004	.001	.001	.011	.002	.002
7-2	.002	.010	.010	.009	.011	.008	.002	.002	.012	.001	82
7-16	.008	.002	.010	.007	.009	.002	.001	.004	.011	.002	.002
7-28	.010	.005	.002	.009	.009	.009	.002	.002	.008	.002	.001
8-13	.009	.010	.001	.002	_ 20	.002	.002	.002	.006	.001	.002
8-26	.007	.006	.005	.002	.002	.004	.002	.002	.008	.002	.002
9-15	.010	.009	.004	.008	.001	.004	.002	.004	.020	.002	.002
10-1	-	R <u>1</u> 0	50.	.011	.001	.008	.002	.002	.001	.002	.004
10-15	-	140	809.	.002	.001	.001	.002	.005	.015	.002	.001
10-28	1021	-	-	.011	.002	.008	.001	.020	.010	-	.002
11-12	-	_	-	.009	.009	.010	.002	.015	.013	-	.001
11-24	-	-	-	-	-	-	-	-	10	.001	.001

Table 4. Iron content of forage utilized at different grazing pressures.

	299930	Common Crimso Ryegra	n-	0	Coastal		-%- Coast- cross	Ва	hia		ove-
Date	H	M	L	Н	M	L	M	Н	L	Н	L
2-24	.006		.008	-	-	-	1002	_	1.072 902	_	_
3-11	.01	.02	.008			-	_0,	1	14	-	122
3-24	-	.009		-	-	-	-	0.00	00	.005	.004
4-7	.02	.009	.008	-	-	-	-	-	80.	.004	.004
4-23	.011	.015	.012	.015	.015	.008	.008	-	.01	.01	.003
5-7	.009	.014	.003	.006	.014	.008	.009	800	.02	.009	.006
5-19	.006	.008	.004	.007	.007	.009	.004	-	.02	.008	.008
6-4	.006	.01	.006	.006	.006	.008	.004	S <mark>T</mark> R.	.01	.002	.002
6-17	.006	.006	.005	.005	.007	.006	.004	100	.02	.002	.002
7-2	.005	.006	.005	.01	.008	.005	.006	-	.02	.074	.002
7-16	.006	.008	.008	.005	.006	.002	.006	070.	.01	.004	.002
7-28	.005	.005	.005	.01	.009	.006	.004	0-05	.02	.011	.003
8-13	.007	.01	.008	.002		.002	.009	070	.01	.012	.007
8-26	.007	.006	.008	.005	.005	.014	.007	50.	.01	.004	.003
9-15	.005	.006	.006	.006	.005	.005	.005		.01	.002	.003
10-1	100	.006	S <del></del> 0.	.007	.004	.005	.003	1 2000	· a <del>.</del> 0.	.015	.003
10-15	ΩD	070.	10	.002	.005	.002	.004	Note	.013	.003	.003
10-28	\$07.		800.	.005	.004	.005	.004	.02	.018	-	.004
11-12	500.	270.	200.	.005	.004	.008	.005	.008	.016	-	.003
11-24	-	070	0 <del>.</del> 0.	-00	-80	osa		-	-	.004	.003

Table 5. Zinc content of forage utilized at different grazing pressures.

18

	1	pressur	es.					. 15 709 8570				
Harrison J		Common- Crimson- Ryegrass		(	Coastal	stal	-%- Coast- cross	Bahia		Love- grass		
Date	H	<u>M</u>	L	H	M	L	<u>M</u>	H	L	H	L	
2-24	.005	-	.01	_	-	-	-	-23	-	- 125	-	
3-11	.009	.006	.007	-	-	_	-	8 . <del></del>	25.+	31	11-6	
3-24		.009	-	-	-	-	-	-	-25	.018	.01	
4-7	.007	.009	.01	-	-	-	-	83. <del></del>	18-	.014	.01	
4-23	.013	.011	.011	.007	.01	.014	.01	.03	.04	.014	.01	
5-7	.012	.008	.009	.009	.007	.009	.009	.02	.02	.014	.01	
5-19	.012	.013	.013	.01	.012	.013	.012	15-	.03	.022	.01	
6-4	.013	.01	.01	.009	.009	.01	.005	.02	.02	.016	.01	
6-17	.01	.01	.01	.009	.009	.011	.012	.017	.02	.013	.01	
7-2	.01	.01	.02	.013	.013	.012	.012	.018	.03	.029	.01	
7-16	.02	.02	.02	.017	.012	.009	.018	.017	.02	.021	.01	
7-28	.02	.02	.02	.015	.013	.013	.012	.028	.03	.022	.02	
8-13	.01	.02	.01	.01	$\frac{1}{2}$	.008	.012	.032	.03	.019	.01	
8-26	.01	.02	.02	.013	.009	.016	.011	.028	.04	.022	.01	
9-15	.01	.02	.02	.013	.012	.012	.007	.027	.04	.021	.01	
10-1	i.i	.01	1 . <del>.</del> .	.012	.013	.018	.007	.043	.04	.019	.01	
10-15	i	84 <del>+</del>	10-	.009	.013	.015	.009	.024	.045	.019	.01	
10-28	-	05-	22 <del>-</del>	.013	.01	.017	.01	.04	.04	8	.01	
11-12	-	96 <del></del>	58-	.019	.008	.016	.007	.035	.53	-	.02	
11-24	-	_	_	-	_	_	-	-	-	.018	.01	

Table 6. Manganese content of forage utilized at different grazing pressures.

						2.50-1						
Commo Crims Ryegr		.mson-	n- Gasso			663.61	-%- Coast- cross	Ba	hia	Love- grass		
Date <u>H</u>	<u> </u>	M	L	H	M	L	M	Н	L	H	L	
2-24 .2	.5	-	.23	-	_	-	-	10 <del>4</del> ,	-	10 -		
3-11 .2	1.	29	.16	-	-	-	-		30.4	- 60	11	
3-24 -		23	-	-	-	-	-	-	90 <del>0</del>	.16	.16	
4-7 .2	2.	31	.24	-	-	-	-	10-	e0@.	.14	.12	
4-23 .2	1.	41	.21	.17	.21	.17	.29	.30	.27	.14	.11	
5-7 .2	3.	20	.20	.15	.17	.16	.30	.29	.22	.14	.12	
5-19 .2	1.	20	.27	.15	.15	.15	.28	с. <del></del> .	.23	.15	.13	
6-4 .2	3.	25	.30	.25	.19	.16	.26	.25	.39	.12	.12	
6-17 .2	7.	35	.29	.19	.19	.16	.23	.30	.21	.14	.12	
7-2 .2	1.	27	.23	.13	.15	.16	.24	.25	.23	.14	.14	
7-16 .2	4 .	25	.24	.14	.17	.15	.27	.23	.25	.13	.11	
7-28.2	4 .	25	.28	.15	.15	.17	.29	.26	.23	.14	.12	
8-13 .2	4.	22	.23	.17	<del>.</del> 00.,	.19	.22	.32	.22	.15	.14	
8-26 .2	2.	23	.23	.17	.15	.15	.26	.25	.23	.13	.12	
9-15 .2	. 0	25	.24	.15	.17	.16	.31	.24	.17	.11	.09	
10-1 -		18	÷.,	.14	.19	.15	.25	.27	.27	.11	.10	
10-15 -	4.5 F	÷. s	<u>.</u>	.15	.23	.15	.28	.31	.23	.12	.13	
10-28 -		<del>.</del>	÷ <del>e</del> ,	.15	.17	.17	.28	.15	.20	3	.12	
11-12 -		<del>.</del> . 8	έ <del>θ</del> .	.16	.15	.17	.25	.22	.27	3	.14	
11-24 -		-	-	-	-	-	-	-	-	.13	.12	

Table 7. Magnesium content of forage utilized at different grazing pressures.

1999, 9 Ag	Common- Crimson- Ryegrass		Co	pastal		-%- Coast- cross	Ва	hia	Love- grass		
Date	H	M	_L_	H	<u>M</u>	L	<u>M</u>	H	L	H	L
2-24	.001	_	.002	- +	-	-	-	-	_	-	_
3-11	.001	.001	.004	-	×-	-	÷	-	-	-	-
3-24	-	.002	-	87 <u>4</u> 0 .	15_30	ar_yr	PRE-	ARO <mark>Z</mark>		.001	.003
4-7	.006	.002	.004	-	uza a	H LIF	-	-	-	.001	.001
4-23	.002	.004	.003	.009	.006	.002	.005	.004	.004	.005	.002
5-7	.0005	.003	.0005	.003	.007	.004	.005	.002	.005	.001	.001
5-19	.0005	.001	.0005	.003	.002	.002	.002	o o <u>z</u> ew	.007	.004	.001
6-4	.002	.007	.002	.003	.002	.003	.001	.002	.004	.001	.002
6-17	.003	.002	.003	.001	.002	.003	.003	.001	.009	.001	.001
7-2	.003	.002	.002	.005	.003	.002	.004	.002	.005	.002	.001
7-16	.003	.004	.004	.005	.002	.001	.004	.002	.004	.002	.003
7-28	.002	.001	.001	.004	.001	.004	.002	.007	.004	.003	.006
8-13	.003	.004	.001	.0005	ingeo e	.0005	.002	.002	.005	.002	.001
8-26	.001	.001	.004	.0005	.001	.003	.005	.001	.003	.001	.001
9-15	.002	.002	.004	.002	.001	.001	.003	.004	.001	.001	.001
10-1	and at	.002	sbam rit	.003	.0005	.0005	.002	.002	.005	.001	.001
10-15	in <u>si</u> en	al <u>-</u> da	ese_bet	.0005	.001	.0005	.001	.001	.004	.001	.001
10-28	2110 A	n files	Ligns a	.0005	.0005	.002	.001	.006	.006	the Tr	.001
11-12	bn= 18	dia <u>m</u> o	R. i. 4. at	.002	.002	.002	.001	.004	.007	th 1=00	.001
11-24	-	-	-	-	ograd la	101.155	ab <u>o</u> da	are of	7 8_18 2200210	.001	.0005

Table 8. Copper content of forage utilized at different grazing pressures.

Morefully was finited to che first reacts and platents between a conditions caused some buildup of seedling diseases, rationarily in two proves but viold losses appoined to be miniser. Rainfall amounts by word were: September-6.04; October-1.67; November-1.11; December-5.17; Janour etc?: Pegruary-1.69; March-1.67; April-1.15; and May-6.15. We observed to Severe winterstil with the coldest besperatures occurring on becember to (10° F), and March 1.(1° F). One to the warmer than averant bemperature to extra forese clipping was obtained on all of the small grain crops.

In the rynerase experiment (Table 1), the rest was harvested six simes. If the Doc 4th Hervest, forage yields were below normal and no shaifform differences were objerved between voristics. Seedling