

EFFECT OF FARMYARD MANURE AND AMMONIUM SULPHATE ON THE CALCIUM AND MAGNESIUM CONTENT AND UPTAKE BY RAGI (*Eleusine coracana*) GAERTN.

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A field experiment was conducted to study the effect of FYM and $(\text{NH}_4)_2\text{SO}_4$ on the Ca and Mg content and uptake of Ragi. The study revealed that Ca and Mg content increased markedly by the application of N-Sources of Fertilizers. Ragi variety Co-9 recorded significantly higher content of Ca than Co. 7. Combined application of FYM @ 90 Kg N/ha and $(\text{NH}_4)_2\text{SO}_4$ @ 90 kg N/ha registered the highest total uptake of Ca. Application of 60 kg N/ha as FYM and $(\text{NH}_4)_2\text{SO}_4$ recorded the highest content of Mg in ragi grain. The variety of Co. 7 recorded significantly higher uptake of Mg than Co. 9. The variety Co. 7 registered significantly higher uptake of Mg by grain as well as total uptake than Co. 9

Nitrogenous fertilizers not only provides the source of N for plants but also increase the availability of other plant nutrients like Ca and Mg. It is evident that the application of either FYM or $(\text{NH}_4)_2\text{SO}_4$ alone or in combinations increased the availability of Ca and Mg thereby the contents and uptake of plants. Hence an experiment was conducted to study the effect of FYM and $(\text{NH}_4)_2\text{SO}_4$ on the availability of Ca and Mg and their content and uptake in ragi and the results are presented.

MATERIALS AND METHODS

A field experiment was conducted during Kharif, 1978, with the Variety Co.7 and Co.9 ragi in a split plot design replicated thrice consisting the varieties as main plots and levels of N as sub plot treatments. The N was applied @ as 0, 30, 60 and 90 kg/ha in the form of FYM and $(\text{NH}_4)_2\text{SO}_4$ alone and in combinations. The

entire dose of P and K was applied as basal dressing in the of form superphosphate @ 45 P_2O_5 /ha and muriate of potash 22.5 Kg K_2O /ha, respectively. The crop was transplanted with a spacing of 15 X 15 cm with a plot size of 20 m². The entire dose of FYM was applied as basal dressing while $(\text{NH}_4)_2\text{SO}_4$ was applied twice i. e. 50% N basally and the remaining 50% at tillering stage. The content and uptake of Ca and Mg were assessed after harvest both in grain and straw as per the method suggested by piper (1966).

RESULTS AND DISCUSSION

(A) Content and uptake of Calcium : (Table 1, 2 & 3)

The variety Co.9 recorded significantly higher Ca content 0.68% than Co.7 (0.61%) in grain. Application of N as FYM significantly influenced the Ca content of grain (0.704%) and the

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Table 1. Calcium content of Ragi grain (Mean values in Percentage)

Sources and levels of N kg/ha	Farmyard		Manure		Ammonium			Sulphate	
	0	30	60	90	0	30	60	90	Mean
Varieties									
Co.7	0.567	0.565	0.563	0.658	0.678	0.588	0.590	0.588	0.611
Co.9	0.650	0.698	0.631	0.750	0.663	0.681	0.682	0.703	0.682
Mean	0.608	0.631	0.642	0.704	0.670	0.634	0.636	0.646	—
Sources									
Between Varieties	SED			CD (P=0.05)					
Between levels of FYM	0.007			0.016					
Between levels of $(NH_4)_2SO_4$	0.011			0.023					
	0.011			0.021					

Table 2. Calcium content of Ragi straw (Mean values in percentage)

Sources and levels of N kg/ha	Farmyard		Manure		Ammonium			Sulphate	
	0	30	60	90	0	30	60	90	Mean
Varieties									
Co.7	0.639	0.677	0.710	0.693	0.663	0.672	0.698	0.685	0.680
Co.9	0.682	0.669	0.720	0.698	0.628	0.620	0.762	0.759	0.692
Mean	0.660	0.673	0.715	0.695	0.645	0.646	0.730	0.722	—
Sources									
Between Varieties	SED			CD (P=0.05)					
Between levels of FYM	—			—					
Between levels of $(NH_4)_2SO_4$	0.009			0.018					
	0.009			0.019					

Table 3. Total uptake of Calcium by Ragi Plant (Mean values in Kg/ha)

Sources and levels of N kg/ha	Farmyard		Manure		Ammonium			Sulphate	
	0	30	60	90	0	30	60	90	Mean
Varieties									
Co.7	42.40	47.80	54.45	53.58	46.01	48.41	51.69	52.13	49.56
Co.9	49.90	59.91	62.67	66.61	48.41	55.67	65.79	69.22	59.77
Mean	46.15	53.85	58.56	60.10	47.21	52.04	58.74	60.67	—
Sources									
Between Varieties	SED			CD (P=0.05)					
Between levels of FYM	0.376			0.806					
Between levels of $(NH_4)_2SO_4$	0.531			1.337					
	0.677			1.363					

Table 4 : Magnesium Content of Ragi grain (Mean values in percentages)

Sources and levels of N kg/ha	Farmyard		Manure		Ammonium			Sulphate	Mean
	0	30	60	90	0	30	60	90	
Varieties									
Co. 7	0.133	0.306	0.329	0.390	0.193	0.240	0.286	0.335	0.263
Co. 9	0.146	0.279	0.266	0.183	0.158	0.208	0.258	0.251	0.219
Mean	0.135	0.291	0.298	0.297	0.175	0.224	0.272	0.293	

Sources	CD (P=0.05)
Between varieties	N.S
Between levels of FYM	N.S
Between levels of $(NH_4)_2SO_4$	N.S

Table 5 : Magnesium content of Ragi straw (Mean values in percentage)

Sources and levels of N kg/ha	Farmyard		Manure		Ammonium			Sulphate	Mean
	0	30	60	90	0	30	60	90	
Varieties									
Co. 7	0.288	0.443	0.466	0.461	0.330	0.378	0.463	0.487	0.414
Co. 9	0.274	0.376	0.400	0.340	0.319	0.333	0.354	0.384	0.348
Mean	0.281	0.409	0.433	0.400	0.325	0.355	0.408	0.435	

Sources	SED	CD (P=0.05)
Between varieties	0.007	0.015
Between levels of FYM	0.010	0.021
Between levels of $(NH_4)_2SO_4$	0.021	0.042

Table 6 : Total uptake of Magnesium by ragi plant (Mean values in Kg/ha)

Sources and levels of N kg/ha	Farmyard		Manure		Ammonium			Sulphate	Mean
	0	30	60	90	0	30	60	90	
Varieties									
Co. 7	15.56	28.80	31.88	29.90	18.41	23.81	30.41	33.50	26.53
Co. 9	16.40	29.74	31.57	25.51	19.33	24.25	28.69	30.94	25.80
Mean	15.98	29.27	31.73	27.70	18.87	24.03	29.55	32.33	

Sources	SED	CD (P=0.05)
Between varieties	0.337	0.724
Between levels of FYM	0.477	1.023
Between levels of $(NH_4)_2SO_4$	0.454	0.915

highest content was recorded at 90 Kg N/ha in grain, but the level of 60 Kg N/ha had given the highest Ca content (0.72%) in straw. Application of N as $(NH_4)_2SO_4$ has not influenced the Ca content in grain but in straw the highest Ca content (0.73%) was recorded at 60 Kg N/ha. Similar results was also reported by Krishnamoorthy (1968)

The variety Co.9 registered higher Ca uptake (59.77 Kg/ha). This may be due to higher straw yield. Application of N as FYM @ 90 Kg N/ha and $(NH_4)_2SO_4$ @ 90 Kg N/ha recorded the highest uptake of 60.67 Kg/ha. Sree Ramulu and Mariakulandai (1964) earlier indicated that application of FYM favourably influenced the uptake of Ca,

b) Content and uptake of Magnesium
(Table 4, 5 & 6)

Application of N as FYM as well as $(NH_4)_2SO_4$ had not influenced the Mg content of grain. The Mg content of straw was increased by the application of N as FYM @ 60 Kg N/ha (0.43%) and $(NH_4)_2SO_4$ @ 90Kg N/ha (0.44%). This may probably due to that Mg is the central part of chlorophyll molecule which performs photosynthesis.

The variety Co. 7 recorded significantly higher uptake of Mg (26.53 Kg/ha) by grain as well as total uptake than Co.9, whereas the uptake of Mg by straw was found to be higher in Co. 9 as compared to Co.7. Application of N as FYM @ 60 KgN/ha and $(NH_4)_2SO_4$ @ 90 Kg N/ha registered the highest uptake of Mg i. e. 31.73 Kg/ha and 32.33 Kg/ha, respectively. This is in accordance with the work of Sankaran (1977) who reported that increased application of N as organic and inorganic form increased the Mg uptake.

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