

## Effect of Graded Doses of Potassium on the Yield and Uptake of K by CO 7 Finger millet (*Eleusine coracana* Gaertn.)

### Grown in Major Soil Series of Coimbatore District

By

S. EKAMBARAM<sup>1</sup>, G. V. KOTHANDARAMAN<sup>2</sup> and K. K. KRISHNAMOORTHY<sup>3</sup>

#### ABSTRACT

A pot experiment was conducted to study the effect of graded doses of K on the yield and uptake of K by CO 7 finger millet grown in four major soil series of Coimbatore district. The results indicated that application of K at 25 kg K<sub>2</sub>O/ha increased the yield of grain and straw but not significantly. Black and alluvial soils registered significantly higher grain yield than red non-calcareous and red calcareous soils, whereas alluvial soil registered the maximum straw yield over the other soils.

#### INTRODUCTION

Soils of Tamil Nadu are considered to be rich in K due to the presence of potassic minerals in high amounts. Experiments conducted recently on the response of cereal grain crops to K has given contradicting results. Venkatramana and Krishna Rao (1961) observed that on sandy infertile soil, K application in combination with N and P increased grain yield of finger millet. Ayyathurai (1965), Subramanyam (1968) and Subramanian *et al.* (1971) concluded that application of K alone did not influence the yield of grain and straw of finger millet. Antony Joseph (1972) reported that there was no response to the application of K alone but when K and N were applied together at higher levels the yield of finger millet was increased. The present study was taken up to find out the response of CO 7 finger millet, a high yielding variety, to K fertilizer.

#### MATERIALS AND METHODS

A pot experiment was conducted with CO 7 finger millet as test crop on four soils representing major soil series of Coimbatore district viz. the Irugur (red non-calcareous), the Palathurai (red calcareous), the Noyyal (alluvial) and the Peelamedu (black). The treatments were 0, 25, 50, 75, 100, 125 and 150 kg K<sub>2</sub>O/ha and K was applied as muriate of potash as basal dressing at the time of planting. A basal dressing of N at 90 kg/ha. P<sub>2</sub>O<sub>5</sub> at 45 kg/ha and 12.5 tonnes farm yard manure/ha were applied to all the treatments. The yields of grain and straw were recorded. The dried plant samples of grain and straw were analysed for K content.

#### RESULTS AND DISCUSSION

**Grain yield :** The statistical analysis of yield data indicated that there was significant difference among the

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TABLE 1. Yield and potassium uptake of finger millet grain and straw

Soil and treatment		Yield dry wt. in g/pot		Potassium uptake mg/pot on moisture free basis	
		Grain	Straw	Grain	Straw
<b>Irugur series (red non-calcareous soil-S1)</b>					
Control	T <sub>1</sub>	13.02	30.20	60.2	682.7
25 kg K <sub>2</sub> O/ha	T <sub>2</sub>	15.24	29.65	77.9	683.7
50 kg "	T <sub>3</sub>	13.47	28.45	64.6	705.6
75 kg "	T <sub>4</sub>	16.86	35.03	73.3	888.6
100 kg "	T <sub>5</sub>	14.24	29.10	71.3	739.6
125 kg "	T <sub>6</sub>	17.98	32.25	93.9	874.9
150 kg "	T <sub>7</sub>	15.23	32.28	69.0	909.8
<b>Palathurai series (red calcareous soil-S2)</b>					
Control	T <sub>1</sub>	11.40	23.26	48.0	580.7
25 kg K <sub>2</sub> O/ha	T <sub>2</sub>	12.93	27.83	62.8	670.9
50 kg "	T <sub>3</sub>	14.45	27.68	61.2	714.7
75 kg "	T <sub>4</sub>	8.99	28.15	68.5	659.8
100 kg "	T <sub>5</sub>	16.16	30.96	81.5	793.0
125 kg "	T <sub>6</sub>	13.63	27.45	63.7	768.3
150 kg "	T <sub>7</sub>	15.01	30.03	67.6	764.0
<b>Noyyal series (alluvial soil-S3)</b>					
Control	T <sub>1</sub>	18.44	36.30	89.7	1161.7
25 kg K <sub>2</sub> O/ha	T <sub>2</sub>	20.21	40.80	106.4	1447.3
50 kg "	T <sub>3</sub>	20.54	37.40	94.5	1365.6
75 kg "	T <sub>4</sub>	18.99	41.38	97.4	1416.6
100 kg "	T <sub>5</sub>	18.00	41.80	78.0	1521.2
125 kg "	T <sub>6</sub>	18.43	40.00	87.2	1423.5
150 kg "	T <sub>7</sub>	20.77	40.80	111.5	1253.7
<b>Peelamedu series (black soil-S4)</b>					
Control	T <sub>1</sub>	16.98	31.00	76.4	866.7
25 kg K <sub>2</sub> O/ha	T <sub>2</sub>	21.75	37.38	128.9	1145.0
50 kg "	T <sub>3</sub>	20.47	30.55	105.8	902.5
75 kg "	T <sub>4</sub>	18.78	32.10	99.1	899.3
100 kg "	T <sub>5</sub>	18.82	33.83	97.5	935.8
125 kg "	T <sub>6</sub>	18.65	32.30	93.9	1030.8
150 kg "	T <sub>7</sub>	23.07	34.38	120.8	920.0
Between soils S. E.		1.5	1.41	5.41	57.01
C. D. 5%		2.5	2.88	11.10	116.98
Between treatments S. E.				7.16	
		N. S.	N. S.		N. S.
C. D. 5%				14.69	



soils studied with respect to grain yield (Table 1). Black soil registered maximum yield and was on par with alluvial soil. These two soils registered significantly higher yield over red non-calcareous and calcareous soils which were on par. The higher grain yield obtained in black and alluvial soils may be attributed to the presence of higher amounts of available nutrients like N, P and K than in red soils. Blacksoil was rich in both exchangeable K (375 ppm) and total K (0.46 per cent) followed by alluvial soil (exchangeable K 125 ppm and total K 0.31 per cent) compared to red soils (exchangeable K 80 ppm and total K 0.23 per cent in red non-calcareous soil and exchangeable K 110 ppm and total K 0.24 per cent in red calcareous soil).

**Straw yield:** The mean straw yields were 39.74, 33.07, 30.71 and 27.96 g/pot for alluvial, black, red non-calcareous and red calcareous soils respectively (Table 1). Alluvial soils recorded significantly higher yield than other soils. Black and red non-calcareous soils were on par but superior to red calcareous soils. The increase in the straw yield over that of control due to K application was not significant.

Application of K fertilizer at 25 kg  $K_2O$ /ha increased the grain and straw yields over control but not significantly and higher levels of application did not result in increased yields. This is in accordance with the findings of Ayyathurai (1965), Subramanyam (1968), Antoni Joseph (1972), Patro (1970) and Subramanian *et al.* (1971) who have reported that application of K did not increase the

grain and straw yield of finger millet. The poor response to applied K may be due to sufficient amounts of exchangeable K present in these soils to meet the crop needs.

Significant positive correlations were obtained between the yield of grain and different forms of K viz., water soluble K ( $r = 0.601^{***}$ ) exchangeable K ( $r = 0.529^{**}$ ) and nitric acid extractable K ( $r = 0.607^{***}$ ) present in soil at pre-planting period after fertilizer application.

**Content and uptake of potassium:** The percentage content of K varied from 0.35 to 0.68 in grain and 2.16 to 4.00 in straw. The mean content and uptake of K in grain were high in plants grown in black soil followed by alluvial, red non-calcareous and calcareous soils respectively. Black and alluvial soils were on a par and significantly superior to other two soils.

Grain yield and K uptake were found related as shown by significant correlation ( $r = 0.987^{***}$ ) and also straw yield and K uptake ( $r = 0.900^{***}$ ). The uptake of K by grain was significantly correlated with water soluble K at pre-transplanting period ( $r = 0.497^{***}$ ) after fertilizer application.

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## INTRODUCTION

The occurrence of black soil material over red material is not uncommon in Tamil Nadu. Black soil over red material was described in the Periyar Rajakapalayam series of Coimbatore district (Anon. 1972). Ramanathan and Krishnamoorthy (1973) reported the occurrence of this type of multiple soil profiles found about Coimbatore and Udumalpet areas. Literature available on such multiple soil profiles are limited. Therefore, attempt was made to describe some of the profile characteristics of the multiple soil, sampled at Harur taluk and an attempt is made to interpret the possible reasons for such an occurrence.

## MATERIALS AND METHODS

Profile characters of Jajayuram series at Harur taluk, Profile No. 1, Location: Mallapuram.