The study, though by no means conclusive at this stage, confirm certain observed phenomena in Kodaikanal ecosystem. The *shola* cover is the natural source of protection to the rolling hills. The banana plantation, even though protected by contour walls, suffered loss due to surface run off both in terms of top soil and nutrient loss. But certain amount of cultivation for sustenance of population is to be encouraged and the crops so grown have a place in the mountain economy. But in any thoughtful scheme of cultivation, soil conservation in terms of vegetational cover will have to be emphasised.

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EFFECT OF SOIL TEST METHODS ON POD YIELD, RESPONSE AND UPTAKE OF NUTRIENTS IN GROUNDNUT

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ABSTRACT

A study was conducted at Chinnathadagam, Coimbatore during the year 1987-88 with three levels of nitrogen (0,20 and 40 kg ha^{-1}), four levels of phosphorus (0, 20, 40 and 60 kg ha^{-1}), five levels of potassium (0, 30, 60, 90 and 120 kg ha^{-1}) and three levels of farm compost (0, 6 and 12 t ha^{-1}) to find out the influence of soil test methods on pod yield, response and uptake of nitrogen, phosphorus and potassium in groundnut Co.1. Significant positive correlations were obtained between the soil test methods and the pod yield of groundnut. However, with uptake the $KMnO_4$ - N had a negative relationship evidencing that significant contribution of N is from the native source.

Soil testing is well recognised as one of the scientific means for quick characterisation of the fertility status of the soils and predicting the nutrient requirement of crops. The economic and judicious use of fertilisers is based on soil tests. Hence the present investigation was carried out to evaluate the soil test methods and their influence on pod yield, response and uptake of nutrients in groundnut.

MATERIALS AND METHODS

The experiment was conducted on loamy sand soil (Udic Haplustalf). The soil had a pH of 7.4 and organic matter content of 0.49 per cent. It was low, medium and medium with respect to available nitrogen, available phosphorus and available potassium status (196, 148 and 264.2 kg ha^{-1}) respectively. The treatments consisted of 3 levels of nitrogen (0, 20 and 40 kg ha^{-1}), 4 levels of phosphorus (0, 20, 40 and 60 kg ha^{-1}), 5 levels of potassium (0, 30, 60, 90 and 120kg ha^{-1}) and 3 levels of farm compost (0, 6 and 12 t ha^{-1}). Twenty selected combinations of NPK with farm compost and four control were distributed over each of the four gradient strips in a factorial randomised block design. The soil samples were analysed for $KMnO_4$-N (Subbiah and Asija, 1956) Olsen - P (Olsen *et al.*, 1954) and NH_4OAc-K (Hanway and Heidal, 1952). The plant samples were collected at post harvest stage and analysed for the different nutrients following the standard analytical procedures then the respective uptake was calculated (Jackson, 1973).

Plant uptake (kg ha^{-1})

$$= \frac{\text{Per cent nutrient in pod}}{100} \times \text{Pod yield (kg ha}^{-1}) + \frac{\text{Per cent nutrient in haulm}}{100} \times \text{Haulm yield (kg ha}^{-1})$$

Table 1. Effect of soil test methods on yield response and uptake of nutrients (N, P and K in kg ha^{-1})

Treatments	Yield	Response	Soil Test Method			Uptake		
			$KMnO_4$-N	Olsen-P	NH_4OAc-K	N	P	K
N								
0	3250	1843	213.0	27.2	262.1	76.0	11.3	45.7
20	3579	2171	231.3	32.9	302.4	90.8	14.2	52.2
40	3805	2397	249.4	37.7	350.0	97.0	16.8	58.9
CD at 5%	216.5	220.1	16.7	NS	NS	5.2	NS	2.4
P_2O_5								
0	2933	1526	207.8	25.7	218.8	76.6	7.7	40.7
20	3396	1989	220.2	29.1	270.2	92.8	12.6	46.1
40	3636	2228	236.8	32.8	318.7	87.4	15.6	53.9
60	3976	2568	247.0	39.5	373.2	106.1	17.7	63.1
CD at 5%	232.2	230.0	NS	2.5	NS	4.8	1.9	NS
K_2O								
0	1525	252	188.0	24.7	161.8	61.6	6.1	15.9
20	2879	1471	198.0	26.4	209.0	89.5	10.5	36.5
60	3349	1941	223.6	29.2	270.7	80.4	12.4	47.0
90	3739	2332	239.1	34.6	332.5	99.0	14.4	56.0
120	3974	3974	248.8	37.7	371.8	99.9	18.0	64.4
CD at 5%	227.3	216	NS	NS	36.2	0.8	NS	8.1
Fe								
0	3052	1815	224.3	30.4	272.1	95.0	12.3	45.5
6	3193	2050	225.3	30.6	273.5	133.8	12.5	44.0
12	3180	1585	228.4	32.3	285.4	71.6	18.9	43.9
CD at 5%	25.7	1815	0.7	0.1	1.3	22.0	NS	0.1

NS : Not significant

RESULTS AND DISCUSSION

Soil test methods with yield, response and uptake of nutrients

The fertility status ($KMnO_4$ - N, Olsen - P and NH_4OAc - K) of the Somayanur series (Udic Haplustalf) Coimbatore district was determined. The data on soil analysis, pod yield, response and uptake of nutrients are presented in Table1.

It was evident that the pod yield of groundnut increased with increase in the level of N P K fertilisers. With regard to $KMnO_4$ - N, it was in line with the yield showing a progressive increase. Similarly the Olsen - P and NH_4OAc - K followed the same gradient of increase with an increase in the fertility status. A similar response was observed even in case of N P and K uptake by the groundnut crop as influenced by soil test methods.

It was, therefore, concluded that $KMnO_4$ - N was a good index of soil available nitrogen. The superiority of Olsen - P in improving the available - P status was observed in the present study and this corroborated with the findings of Ray *et al.*, (1986) and Selvaraj (1988).

The NH_4OAc - K was a better method in enhancing the K availability with test crop of groundnut. This was in conformity with the findings of Padalia *et al.*, (1983) and Nath and Purkaystha (1988). The alkaline - $KMnO_4$ method for available nitrogen, the Olsen - method for available phosphorus and neutral normal NH_4OAc method for available potassium were found to be suitable for rice.

Correlation/regression studies

Yield:

$Y = -4.3664 + 0.1824\ SN\ (r = 0.578^{**})$
$Y = 13.7349 + 0.6644\ SP\ (r = 0.643^{**})$
$Y = 8.4271 + 0.0875\ SK\ (r = 0.862^{**})$
(where Y - yield, SN - $KMnO_4$. -N, SP - Olsen - P and SK - NH_4OAc - K)

The suitability of $KMnO_4$ - N, Olsen - P and NH_4OAc - K for available nitrogen, available phosphorus and available potassium respectively was judged by the simple correlation coefficients with yield. $KMnO_4$ - N method recorded a correlation r = 0.578**, while Olsen - P reflected r = 0.643** and NH_4OAc - K registered r = 0.862** with yield.

Uptake :

UN = 58.6387 + 0.1388 (r = 0.164 NS)

UP = -0.3781 + 0.4694 (r = 0.779**)

UK = -0.2782 + 0.1709 (r = 0.863**)

(where UN, UP and UK represent uptake of nitrogen, uptake of phosphorus and uptake of potassium)

Similar relationship with uptake as dependent variable was worked out for available nitrogen, available phosphorus and available potassium. The Olsen - P established significant correlation with r = 0.779**, while the influence of $KMnO_4$ - N on uptake of nitrogen was non-significant.

It was concluded that the methods - $KMnO_4$.N Olsen - P and NH_4OAc - K were good indices in predicting the soil available N, P and K as judged by the correlation/regression with pod yield and uptake of N, P and K using test crop of groundnut.

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EFFECT OF SALINITY AND SODICITY OF WATERS USED FOR SUPPLEMENTAL IRRIGATION ON SOIL PROPERTIES AND GROWTH OF PEARL MILLET (*Pennisetum americanum* L. (Leeke)

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ABSTRACT

A pot experiment was conducted during the *kharif* season of 1988'-89 to find out the effect of levels of EC (3, 6 and 9 dSm^{-1}) and Adj. SAR of supplemental irrigation waters (15, 30, 45 and 60) on soil properties (ECE, SAR, ESP and pH), plant height, number of tillers per plant, test weight, grain and stover yield of three varieties (HLBH-10, MH-169 and MBH-130) of pearl millet. The increasing levels of EC and Adj.SAR of irrigation waters increased the ECe, SAR and ESP of soil. The pH of soil increased with increasing Adj. SAR while it decreased with increasing level of EC of irrigation water. The increasing levels of EC and Adj. SAR of irrigation water decreased the plant height, number of tillers per plant, test weight and grain and stover yield. The maximum plant height, tillers, test weight and grain and stover yield were observed in HLBH-10, followed by MH-169 and MBH-130.

It is well established that salinity and sodicity of irrigation water or soil limit the growth and development of plants and even cause premature termination of life cycle while altering their morphological, physiological and biochemical attributes. On the other hand, there are certain plants which grow vigorously and produce more dry matter under such conditions than the other plants. Even the different varieties of particular species may exhibit differential behaviour in this regard (Joshi and Singh, 1975). Thus, selection and growing of salinity and sodicity tolerant varieties is one of the most important practices for salt affected soils or under irrigation with poor quality waters.