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Studies on the Available Potassium Status of Soil as Influenced by the Application of Nitrogen and Potassium

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The results of a field experiment conducted to study the effect of N and K fertilizer in bhendi crop on available potassium status of soil are presented. The available K content of the soil was not influenced by the application of N but the application of K significantly increased the K content of the soil. There was a progressive reduction in the available K content of the soil as the crop growth advanced. The interaction between N and K considerably influenced the available K content of the soil.

The depletion of nutrients in soil is quite considerable due to continuous cropping over the ages. Availability of K to crops depends upon the amount, form and the ease with which the depleted avilable forms are restored from the reserve supplies. Understandably, the influence of soil properties, crop removal and the presence of other cations influence the availability of K. In the present communication, an attempt has been made to investigate the changes in the progressive availability of K in a Red sandy clay loam soil under the influence of N and K fertilizers at successive growth stages of bhendi crop (*Abelmoschus esculents* L. Moench).

MATERIAL AND METHODS

A field experiment was conducted on a red sandy clay loam soil with varying levels of N and K fertilizers on available K status of the soil in the Tamil Nadu Agricultural University Farm, Coimbatore. The soil was low in availd able N, medium in available P and rich in available K. The treatments includee all possible combinations of N and K_2O at five levels in each of N (0, 20, 40, 60 and 80 kg/ha) and K_2O (0, 15, 30, 45 and 60 kg/ha). The design of the experiment was 5×5 Randomised block design with three replications. Three stages of growth were chosen for soil sampling and analysis viz., 30th day and 60th day of sowing and post-harvest state. The available K was estimated by flame photometric method (Jackson, 1967).

RESULTS AND DISCUSSION

The available K content of the soil at successive growth stages and the summary of statistical analysis of the data are presented in the Table I and II respectively. The available K content of the soil wos not influenced by the application of N. It might be possible that the appliad N could not

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TABLE I Progressive Changes in the Available Potassium Status of the Soil (Mean of three replications — Kg/ha)

Treatment/ Stages	S_1	S_2	S_3
N_0 K_0	754.1	660.8	597.3
N_0 K_1	802.7	739.2	653.3
N_0 K_2	832.5	784.0	735.5
N_0 K_3	836.3	791.5	742.9
N_0 K_4	862.4	821.3	769.1
N_1 K_0	754.1	679.5	619.7
N_1 K_1	810.1	735.5	675.7
N_1 K_2	832.5	787.7	731.7
N_1 K_3	851.2	810.1	765.3
N_1 K_4	862.4	806.4	761.6
N_2 K_0	742.9	672.0	612.3
N_2 K_1	787.7	742.9	679.5
N_2 K_2	832.5	784.0	720.5
N_2 K_3	847.5	810.1	750.4
N_2 K_4	888.5	825.1	765.3
N_3 K_0	754.1	664.5	601.1
N_3 K_1	791.5	731.7	686.9
N_3 K_2	825.1	784.0	728.0
N_3 K_3	843.7	798.9	742.9
N_3 K_4	891.1	836.3	761.6
N_4 K_0	757.9	686.9	616.0
N_4 K_1	791.5	731.7	664.6
N_4 K_2	828.8	780.3	713.1
N_4 K_3	832.5	787.7	746.1
N_4 K_4	888.5	832.5	761.6

S_1 = 30th day
S_2 = 60 th day
S_3 = Post—harvest stage
N_0 = Nitrogen 0 kg/ha
N_1 = Nitrogen 20 kg/ha
N_2 = Nitrogen 40 kg/ha
N_3 = Nitrogen 60 kg/ha
N_4 = Nitrogen 80 kg/ha
K_0 = Potassium 0 kg/ha
K_1 = Potassium 15 kg/ha
K_2 = Potassium 30 kg/ha
K_3 = Potassium 45 kg/ha
K_4 = Potassium 60 kg/ha

have appreciably affected either the release of K from the exchange site or forced the K fixation eventhough there are quite a few references to show that the addition of N had caused either release or fixation of K (Acquaye and MacLean, 1966), as both are lattice fixable cations of similar ionic radii. There was a significant increase in the available K content of the soil by the application of K fertilizer as could be expected due to increase in its concentration in soil solution. The availability of K decreased as the crop growth advanced. This could be primarily due to the absorption of K by the crop and also to a certain extent to fixation in the soil as the time advanced. This result is in accordance with the work of Antony Joseph (1969) and Ramanathan (1977). Increased availability of K with increasing levels of K application was noticed irrespective of the levels of N application and states of sampling. As in the case of straight effect, the early state samples registered higher content of available K than the latter states at all the levels of K application.

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TABLE II Summary of Statistical Analysis on Available potassium (kg/ha) in soil

e. Potassium levels

	K_1	K_2	K_3	K_4	S. E	C. D.
678.2	735.8	781.2	797.2	821.6	2.05	5.68

b. Stages

S_1	S_2	S_3	S. E.	C. D.
819.6	764.0	704.7	1.59	4.40

C. Interaction : Nitrogen X Potassium

	K_0	K_1	K_2	K_3	K_4	S. E.	C.D.
N_0	671.0	730.5	783.9	790.2	817.6	4.58	12.70
N_1	684.4	740.4	784.1	808.9	810.1		
N_2	675.7	736.8	779.0	812.7	827.2		
N_3	673.2	741.7	784.0	795.2	826.3		
N_4	686.9	729.3	775.2	788.9	827.6		

d. Interaction : Potassium X stages

	S_1	S_2	S_3	S. E.	C. D.
K_0	752.6	672.8	609.3	3.55	9.84
K_1	796.7	738.5	672.1		
K_2	830.2	784.7	728.8		
K_3	842.2	799.7	749.7		
K_4	876.5	924.3	763.8		