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Schoenite as a Source of Potassium for Rice

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In order to study the relative efficiency of potassium schoenite as a source of potassium to rice in comparison with potassium sulphate and potassium chloride at different levels, experiments were conducted during 1973 - 74 and 1974 - 75. The results of the study revealed that there was no significant influence of potassium on grain and straw yield of rice varieties IR 8, IR 20, Ponni and Karikalan during both the years. Potassium schoenite being an indigenous product may be preferred if potassium application is desired.

Schoenite is a double sulphate of potassium and magnesium (K_2SO_4 $MgSO_4$ $6H_2O$) prepared from mixed salt obtained by solar evaporation of sea water. The salt and Marine Chemical Research Institute, Bhavanagar (Gujarat) manufactures it on a large scale by floatation process. In Tamilnadu, it is manufactured as a byproduct from salt industry by the Marine Transport Company Limited, Tuticorn. In foreign countries potassium schoenite and other potassium carrying materials viz., Polyhalite and Langbenite are extensively used as fertilizer while in our country very scanty information is available about its use as a fertilizer. The fertilizer contains only 2 to 3 per cent of sodium chloride as impurity. The chemical composition of schoenite is given in Table I. Schoenite

TABLE I Composition of Schoenite on dry weight basis (percent)

1.	Potassium (as K_2O)	22-24
2.	Magnesium (as MgO)	8-11
3.	Total chlorides (as cl)	2-5
4.	Sodium (as Nacl)	2.0

was found to be an economic and indigenous potassium fertilizer for groundnut by Govinda Iyer *et al.* (1970) and Natarajan *et al* (1973) and for Ragi by Helkiah (1976). Similarly for rice crop, potassium schoenite was found to be as good as other conventional potassium schoenite was found to be as good as other conventional potassium fertilizers (Anonymous 1975). Hence this experiment was designed in, the All India Co-ordinated Agronomic Research Project to study the relative efficiency of potassium schoenite as a source of patassium as compared to potassium sulphate and potassium chloride.

MATERIALS AND METHODS

The experiment was conducted in the Model Agronomy Centre at Karaiyiruppu of Tirunelveli district for two years (1970-74 and 1974-75). The experiment was started in Kharif and the residual effect was studied on the succeeding crop in rabi. Randomised block design with four replications was adop-

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ted for the study with the following treatments.

Treatment No.	Details
1.	Control (No. fertilizer)
2.	Nitrogen at 120 kg and Phosphorus at 60 kg/ha
3.	Treatment 2 + K_2O at 40 kg/ha as potassium schoenite
4.	Treatment 2 + K_2O at 80 kg/ha as Potassium schoenite
5.	Treatment 2 + K_2O at 120 kg/ha Potassium schoenite
6.	Treatment 2 + K_2O at 40 kg/ha
7.	Treatment 2 + K_2O at 40 kg/ha
8.	Treatment 2 + K_2O at 120 kg/ha Patassium sulphate
9.	Treatment 2 + K_2O at kg/ha
10.	Treatment 2 K_2O at 120 kg/ha as Potassium chloride
11.	Treatment 2 + K_2O at 40 kg/ha as potassium sulphate + Magnesium sulphate to equalize magnesium treatment contents as in T_8
12.	Treatment 2 + K_2O at 80 kg/ha as Potassium sulphate + Magnesium to equalize magnesium contents as T_4
13.	Treatment 2 + K_2O at 120 kg/ha as potassium sulphate + Magnesium sulphate to equalize magnesium con -tents as in T_5
14.	Treatment 2 + K_2O at 120 kg/ha as potassium scheonite + 50 kg Zinc sulphate
15.	Treatment 2 + K_2O at 120 kg/ha as potassium sulphate + Zinc sulphate at 50 kg/ha.
16.	Treatment 2 + K_2O at 120 kg/ha as Potassium sulphate + $MgSO_4$ to equalize magnesium conrents as in T_5 + Zinc sulphate at 50 kg/ha.

Rice varieties IR 8 in (Kharif 1973-74 and Rabi 1974-75) Ponni in (Rabi 1973-74) and Karikalan in (Kharif 1974-75) were tried as test crops. The Rabi crops received 60 kg N and 30 kg P_2O_5/ha for all treatments except absolute control. The soil was of black clay loam type with the following nutrient status. Grain and straw yield were recorded and data subjected to statistical scrutiny.

	1973-74	1974-75
Available N (kg/ha)	187.5	125.0
Available P (kg/ha)	12.0	11.2
Available K (kg/ha)	254.8	132.2

RESULTS AND DISCUSSION

Data on grain and straw yield are given in Table II. Direct effect of potassium was not significant in both the years for different levels and different sources. The control (Treatment No : 1) alone had yield significantly lesser than the rest of the treatments. The residual effect was also similar to that of the direct effect. Thus the nutrients N and P were alone found limiting the yield in the region of experimentation with the rice cultures tried. Response to Magnesium and Zinc was also negligible.

One salient finding was that the native soil had a good reserve of available potassium in relation to the needs of wet paddy. Fertilizer potassium as a nutrient either from the conventional sources such as potassium sulphate and potassium chloride or from potassium schoenite did not significantly influence on grain and straw yield of paddy. The sources of potassium had no significant influence on the grain yield of rice (Anonymous, 1975).

TABLE II Efficiency of Potassium schoenite as a source of potassium (kg/ha)

Treatment	Grain						Straw					
	Kharif (Direct)			Rabi (Residual)			Kharif (Direct)			Rabi (Residual)		
	1973-74 IR 8	74-75 Karikalan	Pooled	73-74 Ponni	74-75 IR 8	Pooled	73-74 IR 8	74-75 Karikalan	Pooled	73-74 Ponni	74-75 IR-8	Pooled
T1 Mean yield of untreated plot	2428	3925	3176	2483	3109	2796	2900	4525	3712	3126	3316	3221
T2 Response to N + P_2O_5 Response over N + P_2O_5	1765	2187	1976	2523	2645	2584	2441	2897	2669	3801	2985	3393
T3 Potassium schoenite at 40 kg K_2O/ha	93	6	50	17	—48	—16	—3	3	3	—22	—60	—41
T4 Potassium schoenite at 80 kg K^2O/ha	25	5	15	3	—32	—15	4	—14	—5	— 7	—45	—26
T5 Potassium schoenite at 120 kg K_2O/ha	80	3	42	14	—13	0	—167	— 9	—88	—46	— 7	—26
T6 Potassium sulphate at 40 kg K_2O/ha	46	—4	21	5	—81	—38	33	13	23	— 5	384	189
T7 Potassium sulphate at 80 kg K_2O/ha	—39	—3	—21	0	—58	—29	—184	—11	—97	— 6	—32	—19
T8 Potassium sulphate at 120 kg K_2O/ha	38	15	12	—2	23	10	—189	—13	—101	10	—35	—14
T9 Potassium chloride at 40 kg K_2O/ha	57	—4	27	16	35	25	12	8	10	48	35	41
T10 Potassium chloride at 120 kg K_2O/ha	33	—4	15	3	—82	—40	7	18	13	— 3	—47	—25
T11 Pottassium sulphate at 40 kg K_2O/ha+Magnesium sulphate to equalize Magnesium content as in T3	81	19	50	17	—3	7	—26	10	—8	21	—8	6

(contd.)

1	2	3	4	5	6	7	8	9	10	11	12	13
T12 Potassium sulphate at 80 kg K_2O/ha + Magnesium sulphate to equalize Magnesium content as in T4	27	—5	11	5	—24	—10	39	—27	6	1	—7	—3
T13 Potassium sulphate at 120 kg K_2O/ha + Magnesium sulphate to equalize Mg. content as in T5	46	—7	20	3	—26	—12	20	—10	5	9	—12	—5
T14 Potassium schoenite at 120 kg K_2O/ha + Zinc sulphate (50kg/ha)	33	—4	15	0	—1	—1	—217	—24	—96	—42	—12	—27
T15 Potassium sulphate at 120 Kg K_2O/ha + Zinc sulphate (50kg/ha)	9	—4	3	4	— 7	—2	—119	—14	—66	0	—484	—242
T16 Potassium sulphate at 120 kg K_2O + Magnesium sulphate to equalize Mg. con-tent as in T5 + Zinc sulphate (50kg/ha)	01	—6	2	5	11	8	37	—14	12	63	—444	—191
S.E. of difference between means	231.6	14.8	71.3	129.1	114.7	29.1	312.6	91.7	110.9	52.5	136.5	239.6
C.D. (5%)	466.4	29.9	151.9	260.1	230.9	62.1	529.5	185.2	236.2	105.7	275.8	510.5
G.M.	4116	5975		4853	5570		5141	7239		6689	6097	
E.V.	5.39	0.01		1.42	0.90		7.86	0.05		0.17	1.26	

N.B. 1. Potassic fertilizers, Mangnesium sulphate and Zinc sulphate applied to first crop only. A dose of 120 kg N/ha 150kg P_2O_5/ha in Kharif and 60 kg N/ha + 30 kg P_2O_5/ha in Rabi was applied.

2. Unweighted analysis of variance done for pooled data except for Rabi (Grain)

Hence potassium shoenite could be safely recommended as potassium carrier for rice in potassium responsive soils. The use of potassium schoenite as a carrier could bring out a sizeable saving in the foreign exchange as the entire quantities of potassic fertilizers are imported.

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