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EFFICIENCY OF RAJPHOS COMPACTED WITH MONO-AMMONIUM PHOSPHATE OR SINGLE SUPER PHOSPHATE FOR GROWTH AND YIELD OF RICE

Rajasthan State Mines and Minerals Ltd. (RSMML), Udaipur, is having the largest rock phosphate deposits in India and constitutes about 40% of the known phosphate reserve. The Jhamarkotra phosphate rock (JPR) is similar to any other phosphate rock of the country and is non-reactive due to its apatite structure and is considered as a poor source of P fertilizer for the crops. The green house studies conducted by the International Fertilizer Development Centre, showed that the dry compaction of JPR (Rajphos) with MAP improves its agronomic efficiency by 95% in acid soils and 86% in neutral soils. The compacted forms of JKT(A) or JKT(B) either with SSP or MAP increases the efficiency in deciding yield and uptake of nutrients for rice in the acid soils of Kerala and performs equally well when compared with MAP. The present study was conducted to find out the efficiency of the compacted Rajphos JKT(B) with SSP and Rajphos JKT(B) with MAP in comparison with SSP and MAP and their efficiency were tried in the cultivator's field for two seasons in two locations for one year in 1999-2000, in the lateritic alluvial soils of Pattambi, Kerala.

Field experiments in the cultivators field were conducted during 1999 to 2000 for one year in two locations viz. one at Nellicode and one at Karimkara Padasekharam of Vallappuzha Panchayat of Pattambi, during the first and second crop seasons. The treatment details are presented below.

T1	Control
T2	Rajphos (B)
T3	SSP
T4	MAP
T5	Rajphos (B) + SSP (compacted)
T6	Rajphos (B) + MAP (compacted)
Plot size	5 x 4 m2
Replications	4

The experiments were conducted using the test crop rice variety Aiswarya. Eight experiments were conducted per season in irrigated conditions and the pooled data of the yield and average uptake in kg/ha are presented in Table 1 & 2. Fertilizer recommendation of Kerala Agricultural University was followed. The uptake studies were estimated treatmentwise for N, P, K, Ca & Mg in all seasons throughout the experiments.

Soil N was estimated by using Kjheldal's method as suggested by Piper (1942). Total and Available P_2O_5 content in the soils was estimated by adopting the procedure laid down by Jackson (1958). Available N was estimated as suggested by Subbiah & Asija (1956). Total K_2O content of the soil was estimated by using the HC1 extract of the soil by flame photometer method as suggested by Black (1968). Ca & Mg content of the soil was estimated by the titration methods as suggested by Black (1968). NPK content of the plant and soil were also estimated for computing the uptake. Plant N was estimated as per the method suggested by Piper (1942). Phosphorus content of the plant was estimated by using vanadomolybdate method as suggested by Piper (1942). K content of plant digest was estimated by using flame photometer method as suggested by Piper (1942).

Table 1 Pooled data on the yield of rice (kg ha^{-1})

Treatments	Virippu		Mundakan	
	Grain	Straw	Grain	Straw
T_1	2167.63	2699.30	2134.38	2709
T_2	3067.56	3828.94	3140.06	4011.49
T_3	3077.00	3832.04	3091.62	3948.32
T_4	3365.8	4199.89	3419.56	4279.00
T_5	3310.82	4133.38	3301.00	4214.44
T_6	3347.00	4148.93	3350.00	4279.72
CD 5%	118.18	148.17	109.23	147.08

Table 1 represents the yield of grain and straw of rice for the year 1999-2000 during virippu and mundakan seasons. The result shows that the treatments have got significant effects on yield of grain and straw in both the seasons. T1(control) recorded the lowest yield of grain and straw. The highest yields of grain and straw in both seasons were recorded for T4. The treatments T4, T5 & T6 are on par which was followed by T3 & T2. T2 & T3 are also on par. Table 2 represents N, P, K, Ca & Mg uptake by rice during virippu and mundakan seasons. The

Table 2 Mean N, P, K , Ca & Mg uptake (grain + straw) in kg/ha for rice during 1999-2000

Treat-ments	Nitrogen		Phosphorous		Potassium		Calcium		Magnesium	
	Virippu	Mundakan	Virippu	Mundakan	Virippu	Mundakan	Virippu	Mundakan	Virippu	Mundakan
T,	45.34	45.92	9.61	9.43	17.85	17.90	37.12	37.26	5.99	5.97
T_2	67.28	69.33	13.23	14.78	25.12	27.09	52.81	55.73	8.88	9.53
T_3	65.9	68.26	13.12	14.57	24.77	27.00	51.74	55.03	8.41	9.38
T_4	73.75	75.66	14.63	16.31	27.58	27.96	56.82	60.83	9.69	10.37
T_5	71.19	73.23	14.41	15.77	26.67	28.85	54.60	58.76	9.50	10.00
T_6	73.48	74.33	14.94	15.99	27.57	29.49	54.86	59.63	9.53	10.17

results showed that the treatments have significant effects in the uptake of the nutrients N, P, K, Ca & Mg. The highest uptake was noted for N, P & K for the treatment T4 which was followed by T5 & T6. The lowest uptake was noted for T1. The highest uptake of Ca and Mg was noted for T4 and lowest was noted for the control. Between treatments, only very slight difference was noticed in the uptake of Ca and Mg.

The results showed that in the case of grain and straw yield, the highest was noticed for T4 followed by T6, T5 & T3. T4, T5 & T6 are on par. This shows that all the treatments are good in giving higher grain and straw yield. The treatments are JPR(A) or JPR(B), compacted with MAP or SSP. The same trend was noted for the uptake of N, P, K, Ca & Mg. The compacted forms of P fertilizers are good for the growth and yield of rice. The compacted forms of Rajphos, either with SSP or MAP possess 50% water soluble form of phosphate and the rest 50% in the form of tricalcium phosphate and this helps the plant to perform better in acid soil and hence gives superior yield of rice grain and straw. This result is in agreement with the findings of Menon *et. al.* (1990). The results clearly indicates that Rajphos (B) compacted with either SSP or MAP is equally good as MAP alone in giving higher grain & straw yield.

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