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Sulphur Nutrition in Direct Seeded Rainfed Lowland Rice

Intensive cropping has led to multiple nutrient deficiencies and the associated decline in productivity of crops. In rice, among the various secondary and micronutrient deficiencies observed, deficiency of sulphur has been gaining considerable importance. Growing high yielding varieties, use of inorganic fertilizers devoid of sulphur and lack of addition of sufficient quantity of organic matter have contributed to the aggravation of sulphur deficiency in rice soils. Economic backwardness of farmers of rainfed lowland rice tract necessitates evaluation of cheaper sources of sulphur for meeting the crop needs.

A field experiment was conducted at the Agricultural Research Station, Mugad, and Karnataka, India during the *kharif* season of 1994 to find out the response of direct seeded rainfed lowland rice to different sources of sulphur. The treatments consisted of application of 20 Kg of sulphur per ha in the form of single super phosphate, pyrite, gypsum, ammonium sulphate, zinc sulphate or elemental sulfur, along with a check treatment in which sulfur was not applied and an absolute control without any fertilizers. The trial was laid out in a randomized complete block design with three replications. Soil was clay with pH 6.9 and 150,64,150 and 31 Kg of available N,P_2O_5, K_2O and S, respectively. Seeds of *Abhilash* rice (155) were sown with seed drill in moist soil on 31st May 1994. Recommended levels of N P K fertilizers were applied to all the treatments except absolute control. Entire doses of sulphur, Phosphorous and Potash were applied in furrows just before sowing. The cropping season received a total rainfall of 1087 mm spread over 77 rainy days.

The results indicated that sulphur application did not increase the grain yield significantly as there were no significant differences between sulphur applied treatments and the one without sulphur. However, all the fertilized treatments recorded significantly higher grain yield compared to absolute control. Similar

Table 1. Yield components and yield of rainfed lowland rice as influenced by Sulphur nutrition

Treatments	Tillers Per m²	Panicles Per m²	Mean Panicle Weight (g)	1000 grain Weight (g)	No. of filled grains per Panicle	% Chaff	Grain Yield at 14% moisture (kg/ha)	Straw Yield (kg/ha)
1.DAP+ MOP	220 a	172 a	5.42	32.73	147	18.2	6522 a	6417
2.T_1+S as SSP	216 a	184 a	6.19	33.19	168	18.1	6948 a	7500
3.T_1+S as FeSO4	225 a	173 a	5.88	32.59	157	21.7	6327 a	6334
4.T_1+S as Gypsum	235 a	198 a	6.64	33.36	177	16.9	6491 a	7111
5.T_1+S as Ele.S	240 a	196 a	6.17	33.07	166	15.3	6812 a	7056
6.T_1+S as A/S	240 a	188 a	5.96	32.89	163	16.8	7235 a	7917
7.T_1+S as ZnSO4	203 a	164 a	6.17	32.61	163	19.8	6495 a	7111
8.No fertilizer	167 b	125 b	5.90	32.75	143	16.7	5130 b	5889
CV%	11.4	13.2	8.8	3.6	9.8	--	9.2	20.2
SEm±	20.3	18.9	0.43	0.97	12.8	--	486	1138
CD (5%)	43.6	40.5	NS	NS	NS	--	1043	NS

*S=Significant NS=Non significant Ele.S =Elemental sulfur A/S= Ammonium Sulphate results were observed by Huang Zhi Wu (1993) and De Datta (1995).Grain yield was mainly influenced by number of tillers and panicles per square meter, which also showed similar variation due to different treatments (Table 1). Other yield components *viz.* mean panicle weight, 100-grain weight, number of filled grains per panicle and straw yield did not differ significantly due to different treatments. These results are in accordance with that of Patnaik and Sathe (1993) and Singh and Prasad (1996). From the results, it may be inferred that the sulphur content of the given soil is sufficient for the productivity level of rice observed during the year. However, application of sulphur in the form of ammonium sulfate recorded maximum grain yield (7235 kg/ha 0 and net returns (Rs 35555/ha) with higher Benefit-Cost ratio (5.11) than all other sulphur treatments. Therefore, in soils with sulphur deficiency application of Ammonium sulfate as source of N and S may be suggested.

Table 2. Economics of sulphur nutrition in rainfed llowland rice

Sl. No.	Treatments	Cost of cultivation	Gross returns	Net returns	BCR
1.	DDP+MOP	6500	37744	31244	4.81
2.	T_1 +20kg S/ha as SSP	6964	40740	33776	4.85
3.	T_1+20 kg S/ha s $FeSO_4$	9468	36702	27234	2.88
4.	T_1+20kg S/ha as Gypsum	6662	38144	31482	4.73
5.	T_1+20kg S/ha has Elemental S	9300	39705	30405	3.27
6.	T_1 +20kg S/ha as Ammonium Sulfate	6954	42509	35555	5.11
7.	T_1 +20 kg S/ha as $ZnSO_4$	9076	38874	29798	3.28
8.	No fertilizer	4500	30361	25861	5.75

Note	SSP	$FeSO_4$	Gypsum	Elemental	Ammonium sulfate	$ZnSO_4$
Quantity applied (kg/ha)	160	106	108	20	83	112
Price (Rs/ha)	2.9	28.0	1.5	140.0	5.5	23

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