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NOTE

Sulfur Status of Rice Soils of Puri Canal Command Area and Impact on Rice

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Abstract

An investigation on available S status (0.15% $CaCl_2$ extracted) of soils of 8 blocks were taken up collecting 800 samples. The status showed available S ranging from 4.08 to 67.13 mg/kg. Considering 10 mg/kg S as the critical limit of deficiency, almost all the blocks had low S soils. The deficient per cent varied from 5.45 to 49.33, maximum per cent of S deficiency (49.33) was observed in the block Balipatna. Response of rice to S in the block was carried out taking four levels of S (10, 20, 30 and 40 kg/ha) along with a control replicated four times in randomized block design. Application of graded dose of S up to 30 kg/ha increased the grain and straw yields of rice. Further, 10 kg/ha supplementation to it decreased the yield.

Key words : Sulfur status, Rice soils, Response.

Representative 800 soil samples from eight blocks (Baranga, Pipili, Balipatna, Balianta, Nimapara, Bhubaneswar, Gop and Kakatapur) of the command area were collected for investigation. The soil samples were analyzed for mechanical composition, pH and organic carbon using standard procedure. Available S was extracted by 0.15% $CaCl_2$ and determined colorimetrically (1).

A field study was conducted during *rabi* 2000-2001 on a S deficient farmers field of block Balipatna of the command area to find out a suitable dose of S for rice. There were four levels of S (10, 20, 30 and 40 kg/ha) along with the control treatment replicated four times in randomized block design.

Soil of the experimental plot was sandy loam having pH 5.00, organic carbon 0.183% and S (0.15% $CaCl_2$ extracted) 7.98 mg/kg.

The rice variety Lalat was transplanted with recommended doses of N, P and K (80 : 40 : 40 kg/ha). Full dose of P and K along with 25% of N and respective doses of S in the form of phosphogypsum containing 16% of S and 18% of Ca were applied at transplanting. Out of rest of N, 50% was applied at tillering and 25% at heading. Sources of N, P and K were di-

Table 1. Some physical and chemical properties and content of available S (0.15% $CaCl_2$) in Puri canal command area. Figures in parentheses indicate mean.

	Name of the block	No. of soil samples analyzed	Texture Silt (%) range & mean	Clay (%) range & mean	pH	Organic carbon range & mean	Sulfur (mg/kg) Range & mean	Deficient (%)
1	Baranga	175	4-24 (13)	4-35 (18)	4.59-6.97	0.148-1.131 (0.604)	4.67-67.13 (31.86)	14.85
2	Pipili	165	3-29 (15)	3-35 (22)	4.57-7.15	0.114-1.237 (0.522)	4.08-63.88 (22.93)	13.93
3	Balipatna	150	3-24 (13)	4-34 (19)	4.59-6.90	0.131-1.993 (0.501)	4.75-63.28 (20.49)	49.33

Table 1. Continued.

	Name of the block	No. of soil samples analyzed	Texture Silt (%) range & mean	Texture Clay (%) range & mean	pH	Organic carbon range & mean	Sulfur (mg/kg) Range & mean	Deficient (%)
4	Balianta	120	3-24 (12)	4-34 (19)	4.66-6.95	0.187-1.732 (0.600)	6.33-52.86 (24.54)	11.66
5	Nimapara	60	3-24 (13)	5-33 (18)	4.65-6.92	0.181-1.168 (0.598)	5.89-50.73 (23.22)	10
6	Bhubaneswar	55	3-24 (13)	4-32 (15)	4.66-6.88	0.193-1.231 (0.719)	8.11-50.63 (28.44)	5.45
7	Gop	40	3-24 (14)	5-30 (16)	4.75-6.87	0.206-1.223 (0.696)	8.37-47.56 (27.49)	10
8	Kakatapur	25	3-24 (14)	5-30 (15)	4.69-6.92	0.198-1.130 (0.633)	6.39-48.76 (24.77)	11.42
	Total	800	3-29 (13)	3-35 (21)	4.57-7.15	0.114-1.993 (0.581)	4.08-67.13 (25.35)	19.25

calcium phosphate, urea and muriate of potash.

Some of the physical and chemical properties of the soils of the command area are given in Table 1. The data showed that silt content of the samples varied from 3 to 29% and clay content varied from 3 to 35% having mean values of 13 and 21% respectively. Maximum silt (29%) was recorded in block Pipili whereas maximum clay (35%) was found in blocks Baranga and Pipili. Soils of the command area are in a wide range of textural classes which vary from sand to clay loam and the maximum being clay loam followed by sandy loam.

The pH of the soils ranged from 4.57 to 7.15 in which maximum (53%) remained under pH varying from 5.00 to 6.00 indicating moderately acidic in reaction. Organic carbon content of the soils ranged from 0.114 to 1.993% with a mean content of 0.581%.

Considering 10 mg/kg of S as the critical level of deficiency (2), 19.25% of the soils of the command area were deficient with this element, maximum being in block Balipatna. Table 2 shows that application of S increased the grain and straw yields. The yield increased from 22.6 to 31.2% for grain 20.4 to 29.0% for straw. Maximum grain and straw yields were recorded at 30 kg S/ha. Further 10 kg of S/ha supplemented to this dose decreased the yields which might be due to higher absorption of S which interferes in the uptake of other nutrients.

Application of S increased the concentration and its uptake. Minimum concentration and uptake were recorded in control which increased to the maximum to 40 kg S/ha. Sahu and Nanda (3) reported the response of rice to sulfur in black and laterite soils of Orissa.

Table 2. Response of rice to sulfur.

	Treatments	Yield (q/ha) Grain	Yield (q/ha) Straw	Per cent increase over control Grain	Per cent increase over control Straw	S content (%) Grain	S content (%) Straw	S uptake (g/ha) Grain	S uptake (g/ha) Straw	S uptake (g/ha) Total
1	S_0	28.13	36.63	–	–	0.013	0.015	363	548	911
2	S_{10}	34.48	44.47	22.6	21.4	0.115	0.116	5080	7110	12190
3	S_{20}	35.76	45.77	27.1	24.6	0.118	0.121	6420	9610	16030
4	S_{30}	36.91	47.24	31.2	29.0	0.120	0.123	7370	10860	18230
5	S_{40}	34.74	44.11	23.5	20.4	0.125	0.126	8570	11450	20020
	SE	0.733	0.903			0.1008	0.1008	0.025	0.039	
	CD (0.05)	2.260	2.781			0.1026	0.1026	0.078	0.123	

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