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MINERAL NUTRITION AND YIELD OF SESAME IN THE GANGES TIDAL FLOODPLAIN SOIL

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Abstract

A field trial was conducted in the saline region of Satkhira District (AEZ 13) to investigate the mineral nutrition and yield of four varieties of sesame in *kharif-1* season of 2002. The varieties were BARI Til-2, BARI Til-3, T-6 and local (red). The soil and irrigation water salinity at sowing were 2.63 and 2.01 dS m^{-1}, respectively. Among the varieties, the T-6 produced the highest seed yield (1.66 t/ha) and BARI Til-3 (0.71 t/ha) did the lowest. The maximum 1000-seed weight (2.66 g) was recorded in T-6 variety and the minimum was (2.27 g) in local (red) variety. The N, P, K, Zn, and S concentrations of seeds or stovers of different varieties were statistically identical. The uptake of these elements also did not vary with varieties.

Key Words **:** Mineral nutrition, sesame, soil salinity.

Introduction

Til (*Sesamum indicum*) is an important oil crop in Bangladesh. In terms of acreage, it is next to mustard. In Bangladesh, 38,866 hectares of land (2003-04) are cultivated under sesame with a production of 25,000 metric tons of seed showing a yield of 640 kg/ha (BBS, 2004). It can be cultivated both in *kharif* and *rabi* seasons. The main regions are greater Faridpur, Barishal, Rangamati, Dinajpur, Pabna, Khulna, Dhaka, Mymensingh, and Comilla. The seed on an average, consists of 47% oil and 20% protein (Rahman, 1976)

Lack of high yielding variety may be the main reason of low yield of sesame. Out of 2.85 million hectares of coastal and off-shore areas about 0.833 million hectares of the arable lands, which constitute about 52.8 percent of the net cultivable area in 64 *upazilas* of 13 districts, is affected by varying degrees of soil salinity. The soil and water salinity levels vary widely from place to place and from season to season. Due to lack of fresh irrigation water, major cropping pattern of coastal saline regions like Satkhira District is Fallow-T.Aman rice-

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Fallow. It is reported that sesame is a moderately tolerant crop to sodium chloride salinity (Yousif *et al.,* 1972). So, there is a scope for cultivation of sesame in the coastal saline areas in the *kharif-1* season with rain fed or residual soil moisture (Kaul *et al*., 1986). This study was conducted to evaluate the mineral nutrition and yield of sesame in the coastal saline areas and thereby to introduce a Sesame-T.Aman rice-Fallow cropping pattern.

Materials and Method

The field experiment was conducted at Benarpota of Satkhira sadar (AEZ 13). Four varieties of sesame, namely BARI Til-2, BARI Til-3, T-6, and local (red) were sown as broadcast on 7 March 2002. BARI Til-2 and BARI Til-3 seed (80% germination) were sown @ 16 kg/ha. Due to low germination percentage (40%), T-6 and the local ones were sown @ 32 kg/ha. Nitrogen, P, K, S, Zn, and B were applied @ 53, 27, 23, 19, 1.8 and 1kg/ha as urea, TSP, MP, gypsum, zinc sulfate and boric acid, respectively. Thinning was done after 20 days of sowing at 5 cm intervals. Soil salinity was monitord at 15-day intervals throughout the growing season. The soil samples (0-15 cm depth) were dried, ground, and passed through 2 mm sieve. About 200 g soil sample was stirred by glass rod with about 100 ml of distilled water to make a saturation paste, and the soil paste was sucked down into a Buckner flask with a vacuum pump. The soil electric conductivity (EC) was measured from the saturation extract (Chapman, 1961). The crop was harvested on 8 May 2002 before sprouting the capsule at maturity. For chemical analysis, stover sample was oven dried at 69°C for 72 h and ground by Wiley Mill, but seed was not ground. Total N concentration in seed and stover was determined by micro-Kjeldahl method and the concentrations of P, K, S, and Zn were analyzed following standard procedures (Yoshida *et al*., 1976) A randomized complete block design with three replications was used in the study. The statistical analysis was done by using IRRISTAT windows version (Bartolome *et al*., 1998).

Results and Discussion

Soil and irrigation water characteristics

The soil was alkaline (pH 7.4) in reaction and clay in nature with medium organic matter (2.95%). The soil had 0.17% total N, 24 mg/kg available P, 0.10 c mol/kg exchangeable K, 9 mg/kg available S and 22 mg/kg water soluble Na. The electrical conductivity of soil was 2.63 ds/m (slightly saline).

Soil salinity level increased initially from 08 March to 23 March and then decreased sharply upto 24 April due to rainfall and then again increased upto 08 May, and thereafter declined upto 08 June. Irrigation was done only before sowing and the EC value was 2.01 dS/M.

Yield of sesame

Seed yield varied significantly with varieties (Table 1). The highest seed yield (1.66 t/ha) was found in T-6 variety followed by BARI Til-2 (1.41 t/ha) and local variety (1.00 t/ha) and the lowest in BARI Til-3 (0.71 t/ha) (Table 2). The highest stover yield (3.03 t/ha) and the highest number of seeds/10 pods were found in T-6 (363) and the highest number of pods/5 plants in local variety (391). The maximum 1000-seed weight (2.66 g) was found in T-6 followed by BARI Til-2 (2.54 g) and BARI Til-3 (2.30 g) and the minimum (2.27 g) in local variety.

Table 1. Yield of different sesame varieties.

Varieties	Seed yield (t/ha)	Stover yield (t/ha)	Seeds/10 pods	Pods/5 plants	1000-seed wt (g)
BARI Til-2	1.41	2.51	342	337	2.54
BARI Til-3	0.71	2.55	286	339	2.30
T-6	1.66	3.03	363	341	2.66
Local	1.00	2.83	325	391	2.27
LSD (0.05)	0.40	ns	ns	ns	0.17

Nutrient concentration and uptake

The nutrient contents in seed and stover are presented in Table 2. Variation of a nutrient concentration in seeds or stovers of different varieties were not significant. The N, P, K, S, and Zn concentrations in seeds varied between 2.28 and 2.82%, 1.06 and 1.17%, 0.32 and 0.38%, 0.18 and 0.23%, and 63 and 71 ppm and in stovers were 0.59 and 0.85%, 0.24 and 0.32%, 1.35.146%, 0.23 and 0.33%, and 33 and 46 ppm, respectively. Nutrient uptake by different varieties is presented in Table 3. No. varietal difference in nutrient uptake was observed. The highest N, P, K, S and Zn uptake were found in T-6 variety.

Table 2. Nutrient concentrations in seed and stover of sesame.

Varieties	N	P		K	S	Zn
	%					ppm
			Seed			
BARI Til-2	2.82	1.09		0.35	0.21	67
BARI Til-3	2.49	1.17		0.38	0.23	71
T-6	2.28	1.11		0.37	0.18	67
Local	2.81	1.06		0.32	0.19	63
LSD (0.05)	ns	ns		ns	ns	ns
			Stover			
BARI Til-2	0.59	0.24		1.37	0.23	46
BARI Til-3	0.85	0.32		1.35	0.30	38
T-6	0.69	0.26		1.46	0.33	33
Local	0.74	0.30		1.37	0.24	33
LSD (0.05)	ns	ns		ns	ns	ns

Table 3. Nutrient uptake (kg/ha) by sesame (seed+stover).

Varieties	N	P	K	S	Zn
BARI Til-2	55	21	10	39	0.20
BARI Til-3	38	17	9	37	0.15
T-6	59	26	13	51	0.22
Local	50	19	9	40	0.15
LSD (0.05)	ns	ns	ns	ns	ns

Conclusion

The variety of sesame can be cultivated in the slightly saline southwestern region of Bangladesh in the Sesame-T.Aman rice-Fallow cropping pattern.

References

Bartlome, V.I., M.C.A. Carrasco, L.C. Quintana, M.I.B. Ferino, J.Z. Mojica, A.B. Olea, L.C. Paunlagui, C.G. Ramos, M.A. Ynalvez, and C.G. Mclaren. 1998. Experimental design and data analysis for agricultural research. Manila, Philippines: International Rice Research Institute.

Bangladesh Bureau of Statistics. 2004. Year book of Agricultural Statistics of Bangladesh. Ministry of Planning. Government of the People's Republic of Bangladesh. Dhaka. P 38.

Chapman, H.O., and P.F. Pratt. 1961. Methods of Analysis for Soils, Plants and Water. University of Calfornia. Divn. of Agric. Sci., 184-196.

Karim, Z., S. G. Hussain and M. Ahmed, 1990. Salinity problems and crop intensification in the coastal regions of Bangladesh. BARC publication no. 33:63.

Kaul, A.K, 1986. Oilseeds in Bangladesh. Bangladesh-Canada Agriculture Sector Team, Ministry of Agriculture, Dhaka.

Rahman, I. 1976. Importance of oilseeds in the economy and nutrition of Bangladesh. Proc. 1st National Workshop on Oilseeds and Pulses, 11-13 October, 1976. Bangladesh Agricultural Research Council, Dhaka.

Yoshida, S., D.A. Forno, J. H. Cock, and K.A. Gomez. 1976. Laboratory Manual for Physiological Studies of Rice, 3rd edition, 14-22. Manila, Philippines: International Rice Research Institute.

Yousif, Y. H., F. F. Bingham and D. M. Yermanos. 1972. Growth, mineral composition and seed oil of sesame (*Sesamum indicum* L.) as affected by NaCl. *Soil Sci. Soc. Amer. Proc.* **36**:450-453.