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Effect of Silicate Effluent on Chemical Properties of Soil and Groundnut Yield

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More than 1500 textile units print about 4.5 lakhs sarees per day using about 3650 lakh litres of water daily (Menon, 1987). Of late, the treatment of urea in saree printing has been substituted by sodium silicate as the latter given better shining and lustrous printing. Since the effluent washing of urea treated sarees when used as irrigation was beneficial to crops, some farmer's also unknowingly started using the effluent of sodium silicate treated sarees for irrigating their crops. But the experience of farmers showed that use of effluent of first two washings of the sodium treated sarees was detrimental to both crops and soils. Therefore, the farmers now letout the first two washings either in the open grazing public land or in ponds around their fields. This not only leads to waste of costly commodity but also to water pollution. It might be possible that dilution of this effluent may prevent spoilage of soil and adverse effect on crop growth. This note reports the results of a study on the effect of different dilutions of silicate treated textile effluent on growth of groundnut and soil properties.

A pot experiment was conducted during summer 1989 with seven dilution treatments of silicate effluent water (Table 1) with three replications in a completely randomized design on calcareous caly soil (Vertic Ustochrepts). The soil, clay in texture, had pH (1:2.5) 8.2 , EC (1:2.5) 0.45 dSm^{-1}, $CaCO_3$ 19%, organic C.O. 45%, Olsen's P 6.9 mg/kg and available K 268 mg/kg. A basal doses of nitrogen and phosphorus were applied through urea and DAP respectively. The earthen pots were filled with 13 kg of the soil. Three seedlings of groundnut variety GG-2 were raised in each pot. The pots were irrigated with silicate effluent water of different dilutions as per the treatment (Table 1) throughout the crop season. At maturity, the crop was harvested and soil samples were collected and analysed for chemical properties following the standard methods (Jackson, 1973).

Effect on soil

An increase in the concentration of irrigation water with the silicate effluent considerably increased as per the expectation the values of EC, pH, Na^+, K^+, $CO_3^=$, HCO_3^-, RSC', SSP' and SAR but decreased those of Ca^{++} and MG^{++} (Table 1). When this effluent treated water were used for irrigation, the values of EC (dSm^{-1}), pH, SAR, RSC ($me\ L^{-1}$),

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TABLE 1

Composition of dilute silicate effluent water used for irrigation.

Treatment	EC x 10^3 (dSm^{-1})	pH	Na^+	K^+	Ca^{++}	NG^{++}	$CO^{=}_3$	HCO^{-}_3	Cl^-	RSC	SSP	SAR
						($me\ L^{-1}$)						
T_0 (Control)	1.0	7.5	2.5	—	4.8	2.6	0.4	2.8	5.4	Nil	25.25	1.39
T_1 (1% effluent)	1.1	8.3	4.7	0.08	2.0	2.2	1.0	2.5	6.6	Nil	52.21	3.2
T_2 (2.5% effluent)	1.3	8.5	8.9	0.12	0.8	1.6	1.6	3.1	7.0	2.3	77.91	8.2
T_3 (5% effluent)	2.3	9.0	17.3	0.25	0.8	0.8	4.0	5.0	7.7	7.4	90.3	19.3
T_4 (7.5% effluent)	3.0	9.2	25.5	0.36	0.6	0.6	6.6	7.0	8.2	12.4	93.2	32.9
T_5 (10% effluent)	3.8	9.4	33.3	0.47	0.4	0.4	8.8	10.1	9.4	18.1	96.3	52.6
T_6 (15% effluent)	5.2	9.6	45.0	0.64	0.4	0.2	13.6	15.7	11.1	28.7	97.3	82.2
T_7 (20% effluent)	6.4	9.9	51.6	0.82	0.4	0.1	24.4	17.6	13.4	41.5	97.5	103.1

TABLE 2

Effect of effluent silicate water on chemical properties of soil and yield of groundnut.

Treatment	Water soluble (1:2.5)					Exch. (c mol (P^+) kg^{-1})				Avail.	organic	yield (g pot^{-1})	
	EC x 10^3 (dSm^{-1})	pH —	SAR —	RSC (meL^{-1})	SSP —	Ca+Mg	Na	K	ESP	P_2O_5 kg ha^{-1}	carbon (%)	Pod	Haulm
T_0	0.20	8.2	0.90	1.24	36.2	37.3	1.7	0.33	4.4	30.8	0.55	10.32	25.3
T_1	0.25	8.2	2.59	1.84	35.2	35.2	2.6	0.33	6.8	30.7	0.55	9.33	24.3
T_2	0.35	8.3	3.79	1.75	70.0	33.5	4.4	0.38	11.6	30.7	0.56	8.01	23.7
T_3	0.50	8.3	5.30	1.88	74.9	33.2	10.3	0.45	23.5	30.7	0.54	6.99	21.2
T_4	0.75	8.4	5.82	2.39	75.0	30.2	15.3	0.55	33.3	29.1	0.52	7.11	19.5
T_5	0.83	8.6	6.31	2.99	75.7	26.7	18.0	0.55	39.8	29.1	0.54	5.62	14.3
T_6	0.92	8.7	7.70	4.25	78.2	20.5	20.1	0.59	48.9	28.3	0.48	4.36	14.0
T_7	1.13	9.2	9.30	6.08	80.6	15.4	21.6	0.68	57.3	29.1	0.48	4.26	13.0
C. D. @ 5%	0.08	0.1	0.8	0.66	5.5	2.2	1.5	0.06	7.2	NS	NS	1.92	5.3

NS : Non significant