

Wheat :

Gross return in this crop behaved similar to maize crop but net return and benefit cost ratio with residual effect of FYM was more as compared to the direct effect.

Increase in fertility levels increased the gross as well as net return but maximum benefit cost ratio was obtained with lowest fertility level. (Table 3)

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EFFECT OF SUGAR FACTORY EFFLUENT ON GROWTH, YIELD AND QUALITY OF BHENDI - VAR PKM-1

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ABSTRACT

A field experiment was conducted to study the effect of sugar factory effluents on growth, yield and quality of bhendi-var PKM 1 in the premises of a sugar factory in Aundipatti, Madurai District. The crop quality was not affected. Increased yields were obtained with 50% and 75% dilutions when compared to zero per cent dilution. There was no adverse effects on the soil physical properties. The effluent can be used for irrigating bhendi with proper dilution.

KEY WORDS : Sugar factory effluent, quality of bending soil physical properties.

In order to meet the production needs in agriculture, the Government of India's working group on fertilizers has estimated that 20.6 mt. of nitrogen, phosphorus and potassium may be required by 2000 A.D. On no account fertilizers, or any single input can provide such large quantities of plant nutrients. All available nutrient sources have to be tapped to meet the target. In addition, integrated use of mineral, organics and usable wastes is necessary for sustaining high crop yields. Based on these lines, an experiment was conducted, on the utilization of sugar factory effluent and its effect on growth, yield and quality of bhendi var PKM-1.

MATERIALS AND METHODS

A field was selected adjacent to the premises of a sugar factory in Aundipatti, Madurai District. The soil characters were as follows :

Initial soil characteristics

1. Soil reaction (pH)	:	7.2
2. Electrical conductivity	:	0.28 dSm ⁻¹
3. Bulk density	:	1.34 Mg/m ³
4. Particle density	:	2.14 Mg/m ³
5. Maximum water holding capacity (MWHC)	:	26.54%
6. Pore space	:	45.76%
7. Volume expansion	:	11.77%
8. Organic carbon	:	1.07%
9. Organic matter	:	1.84%
10. Available nitrogen	:	284 kg ha ⁻¹
11. Available phosphorus	:	19.5 kg ha ⁻¹

Table 1. Influence of sugar factory effluent on the physical character of bhendi

Treatments	Biometric observations					
	Plant height (cm)	Root length (cm)	Shoot length (cm)	No. of fruits/plant	Fruit length (cm)	Fruit weight (gm)
T1-0% dilution (treated effluent water)	41.5	9.0	29.0	4	13.5	41.9
T2-25% dilution	44.5	13.0	31.5	8	14.5	43.5
T3-50% dilution	49.5	13.0	36.5	10	16.0	44.2
T4-75% dilution	50.5	13.5	40.0	12	15.5	50.6
T5-100% irrigation water	52.5	15.0	37.5	13	17.0	47.7
SED	4.02	1.84	2.98	1.12	1.10	0.69
CD at 5%	8.75	4.10	6.50	2.80	2.40	1.50

12. Available potassium : 321 kg ha⁻¹

The bhendi crop was raised with the following treatments.

T1 - Undiluted treated effluent water

T2 - 25% dilution of treated effluent water

T3 - 50% dilution of treated effluent water

T4 - 75% dilution of treated effluent water

T5 - 100% irrigation water

The treated effluent water, used for irrigation, has the following physico-chemical characters.

Colour : Dark brown

Odour : Phenolic odour

Temperature : 41° C

T.D.S. : 700 ppm

pH : 6.6

EC : 1.56 dSm⁻¹

BOD : 196.9 mg l⁻¹

COD : 787 mg l⁻¹

Ca : 36.4 me/litre

Mg : 26.8 me/litre

Sulphate : 1009.8 ppm

Biometric observations and yield were recorded at harvest. The harvested samples were analysed for their moisture content, ash content, calcium, magnesium, crude protein, crude fibre and sulphate contents as per the standard procedure

(A.O.A.C., 1960). The post-harvest soil samples were analysed for their physical properties. The data were subjected to statistical scrutiny following the methods described by Panse and Sukhatme (1961).

RESULTS AND DISCUSSION

The biometric observations are furnished in the Table 1. The results revealed that all the treatments were significantly different from each other in plant height, root length, shoot length, number of fruits per plant, fruit length and fruit weight. Marked difference between the undiluted treated effluent water and treated effluent water with different dilutions might be due to the high content of Ca, Mg and sulphate of the effluent water.

The fruit yield of bhendi grown under effluent irrigations is furnished in the Table-2. The results revealed that all the treatments were significantly different from each other. Application of pure irrigation water recorded the maximum fruit yield (13.06 tha⁻¹) followed by 75% dilution of effluent water (12.50 tha⁻¹). The lowest yield was obtained in plots irrigated with undiluted effluent water. The same trend of results was obtained in groundnut by Devarajan *et al.*, (1993).

Table 2. Effect of irrigation with sugar factory effluent or fruit yield of bhendi

Treatment	Fruit yield (t/ha)
T1-0% dilution treated effluent water	9.72
T2-25% dilution	10.65
T3-50% dilution	11.43
T4-75% dilution	12.50
T5-100% irrigation water	13.06
SE D	0.321
CD at 5%	0.699

Table 3. Influence of sugar factory effluent on the quality characters of bhendi

Treatments	Quality characters						
	Moisture (%)	Ash (%)	Ca (%)	Mg (%)	Crude protein (%)	Crude Fibre (%)	Sulphate (%)
T1-0% dilution treated effluent water	89.19	9.64	4.93	3.49	1.07	1.23	0.18
T2-25% dilution	85.56	10.60	4.80	3.63	1.26	1.26	0.16
T3-50% dilution	89.26	10.07	5.96	3.89	1.31	1.28	0.14
T4-75% dilution	90.38	9.50	6.18	4.29	1.48	1.03	0.13
T5-100% irrigation water	89.88	9.92	5.90	3.94	1.69	1.25	0.14
SED	2.39	0.64	0.41	0.13	0.10	0.03	0.009
CD at 5%	NS	NS	0.90	0.29	0.22	0.06	0.02

Table 4. Physical properties of the soil before and after the experiment

Treatments	pH	EC dSm ⁻¹	Bulk density mgm ⁻³	Particle density mgm ⁻³	M W H C %	Pore space (%)	Volume expansion (%)	Organic Carbon (%)	Organic matter (%)
Initial Analysis	7.2	0.28	1.34	2.14	26.54	45.76	11.77	1.07	1.84
T1-treated effluent water	8.1	0.3	1.31	2.32	26.58	45.82	10.92	1.15	1.98
T2-25% dilution	7.9	0.3	1.34	2.26	25.42	46.13	11.76	1.11	1.91
T3-50% dilution	7.9	0.2	1.45	2.38	26.78	45.72	12.57	1.14	1.96
T4-75% dilution	7.6	0.3	1.38	2.24	27.78	46.33	12.26	1.02	1.76
T5-100% irrigation water	7.7	0.3	1.40	2.28	26.85	45.16	13.76	1.06	1.82
SED	0.41	0.05	0.41	0.06	1.08	0.54	1.30	0.06	0.10
CD at 5%	NS	NS	0.90	NS	NS	NS	NS	NS	NS

The quality attributes of bhendi are presented in the Table 3. The treatments were significantly different from each other for Ca and Mg, crude protein, crude fibre and sulphate contents. Mixing of treated effluent with irrigation water has favourable effect on the quality of fruits. The palatability of the green bhendi fruits was also good. Similar trend was also obtained by Sivaramakrishnan *et al.*, (1983).

The analysis of the physical properties of the soil (Table 4) before and after the experiment brought out the absence of significant differences among the treatments. Singaram (1992) reported that noticeable differences in physical characteristics of soil can be brought by prolonged use of effluent water for irrigation.

The sugar factory effluent can be used for irrigating bhendi crop with proper dilution. The crop quality was not affected and there was no adverse effects on the soil physical properties also.

From these studies the feasibility of using sugar factory effluent for growing vegetables like bhendi with proper management is established.

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