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EFFECT OF MODI DISTILLERY USB WASTE WATER DIGESTER EFFLUENT IRRIGATION ON STARCH CONTENT, 100 SEED WEIGHT, STOVER YIELD AND SEED YIELD OF MAIZE

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ABSTRACT : The effect of effluent was observed on the maize varicty Prabhat and Hybrid KH-5981, the observation were recorded on seed yeild. stover yield 100 seed test weight and starch content of the grains. The seed yield increased to 3.289% in Hybred KH 5981 and 9.138% in var. Prabhat at 50% dillution of the effluent. An increase in stover yield also registered 3.45% at 50% dellution in Hybrid KH 5981 and 5.22% at the some dillution but at 75% dillution the strover yieeld in creased up to 5.097% the 100 seed test was increased to 3.706% at 25% dellution in Hybrid KH 5981 and of var. Prabhat up 7.12% at the same dillution but 10% delution was also effective which recorded a seed wlight of 10.064% However the starch content was found to be significantly reduced in Hybrid KH-5981 and Prabhat at all the concentration of the effluent used.

Key words : Starch content, distillery waste water, maize.

INTRODUCTION

In India, alcohol is mostly produced from sugarcane molasses which is the mother liquor left behind after extraction of Sugar. The molasses is then fermented and alcohol is distilled from fermented wash leaving behind spent wash. Four to five Kg of molasses is required for producing one liter of alcohol by discharging about 12-14 liters of effluent. Thus the problem of disposal of effluent (Spentwash) has assumed paramount importance. In India there are 290 distilleries which produce 2.75 billion liters of alcohol (Pravin *et al*, 2002) and in Uttar Pradesh there are 21 distilleries with annual installed capacity of producing 64.12 million liters of alcohol. Modi distillery situated at Modinagar Ghaziabad has a capacity of producing 15,000 liters of alcohol per day and discharges about 1,95,000 liters of effluent per day. Some of the farmers around the factory and factory farm are utilizing this effluent after lagooning and diluting with tube well water for irrigation. The alcohol distillery effluents and obtained from an edible product processed in food industry. The constituent of the distillery effluents are plant organic matter, dead yeast cells, salts of Potassium, Calcium, Magnesium, etc, which the sugarcane plant has absorbed form the soils and nutrients are not hazardons chemicals. Brazil, which is the world's largest producer of Ethy1Alcohol of the order of 11 billion liters per annum from sugarcane juice as well as molasses, is not in any way confronted with the problem of disposing the distillery effluents. The entire effluents produced from about 450 disstilleries in Brazil, are transported in the road tankers to the sugarcane fields and used for "Ferti-Irrigation". This means that the fartilizers as well as the irrigation water are simultaneously supplied to the sugarcane fields by this method there had not been any undesirable effect reported from any part of Brazil by adopting "Ferti-Irrigation system". Therefore there is, no reason why India also should not adopt the same method. Therefore this study was conducted to find out a proper effluent dilution required for irrigation to raise different crops without effecting the productivity of soil and soil health.

MATERIALS AND METHODS

Effect of distillery effluent irrigation on growth, yield and quality of crops was studied. The possibility of utilizing effluent mixed with tube well water was studied in the following ratio of effluent concentration:

10% (effluent 1 : water 9) ———D_1
25% (effluent 1 : water 3) ———D_2
50% (effluent 1 : water 1) ———D_3
75% (effluent 3 : water 1) ———D_4

Symbolized as D1, D2, D3 and D4 respectively, Plot size used for the experiment was 8.0m x 6.0m and the statistical design adopted was randomized block design with three replications, the test crops grown were Maize verities KH 5981. The observations were recorded for Starch Content, 100 seed Weight, Stover yield and seed yield of Maize. A dilution tank of 10,000 liters capacity was constructed by the side of experimental plots. Effluent was collected from the Modi distillery and diluted to obtained required level of concentration with tube wall

water. During crop growth periods sugarcane varities were given 12 irrigations where as maize varieties were given 6 irrgations, respectively.

Starch was estimated according to the method described by Cready *et al* (1950). To the residue left in the extraction flask after alcohol extraction 10 ml of water was added followed by 13 ml of 52% per chloric acid stirring occasionally for 15 monutes at 3000 x g. The solution was poured into 100 ml volumetric flask, to the residue added 5 ml of water followed by 6.5 ml of 52% per chloric acid. Solubilized as before for 15 minutes and washed the contents of the flask into 100 ml volumetric flask. The volume was made upto 100 ml and filtered.

Diluted 2 ml of the filtered starch solution to 50 ml in a volumetric flask pipetted out 5 ml of the diluted solution into 24 x 250 mm borosilicate glass tube cooled in ice bath and added 10 ml of fresh anthrone reagent (0.2%) anthrone solution in 95% aulphuric acid). After the anthrone reagent has been added to all the series of sample tube, cooled in a ice bath each one was mixed thoroughly and they were heated together for 7.5 minutes over a water bath at 100^0C. The tubes were cooled repidly to 25^0C in a water bath and the colour intensities were determined at 630 nm in a spectrometer. A standard curve was prepared by using 50, 100, 120, 130, 140, 200 u gm of glucose containing the same amount of perchloric acid as that in the starch aliquot and using this calibration curve the yield of glucose from starch was estimated.

OBSERVATIONS

The results in Table 1 and Fig 1 indicate that the starch content in effluent treated plants was significantly reduced and the maximum reduction was observed in 10% concentration of effluent treatment. There was higher percentage of starch in control plants in comparision to treated plants of both the varities viz. hybrid KH 5981 and Prabhat. The starch content was higher in Prabhat in comparison to Hybrid KH 5981 var. Prabhat showed a decrease of 0.46, 0.77, 0.60, and 0.39% in starch content at the effluent concentration of 10, 25, 50 and 75%. There existed a strong interaction between variety and treatment but the interaction between. Variety and dilution and between treatment and dilution was not significant.

100 seed weight

The data on the effect of effluent and their interaction on the 100 seed weight of maize have been presented in Table 2 and Fig. 2. Results showed that different dilutions used increased the 100 seed test weight. The maximum increase was observed in Hybrid KH 5981 of 15.43% and in var. Prabhat 10.06% at D1 dilution of effluent. while the 25%, 50% and 75% concentration showed an increase of 3.7%, 2.30%, and 2.52% in Hybrid KH 5981, and in var. Prabhat 7.12%, 3.73% and 3.26% respectively. There existed a strong interaction between variety and treatment, variety and dilutions used, but the interaction between variety and treatment, variety and dilutions used, but the interaction between treatment and dilution was not significant, but however the interaction between. Variety, treatment and dilution was found to be significant.

Stover yield

Data Presentad in table 3, Fig. 3 indicate that the effect of effluent dilutions resulted in the increased stover yield in maize in both the varities viz. Hybrid KH 5981 and var. Prabhat tested. The maximum increase was observed in D3 and D4 times dilutions of effluent irrigation 50 times diluted effluent irrgation resulted in the increase of 5.22% in stover yield in var. Prabhat while the corresponding increase in Hybrid KH 5981 was 3.45% the D4 times diluted effluent resulted in the increase of 5.097% in var. Prabhat and 2.45% in Hybrid. KH 5981. The D1 dilution resulted in the increase of 3.44% in Hybrid KH 5981, and 2.3% in var. Prabhat, thus 50 times dilution responded more significantly then any other dilution of the effluent used. Interaction between variety and dilution, variety and treatment, treatment and dilution were also significant.

Seed yield in Maize

The data presented in Table 4 Fig. 4 indicate that 10% concentration effluent recorded the highest yield in var. Prabhat which showed an increase of 9.138% and at 25% concentration an increase of 9-10% was observed but it declined at 50% and 75% concentration to 6.77 and 6.50% in comparison to non treated control. The percent increase in seed yield was observed more with var. Prabhat in comparison to Hybrid KH 5981. which showed an increase of 3.289% at 10% concentration. Thus the percentage increase was much higher in variety Prabhat and was recorded at all the concentration used. Interaction between variety and treatment variety and dilutions of effluent and between treatment and dilution, and between veriety treatment and dilution was found to be significant.

DISCUSSION

Singh and Raj Bahadur (1998) Studied the effect of distillery effluent on growth of maize and soil properties. The effluent was applied as pre sowing irrigation on maize crop and its effect on growht and soil properties was monitored. Effluent treated plants improved the growth and yield of plants. The pH and electrical conductivity of the soil increased where as the soil organic, carbon,

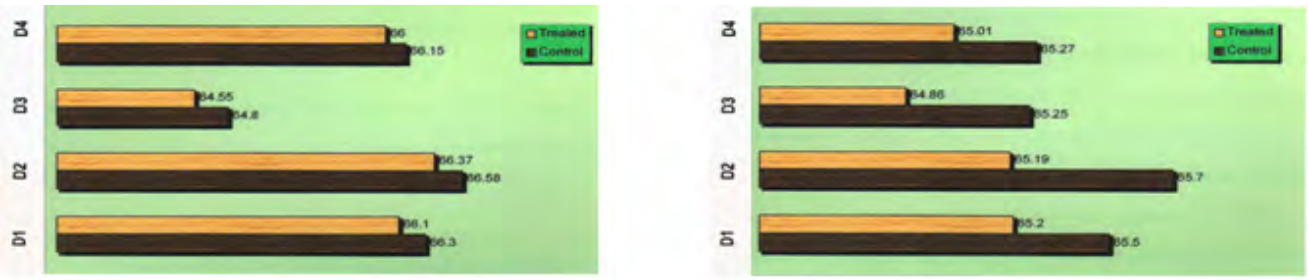

Fig. 1 : Effect of effluent dilution and their interaction on the starch content (%) of Maize.

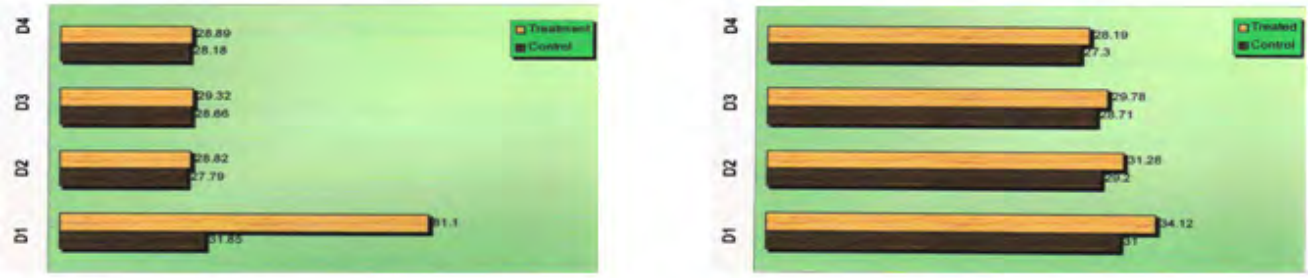

Fig. 2 : Effect of effluent dilution and their interaction on the 100 seed test weight (g) of Maize.

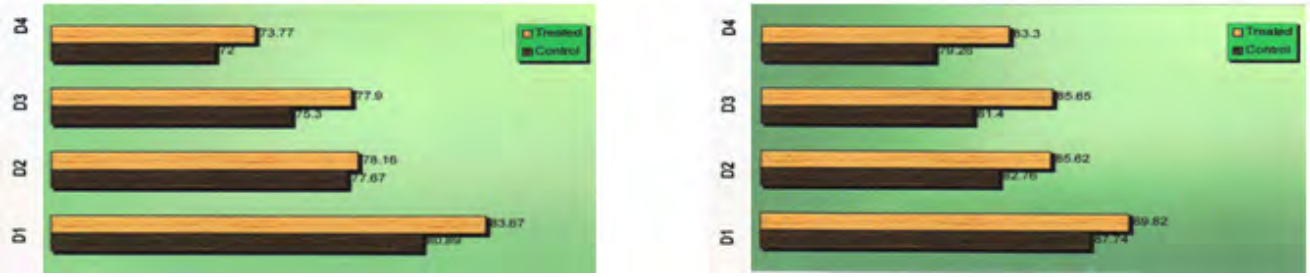

Fig. 3 : Effect of effluent dilution and their interaction on the stover yeild of Maize.

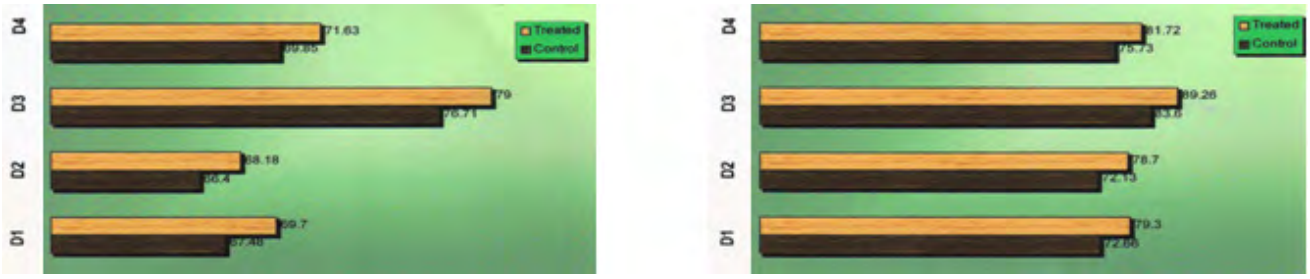

Fig. 4 : Effect of effluent dilution and their interaction on the seed yeild of Maize.

nitrogen, phosphorus and potassium content increased significantly with increase in the number of presowing effluent irrigated.

The effect of effluent dilution on maize crop was assessed in terms of seed yield, stover yield, 100 seed test weight and starch content. Studies were made on two varities of maize VIZ Hybrid KH 5981, Var Prabhat for comparision. The seed yield increased to 3.289% in Hybrid KH 5981 and to 9.138% in var. Prabhat at 10% concentration. Stover yield were in Hybrid KH-5981 - 3.45 and in var. Prabhat 5.22 at 50%. The 100 seed test weight was increased upto 3.706% in Hybrid KH 5981 at 25% concentration while at the same concentration of var. Parbhat showed 7.12% in seed weight, however at 10% concentration this variety recorded an increase of 10.064% more in 100 seed test weight. The starch content reduced to 0.30, 0.32, 0.38, and 0.22% inhybrid KH 5981 and var Prabhat 0.46, 0.77, 0.60, and 0.39% at 10, 25, 50

Table 1 : Effect of effluent dilution and their interaction on the starch content (%) of Maize.

Effluent Dilution	Variety K.H 5981		Vareity Prabhat		Mean	Percentage Increase (+) or Decrease (-) over Control	
	Control	Treated	Control	Treated		Variety K.H.-5981	Vareity Prabhat
D1	66.3	66.1	65.5	65.2	65.78	- 0.30	- 0.46
D2	66.58	66.37	65.7	65.19	65.96	- 0.32	- 0.77
D3	64.8	64.55	65.25	64.86	64.87	- 0.38	- 0.60
D4	66.15	66	65.27	65.01	65.61	- 0.22	- 0.39
Mean	65.96	65.76	65.43	65.07			

	F-Test	S.Em+	C.D. at 5%
Variety (a)	**sig**	**0.092546**	**0.26725**
Treatment (b)	**sig**	**0.092546**	**0.26725**
Dilution (c)	**sig**	**0.130879**	**0.3779**

Table 2 : Effect of effluent dilution and their interaction on the 100 seed test weight (g) of Maize.

Effluent Dilution	Variety K.H 5981		Vareity Prabhat		Mean	Percentage Increase (+) or Decrease (-) over Control	
	Control	Treated	Control	Treated		Variety K.H.-5981	Vareity Prabhat
D1	31.85	81.1	31	34.12	44.4	+ 15.43	+ 10.064
D2	27.79	28.82	29.2	31.28	29.27	+ 3.706	+ 7.12
D3	28.66	29.32	28.71	29.78	29.12	+ 2.30	+ 3.73
D4	28.18	28.89	27.3	28.19	28.14	+ 2.52	+ 3.26
Mean	29.12	42.03	29.05	30.84			

	F-Test	S.Em+	C.D. at 5%
Variety (a)	**sig**	**2.521**	**7.282**
Treatment (b)	**sig**	**2.521**	**7.282**
Dilution (c)	**sig**	**3.566**	**0.01**

Table 3 : Effect of effluent dilution and their interaction on the Stover yeild of Maize.

Effluent Dilution	Variety K.H 5981		Vareity Prabhat		Mean	Percentage Increase (+) or Decrease (-) over Control	
	Control	Treated	Control	Treated		Variety K.H.-5981	Vareity Prabhat
D1	80.89	83.67	87.74	89.82	85.53	+ 3.44	+ 2.370
D2	77.67	78.16	82.76	85.62	81	+ .63	+ 3.46
D3	75.3	77.9	81.4	85.65	80	+ 3.45	+ 5.22
D4	72	73.77	79.26	83.3	77	+ 2.45	+ 5.097
Mean	76.47	78.38	82.79	86.097			

	F-Test	S.Em+	C.D. at 5%
Variety (a)	**sig**	**0.025**	**0.072**
Treatment (b)	**sig**	**0.025**	**0.072**
Dilution (c)	**sig**	**0.035**	**0.102**

and 75% dilution of effluent used.

The increased seed yield, and stover yield observed in the present study, may be due to highter seed yield observed in the present study, may be due to higher seed yield obervie in the study. 100 test weight of seed will be responsible for increse in the yield of the crop. However the starch concentration in the treates plants was lover. It was found to be significantly reduced in all the diluted effluent treated plants of both the varities of maize used for the study. Which may be due to high grain yield

Table 4 : Effect of effluent dilution and their interaction on the seed yeild of Maize.

Effluent Dilution	Variety K.H 5981		Vareity Prabhat		Mean	Percentage Increase (+) or Decrease (-) over Control	
	Control	Treated	Control	Treated		Variety K.H.-5981	Vareity Prabhat
D1	67.48	69.7	72.66	79.3	72.29	+ 3.289	+ 9.138
D2	66.4	68.18	72.13	78.7	71.35	+ 2.680	+ 8.108
D3	76.71	79	83.6	89.26	82.14	+ 2.998	+ 6.770
D4	69.85	71.63	75.73	81.72	74.98	+ 2.548	+ 6.503
Mean	70.11	72.13	76.28	82.25			

	F-Test	S.Em+	C.D. at 5%
Variety (a)	**sig**	**0.031**	**0.09**
Treatment (b)	**sig**	**0.031**	**0.09**
Dilution (c)	**sig**	**0.044**	**0.127**

produced which might have resulted in lesser distribution of starch over more member of grains or the reduction observed in the concentration of starch may be due to interference in starch synthesizing mechanism of the treated plants. continuous use damge the soil structure by using, the source of organic compost present in distillery waste we can remove our dependence on the exhorbitantly priced inorganic fertilizers and side by side we can also reduce the expansion on chemical fartilizers.

Yasser *et al* (2013) observed that the steady the effect of waste water effluent growth of Chinese cabbage & corn. The bio mass (total fresh weight of plant was used & an indicator of plant growth which was higher in treated plant Soil analyses also showed grater changes in soil Properties due to irrigation with effluent. The interesting out come to this studies that the effluent is effective source of Plant Nutrients. It is increasing to reuse effluent in agriculture System after effluent.

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