EFFECT OF DAIRY EFFLUENTS ON EARLY SEEDLING GROWTH OF PENNISETUM TYPHOIDES(L)

Goutam Bhakta
Research Scholar,
CMJ University, Meghalaya

ABSTRACT

With the growing industrialization and urbanization environment degradation has now become challenging global problem. Among the industries food processing industrial effluents released from the dairy industries are rich in various kinds of nutrients like phosphate, Calcium, Nitrogen, Magnesium etc. and has good potential in utilization of released effluents as source of nutrients for the crop plants. To study the effect of dairy effluents on early seedling growth of Pennisetum typhoides (L). different parameters like i) Plumule and redicle ratio, ii) Fresh wt. and dry wt of germinated seeds, iii) Height of the stem, iv) Fresh wt. and dry wt. of stem, v) Root length, vi) no of leaves, vii) internodal length etc, of plants under various concentrations of milk plant effluent in compost rich and compost free soil are taken. The vegetative growth of pearl millet increases with the increase in concentration of effluent upto 80 percent decreases when irrigated with 100. conc. of effluent,

Key Words :- *Pearl millet, seedling vegetative growth, dairy effluent.*

INTRODUCTION

Pearl millet, Pennisetum typhoides (L) is the basic staple for households in the poorest countries and among poorest people because of having high protein and high fact content Chemical fertilizer and industrialisation cause great hazards to the crop field, but dairy effluents released from milk plant due to presence of varied groups of chemical compounds including nutrients like phosphate, magnesium, calcium etc. help in soil fertility and would also increase productivity of the land. The study related to effect of dairy effluents on early seedling growth of Pennisetum typhoides (L) is of great emphasis.

MATERIAL METHODS

For studying physico-chemical analysis of soil collected from Balsamand area, Hisar air dried soil samples passing through 2.0 mm sieve were used, ph, electriacal conductivity, calcium carbonate, organic carbon, nitrogen, phosphorous, potassium estimation are done and for physico-chemical analysis of dairy effluents released from milk plant, sirsa, Haryana, Ph, electrical conductivity, total dissolved solids, calcium, magnesium, sulphate, phosphate, chloride, BOD, COD are done. To carry out the effect dairy effluents on early seedling growth first twenty seeds sterilized in $HgCl_2$ for 2 minutes were soared in water in a beaker for 8 hours. Total thirty six earthen pots (18 for compost soil and 18 for without compost each filled with 2.0 kg soil numbering with 1, 2, 3 .....35,36 in each pot numbered 1-15, 100 gms vermicompost was also mixed thoroughly , then these pots were irrigated with different doses of effluent i, e control 20% , 40% , 60%, 80%, and

100% regularly up to 60 days. then different parameters of early seedling growth were observed and recorded minutely.

RESULTS AND DISCUSSIONS

Table 1 :

The height of stem (cm), under compost and without compost, of pearl millet as influenced by different concentrations of effluent

Concentrations	Height of Stem (cm)							
	Compost				Without Compost			
	15th	30th	45th	60th	15th	30th	45th	60th
	Day				Day			
Control	4.3	6.2	11.3	40.4	3.4	5.7	9.8	28.5
20%	4.3	5.8	11.8	42.2	3.1	6	10.6	39
40%	4.5	6.3	12.5	45.4	3.5	6.6	11.4	43.8
60%	4.6	6.3	13.1	47.4	4.0	7.0	12.2	47.2
80%	5.2	6.5	13.5	59	4.3	8.8	12.5	52
100%	3.1	4.9	10.7	38.5	3	5.5	8.8	26.7

The stem height of pearl millet was observed to be maximum at 80% concentration of effluent under both compost (59cm) and without compost (52cm) after 60 days of sowing.

Table 2

The fresh weight and dry weight of stem (gm), under compost and without compost, of pearl millet as influenced by different concentrations of effluent.

Concentrations	Stem			
	With Compost		Without Compost	
	Fresh Wt. (gm)	Dry Wt. (gm)	Fresh Wt. (gm)	Dry Wt. (gm)
Control	31	5	12	2.2
20%	36.2	4.2	18.6	2.7
40%	41.6	5	19	2.7
60%	51.6	5.3	21.1	2.9
80%	54	6.8	22.5	3.6
100%	30	4	11.5	2.0

The fresh wt. and dry wt. stem of pearl millet were observed to be maximum at 80% concentration of effluent under both compost (fresh wt =54 gm, dry wt. = 6.8 gm) and without compost (fresh wt = 22.5 gm, dry wt. = 3.6 gm) and were observed to be minimum at 100% conc. of effluent under both compost (fresh wt = 3. gm dry wt. 4gm) and without compost (fresh wt 11.5 gm, dry wt. = 2.0 gm)

Table 3

The root length (cm), under compost and without compost, of pearl millet as influenced by different concentrations of effluent, after 60 days of sowing.

Concentrations	Root length (cm)	
	Compost	Without Compost
Control	36.8	37.8
20%	38.2	38
40%	40	38.5
60%	41.2	39.2
80%	42.4	40.1
100%	39.6	36.9

The root length was observed to be maximum at 80% concentration of effluent under both with compost (root length 42.4 com) and without compost (root length =40.1 cmm) and, minimum at control (36.8 cm) under with compost where as in case of without compost the minimum root length (36.9 am) was observed at 100% con of effluent.

Table 4

The fresh weight and dry weight of root (gm), under compost and without compost, of pearl millet as influenced by different concentrations of effluent, after 60 days of sowing.

Concentrations	Root			
	With Compost		Without Compost	
	Fresh Wt. (gm)	Dry Wt. (gm)	Fresh Wt. (gm)	Dry Wt. (gm)
Control	2.2	1.09	1.06	0.57
20%	2.74	1.15	1.11	0.59
40%	3.21	1.17	1.56	0.64
60%	3.7	1.23	1.72	0.8
80%	5.80	1.66	1.80	0.88
100%	2.20	1.03	0.95	0.55

Fresh wt. and dry wt. root were observed to be maximum at 80 percent con. of effluent both compost (fresh = 5.80gm, dry wt. = 1.66 gm) and without compost (fresh wt. = 1.80 gm. dry wt. =.88), minimum at 100 percent con. of effluent under both with compost (fresh wt = 2.20 gm. dry wt. = 1.03 gm), without compost (fresh wt = .95 gm, dry wt. = .55 gm).

Table 5

The number of leaves, under compost and without compost, of pearl millet as influenced by different concentrations of effluent.

Concentrations	No. of leaves							
	Compost				Without Compost			
	15^{th}	30^{th}	45^{th}	60^{th}	15^{th}	30^{th}	45^{th}	60^{th}
	Day				Day			
Control	4	4	6	8	3	4	5	7
20%	3	4	6	9	3	4	6	8
40%	4	4	7	9	3	4	6	8
60%	4	4	7	10	3	3	6	8
80%	3	4	7	11	3	4	7	9
100%	3	4	6	7	3	4	5	6

Number of leaves was observed to be maximum at 80 percent conc. of effluent under both with compost (11) and without compost (9), minimum at 100 percent conc. of effluent under both with compost (7), without compost (6).

Table 6

The collar diameter of stem (cm), under compost and without compost, of pearl millet as influenced by different concentrations of effluent.

Concentrations	Collar Diameter (cm)							
	Compost				Without Compost			
	15th	30th	45th	60th	15th	30th	45th	60th
	Day				Day			
Control	1.06	1.60	2.3	4	1.02	1.36	1.77	2.84
20%	1.10	1.61	2.76	3.92	0.84	1.34	1.9	2.6
40%	1.13	1.63	2.75	3.84	0.86	1.38	1.96	2.70
60%	1.2	1.60	2.74	3.77	0.8	1.38	1.95	2.58
80%	0.93	1.34	2.70	3.70	0.88	1.4	2	2.51
100%	0.95	1.33	2.65	3	0.97	1.43	1.6	2.36

Collar diameter of stem observed to be maximum at control treatment under both with compost (4cm) and without compost (2.84 cm) after 60days of sowing, minimum at 100conc of effluent both with compost (3.0cm) without compost (2.36cm) after 60 days of sowing.

7.(a)

Internodal lengths (cm) of pearl millet as influenced by different concentrations of effluent, after 60 days of sowing (compost)

Concentration	Internodal length (cm) (Compost)									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Control	4.34	6.5	9.34	8.67	8.2	6.9	6.2	4.2		
20%	1.93	4.3	5.40	6.65	5.86	4.58	2.53	0.8	2.2	
40%	3.63	8.53	9.6	9.25	8.84	7.92	6.06	2.32	1.8	
60%	1.97	6.46	7.70	7.65	7.59	6.44	5.04	4.2	0.5	
80%	4.07	8.66	10.28	10.45	9.10	8.16	7.38	4.06	2.4	1.8
100%	5.20	8.24	8.16	8.04	8.17	6.70	5.2	4.2		

7.(b)

Internodal lengths (cm) of pearl millet as influenced by different concentrations of effluent, after 60 days of sowing (without compost)

Concentration	Internodal length (cm) (Without Compost)									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Control	2.36	3.28	4.06	4.2	4.54	3.2	5.94			
20%	1.5	6.12	7.04	7.18	7.39	6.4	4.09	5.34	2.6	
40%	3.82	6.14	8.3	8.16	5.05	4.2	5.72	3.6	2.3	
60%	5.44	6.86	7.16	8.14	9.35	8.36	8.16	7.1		
80%	3.96	7.95	8.72	10.44	9.59	6.8	6.34	2.2	8.2	
100%	1.66	3.90	4.14	6.69	4.99	2.75	2.2			

In case of compost, the minimum internodal length was recorded 20 percent conc. of effluent and in case of without compost minimum internodal length was recorded with control treatment where as maximum at 80% conc. of effluent under both compost and without compost

CONCLUSION

Pearl millet crop irrigated with 100 percent concentration of effluent i, e effluent without dilution causes decrease in vegetative growth in comparison to control condition due to presence of sulphate and phosphate in the effluent. Vegetative growth increases with the increase in concentration of effluent upto 80 percent.

REFERENCES

Aggarwal, R.K., Sharma, B.M. and Kumar, P. (1989). Potential use of fly ash for improving physico- chemical properties of sandy soils. Int. Symposium Managing Sandy Soils. Part – I: 133-138.

Baruah, B.K. and Dass, M. (1998). Study the impacts of paper mill effluent on germination behavior and seedling growth of crop plant Oryza sativa L. Pollution Resources,17(1): 65-68.

Dutta, S.K., Boissya, C.L. (1997). Effect of paper mill effluent on germinations of rice seed (Oryza sativa L. var. Masuri) and growth behaviour of its seedlings. J Indl Polln Contl, 13(1), 41-47.

Prasanna Kumar, P.G., Pandit, B.R., Mahesh Kumar, R. (1997). Effect of dairy effluent on seed germination, seedling growth and pigment content of green gram (Phaseolus aureus L.) and black gram (Phaseolus mango L.). Adv Plant Sci, 10(1), 129-136.

Ramana, S., Biswas, A.K., Kundu, S., Yadav, R.B.R. (2002) Effect of distillery effluent on seed germination in some vegetable crops. Bioresource Technology, 82, 273-275.

S. Arora, A.K. Chopra et al (2005). Physicochemical and bacteriological characteristics of Aachal Dairy milk effluent and its effects on seed germination of some agricultural crops. Nature, Environment and Pollution Technology. 4(3): 441-444.

Singh, Anoop, Agrawal, S.B., Rai, J.P.N., Singh, Pratibha (2002). Assessment of the pulp and paper mill effluent on growth, yield and nutrient quality of wheat (Triticum aestivum L.). J Environ Bio, 28(3), 283-288.

Singh, G. and Gupta, S.K. (1989). Potentiality of fly ash in augmenting the physico- chemical properties of sandy soils for improved crop- production. Int. Symposium Managing Sandy Soils Part I. 142-145.

Singh, Lamabam P., Siddiqui, Zaki A. (2003). Effects of fly ash and Helminthosporium oryzae on growth and yield of three cultivars of rice. Bioresource Techno, 86(1), 73-78.

Yadav, J.P. and Minakshi (2006). Effect of sugar mill and milk plant effluent on the seed germination and early seedling growth of agricultural crops. Pollution Resources 25(4): 701-705.

Young, J.C., Boumann, E.R. and Dannyal, V. (1975). Packed bed reactors for secondary effluent BOD and ammonia removal. J. Wat. Pollut. Control Fed., 47, 46.