



**EFFECT OF DAIRY EFFLUENTS ON SEED GERMINATION AND EARLY SEEDLING GROWTH OF *Pennisetum typhoides*(L) IN CONTAI BLOCK AREA, PURBA MEDINIPUR, WEST BENGAL**

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**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 seed germination and early seedling growth of *Pennisetum typhoides* (L). different parameters like i) Plumule and radicle 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 germination percentage of pearl millet decreased as the concentration of effluent increased. 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, germination 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 fat 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. For this studies related to seed germination were carried out to check the viability of seeds. In my present work I hope the Investigation the germination percentage

of pearl millet seed along with radicle plumule length and also the fresh weight and dry weight of germinated seedlings, and early seedling growth of *Pennisetum typhoides*(L) are of great emphasis.

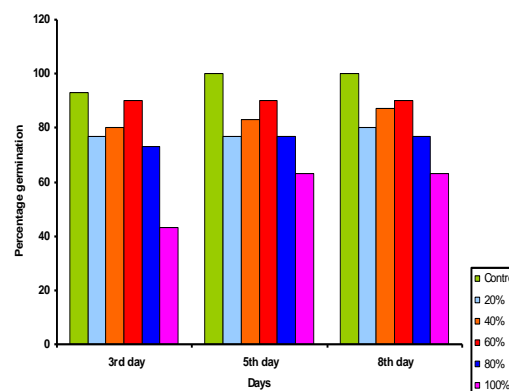
**Material methods :-** For studying physico-chemical analysis of dairy effluents released from milk plant, Contai, West Bengal, Ph, electrical conductivity, total dissolved solids, calcium, magnesium, sulphate, phosphate, chloride, BOD, COD are estimated. To carry out the effect of dairy effluent seed germination experiments first to check the viability of seeds. For this twenty

seeds of pearl millet were soaked in water taken in a beaker for 30 minutes. After that these seeds were placed on double layered water soaked filter paper placed in petri plates. The covered petriplates were kept in BOD at  $25 \pm 1^\circ\text{C}$  for 3 days. After 3 days, first observation was done for their viability; secondly to study the effect the effect of various concentrations of effluents (20%, 40%, 60%, 80%, 100% and control) of milk plant on seed germination percentage, first all seeds of pearl millet sterilized in  $\text{HgCl}_2$  for 2 minutes. Eighteen petriplates (for six setups in multiple of three) were used. At one time ten seeds were taken on double folds of whattman no. 1 filter paper for every petriplate and were supplied with different dose of effluents in controlled condition at  $25 \pm 1^\circ\text{C}$  in seed germination for the experimental period 1–8 days Reading were taken after. 3rd day, 5th day and 8th day. On 8th day radical and plumule lengths were noted and radical / plumule ratio was derived; dry and fresh wt of germinated seedlings were estimated. To carry out the effect dairy effluents on early seedling growth first twenty seeds sterilized in  $\text{HgCl}_2$  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 Discussion:-

### Bar 1.

#### RESULTS OF SEED GERMINATION EXPERIMENT



The germination percentage of pearl millet decreased as the concentration of effluent increased (Fig.: 4.3.1).The maximum germination percentage i.e. 100 per cent was observed under control and minimum i.e. 63.3 per cent was observed under 100 per cent concentration of effluent on 8<sup>th</sup> day of germination. The percentage of seed germination increased up to 60 per cent concentration of effluent. The percentage of seed germination at 20 per cent concentration of effluent was found to be 80 per cent and at 60 per cent concentration it was found to be 90 per cent. The similar observations were recorded by (Gautam et al., 1992; Arora et al., 2005; Ajmal et al., 1984). The viability of the seeds was recorded to be 100 percent.

**Table 1.**

Effect of different concentrations of dairy/ milk plant effluent on the plumule length and radical length(cm) of germinated seedlings of pearl millet after 8 days.

Concentration	Length of Plumule (cm)	Length of Radicle (cm)	Plumule : Radicle Ratio
Control	5.2	16.2	0.32
20%	5.3	16.4	0.32
40%	6	17.3	0.35
60%	6.5	18.3	0.35
80%	3.4	12.5	0.27
100%	1.3	4.9	0.26

Plumule radicle ratio was recorded maximum i.e. 0.35 at 40 percent & 60 percent conc. of effluent and minimum i.e. .26 at 100 percent effluent.

**Table 2**

Effect of different concentrations of dairy/ milk plant effluent on the fresh weight and dry weight(gm) of germinated seedlings of pearl millet after 8 days.

Concentrations	Fresh wt. of germinated seedlings (gm)	Dry wt. of germinated seedlings (gm)
Control	1.291	0.109
20%	1.319	0.119
40%	1.411	0.127
60%	1.450	0.138
80%	0.954	0.089
100%	0.540	0.047

The fresh wt. and dry wt. of germinated seedling of pearl millet were observed to be minimum i.e. 0.540 gm and .047 gm respectively at 100 percent concentration; and to be maximum i.e. 1.450 gm and 0.138 gm respectively at 60 percent con. of effluent.

**Table 3 :**

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			
	15 <sup>th</sup>	30 <sup>th</sup>	45 <sup>th</sup>	60 <sup>th</sup>	15 <sup>th</sup>	30 <sup>th</sup>	45 <sup>th</sup>	60 <sup>th</sup>
	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 4**

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 5**

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 6**

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 7**

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 <sup>th</sup>	30 <sup>th</sup>	45 <sup>th</sup>	60 <sup>th</sup>	15 <sup>th</sup>	30 <sup>th</sup>	45 <sup>th</sup>	60 <sup>th</sup>
	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 8**

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			
	15 <sup>th</sup>	30 <sup>th</sup>	45 <sup>th</sup>	60 <sup>th</sup>	15 <sup>th</sup>	30 <sup>th</sup>	45 <sup>th</sup>	60 <sup>th</sup>
	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.

**9.(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)									
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>	8 <sup>th</sup>	9 <sup>th</sup>	10 <sup>th</sup>
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		

**9.(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)									
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>	8 <sup>th</sup>	9 <sup>th</sup>	10 <sup>th</sup>
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:** It is concluded that a) germination percentage of pearl millet decreased as the concentration of effluent increased i.e. i) 100 percent germination was observed under control and minimum under 100 percent concentration of effluent. ii) Plumule radicle ratio was recorded maximum at 40 percent and 60 percent and minimum at 100 percent concentration of effluents. iii) Fresh wt. and dry wt. of germinated seeding of pearl millet also increased as the conc. of effluent increased upto 60 percent and decreased upto 100 percent conc. of effluent.

b) 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.

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