EFFECT OF CHLOR-ALKALI PLANT EFFLUENT ON SEED GERMINATION AND EARLY GROWTH PERFORMANCE OF SOYABEAN, TOMATO AND METHIE

DR. MANORAMA GUPTA, DASHMEET KAUR ARORA

Chh. Govt. P. G. College, Panna

AND

DR. S. P. SINGH, KUM. SHWETA SINGH BAGHEL

Govt. Girls College, Shahdol

RECEIVED : 30 December, 2016

Effect of chlor-alkali plant effluent was studied on the seed germination and early growth performance of Soyabean (glycine max), tomato (Lycopersicum esculentum) and methie (Trigonella foinum-graecum) seeds. It was found that chlor-alkali plants are highly deleterious for germination and early growth performance of seeds as compared to control germination.

Co-efficient of co-relation ® was calculated between the germination, early growth performance and increasing concentration of effluent. All the values showed negative co-relation. The relative toxicity of the effluent to all the seeds was as follows: 10% < 25% < 45% < 65% < 85% <100%.

KEYWORDS : Chlor-alkali plant effluent growth performance of seeds- soyabean, tomato, methie, co-relation etc.

INTRODUCTION

Industrial effluent pollution has received considerable attention. Its effect on seed germination, growth performance and physiology of various organisms has been investigated (S.P. Singh and R.K. Shrivastava 1995, K. C. Mathur 1984, Oblisami 1979). The present study attempts to find out the effect of chlor-alkali plant effluent on seed germination and early growth performance of seeds of soyabean, tomato and methie.

Materials and methodology

Chlor-alkali plant effluent was collected from 3 different sampling stations and analysed for physics-chemical characteristics. Chlor-alkali plant effluent is turbid white and highly alkaline.

Healthy seeds of above mentioned plants were soaked separately in the chlor-alkali plant effluent solutions (10%, 25%, 45%, 65%, 85%, and 100%, along with the control for the whole night.

25 ml of each solution mentioned above were used to soak the filter paper in each of the neat and clean petridish. Triplicate sets of petridish for each solution were prepared. The seeds

were spread at the rate of 25 per petridish, 75 seeds of each species were tested for each concentration. Control germination was also run simultaneously.

From the third day of sowing the seeds, the germination was studied and was carried out upto 70 days. Average percentage of five-day germination was taken for discussion.

Discussion

In Glycine max, the percentage germination from 10 to 100% effluent as inhibited when compared with controlled 93%. Percentage germination decreases from 55% to 10% with the increase of the concentration of the effluent from 10% to 100%.

Singh, A.K. *et al*. (1996), Singh K. *et al*. (2011) found very similar results when they treated Glycine Max seeds with chlor-alkali plant effluent.

In Lycopersicum esculentum, the percentage germination from 10 to 100% effluent was inhibited when compared with controlled germination 87%. Percentage germination decreases from 44.2% to 13.2% with the increase of the concentration of the effluent from 10% to 100%.

Rajaram and oblisami (1979) have observed similar effects when treated Lycopersicum esculentum seeds with paper mill effluent.

Singh, S.P. (1995) had observed very similar effects, when Lycopersicum Esculentum seeds were treated with paper mill effluent. Gupta *et al*. (2016) had also observed same results on treating Lycopersicum Esculentum seeds with paper mill effluent.

In Trigonella foinum-graecum, the percentage germination from 10% to 100% effluent was also inhibited when compared with controlled germination 95%. The percentage germination decreases from 59% to 9% with the increase of the concentration of the effluent from 10% to 100%.

Mhatree and Chaphekar (1982) observed same effect on treating Trigonella foenum Graecum with polluted water. Singh, S.P. (1995) observed same results on treating Methie seeds with paper mill effluent. Kumar *et al*. (2010) observed same result on treating Methie seeds with polluted water.

Table 1. Percentage of seed germination of selected plants species under stress experimental condition of chlor-alkali plant effluent.

% of chlor-alkali plant effluent	Glycine Max Days					Lycopersicum Esculentum Days					Trigonella Foinum-Graecum Days				
	3	4	5	6	7	3	4	5	6	7	3	4	5	6	7
10	35	35	45	65	75	37	39	45	50	50	55	60	60	60	60
25	30	31	42	55	55	35	38	39	45	45	52	52	52	52	52
45	26	26	40	48	48	30	30	35	35	35	40	40	40	40	40
65	20	20	25	25	25	23	23	24	24	24	25	25	25	25	25
85	15	15	15	15	15	18	18	20	20	20	18	18	18	18	18
100	10	10	10	10	10	12	12	14	14	14	9	9	9	9	9
Control	85	95	95	95	95	80	85	90	90	90	95	95	95	95	95

Table 2. Average Percentage germination of seedlings

% of chlor-alkali plant effluent	Glycine Max	Lycopersicum Esculentum	Trigonella Foinum-Graecum
10	55	44.2	59
25	42.6	40.4	52
45	37.2	33	40
65	23	23.6	25
85	15	19.2	18
100	10	13.2	9
Control	93	87	95

Conclusion

In all the species, the percentage germination has almost decreased with increasing percentage concentration of the effluent.

The chlor-alkali plant effluent has a higher C.O.D. value; seeds require higher oxygen tension for germination. Due to highest C.O.D. value, oxygen tension is very low causing low percentage of germination. By increasing percentage concentration of the effluent, the oxygen tension further goes down resulting low percentage of germination. Seeds required an active aerobic oxidation system for germination due to higher C.O.D. value and hence percentage germination also decreases.

References

1. Singh, S.P., "Bio-chemical studies on effect of Paper Mill effluent", *Ph.D. Thesis* (1995).
2. Shrivastava, R.K., "Effect of Paper Mill effluents on seed germination and early growth performance of radish and onion", *J. Ecotoxical. Environment. Monit*., **1**, 13-18 (1991).
3. Rajanan, G. and Oblisamy, "Effect of paper factory effluent on soil and crop plant", *Indian J. Environment Hith*., **21**, 120-130 (1979).
4. Agrawal, R. Sahai, Khosla, N., "Effect of fertilizer factory effluent on seed germination, seedling growth and chlorophyll contents of phaseolus radiantus", *L. Trop. Eco.*, **20**, 155-162 (1979).
5. Singh, D.K., "Effect of distillery effluent on some germination parameters of certain legumes", *Scie Environ.*, **5**, 61-69 (1982).
6. Ajmal, M. and Khan, A., "Effect of textile factory effluent on soil and crop plants", **31**, 131-148 (1985).
7. Ajmal, M. and Khan, A., "Effect of sugar factory effluent on crop plants", *Environ. Pollu.*, **30**, 135-141 (1983).
8. Singh, K., *et. al.*, Accumulation and translocation of heavy metal in soil and plants from fly ash contaminated area, *J. of Envi. Biol*., **31**, 421-430.
9. Gupta, Akhil, Singh, Aprajita, Pathak, J.K. and Tripathi, Anamika, Toxicity and Ferti-irrigation Assessment of Paper Mill effluent on Agronomic characteristics of Black Gram, *Asian J. Adv. Basic Sci.*, **4 (2)**, 01-07 (2016).
10. Singh, A.K. *et. al.*, Performance of several crops grown in fly ash amended soil (WOCA) conference.

11. Mahatre, G.N. and Chaphekar, S.B., "Effect of heavy metals on seed germination and early growth, *I. Environmental Bot.*, **3 (2)**, 53-63 (1982).
12. Kumar, V., Chopra, A.K., "Fertilization effect of distillery effluent on agronomical practices of Trigonella Foenum – graecum L. (Fenugreek), *Environ Monit Assess*, **184 (3)**, 1207-1219 doc : 10 1007/S 10661 – 011 – 2033-7 (2010).

❑