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Soil Irrigation Effect of Thermal Power Plant Effluent on Biochemical Changes of *Pisum sativum* L.

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ABSTRACT

The present study has been carried out to see the effect of thermal power plant effluent collected from discharge side of Ukai thermal power plant, on biochemical changes of *Pisum sativum* L. Study was conducted up to 20 days. Experiments were in triplicates. Biochemical parameters of different parts (leaf, stem & root) of plants were done at every 5th day. Experiments were done using different concentrations of thermal power plant effluent like 20%, 50%, 80% & 100% as well as control for comparisons. Tap water was used as a control. Chlorophyll content (chlorophyll a, chlorophyll b & total chlorophyll) was recorded highest at lower concentration of effluent. Other biochemical parameters such as protein & carbohydrate content also recorded highest at lower concentration of the effluent. The study reveals that the biochemical content of different parts of plants gradually declined with the increasing concentration of the effluent. The study suggests that the effluent may be used for agricultural purposes if proper dilution is taken up.

Key words: Thermal power plant effluent, *Pisum sativum* L., Chlorophyll content, Biochemical content

I. INTRODUCTION

Industrialization is the important part for our morden civilization. But industries are also big threat for our environment, because it create the pollution in environment by their by products. Coal based thermal power plants are one of the major part of industrialization because it provide electricity for our day to day life.

Fly ash, bottom ash, effluent are the by product of coal based thermal power plants. Rest of that cement industries and brick industries use fly ash & bottom ash (I. Nwaz 2013). Fly ash & bottom ash is also used in road construction (Sharda Dhadse et al, 2007). Effluent directly drain in to the river or natural source of water. So it creates water pollution.

In lack of water many farmers use this effluent directly (Sajid Ali and Masood Alam, 2015). But lately it leads to the changes in soil nutrients, so some abnormalities were found on growth of plant like uneven maturity, excessive vegetative growth, weight and reduced yield (Jairajpuri Mariya et al, 2018). If the proper dilutions of effluent will used for irrigation it shows good results (Rawat et al., 2011).

So present study deals with the effect of different concentrations of thermal power plant effluent on biochemical changes (chlorophyll, protein & carbohydrate content) of seedlings of *Pisum sativum* L.

II. MATERIALS AND METHOD

Effluent samples were collected in plastic containers from discharge side of Ukai thermal power plant. It stored in refrigerator (4^{o}C) for future use. Seeds of *Pisum sativum* L. were collected from certified Hariyali agro, Chikhali. For better results uniformity of seeds were maintained.

Different concentrations of effluent like 20%, 50%, 80% & 100% were used for irrigation. Tap water was used as control. Studies were conducted up to 20 days and plants were uprooted on every 5th for estimation of biochemical parameters.

Chlorophyll content was estimated from leaf of seedling of Pisum sativum L. Chlorophyll estimation was done by Mac Kinney Method (Mac Kenney G., 1941). Protein and carbohydrate content were estimated from different parts like leaf, stem & root of seedlings of Pisum sativum L. For protein estimation Lowery's method was used (Lowry et al., 1951). Anthron method was used for carbohydrate estimation.

III. RESULTS AND DISCUSSION

Lower concentration of thermal power plant effluent shows good results on seedlings of *Pisum sativum* L. whereas with higher dosage of TPP effluent shows adverse effects on seedlings in compare to control. Like chlorophyll content was decreased when plants were treated with higher dosage of effluent because abnormalities like Chlorosis and necrosis were found. At lower dosage of TPP effluent no Chlorosis & necrosis were found i.e. at lower concentration of TPP effluent amount of chlorophyll was slightly higher in compare to control. Effects of thermal power effluent of changes of chlorophyll content of Pisum sativum L. is given in figure 1, 2 & 3.

Effects of protein content of different parts (leaf, stem & root) of *Pisum sativum* L. are given in figure 4, 5 & 6 respectively. The same results were found with protein & carbohydrate content that at lower concentration of TPP effluent protein & carbohydrate content was slightly higher and with higher concentrations protein & carbohydrate content was lower in compare to control. An effect of carbohydrate content of different parts of plants like leaf, stem & root of *Pisum sativum* L. are given in figure 7, 8 & 9.

Results of present investigation support with previous work of Raphanus sativus L. with effects of sugar mill effluent (Vijayaragavan M. et al., 2011). Biochemical parameters viz., chlorophyll, protein & carbohydrate content increased at lower concentration when paddy was treated with dairy effluent (Dhanam S., 2009). Increasing of chlorophyll content could be due to high nutrient uptake from lower concentration of dairy effluent (Nagda et al., 2006). When sunflower seedlings were irrigated with lower concentration of sago factory effluent, chlorophyll a, chlorophyll b & total chlorophyll content were increased (Ravi T. Mycin and M.Lenin, 2012). The extreme higher concentration of fly ash restricted the protein content but when it mix it with soil protein concentration was increased (Raval R., 2018). The carbohydrate content is decreased in *Brassica oleracea* L. with increased concentration of waste water (Bamniya B.R. et al., 2010).

It can be concluded that the effluent restrict the growth of plant, so it can suggested that effluent have to be diluted before it is used for irrigation. The effluent characteristics will became reduced and it good to reduce pollution level from environment. Lower concentration of effluent can be serving as a liquid fertilizer for the agricultural crops.

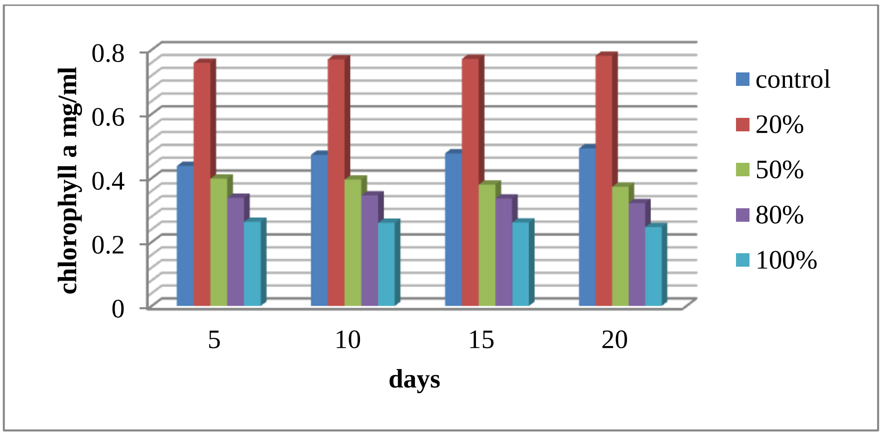

Figure 1. Effects of TPP effluent on chlorophyll a content of *Pisum sativum* L.

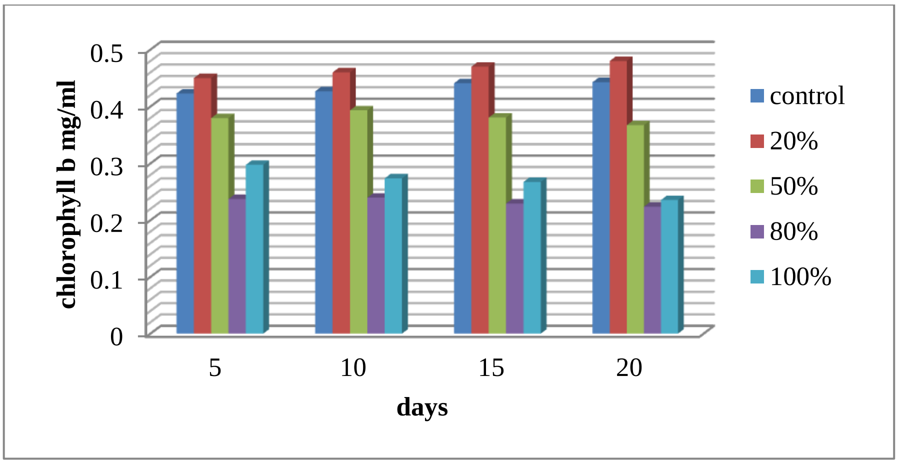

Figure 2. Effects of TPP effluent on chlorophyll b content of *Pisum sativum* L.

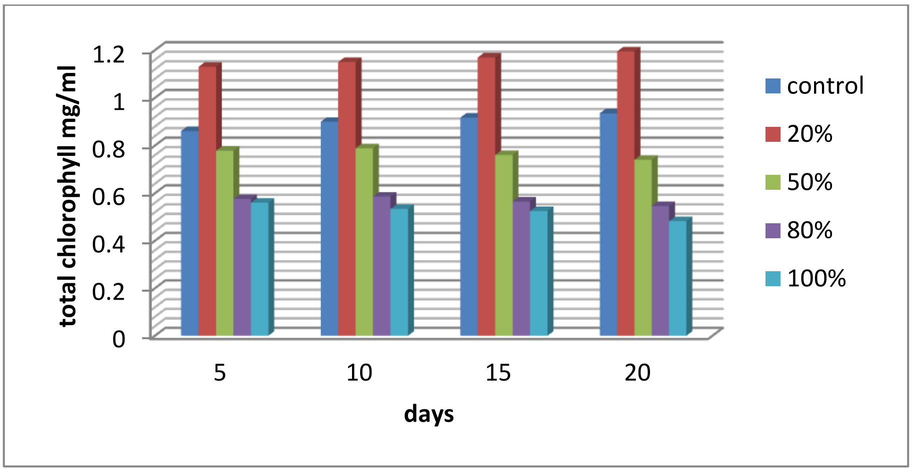

Figure 3. Effects of TPP effluent on total chlorophyll content of *Pisum sativum* L.

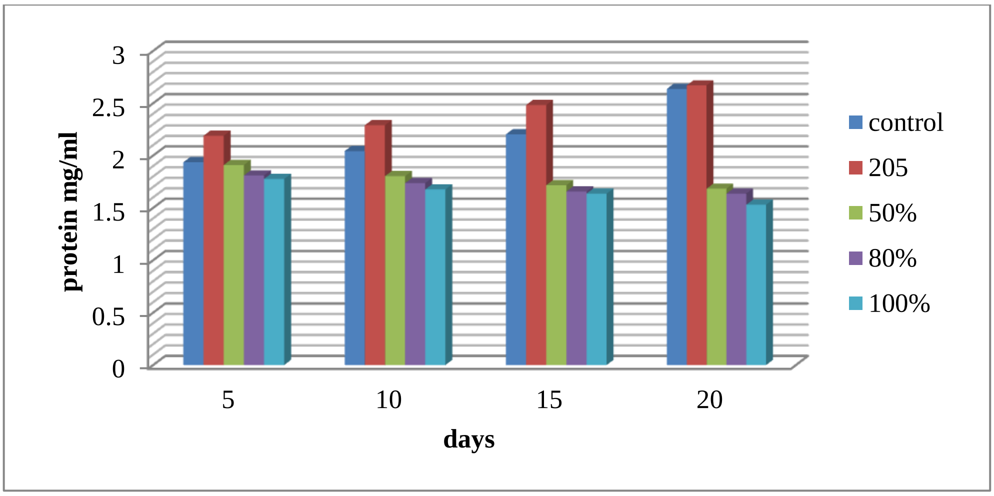

Figure 4. Effects of TPP effluent on protein content in leaf of *Pisum sativum* L.

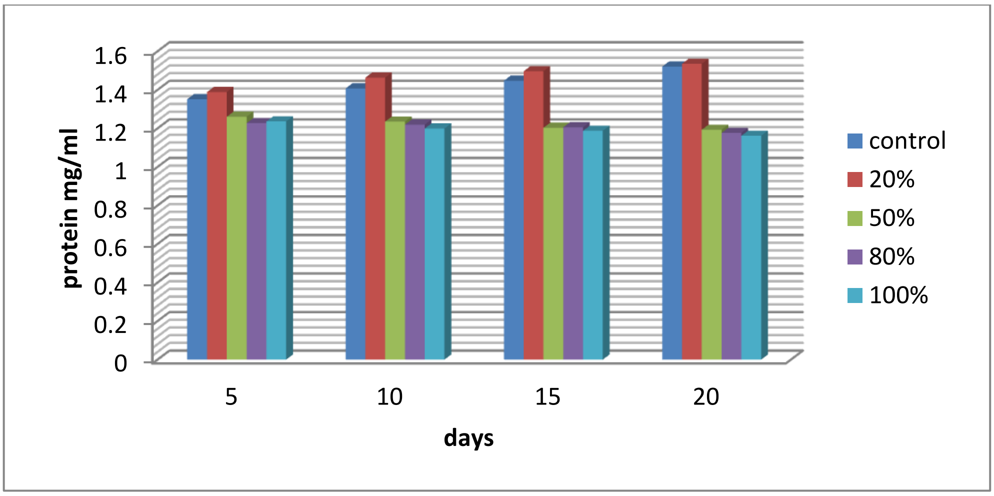

Figure 5. Effects of TPP effluent on protein content in stem of *Pisum sativum* L.

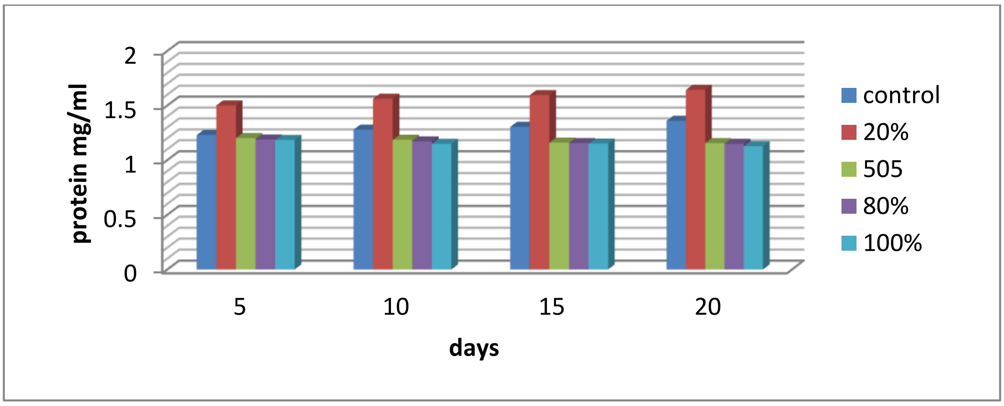

Figure 6. Effects of TPP effluent on protein content in root of *Pisum sativum* L.

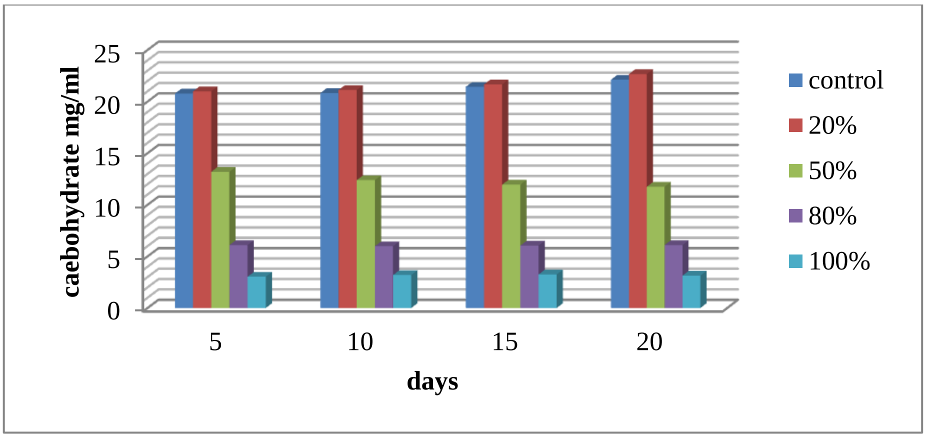

Figure 7. Effects of TPP effluent on carbohydrate content in leaf of *Pisum sativum* L.

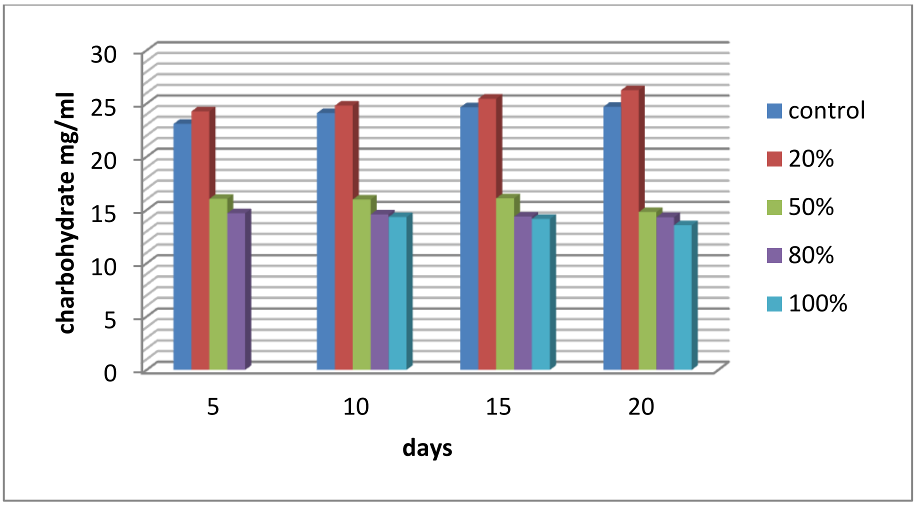

Figure 8. Effects of TPP effluent on carbohydrate content in stem of *Pisum sativum* L.

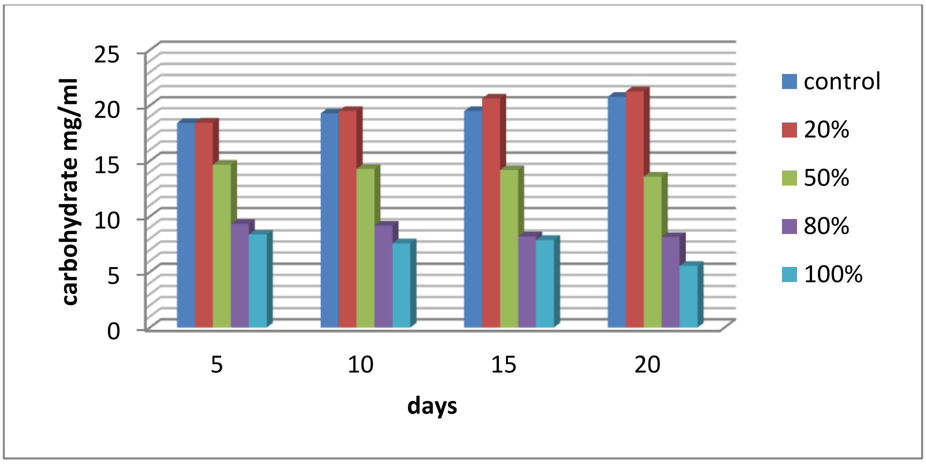

Figure 9. Effects of TPP effluent on carbohydrate content in root of *Pisum sativum* L.

IV. ACKNOWLEDGEMENT

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