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Research Article

EFFECTS OF THERMAL POWER PLANT EFFLUENT ON THE ROOT OF *PISUM SATIVUM* L.

Brijal Mistry* and Kailash Patel

Department of Bioscience, Veer Narmad South Gujarat University, Surat

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ABSTRACT

The present investigation has been carried out to see the effects of thermal power plant effluent on morphology and anatomy of root of *Pisum sativum* L. For irrigation of pea seedlings different concentrations (20%, 50%, 80%, and 100%) of thermal power plant effluent were used. Tap water was used as a control. Anatomy of root was done by hand section method. At higher concentrations of effluent abnormalities were found like browning of root, cell death were seen, loss of root hairs etc. where with lower dosage of effluent it was almost similar to control seedling i.e. no abnormalities were found with lower concentration of effluent.

INTRODUCTION

Directly or indirectly our morden civilization is based on industrialization. Coal based thermal power plants are one major part of industrialization because it produced electricity is the back bone of our morden life. Thermal power plant emits fly ash, bottom ash and effluent as their waste materials.

Utilization of fly ash & bottom ash was headache for thermal power plants but now a days fly ash & bottom ash is utilizes by cement industries as a row material for cement production (Dilip *et al*, 2014). Fly ash is also used in road construction for stabilizing and constructing base (Sharda *et al*, 2008). So, ways of utilization of fly ash and bottom ash are there but waste water of thermal power plant is directly discharge in to natural source of water. It affect on flora and fauna of aquatic life.

In scarcity of healthy water, this waste water is used by many farmers for irrigation (Sajid and Masood, 2015). Waste water of industries contains some heavy metals as well as having some macro and micro nutrients which shows beneficial effect on plant growth (Rawat *et al*, 2011). So use of waste water for irrigation purpose is the best step to overcome from scarcity of water (Medhi *et al*, 2008). A proper dilution of waste water is the beast alternative way of utilization of pollution.

MATERIALS & METHODOLOGY

Effluent samples were collected from discharge side of Ukai thermal power plant. Acid rinsed plastic containers were used for effluent collection. It store at 4ºC in refrigerator for further use. Standard method was used for effluent collection (APHA, 2005).

Plants were irrigated with different concentration of thermal power plant like 20%, 50%, 80% & 100%. Study was up to 30 days. For anatomical observation transverse sectioning of root of *Pisum sativum* L. were done by hand sectioning method. Then the sections were stained with safranine satin. Then slides were observed under Auxioscope A1.

RESULTS & DISCUSSION

Effects of different concentrations of thermal power plant effluent on root of *Pisum sativum* L. is given in figure 1. Normally tap root system was found in *Pisum sativum* L. When it was treated with higher concentrations of thermal power plant effluent development of tape root was restricted. With a lower dose of effluent roots are just similar to control i.e. no abnormalities were found.

In normal anatomy of root of seedlings of *Pisum sativum* L. triarch protoxylem with pith and normal root hair was found. When seedlings were irrigated with lower concentration of

Corresponding author:* **Brijal Mistry
Department of Bioscience, Veer Narmad South Gujarat University, Surat

thermal power plant effluent normal anatomy was seen. With the increasing of dosage of thermal power plant effluent abnormalities like loss of root hair, damaged epidermis layer, cell death etc. were found. Anatomy of root of seedlings of *Pisum sativum* is given in plate 1.

Figure 1 Effect of different concentrations of thermal power plant effluent on root of *Pisum sativum* L.

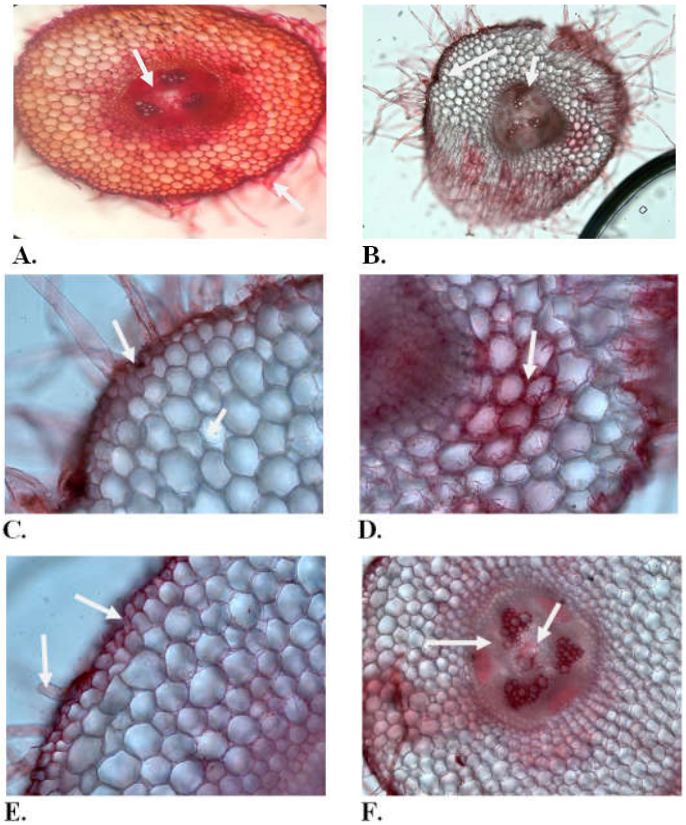

Plate 1 A. Triarch protoxylem with pith, root hairs are appear, cortical cells are normal. **B.** Some of the epidermis cells & cortex cells became brown in colour due to cell death. Still root hair appear. **C.** Tissue damage is there in epidermis layer. **D.** Ruptured wall of cortex cells & cells became brown in colour due to cell death. **E.** Epidermis layer is damage & loss of root hairs is also there. Papilla is found. **F.** Triach protoxylem with enlarge pith parenchyma, later lysogenus cavity will developed.

Similar results were found with A. hybridus, when A. hybridus treated with higher concentration of pharmaceutical effluent toxic effects were found like drastic reduction were found in number of parenchyma cells where as with lower concentration of same effluent proliferation of parenchyma cells were found (Clement *et al*, 2013). Reduced width of vessels in plants irrigated with industrial effluents has already been reported in Chenopodium album L. (Tyagi *et al*, 2012) and hyacinth. (Mahmood *et al*, 2005).

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