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Effect of Water from Different Sources on Oxidative Stress Parameters of *Trigonella foenum-graecum* (Fenugreek)

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Abstract: ***Soil contamination by different water sources is becoming a serious problem for irrigation purpose therefore the present work was done to know the impact of water from coalmines and boring on oxidative stress parameters of Trigonella foenumgraecum plants. River water was used as control. Peroxidase activity was significantly increased in both boring water and coalmine water as compared to control. Insignificant increase was observed in proline and MDA content in both source of water as compared to control. It was concluded from the present study that boring water and water from coal mine can be used for irrigation purpose without adversely affecting the growth.***

Keywords: Coalmine water, Malondialdehyde, Peroxidase, Proline, River water

1. Introduction

Today, soil contamination is an important environmental problem. Contamination causes due to wide range of inorganic or organic compounds like heavy metals, combustible and putrescible substances, hazardous wastes, explosives and petroleum products. Heavy metals are the major environmental contaminants and possess a severe threat to human and animal health by their long-term persistence in the environment (Subhashini *et al.* 2015). Remediation technologies are required to resolve the problem of soil contaminated with petroleum hydrocarbons, which are used by a variety of industries (Etsuko *et al*., 2007). Phytoremediation also called as botanical-bioremediation (Chaney *et al*., 1997) is an emerging technology which is cheaper, ecofriendly and safe alternative to conventional cleanup techniques.

2. Material and Methods

- **Seeds obtained from-** 121-122, BeejBhavan, Nandlalpura,Indore, M.P.452004.
- **Collection of water-** River water (Control): Kewai River, Kotma Colliery, M.P. 484336
  Boring water: 91-Janki Nagar-Ext. Indore, M.P. 452001
  Coalmine water: Filter Plant, Jamuna Colliery, M.P. 484444
- **Parameters studied:** The various parameters studied in this work are as follows-
- **Proline content**- proline was estimated using acid ninhydrin reagent following method of Bates *et al*., (1973).
- **Peroxidase activity-** It was estimated according to method of Summer *et al*., (1943) using O- dianisidine **.**
- **MDA content-** It was estimated using thiobarbituric acid reagent by the method of Health and Packer (1986).

3. Observations

Figure 1: Photograph showing 15 days old seedlings irrigated with Boring water

Figure 2: Photograph showing 15 days old seedlings irrigated with Kevai river water

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Figure 3: Photograph showing 15 days old seedlings irrigated with Coalmine water

Treatment	Proline (µM/g)	Peroxidase activity (Units/mg/g)	MDA (mM/gm)
River(control)	0.467±0.419	40.53±1.665	0.0006±0.0002
Boring	0.634±0.191 ^{NS}	76.5±9.48*	0.0007±0.0002 ^{NS}
Coalmine	0.709±0.045 ^{NS}	46.4±1.2*	0.0026±0.0038 ^{NS}

Values expressed are means ± standard deviation.
*Indicates $p<0.05$ and is significant.
^{NS} indicates $p> 0.05$ and is not significant.

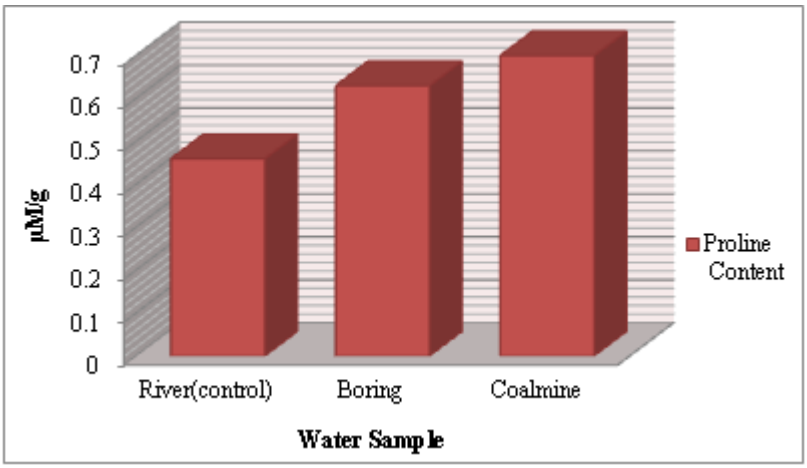

Figure 4: Effect of different sources of water on Proline content of *Trigonella foenumgraecum:*

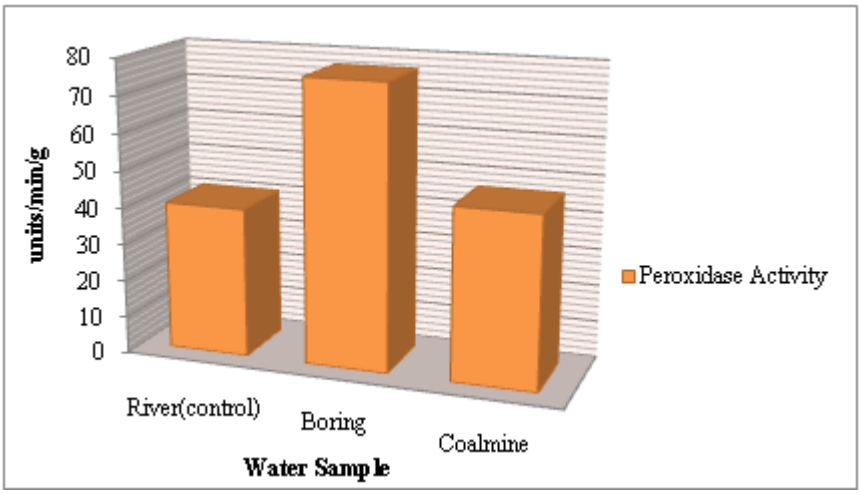

Figure 5: Effect on different sources of water on Peroxidase activity of *Trigonella foenumgraecum:*

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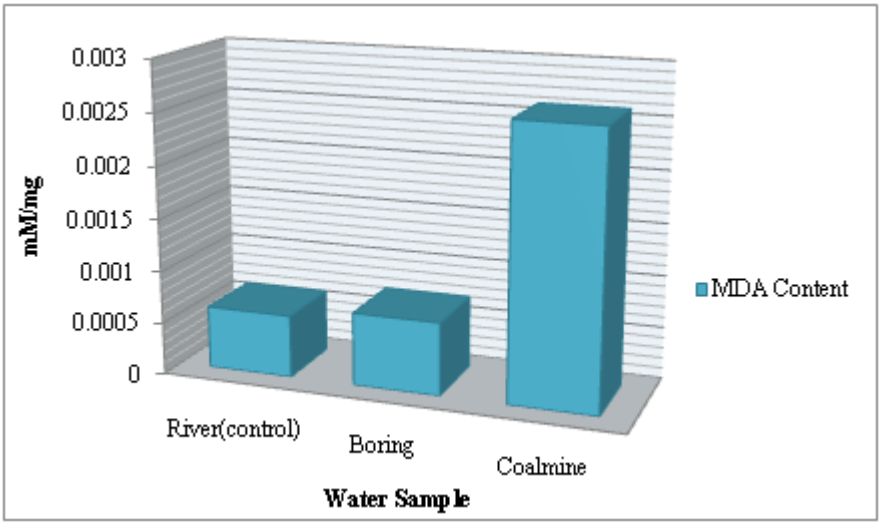

Figure 6: Effect on different sources of water on MDA content of *Trigonella foenumgraecum:*

4. Result and Discussion

Effect on Proline content:
Proline content was insignificantly increased in seedlings of *Trigonella foenumgraecum* irrigated with boring and coalmine water sources as compared to river water (control) . According to Mattioli *et al*., (2009) Proline is major component involved in synthesis of protein, and also in environmental stresses. Although a relationship between accumulation of proline and adaptation of plants against stress is still not clear. Hare and Cress, (1997) observed increase in proline content after stress condition which was beneficial for the plant cell.

Effect on peroxidase activity:
Peroxidase activity significantly increased in seedlings of *Trigonella foenumgraecum* irrigated with boring and coalmine water sources as compared to river water (control). The results of present study were in the agreement of findings of Singh *et. al.,* (2010) who concluded that peroxidase activity increases in plants grown at waste water irrigated sites as compared to those at ground water irrigated ones. Peroxidase enzyme is involved in defense system of plants against free radicals.

Effect on Malondialdehyde (MDA) level:
In present study Malondialdehyde (MDA) level were insignificantly increased in *Trigonella foenumgraecum* plants irrigated with boring and coalmine water source as compared to river (control). Singh and Agrawal (2010*)* showed that plants irrigated with waste water showed higher MDA concentration. Malondialdehyde (MDA) is a marker of lipid peroxidation caused by oxidative stress (Davey, 2005). This study was in agreement with the study of Del *et al.,* (2005) that peroxidation of lipid present in membrane is markers of oxidative stress. Heavy metals are known to induce generation of ROS and free radicals, which can cause peroxidation of lipid membrane leading to increased permeability and oxidative stress to the plants (Nada *et al*., 2007).

5. Conclusion

It was concluded from the present study that boring water and water from coalmine can be used for irrigation purpose without adversely affecting the growth.

6. Acknowledgement

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