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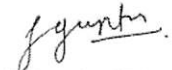
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# Effect of (Strontium) Alkaline Earth Metal on the Anatomical Aspect of *Lycopersicon Esculentum* Mill

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## ABSTRACT

An attempt has been made to study the accumulation of alkaline earth metal strontium in the plant *Lycopersicon esculentum* Mill., as bioaccumulation of this compound leads to various health risks. The study was conducted by treating the plant *Lycopersicon esculentum* Mill. with the chemical strontium chloride at four different concentrations- 100 $\mu$ M, 500 $\mu$ M, 1mM and 5mM and compared with the effect of distilled water. At the end of the study (80 days) it was observed that strontium at various concentrations were present in plants and degradation of vascular tissues.

**Keywords:** Strontium Chloride, *Lycopersicon Esculentum* Mill.

## 1. INTRODUCTION

Increasing pace of industrialization in public and private sectors along with urbanization, population explosion and green revolution are clearly reflected on varying degrees of pollution of water, soil and air. Quite a large amount of waste substances and energy are introduced in to the environment through several sources [3]. The soil contamination is primarily due to industrial waste disposal and secondarily by the water supplies within and underlying soil [7]. It finally leads to various health risks. A part of the strontium that is introduced by humans does not move into groundwater and stays within the soil for decades. Strontium concentrations in soil get increased by human activities, such as by the disposal of coal ash and incinerator ash, and industrial wastes. One of the reasons for soil pollution is due to alkaline metals. The chemicals find their way to the environment by affecting soil surface and are considered carcinogenic [6].

The agricultural plants from industrial areas have higher probability of strontium uptake. Crops get saturated with heavy metals and chemicals which are harmful to man and other organisms [8]. For children exceeded strontium uptake

may be a health risk, because it can cause problems with bone growth. When strontium uptake is extremely high, it can cause disruption of bone development. But this effect can only occur when strontium uptake is in thousands of ppm range. The present study aims at determining the effect of alkaline earth metal strontium chloride on anatomical character of *Lycopersicon esculentum* Mill.

## 2. MATERIALS AND METHODS

The pure and viable plant seeds were bought from Agricultural Technology Information Centre, Mannuthy, Thrissur and grown in polythene bags. Surface sterilized seeds were soaked for 24 hours in various concentrations of Strontium chloride. For control, distilled water was used. Seeds were placed on filter paper in sterilized petridishes for germination and moistened with 15 ml of different concentrations of Strontium chloride.

For anatomical studies, transverse sections of stem, leaf, root and petiole of *Lycopersicon esculentum* Mill. was taken with the help of sharp blade. The sections were stained in saffranin mounted in glycerin on a slide. Such sections were studied under the microscope. The anatomical features were observed

and recorded. The microphotographs of the sections were also taken. These parameters are noted down after 80 days of growth of plant under study.

### 3. RESULTS AND DISCUSSIONS

In the present study, it is evident that as the concentration of strontium chloride was increased, there is a decrease in growth, number of complex tissues and development of plant. For anatomical studies, the different plant parts like stem, root, leaves and petiole were taken and sections were analyzed under the microscope. Degradation of vascular tissues occurred due to the effects of strontium. In normal condition (control) plants shows good vigour, health and vascular tissues are abundant with water. Strontium not only disintegrated the vascular tissues but also it decreases the uptake of water and minerals. The inhibitory effect at higher concentrations might be due to excess of metals, which happens to be injurious to plant growth, affecting water absorption and other metabolic process in plants. It was proven by [4].

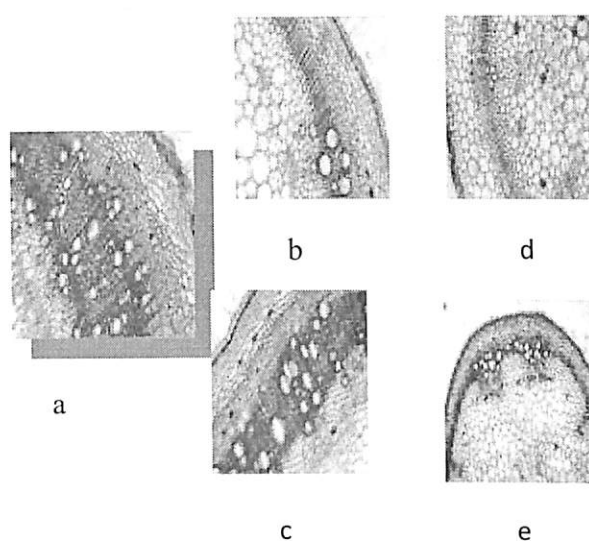
The study on anatomical features like transverse section of stem, root, leaves and petiole revealed increased numbers of complex tissues layers like xylem and phloem for controlled plants and decreased in plant treated with 5  $\mu\text{M}$  strontium chloride (Fig 1, 2, 3 & 4). From the present study it is clear that strontium chloride gets effect at different concentrations in stem, root, leaves and petiole of the plant- *Lycopersicon esculentum* Mill. Since this plant is used as a vegetable it is important to know the response of the plant to different concentrations of metal. Strontium chloride accumulation in stem, root, leaves and petiole were found to be at toxic level, which is harmful to human. Studies on effect of heavy metals Cadmium, Cobalt, Mercury and Lead in some members of Malvaceae [1], corn and soya beans support these findings [2, 5]. So vegetables are not advised to cultivate in polluted areas.

### 4. CONCLUSION

Even if lower concentrations of Strontium are used for enhancing the growth of the plants, it is harmful to humans as well as animals. It is imperative to have proper understanding of plant response and pollutant concentration relationship with environmental conditions to preserve our nature and natural resources. Disintegrated xylem forms, disturb transportation of

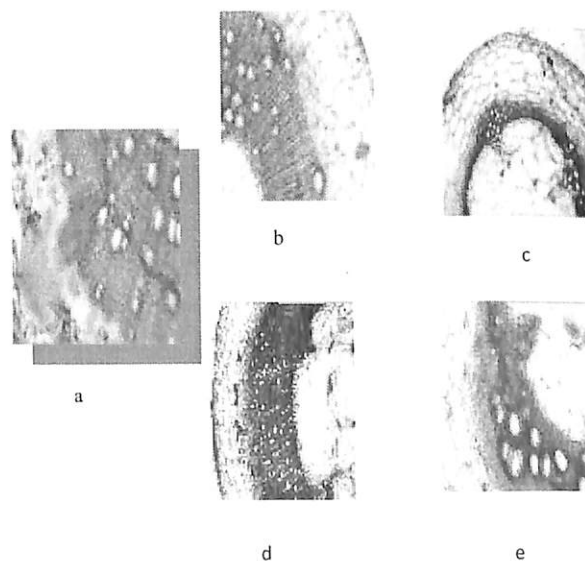
water, and dissolved mineral nutrients throughout the plant from the roots. The functions of phloem also partially prevent the transportation of sugars, proteins and minerals around the plant). So the plants become stunted in growth. In the present study, the Strontium accumulations in leaves were found to be at toxic level, which is harmful to humans. Since *Lycopersicon esculentum* Mill. is used as a vegetable, it is important to know the response of the plant to the heavy metal at different concentrations.

**Figure: 1** Effect of different concentration of Strontium chloride on Stem anatomy of *Lycopersicon esculentum* Mill.



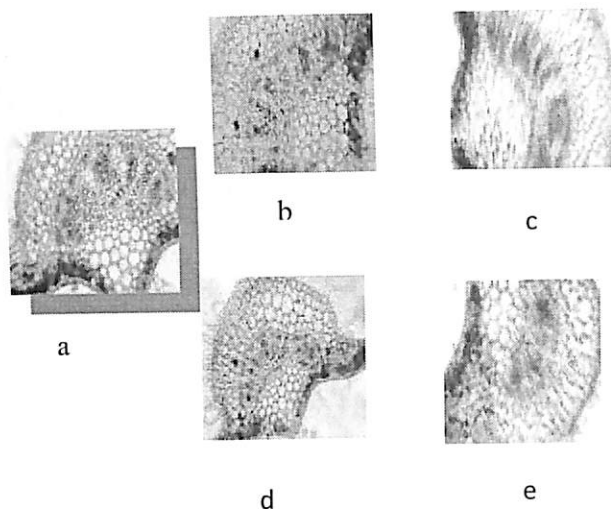
a – Control, b - 100 $\mu\text{M}$ , c – 500 $\mu\text{M}$ , d -1mM, e -5mM

**Figure: 2** Effect of different concentration of strontium chloride on Root anatomy of *Lycopersicon esculentum* Mill.



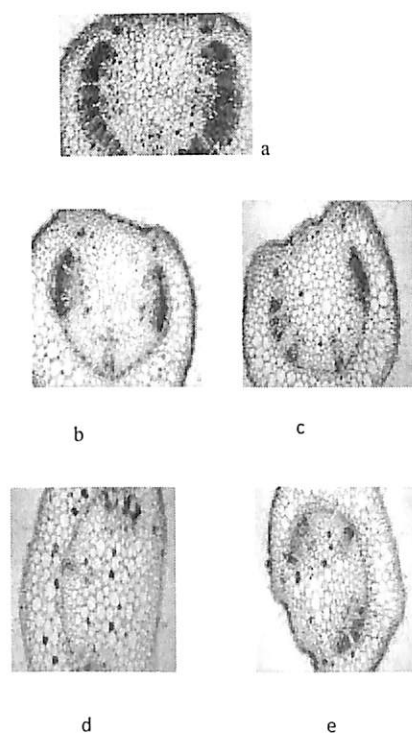
a – Control, b - 100 $\mu$ M, c – 500 $\mu$ M, d -1mM, e -5mM

**Figure: 3** Effect of different concentration of strontium chloride on Leaf anatomy of *Lycopersicon esculentum* Mill.



a – Control, b - 100 $\mu$ M, c – 500 $\mu$ M, d -1mM, e -5mM

**Figure: 4** Effect of different concentration of strontium chloride on Petiole anatomy of *Lycopersicon esculentum* Mill.



a – Control, b - 100 $\mu$ M, c – 500 $\mu$ M, d -1mM, e -5mM

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## 6. REFERENCE

- [1] Dutta Mitta, Sen Ali and Bhattacharya Sima, Effect of heavy metals Cobalt, Mercury and Cadmium on Malvacean family members, 1988; Env.Eco.,6 (2): 410-416 (10).
- [2] Jacobson and Hill, Effect of application of urea on plants, 1989; TMH publishers: 23-75.
- [3] Kabota Pandias, A. & Pandias, H.1992; Trace elements in soils and plants, ed.2, CRC Press, Boca Raton, London.
- [4] Karunyal Samuel, Renuga, G. and Palwal Kaliash, 1994; Effect of tannery effluents on seed germination, leaf area, biomass and mineral content of some plants. Bioresource Techno. 4(3), 215-218(8 ref).
- [5] Malone C Miller R and Koeppe D, Root growth in corn and soya beans: effects of cadmium and lead in lateral root initiation, 1977; J'Environ. Qual,25: 562- 566.
- [6] Reo,K.S, Srivastava, S And Shankar, S, 1998; Acute toxicity of relative textile dyes to egg and early life history stages of *Cyprinus carpio* Geobios. 15:111-113
- [7] Synder, C. 2005; The dirty work of promoting recycling of America's sewage sludge. Int. J. Occup. Environ. Health 11 (4) : 415-427.
- [8] Unnithan. R. V. and Remani. K. N, 2009; Organic pollution in Cochin backwaters. Ind .J. Mar. Sci 4:39-42.