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Original Research Article

Metal Toxicity in Radish Plant with Carotenoids, Chlorophylls Study Under Stress Condition's

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Abstract

Radish is consumed and cultivated globally and is reflected as a part of human-diet, although this root vegetable is not common in many populations. Different varieties of radish have the different soil and climate requirements for better growth and yield but the most beneficial and important agro-technique is nutrition for better performance. For better quality and optimal radish production, fertilization by organic, inorganic and bio-fertilizers are very important constituents. Other pharmaceutical uses of radish include treatment of chronic diarrhea, neuralgic-headache and sleeplessness. Toxicity of Ni in radish plant is confirmed by inhibition of growth, chlorosis, necrosis and wilting. This report based study conducted to investigate the biological, physiological effects of heavy metals on the radish. In this study it was noticed that nickle sulphate act as suppressor on growth of the plant and it also decreased the content of carotenoids and chlorophyll contents such as Chlorophyll-a, b. Statistical analysis was achieved after collection of data by using appropriate computer software such as ANOVA.

Keywords: Carotenoids, chlorophyll a, Chlorophyll b, radish, metals, toxicity, physiological features.

INTRODUCTION

Radish is an important and very prevalent root vegetable crop cultivated in the tropical, sub-tropical and in the temperate areas of world. Radish is cultivated both as an annual and the biennial root vegetable crop depends on the purpose of which it is cultivated. It is mainly a cool period crop. However, Asiatic kinds can withstand high temperatures than the varieties of Europe. In mild weather, it can be cultivated almost the whole year excluding few summer months [1, 2].

Eating vegetables aid in inhibiting of many diseases, therefore it is also called as protecting food. Vegetables are the richest, natural and inexpensive source of very protective food that provides fats, minerals, carbohydrates, vitamins and proteins [3]. According to the suggested diet proposal, vegetables feeding should be 300g per day/person. Out of these 300g, 125g the leafy-green-vegetables, 100g deep-rooted-vegetables and the 75g other included. During the metabolism in radish the enzyme myrosinase leads to the formation of isothiocyanates by enzymatic hydrolyses of glucosinolates. The cells of some plants also pretentious with the cancer due to the abnormal cells proliferation. Bacterial micro-flora, present in the colon of human, also exhibits same enzyme activity [4].

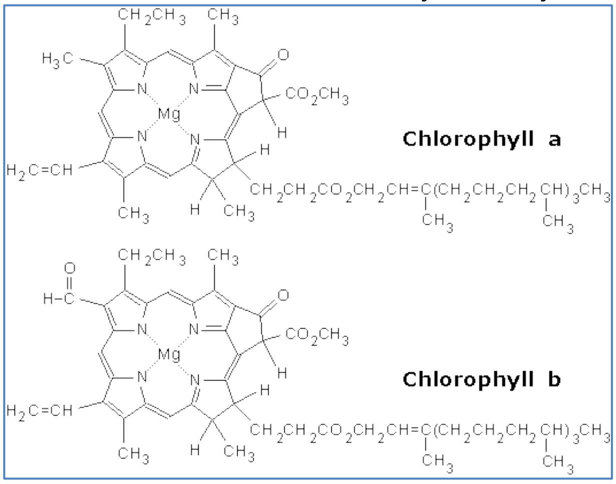

Fig-1: Shows the structures of chlorophyll a and b

Other pharmaceutical uses of radish include treatment of chronic diarrhea, neuralgic-headache and sleeplessness. The whitish color ash is obtained from the roots processing that act as a therapy for diuresis and constipation [10]. Leaves of Plants contain distinct pores that are called stomata. Endorsement of various heavy-metals by the plants change the mechanisms of growth by triggering secondary responses such as oxidative-damage, may be by accumulation of hydrogen per oxide which occurred by changing balance of ROS (reactive oxygen species) metabolisms. Interaction of metals with the metabolism and growth has communal effects which finally disturbs the growth of plant. Plant built neutraceuticals products are utilized in pharmacological industries. For example, quantity of the ne metal may distress negatively or positively to the other element, either it transform or diminishes the poisonous effects of the heavy-metals [11].

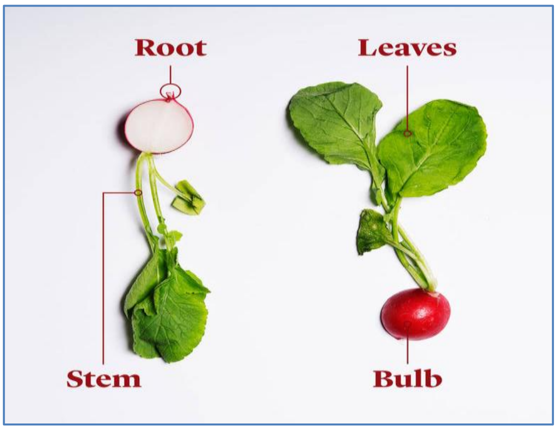

Fig-2: Shows the botanical features of radish plant

This report based study conducted to carry the effects of heavy metals on the radish.

MATERIALS AND METHODS

This report based study conducted to carry the effects of heavy metals on the radish. In this study it was noticed that nickle sulphate act as suppressor on growth of the plant and it also decreased the content of carotenoids and chlorophyll contents (Chlorophyll-a, b). Statistical analysis was achieved after collection of data by using appropriate computer software such as ANOVA [14]. All morphological changes were observed to collect the data for the biochemical analysis. A marked reduction in chlorophyll a and chlorophyll b was noticed with slight elevation of carotenoid.

To evaluate the amount of carotenoids and chlorophyll a and chlorophyll b, methodology. 0.10g of leaf samples were collected through cutting and socked them into a beaker containing 10ml of 80% acetone then these sample were centrifuged after 24 hours at 10,000 rpm for 5min and then spectrophotometer was used to check the supernatant's absorbance 480, 645 and 663 nm[15].

STATISTICAL ANALYSIS

Statistical analysis performed to this data of report and organized in the form of tables.

RESUSLTS AND DISCUSSIONS

Table-1: Shows the values of ANOVA table of chlorophyll a,b and carotenoids

SOV	DF	Chlorophyll a	Chlorophyll b	Carotenoids
Treatment	3	3.572	4.8299**	9.2***
Error	8	7.568	9.5843	2.2279

The analysis of collected data from radish's chlorophyll a that were grown under controlled conditions is presented in table. Nickle sulphate act as suppressor that bring the reduction in growth as well as chlorophyll a($P \geq 0.001$). Under controlled conditions maximum reduction was observed as compared at 150mM Nickel sulphate that was applied in Foliar medium [16].

The analysis of collected data from radish's chlorophyll b that were grown under controlled conditions is presented in table. Nickle sulphate acts as suppressor that brings the reduction in growth as well as chlorophyll b. Under controlled conditions maximum reduction was observed as compared at 30mM Nickel sulphate that was applied in Foliar medium[17, 18]. Analysis of variance of data for carotenoids of Radish under foliar application of $NiSo_4$ is presented in table observed in carotenoids [19-21].

Toxicity of Ni in radish plant is confirmed by inhibition of growth, chlorosis, necrosis and wilting. The plants that grow in polluted soil generally have higher heavy metals level depending upon total meditation of soil and the genotype plants. Catalase and heme with increased concentration of Ni may show intrusion in the metabolism of iron in plants. With the aggregate level of nickel the superoxide dismutase and ribonuclease activities and the level proline also increased [12, 13].

The young roots are consumed as raw in salad and prepared as vegetable. It has pungent taste and reflected as an appetizer. The leaves are eaten and cooked as vegetable [5]. The provisions of Raphanus sativus are beneficial for gall bladder and the liver troubles. The leaves, flowers, pods and roots play vital role against the urinary complaint, gastrodynia, piles and gram positive bacteria. The salts are taking out from root and are dried then burnt to whitish ash and are utilized to diminish stomach difficulties [6].

Mainly, the growth and yield of vegetable crops depends upon the soil and favorable weather. The barcodes of plant DNA are utilized for identification of species. The heavy metals prove very toxic for the vegetable crops. They reduce the performance of crops. Many of the plants suffered by the toxicity of Ni [7]. Different varieties of radish have the different soil and climate requirements for better growth and yield but the most beneficial and important agro-technique is nutrition for better performance. The requirements of radish plant fluctuate with soil fertility, agro climatic conditions, soil and humidity [8, 9].

CONCLUSION

Consistent amount of nickel was applied. In this study it was noticed that nickle sulphate act as suppressor on growth of the plant and it also decreased the content of carotenoids and chlorophyll contents and Chlorophyll a, b. Determination of chlorophylls and coronoids are imprints to investigate the physiological properties of plants because these important to help the different features of disease causing microbes and metals.

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