

Effect of Sulphur Dioxide on Growth and Morphology of *Cassia Tora L.*

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Abstract: *Cassia tora L.* is popularly known for its medicinal value and various chemicals it possess. It is useful in treatment of fever, skin diseases, and acts as nerve tonic, acts as substitute for coffee and many more properties. But in nature being stationary and continuously exposed to polluted atmosphere particularly Sulphur dioxide there is tremendous effect on morphology and growth causing ultimately impact on its medicinal properties. In the present study an attempt has been made to understand the effect of different concentrations of Sulphur dioxide (10, 20, 30, 40 and 50 ppm) on the growth and morphological characters of *Cassia tora* seedlings. At the end of 15 days the effects were recorded in terms of colour and nature of leaves, stem, lamina, and dry weight of the plant. As the concentration of SO₂ increased (50ppm) different notable changes were recorded like change in the turgidity and inward curling of the leaves. Dry weight of the plant decreased with increase in the concentration of SO₂ where as no change was noted in the nature of roots.

I. Introduction

A wide array of toxic substances including gases and particulates are emitted from the industries, especially from large industrial complexes, which affect our food supplies, health and economy. In particular these atmospheric pollutants adversely affect the growth and yield of practically all crop plants and structures of natural ecosystem. In India SO₂ has been recognized as a major air pollutant in urban and industrial areas (Chakraborty and Rao., 1962; Aiyanger et al., 1973; Yennwar et al., 1970). SO₂ not only affect well being of mankind, animals but also vegetation including many medicinal plants (Rao et al., 1977). *Cassia tora L.* is one of the medicinal plant which posses various chemical. It is useful in treatment of fever, skin diseases, act as nerve tonic, acts as substitute for coffee and many more medicinal properties. The effect of air pollution on the morphology, physiology and biochemistry of plants have long been recognized (Koziol and Whatley, 1984; Treshow, 1985; Ahmed et al., 1988). The leaves of the plants are highly exposed organs and they express most of the obvious effects. The present investigation deals with the effects of SO₂ on the growth and morphological characters like nature of leaves, nature of stem, nature of roots, and leaf lamina of *Cassia tora L* seedlings.

II. Materials And Methods

The seeds of *Cassia tora* were collected from Marathwada Agriculture University, Parbhani. Earthen pots of 25 cm² diameter were filled with adequately fertilized sterilized black cotton soil and each to 15 seeds were sown. The thinning was done at the age of 10 days and only 10 plants were allowed to grow up to the age of 15 days. Pots were irrigated as and when required. The pots were exposed to different concentrations of SO₂ (10, 20, 30, 40 and 50 ppm) was generated by following Khan and Kulshreshtra, 1991). The seedlings of *Cassia tora L* having the age of 21 days were placed in exposure chamber at different concentration for 6 hrs duration. After completeion of the desired exposures of seedling, morphological changes were observed.

III. Observations

Effect of SO₂ on morphological changes of seedlings of *Cassia tora L.*

SO ₂ ppm(v/v)	Nature of Leaves	Nature of stem	Nature of roots	Nature of Lamina	Dryweight(gm)
Control	No change	No change	No change	No change	3.18
1	Two bottom leaves turned to pale yellow	Stem turned pale yellowish green	No change	Old leaf lamina edge Brittle / Dried, Green coloured.	3.12
2	Older leaves turned pale yellow.	Pale yellow colour loss of rigidity	No change	Edge of Old leaf lamina was Brittle	2.83
3	Leaves became leathery. Leaves near to roots pale yellow.	Pale yellow colour Weaker & loss of turgidity	No change	Leaf lamina curling inward with Brittleness/Dryness.	2.55

4	Leaves near to the roots are yellow.	Yellow coloured. Loss of turgidity	No change	Leaf lamina curling inward with Brittleness/Dryness and total leaves of seedlings shows such symptoms.	2.31
5	Older leaves are yellow in colour.	Stem was pale yellow. It is highly weak with loss of turgidity.	No change	Leaf lamina Dry & Brittle to touch.	2.01

IV. Results And Discussion

In the present investigations growth and morphological changes of *Cassia tora* were observed at different concentrations of SO₂. It is evident from the results presented in table that, the seedlings of *Cassia tora* L. showed the following changes at the end of 15 days. The two leaves turned pale yellow at lower concentration of SO₂ (10 ppm) where as older leaves turned yellow at higher concentration (50 ppm). The Lamina of older leaves became Brittle/Dried at edge at lower concentration (10 ppm) SO₂, while at higher concentration (50 ppm) of SO₂ all the leaves of seedling showed such symptoms along with inward curling of leaves. Stem was observed Pale yellowish green at lower concentration (10 ppm) while it became yellow, weak with loss of turgidity at higher concentration. No change was recorded in nature of roots. According to Halbwechs, 1984, very young or not yet fully expanded leaves, are relatively resistant and fully expanded leaves are more sensitive than the older ones.

It is also evident from table that the dry weight of seedling decreased with increase in concentration of SO₂. Similar kind of results were observed by Ayer and Bedi (1990) when maize plants were exposed in fumigation chamber with different concentration of SO₂. In their study, no of leaves, leaf area, biochemical parameters and yield was recorded maximum in 1.0 ppm SO₂ exposure. In case of long term exposure to low SO₂ concentrations the older leaves of *Beta vulgaris*, *Vicia fabamalus* and pyrus showed injury symptoms usually earlier then the younger ones (Guderian 1977). In conclusion, our study shows that change in the nature of leaves of *Cassia tora* due to SO₂ can affect the functional contents there by altering its medicinal properties.

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