

# Impact Of Sulphur Dioxide On Growth And Morphology Of *Xanthium Strumarium L.*

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*Abstract: Xanthium strumarium L. commonly known as chota dhatura has many medicinal properties like cooling, laxative, anthelmintic, tonic, digestive, antipyretic, improves appetite etc. The dried leaves of Xanthium strumarium are a source of tannin. 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 Xanthium strumarium L. seedlings. At the end of 15 days the effects were recorded in terms of colour and nature of leaves, stem, lamina, roots and dry weight of the plant. As the concentration of SO<sub>2</sub> increased (50ppm) different notable changes were recorded like inward curling of the leaves, change in the colour of roots, weakness of petiole. Older leaves are affected first than younger. Dry weight of the plant decreased with increase in the concentration of SO<sub>2</sub> where as no change was noted in the nature stem up to 40 ppm.*

## 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 SO<sub>2</sub> 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). SO<sub>2</sub> not only affect well being of mankind, animals but also vegetation including many medicinal plants (Rao et al., 1977). *Xanthium strumarium L.* is one of the medicinal plant which posses various chemicals. It is cooling, laxative, anthelmintic, tonic, digestive, antipyretic, improves appetite medicinal properties. A decoction of the root has been used in the treatment of high fevers. 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 SO<sub>2</sub> on the growth and morphological characters like nature of leaves, nature of stem, nature of roots, and leaf lamina of *Xanthium strumarium L.* seedlings.

## II. MATERIALS AND METHODS

The seeds of *Xanthium strumarium L* were collected from Marathwada Agriculture University, Parbhani. Earthen pots of 25 cm<sup>2</sup> 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 SO<sub>2</sub> (10, 20, 30, 40 and 50 ppm) was generated by following Khan and Kulshreshtra, 1991). The seedlings of *Xanthium strumarium 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

SO <sub>2</sub> ppm (v/v)	Nature of Leaves	Nature of stem	Nature of roots	Nature of Lamina	Dry weight (gm)
Control	No change	No change	No change	No change	3.32
1	Younger leaf normal, older brittle and pale green. Lower two leaves yellow	No change	Upward curling of leaf lamina	No change	3.09
2	Leaf petiole weaker	No change	Upward curling of leaf lamina	Yellowish brown	2.91
3	Upper leaves green and curling inward. Lower two leaves thin	No change	Leaf lamina brittle and dry	Yellowish brown	2.72
4	Petioles of leaves weak. Loss of firmness	No change	Leaf lamina curled	Yellowish brown	2.13
5	Petioles are weaker	Drooping	Leaf lamina curled	Yellowish brown	1.95

Table 1: Effect of SO<sub>2</sub> on morphological changes of seedlings of *Xanthium strumarium* L.

### IV. RESULTS AND DISCUSSION

In the present investigations growth and morphological changes of *Xanthium strumarium* were observed at different concentrations of SO<sub>2</sub>. It is evident from the results presented in table that, the seedlings of *Xanthium strumarium* L. showed the following changes at the end of 15 days. The older leaves first showed brittleness turned pale green became yellow at low concentration (10ppm) of SO<sub>2</sub>. Up to 40 ppm no change is seen in morphology of stem however at 50 ppm change was recorded in stem. At lower concentration (10ppm) of SO<sub>2</sub>, upward curling of leaf lamina was observed from 30ppm conc of SO<sub>2</sub> lamina became Brittle and dry along with upward curling. As concentration increases from 20 ppm to 50 ppm, roots became yellowish brown. The dry weight of seedling also found to be decreased with increase in concentration of SO<sub>2</sub>.

It is also evident from table that the dry weight of seedling decreased with increase in concentration of SO<sub>2</sub>. Similar kind of results were observed by Ayer and Bedi

(1990) when maize plants were exposed in fumigation chamber with different concentration of SO<sub>2</sub>. In their study, no of leaves, leaf area, biochemical parameters and yield was recorded maximum in 1.0 ppm SO<sub>2</sub> exposure. In case of long term exposure to low SO<sub>2</sub> concentrations the older leaves of *Beta vulgaris*, *Vicia fabamalus* and pyrus showed injury symptoms usually earlier then the younger ones (Guderian 1977). In conclusion, study shows that change in the nature of leaves of *Xanthium strumarium* due to SO<sub>2</sub> can affect the functional contents there by altering its medicinal properties.

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