



## Effect of Sulphur-di-oxide fumigation on *Cicer arietinum L.*

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### Abstract

An experiment was conducted on *Cicer arietinum L.* (Gram) to study the effect of Sulphur-di-Oxide On pH of leaf extract, chlorophyll and Growth of the plant at Central Institute of Agriculture Engineering, Nabi Bagh, Bhopal during its cropping season. 20 days old Gram plants were exposed to Sulphur-di-Oxide for 30 days. Results were noted for 35, 50, 65 days plants. Growth parameters, pH of leaf extract, Carotenoid and chlorophyll were adversely affected under Sulphur-di-Oxide exposure of 1.00 ppm.

*Key words:* Sulphur-di-Oxide, *Cicer arietinum L.*, pH of leaf extract, chlorophyll, Carotenoid.

### Introduction

Emission of various gases particularly Sulphur-di-Oxide from different industries, Thermal power stations, petrofuels etc. may be harmful to our common agricultural crops. Effect of SO<sub>2</sub> on chlorophyll, Carotenoid, Growth parameters, and pH of leaf extract was studied in the present investigation.

### Material and Methods

For Experiment *Cicer arietinum* crops were grown at Central Institute of Agriculture Engineering, Nabi Bagh, and Bhopal. Twenty days old *Cicer arietinum* (Gram) Plants were exposed to 1 ppm of SO<sub>2</sub>. Plants of Gram were exposed to SO<sub>2</sub> daily for one hour for 30 days. Plant Sample was collected for biochemical analysis, when plants were 35, 50 and 65 day old. SO<sub>2</sub> was generated By Na<sub>2</sub>SO<sub>3</sub> in closed – top chambers as prescribed by Dudev and AmritpHale in their procedure Manual. Chlorophyll Pigments were determined by Maclachlan and Zalik and Duxbury and Yentsch method. pH of leaf extract was also estimated by Dubey and Amritp Hale's method .

### Results and Discussion

The results of the growth parameters and of the

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biochemical study are given in tables 1 and 2.

**Plant Growth:** Significant reduction in shoot length was observed in *Cicer arietinum* plants (Table-1). Reduced plant growth under SO<sub>2</sub> has been mainly attributed to altered photosynthesis and changed pattern of translocation of photosynthates (Bansal, 1988) similar growth reductions have also been observed and recorded earlier in *Vigna mungo* (Sharma *et al.*, 1995).

**Chlorophyll:** The chlorophyll content of leaves of SO<sub>2</sub> exposed plants reduced in all the age groups of plants (Table-2). Chlorophyll a was found to be more sensitive than chlorophyll b and Carotenoids. This seems to be the loss of structural Organisation of Chloroplast (Rao, 1979; Tiwari,1991). Reduction in photosynthetic pigments due to pollutant exposure has been reported by many workers (Lee and Talashi, 1966; Nandi *et al.*, 1984; Dubey, 1984; Sharma *et al.*, 1995). Chlorophyll is the index of productivity in plants Gaseous air pollution can inhibit both light and dark reactions of photosynthesis. The inhibitory effect of SO<sub>2</sub> on photosynthesis CO<sub>2</sub> exchange has been well documented by Yunus *et al.*, 1985).

**pH:** Many Pollutants especially SO<sub>2</sub> is known to decrease the pH of the Plants . This is due to subsequent Conversion of SO<sub>2</sub> to Sulphuric acid on reaction with water . This is a very important



phenomenon because the cellular metabolism is the function of its pH, any shift in pH on either side is expected to alter the metabolic processes to a considerable extent. Working on effect of SO<sub>2</sub> on Calendula and Dahlia, Yunus *et al.*, (1985) have reported similar shift towards acidic pH. The pH of control plants remained same and in treated plants it slightly shifted towards acidic side.

**Table – 1 . Shoot length of control and fumigated *Cicer arietinum* L. at different stages of growth**

Experimental Condition	Age of plants in days	Shoot length ( cm )
Control	35	15.8
	50	17.4
	65	19.3
Fumigated 1ppm.	35	13.8
	50	14.3
	65	14.6

Value are in mean ( n = 10 )

**Table – 2. Effect of Sulphur – di –oxide on chlorophyll contents in *Cicer arietinum* L .**

Experimental Condition	Age of plant In days	Chl. a (mg/g)	Chl.b (mg/g)	Carotenoids ( mg/g )	Total Chl. ( a+b) (mg/g)
Control	35	1.11	0.88	1.51	1.99
	50	1.14	0.98	1.59	2.12
	65	1.20	1.00	1.64	2.20
Fumigated 1ppm(SO <sub>2</sub> )	35	0.87	0.78	1.12	1.65
	50	0.76	0.85	1.05	1.61
	65	0.65	0.88	1.00	1.53

Value are in mean ( n = 10 )

### Conclusion

It can be concluded from the above investigation that Gram plants exposed to SO<sub>2</sub> had adverse effects on Growth, chlorophyll Carotenoids, pH Contents of leaves. chlorophyll and Carotenoids decreased drastically in exposed plants. pH of the fumigated leaves decreased. Overall fruit formation or productivity was reduced.

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