



## EFFECT OF CEMENT DUST POLLUTION ON GERMINATION AND GROWTH OF PEA (PISUM SATIVUM.)

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### ABSTRACT

*Air pollution has been described as an additional stress on plants since they often respond to atmospheric contamination in the same way as they respond to drought and other environment stress. The role of air pollutants causing injury to plants either by direct toxic effect or modifying the host physiology rendering it more susceptible to infection. In severe case of pollution, the injury symptoms were expressed as foliar necrosis or completely disappearance of the plant. In that way the present research work carried out cement dust pollution on germination growth and biochemical of Pea. The cement dust artificially sprayed on the plant surface with different levels. All the morphological and biochemical were analyzed. Morphological parameters Root length, Shoot Length, and dry weight were inhibited in high dose of cement deposition when compare control plant. The highest amount of all biochemical content which present in control set and lowest one recorded in 25g/pot sprayed with cement dust.*

**Keywords:** Cement Dust, Seeds, Hgcl, Soil

### INTRODUCTION

Air pollution has been described as an additional stress on plants since they often respond to atmospheric contamination in the same way as they respond to drought and other environment stress. The role of air pollutants causing injury to plants either by direct toxic effect or modifying the host physiology rendering it more susceptible to infection. In severe case of pollution, the injury symptoms were expressed as foliar necrosis or completely disappearance of the plant. Several workers have also previously studied the impact of air pollution on plants with reference to foliar anatomical and biochemical changes by experimenting on various sensitive plants (Samal and Santra, 2002). The main atmospheric pollutants are: gaseous - mainly SO<sub>2</sub> NO<sub>x</sub>, O<sub>3</sub>, heavy metals and dust, which often includes heavy metals. Increased concentrations of the above pollutants cause progressive reduction in the photosynthetic ability of leaves, closure of leaf stomata and, mainly, a reduction in growth and productivity of plants (Larcher 1995). Environmental contamination due to dust particle coming from Cement Industries, Coal Mining, Quarrying, Stone Crushing, Thermal Power Plant etc., has drawn much attention to the environmental scientists today as they create serious pollution problems and pose threat to the ecosystem. The cement industry also plays a vital role in the imbalances of the environment and produces air pollution hazards (Stern, 1976). These dust particulates are causing large scale deforestation. The present research paper reveals the effect of cement dust to the soil on the germination and biochemical behavior of Pea (*Pisum sativum*).

### MATERIALS AND METHOD

Cement dust were collected and from nearby mixed with garden soil from experimental garden Dept. of

Botany, Magadh University, Bodh Gaya. Pea (*Pisum sativum*). The seeds were surface sterilized with 0.1% Hgcl for 10 minutes and then soaked for overnight before sowing. Cement dust mixed with soil were kept in germination cups in the ratio of Control, 5g/Kg, 10g/Kg, 15g/Kg, 20g/Kg, 25g/Kg, without cement dust treated as control. Germination test were carried out triplicate samples were maintained (each containing 20 seeds), under natural photoperiod of day and night temperature 27-31°C and 23- 26°C respectively. The seedlings raised in dust free soil were treated as control. In the third day of germination test, the seeds were germinated through the breakage of seed coat were visible. In the seventh day of seedling growth parameters such as Germination percentage, Seedling length (Cm/Seedling), Fresh weight (g/seedling), Dry weight (g/seedling), Vigour index, Tolerance Index and percentage of Phytotoxicity, were measured and recorded, in addition to that above said parameters, bio-chemical parameters like chlorophyll (Arnon, 1949), Protein (Lowry, 1951), Amino acid (Moore and Stein, 1948), Total sugar (Nelson, 1944) were estimated and recorded.

### RESULT AND DISCUSSION

To find out the effect of cement dust on germination, we made different concentration (Control, 5g/Kg, 10g/Kg, 15g/Kg, 20g/Kg, 25g/Kg) of cement dust with soil were taken. Seed germination percentage, Seedling length (Cm/Seedling), Fresh weight (g/seedling), Dry weight (g/seedling), Vigour index, Tolerance Index and percentage of Phytotoxicity, were measured and recorded, in addition to that above said parameters, bio-chemical parameters like chlorophyll, Protein, Amino acid, Total sugar were estimated and recorded on the seventh day after sowing. The effect of cement dust pollution on

germination studies of groundnut are represented in Table no -1. The higher germination percentage (100%), seedling length (9.967 cm/seedling), fresh weight (1.90 g /seedling), dry weight (0.666 g/seedling), vigour index (487) was observed in control plants. The lower germination percentage (30), seedling length (5.766 cm/seedling), fresh weight (0.75 g/seedling), dry weight (0.250 g/seedling) and vigour index (172.98) was observed in 25 g/kg cement dust sprayed seedlings. Seed germination and growth are vital for continuation of plant life. Seeds and seedlings are extremely vulnerable to environment stress due to presence of polluting agents in the environment especially during seed hydration period which is very much important for initiating and triggering the investigate sequence of metabolisms essential for germination and growth of seedlings. In this experiment, the biochemical studies such as chlorophyll, carotenoid, protein, amino acid and total sugars were analyzed. All the biochemicals are gradually decreased with the increase in cement dust concentrations. The higher chlorophyll, carotenoid, protein, amino acid and sugars were observed in control plants and the lower values of these parameters were observed in higher concentrations of cement dust sprayed plants. Moreover 50% reduction of biochemical contents was observed at 25 g soil mixing cement dust concentrations when compared with control. Similarly, these parameters were increased with the increase in the age of the plant. The shoot contains higher protein, amino acid and sugars than the root in all the concentrations. The chlorophyll 'a', chlorophyll 'b', total sugars, protein, starch, lipids and amino acids are gradually decreased in dust polluted plants than in control plants . The amounts of chlorophyll 'a', chlorophyll 'b', total chlorophyll and carotenoid contents of cement dust treated samples were always lower than that of control plants. A maximum reduction of 1.80% of total chlorophyll was recorded in 10% treatment at the age of 45 days. Decrease in chlorophyll content might be due to chloroplast damage by incorporation of cement kiln dust into leaf tissues.

**Table 1- Effect of cement dust pollution on germination and growth of Pea (*Pisum sativum*.)**

SI N O	Growth stage(da ys)	Growth of plants parts (%)					
		Ste m leng th	Branc hes	Lea f	Bud s	Flowe rs	Fru its
1	0-20	2	2	-	-	-	-
2	20-40	6	8	2	-	-	-
3	40-60	12	10	4	-	-	-
4	60-80	20	32.65	8	6.2 3	-	-

5	80-100	34	32.65	11. 88	11. 8	14.5	14 16
6	100-120	58.1 2	32.65	11. 88	11. 88	14.5	14.1 6

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