



## Morphological analysis of blackgram cultivated around cement factory of Tirunelveli district, India

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### Abstract

The sampling sites revealed that the morphological analysis of blackgram cultivated in and around the Cement factory reported morphological reduction in shoot length, number of branches, number of leaves, number of pods and weight of pods. Correlation co-efficient analysis of the morphological parameters of blackgram showed 0.05 level of positive significant.

**Keywords:** cement emissions, environmental pollution, atmospheric changes, human health

### Introduction

Cement dust is a common particulate air pollutant around cement factories and construction sites. Cement dust emanating from the factory settles on the surface soil and vegetation badly affects large area directly through leaf stomata (Butler and Sharma, 1973) [1] and indirectly by changing the pH of the soil affects plant growth by the formation of crusts on leaves, branches, flowers and fruits (Singh and Rao, 1981) [4]. The fall out of cement dust led to changes in the soil characteristics, plant structure and function reflect irremediable habitat degradation. The deposited dust later crystallizes and solidifies to a hard crust indicating intimate contact of dust with the leaf. Prolonged dry periods afford no chance for hydration and crusts formation. Dust deposit cause stomatal plugging and prevent gaseous exchange (Mandre *et al*, 1998) [5].

### Materials and Methods

Experimental field work was carried out around the cement factory of Tirunelveli District. The cultivated blackgram around the vicinity of the factory i.e. 3-10 km was treated as polluted and beyond 10km as control plants.

### Results and Discussions

The present study revealed that the shoot length in inches of

cement polluted blackgram plant varied from  $8.90 \pm 0.141$  cm in monsoon to  $9.60 \pm 0.283$  cm in summer and non-cement polluted blackgram plant varied from  $15.20 \pm 0.212$  cm in summer to  $15.90 \pm 0.000$  cm in monsoon. Number of branches in the cement polluted blackgram plant varied from  $7.00 \pm 0.000$  in summer to  $8.00 \pm 0.000$  in monsoon and the number of branches in the non-cement polluted blackgram plant reported similar data  $3.00 \pm 0.000$  during monsoon and summer. Number of leaves in the cement polluted blackgram plants revealed similar data  $9.00 \pm 0.000$  in monsoon and summer whereas, the control leaves showed similar data  $16.00 \pm 0.000$  in monsoon and summer. Number of pods in the cement polluted blackgram plant varied from  $15.00 \pm 0.414$  in summer to  $18.00 \pm 0.414$  in monsoon and number of non-cement polluted blackgram pods varied from  $22.00 \pm 0.707$  in summer to  $25.00 \pm 0.707$  in monsoon. Weight of the cement polluted blackgram pods varied from  $290.00 \pm 0.707$  mg in summer to  $299.00 \pm 0.134$  mg in monsoon and weight of the control pod varied from  $550.00 \pm 0.414$  mg in summer to  $555.00 \pm 2.121$  mg in monsoon (Table: 1).

**Table 1:** Morphological parameters of Black gram growing around Cement Factory

S. No	M.P	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>
1	SL	$15.20 \pm 0.212$	$9.60 \pm 0.283$	$15.90 \pm 0.000$	$8.90 \pm 0.141$
2	NB	$7.00 \pm 0.000$	$3.00 \pm 0.000$	$8.00 \pm 0.000$	$3.00 \pm 0.000$
3	NL	$16.00 \pm 0.000$	$9.00 \pm 0.000$	$16.00 \pm 0.707$	$9.00 \pm 0.707$
4	NP	$22.00 \pm 0.707$	$15.00 \pm 0.414$	$25.00 \pm 0.707$	$18.00 \pm 0.414$
5	WP	$550.00 \pm 0.414$	$290.00 \pm 0.707$	$555.00 \pm 2.121$	$299.00 \pm 0.134$

SL – Shoot Length in cm; NB- Number of Branches per Plant; NL-Number of Leaves; NP – Number of Pod; WP - Weight of Pod in mgs; A<sub>1</sub> – Non Cement Polluted Blackgram in summer; A<sub>2</sub>- Cement Polluted Blackgram in summer; A<sub>3</sub> – Non Cement Polluted Blackgram in Monsoon; A<sub>4</sub> – Cement Polluted Blackgram in Monsoon.

The earlier studies reported that the bio-nutritional analysis of *Oryza sativa* plants at the cement polluted sites showed significant reduction of Starch, Carbohydrate, Total aminoacid, Vitamin A and Vitamin B1 are positively correlated (0.99)\*\* at 0.01 level of significant whereas, (0.87)\* showed 0.05 level of significant (Christudhas and Suja, 2017) [2]. The present study showed that the correlation co-efficient of blackgram plant showed that the shoot length are positively correlated 0.99\*\* (A<sub>2</sub> -A<sub>1</sub>) & (A<sub>3</sub>-A<sub>4</sub>) at 0.01 level of significant; number of branches are positively correlated 0.97\*\* (A<sub>2</sub> -A<sub>1</sub>) & 0.96\*\* (A<sub>3</sub>-A<sub>4</sub>) at 0.01 level of significant; number of blackgram leaves are positively correlated 0.98\*\* (A<sub>2</sub> -A<sub>1</sub>) & (A<sub>3</sub>-A<sub>4</sub>), 0.99\*\* (A<sub>4</sub>-A<sub>2</sub>) at 0.01 level of significant; number of blackgram pods are positively correlated 0.88\* (A<sub>2</sub> -A<sub>1</sub>) & 0.90\* (A<sub>3</sub>-A<sub>4</sub>) at 0.05 level of significant and weight of pods are positively correlated 0.90\* (A<sub>2</sub> -A<sub>1</sub>) & 0.86\* (A<sub>3</sub>-A<sub>4</sub>) at 0.05 level of significant (Table: 2). Morphological parameters via tiller length, number of leaves, length of inflorescence, number of paddy, weight of paddy and moisture content revealed minimum production in the cement polluted soil observed during summer and maximum production in monsoon. The morphological parameters are positively correlated at 0.01 and 0.05 level of significant (Jemila *et al.*, 2015) [3].

**Table 2:** Correlation Co-efficient for Morphological parameters of Black gram compared with different variables

S. No	M.P	A <sub>1</sub> - A <sub>3</sub>	A <sub>2</sub> - A <sub>1</sub>	A <sub>3</sub> - A <sub>4</sub>	A <sub>4</sub> - A <sub>2</sub>
1	SL	0.01	0.99**	0.99**	-0.18
2	NB	0.31	0.97**	0.96**	-0.18
3	NL	-0.19	0.98*	0.98**	0.99**
4	NP	-0.18	0.88*	0.90*	0.01
5	WP	0.35	0.90*	0.86*	0.01

### Conclusion

The morphological analysis of the cultivated blackgram around cement factory revealed that the fall out of cement dust on the crop plants reflect the reduction of vegetative and reproductive parts result in the reduction of the yield was a great loss to the poor farmers who reside near to the factory.

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