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Observation of bio-nutritional at blackgram cultivated around cement factory of Satna district (M.P.)

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Abstract
The natural environment consists of air, water and soil. The release of industrial waste emissions into any component of the environment causes pollution. Industrial pollution significantly threatens people's natural right to enjoy a safe environment. The effect of environmental pollution on the poor nutritional components of black gram grown in and around the Cement Plant is evaluated and correlated. Correlation coefficient analysis of bionutritional parameters of black gram showed 0.01 and 0.05 levels of positive significance.

Keywords: Cement dust, black gram, bio-nutritional analysis, pods, leaves, branches

1. Introduction
Black gram or urid is one of the important pulse crop in India. Black gram (*Vigna mungo* L.) reported to be originated in India. Its references have also been found in Vedic texts such as Kautilya's 'Arthasasthra' and in 'Charak Samhita' lends support to the presumption of its origin in India. India is the largest producer and consumer of Black gram in the world.
Cement dust is a common particulate air pollutant around the cement factories and construction sites. Even though cement is very useful to mankind for building purposes, badly affects the vegetation produces considerable heavy metal accumulation in the soil, leaves, stem and fruits (Asubiojo *et al*., 1991; Ade-Ademilua and Umebese, 2007) [1-2]. The fall out of cement dust areas lead to changes in the soil characteristics and plant structure affects the plant growth with the formation of crusts on leaves, branches, flowers and fruits. These changes reflect irreparable habitat degradation. The cement polluted plants are directly affected through leaf stomata and indirectly by changing the pH of the soil (Singh, 1981) [3].
The importance and contribution of agricultural sector has certainly been a dominant factor in making Satna an economically viable state over past few decades. Though industrial economy contributes to a large extent still agrarian economy is the important pillars of Satna economy and will continue to hold pretty strong influence over its economy even in coming years. Cement factories and plants are obviously capitalizing on huge reservoir of limestone mineral that is found in Satna District, which actually has helped in making Satna city the official cement capital of India. Various industries have attributed to growing urbanization and industrialization of the local economy.

2. Material and Methods
Satna district is situated in the Vindhyachal Plateau of Madhya Pradesh State. The district is located in between the Vindhyachal and Satpura range of hills. The district is having the boundaries of Banda district of Uttar Pradesh State in North, Rewa and Sidhi districts in the east, Panna district in the west and Jabalpur and Umaria districts in the south. The district is located in between 23.58 degree North Latitude to 25.12 degree North Latitude and 80.21 degree East Longitude to 81.23 East Longitude. The District is situated about 305 meters above the mean sea level.
Experimental field work was carried out around the cement factory of Satna District. The cultivated black gram around the vicinity of the factory *i.e.* 2-10 km was treated as polluted and beyond 10 km as control plants.

3. Result and Discussion
3.1 Bio-nutritional Analysis of Black gram
Black gram consists of many antinutrients such as protease inhibitors, raffinose family oligosaccharides (RFOs), stachyose, verbascose, phytates, tannins, saponins, lectins etc. (Jain *et al*., 2009) [4]. Polluted and control rice plants around the Thalaiyuth cement plant reported reductions in bionutrients such as starch, carbohydrates, total amino acids, vitamin A and

vitamin A_1 in summer and monsoon. Starch content in the cement polluted rice fruits varied from the minimum of 0.59±0.414 in monsoon to the maximum of 0.64±0.414 in summer. On the other hand, starch content in the control fruits varied from the minimum of 0.92±0.016 during summer to the maximum of 0.99±0.006 in monsoon (Christudhas and Suja, 2017 & Prayline, 2018) [5-6]. The present study showed Chlorophyll 'a' content of the cement polluted black gram leaves varied from 0.52±0.001 in summer to 0.54±0.002 in monsoon and control leaves varied from 0.86±0.018 in summer to 0.89±0.002. Chlorophyll 'b' content of the cement polluted black gram leaves varied from 0.27±0.002 in monsoon to 0.28±0.006 in summer and control leaves varied from 0.07±0.003 in monsoon to 0.10±0.015 in summer. Total chlorophyll content of the cement polluted black gram leaves varied from 0.78±0.007 in summer to 0.81±0.001 in monsoon and control leaves varied from 0.94±0.004 in summer to 0.94±0.002 in monsoon. Carbohydrate content of the black gram leaves varied from 0.52±0.002 in summer to 0.54±0.008 in monsoon and control leaves varied from 0.87±0.002 in summer to 0.89±0.001 in monsoon. Carbohydrate content of the cement polluted blackgram fruits varied from 0.37±0.003 in summer to 0.40±0.001 in monsoon and control fruit varied from 0.77±0.003 in summer to 0.81±0.006 in monsoon. Free sugar content of the cement polluted black gram leaves varied from 0.30±0.001 in summer to 0.32±0.008 in summer and control leaves varied from 0.60±0.008 in summer to 0.62±0.013 in monsoon (Table: 1).

Table 1: Nutritional Bio-chemical parameters of Blackgram

S. No	N.B.P.	A_1	A_2	A_3	A_4
1	Chl. a (L)	0.86±0.018	0.52±0.001	0.89±0.002	0.54±0.002
2	Chl. b (L)	0.10±0.015	0.28±0.006	0.07±0.003	0.27±0.002
3	T. Chl (L)	0.94±0.004	0.78±0.007	0.94±0.002	0.81±0.001
4	Car (L)	0.87±0.002	0.52±0.002	0.89±0.001	0.54±0.008
5	Car (L)	0.77±0.003	0.37±0.003	0.81±0.006	0.40±0.001
6	F (L)	0.60±0.008	0.30±0.001	0.62±0.013	0.32±0.008

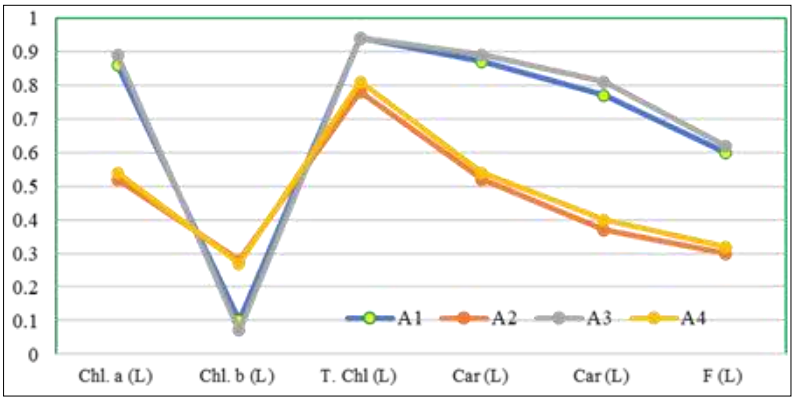

Fig 1: Nutritional Bio-chemical parameters of black gram

Correlation co-efficient of Bio-nutritional analysis - Blackgram 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 B_1 are positively correlated (0.99)** at 0.01 level of significant whereas, (0.87)* showed 0.05 level of significant (Prayline, 2018 & Christudhas and Suja, 2017) [6-7]. The present study showed Chlorophyll 'a' content of blackgram leaves are positively correlated 0.88* (A_2 -A_1) & 0.87* (A_3-A_4) at 0.05 level of significant. Chlorophyll 'b' content of the blackgram leaves are positively correlated 0.88* (A_2-A_1) at 0.05 level of significant whereas, 0.97** (A_3-A_4) showed 0.01 level of significant. Total chlorophyll content of the blackgram leaves are positively correlated 0.97** (A_2-A_1) at 0.01 level of significant whereas, 0.89* (A_3-A_4) showed 0.05 level of significant. Carbohydrate content of the blackgram leaves are positively correlated 0.87* (A_2-A_1) and 0.89* (A_3-A_4) at 0.05 level of significant. Carbohydrate content of the blackgram fruits are positively correlated 0.88* (A_2-A_1) and 0.87* (A_3-A_4) at 0.05 level of significant (Table: 2). Morphological parameters through shoot length, leaf number, inflorescence length, paddy number, rice weight and moisture content revealed minimum production in cement polluted soil observed during summer and maximum production in monsoon. Morphological parameters are positively correlated at the level of significance of 0.01 and 0.05 (Jemila *et al*., 2015).

Table 2: Correlation Co-efficient of Nutritional Bio-chemical parameters

S. No	N.B.P	A_1- A_3	A_2 - A_1	A3 - A4	A_4 - A_2
1	Chl. a (L)	-0.17	0.88*	0.87**	0.01
2	Chl. b (L)	-0.22	0.88*	0.97*	-0.03
3	T. Chl. (L)	-0.03	0.99**	0.89*	-0.21
4	Car (L)	0.01	0.87*	0.89*	-0.07
5	Car (L)	0.01	0.88*	0.87*	0.96**
6	F (L)	0.01	0.87*	0.87*	0.88*

4. Conclusion

Bionutritional analysis of cucumber grown in the vicinity of a cement plant revealed that the fallout of cement dust on plants reflects that the cultivation of blackgram in the vicinity of a cement plant is hazardous to the health of consumers.

5. Acknowledgement

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6. References

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