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BIO-NUTRITIONAL ANALYSIS OF THE CULTIVATED RICE VARIETY – KANNAGI AROUND THALAIYUTH SANKAR CEMENT FACTORY OF TIRUNELVELI DISTRICT, INDIA

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ABSTRACT

Bio-nutritional analysis of the *Oryza sativa* plants at the cement polluted sites reported 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. Multiple regression analysis of the bio-nutrients are highly dependent against the variables, R^2 value (0.987326291) and multiple R (0.972356732) in the control rice during summer whereas, the R^2 value (0.955673275) and multiple R (0.963267135) in the cement polluted rice during summer.

KEYWORDS: *Oryza sativa*, correlation, multiple regression, multiple linear regression, cement dust, Kannagi, Thalaiyuth.

INTRODUCTION

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; Umebese and Ade- Ademilua, 2007). 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).

MATERIALS AND METHODS

Experimental field work was carried out around the Sankar cement factory at Thalaiyuth of Tirunelveli district. The cultivated rice variety – Kannagi around the vicinity of the factory i.e. 3-10 kms was treated as cement polluted and beyond 10kms as control plants. Bio-nutritional estimations were carried out as prescribed by Sadasivam and Manickam.

RESULT AND DISCUSSION

The polluted and control rice plants around the Thalaiyuth Cement Factory reported the reduction of bionutrients for instance starch, carbohydrate, total aminoacid, Vitamin-A and Vitamin – A1 in summer and monsoon.

Starch content in Fruits

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.

Carbohydrate content in Fruits

Carbohydrate content in the cement polluted rice fruits varied from the minimum of 0.42 ± 0.001 in summer to the maximum of 0.82 ± 0.428 in monsoon. On the other hand, carbohydrate content in the control fruits varied from the minimum of 0.78 ± 0.001 in summer to the maximum of 0.80 ± 0.414 in monsoon.

Total aminoacid content in Fruits

Total aminoacid content in the fruits varied from the minimum of 0.40 ± 0.001 in summer to the maximum of 1.25 ± 0.001 in monsoon. On the other hand, total aminoacid content in the control fruits varied from the minimum of 0.728 ± 0.001 in monsoon to the maximum of 0.85 ± 0.001 in summer.

Vitamin A content in Fruits

Vitamin A content in the cement polluted rice fruits reported similar data 0.25 ± 0.001 during summer and monsoon. On the other hand, Vitamin A content in the control fruits varied from the minimum of 0.48 ± 0.414 in summer to the maximum of 0.51 ± 0.002 in monsoon.

Vitamin B_1 content in Fruits

Vitamin B_1 content in the cement polluted rice fruits varied from the minimum of 0.12 ± 0.001 in summer to the maximum of 0.16 ± 0.001 in monsoon. On the other hand, Vitamin B_1 content in the control fruits varied from the minimum of 0.38 ± 0.001 in summer to the maximum of 0.40 ± 0.003 in monsoon (Table: 1).

Table: 1 Bio-nutritional analysis of the cement polluted and non-cement polluted Rice Fruits in summer and monsoon

S. No	Biochemical	A_1	A_2	A_3	A_4
1.	Starch	0.92 ± 0.016	0.64 ± 0.414	0.99 ± 0.006	0.59 ± 0.414
2.	Carbohydrate	0.78 ± 0.001	0.42 ± 0.001	0.80 ± 0.414	0.82 ± 0.428
3.	Total aminoacid	0.85 ± 0.001	0.40 ± 0.001	0.728 ± 0.001	1.25 ± 0.001
4.	Vitamin A	0.48 ± 0.414	0.25 ± 0.001	0.51 ± 0.002	0.25 ± 0.001
5.	Vitamin B_1	0.38 ± 0.001	0.12 ± 0.001	0.40 ± 0.003	0.16 ± 0.001

Correlation co-efficient analysis

Starch and Vitamin A content are positively correlated $(0.99)^{**}$ at 0.01 level of significant whereas, carbohydrate $(0.87)^{*}$ and Vitamin B_1 $(0.87)^{*}$ showed 0.05 level of significant (Table: 2).

Table: 2 Correlation co-efficient for bio-nutritional analysis of cement polluted and non-cement polluted Rice Fruits in summer and monsoon

S.No	Biochemical	A_1	A_2	A_3	A_4
1	Starch	0.59	0.50	0.99^{**}	0.99^{**}
2	Carbohydrate	0.59	0.43	0.87^{*}	0.05
3	Total aminoacid	-0.009	0.02	0.30	-0.18
4	Vitamin A	-0.41	0.99^{**}	0.99^{**}	-0.08
5	Vitamin B_1	0.35	0.01	0.90^{*}	0.02

Multiple Regression Analysis

Multiple regression analysis revealed that the bio-nutrients are highly dependent against the variables, R^2 value (0.987326291) and multiple R (0.972356732) in the control rice during summer whereas, the R^2 value (0.955673275) and multiple R (0.963267135) in the cement polluted rice during summer. On the other hand, the bio-nutrients are highly dependent against the variables R^2 value (0.977783281) and multiple R (0.967321832) in the control rice, R^2 value (0.966532503) and multiple R (0.955548967) in the cement polluted rice during monsoon (Table: 3).

Table: 3 Multiple Regression Analysis for bio-nutritional parameters

Variables	R Square value	Multiple R
A_1	0.987326291	0.972356732
A_2	0.955673275	0.963267135
A_3	0.977783281	0.967321832
A_4	0.966532503	0.955548967

Table: 4 Multiple Linear Regression Analysis for bio-nutritional parameters

A_1	Y= 0.8992; X_1+ -20.2733; X_2+ -526; X_3+ 22.3076; X_4+-33.2882; X_5
A2	Y= 1.7736; X_1+ 7.8734; X_2+ 9.8367; X_3+ 10.8486;X_4+ 15.3248; X_5
A_3	Y= 0.2953; X_1+ 3..2998; X_2+ 3.2557; X_3+ 26.4782; X_4+ 10.8392; X_5
A_4	Y = 0.2954; X_1+ 2.9321; X_2+2.8324; X_3+3.9993; X_4+ -3.8293; X_5

CONCLUSION

Bio-nutritional analysis of the cultivated rice variety – Kannagi around Thalaiyuth Sankar cement factory revealed that the fall out of cement dust on the rice plants reflect that the cultivation of rice around the cement factory is dangerous, as far as the health of consumers is concerned.

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