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STUDY OF ORGANICALLY GROWN *ZEA MAYS* L. (MAIZE/CORN) FOR ITS NUTRITIONAL ASPECT OF IRON CONTENT

Botany

Dr. Urmila Sarkar Assistant Professor, Department of Botany, Kirti M. Doongursee College of Arts, Science and Commerce, Dadar, Mumbai 400028, India.

Sensei Surendra Sawardekar* Assistant Professor, Department of Botany, Kirti M. Doongursee College of Arts, Science and Commerce, Dadar, Mumbai 400028, India *Corresponding Author

ABSTRACT

Nutritional value of plant purely depends on the methodology of cultivation. Different methods of cultivation lead to prior proficiency of plant growth in terms of germination, height, weight, nutritional factors and so on. Among various methodologies 'Organic Cultivation' practice target precisely as a capable resource for its essential nutritional factors. A crop such as *Zea mays* L. (Maize or Corn) is an important staple crop known for its wide range of nutritional component such as Carbohydrate, fats, proteins, minerals, vitamins, moisture, ash etc.

The current research attempt is made to grow *Zea mays* L. organically for 7 days and study for its nutritional content. Among different nutritional content this research is focused on study of nutritional aspect of **'Iron'** present in *Zea mays* L. (maize or corn). The assessment of Iron content analysis by Atomic Absorption Spectroscopy (AAS); model: AA-7000F successfully estimate the amount of Iron in a fresh plant material used as a whole viz. roots, seed and aerial parts.

KEYWORDS

Zea mays L., Iron (Fe^{3+}), Organic cultivation, Atomic Absorption Spectroscopy (AAS).

INTRODUCTION

Maize or corn (*Zea mays* L.) is an important cereal crop of the world. (Tajamul Rouf Shah *et. al.*). It is a source of nutrition as well as phytochemical compounds. (Tajamul Rouf Shah *et. al.*). The genus Zea consists of four species of which *Zea mays* L. is economically important. (Tajamul Rouf Shah *et. al.*). The taxonomy of maize as described in the review article of '*Cogent Food and Agriculture*' is as given below.

Taxonomy of maize: (Tajamul Rouf Shah *et. al.*)

Kingdom	: Plantae
Subkingdom	: Tracheobionta
Superdivision	: Spermatophyta
Division	: Magnoliophyta
Class	: Liliopsida
Subclass	: Commelinidae
Order	: Cyperales
Family	: Poaceae
Subfamily	: Panicoideae
Tribe	: Andropogoneae
Genus	: Zea
Species	: Zea mays

Maize kernel is an edible and nutritive part of the plant. (Tajamul Rouf Shah *et. al.*). The seeds edible has innumerable source of enriched required nutritional components. However, the plant is especially cultivated for its seeds. While the remaining crop is utilised as a fodder for feeding domestic animals. Although a plant seed is used economically a research on plant as a whole such as roots, seed and aerial parts; for its nutritional aspect grown for a periodical span is yet needed to be done.

Based on the scope of availability for research; a present study is focused on **'Organic cultivation'** of *Zea mays* L. grown for 7 days. And a whole sapling is used to evaluate for its nutritional aspects. However, the current research is priorly analysed for Iron content present in *Zea mays* L. by Atomic absorption spectroscopy.

The following elements may be determined directly by air/acetylene AAS: Ca, Mg, Mn, Fe, Sb, Bi, Cd, Cs, Cr, Co, Cu, Au, Ir, Pb, Li, Mn, Ni, Pd, Pt, K, Rh, Ru, Ag, Na, Sr, Tl, Sn and Zn. (Paul *et. al.*).

MATERIALS AND METHOD

The seeds of *Zea mays* L. bought from local nursery were thoroughly washed with water and allowed to soak in water for 24 hours kept in dark condition.

After 24 hours of treatment, the seeds were sowed in a soilless media such as Cocopeat mixed with "**organic fertilizer**" in a proportion of 3:1. The *Zea mays* L. (maize) sample kept for 7 days in-order to grow. After 7th day, saplings as a whole such as roots, seed and aerial part was thoroughly washed and tested for its assessment of Iron content by Atomic Absorption Spectroscopy (AAS); model: AA-7000F.

- The optic parameters used for analysing a sample for '*Fe* element' is as given below

Socket	: 4
Lamp current Low (Peak) (mA)	:12
Wavelength (nm)	: 248.3
Slit Width (nm)	: 0.2
Lamp mode	: BGC-D2

- The atomic/ gas flow rate used is as given below

Fuel gas flow rate (L/min)	: 2.2
Support gas flow rate (L/min)	: 15.0
Flame type	: C_2H_2 (Acetylene).

Atomic Absorption Spectroscopy (AAS) is a very useful tool for determining the concentration of specific mineral in a sample. (Paul *et. al.*)

Liquefied sample is aspirated, aerolized and mixed with combustible gases such as acetylene and air or acetylene and nitrous oxide and burned in a flame to release the individual atoms. (Paul *et. al.*).

RESULTS AND DISCUSSION

Analysis of standard sample concentration at parts per million (ppm) along with a plant sample recorded is presented in **Table 1.1**. While the peak achieved at **248.51nm** is presented in **Figure 1.1**. The calibration curve of standard concentration is presented in **Figure1.2**.

Table1.1

Wavelength 248.3 nm		
Standard	Conc (ppm)	Abs
	1.0000	0.1040
	2.0000	0.1953
	3.0000	0.3043
	4.0000	0.3924
	5.0000	0.5042
Plant sample	0.7921	0.0798

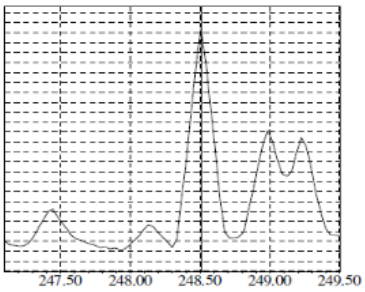

Figure1.1

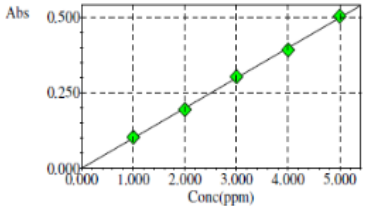

Figure 1.2

The amount of Iron content present in 1 gram of *Zea mays* L. plant sample was found to be 1.05 mg. Hence 100gm of plant sample when consumed provides 105mg of Iron.

The Daily Value (DV) of standard consumption produced by ***'Food and Agriculture Organization of United Nations/ World Health Organization'*** through a joint report on 'Human vitamin and Mineral requirements' in terms of expert consultation; Bangkok, Thailand is presented below at ***Table 40***

Table 40

The recommended nutrient intakes for iron based on varying dietary iron bio-availabilities

Group	Age (years)	Mean Body weight (kg)	Recommended Nutrient Intake[a] (mg/day) % Dietary Iron Bio-availability 15	12	10	5
Children	0.5–1	9	[6.2][b]	[7.7][b]	[9.3][b]	[18.6][b]
	1–3	13.3	3.9	4.8	5.8	11.6
	4–6	19.2	4.2	5.3	6.3	12.6
	7–10	28.1	5.9	7.4	8.9	17.8
Males	11–14	45	9.7	12.2	14.6	29.2
	15–17	64.4	12.5	15.7	18.8	37.6
	18+	75	9.1	11.4	13.7	27.4
Females	11–14[c]	46.1	9.3	11.7	14	28
	11–14	46.1	21.8	27.7	32.7	65.4
	15–17	56.4	20.7	25.8	31	62
	18+	62	19.6	24.5	29.4	58.8
Post-menopausal		62	7.5	9.4	11.3	22.6
Lactating		62	10	12.5	15	30

[a]Based in part on a 1988 report from the FAO/WHO (*8*) and in part on new calculations of the distribution of iron requirements in menstruating women. Because of the very skewed distribution of iron requirements in these women, dietary iron requirements are calculated for four levels of dietary iron bio-availability.
[b]Bio-availability of dietary iron during this period varies greatly.
[c]Non-menstruating.

CONCLUSION

The above daily value referred from Table-40, with reference from FAO/WHO expert consultation on Human vitamin and Mineral requirements, purely indicates the intake of iron intake from *Zea mays* L. in daily diet.

The research experiment of organically grown *Zea mays* L. has a potency to be used in daily diet. The supplementation of Iron in daily diet at a particular quantity proves to be a useful source for good health condition of body.

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