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Determination of iron content in neglected leafy vegetables Sonchusarvensis and Portulaca Oleraceae by Colorimertrically

Mallikarjun B Zade
Department of Chemistry, Azad College Ausa Dist. Latur, Maharastra, India

Abstract
Iron is one of the important nutrients for good health and Vigour. It is needed for the formation of the Hemoglobin which carries oxygen from the lungs to the body cells. Vegetables are richer in iron than fruits. Most of the iron for our body requirements can be obtained from green leafy vegetables and nutritional anemia can be easily cured by green leafy vegetables. Iron is an essential part of Red Blood Corpuscles and is an essential element in the body. Its best sources are Sonchus arvensis and portulaca Oleraceae.

Keywords: vegetables, Iron, Ashsolution, $[Fe(SCN)6]^{3-}$complex and colorimeter

Introduction

The food refers to a chemical substance which after eaten, digested and absorbed by the body will provide the nutrients for promoting the growth and repair of tissue, produce energy and regulate various functions of the body thereby helps to maintain nutritional status and good health [19]. The chemical constituent of food which performs different functions of the body are referred as nutrients. These nutrients which perform various body processes which promote the growth and repair of tissue, impart energy and involve in regulation of body processes. There are six major groups of nutrients which are required for healthy growth. They are fats, proteins, carbohydrates, vitamins, mineral elements and water. These nutrients are digested and assailable by the body for subsequent processes (hydrolysis). The presence of dietary fiber in our food is equally important as the other six nutrients. The dietary fiber is indigestible part of the food and is now considered as important nutritionally as one of the nutrients of the food because of its role of imparting roughage in the diet in maintaining health.[1] In addition to these nutrients the body also requires a continuous supply of oxygen to release energy from the body.

Fresh vegetable, get spoiled very easily. The tropical climate of country is further responsible for the higher rate of spoilage of these foods and thus these food stuffs cannot be kept at room temperature for long period of time. The different types of foods are grown at different places and during different seasons. As a result, the particular foods are in plenty at their place of production and during the season when they are grown.

The other important aspect is food hygiene which is necessary for ensuring safety, wholesomeness and soundness of fruits and vegetables at all stages from its growth, production, manufacture and its final consumption. The diseases transmitted by contaminated fruits are referred as food born infection which includes gastro intestinal disturbances caused by microorganisms. These diseases are also referred as intoxications caused by chemical poisons in food, the poisons may be microbial or non-microbial in origin or may be naturally present in food same times they are incorporated by adulteration of foods, increased use of pesticides, fertilizers in agriculture, dairy farming, during storage and processing of foods.

The deep green yellow and orange coloured vegetables such as green leafy vegetables, carrots, papaya, tomatoes and yellow pumpkin which are rich sources of carotene are best sources of vitamin A as the carotene is converted into vitamin A in the body. This vitamin is essential for normal growth and vitality, good eyesight, healthy skin, protection against diseases of respiratory treat. The deficiency of this vitamin leads to eye infection, poor vision, night blindness, frequent colds, lack of appetite and skin disorders. They are good sources of folic and ascorbic acid, protein and calcium. Some green vegetables also contain oxalic acid which interferes in absorption of calcium.

The Leafy vegetables Sonchusarvensis and Portulacaoleraceae is widely taken in the season. When the leaf of Sonchusarvensis is cutoff its pedicel it shows red spot, which indicates rich iron content.

2. Materials and Methods

2.1 Preparation of reagents

For the determination of iron in fruit and vegetable colorimetrically, the required reagent are prepared as follow.

1. **Concentrated H2SO4:** The C.P Grade and iron free concentrated H2SO4 was used.
2. **Saturated potassium persulphate (K2S2O2) solution:** 8 g of AR grade iron free potassium per sulphate was dissolved with constant shaking in 100 mL glass distilled water. The prepared solution was shaken properly before use.
3. **3N potassium thiocyanate (KSCN) Solution:** 146 g of reagent grade potassium thiocynate was dissolved and diluted to 500 ml in distilled water so that the resultant solution becomes 3N. 20 ml of pure acetone was added to improve the keeping quality.

Standard iron solution

0.702 g of reagent grade crystalline ferrous ammonium

sulphate [FeSO4 (NH4)2SO4.6H2O]was dissolved in 100 mL of distilled water and 5 mL of concentrated H2SO4 was added in it and warmed slightly and then concentrated solution of potassium permanganate, reagent grade was added drop by drop until one drop produces a permanent colour. This solution was transferred into one litter volumetric flask and marked to one liter with the help of distilled water. This resultant solution contains 0.1 mg of ferric (iron) per mL and stable indefinitely.

2.2 Preparation of sample

Sample of fruit and vegetable under study were collected after selection, randomization by suitable plucking, sorting and surface cleaning method. The representative sample were then prepared by standard procedure.

2.3 Experimental procedure for Determination of Iron

Preparation of coloured complex and measurement of optical density

The iron in the ash solution was determined colorimetricaly by first converting the iron into ferric form using oxidizing agent potassiumpersulphate and the converting the ferric into red ferric thiocynate complex $[Fe(SCN)6]^{3-}$ exhibiting λmax at 480 nmby treatment with potassium thiocynate reagent.

A 5 mL aliquot of the above obtained ash solution, an aliquot of standard iron solution (1.0 mL = 0.1 mg of Fe) and 5 mL of distilled water as blank were taken in separated three big test tubes. The solution in each test tube was then treated with 0.5 mL of conc. H2SO4, 1.0 mL of Saturated potassium persulphate solution and 2.0 mL of 3Npotassium thiocynate solution and the solution in each tube was then made up to the volume of 15 mL by using distilled water as shown in table. After proper equilibrium the optical density of each solution was measured at 480 nm wavelength by setting the blank at 100% transmission.

The amount of iron (mg/100g) in the fruit and vegetable was then calculated by applying the formula given below:

1. Formula

$$\text{Iron mg/100g} = \frac{\text{O.D. of sample} \times 0.1 \times \text{total volume of ash solution} \times 100}{\text{O.D. of standard} \times 5 \times \text{Wt. of Sample Taken for Ashing}}$$

Result and Discussion

The analytical data for iron content in neglected vegetables used for the study is given in the table.

The iron content of neglected vegetables Sonchus arvensis and hibiscus canabinus was determined by thiocyanate colorimetric method. The iron content of sounches arvensis was found to be 8.56mg/100g which was found to be relatively as compare to portulaca oleraceae 1.52mg/100g.

Conclusion

Therefore on the basis of conclusions drawn from the results of present investigation it may be suggested that the neglected leafy vegetables sonchus arvensis is best recommendation as iron rich vegetable for treatment of iron deficiency diseases and also for good health.

Table 1: Analytical data for Iron content of rare fruits

Sr. No.	Name of Neglected Vegetable (Local)	Botnical name	Observation Table								
				Volume taken (mL)	Conc-entration (mg/mL)	Volume of conc. H2SO4 (mL)	Volume of K2S2O8 (mL)	Volume of 3N KSCN (mL)	Finial Solution (mL)	optical density at 480 nm	Amount of iron (mg/ 100g)
1	Patrachi Bhaji	Sonchus arvensis	Standard iron solution	1.0	0.1	0.5	1.0	2.0	15	0.95	8.56
			Sample ash solution	5.0	-	0.5	1.0	2.0	15	1.83	
			Blank solution	-	-	0.5	1.0	2.0	15	0.5	
2	Mothi Ghol	Portulaca oleraceae	Standard iron solution	1.0	0.1	0.5	1.0	2.0	15	0.95	1.52
			Sample ash solution	5.0	-	0.5	1.0	2.0	15	1.08	
			Blank solution	-	-	0.5	1.0	2.0	15	0.57	

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