Research Article CODEN: IJPRNK ISSN: 2277-8713
Priyanka Das, IJPRBS, 2015; Volume 4(1): 381-390 IJPRBS

INTERNATIONAL JOURNAL OF PHARMACEUTICAL RESEARCH AND BIO-SCIENCE

A COMPARATIVE STUDY ON NUTRITIVE VALUES OF SEVERAL VEGETABLES FROM WEST BENGAL, EASTERN INDIA

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Accepted Date: 17/02/2015; Published Date: 27/02/2015

Abstract: An investigation was carried out with ten green vegetables with their popular varieties most commonly grown in Eastern India to determine their biochemical composition. The nutritive value such as crude protein, total sugar, vitamin C and amino acid content of the selected vegetables were analysed. Among the vegetables *Spinacia oleracea*, *Daucus carota, Trigonella foenumgraecum, Raphanus sativus, Allium cepa, Solanum tuberosum, Capsicum annum, Pisum sativum, Phaseolus, Lycopersicon esculetum* were selected. The study result showed that nutritional potential of the vegetables were as follows. The soluble sugar concentration and free amino acid concentration was maximum in potato and in onion, the protein content was highest in methi (460 µg/ml). The vitamin C concentration was high in green chilli and in onion.

Keywords: Vegetables, Crude protein, Carbohydrate, Vitamin C, Amino Acid

PAPER-QR CODE

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Access Online On:

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How to Cite This Article:

Priyanka Das, IJPRBS, 2015; Volume 4(1): 381-390

INTRODUCTION

Green vegetables are rich source of vitamins such as beta carotene, ascorbic acid, folic acid and riboflavin as well as minerals such as iron, calcium and phosphorous. They also contain an immense variety of bioactive non-nutritive health promoting compounds such as antioxidants and phytochemicals, which provide health benefits beyond basic nutrition. Green vegetables have long been recognized most abundant sources of protein, vitamins and minerals. Antioxidants vitamins like ascorbic acids, phenols etc. are important in human food since they function as an anticancer agent. Botanicals have been used for the treatment of various human diseases throughout history. In addition botanicals play a role in disease prevention. Epidemological studies have suggested that a reduced risk of cancer is associated with high consumption of vegetables. People in many developing countries depend on wild resources including wild edible plants to meet their food need especially in period of food crisis. Vegetables are the fresh and edible portions of herbaceous plants, which can be eaten raw or cooked. They are valued mainly for their high carbohydrate, vitamin and mineral contents. Vegetables may be edible roots, stems, leaves, fruits or seeds. Each group contributes to diet in its own way. Green leafy vegetables have long been recognized as most abundant sources of protein and vitamins. An antioxidant vitamin like ascorbic acid is important in human food since they function as an anticancer agent . Many leafy vegetables especially, amaranth and spinach have attained commercial status and its cultivation is wide spread in India. Because of their low production cost and high yield, leafy vegetables are considered to be one of the cheapest vegetables in the market and it could be rightly described as 'poor man's vegetables'. Attempts have been made by some researchers from different parts of the world on compositional evaluation and functional properties of various types of edible plants. In India, some researchers also enumerated nutritional evaluation of various types of edible plants. The present study was conducted to evaluate the nutritional value of 9 known vegetables commonly consumed in West Bengal.

EXPERIMENTAL PROCEDURE

Materials Required :

Vegetable Samples - Spinach, Carrot, Methi, Radish, Onion, Potato, Green chili, Peas, Broad bean, Tomato

Chemicals - Anthrone reagent, Sulphuric acid, Ninhydrin reagent, Folin reagent, Glycine, Sodium-potassium tartarate, Sodium carbonate, Copper sulphate Ascorbic acid, 2,5-dichlorophenol indophenol, Distilled water. All chemicals used are of analytical grade and supplied by local chemical suppliers.

Glasswares - Test tubes, Pipette, Burette, Beaker, Conical Flask, Measuring Cylinder.

Instruments - Double Beam UV-VIS Spectrophotometer, Centrifuge, Water bath.

METHODS AND RESULTS

METHODS

ESTIMATION OF CARBOHYDRATE FROM PLANT SAMPLES

1. 1gm of vegetable was taken. It was crushed with mortar and pistle. The homogeneous crushed material was suspended in 10 ml of sterilized distilled water.
2. The material was then centrifuged and the supernatant was taken, and the pellet was discarded.
3. The solution was then diluted with 0.1 ml Anthrone reagent. The test tubes were heated at 100ºc for 8 minutes.
4. The samples were then cooled down and the absorbance (O.D.) were taken at 595 nm using a Double Beam UV-VIS Spectrophotometer.

ESTIMATION OF AMINO ACID FROM PLANT SAMPLES

1. 0.1ml of diluted vegetable sample was taken and was mixed with 0.9 ml water, 2 ml Ninhydrin reagent and was mixed thoroughly.
2. The test tubes were incubated at 100ºc for 5 minutes.
3. The purple colour which appeared was estimated using a Spectrophotometer at 570 nm. A control was set up using 1ml Distilled water and 2ml of Ninhydrin reagent. This blank sample was set as 0.0 O.D. using spectrophotometer.

ESTIMATION OF PROTEIN FROM THE PLANT SAMPLES

1. Lowry method was carried out for the estimation of soluble protein present in the samples for which the samples were mixed with 0.9 ml of Distilled water and then 1ml of Folin reagent solution B was added.
2. Then they were incubated at 37ºc for 30 minutes.

3. A standard curve was made using Bovine Serum Albumin (BSA) with variable concentrations such as 10, 20, 30, 40, 50, 60, 70 µg respectively. The color intensity was measured at 750 nm using a Spectrophotometer.

ESTIMATION OF VITAMIN- C FROM THE PLANT SAMPLES

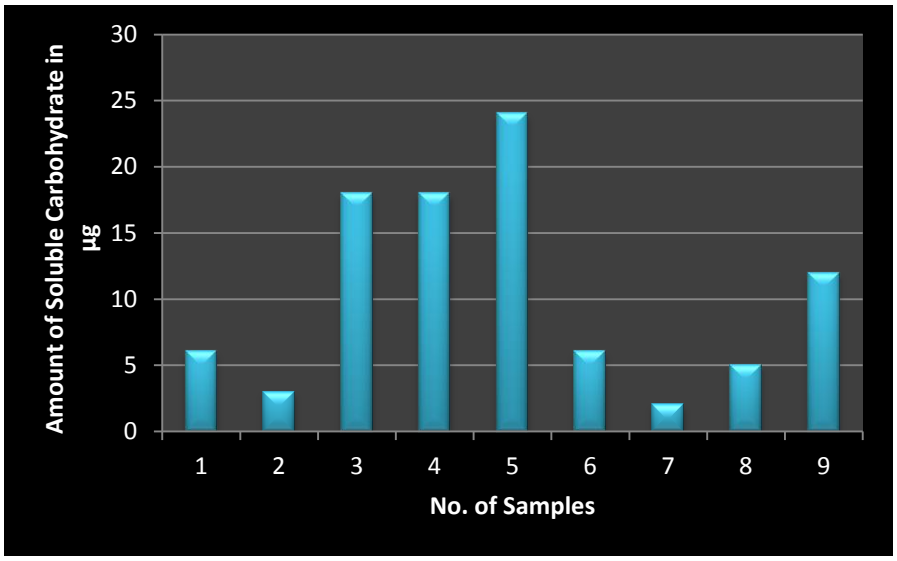
1. Vitamin C was estimated following 2,5-dichlorophenol indophenols method. 1gm of vegetable sample was taken and was extracted with 10 ml of water. This sample was utilized for the estimation of vitamin C.

2. 10 ml of dicholorophenol indophenols solution was titrated with variable concentration of standard ascorbic acid. The value of the ascorbic acid was estimated. This value was utilized as the standard value for the determination of ascorbic acid in the samples.

RESULTS

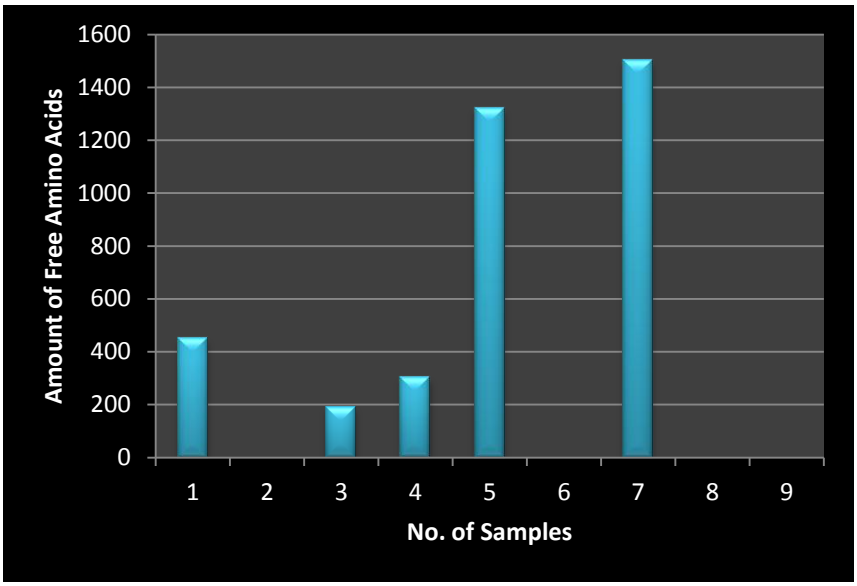
Soluble Sugar Concentration in Various Vegetable Samples

SL. No.	Name of Vegetable Samples	Concentration of Soluble Carbohytrate in (µg)
01.	Spinach	150 µg/ml
02.	Carrot	80 µg/ml
03.	Methi	60 µg/ml
04.	Radish	150 µg/ml
05.	Onion	320 µg/ml
06.	Potato	490 µg/ml
07.	Green Chilly	270 µg/ml
08.	Peas	150 µg/ml
09.	Bean	160 µg/ml



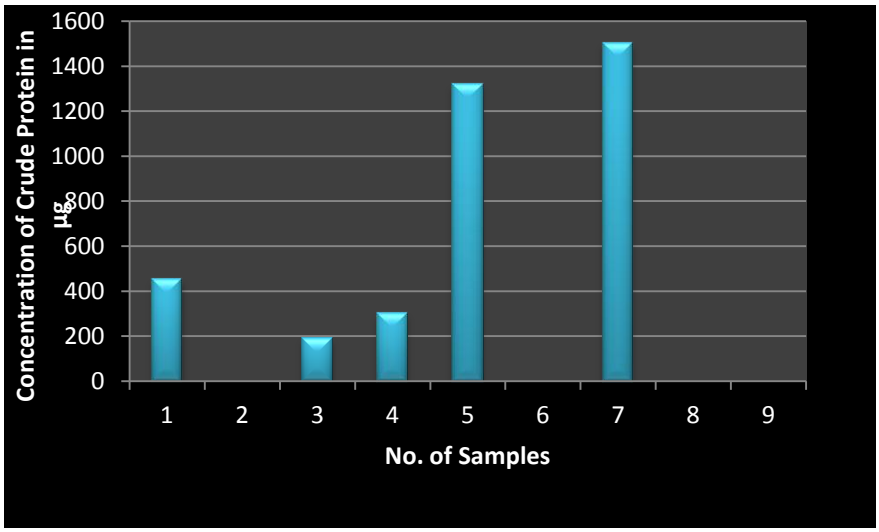
Concentration of Free Amino Acids in the Samples

SL. No.	Name of Vegetable Samples	Concentration of Free Amino Acid in (µg)
01.	Spinach	6 µg/ml
02.	Carrot	3 µg/ml
03.	Methi	18 µg/ml
04.	Radish	13 µg/ml
05.	Onion	18 µg/ml
06.	Potato	24 µg/ml
07.	Green Chilly	6 µg/ml
08.	Peas	2 µg/ml
09.	Bean	5 µg/ml



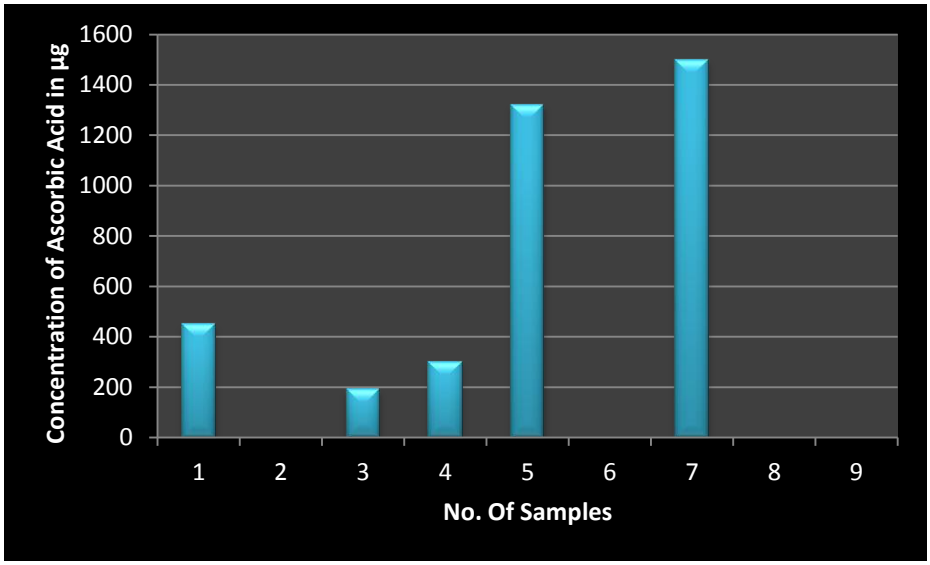
Concentration of Proteins in Various Samples

SL.No.	Name of Vegetable Samples	Concentration of Crude Protein in (µg)
01.	Spinach	260 µg/ml
02.	Carrot	60 µg/ml
03.	Methi	460 µg/ml
04.	Radish	50 µg/ml
05.	Onion	60 µg/ml
06.	Potato	180 µg/ml
07.	Green Chilli	150 µg/ml
08.	Peas	60 µg/ml
09.	Bean	260 µg/ml



Concentration of Vitamin C in Various Samples

SL.No.	Name of Vegetable Samples	Concentration of Soluble Carbohytrate in (µg)
01.	Spinach	450 µg
02.	Carrot	Nil
03.	Methi	190 µg
04.	Radish	300 µg
05.	Onion	1320 µg
06.	Potato	Nil
07.	Green Chilli	1500 µg
08.	Peas	Nil
09.	Bean	Nil



CONCLUSION

The carbohydrate concentration was determined following a standard curve. From the estimated results it was concluded that the potato sample contains maximum soluble sugar (490 µg/ ml). The next highest carbohydrate content was onion (320 µg/ml).

For the estimation of amino acid concentration the standard curve was made using glycine solution. A graph was drawn and from the graph it was concluded that potato (6 µg) contained highest free amino acid . Moderate level of free amino acid was present in methi and lowest free amino acid was found in carrot and in green chilli.

For the estimation of protein a standard curve was prepared. From the estimated results it was concluded that the amount of crude protein was highest in methi (460 µg), whereas the lowest amount of protein was found in radish (50 µg).

For the estimation of ascorbic acid concentration a standard curve was plotted. From the estimated results it was concluded that maximum amount of vitamin C was present in green chilli (1500 µg) whereas in several samples such as carrot, peas, potato vitamin C was not present. All samples contained a good amount of soluble sugar, crude protein, free amino acid and ascorbic acid, and hence they have a great nutritive value.

ACKNOWLEDGEMENT

I express my heartfelt thanks and sincere gratitude to my guide Dr. J.P. Thakur, Burdwan Institute of Management and Computer Science, Burdwan for his immense support and guidance providing to me throughout the entire course of this project work.

I express my deepest gratitude to Dr. Bidyut Bondopadhyay, Head of The Department of Biotechnology, BIMS, Burdwan for his never ending guidance and direction through valuable suggestions along with enthusiastic encouragement through-out the period of my work and preparation of this project report.

Last but not the least I would like to thank my parents for their constant support and encouragement in bringing this work to the present form.

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