



E-ISSN: 2278-4136  
P-ISSN: 2349-8234  
JPP 2020; SP6: 83-85

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## International Web-Conference On

**New Trends in Agriculture, Environmental & Biological Sciences for  
Inclusive Development  
(21-22 June, 2020)**

### Development of product through supplementation using beet greens and its sensory evaluation

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#### Abstract

*Beta Vulgaris* L. is an herbaceous biennial which is grown today as annual crop. It has several varieties with bulb colour ranging from yellow to red. Commonly, people in India use beet and leaves are discarded while it contains various nutrients. So, to utilize this underutilized part of beets, this study was planned. The main objective of the study was to develop low-cost food product using beet greens for population who are facing problem of iron deficiency anaemia. Beet root greens were collected, washed and sun dried for a week for making powder of it. Popular snacks Mathari was supplemented with powder of Beet root green leaves. Amount of DBGLP per serving were used 5gm and 10gm. Sensory evaluation was done with the help of 9 point hedonic rating scale. Proximate analysis of product showed Moisture 5.43%, Ash 3.4%, Fat 42%, Protein 20.21%, Carbohydrate 28.96% and calorie- 487.8 Kcal (values as per 100 gm).

Both ratio of 5gm and 10gm of DBGLP in product preparation showed same acceptability as it is noticed that beet greens are delicious too, if they are picked and cooked at the right time. As Beet greens are loaded with different nutrients and it is an underutilized part of the plant. So, we can use the powdered or fresh form of it to fortify or supplement to make low cost food products for micronutrient deficiencies.

**Keywords:** Product Development, Dried Beet root greens powder, Sensory evaluation, Supplementation.

#### Introduction

Green leafy vegetables are good source of fibre and micronutrients. Beet root leaves (*Beta Vulgaris* L.) are commonly cut off and discarded before using its bulb due to lack of knowledge of how to use them. The Beet root leaves showed significant levels of protein and lipids in all developmental stages and all proximate composition nutrients decreased during maturation stages. Beet tops are one of very versatile, nutritious green leafy vegetables. Nonetheless, they are one of the healthiest greens recommended in the diet for their low fat, no cholesterol but health benefiting vitamins, minerals and antioxidants. High quality nutrition profile of beet greens offer protection from vitamin A deficiency anemia and believed to protect from cardiovascular disease. Beet root greens leaves are loaded with Vitamin A, C, K and some key B vitamins like folate. It contains essential trace and major minerals including iron, calcium, potassium and magnesium. People consume root part and leaves remain unused. Beet root is mainly cultivated in Haryana, Uttar Pradesh, Himachal Pradesh, West Bengal and Maharashtra. Beet greens are simply the leafy portion of a beet. Beet roots can be simmered in stew used uncooked and shredded on salads or juiced. They can be steamed, roasted, boiled and braised. Aiming at use of these leaves in present study product was developed using beet greens and its acceptability was also analyzed by hedonic rating scale.

#### Materials and Method

##### Raw Material

##### 1-Dried Beet Root leaves Powder

Fresh leaves of Beet root were collected from Gorakhpur city. First the leaves were sorted and washed under running tap water. After washing leaves were hung to remove extra water. After cleaning the leaves were dried under the sun for one week. After drying the matter was grinded and prepared a fine powder of it.

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Amount-5gm, 2-Refined flour-25gm, 3-Soya flour-10gm, 4-Oil-100ml, 5-Ghee-5gm, 6-Caron seeds-1 Pinch, 7-Baking Powder -1 pinch, Salt-1 pinch.

### Product Development (Mathari)

#### Steps-

1-Refined flour+Soy flour+Carom seeds+Baking powder+Salt



2-10gm and 5gm powder of DBRLP added. Added ghee and mixed it well.



3-Added water and knead it and formed a firm dough.



4-Kept aside for 15-20 min and kneaded it again. Now divided the dough into small portions. Rolled each portion on rolling board.



5-Rolled it out into round flat surface having 1/2 inch thickness approx. and made 8-10 pricks on it with fork.



6-Deep fried and maintained the flattened circle in the same

way.

**Nutrient Analysis-** The prepared product were analysed for proximate composition.

Moisture-Moisture content of the developed product was assessed by using oven.

Ash-Amount of total ash in developed product was assessed with the help of muffle furnace.

Fat-Fat content estimation was done with the help of Soxhlet Extraction Apparatus.

Protein-Analysis of protein content of the product was done with kjeldal apparatus, Carbohydrate- Carbohydrate content of the product was calculated by using thus formula:

$$\text{Carbohydrate \% by mass} = (M+A+F+P)-100$$

M=Moisture%, A=Ash%, F=Fat%, P=Protein%

Energy-Determination of Energy content was performed using Bomb Calorimeter.

### Sensory Evaluation

The sensory evaluation of the product was performed to know its acceptability. For evaluation 9 point hedonic scale was used by semi trained judges. Range of score was 9(like extremely) to 1(dislike extremely) 3, 5. After collection of data, data was statically analyzed during computer software.

### Result and Discussion

Nutritional Composition of developed food product

**Table 1:** Nutritive Value of Developed Product

DBRLP Supplemented Mathari	Moisture %	Total Ash %	Total Protein %	Fat %	Carbohydrate %	Energy kcal
	5.43	3.4	20.21	42	28.96	487.8

Values-per 100 gm

The moisture content of the recipe was reported 5.43%. Total Ash content was 3.4%. Protein content of the recipe was found 20.21%. Fat content of the developed product was 42% and carbohydrate content was 28.96%. The 100gm of supplemented recipe provides 487.8kcal. The developed product was good source of protein, carbohydrate and calories as well as beet greens are excellent source of fibre and good source of vitamin A,K,C and folate. These are an excellent source of 5 minerals including copper, potassium, magnesium, manganese and calcium while it is a good source of iron too.4

**Table 2:** Sensory evaluation of Development Product

Product	Appearance	Odour	Taste	Flavour
Mathari	8.00	8.00	9.00	8.00
Mathari+5gm DBRLP	5.40	5.60	5.40	5.80
Mathari+10gm DBRLP	4.80	4.40	4.60	4.80

The table revealed the sensory evaluation using 9 point hedonic rating scale, about appearance, odour, taste and flavour of the food product.

According to the data of the table all the products acceptability was good in context of its appearance, odour, taste and flavour. Highest acceptability (8.00) was seen for control product while 5gm DBRLP incorporated mathari showed less acceptability (5.80) than control product

(Mathari). Least acceptability (4.80) was seen for 10gm DBRLP incorporated mathari. The range of acceptability of 5gm DBRLP mathari rated as liked slightly and 10gm DBRLP mathari was neither liked nor disliked. So, the analysis indicated that as the amount of DBRLP increased in the product acceptability of the product was decreased. Similar results were quoted by Kaur and Awasthi 6 that the increase in levels of both food remnants (Pomace and Cauliflower green) was decreasing acceptability.

### Conclusion

Beet root greens are an excellent source of vitamin K, vitamin A (in the form of carotenoids), vitamin C, copper, potassium, manganese, vitamin B<sub>2</sub>, magnesium, vitamin E, fiber and calcium. They are very good source of iron, vitamin B<sub>1</sub>, B<sub>6</sub> and pantothenic acid as well as phosphorus, protein and good source of zinc, folate and vitamin B<sub>3</sub>. The present study was carried out to develop the food product using powder of beet root leaves and to evaluate the acceptability of the product. The proximate analysis of the product showed that 100gm of developed product contains 5.43% moisture, 3.4% ash, 42% fat, 20.21% protein, 28.96% carbohydrate and 487.8 kcal energy. Addition of 5gm and 10gm of DBRLP was found acceptable but as the amount of DBRLP was increased, acceptability of the product decreased. So, we should promote the use of beet root greens or powder of it in our recipes for a powerful nutrient dense super food.

**Acknowledgement**

We are thankful to Regional Food Research and Analysis Centre Lucknow for helping us in proximate analysis of developed food product.

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