

A PERSPECTIVE STUDY ON NATURAL COLOURANTS (RED BETA VULGARIS) AND DEVELOPMENT OF VALUE ADDED PRODUCTS

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Abstract

Food colouring, or colour additive, is any dye, pigment or substance that imparts colour when it is added to food or drink. They come in many forms consisting of liquids, powders, gels, and pastes. Food colouring is used both in commercial food production and in domestic cooking. Food colorings are a common additive used in the production of foods and beverages. A colour is deemed natural if its origin is vegetal, microbiological, animal or mineral. Whereas, artificial colors were created in labs (and sometimes accidentally) by chemists. Natural ingredients are derived from natural sources – for example, Beets, Carrot, Bougainvillea, Amaranth and some berries provide that is used as a food coloring. Many other additives, however, are not found in nature and, therefore, must be synthetically produced as artificial ingredients but it has known hazardous health effects. The three most widely used synthetic food colour - Yellow 5, Yellow 6 and Red 40 - contain compounds, including benzidine and 4 - aminobiphenyl, that research has linked with cancer.

The root vegetable beetroot has an array of colour pigments within, commonly known as betalains. Pigments extracted from red beetroot powder can provide various shades of reds, pinks, purples, oranges and yellows. Commonly these extracted pigments are utilised in dairy products, confectionary, fruit preparations , beverage and also for other recipes. Beets are a unique source of phytonutrients called betalains. Betanin and vulgaxanthin are the two best-studied betalains from beets, and both have been shown to provide antioxidant, anti-inflammatory, and detoxification support. *As the nutritional value of beetroot juice is very high due to its high content of carbohydrate, folate, fiber, iron, nitrate, manganese, potassium, vitamin C and in addition to that free fat, low in calories, inexpensive and beets are available throughout the year, the present project was undertaken to create awareness on the consumption of artificial and synthetic colourants.*

Keywords : *Betalains, Betaxanthins, Phytonutrients, Antioxidant, Healthylife.*

1. Introduction

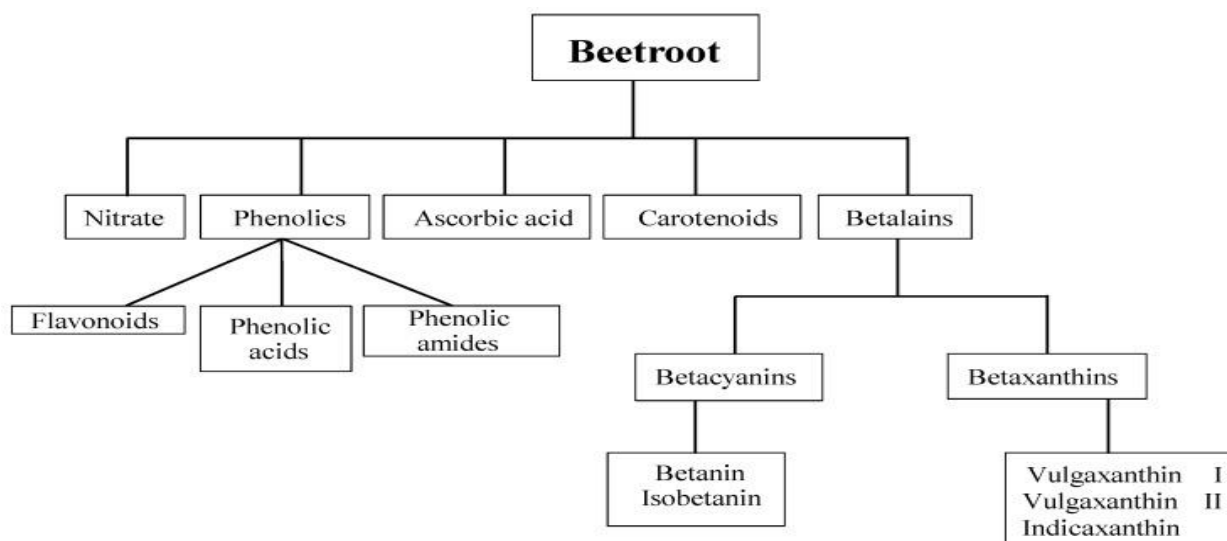
Natural colourants have been utilised by the food industry for many years. The growing consumer demand to deviate from synthetic dyes has prompted researcher to source alternative colour pigments from fruits and vegetables. Recently, beetroot is gaining popularity as a ‘**super food**’ due to its health beneficial value. Beets are highly nutritious and “cardiovascular health” friendly root vegetables. Certain **unique pigment antioxidants** in this root and its top greens have been found to offer protection against coronary artery disease and stroke, lower cholesterol levels within the body, and have anti-aging effects. Beets are a unique source of phytonutrients called betalains. Betanin and vulgaxanthin are the two best-studied betalains from beets, and both have been shown to provide antioxidant, anti-inflammatory, and detoxification support. The study focused with the standardization and development of the products using natural colourants and to educate the adolescents on the significant roles and therapeutic benefits on natural colourants.

2. Materials and Methods

Among red colour of Bougainvillea, Amaranth, and many Cacti, beets possess deep red colour because of the presence of betalain pigments. Hence, the beetroot was selected for the study because of the colour retention and stability which is comparatively high than other betalain pigmented plants. And also Betanin has nearly no potential allergen. Betanin absorbs well from the gut and acts as an antioxidant. The good quality of beets were purchased from the department store and it was weighed. Avoid those with slump looking or soft in consistency, over-mature and large Beet roots. The fresh, bright, firm textured beets with rich flavor and uniform size were selected for the study. The weight of the beetroot was recorded. Then it was subjected to washing and cleaning of dirt.

$$\text{Percentage of edible portion} = \frac{\text{weight as purchased}}{\text{weight of the edible portion}} \times 100$$

OVERVIEW OF POTENTIALLY BIOACTIVE COMPOUNDS IN BEETROOT



A physical property is any property that is measurable, whose value describes a state of a physical system. The processed beet root powder was subjected to moisture content, ash content, betalain content analysis and the pH content of beet root powder were also analyzed. Reducing the moisture content of food prevents the growth of these spoilage-causing microorganisms and slows down enzymatic reactions that take place within food, therefore the powder was subjected for dehydration. Finally the red fine powder was packed and stored in an air tight container in the room temperature or in refrigerator to maintain the shelf life of the product. Products need to be preserved and protected in order to reach their destination in perfect condition.

The food products were formulated and developed with the incorporation of beet root powder. The recipes were standardized and formulated with incorporation of 5% and 10% level of natural colorants. The education and popularization among the students were done, to impart natural colourants in their dietary habits by the preparation and demonstration of recipes with the incorporation of beet root powder. Marginal cost of the natural colourants and synthetic colourants were compared for affordable cost. An increase or decrease in the volume of good products translates to costs of goods produced, therefore, it is important to know the difference.

3. Results and Discussion

The percentage of the edible portion was predicted in the following table

TABLE – I PERCENTAGE OF EDIBLE PORTION

| S.NO | Name of the Ingredients | Weight as Purchased (g) | Weight of Edible Portion (g) | Percentage of Edible Portion (%) |
|------|-------------------------|-------------------------|------------------------------|----------------------------------|
| 1 | Beet root | 500 | 430 | 117% |

TABLE – II VALUES OF PHYSICOCHEMICAL PROPERTIES

| PHYSICOCHEMICAL PROPERTIES | VALUES |
|----------------------------|------------------|
| Ash | 4.9% |
| Moisture | 3.8% |
| pH (1% solution) | 5.0 |
| Betaline | 1.3% (13.2 mg/g) |

TABLE – III NUTRITIVE VALUE OF BEETROOT

| NUTRIENTS | AMOUNT / 100 gm |
|------------------|-----------------|
| Energy(K.cal) | 43 |
| Carbohydrates(g) | 8.8 |
| Protein (g) | 1.7 |
| Vitamin C (g) | 10 |
| Potassium (mg) | 43 |

Acceptability is a subjective measure, which in turn is influenced by the sensory properties of the food, previous exposure to it and subsequent expectations, contextual factors, an individual's culture, physiological status.

The sensory evaluation of food is achieved by using score card. The overall acceptability of averages score obtained through organoleptic evaluation of formulated recipes were given below.

TABLE – IV OVERALL ACCEPTABILITY OF STANDARD AND VALUE ADDED POORI

| CRITERIA | STANDARD | 5% | 10% | AVERAGE |
|-----------------------|----------|-----|-----|---------|
| Appearance | 3.8 | 3.5 | 4.5 | 4 |
| Colour | 4.5 | 5 | 5 | 5 |
| Taste | 5 | 5 | 5 | 5 |
| Texture | 5 | 5 | 5 | 5 |
| Flavour | 5 | 5 | 5 | 5 |
| Overall acceptability | 3.6 | 4.5 | 4.8 | 4.8 |

FIGURE - I
OVERALL ACCEPTABILITY OF STANDARD AND VALUE ADDED DOSA

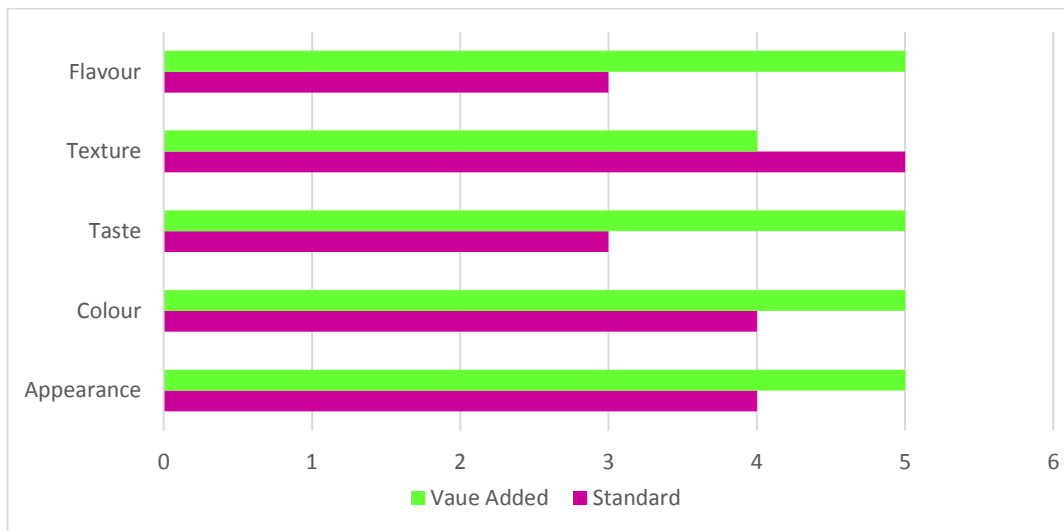


FIGURE - II
OVERALL ACCEPTABILITY OF STANDARD AND VALUE ADDED GULAB JAMUN



TABLE – V OVERALL ACCEPTABILITY OF STANDARD AND VALUE ADDED PANCAKE

| CRITERIA | STANDARD | 5% | 10% | AVERAGE |
|-----------------------|----------|-----|-----|---------|
| Appearance | 4.3 | 4 | 4 | 4 |
| Colour | 2.5 | 5 | 5 | 5 |
| Taste | 3.5 | 4 | 4 | 4 |
| Texture | 4.5 | 3.5 | 3.5 | 3.5 |
| Flavour | 4 | 3.5 | 3.5 | 3.5 |
| Overall Acceptability | 3.76 | 4 | 4 | 4 |

FIGURE - III
OVERALL ACCEPTABILITY OF STANDARD AND VALUE ADDED KULFI

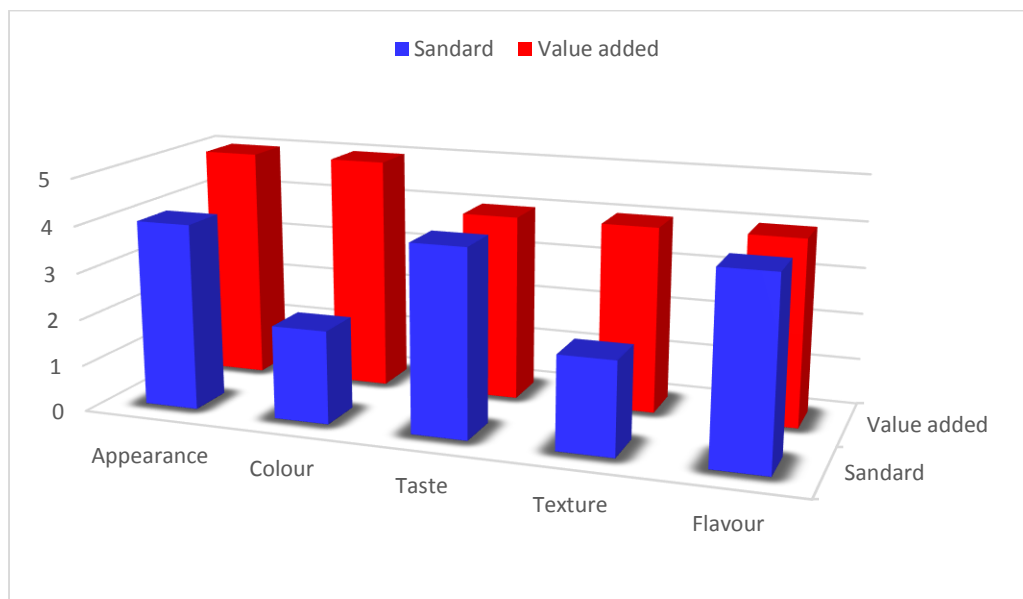


TABLE - VI OVERALL ACCEPTABILITY OF STANDARD AND VALUE ADDED LOLLIPOP

| CRITERIA | STANDARD | 5% | 10% | AVERAGE |
|-----------------------|----------|-----|-----|---------|
| Appearance | 4 | 3 | 5 | 4 |
| Colour | 2 | 5 | 5 | 5 |
| Taste | 3.5 | 3.5 | 3.5 | 3.5 |
| Texture | 4.5 | 3 | 5 | 4 |
| Flavour | 4 | 4 | 4 | 4 |
| Overall acceptability | 3.6 | 3.7 | 4.5 | 4.1 |

TABLE - VII COMPARITIVE NUTRITIVE VALUE OF STANDARD AND VALUE ADDED KULFI

| NUTRIENTS | STANDARD | VALUE ADDED | |
|------------------|----------|-------------|-------|
| | | 5% | 10% |
| Energy(K.cal) | 447 | 449.1 | 451.3 |
| Carbohydrates(g) | 68.7 | 69.1 | 69.5 |
| Protein (g) | 12.9 | 13.0 | 13.1 |
| Vitamin C (g) | 2 | 2.5 | 3 |
| Potassium (mg) | - | 2.15 | 4.3 |

TABLE - VIII
COMPARITIVE NUTRITIVE VALUE OF STANDARD AND VALUE ADDED PAN CAKE

| NUTRIENTS | STANDARD | VALUE ADDED | |
|------------------|----------|-------------|-------|
| | | 5% | 10% |
| Energy(K.cal) | 942.5 | 944.6 | 946.8 |
| Carbohydrates(g) | 184.0 | 184.4 | 184.9 |
| Protein (g) | 18.4 | 18.5 | 18.6 |
| Vitamin C (g) | 1.4 | 1.9 | 2.4 |
| Potassium (mg) | 490.1 | 492.2 | 494.4 |

TABLE – IX
COMPARITIVE NUTRITIVE VALUE OF STANDARD AND VALUE ADDED LOLLIPOP

| NUTRIENTS | STANDARD | VALUE ADDED | |
|------------------|----------|-------------|-------|
| | | 5% | 10% |
| Energy(K.cal) | 238.8 | 240.9 | 243.1 |
| Carbohydrates(g) | 57.6 | 58.0 | 58.5 |
| Protein (g) | 0.08 | 0.16 | 0.25 |
| Vitamin C (g) | - | 0.5 | 1 |
| Potassium (mg) | - | 2.15 | 4.3 |

4. SUMMARY AND CONCLUSION

This study shows the alternative way for the usage of food colourants by naturally and homemade. The natural colourants gives colour to the food in addition to this also enhances the nutritive value of food. This food colourants can be added to any type for colour and also to enrich the nutritive value. This natural food colourants are not produce any allergies and other hazardous to health like synthetic colourants.

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