A PROJECT REPORT

on

Preparation of Red Cabbage Powder and Proximate Analysis

Submitted to

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Supervised by

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Submitted by

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LETTER OF ACCEPTANCE

To

Professor Dr. Md. Bellal Hossain

Department of Nutrition and Food Engineering (NFE)

Daffodil International University

Subject: Submission of Project Report.

Dear Sir,

I would like to take this opportunity to thank you for the guidance and support you have provided me during the course of this report. Without your help, this report would have been impossible to complete.

To prepare the report I collected what I believe to be the most relevant information to make this report as analytical and reliable as possible. I have concentrated my best effort to achieve the objective of the report and hope that my endeavor will serve the purpose. The practical knowledge and experience I have gathered during preparation report will immeasurably help in my future professional life. I request you to excuse me for any mistake that may occur in the report despite of my best effort.

I would really appreciate if you enlighten me with your thoughts and views regarding the report. Also, if you wish to inquire about an aspect of my report, I would gladly answer your queries.

Thank you again for your support and patience.

Faisal Sardar
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DEDICATION

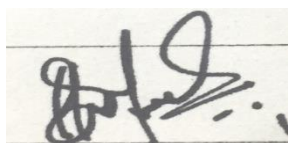This research work is dedicated to my beloved father **Mr. Shajahan** and mother **Mrs. Nurjahan.**

Letter of Recommendation

This is to certify that the project report entitled *"Preparation of Red Cabbage Powder and Proximate Analysis"* submitted for assessment to the examination committee by Faisal Sardar ID No: 162-34-555 of the Department of Nutrition and Food Engineering. I am pleased to declare that this report is entirely written by the author and all related research work has been conducted by the researcher under my strong supervision and observation. This is a piece of original work and has neither been submitted to nor been published anywhere before for any other purpose.

I strongly recommended the approval of the report by the authority and by the same token, I also recommended a positive and fare evaluation of the work.

I wish every success in his life.

YoursSincerely

Dr. Amir Ahmed
Associate Head
Department of Nutrition and Food Engineering
Daffodil International University

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ABSTRACT

The aim of this work is to develop red cabbage powder and examine the nutritional content by proximate analysis. Red cabbage containsanthocyanin's that dissolve in water, have antioxidant properties, and have a fairly wide range of colour changes owing to changing pH. These characteristics not only make red cabbage useful as an acid–base indicator. The main objectives of this study was to determine the proximate composition. Nutritional properties of red cabbage powder and evaluate the quality of its contents. The chemical analysis of red cabbage powder as per the examined samples are Protein_10.94%, Ash_ 5.2%, Moisture_5.5%. Moisture content was determined by using moisture analyzer, Ash content was determined by muffle furnace, Protein content determined by Kjeldahl apparatus. Red cabbage powder can be used in many cooked food as a supplement for antioxidant and dietary finer. In this study newly prepared red cabbage powder was used in chicken corn soup as supplement. The soup appeared with extraordinary colour and texture, improved thickness and taste. Sensory evaluation of the product was also satisfactory. It is concluded that red cabbage powder can be used as nutritional supplement in amy cooked food with local and international recipes to improve protein and finer contents.

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Chapter 1

Introduction

Red cabbage: ***Brassica oleracea var. capitate f. rubra***

There are hundreds of varieties of cabbage, from the vibrant red cabbage to the common white cabbage. They grow all over the world and are highly versatile –they can be steamed, stewed, fermented, pickled, sautéed and even eaten raw too! There are many health benefits of this vegetable as its high in vitamin C and vitamin K.

Alongside other popular vegetables including broccoli, Brussels sprouts, cauliflower and bok choy, cabbage is known as cruciferous. These vegetables have gained this title because of the shape of their leaves which are said to resemble a cross.

As with broccoli and cauliflower, cabbages come in all shapes and sizes with the largest ever grown reaching a whopping 62 kg! There's also variety in the leaves of cabbages as some are smooth and crunchy whilst others are soft crinkled. Cabbages are well known for their odorous smell but this only comes about when it's over-cooked therefore, if the vegetable is cooked correctly, the air freshener won't be necessary!

Bearing this in mind, white cabbage makes a healthy side dish to many dinners but, equally, it can be used as the basis for a main too. White cabbages have a round, firm shape and leaves that are tightly packed, shiny and pale green in color. The taste is mild with just a little bit of sweetness which makes them great for coleslaw and salads. After being finely chopped, white cabbage is often used in sauerkraut as well. Although sauerkraut has a slightly sour taste, this fermented food is incredibly healthy and is great for your gut too!

Red cabbages are also fairly common on supermarket shelves and, with lots of tightly packed layers, a little can go a long way! This variety is ideal for pickling, braising or for adding a bit of color to your salads. There are hundreds of types of cabbage available but as well as white and red, savoy cabbage is also one of the more popular varieties. With its dark green and crinkles leaves, this is often viewed as a winter vegetable. It has a strong, flavor so most prefer to cook it rather than adding it to salads.

1.1 Chemical composition of Red Cabbage

Red cabbage has a high content of vitamin C and vitamin A, containing 44% and 72%, respectively, of the daily value (DV) per 100-gram amount.

1.2 Nutritional facts of Red Cabbage

Nutritional value per 100 g	
Energy	122 kJ (29 kcal)
Carbohydrates	6.94 g
Sugars	3.32 g
Dietary fiber	2.6 g
Fat	0.09 g
Protein	1.51 g
Vitamins	**Quantity% DV†**
Vitamin A equiv.	0%
beta-Carotene	2 mg
	0%
	20 mg

Folate (B9)	6%	
	24 mg	
Vitamin C	41%	
	34.4 mg	
Vitamin K	45%	
	47.6 mg	

1.2 About Red Cabbage Powder

Red Cabbage is red food color made from purple cabbage through extraction, concentration, refining and sterilizing processes. Its main compositions are anthocyanin and flavones. It is a red purple liquid or powder which is easily dissolved in water and water alcohol solutions. It has good heat and light resistant and storability. The pH value of the solvent will affect its hue. It will become red or red purple in acid, blue in neutral and green in alkaline. It is widely used in food, beverage, pharmaceutical, cosmetic and other industries. It is an ideal colorant used in wine, drink, syrup, jam, ice cream, pastry and so on.

1.3 Literature review

Fresh cabbage juice, prepared either separately or mixed with other vegetables such as carrot and celeryis often included in many commercial weight-loss diets (Samec, 2011),diets that improve the bioavailable content of nonheme iron (Chiplonkar et al., 1999),as well as alternative therapies for cancer patients (Maritess et al., 2005)

The values of cabbage varieties obtained by FRAP assay were between 16.39 µmol TE/g fw for Savoy and 80.87 µmol TE/g fw for Red varieties. However, the antioxidant capacity also depends on several other factors including genetics, environmental conditions, production techniques used, date of harvest and post-harvest storage conditions (Dumas et al., 2003).

This crop has been recognized as modern multitasker's dream food for its numerous benefits that it provide us (Das et al., 2014). The crop can be harvested are 3 months of harvesting. It is cultivated in America, Europe, Asia (China, India etc.).

It protects us from cancer, premature ageing, diabetes, ulcer and Alzheimer's diseases. It helps in weight loss, boosting the immune system, improving the skin and eye and detoxification of body. Secondary plant metabolites like glucosinolates (GSs) present in red cabbage are known for the health-promoting properties (Verkerkand Dekker, 2004). These natural chemicals breakdown into compounds like indole-3-carbinol, which has anti-cancer property. Flavonoids of the crop have good therapeutic potential in inflammation and pain (Shama et al., 2012).

1.4 Objective:

There are three key objects as follows:

i. To develop a nutritious red cabbage powder.

ii. To conduct a proximate analysis for determining the nutritional value.

iii. To develop a soup using red cabbage powder to enhance the nutritional content of the meal.

1.5 Scope of study

I. To determine the general acceptability of red cabbage powder as nutritional supplement in many cooked foods.

II. To evaluate the chemical characteristic of red cabbage powder.

1.6 Methodology

The study of the red cabbage powder was made using the following equipment, ingredient & utensil.

1.7 Materials & Method

The experiment was conducted in the laboratory of the Department of nutrition & food engineering in daffodil international University of Bangladesh. Red cabbage collected from local market.

1.8 Collection of raw materials

The fresh Red cabbage was collected from the local market. The Red cabbage was use to prepare Red cabbage powder.

Chapter 2

2.1 Collection of tools & apparatus

- Knife

- Chopping board

- Bowl

- Blender machine

- Measuring cylinder

- Beaker

- Conical flaks

- Solar dryer

- Oven

- Sauce pan

- Tissue

- Spoon

- Frying pan

- Tray

2.2 Prepared Red Cabbage Powder

500 gm Red cabbage

2.3 Red Cabbage Powder preparation

Red Cabbage Powderpreparation is used in two steps. First step is Red cabbage is to dry & second step is to blend.

2.4 First step of fresh Red cabbage

1. **Selection**

- Lack of insect & injuries

- Check the maturity

- Check color

- Check texture

2. Washing

Select Red cabbage & it is washed by the clean water.

3.Red cabbage preparation

- Collect the red cabbage from the local market

- Then the red cabbage cut in to slices.

4. Blanching

balancing the red cabbage.

5. Drying

In this process solar drier is used to make it dry to remove moisture content solar drier is used.

Figure: 2.3.1 raw red cabbage

Figure: 2.3.2 raw red cabbage

2.5 Second step powder from raw Red Cabbage

In this step dried Red cabbage make blend with blender machine

Figure: 2.4.1 Red cabbage powder

2.6 Flow chart of Red Cabbage powder

Red cabbage

Washing

Slices

Balancing

Drying

Blend

2.7 Red cabbage powder soup

1. 2 Tablespoon olive oil

2. ½cup red cabbage powder

3. 1 leek sliced

4. 1 onion, peeled and chopped

5. 1 small potato, peeled and diced

6. 100 ml almond milk

7. 1 teaspoon salt

2.4.3 Red cabbage powder soup

Instruction

1. Heat the olive oil in a large saucepan over moderate heat. Added the leeks and onion and a pinch of salt and sautéfor about 3 minutes until soft. Added the potatoes and water and sautéfor 10 minutes until the potatoes cooked. Then added the red cabbage powder and sautéfor 5 minutes bring to boil over medium heat and when it has reached a boil remove the saucepan from the heat.

2. Added the almond milk, salt with a hand mixer, mix it all well until perfectly combined.
3. Serve it hot.

Chapter 3

3.1 Determination of Ash content

The ash content is a measure of the total amount of minerals present within a food .In the ash content water and organic matter have been removed by heating in the presence of oxidizing agents, measure of the total amount of minerals within a food.

Hog plum bar: In the ash content source of heat come from the Drying oven. At first take the crucible and annex the weight of crucible then take the weight crucible with sample in measuring machine. Impart the crucible in the oven for 6h and it temperature is 600°C. After passing 6h the oven is off then wait 3h for cool it and put it in the dedicator.

Figure: 3.1.1 MuffleFurnace

Calculation:

Calculation

% ash content = (C-A) / (B-A) x100

= (23.916-23.76) / (26.76-23.76) x100

= 5.2%

 B= Weight of empty dish + Weight of sample = 26.76

C=Weight dish + ash = 23.916

Result: The result of ash content is 5.2%

3.2 Determination of moisture content of Red Cabbage Powder

The moisture content of samples was determined using hot oven method. Weight the empty crucible .then add   of sample was put into a washed & dried crucible dish weight it & placed in a phoenix oven at a temperature of 105 *c for 1 hour. After drying weight the crucible with sample .the weight loss obtained as the moisture content & was calculated as:

Figure: 3.2.1 Moisture content oven

$$\% \text{ moisture content} = (w2-w3) / (w2-w1) \times 100$$

Here,

W1=initial weight of empty crucible =17.907

W2=weight of crucible + sample =20.907

W3=final Wight of crucible + sample (after heat) =20.742

Results: The result of moisture content is   5.5% moisture of the sample.

3.3 Determination of protein content

Materials required:

1. H2SO4
2. Digestion mixture (2g CuSO4 +98 K2SO4)
3. 40% NaOH
4. 0.1 N HCL
5. Methyl red indicator
6. 0.1 NaOH
7. Distilled water

Procedure:

Digestion:

1. First of all take 0.4gm of water caltrop, H2SO4 10ml, and digestion mixture

2. Then it was put on the digestion flask.

3. After that, use two digestion flasks for this procedure average value can be taken

4. Then heat slowly then increase heat and heat about 15-18 hours.

5. The end point will be no smoke of H2SO4 and the solution will be crystal clear

6. Then cool it for some time.

Fig: 3.3.1 Digestion machine

Distillation:

1. At first taken volumetric flask then make it 100ml level using distilled water for pour the solution.

2. Then taken 10ml from that conical flask to the distillation flask.

3. Then taken 150ml distilled water and 10ml 0.1N HCL and 2 drops of methyl red (1%) in the trapping conical flask.

4. After that use 3 distillation flasks for this procedure where one of them will be blank (no sample)

5. Only take 150ml distilled water with 10ml 40% NaOH.

6. Then use 3 trapping solution in 3 trapping conical flasks remaining the same thing.

7. Then set up the condenser and start it.

8. Start the distillation unit and run for 30 minute.

Fig: 3.3.2 Distillation machine

Titration:

1. Fill the burette with 0.1N NaOH.
2. Then taken 25ml HCL on trapping flax.
3. Do the titration 3 times with 3 trapping solution.
4. The endpoint will be color changes from pink to light yellow.

Calculation:

(B-S) ×1.4×10 ×6.25 ×0.1 / Sample weight

= (10-9.5) ×1.4 ×10 ×6.25 ×0.1 / 0.4

= 10.94%   **Result:** The protein content of red cabbage is 10.94%

3.4 Health and medical benefit of red cabbage

One of the main reasons why red cabbage is such a popular vegetable addition to meals is the wealth of phytochemicals, antioxidants, nutrients, vitamins, and minerals These essential components include thiamin, riboflavin, folate, calcium, manganese, magnesium, iron, and potassium, as well as vitamin C, vitamin A, vitamin K, dietary fiber, and the B vitamins. Its organic compounds are almost too many to list, but its antioxidants like anthocyanin and indoles are extremely valuable for human health.

Other benefits:

1. Reduces cancer risk.
2. Weight loss
3. Anti-aging properties
4. Eye care
5. Boosts Immune system
6. Increase bone mineral density
7. Protects from Alzheimer's disease

Chapter 4

4.1 Result & Discussion

The data is collected on different aspects were arrange and analyze the statistically using the methods analysis of variance and very critical difference technique. The significant and non-significant difference observed have analyzed critically within and treatment combination.

The result was obtained from the analysis are presented in this chapter under the following below.

Moisture (%)	Ash (%)	Protein (%)	
5.5	5.2	10.94	

Table 2: Chemical composition of Red cabbage powder

Moisture content

The moisture of red cabbage powder was found 5.5%.It is proven that these red cabbage carried good amount of water content to making their flesh from.

Ash content

The ash content of red cabbage powder cheeps was found 5.2%.

Protein content

It can be observed from upon the table 10.94%. In red cabbage powder has contain 10.94% protein. So this is very helpful for our health.

4.2 Conclusion:

Red Cabbage sometimes called a supper food is a very nutritious vegetable that can be added in diet chart specially for antioxidant and dietary finer. It contains Calories: 22, Protein: 1 gram, Fiber: 2 grams, Vitamin K: 85% of the RDI, Vitamin C: 54% of the RDI, Folate10% of the RDI, Manganese: 7% of the RDI, Vitamin B6: 6% of the RDI. In this red cabbage powder was developed and examine the nutritional content by proximate analysis. Nutritional properties of red cabbage powder has been examined and the quality of its contents has been evaluated. The chemical analysis of red cabbage powder as per the examined samples are Protein_10.94%, Ash_5.2%, Moisture_5.5%. Moisture content was determined by using moisture analyzer, Ash content was determined by muffle furnace, Protein content determined by Kjeldahl apparatus. Red cabbage powder can be used in many cooked food as a supplement for antioxidant and dietary fiber. In this study newly prepared red cabbage powder was used in chicken corn soup as supplement. The texture and colour of the soup appeared extraordinary. The thickness and taste were also improved. Sensory evaluation of the product was also satisfactory. It is concluded that red cabbage powder can be used as nutritional supplement in amy cooked food with local and international recipes to improve protein and finer contents.

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