Daffodil International University

# Department of Nutrition and Food Engineering

## PROJECT REPORT

*Analysis of Physico-chemicals properties of new source of Antioxidant rich potatoes*


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# Date of Submission:

## LETTER OF TRANSMITTAL

Professor Dr. Md. Bellal Hossain
Head
Department of Nutrition and Food Engineering
Daffodil International University

Date:

**Subject: Submission of my project report**

**Dear Sir,**

With due respect, I would like to inform you that, it is a great pleasure for me to submit the project report on "**Analysis of physico-chemical properties of new source of Antioxidant rich potatoes"**. It is the partial fulfilment of the requirements to achieve BSc Engineering from Daffodil International University. I have given my best efforts to make this report specific and coherent.

To prepare the report, I have collected what I feel to be most relevant data with specific accuracy and precision. The practical knowledge, application software and experiencesI have obtained during the report preparation will immeasurably help in my professional life. I request u to excuse me for any unwanted mistakesthat may occur in the report despite of my best effort.

I have followed all the instructionsDr. Mahatbuddin given to me what need to exist in a well prepared report and I will be highly grateful if u accept my project report.

Thank you again for your support and consideration.

Sincerely Yours,

Jerin Afrose Annhi
ID: 152-34-311
Department of Nutrition and Food Engineering
Daffodil International University

# Letter of Authorization

Dr. Md Bellal Hossain
Department of Nutrition and food Engineering
Faculty of Allied Health
Daffodil International University

Date:

Subject: Declaration regarding the validity of the project report

Dear Sir,

This is my truthful declaration that the “Analysis of physico-chemical properties of new source of Antioxidant rich potato” I have prepared is not a copy thesis report previously made any other students.

I also express my honesty confirmation in support to the fact that the said thesis report has neither been used before to fulfill my other course related not it will be submitted to any other person an authority in future.

Sincerely yours,

Jerin Afrose Annhi
ID: 152-34-411
Department of Nutrition and Food Engineering
Daffodil International University

## Certification of approval

I am pleased to certify that the report on the study on "Analysis of physico-chemical properties of new source of Antioxidant rich potato". Conducted by Jerin Afrose Annhi bearing (ID No: 152-34-411) of the department of Nutrition and Food Engineering has been approved or presentation and defense/viva-voice. I am happy to recommended the report presented by Jerin Afrose Annhi consists new varieties of potatoes which is not a copy of any other projects submitted anywhere. I need to train up him from very basis level, which evokes me to request the Head of the Department to arrange or allot a 3 credit course to their students to teach basic research methodologies that could help the students to generate more efficient and productive project reports. However, her keen interest and devotion to research mark her as one of the top scorers compared to average students in DIU. It was my pleasure working with her. I wish her all success in life.

Dr. Md.Bellal Hossain
Professor and Head
Department of Nutrition and food Engineering
Faculty of Allied Health
Daffodil International University

Dr. Sheikh Mahatabuddin
Associate Professor
Department of Nutrition and Food Engineering
Faculty of Allied Health
Daffodil International University

# ACKNOWLEDMENTS

I am expressing my heartfelt gratitude to the Almighty Allah, as I finished my project report in the appropriate time for this special kindness to give me the opportunity to complete the project report successfully. I am grateful to each and every people who are involved with me in my every phase of my life.

I am grateful to my oldsters while not whom I can't be here. Without the support of my oldsters, I couldn't be ready to deliver the goods objectives and goals.

I would also like to express my great respect & warmest thanks to my project co-supervisor, Dr. Sheikh Mahatabuddin for his whole-hearted help and supervision during my project work and organizational attachment period.

I would like to convey gratitude to our honorable Dean, Faculty of Allied Health Science,

Professor Dr. Ahmed Ismail Mostafa for his kind cooperation to accept this degree.

I am deeply indebted to my supervisor Prof. Dr. Md. Bellal Hossain, Head of Department of Nutrition & Food Engineering, Daffodil International University for his whole-hearted supervision during my organizational attachment period.

I also grateful to all the other NFE Faculty member for their great help during university life.

Finally, I wish to express immense gratitude & humbly convey my heartfelt respect to the Managing Director.

# Abstract

Bangladesh ranked 7$^{th}$country in the world and 3$^{rd}$country in Asia among all the potato producing countries. This is the third major vegetable consumed by Bangladeshis, which indicate its importance as source of nutrient and potentiality to be source of preventive therapeutic crop. Introduction of new antioxidants, polyphenols, and carotenoids rich varieties could offer the prospect to use this widely used vegetable as a source of therapeutic biomaterials for anticancer or heart disease. In Indian subcontinent, people suffer from mal-nutrition especially in rural area. Sweet potatoes are not as expensive so poor people of rural areas can afford this easily. So, it is important to know the nutritional content of potatoes and sweet potatoes.Sweet potatoes come in many different colors. The skin can be white, yellow, red, purple or brown, and the flesh can be white, yellow, orange or purple. However, in the United States, there are two main varieties of sweet potato: one has a golden skin with creamy white flesh and a crumbly texture.In Bangladesh sweet potatoes grows well because of its climate. It is easy to cultivate and less expensive. So if we grow it more and supply to the poor people then malnutrition problem could be solved.Sweet potatoes are available a range of colors, including those with white, yellow, orange or purple flesh. The purplevarieties contain the foremost antioxidants, and also the white-fleshed varieties contain the smallest amount of those helpful nutrients, in keeping with a study revealed in "Food Chemistry" in 2007. Different flesh of colored potato like yellow, purple, orange are also out there. However, the foremost common kind of sweet potato is that the one with copper-colored skin and soft orange flesh. To address these scientific challenges 14 new varieties of potatoes, including colored species, have been collected and their drying kinetics, total suspended solid content, effect of pH on their extracts have been observed. Irrespective of colors these varieties have higher amount of total suspended solids (TSS), lower drying rates and solid content compared to available varieties in Bangladesh. Concomitantly, the TSS and drying kinetics suggested that, these varieties have the prospect to be the major source of Antioxidants and water insoluble nutrients to confirm their supremacy as food compared to existing species. Physico-chemical properties are important to know because Bangladesh is a developing country.

# Table of Content

# *CHAPTER-01*

# *INTRODUCTION*

# 1.1 Introduction:

The Potato, scientific name *"Solanum Tuberosum"*has been denoted as the third most consumed crop globally behind rich and wheat [1].Potato is an English word originated from Spanish word patata.According to Royal Academy Sciences, Pata is a hybrid of the Taino Batata (Sweet Potato) and the Quechua papa (potato) [2]. Potatoes, a versatile crop, can be cultivated in diverse environments and are currently grown in 100 different countries [3]. It has been consumed in all over the globe, because of its low fat content and availability. Potato crops can yield 9.2 M calories per acre, which is more than that of maize (7.5M), rice (7.4M), Wheat (3M), and Soybean (2.8M) ([3] Ensminger et al. 1994).

The part of the potato consumed by us is a transformed tuber that grows under the ground. Andean plateaus of South America originally discovered potato and set out to conquer the world around 6,000 years ago when the Inca Indians first cultivated them. There are about 5,000 Potato varieties worldwide. Three thousands of them are also found in the Andes alone, Mainly Peru, Bolivia, Ecuador, Chile and Colombia. Themodern potatoes found all over the world was discovered in the 16th century by Spanish explorers in Peru. They belong to eight to nine species, depending on the taxonomic school. Apart from the 5,000 cultivated varieties, there are regarding two hundred wild species and taxonomic category, several of which may be cross-bred with cultivated varieties. There are close to 4000 varieties of potato including common commercial varieties, each of each of which has specific agricultural or culinary attributes.

In United Kingdom, there are around 80 varieties of potatoes. In general, varieties area unit classified into a couple of main teams supported common characteristic like russet potatoes (rough brown skin), red potatoes, white potatoes, yellow potatoes (also known as Yukon potatoes) and purple potatoes.Whether mashed, baked or roasted, people often consider potatoes as enjoyable dish irrespective breakfast, lunch or dinner in the Indian subcontinent. According to, World Food Organization (WFO) it has the 4$^{th}$place based on the amount consumed per day [??].In addition to potatoes, sweet potatoes also been consumed widely in our country or neighboring countries. After rice, wheat and potato, sweet potato is the fourth important crop in Bangladesh. It cultivated in different areas of Bangladesh especially river sides. Sweet potato covers about 58 thousand hectares which is

nearly 0.70% of the total crop area in Bangladesh producing 7.20 lakhs tones annually with an average of 12.41 tones per hector (BBS, 2007).Aforementioned information proven the importance of potatoes and sweet potatoes in our country. A Potato contains negligible fat, 79% water, 17% carbohydrates and 2% protein. Potatoes also contain fiber it may help in lower the total amount of cholesterol in the blood. It is well known that, the Potatoes are naturally gluten-free and they are packed with nutritional benefits needed for healthy lifestyle. It is also a good source of vitamin B6, magnesium and minerals.

Different types of sweet potatoes are cultivated all over the world. It cultivated in both tropical and subtropical reason. It grows easily and quickly at ambient condition and widely cultivated in China, Uganda, Nigeria, Vietnam, India, Malaysia, and United states. But among them widely commercial sweet potato producers are China, Japan, and India.Comparatively sweet potato have better attributes over normal potato. It has short production cycle, high nutritional value, good taste and texture. To increase the awareness about new source of antioxidant rich potatoes among people, we should provide them a clear knowledge about its proximate composition. Sweet potato have greater health benefits over normal potato. It has antidiabetic property and can be useful against malnutrition. International Potato Center (CIP)has been designate sweet potatoes as a valuable source of vitamin-A, B, C, and E. It also a source of Zn and Fe.

The colored flesh of antioxidant rich potatoes have anthocyanin and carotenoids. Anthocyanin is helping in reduce the risk of cardiovascular disease (CVD), cancer and cognitive decline other hand carotenoids act as a type of Antioxidant for humans and it’s enhance our immune system. This nutritious food has huge demand in each level of consumer and all over the year. Therefore, the long shelf-life and elongated dehydration rates could make my new varieties more desirable vegetable compared to existing one, Note: the richness of different necessary nutrient have the authority to play crucial role in this perspective. In that retrospect, I measure the dehydration kinetics, total suspended solid (TSS0 content, total moisture content through thermo-gravimetric method. For dehydration kinetics we use both the air dry method and conventional oven heating methodology. This potatoes are full of vitamins and minerals such as potassium, vitamin C, calcium and other nutrients that act as antioxidants that give them anti- cancer, anti- diabetic, and anti-inflammatory properties. Cyaniding is another antioxidant bonus of sweet potato.

Traditionally we have three types of sweet colored potatoes for example white, yellow and orange. The former two species have been reported as low yielding, no resistance to big range of pests and diseases and poor in nutritional value. Therefore, recently and the colored flesh sweet potatoes have been introduced by different scientist from Agricultural Universities including Bangladesh Agricultural University (BAU). These varieties are under investigation and not yet opened for the farmer level cultivation. Professor Dr. Rahim kindly provide new 14 varieties of antioxidant rich colored flesh potatoes for the physicochemical analysis. We analyzed the dehydration kinetics, total solid content, pH of the extract and effect of pH have been investigated and the results have been reported in this report. Richness of colored substances might offer there new varieties of potatoes as the source of the bioactive agents to prevent cancer and heart diseases.

V6 potato and its cross section

UNK7

Unk5

Cross section of 10125

## 1.2 Origin of the study

Thesis or project report partially fulfill the requirement of the necessary credits and trainings for an ungraduated student. In that retrospect, Department of Nutrition and Food Engineering of Daffodil International University provides thesis opportunity for students who going to complete their 4 year Bachelor courses in their university laboratory.

Purpose of this study about physico-chemical properties of potatoes as follows:

- To find out all information about potatoes
- To know how much it beneficial for human health
- To learn about methodology and apparatus related to this project
- To learn how to use theoretical knowledge in practical
- To become self-dependent
- To learn academic writing and techniques to run independent projects.

## 1.3 Objective of the study

We have two types of objectives for this study:

1. General objectives
2. Specific objectives

## General objectives

Consuming fruits and vegetables of all types has long been related to a reduced risk of the many adverse health conditions. Increasing consumption of plant foods, like sweet potatoes, decreases the risk of obesity, diabetes, heart disease, and overall mortality research suggests that.A diet including fresh fruit and vegetables which also may promote a healthy complexion, increased energy, and overall lower weight.(Megan Ware RDN LD, Last updated Fri 1 September 2017) (Reviewed by Natalie Butler, RD, LD) [17]

## 1.4 Scientific Classification of potato:

| | |
|---|---|
| **Scientific Name** | Solanum tuberosum |
| **Kingdom** | Plantae |
| **Order** | Solanales |
| **Family** | Solanaceae |
| **Genus** | Solanum |
| **Species** | S. tuberosum |
| **Binomial name** | Solanum tuberosum |

## 1.5 Scientific Classification of Sweet Potato

| | |
|---|---|
| **Scientific Name** | Ipomoea batatas |
| **Kindom** | plantae |
| **order** | Solanales |
| **Family** | Convolvulaceae |
| **Genus** | Ipomoea |
| **Species** | I.batatas |
| **Binomial name** | Ipomoea batatas |
| **Botanical name** | Solanum tuberosum |

## 1.6Nutritional importance of Antioxidant rich Potatoes

Potatoes are a storehouse of energy and nutrition including vitamins, minerals and essential organic compound. Potatoes are low in calories. They are a good sources of Vitamin C and B6, Manganese, Phosphorus, Niacin and Pantothenic acid. It also contain

moderate amount of protein, carbohydrate and fiber. Potatoes fiber, vitamin C, vitaminB6, potassium, coupled with its lack of cholesterol, all support heart health. Potato contain fiber which helps lower the total amount of cholesterol in the blood, thereby decreasing the risk of heart disease.

According to the"**USDA's national nutrient database**" one medium, baked sweet potato with skin (2 inches in diameter, five inches long, about 114 grams) provides:

- 103 calories
- 0 grams (g) of fat
- 24 g of carbohydrate, including 4 grams of fiber and 7 grams of sugar
- 2.3 grams of protein [74]

Sweet potatoes are unit a good supply of provitamin A, a powerful antioxidant that gives orange fruits and vegetables their vibrant color. Beta-carotene is regenerate toantiophthalmic factor within the body. Consuming foods wealthy in provitamin a could scale back the danger of developing bound sports of cancer, supply protection againstrespiratory disorder and heart condition, and delay aging and body degeneration.

## 1.7 Nutritional Analysis of Potatoes

| | |
|---|---|
| Vitamin D | 4% |
| Iron | 6% |
| Vitamin C | 30% |
| Potassium | 15% |
| VitaminB6 | 10% |
| Calcium | 12% |
| Fiber | 7% |

(Michael Jessimy May 10, 2019), [13]

## 1.8 Health benefit of potatoes

- Provides quick relief from burns.
- Reduce risk of heart disease.
- Helps prevent scurvy
- Protects against cancer.
- Stimulates brain function.

- Provides relief from rheumatism.
- Prevents formation of kidney stones.
- Potatoes combats diarrhea.
- Potatoes are good for digestive system.
- It relief  Arthritis pain

(Mr.Allah Dad Khan, Peshawar at Consultany Natural Resource Management Specialist IUCN PAkistan,Published on Jul 4, 2017) [11)

## 1.9 Medicinal important of sweet potatoes

- Sweet potatoes are high are in Antioxidants, which work in the body to prevent inflammatory problem like asthma, arthritis, gout and many more.
- Sweet potatoes are the excellent source of carbohydrates foe those with blood sugar problems. These fibrous root vegetables can help regulate blood sugar levels and prevent conditions like insulin resistance.
- Sweet potatoes are healthy are for the digestive tract. It helps to relieve constipation and may prevent colon cancer.
- Sweet potatoes are good for those who are pregnant or trying to conceive because they are high in folate, which is essential for the healthy development of fetal cell and tissue.

(Shahid Farooq, Assistant Director, Published on Feb 16, 2014) [25]

# *CHAPTER-02*

# *MATERRIALSand METHODS*

## 2.1 Collection of Sample

The research was conduct on “Analysis of physico-chemical properties on new source of Antioxidant rich potatoes”, potatoes were grown in Bangladesh, originated fromto estimate the physico-chemical properties. The experimental samples were kindly provided by Professor Dr. M A Rahim of Bangladesh Agricultural University, Bangladesh. The sample was collected as fresh as possible and processed in research laboratory of Nutrition and Food Engineering DepartmentFor analysis. Potatoes were stored in 4 degree Celsius chamber in the air tight bag to keep them as fresh as possible during our study period.

## 2.2 Chemicals/reagents

The following chemicals/reagents were used:

Hydrochloric Acid (HCl)

Sodium hydroxide (NaOH)

## 2.3 Equipment’s

Following equipment’s were used:

Electrical balance

Oven

Grinder

Refrigeration

Solar dryer

pH meter

## 2.4preparation of sample for extraction of water soluble compound

At first potatoes were washed and peeled. Then it was cut into cubes. Cube was then transferred to a crucible of known weight. The total weight of crucible potato cube was then measured. Then then potato crashed cubes and added 20 ml distilled water into crushed potato, the liquid portion of the crushed potato put into funnel. To confirm the removal all the water soluble part in the potato. Then it was allowed to dry in the oven at 60℃for overnight. The weight of dried solid was then measured.

## 2.5 Flowchartof Extraction of water soluble components

**Flowchart 1: Extraction of water soluble components**

Potato was peeled after washing with excess water

Sliced into cubes by kitchen knife(Dimensions: 1cm × 1cm ×1cm)

Each potato cube was weighted by keeping it on a crucible

Sliced potatoes were then mashed in a grinder

Mesh was then soaked with water and mixed well

Resulting mixture was filtered and used for analysis

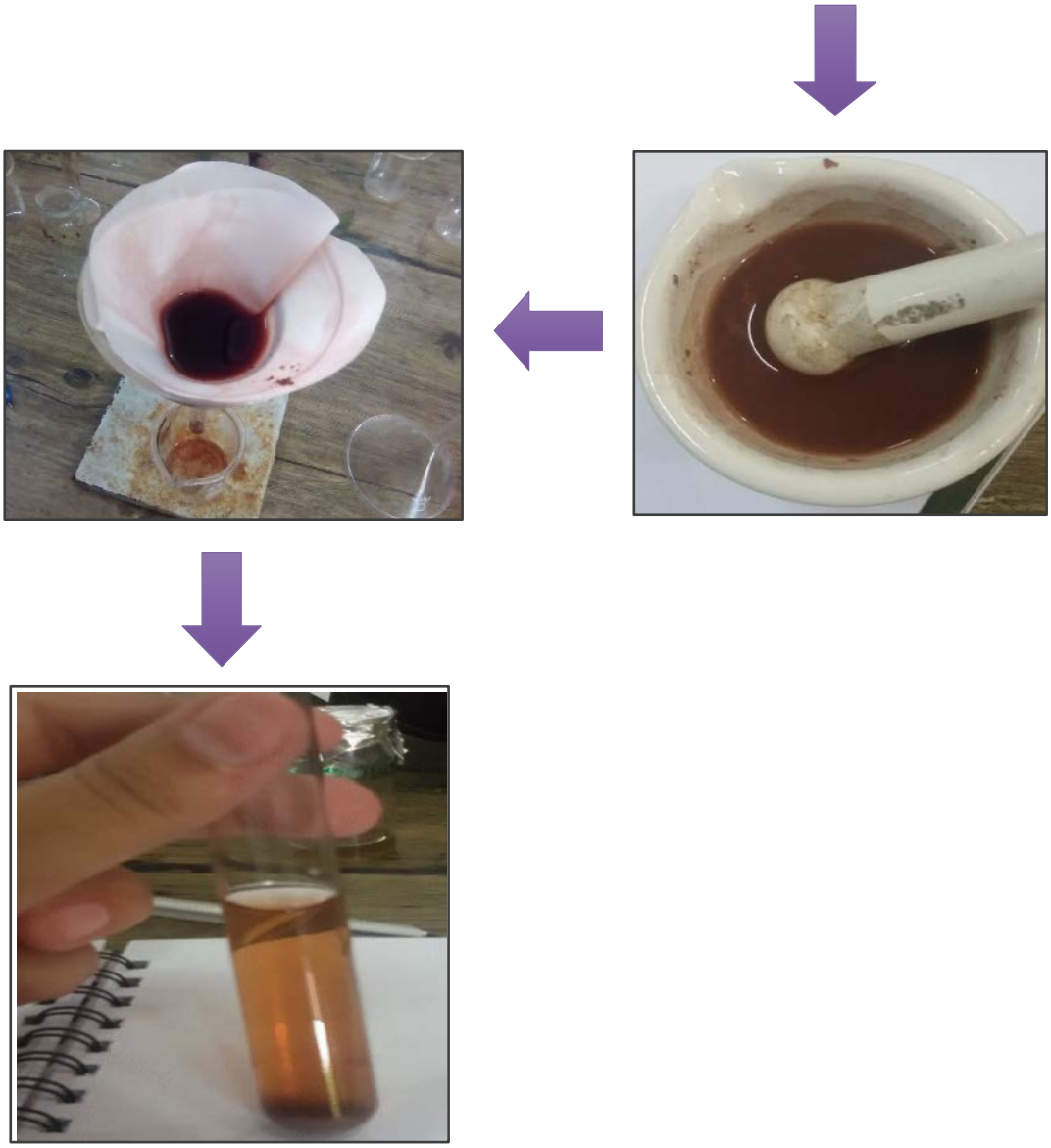


**Figure1: Preparation of sample for Extraction**

## 2.6 Preparation of sample for Thermo-gravimetric method

Potatoes were washed with excess amount of water and peeled. Then it was cut into cubes. Cubes was then transferred to a crucible of known weight. The total weight of crucible plus potato cube was then measured. Then kept the potatoes on oven at 105 ̊C and weight the potato cubes was recorded at 4 hour interval.

## 2.7Flowchart of Thermo-gravimetric method

**Flowchart 2: Thermo-gravimetric analysis of potato's at 105 °C**

↓

Potato was peeled after washing with excess water

↓

Sliced into cubes by kitchenknife (Dimensions: 1cm × 1 cm × 1 cm)

↓

Each potato cube was weighted by keeping it on a crucible

↓

The watch glass was then kept into the oven at 105 ˚C

↓

The weight of the potato cube was recorded at 4 hour interval

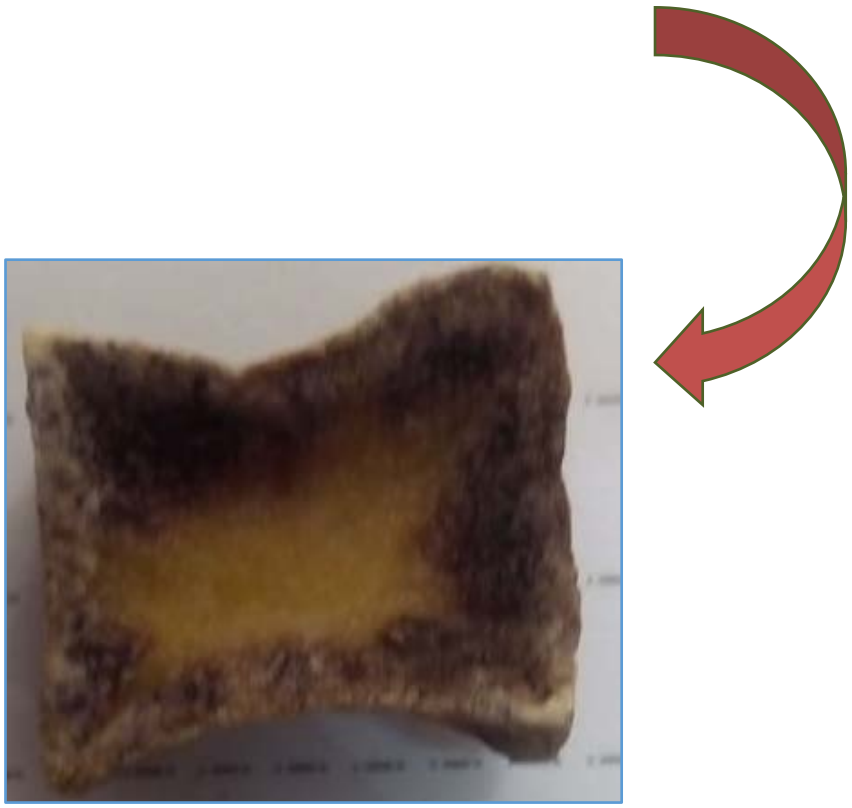


**Figure2: Sample before and after the Thermo-gravimetric analysis**

## 2.8 preparation of sample for Air dry

At first potatoes were washed and peeled. Then it was cut into cubes. Cube was then transferred to a watch glass of known weight. The total weight of watch glass plus potatocube was then measured. Then the potato was put into the solar dryer for air dry and

measure the weight of potato after every 1 hour for see how much difference occur between the potatoes.

## 2.9 Flowchart of Air dry of potatoes

**Flowchart 3: Air Dry of potatoes**

Potato was peeled after washing with excess water

Sliced into cubes by kitchen knife (Dimensions:1 cm × 1 cm× 1cm)

Each potato cube was weighted by keeping it on a watch glass

The watch glass was then kept into the solar for air dry

The weight of the potato cube was recorded at 1 hour interval

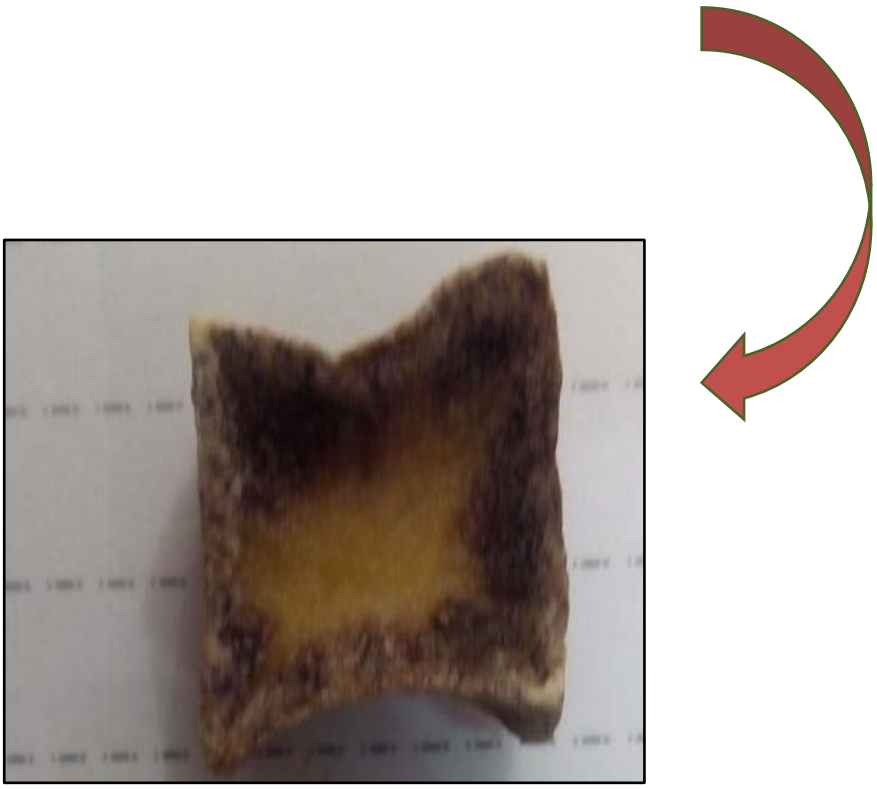


**Figure 3: Sample before and afterthe Air dry**

## 2.10 preparation of sample for Dehydration Kinetics

Potatoes were washed with excess amount of water and peeled. Then it was cut into cubes. Cube was then transferred to a crucible of known weight. The total weight of crucible and potato cube was then measured. Then kept the potatoes on oven at 80℃ for drying and

measure the weight of potatoes after every 30 min to see how much difference occur between the potatoes.

## 2.11Flowchart of Dehydration Kinetics

**Flowchart 4: Dehydration kinetics of potato's at 80℃**

Potato was peeled after washing with excesswater

Sliced into cubes by kitchen knife Dimensions: 1 cm × 1 cm ×1cm

Each potato cube was weighted by keeping it on a crucible

The crucible was then kept into the oven at 80℃

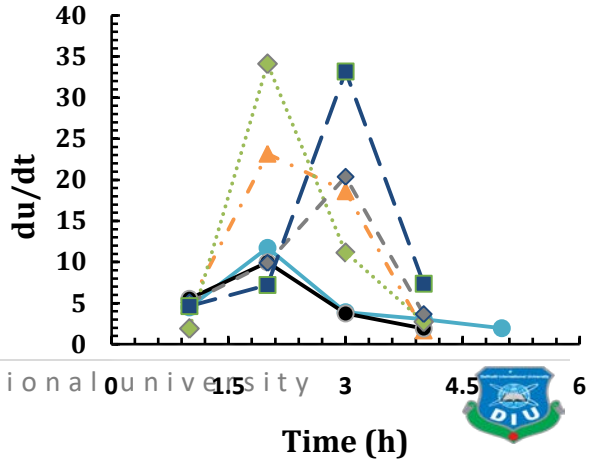
The weight of the potato cube was recorded at 30 minutes interval

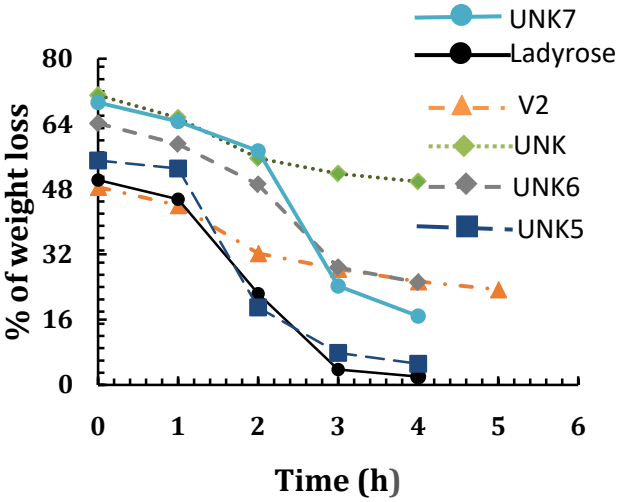
**Figure 4: Sample before and after Dehydration Kinetics by Oven dry method**

# *CHAPTER-03*

# *RESULT DISCUTION*

**3.1: dehydration profile (Solar dry)**





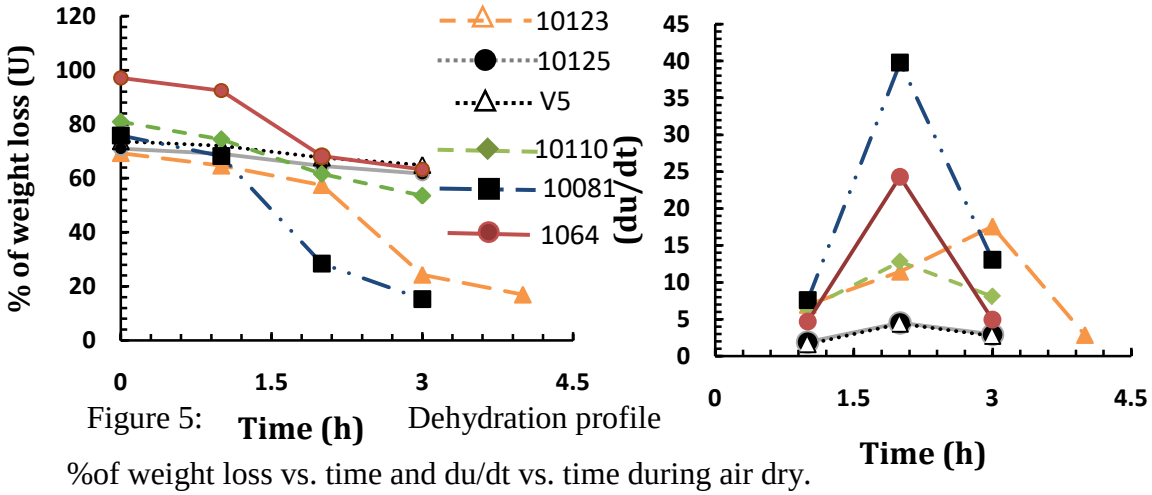




Figure 5: Dehydration profile %of weight loss vs. time and du/dt vs. time during air dry.

## 3.2: Dehydration profile (oven, 80 degree C)

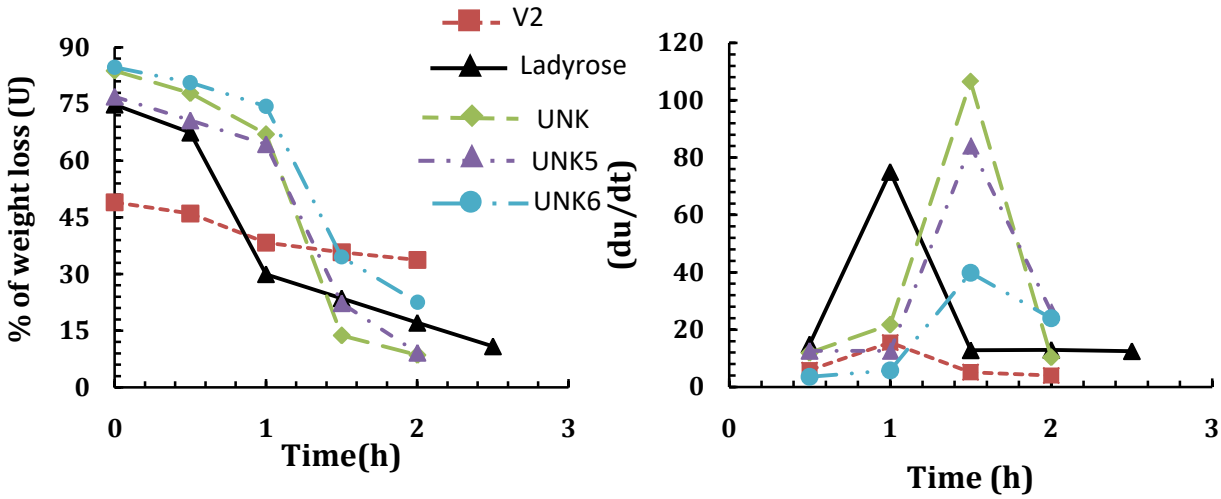



Figure 6: Dehydration profile % of weight loss vs. time and du/dt vs. time during oven dry

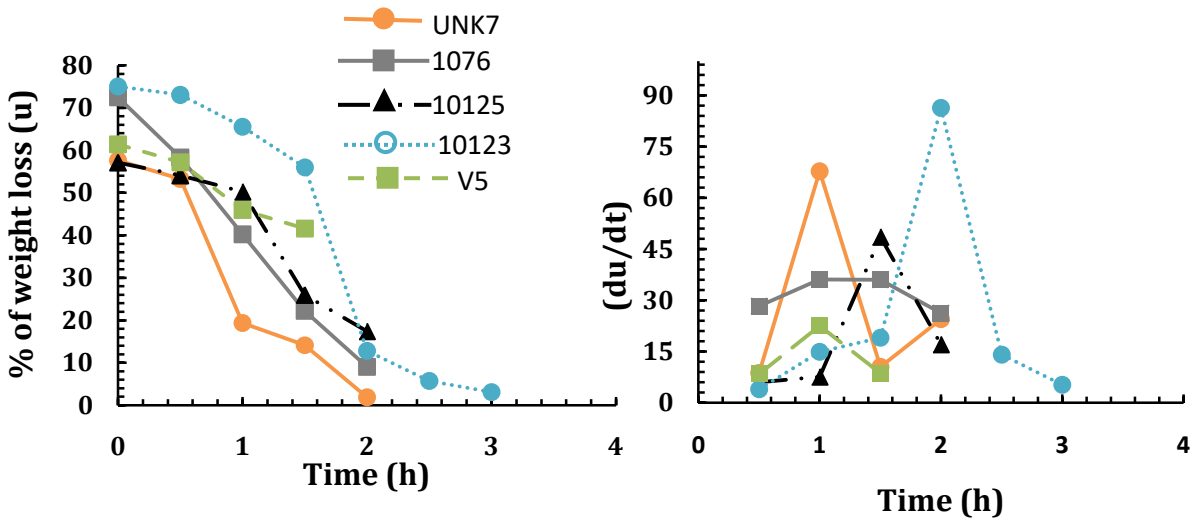



Figure 7: Dehydration profile % of weight loss vs. time and du/dt vs. time

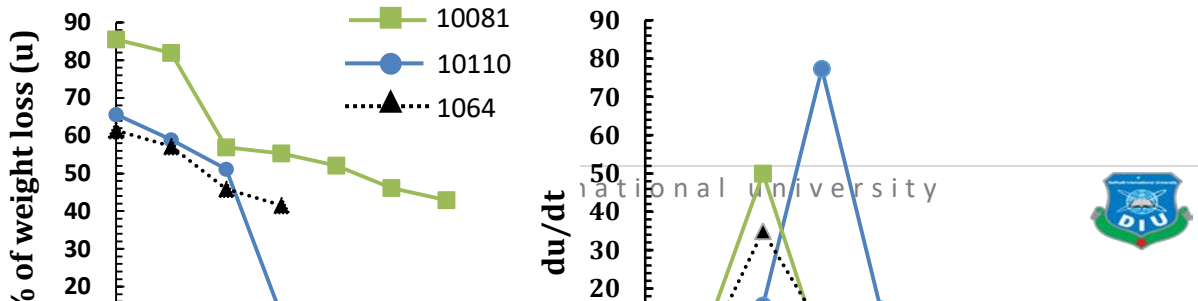


Figure 8: Dehydration profile % of weight loss vs. time and du/dt vs. time

## 3.3: Discussion

The removal of water vapor with time has been investigated through the rate weight loss due to air drying or oven drying process. The weight loss vs time profiles in figure 5-8 represent the dehydration speed and kinetics of the respective potatoes. The water content at time =0 indicating total moisture content of the sample (cube with diameter 1cm × 1cm ×1cm) determined by the thermogravimetric method carried at 10$^{o}$C for 5 hours. To further confirmation similar size of sample was used in Multi Commodity Solar Tunnel Dryer (MCSTD) for longtime drying and a circular shaped sample with 0.3 mm thickness was also kept in the oven at 105 $^{o}$C for 5 hours. All the methods provide similar water content in respective sample and it was used for the calculation as 100% of water. The profiles obtained during drying in MCSTD showed (figure 5 and 6) the dehydration speed has three different steps. In 1$^{st}$ step the speed is very low due to the absorbed heat mainly used up for changing the temperature of the sample. After absorbing sufficient heat energy they started to lose water as water vapor. The dehydration speed become maximum at this point (evident from respective du/dt vs time profile) because this 2$^{nd}$ step evaporates the loosely bound waters from the cube. During the last stages of the dehydration speed profile the evaporation rate again decreased because of the excess energy required to remove tightly bound waters from the potato cubes.

For the further confirmation of dehydration speeds similar samples were allowed to dehydrate at 80 $^{o}$C for 5 hours and the weight loss was recorded after each 30 minutes. These profiles (figure 6 and 7) showed similar trends obtained for solar drying sample and have three different stages as described above. Interestingly, we obtained similar trends for each samples during solar and oven drying processes. The dehydration speed showed two

different groups, forone group dehydration maxima obtained around 1.5 hours while for another group it was around 3 hours. Which implies that, the latter group require long time to be dehydrated and will show longer shelf life compared to others. Longer shelf life is one of the most desirable properties for potatoes or tuber vegetables. The varieties 10081, 10110, UNK7, 10125, ladyrose, V2, UNK5, UNK, UNK6 belongs to first group while UNK7, 10123, 10110 and V1. Among all the varieties the lowest dehydration speed was observed for 10123. However, these profiles illustrate the dehydration kinetics which will help us to determine the optimal condition for industrial drying of these potatoes along with prediction to their shelf life.

The total suspended solids have been measured by removing all the water soluble parts from the mashed potatoes using mortar and the resulted suspended solids were dried by oven. The dried samples were then weighted and recorded, which shown in the table 1.

Table 1: TSS values for different samples.

| Potato varieties | Dried weight (Initial weight) (gm) | Total Suspended Solid [TSS %] |
|---|---|---|
| V2 | 3.98 (7.52) | 52.93% |
| Ladyrose | 3.11 (7.21) | 43.18% |
| UNK | 2.62 (7.78) | 33.66% |
| UNK5 | 1.11(7.34) | 15.12% |
| UNK6 | 3.87 (7.15) | 54.06% |
| UNK7 | 2.67 (7.94) | 33.69% |
| 10076 | 2.43 (7.46) | 32.55% |
| 10125 | 2.18(7.22) | 30.19% |
| 10123 | 2.51 (7.97) | 31.41% |
| V5 | 3.05 (7.65) | 39.84% |
| 10110 | 2.14 (7.62) | 28.13% |
| 10081 | 2.01 (7.16) | 28.06% |
| 1064 | 2.39(7.16) | 33.38% |

TSS= Dried weight/Initial weight*100 %

The maximum suspended solid (>30 %) was highest in V2, Ladyrose, UNK, UNK6, UNK7, 10076, 10125, 10123, V5 and 1064 varieties while it was minimum (<30 %) in 10081, 10110, UNK5.The lowest TSS value was 15.12% for UNK5 while the Maximum TSS was recorded as 54.%. The water insoluble part partially determines the percent of fibers in any food. The more the fiber the better effect on the Guts!

## 3.4: Effect of pH

**Table 1: pH of the extraction and stability of the extracted color at different pH range**

| Sample | pH of the Extract | Color of the Extract | Color at Acidic pH (value) | Color at neutral pH (Value) | Color at basic pH (value) |
|---|---|---|---|---|---|
| 1064 | 4.95 | White color | Yellow (0.73) | 7.01 | Pale yellow (10.33) |
| 10123 | 4.81 | White color | Black (0.67) | 6.78 | Light white (10.18) |
| 10125 | 5.03 | Purple color | Light pinkish (0.84) | 7.05 | Light white (9.75) |
| 10110 | 5.36 | White color | Light white (0.89) | 7.00 | Light white (10.31) |
| 1010 | 5.20 | Deep Purple color | Deep purple color (0.77) | 6.95 | Deep purple color (10.09) |
| V8 | 5.10 | Purple color | Purple color (0.82) | 6.80 | Purple color (9.95) |
| Lady rose | 4.93 | Light white color | Light yellow (0.93) | 6.86 | Pale yellow (10.10) |
| 10081 | 4.95 | Purple color | Purple color (0.86) | 7.03 | Purple color (10.31) |
| 10097 | 4.98 | Deep purple color | Deep purple Color (0.99) | 7.07 | Deep purple Color (8.09) |
| V2 | 4.75 | Purple color | Light white (0.93) | 7.06 | Black (10.10) |
| V5 | 4.98 | Purple color | Light green (0.89) | 6.78 | Pale brown (10.05) |

pH of the extracts and the degradation of the colored compounds with pH have significant contribution to determine the food and therapeutic value of any crops. The stability of the color (Table 1) at wide range of pH indicates the stability of flavonoids or anthocyanins present in the sample. For example, the color of the extracts from 10110,

10190, 10081 and 10097 remain unchanged at a pH range 1 to 10. Such stability could offer the prospect to use these compounds for the multiple purposes.

## 3.6 Conclusion

Bangladesh has been designated as agricultural country since its liberation on 1971. There are several crops and vegetables we produce to fulfill the internal needs of our peoples. These product directly consumed by our rural peoples along with the processed foods made from these vegetables. Potatoes are the most available and used vegetable in our country. Including potatoes in daily intake become familiar practices in rural and urban areas not only in Bangladesh but in the Indian subcontinents also! Therefore, incorporation of nutrient and antioxidant rich varieties have the prospect to fight against malnutrition and other diseases associated with the food habits. In addition, the colored antioxidant richness of the potatoes could provide the antioxidants and phenolic compounds to inhibit DNA damage or DNA mutation to protect us from different types of DNA damage related diseases, for example cancers. Furthermore, the physico-chemical properties will offer the superiority of the newly introduced varieties over existing one to confirm there acceptability to the consumers along with the cultivators. However, lack of awareness about sweet potato's nutrient value people still so far away from its health benefits. Different types of sweet potatoes are popular in others country. So if we cultivate it widely, we can export them along with production of potato starches for using them in different industries. Therefore, appropriate researches and their publications along with the propagation of these information to mass people will help us to make this amazing vegetable more popular and increase its health benefits significantly.

## Reference: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