

Comparison of Vitamin C Contents in Fresh Fruits and Corned Fruits of *Phyllanthusemblica*L.

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Abstract

In this research work, the fruits of *Phyllanthusemblica*L., the amla fruits, Myanmar name, Zee-bu-thee were selected for chemical analysis. The fresh amla fruits were collected from Campus of Myanmar Aerospace Engineering University, Meiktila. The phytochemical constituents of amla fruits were determined by preliminary phytochemical tests. The amla fruits contained alkaloid, glycoside, flavonoid, polyphenol, phenolic compound, reducing sugar, saponin, terpene and tannin according to the phytochemical screening. In addition, the elemental compositions of amla fruits were measured by EDXRF (Energy Dispersive X-ray Fluorescence) spectrophotometer. Potassium, manganese, calcium, phosphorus, copper, sulphur, strontium and iron were present in amla fruits. Then, the antioxidant activity of ethanol extract of the amla fruits was determined by DPPH (1, 1-diphenyl-2-picrylhydrazyl) assay. From the DPPH assay, it was revealed that amla fruits could give the antioxidant activity. Moreover, the water content in the fresh amla fruits was detected by oven method and the sugar content of the fresh fruits was also determined by Iodometric Titration. The sugar content of the fruits sample was found to be 6.31 g/100 g. Then, the corned amla fruits were prepared by sinking the fresh fruits in 2% sodium chloride solution. Finally, the vitamin C contents in fresh amla fruits and corned amla fruits were also studied and the vitamin C contents results were compared. It was identified that the vitamin C content of fresh fruits was larger than that of corned fruits.

Keywords: phytochemical, extract, antioxidant, vitamin C, corned.

Introduction

The fruits of *Phyllanthusemblica*L., amla fruits, Myanmar name, Zee-bu-thee are eaten for curries in fresh as crushed amla with onion as well as in cooked amla with meat and fish in meal by the most Myanmar people. The crushed fresh amla fruits mixed with spices and chilli powder are consumed as sour salad.

In Mandalay, BhudaMyat-swa Pa-ya-pwe is held in each quarter's Damayone between Thidingyut and Taboung every year. In Pa-ya-pwe, almost all the families feed Monhinga or Kyarzanhin or Meeshay including afters to the visitors. The corned amla fruits, Zee-bu-thee and fried Nga-pi always play in afters.

*Phyllanthusemblica*L., also known as amla is a deciduous tree of the family *Phyllanthaceae*.^[1] Indian gooseberry or amla is an extremely sour, nutritious fruit of a tree which grows in India and other Southeast Asian countries.^[2]

In India, amlais made into the sugared candy. The amla candy is traditionally consumed after meals. Amla is also available in various other forms, such as a powder, juice, oil, tablets, and spice. Popularly, people use the amla as shampoos, hair oils and a mordant for fixing dyes in fabrics.^[3]

In traditional medicine, dried and fresh fruits are used. The health benefits of amla can be attributed to its high vitamin C content. It helps in boosting the immune

system, slowing down aging, treating throat infections, reducing blood sugar levels and improving heart health.^[4]

Amla acts as a diuretic agent and it is used to balance stomach acids, fortify the liver, and nourish the brain and mental functioning. It also strengthens the lungs, helps the urinary system, improves skin quality and promotes healthier hair. This fruit increases vitality, aids in vision care, and improves muscle tone.

The fruits has a therapeutic value for diabetics and cancer.^[5]It lowers cholesterol levels, increases red blood cell production, and strengthens teeth and nails.^[6]The amla juicehas ability to re-energize the liver and to improve eyesight.^[7] Amla is good for strong bones, teeth and nails.^[8]

Thus, the amla fruits were selected for this research work.

Materials and Methods

Sample Collection

The amla fruits were collected from Campus of Myanmar Aerospace Engineering University, Meiktila.



Figure (1) Plant and Fruits of *Phyllanthusemblica* L

Preliminary Phytochemical Tests

Preliminary screening was done on the various crude extracts of dried amla fruits by phytochemical tests.

Determination of Elemental Compositions

Elemental compositions of fresh amla fruits were measured by applying EDXRF Spectroscopy.

Determination of Antioxidant Activity

The antioxidant activity of ethanol extract of amla fruits was measured by DPPH (1,1-diphenyl-2-picryl-hydrazyl) scavenging assay.

Determination of Water Content

The water content of fresh amla fruits was determined by oven drying method.

Determination of Sugar Content

The sugar content in fresh amla was determined by Iodometric Titration.

10 ml of 0.075 M glucose solution was placed in the conical flask. 20 ml of iodine solution and 45 ml of 0.1 M sodium hydroxide solution were added into the conical flask and closed the flask and left the flask in the dark place for 15 minutes. 6 ml of 1 M hydrochloric acid solution was added to mixture in the flask. The mixture

solution was titrated with 0.05 M sodium thiosulphate solution in the burette. When the liquid become straw colour, 1 ml of starch indicator solution was added. The solution becomes dark again and 0.05 M sodium thiosulphate solution was added until the colourless solution, end point was obtained. From the experimental data, the concentration of iodine solution was calculated.



Figure (2) Titrimetric Result of 10 ml of 0.075 M Standard Glucose Solution with Iodine Solution

Sample solution of fresh amla fruits was prepared. The 100 g of fresh fruits was washed and wiped dry. The fruits were cut into a few portions. The seeds were removed. The portions with 30 ml of distilled water were blended in a blender. The juice was strained through the cheesecloth to remove the pulp and filtered. After filtration, the fresh fruit juice was mixed with distilled water to obtain 100 ml of sample solution.



Figure (3) Preparation of Sample Solution of Fresh Amla Fruits

10 ml of sample solution of fresh fruits was placed in the conical flask. 20 ml of 0.0465 M iodine solution and 45 ml of 0.1 M sodium hydroxide solution were added into the conical flask and closed the flask and left the flask in the dark place for 15 minutes. 6 ml of 1 M hydrochloric acid solution was added to mixture in the flask. The mixture solution was titrated with 0.05 M sodium thiosulphate solution in the burette. When the liquid become straw colour, 1 ml of starch indicator solution was added. The solution becomes dark again and 0.05 M sodium thiosulphate solution was added until the colourless solution, end point was obtained. From the experimental data, the sugar content was calculated.



Figure (4) Titrimetric Result of 10 ml of Sample Solution of Fresh Fruits with 0.0465M of Iodine Solution

Preparation of Corned Amla Fruits

350 g of fresh amla fruits was sank in 200 mL of 2% sodium chloride solution for 2 weeks. The corned amla fruits were obtained.



Figure (5) Preparation of Corned Fruits

Determination of Vitamin C Content

Vitamin C contents were determined in the fresh amla fruits as well as in corned amla fruits by using Iodometric Titration.

10 ml of 0.0057 M standard ascorbic acid solution was pipetted into a 125 ml conical flask. 10 drops of 1% starch solution were added and then titrated against iodine solution until blue-black color was observed. From the experimental data, the concentration of iodine solution was calculated.



Figure (6) Titrimetric Result of 10 ml of 0.0057 M Standard Ascorbic Acid with Iodine Solution

Sample solutions of fresh amla fruits and corned amla fruits were prepared as the method described above.

10 ml of sample solution fresh amla fruits was pipetted into a 125 ml conical flask. 10 drops of 1% starch solution were added and then titrated against iodine solution until blue-black color was observed. From the experimental data, the vitamin C content in fresh fruits was calculated.

Similarly, the vitamin C content in corned amla fruits was measured.



Figure (7) Titrimetric Result of 10 ml of Sample Solution of Fresh Fruits with 0.0051 M of Iodine Solution



Figure (8) Titrimetric Result of 10 ml of Sample Solution of Corned Fruits with 0.0051M of Iodine Solution

Results and Discussion

The results of phytochemical tests on the crude extracts of amla fruits were shown in Table (1).

Table (1) The Results of Phytochemical Screening of Amla fruits

No.	Test	Reagent	Observation	Result
1.	Alkaloid	Wagner's reagent	Reddish brown ppt	present
2.	Flavonoid	con: HCl, Mg	Pink color ppt	present
3.	Glycoside	10% lead acetate	White ppt	present
4.	Saponin	Distilled water	Forth	present
5.	Steroid	Acetic anhydride Conc: H ₂ SO ₄	No Green color Solution	absent
6.	Phenolic Compound	10% FeCl ₃	Brown color solution	present
7.	Tannin	10% FeCl ₃ , 2 % Na OH	Yellowish brown color ppt	present
8.	Reducing sugar	Benedict's reagent	Red colour Solution	present
9.	Polyphenol	1 % Ferric chloride, 1% K ₃ [Fe(CN) ₆]	Greenish blue Solution	present
10	Terpene	Ethanol, CHCl ₃ , Conc: H ₂ SO ₄	Pink colour solution	present

According to this Table (1), the valuable phytochemical constituents were present in the amla fruits. The phytonutrients have very good effects on the health and proper functioning of internal organs, eyes, and the secretion system and is increasingly being linked to cancer prevention.

The elemental compositions of amla fruits were measured by applying EDXRF Spectroscopy. The results were shown in Figure (9) and Table (2).

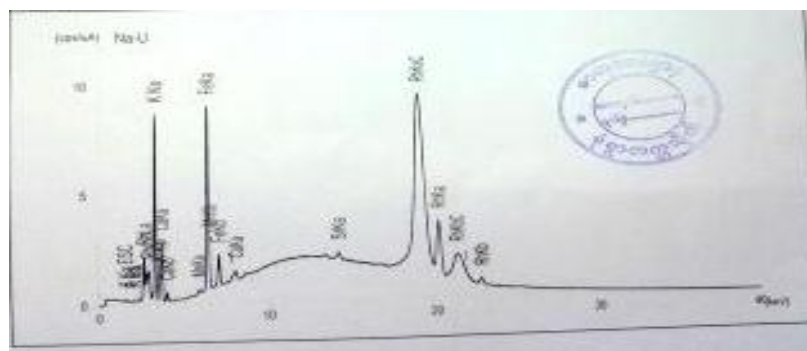


Figure (9) EDXRF Spectrum of The Amla Fruits

Table (2). The Elemental Compositions of Amla Fruits

No.	Elements	Abundance(%)
1	Potassium	0.694
2	Calcium	0.121
3	Phosphorous	0.072
4	Iron	0.047
5	Sulphur	0.039
6	Manganese	0.002
7	Copper	0.002
8	Strontium	0.001
9	Carbon,Hydrogen	99.021

From the results of EDXRF analysis, it was found that potassium, manganese, calcium, phosphorus, copper, sulphur, strontium and iron were present in amla fruits and the fruits contained valuable mineral constituents. The good amount of potassium that was present in amla fruits is very beneficial in washing out the toxic depositions in the kidneys and very effective in reducing both the body temperature and blood pressure.

The antioxidant activity of ethanol extract of amla fruits was measured using standard ascorbic acid. The % inhibition and IC_{50} value of standard ascorbic acid were shown in Table (3) and Figure (10).

Table (3) % Inhibition of Various Concentrations of Standard Ascorbic Acid

Concentration (µg/ml)	Mean Absorbance	Mean % inhibition	IC ₅₀ Value
50	0.168	82.80	8.23 µg/ml
25	0.279	71.44	
12.5	0.400	59.06	
6.25	0.506	48.21	
3.125	0.608	37.77	

IC₅₀ value was calculated by using linear regressive equation.

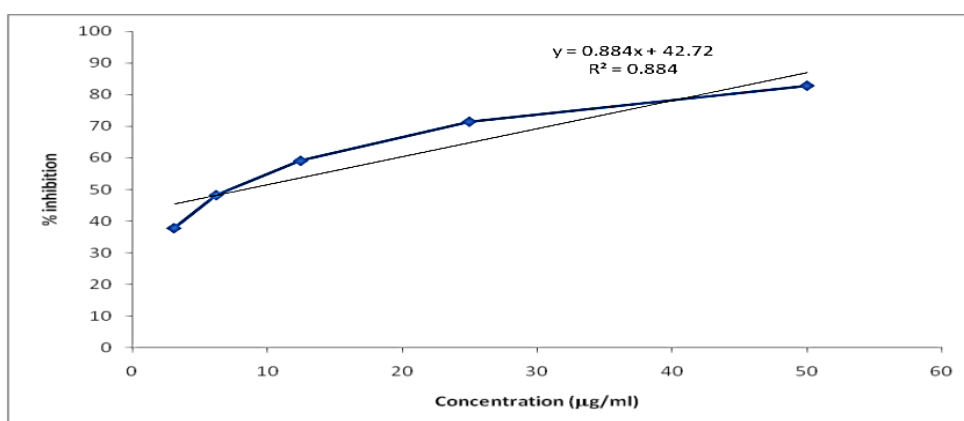


Figure (10) The % Inhibition vs Different Concentrations of Standard Ascorbic Acid

The % inhibition and IC₅₀ value of ethanol extract of amla fruits were shown in Table (4) and Figure (11).

Table (4) The % Inhibition and IC₅₀ Values of Ethanol Extract of Amla Fruits

Concentration (µg/ml)	Mean Absorbance	Mean % Inhibition	IC ₅₀ Value
50	0.0628	89.936	11.98 µg/ml
2.5	0.224	64.103	
12.5	0.288	53.840	
6.25	0.341	45.350	
3.125	0.397	36.378	

IC₅₀ value was calculated by using linear regressive equation

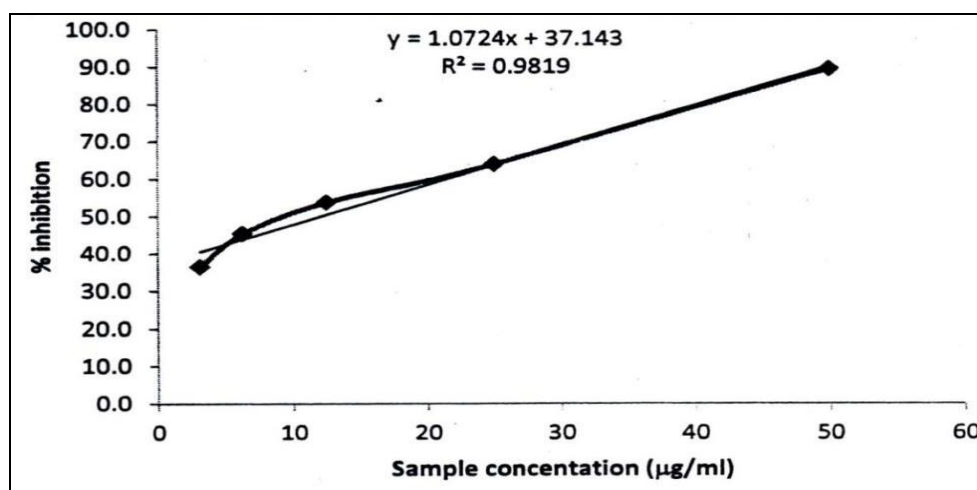


Figure (11) The % Inhibition vs. Concentration ($\mu\text{g/ml}$) of Ethanol Extract of Amala Fruits

IC_{50} value of ethanol extract of amla fruits was found to be $\text{IC}_{50}=11.98 \mu\text{g/mL}$ and that of standard ascorbic acid was $\text{IC}_{50}= 8.23 \mu\text{g/mL}$. From these results, it was seen that amla fruits could prevent the oxidation and it could have the high antioxidant activity.

The water content in fresh amla fruits was calculated. The results were shown in Table (5).

Table (5). The Water Content in the Fresh Amla Fruits

No.	Weight of Sample (g)	Weight of Water (g)	Yield (%) of Water
1	100	79.12	79.12
2	100	80.01	80.01
3	100	80.00	80.00

As shown in Table (5), the water content of fresh amla fruits was 79.12-80.01%. These results showed that the fresh amla fruits are very important for health of consumers. The large amount of water in fresh fruits can help the weakness due to losing sweat and dehydration.

The sugar content in the fresh amla fruits was calculated. The results were shown in Table (6).

Table (6). The Sugar Content in Fresh Amla Fruits

No.	Weight of Sample (g)	Weight of Sugar (g)	Sugar Content (g/100g)
1	100	6.12	6.12
2	100	6.31	6.31
3	100	6.06	6.06

According to this Table, the content of sugar in fresh amla fruits was significant amount.

The vitamin C content in fresh juice of amla fruits was calculated. The results were shown in Table (7).

Table(7). The Vitamin C Content of Fresh Amla Fruits

No.	Weight of Sample (g)	Weight of Vitamin C (mg)	Vitamin C Content (mg/100g)
1	100	744.12	744.12
2	100	744.21	744.21
3	100	744.26	744.26

The vitamin C content in juice of corned amla fruits was calculated. The results were shown in Table (8).

Table (8). Vitamin C Content of Corned Amla Fruits

No.	Weight of Sample (g)	Weight of Vitamin C (mg)	Vitamin C Content (mg/100g)
1	100	642.12	642.12
2	100	642.31	642.31
3	100	642.26	642.26

From these results, it was revealed that the fresh fruits and corned fruits were good

source of vitamin C and they could protect the cancer and diabetes. From the comparison of vitamin C contents, the amount of vitamin C in corned amla fruits was less than that in fresh fruits.

The vitamin C is essential to a healthy diet as well as a highly effective antioxidant acting to lessen oxidative stress and it is useful for its remarkable antioxidant and anti-aging properties.

Conclusion

In this research work, the amla fruits were chosen for the chemical analysis. From the results of chemical analysis, it was found that the valuable phytochemical constituents, the good amount of potassium, the large amount of water, the fair amount of sugar were present in amla fruits. It was revealed that amla fruits were also good source of vitamin C and it could protect the oxidation. Therefore, we conclude that the amla fruits have the health benefiting nutritional constituents and they have high antioxidant activity. People should consume both fresh and corned amla fruits.

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