



NUTRITIONAL AND NUTRACEUTICAL CONTENT OF ALOCASIA MACRORRHIZOS(L.) G. DON (TALYAN)

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CHAPTER 1

PROBLEM AND ITS BACKGROUND

Introduction

Nutritional content of every food is important for us to ensure a proper diet. Talyan is not common here in Northern samar and also it is not popular, it is used as binagol in Tacloban city, it served as food in many Nortehanon.

With the country ever population many people cannot eat properly like rice and some other food. Many farmers need to eat root crops for them to survive. Talyan (Alocasia macrorrhizos) is a nutritious food. Many people need to maintain good health.



Nutritional awareness of every food has important role to our health. It gives us knowledge about the food we eat and can sustain the balance diet needed for our body.

Nutrition is essential for our health, in other country and in the Philippines since it is over populated, hence people cannot eat proper food and some farmers need to eat root crops for them to survive.

This plant is grown under "upland" (none flooded) and "wetland" (flooded) as seen everywhere that is why the researcher was interested to study. Studying this plant was a big contribution to our country for the people that didn't have money to buy some food like rice.

Objectives of the study

This study aimed to determine the nutritional and nutraceutical content of Talyan. Specifically, this study tried to determine the following:

1. Physical properties of Talyan in terms of:
 - a. Boiling point
 - b. Color
 - c. Density
 - d. Odor
 - e. pH



f. Solubility

2. Nutritional content of Talyan in terms of:

- a. Ash
- b. Carbohydrates
- c. Fats
- d. Moisture
- e. Protein

3. Nutraceutical content of Talyan in terms of:

- a. Alkaloid
- b. Flavonoid
- c. Phenolic
- d. tannin
- e. saponin
- f. Vitamin C

Significance of the study

This study is important to future researcher in developing talyan into more useful product. Specially, the following benefit from the result of this study:



Researcher: may contribute knowledge and related literature in the plant Talyan and to promote Talyan as a better source of food.

Farmers and Agriculturist: they may be aware of the plant Talyan in the production in serving as food and it is an additional income of them.

Parents: they may use Talyan as alternative source of food for her family.

Students: may study further uses of Talyan in their research so that people can benefit from the Talyan plant.

Scope and Limitation of the Study

This study focused on the physical properties of talyan in terms of boiling point, color, density, odor, pH and solubility. It also focused on the determining of the nutritional content like ash, carbohydrates, fats, moisture and protein. And also on the nutraceutical content like alkaloid, flavonoid, phenolic, saponin, tannin and vitamin C, that is found in brgy. Enriqueta Lavezares N. Samar. This plant is a family of Araceae that identified of Dr. Helena T. Delarosa, this study is only for talyan plant.

Definition of Terms

For better understanding of the research topic, the following terms are defined operationally and conceptually.



Alkaloid - any of numerous usually colorless, complex, and bitter organic bases (as morphine or caffeine) containing nitrogen and usually oxygen that occur especially in seed plant and are typically physiological active. In this study, this is one of the secondary metabolites to find/test its presence.

Ash content - is the total amount of minerals present in the food, whereas the mineral content is measure the amount of inorganic components present within a food, such as Ca, Na, K, and Cl. In this study, this is one of the nutritional tests.

Carbohydrates - substance found in the talyan that provide the body with heat and energy and are made of carbon, hydrogen and oxygen. In this study, this is one of the nutritional content to test if with its presence. In this study, this is one of the nutritional content to find/test its presence

Crude Fat - the oily substance found in the talyan. Which provide the reserve energy for the body.

Dry Ash Method - is a method used to measure the total amount of minerals present within the food. It is the method used in the study to determine the ash content of talyan.

Flavonoid - any of oxygen containing aromatic antioxidant



compound that includes many common pigments (as anthocyanin and flavones). In this study this is one of the secondary metabolites to find/test its presence.

Kjedahl Method - used to determine the protein content of the sample.

Moisture Content - this refers to the presence of liquid, especially water often in trace amounts. A small amount of water may be found.

Oven Drying Method - is the method of drying sample in an oven of certain temperature. It is a method used in the study to determine the moisture content.

Nutraceutical - a specially treated food, vitamin minerals, herb, etc., that you eat or drink in order to improve your health.

Nutritional content - the process of eating the right kind of food so you can grow properly and be healthy.

Phenolics - is used to determine the total phenolics present in plant it is a white crystalline solid that is volatile.

Saponin - are classes of chemical compound founds in particular abundance in various plant species. More specially, they are amphipathic glycosides grouped phenomenologically by the soap-like foaming they produce



when shaken in aqueous solution, and structurally by having one or more hydrophilic glycosides moieties combined with a lipophilic triterpene derivative. This is also a secondary metabolite that will be test

Soxhlet Method - is the method which extracts fat of sample using solvent. This method is used to determine the crude fat content of the sample.

Spectrophotometer - an instrument measures light spectra to detect a molecule.

Protein - is composed of amino acid containing carbon, hydrogen, nitrogen and oxygen. That is important part of human diet.

Vitamin C - ascorbic acid is an antioxidant that helps tissue grow and repair itself.

CHAPTER II

REVIEW OF RELATED LITERATURE AND STUDIES

Alocasia macrorrhizos is a species of flowering plant in the arum family, Araceae that is native to rainforest from Malaysia to Queensland and has long been cultivated on many Pacific islands and where else in the tropics. Common names include Giant taro and elephant Ear Taro





Fig. 1 *Alocasia Macrorrhizos*

In Australia it is known as the "cunjevoi" (although that the term also refers to a marine animals). It is edible if cooked for a long time but its sap irritates the skin due to calcium oxalate crystals, or raphides which are needle like *Alocasia* species are commonly found in market place in samoa and tonga and other parts of Polynesian. The varieties recognized in Tahiti are the apeoa, haparu, maota, and uahea. The giant hearted-shaped leaves make impromptu umbrellas in tropical down pours.

Alocasia macrorrhizos it is also knowns as *Alocasia indica*, giant taro. *A. macrorrhizos* is an indigenous herb belonging to the family Araceae. Different parts of this plant are traditionally used in inflammation. The juices of leaves of the plant are used as a digestive, diuretic, astringent, antifungal, antiprotozoal, and anti-diarrhoeal agent and for the treatment of rheumatoid arthritis. And the ethanol extract of *Alocasia macrorrhizos* was pharmacologically tested to assess the antioxidant, antidiarrheal, cytotoxic and antibacterial activities it has also been proved to have hepatoprotective properties. This plant contains flavonoids, cynogenetic glycosides, ascorbic



acid, gallic acid, mallic acid, oxalic acid, alocasin, amino acids, succinic acid, and β -lectines. It has also been shown to have anti-oxidant properties. Most plants with anti-oxidant properties, containing flavonoids also possess hypolipidemic properties.

The total phenolic content was found to be 542.26 mg gallic acid equivalent per 100 g dried tuber extract, whereas the flavonoid content was found to be 4.30 mg quercetin equivalent of dried extract tuber. (Md. Khirul Islam et. al 2013)

The food value of the edibles portion of raw stem tubers of giant taro has been reported as moisture content is have a 63-81% and the crude protein is 0.6-3.3% the fat is 0.1-0.2%, carbohydrates 17-27% while the Ash is 1.1-1.3%. (<http://www.nzal.org/gsdllmod>)

The nutritional value of alocasia macrorrhizos the total of 2.2 grams of protein, 23 grams of carbohydrates, and the dietary fiber is 1.9 grams, the vitamin C is have a total of 17 mg. According to the health benefit of a giant taro that it is rich in Vitamin C, carbohydrates, zinc, vitamin E. magnesium and Iron which is essential to maintain the health. (www.healthbenefits.com/gianttaro)



Nutraceuticals are natural bioactive chemical compounds. Nutraceuticals have value in health promoting, disease preventing or semi-medicinal properties. Nutraceuticals are found as natural products from (a) the food industry, (b) the herbal and dietary supplement, (c) pharmaceutical industry, and (d) the newly emerged bioengineered microorganisms, agro products or active biomolecules. It may range from isolated nutrients, herbal products, dietary supplements and diets to genetically engineered "custom" foods and processed products such as cereals, soups and beverages. Chemically the nutraceuticals may be classified as isoprenoid derivatives (terpenoids, carotenoids, saponins, tocotrienols, tocopherols, terpenes), phenolic compounds (coumarins, tannins, lignins, anthocyanins, isoflavones, flavonones, flavanoids), carbohydrate derivatives (ascorbic acid, oligosaccharides, non-starch polysaccharides), fatty acid and structural lipids (n-3 PUFA, CLA, MUFA, sphingolipids, lecithins), amino acid derivatives (amino).

Secondary metabolites

Alkaloid

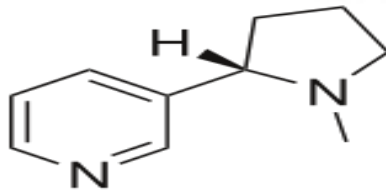


Figure 2. Basic Structure of Alkaloid

Alkaloid is naturally occurring chemical containing basic nitrogen atoms. The name was derived from the word alkaline and was used to describe any nitrogen containing base alkaloid produced by a large variety of organisms, including bacteria, fungi plants and animals are parts of the group of natural products also called secondary metabolites. Many alkaloids are toxic to other organisms. They often have pharmacological effects and are partly used as medication and recreation and recreational drugs. Example is the local anesthetic and stimulant caffeine, nicotine the analgesic morphine or antimalarial drug guanine. Some alkaloids have a bitter taste.

Flavonoid

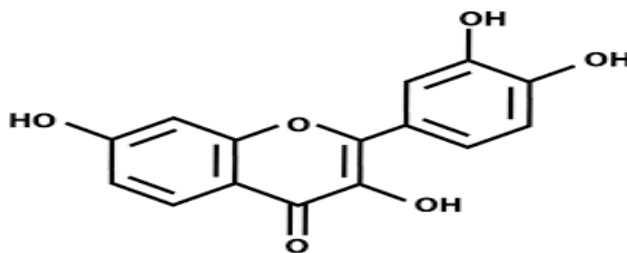


Fig.3 structure of flavonoid

Flavonoids are widely distributed in plants, fulfilling many functions. Flavonoids are the most important plant



pigments for flower coloration, producing yellow or red/blue pigmentation in petals designed to attract pollinator animals. In higher plants, flavonoids are involved in UV filtration, symbiotic nitrogen fixation and floral pigmentation. They may also act as chemical messengers, physiological regulators, and cell cycle inhibitors. Flavonoids secreted by the root of their host plant help *Rhizobia* in the infection stage of their symbiotic relationship with legumes like peas, beans, clover, and soy. *Rhizobia* living in soil are able to sense the flavonoids and this triggers the secretion of Nod factors, which in turn are recognized by the host plant and can lead to root hair deformation and several cellular responses such as ion fluxes and the formation of a root nodule. In addition, some flavonoids have inhibitory activity against organisms that cause plant diseases, e.g. *Fusariumoxysporum*.

Saponin

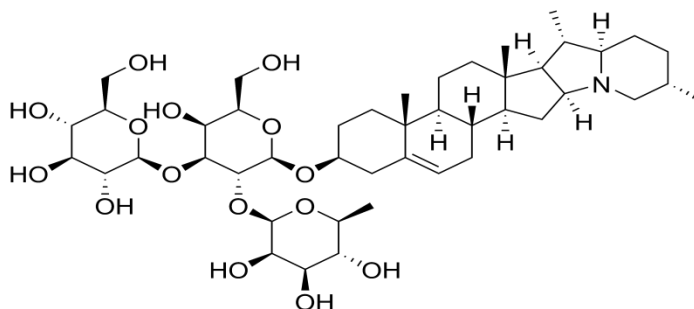




Fig. 4 structure of Saponin

Saponins are a class of chemical compounds found in particular abundance in various plant species. More specifically, they are amphipathic glycosides grouped phenomenologically by the soap-like foaming they produce when shaken in aqueous solutions, and structurally by having one or more hydrophilic glycoside moieties combined with lipophilic triterpene derivative. (<https://en.wikipedia.org/wiki/Saponin>)

Phenolic Compound

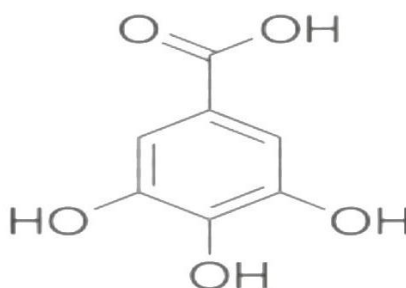


Fig. 5. Basic Structure of Phenolic

Phenols are widely used in household products and as intermediates for industrial synthesis. For example, phenol itself is used (in low concentrations) as a disinfectant in household cleaners and in mouthwash. Phenol may have been the first surgical antiseptic. (<http://medical-dictionary.thefreedictionary.com/Phenolic+compounds>)

Tannin

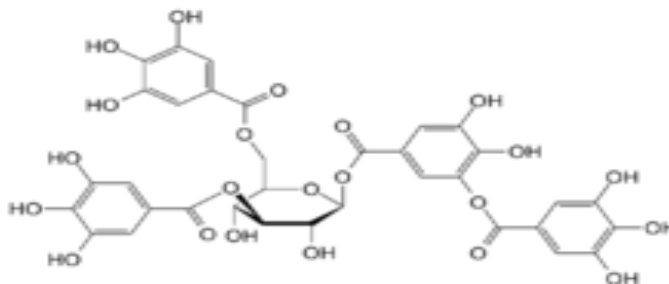


Fig. 6 Structure of tannin

Tannin are non-crystalline when solid, but readily soluble in water or alcohol to give colloidal solutions that are strongly astringent and therefore useful in medicine. Tannins have long been used in compounding ink, because they form greenish-black or bluish-black with ferric salts.

Related Studies

Study of nutritional and Nutraceutical content

The phytochemical analysis conducted *A. Macrorrhizos* extract the presence of Alkaloid, Carbohydrates, Saponin, Phytosterols, Phenol, Tanin, Flavonoid, Protein and Terpenes on crude extract. The presence of phenolic compound and flavonoid in this plant contributed to their antioxidative properties and thus the usefulness of these plants in herbal medicament. (Moghal et al.2014)



The study of Tae Kyung Hyun et al. (2015) is to evaluate of nutritional and nutraceutical value of S.theezan fruit the composition of minerals, organic acids, and proximate fatty acids, total phenolic, total flavonoid, total anthocyanin content and the antioxidant and anti-diabetic activities of S.theezans fruit were analyzed. The result of S.theezan fruit could classified as a potential potassium, malic acid and linoleic/oleic acid-rich fruit. In addition, the ethyl acetate fraction of the 70% ethanol crude extract exhibited strong antioxidant activities including free radical scavenging and reducing power activities compared with the same concentration of butylated hydroxytoluene. The ethyl acetate fraction showed significant of inhibition of α -glucosidase activity. The analysis of the total phenolic and flavonoid content suggested that the remarkable antioxidant and anti-diabetic activities of the ethyl acetate fraction are due to the presence of high levels of polyphenolic compound.

The study of A. Sarma et al. (2015) was about to evaluate the nutritional and nutraceutical properties, mineral and microelement content in certain underutilized edible aroid corms from Assam state of India, nutritionally, all the variants were found to be rich in carbohydrates, protein, crude fiber and ascorbic acid. In protein



($4.39 \pm 0.1\%$), fats ($0.95 \pm 0.2\%$) and flavonoid content ($9.04 \pm 0.0 \mu\text{g QE/mg}$) were found in higher amount. Thus crude fibers ($7.3 \pm 0.05\%$) were found in *C.esculenta* (Bon. Kochu) again the ascorbic acid ($112.87 \pm 0.02 \text{ mg}$) and total phenolic content ($34.3 \pm 0.12 \mu\text{g GAE/mg}$) found higher in *X.violeceum* (krishmakochu). The micro nutrients content such as calcium ($2.53 \mu\text{g/g}$) and zinc ($0.74 \mu\text{g/g}$) found higher in *X.sagittifolium* (Radhakochu: Fe ($1.05 \mu\text{g/g}$) found higher in *A.macrorrhiza* and followed by *C.esculenta* (Bon kochu) with an amount of $0.68 \mu\text{g/g}$. For antioxidant activity, methanolic extract showed a positive correlation between like total phenolic, flavonoid and ascorbic acid, with the increase of these content the antioxidant activity of the all edible aroid samples taken for present study increase. Among the investigated anti activity ($92.36 \pm 0.1 \mu\text{g/g}$) having the potentiality to be used as food antioxidant,

The study of Sem Valera (2015) is to determine the nutritional content of *Dioscoreahispida* Dennst found in Lavezares N. Samar in terms of its moisture content, ash content, fat content, fiber content, protein and carbohydrates. His study also determined the physical characteristics of korot in terms of its color, odor, texture and pH. The detoxified, dried and pounded korot was used in this study for the determination of its nutritional



content. From the results of this study, korot obtained 22% of moisture content and 2.67% of ash content and 9.67% of crude fat content and 10% of crude fiber and 2.99% protein and 62.67% carbohydrates. The color of korot is white, odorless and coarse texture. While its pH is 7.03 which showed that it is neutral. Results revealed that korot is a high source of carbohydrates. It also shows that its moisture content is low which another good thing because it cannot be easily contaminated with bacteria and it is good for preservation.

According to the study of Karina Milagros R. Cui et al (2015) to promote the use of macro fungi as basis of nutrient and nutraceutical several experiment were performed. Macro fungi utilized for food and medicine were documented and macro fungi with potential for cultivation and commercialization were also identified. The Result of the study showed that at least 20 macro fungi species identified belonging two divisions, Basidiomycota and Ascomycota having 8 classes, 13 orders and families but only 4 species were traditionally used for food. The analysis of nutrient includes protein, Carbohydrates, and fats, for the nutraceutical content of the macro fungi species, phytochemical screening was done for flavonoid, carotenoid, phenols, phenolic and ascorbic acid.



Similarities and Differences of the previous study with the present.

Sem Valera (2015) conducted a study which is similar to this study in the nutritional content of korot in terms of protein, fats, carbohydrates, fiber, and ash content of the sample. It differ in the sample used, the previous used korot where water content is included in his study and the toxic content of korot specifically, diosgenin and alkaloids dioscorine, whereas the presence study used Talyan as the sample.

The present study is similar to Karina Milagros R. Cui et al. 2015 study about Analysis of Nutrient & Nutraceutical content of mushroom species. It differs on the kind of sample to used.

Kyung Hyun et al. (2015) conducted a study of nutritional and nutraceutical value of S. theezan fruit. It differ in this study with the sample used for the nutritional and nutraceutical content. This study is similar to the nutritional and nutraceutical content.

A Sarma et al. (2015) conducted a study of nutritional and nutraceutical content of some underutilized edible aroids, in which this study is similar only It differs because of the sample used for nutritional and nutraceutical content.



CHAPTER III

RESEARCH METHODOLOGY

Locale of the Study

This study was conducted in the Chemistry laboratory of the College of Science, University of Eastern Philippines, University Town, Northern Samar.

The *Alocasia macrorrhizos* was collected at Brgy. Enriqueta, Lavezares Northern Samar.



Figure 7 Location map of Enriqueta

Research design

The design of this research was experimental. This research determined the nutritional and nutraceutical content of *Alocasia macrorrhizos*.

Data Gathering procedure

A. Preparation of Talyan Sample

The Talyan sample was collected in the Brgy. Enriqueta Lavezares N. Samar. The skin of talyan was peeled off then it was sliced into a small pieces and it was washed. The talyan was dried using drying oven for the test of nutritional content, And was extracted using the extractor for the test of physical properties and for the nutraceutical content.



B. Determination of Physical properties.

The different physical properties of talyan were determined using the following:

a.) Boiling point

About 5ml of a sample extracted of talyan was poured into a test tube. The test tube was placed in an oil bath and the temperature was recorded when the sample extract started to boil. The process was repeated thrice.

b.) Color

The color of talyan was evaluated by the five respondents using their sense of sight. Evaluation forms were given to each with sample description. They write the observe color in the evaluation form.

c.) Density

For the density were obtained by dividing the mass of extract by the volume of extract. The extract use in determination was poured into a previously weighed graduated cylinder then its volume recorded. Then it was weighed on the electronic balance. The mass of extract were obtained by subtracting the mass of the empty graduated cylinder from the mass of the cylinder with the plant extract. Density will be calculated using the formula:



$$\text{Density} = \frac{\text{Mass of extract}}{\text{Volume of extract}}$$

d.) Odor

The odor of Talyan extract was evaluated by the respondents using their sense of smell. The evaluation forms were given to the evaluators with description.

e.) pH

The pH was determined by using pH meter 20 ml of extract talyan. pH meter was calibrated by buffer solution at 7.0 before it was used digital pH meter into the sample. After one minute, the reading of digital pH meter was recorded.

f.) Solubility

Three (3) solvents were used, namely water, ethanol and hexane for determining solubility. About 5 mL of talyan extract were placed into nine (9) clear test tubes. Then, three test tubes was poured with two 2 mL each of the solvents into three test tubes. The nine (9) test tubes were observed to determine the solubility of talyan in three



different solvents. The result was recorded as miscible or immiscible. Miscible if only one phase was formed and immiscible if more than one phase was formed. Three trials were done for solubility.

C. Determination of Nutritional content

For the determination of nutritional content of Talyan the following procedures and analysis was used:

a.) Ash content (Horwitz et al, 2000)

To determine the ash content of Talyan, three crucibles was marked, with five grams of Talyan, was heated in the oven for three to four hours and the temperature were lower. Before putting into the desiccator for 30 min. the crucible was weighed and recorded. The Talyan sample were burned using the Bunsen burner until it becomes completely ash. It was followed by cooling the sample into the desiccator for 30 min. and was weighed.

$$\text{Ash content (Percent)} = \frac{(W3-W1)}{(W2-W1)} \times 100$$

Where:

W1 - Weight of crucibles (g)

W2 -Weight of crucible and sample (g)

W3 - Weight of crucibles and ash (g)

b.) Carbohydrates (Wang, et al 2006)



Calculation of carbohydrates for talyan was determined by adding the moisture content, protein, fat and ash and the result were subtracted in 100.

Total Carbohydrates = 100(% moisture + % protein +% fat + % ash)

c.) Moisture Content (Cockerell, et al, 2000)

To determine the moisture content of Talyan, ten (10) grams of ground sample were placed in the preheated, cooled and weighed crucibles in the drying oven for 12 hours 105°C. The crucibles were cooled in desiccator for 30 minutes and were weighed. Three trials were made.

Moisture content was calculated by the following formula:

$$\text{Moisture Content (Percent)} = \frac{(B-A)-(C-A)}{(B-A)} \times 100$$

Where:

A - Weight of clean, dry crucible (g)

B - Weight of clean crucible and sample (g)

C - Weight of crucible and dry sample (g)

d.) Total Fat

Talyan was homogenized using blender and dried at 135 ± 1 °C for two hours. Dried talyan was boiled with HCL solution (25+11) for hydrolysis. Soluble materials was



extracted three(3) times from dried sample using with diethyl ether and petroleum ether solvent in separatory funnel. After evaporating the solvent and drying of the extract, crude fat was determined by weight.

D. Determination of Nutraceutical Extraction procedure

a.) Alkaloid

Dragendorffs reagent and Mayer's reagent was used in detecting the presence of alkaloid. A positive result is indicated by the formation of orange precipitate in drangendorff's reagent and a white precipitate with Mayer's reagent.

An equivalent of 20 mL of talyan extract was placed in an evaporating dish. Then it was evaporated to a syrupy consistency over steam bath. Five (5) mL of 2M HCl was added. Next, it was heated with stirring for about five minutes and cooled. Then about 0.5 g NaCl was added, stirred and filtered. The residue was washed with enough 2M HCl to bring the filtrate to a volume of 5 ml. Then to 2 mL of the filtrate was added 2 to 3 drops of Dragendorff's reagent. And also 2 mL of the filtrate was treated with 2 to 3 drops of Mayer's reagent the result was recorded.

b.) Confirmatory Test for Alkaloid



This test is done to confirm the presence of primary, secondary and tertiary alkaloids.

To 15 mL of the filtrate, add drop wise enough 28% ammonia until the solution is alkaline in litmus paper. Then extract the alkaline solution three times in small portion of less than 10 mL chloroform and combine the lower chloroform extract and reserve the aqueous layer. And evaporate the chloroform extract to dryness under the hood and over the water bath. Then take up the residue with 5 mL 2M HCl, and stir over the steam bath for about two minutes and cool. Filter and divide filtrate into two portions, and test one portion with the Dragendorff's reagent and then test the other with the Mayer's reagent. The result obtained was recorded.

c) Total flavonoid content

In this method, Flavonoid was determined through Bale-Smith and Metcalf method. A strong red or violet color indicated the presence of flavonoids.

This test were done by taking an equivalent of 10 g of talyan extracted or plant materials from the stock extract



prepared, evaporate to incipient dryness over a steam bath. Cool to room temperature, defat by taking the residue with 9 ml Hexane and water or with petroleum ether dilute the defatted aqueous layer with 10 mL of 89% ethyl alcohol. Filter and divide the filtrate into two test tubes. Taking one portion as control while the other one portion of the above alcohol filtrates with 0.5 ml concentrated hydrochloric acid (12M). Observe any color change, warm for 15 min. in water bath. Observe for further color change within an hour and compare with the control. And record the result.

e.) Total phenolic content

Formation of blue or green color indicates the presence of phenolic content or compound. Two (2) ml of the extract was be diluted with 100 mL of distilled water. Then about 2 g of the diluted extract were put into separated test tubes and 2 drops of 3% FeCl_3 was added.

f.) Test for saponin

Capillary test was used to determine the presence of Saponin. If level of the plant extract in the capillary tube is half or less than in the other tube containing water, the presence of Saponin may be inferred.



Load the capillary tube with the plant extract by immersing the tube a height of 10mm in the plant extract. Likewise, load another capillary tube with distilled water and lift the capillary tube to keep both in vertical position to allow the liquid inside to flow out freely. And then after sometime, compare the height of the liquids in the two tubes.

g) Test for tannin

The talyan extract was centrifuged for 15 min. To allow the solid particles of the extract to settle down at the bottom of the test tube. A clear supernatant liquid was then decanted and test for the presence of tannin. About 2 mL of lead acetate was added to a few drops of 1% lead acetate. A yellowish precipitate indicates the presence of tannin.

h) Vitamin C (ascorbic acid)

1. Preparation of stock solution

Preparation of 50 ml stock solution of 3% 100 mg ascorbic acid.

Accurately weigh 1.5g of ascorbic acid. Transfer quantitatively to 50 ml graduated cylinder and fill to the mark with water.

2. Preparation of standard solution



Using 10 ml graduated cylinder dilute the stock solution prepared in step 1 as following for the 100%, 75%, 50%, 25% and 12,5%.

3. Rinse one of the cuvette with distilled water and fill it with water. Put the cuvette with distilled water and once with standard solution 1, and then fill it with standard solution 1(100%). Place the cell in the sample compartment. Measure the absorbance at 521 nm. The result was recorded.

4. Set the wavelength 521 nm. Place the cuvette with distilled water in the cell compartment and again set the absorbance to zero.

5. Measured and record the absorbance of each five standard solution starting with the most dilute solution.

6. The result was plotted in the Microsoft excel absorbance over concentration.

Preparation of Sample

1. The talyan extract was centrifuge to settle down the precipitate and get the supernatant liquid.

2. The supernatant liquid of talyan was diluted to distilled water with the following concentration 100 %, 75%, 50%, 25% and 12.5%.



3. Calibration of UV-Vis was the same with the preparation of standard solutions in #2, #3, #4, #5 and #6.

Collection and preparation of plant sample.



Determination of Physical properties.



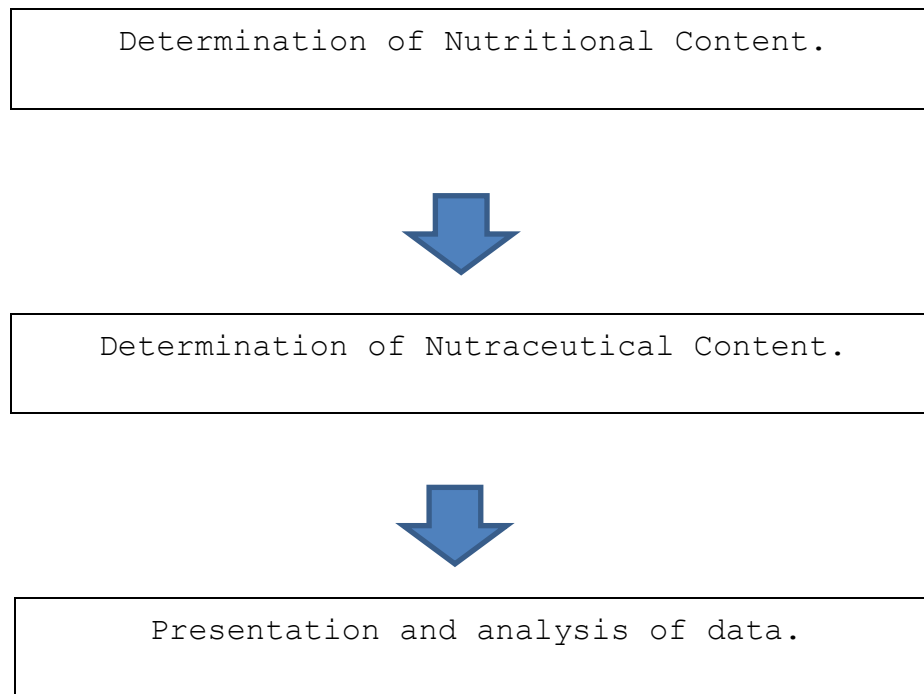


Figure 8 Flow Diagram

CHAPTER IV

RESULTS AND DISCUSSION

This study focused on the determination of the Physical properties, Nutritional and Nutraceutical contents of talyan tubers.

The data gathered from a series of experimentation within three trials were analyzed and interpreted by the



researcher according to the statement of the problems of this study.

The physical properties of Talyan tubers were found out to have a boiling point of 70 °C, white in color, with pleasant odor has 5.33 g/mL density, 3.22 pH which is moderately acidic and have a polar extract in solubility because it is miscible in water and ethanol, while immiscible in hexane.

For Nutritional content, Talyan contained 7.0862% ash content which means it has high mineral such as calcium, potassium and sodium. Carbohydrates 7.0738% provide energy which is needed in our body. Moisture content 80.89% which implies more water and is important in our body, 3.06% protein a substance found in foods that is an important part of the human body diet and 1.89% total fat which is also one of the substance needed in our body in a little ratio for balance diet.

Moreover for the Nutraceutical content, Alkaloid was present which responsible as analgesic and sedative which means it can reduce pain, then flavonoid another secondary metabolites which can be used as antioxidant whereas phenolic, saponin and tannin were not found in talyan tubers.



Physical Properties

Table 1. Physical properties of talyan.

Properties	Result	Interpretation
Boiling point	70°C	
Color	White	
Density	1.0662 g/ml	
Odor	Pleasant smell	
pH	3.22	Moderately Acidic
Solubility	Ethanol (miscible) Water (miscible) Hexane (immiscible)	Polar Polar Polar

Table 1 showed that the boiling point of talyan is 70°C, the color of the extract is white, the total of the density is 1.0662 g/ml the odor of talyan is pleasant, and the pH is 3.22 which is moderately acidic, and for the solubility the result of ethanol and water is miscible to talyan extract but hexane is immiscible, therefore talyan extract is polar.

Nutritional Content of Talyan

Table 2. Result of Nutritional Content



Nutritional content in terms of:	Result
Ash	7.0862%
Carbohydrates	7.0738%
Moisture	80.89%
Protein	3.06%
Total Fat	1.89%

Table 2 showed that talyan has an average of 7.0862 % of ash this further implies that the talyan has a little mineral content. It might be calcium, potassium and sodium. It has an average of 7.0738% carbohydrates which could be the source of energy needed in our body, 80.89% of moisture which implies more water in our body which needs 70 to 80% water to remove some waste product in our body through urine, 3.06% protein its implies our body need protein to keep our metabolism running, our energy up and our blood sugar level stable and 1.89% of total fat which is also one of the substance needed in our body in a little ratio for balance diet.

Nutraceutical content of Talyan

Table 3. Nutraceutical Content of Talyan



Nutraceutical content in terms of:	Result	Interpretation
Alkaloid	Orange precipitate formed for Dragendorffs White precipitate Formed for mayers	Positive Positive
Confirmatory alkaloid	Orange Precipitate formed for dragendorffs White precipitate formed for mayers	Positive Positive
Flavonoid	Slightly purple color formed	Positive
Phenolic content	No formation of Blue or Green color	Negative
Saponin	Higher than distilled water	Negative
Tannin	No yellowish precipitate formed	Negative

As shown in table 3 is the result of analysis made in three trials. Alkaloid is positive the precipitate was turned to color orange for the dragendorffs and turns to white precipitate for the mayers reagent this means that talyan contains alkaloid which is responsible for analgesic and sedative which means reducing pain. Talyan contains flavonoid because of its positive result when it was added with 12M HCL acid the color was changed to slightly purple, it indicate that it can be used as a natural antioxidant in



processed foods. The phenolic content was not found out when it was treated 3% FeCl_3 . The saponin has a negative result which is talyan extract higher than distilled water. And the tannin was not found out when it added a few drops of 1% lead acetate.

Vitamin C

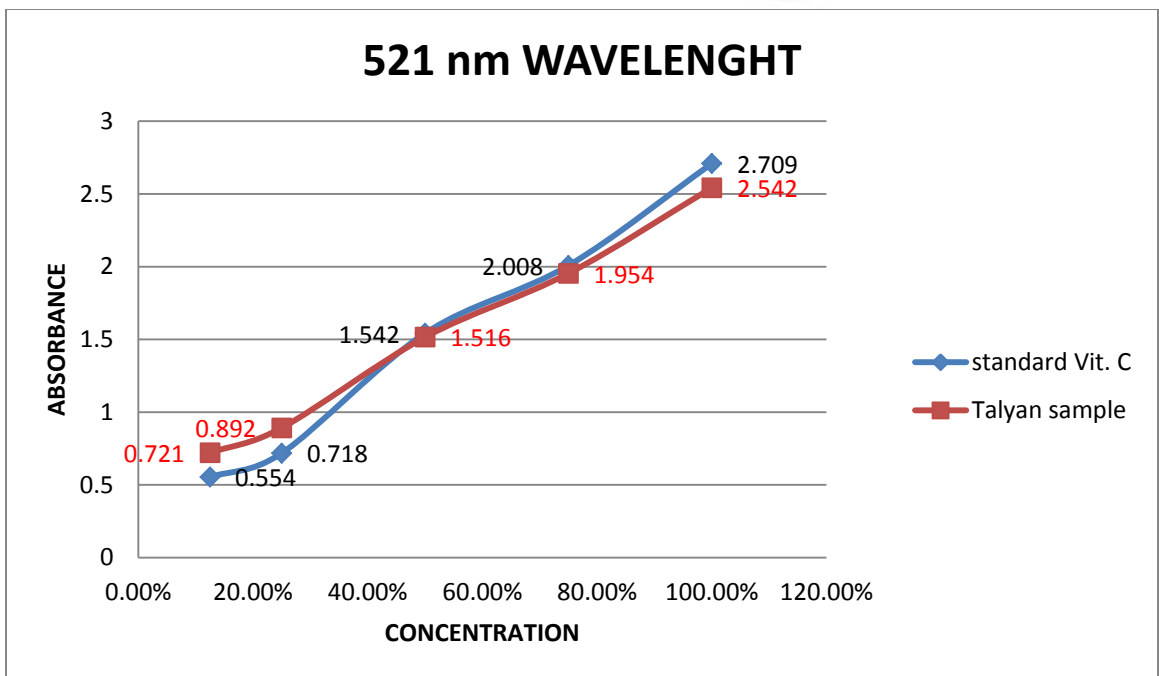


Fig. 9 Graph of Vitamin C standard and the graph of Talyan.

As shown in figure 9, it was found out that as the data plotted the curve as resulted from talyan follows the curve of the standard vitamin C, which indicates the presence of vitamin C in the talyan. It was measured at 521 nm wavelength. According to the health benefit of giant taro, that it is rich in vitamin C and it is good source for vitamin C.

CHAPTER V



SUMMARY, CONCLUSION AND RECOMMENDATION

SUMMARY

This study was conducted to determine the physical properties, nutritional and nutraceutical content of *Alocasia macrorrhizos* (L) G. Don. Talyan sample was collected in the Brgy. Enriqueta Lavezares N. Samar the result of talyan tuber extract for the physical properties, was found out the boiling point is 70°C, white in color, with an average of 1.0662 g/mL density which is denser than water, pleasant in odor and has a pH of 3.22 which is moderately acidic the talyan tuber extract is polar it was an evidence that it was miscible in water and ethanol but immiscible in hexane. Talyan nutritional content were conducted obtained in terms of its Ash, moisture, protein, total fat, and carbohydrates, which is derived that talyan has an average of 7.0862% for the ash content it implies that talyan has a little mineral content such as calcium, potassium and sodium, carbohydrates 7.0738% which could be the source of energy that needed in our body the moisture is 80.89% it implies that more water in our body which needs 70 to 80% water to remove some waste product in our body through urine, protein is 3.06% its implies our body need



protein to keep our metabolism running and for the total fat has an average of 1.89% which is also one of the substance needed in our body in a little ratio for balance diet. And for the further experimental analysis on its nutraceutical content it's revealed that alkaloid is present of the talyan tuber it is formed an orange and white precipitate for the dragendorffs and mayers reagent which is responsible for analgesic and sedative means reducing pain and the flavonoid is positive because the color has already changed that it can used as a natural antioxidant in processed foods. The phenolic content, saponin and tannin are negative to talyan. The Alocasia macrorrhizos has a content of vitamin C which is good source.

Conclusion

Based on the finding of the study, therefore it was found out that the:

1. Talyan extract has a 70 °C boiling point, white in color, has an average of 1.0662 g/ml density, pleasant odor has a pH of 3.22 which is moderately acidic and is immiscible in hexane but miscible in water and ethanol the talyan is polar.
2. The nutritional content has higher moisture content with an average of 80.89%, and has an average 7.0862%



of ash, 7.0738% carbohydrates, 3.06% and 1.89% of total fat.

3. For the nutraceutical talyan is positive in alkaloid, flavonoid and Vitamin C, but it's negative in phenolic content, saponin and tannin.

Recommendation

Another study to be conducted on the:

1. Nutritional and Nutraceutical content of talyan leaves.
2. Nutritional and nutraceutical content of supernatant of talyan tubers extract if it same result.
3. Further study is conducted on the same process but different plant sample.

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APPENDICES



APENDICES B

SENSORY EVALUATION FOR COLOR AND ODOR

NAME : _____ **Date** _____

PRODUCT : _____

You are presented with sample of the talyan tuber extract of *Alocasia Macrorrhizos* (TALYAN). Please describe it by writing the appropriate description of each property.

ODOR

Please describe the odor of *Alocasia Macrorrhizos* (talyan) extract as: pleasant, unpleasant and odorless or characteristics of familiar substance.

EVALUATOR	INTERPRETATION
1	
2	
3	
4	
5	

COLOR

Please observe the color of the extract

EVALUATORS	INTERPRETATION
1	
2	
3	
4	
5	

THANK YOU!!!

JAYSON E. TIBE
Researcher



APENDICES C

RESULT OF SENSORY EVALUATION FOR ODOR

EVALUATORS	ODOR OF TALYAN EXTRACT
1	Pleasant
2	Pleasant
3	Pleasant
4	Pleasant
5	Pleasant

RESULT OF SENSORY EVALUATION FOR COLOR

EVALUATORS	COLOR OF TALYAN
1	White
2	White
3	White
4	White
5	White



APPENDICES D

TABLES AND RESULT OF PHYSICAL CHARACTERISTICS OF TALYAN

Table 4 Boiling Point

TRIALS	RESULT
1	68°C
2	72°C
3	70°C
Average	70°C

Table 5. Color and Odor

	R₁	R₂	R₃	R₄	R₅
Evaluated color of talyan extract	White	White	White	White	White
Evaluated odor of talyan extract	Pleasant smell	Pleasant smell	Pleasant smell	Pleasant smell	Pleasant smell



Table 6. Density test

TRIALS	RESULT
1	1.0614 g
2	1.0594 g
3	1.0780 g
Average	1.0662 g

Table 7. pH test

TRIAL 1	Trial 2	Trial 3	RESULT	Interpretation
3.80 pH	2.87pH	2.98 pH	3.22 pH	Moderately acidic

Table 8. Solubility test

TRIALS	1	2	3	Interpretation
ETHANOL	MICIBLE	MICIBLE	MICIBLE	Polar extract
HEXANE	IMMICIBLE	IMMICIBLE	IMMICIBLE	Polar extract
WATER	MICIBLE	MICIBLE	MICIBLE	Polar extract



APPENDICES E

**TABLES AND RESULT OF NUTRITIONAL AND NUTRACEUTICAL
 CONTENT OF TALYAN**

Table 9. Ash content

Trials	Weight of crucible	Weight of crucible + weight of sample	Weight of crucible + weight of ash	Percent of ash
1	18.1580g	23.2299g	18.5250g	7.2359%
2	17.5856g	22.5899g	17.9265g	6.8121%
3	17.4711g	22.5331g	17.8361g	7.2105%
Average				7.0862%

Table 10. Moisture Content

Trials	Weight of crucible	Weight of crucible + weight of sample	Weight of crucible + weight of dry sample	Percent of moisture
1	18.8882g	29.2489g	20.8452g	81.05%
2	17.8071g	27.8859g	19.7173g	81.11%
3	18.6074g	28.6862g	20.5778g	80.51%
Avreage				80.89%



Table 11. Carbohydrates

%total ash	%total moisture	%total Protein	%total Fat	Carbohydrates
7.0862%	80.89%	3.06%	1.89%	7.0738%

Table 12. Alkaloid test

	Trial 1	Trial 2	Trail 3	Interpre tation
Dragendor ffs	Formation Orange Precipitate	Formation Orange Precipitate	Formation Orange Precipitate	Positive
Mayers	Formation White precipitate	Formation White precipitate	Formation White precipitate	Positive

Table 13. Confirmatory of Alkaloid Test

	Trial 1	Trial 2	Trial 3	Interpre tation
Dragendorf fs	Formation Orange Precipitate	Formation Orange Precipitate	Formation Orange Precipitate	Positive
Mayers	Formation White precipitate	Formation White precipitate	Formation White precipitate	Positive



Table 14. Flavonoid Test

Trials	Result	Control	Interpretation
1	Formation of slightly purple color	White color	Positive
2	Formation of slightly purple color	White color	Positive
3	Formation of slightly purple color	White color	Positive

Table 15. Phenolic test

Trials	Treated with 3% FeCl₃	Interpretation
1	No formation of blue or green color	Negative
2	No formation of blue or green color	Negative
3	No formation of blue or green color	Negative



Table 16. Tannin Test

Trials	Treated with 1% lead acetate	Interpretation
1	No Yellowish Precipitate	Negative
2	No yellowish Precipitate	Negative
3	No yellowish precipitate	Negative

Table 17. Saponin Test

Trials	Result	Interpretation
1	Talyan extract is same level of water	Negative
2	Talyan extract is same level of water	Negative
3	Talyan extract is same level of water	Negative



APPENDICES F

STATISTICAL COMPUTATION

Ash Content

Below is the computation used to determine the ash content of talyan 5 g basis.

$$\text{ash content} = \frac{(w_3 - w_1)}{(w_2 - w_1)} \times 100$$

Where:

W_1 = weight of empty crucible (g)

W_2 = weight of crucible and sample (g)

W_3 = weight of crucible and ash (g)

Trial 1.

W_1 = 18.1580 g

W_2 = 23.2299 g

W_3 = 18.5250 g

$$\% \text{ash} = \frac{18.5250 \text{ g} - 18.1580 \text{ g}}{23.2299 \text{ g} - 18.1580 \text{ g}} \times 100$$

$$\% \text{ash} = \frac{0.367 \text{ g}}{5.0719 \text{ g}} \times 100$$

$$\% \text{ash} = 7.2359 \%$$



Trial 2.

$$W_1=17.5856 \text{ g}$$

$$W_2=22.5899 \text{ g}$$

$$W_3=17.9265 \text{ g}$$

$$\%ash = \frac{17.9265 \text{ g} - 17.5856 \text{ g}}{22.5899 \text{ g} - 17.5856 \text{ g}} \times 100$$

$$\%ash = \frac{0.3409 \text{ g}}{5.0043 \text{ g}} \times 100$$

$$\%ash = 6.8121 \%$$

Trial 3.

$$W_1=17.4711 \text{ g}$$

$$W_2= 22.5331 \text{ g}$$

$$W_3= 17.8361 \text{ g}$$

$$\%ash = \frac{17.8361 \text{ g} - 17.4711 \text{ g}}{22.5331 \text{ g} - 17.4711 \text{ g}} \times 100$$

$$\%ash = \frac{0.365 \text{ g}}{5.062 \text{ g}} \times 100$$

$$\%ash=7.2106 \%$$



Moisture content

The equation used for calculation of moisture content.

$$\% \text{ moisture content} = \frac{(B-A)-(C-A)}{B-A} \times 100$$

Where:

A= weight of crucible

B= weight of crucible+ weight of sample

C=weight of crucible + weight of dry sample

Trial 1.

A= 18.8882 g

B= 29.2489 g

C= 20.8452 g

$$\% \text{ moisture content} = \frac{(29.2489 \text{ g} - 18.8882 \text{ g}) - (20.8452 \text{ g} - 18.8882 \text{ g})}{29.2489 \text{ g} - 18.8882 \text{ g}} \times 100$$

$$\% \text{ moisture content} = \frac{10.3607 \text{ g} - 1.957 \text{ g}}{10.3607 \text{ g}} \times 100$$

%moisture content=81.11%

Trial2.

A=17.8071 g

C=19.7173 g

B=27.8859 g



$$\% \text{ moisrure content} = \frac{(27.8859 \text{ g} - 17.8071 \text{ g}) - (19.7173 \text{ g} - 17.8071)}{27.8859 \text{ g} - 17.8071 \text{ g}} \times 100$$

$$\% \text{ moisture content} = \frac{10.0788 \text{ g} - 1.9102 \text{ g}}{10.0788 \text{ g}} \times 100$$

$$\% \text{ Moisture content} = 81.05 \%$$

Trial 3.

$$A = 18.6074 \text{ g}$$

$$B = 28.6862 \text{ g}$$

$$C = 20.5717 \text{ g}$$

$$\% \text{ moisture content} = \frac{(28.6862 \text{ g} - 18.6074) - (20.5717 \text{ g} - 18.6074 \text{ g})}{28.6862 \text{ g} - 18.6074 \text{ g}} \times 100$$

$$\% \text{ moisture} = \frac{10.0788 \text{ g} - 1.9643 \text{ g}}{10.0788 \text{ g}} \times 100$$

$$\% \text{ moisture content} = 80.51 \%$$

Carbohydrates

To calculate the carbohydrates content of talyan the researchers use the equation:

$$\text{Total carbohydrates} = 100 - (\% \text{ total ash} + \% \text{ total moisture} + \% \text{ total protein} + \% \text{ total Fats})$$

$$\text{Total carbohydrates} = 100 - (7.08625 + 80.89\% + 3.09\% + 1.89\%)$$

$$\text{Total carbohydrates} = 7.0738 \%$$



Vitamin C

To calculate the standard stock solution are shown below:

$$\% \text{ by mass} = \frac{g \text{ of solute}}{g \text{ solution}} \times 100$$

$$3\% = \frac{x}{50 \text{ ml}} \times 100$$

$$0.03 \text{ g} = \frac{x}{50 \text{ ml}}$$

$$= 1.5 \text{ g}$$

To prepare the Standard stock solution are shown below:

For 100 % ,

$$\% \text{ by volume} = \frac{\text{volume of solute}}{\text{volume of solution}} \times 100$$

$$\% \text{ by volume} = \frac{10 \text{ ml}}{10 \text{ ml}} \times 100$$

$$\% \text{ by volume} = 100 \%$$

To prepare 75 % concentration in 10 ml solution,

$$\% \text{ by volume} = \frac{7.5 \text{ ml}}{10 \text{ ml}} \times 100$$

$$\% \text{ by volume} = 75 \%$$



To prepare 50 % concentration in 10 ml solution,

$$\% \text{ by volume} = \frac{5 \text{ ml}}{10 \text{ ml}} \times 100$$

$$\% \text{ by volume} = 50 \%$$

To prepare 25 % concentration in 10 ml solution

$$\% \text{ by volume} = \frac{2.5 \text{ ml}}{10 \text{ ml}} \times 100$$

$$\% \text{ by volume} = 25 \%$$

Prepare 12.5 % concentration in 10 ml solution

$$\% \text{ by volume} = \frac{1.25 \text{ ml}}{10 \text{ ml}} \times 100$$

$$\% \text{ by volume} = 12.5 \%$$

APENDICES G

PHOTO DOCUMENTATION



Plate 1. Determination of Odor



Plate 2. Determination of Color



Plate 3. Boiling point determination



Plate 6. Determination of Density



Plate 4. pH determination of talyan extract



Plate 5. Determination of Solubility

Photo Documentations for Nutritional Content of Talyan

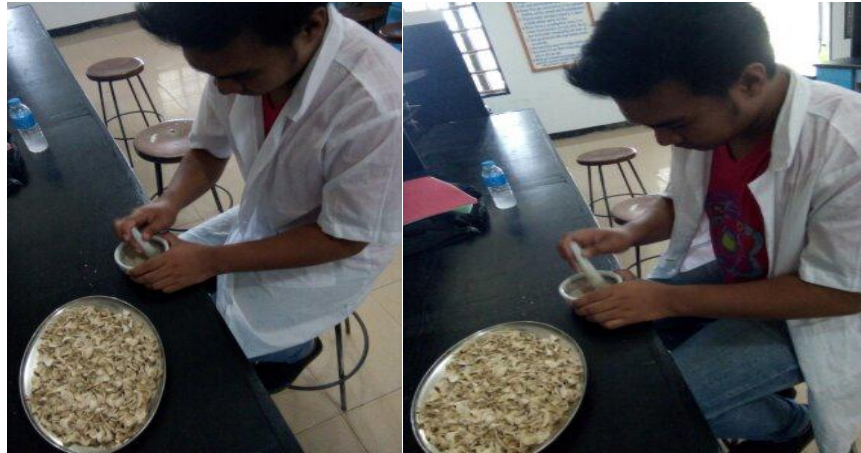


Plate 7. Powdering the dried Talyan

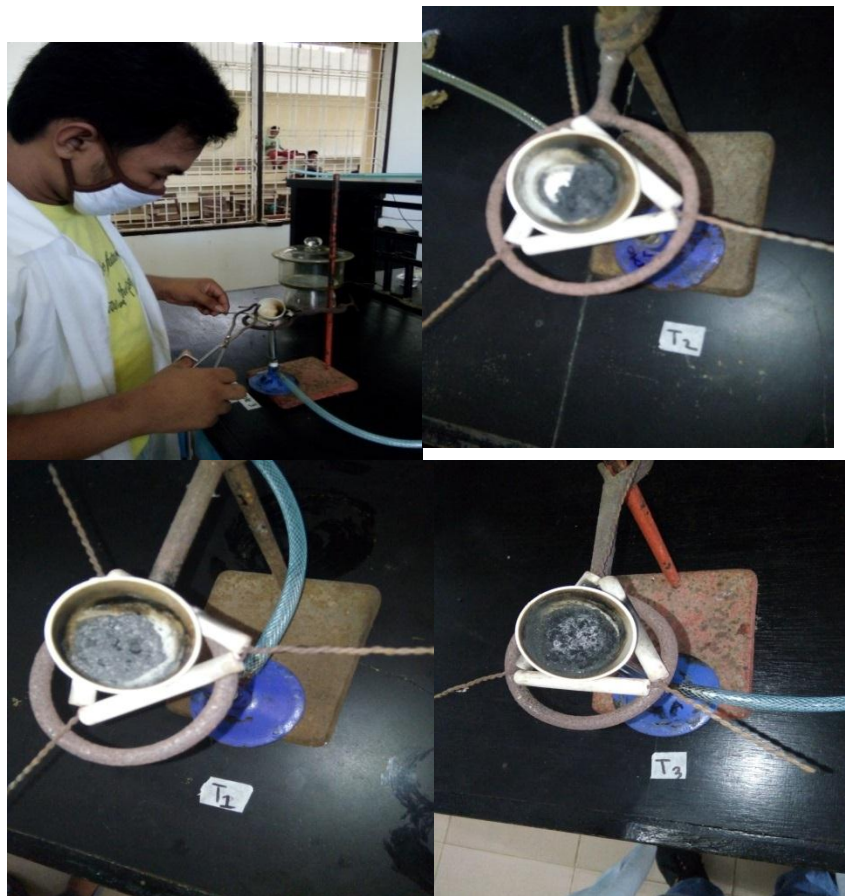


Plate 8. Determination of ash content



Plate 9. Determination of Moisture content



Plate 10. Determination of Total fat

Photo Documentation for Nutraceutical Content



Plate 11. Determination of Alkaloid



Plate 12. Confirmatory test of Alkaloid



Plate 13. Determination of flavonoid



Plate 14. Determination of phenolic Content



Plate 15. Determination of saponin



Plate 16. Determination of Tannin

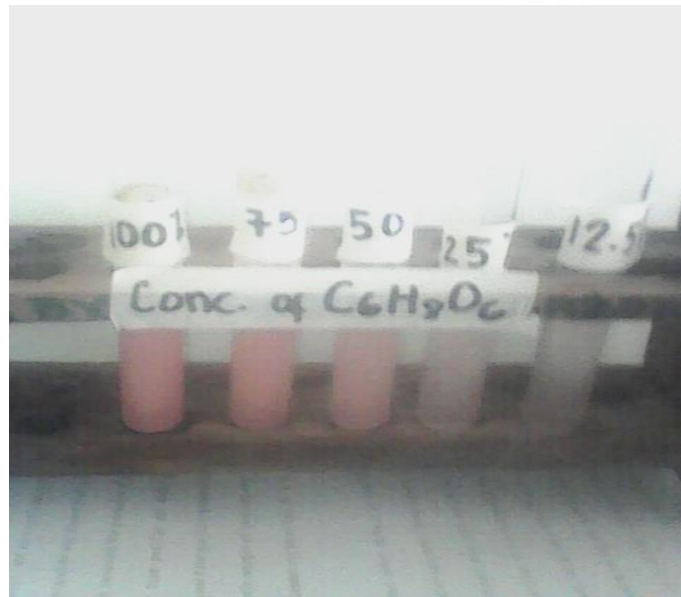


Plate 17. Concentration of Ascorbic Acid

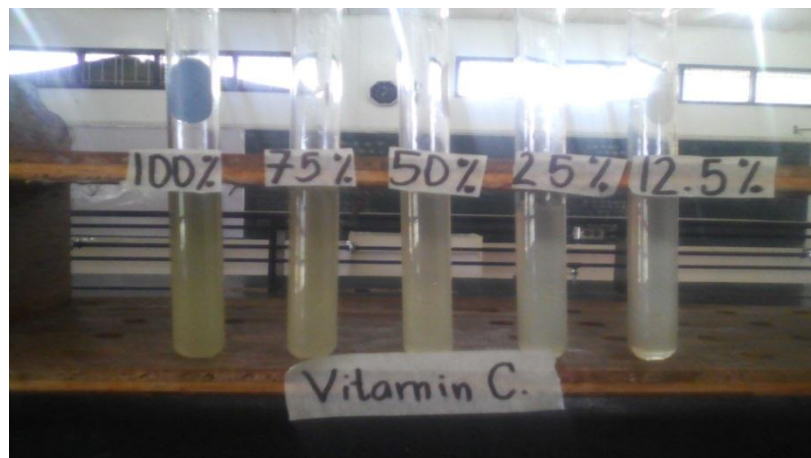


Plate 18. Concentration of Talyan