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Study of some phytochemicals in Almond plant *(Prunus dulcis*) bark and leaves

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ABSTRACT

Prunus dulcis is a significant nut tree which has a high potential values in nutrition and medicine. *The phytochemical analysis of almond bark and its leaves using standard procedures shows it contains (%) saponin 6.0%, flavonoid 10.24%, alkal oid 8.18% and cyanogenic glycoside 2.5% while the saponin, flavoniod, alkaloid and cyanogenic glycoside in leaves are 4.15%, 11.32%, 4.95% and 1.78% respectively. This result shows that the presence of saponin, alkaloid and cyanogenic glycoside are higher in almond barks than its leaves while flavonoid is higher in concentration in almond leaves than its barks. . It has been shown from the analysis that the percentages of the phytochemicals are not lethal especially the cyanogenic glycoside in the sample which indicates less toxicity and a minor quantity of hydrogen cyanide which can easily be detoxified for better health benefits.*

Keywords: almond nut, saponin, alkaloid, cyanide etc

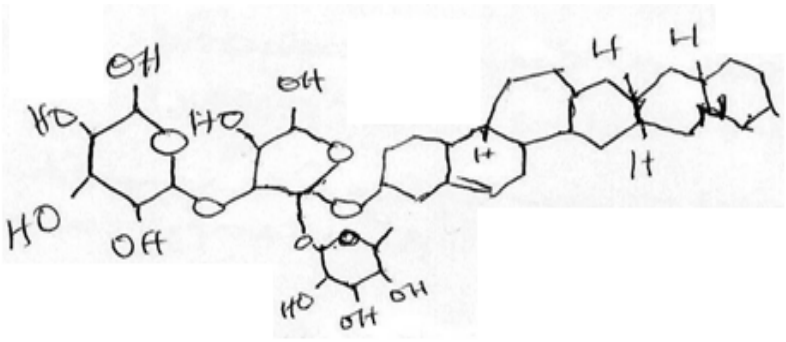
INTRODUCTION

Almond (*Prunus dulcis)* is one of the most important and familiar nut trees for global nut production that includes apples, pears, prunes and raspberries (9). Almond seed skin is a prominent source of polyphenolic compounds, mainly phenolic acids, bioflavonoids, flavanones, isoflavones, flavonol glycosides and lignansthat are reported in a ripened nut (6). Bioflavonoids such as flavanolglycosides, chieflycatechins, epicatechin, procyanidins and flavonol include 3-hydroxyflavone backbone glycosides, particularly isorhamnetin,

isorhamnetin, naringenin and kaempferol are novel agents isolated from ripened seeds. Almond is a popular nut rich in minerals, vitamins, proteins, fibres and other substances which promote a healthy life. The review aims to renew the interest in this promising plant, thus stimulating researchers to go further with the study for discovering novel medicinal and nutritional benefits (5). The kernels of the seeds are a major source of vitamin E and B, dietary fiber, essential elements calcium and magnesium, monounsaturated fatty acids, and phytosterols with significant cholesterol-lowering effects. It is the most popular in nutritive food that can relieve different kinds of ailments (2 and 3). This review summarizes recent advances in the studies regarding Prunus dulcis and its potential significance. Further, there is a need to isolate and evaluate the active chemical constituents of Prunus amygdalus having significant pharmacological values (7). The phytochemicals analyzed were found to be some of the parameters in almond plant which has made it very useful to man and his environment. (10) Some of the phytochemicals determined were saponin, flavonoid, cyanogenic glycoside and Alkaloid using the leaves and nuts. This has also shown that some parts of almond are very edible and can be properly digested, also its usefulness for good health (2). Almond plant, (*Prunus dulcis)* is a highly valued plant that is mostly cultivated in the tropics and sub-tropics, it is a multi-purpose tree which originated from Iran, India, Philippines, Sri-lanka, Thailand, Malaysia, Pakistan, Nigeria, Malaysia, etc. It is a perennial softwood tree with timber of low quality, but for centuries has been advocated for traditional, medicinal and industrial uses with various edible parts. (8).. *Prunus dulcis* belongs to the Rosaceae family which has various species of deciduous trees classified in a single genus. (4). *Prunus dulcis* is the most widely known and distributed species. They are majorly used for food, medicinal and industrial purposes. It is cultivated to use as a vegetable (leaves, green pods, flower seeds), for spice (mainly roots) for cooking and cosmetic oil (seeds) and as a medicinal plant (all plant organs). Medicinally, *moringa* parts are used for treatment of anaemia, anxiety, asthma, fever, semen deficiency (10). Nutritionally, *almond* trees have been used to combat malnutrition, especially among infants and nursing mothers. *Prunus dulcis* (1). contain more vitamin A than carrots, more calcium than milk, more iron than spinach, more vitamin c than milk, more potassium than bananas and that the protein quality of *moringa* leaves rival that of milk and eggs. (4).. It has high anti-oxidant

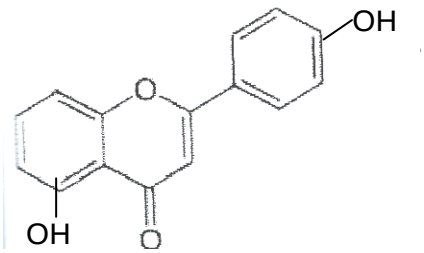
properties making it a valuable source of vitamins A, C and E. it is one of the highest naturally occurring sources of anti-oxidants. (8). The phytochemicals studied such as saponins, cyanogenic glycosides, flavonoids, and alkaloids are natural products which exist in plants and are very significant in the nutritional, medicinal and health benefits of almond plants.(5,6)

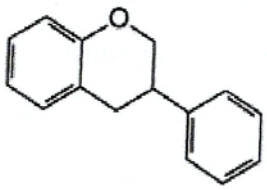
SAPONINS



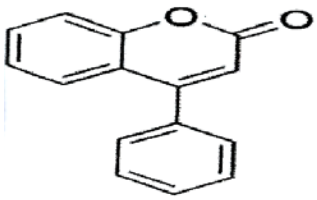
Structure of Saponin

FLAVONOID



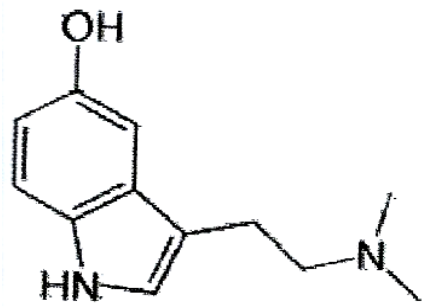


(b) Isoflavan

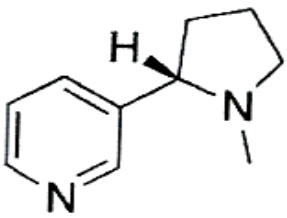


(c) Neoflavonoid

ALKALOIDS



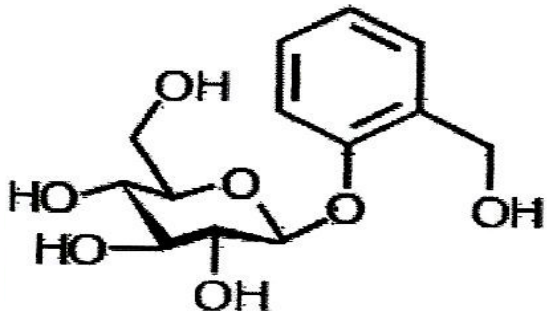
Bufoteinin



Nicotine

Structures of Alkaloids.

CYANOGENIC GLYCOSIDE



Structure of Glycoside

MATERIALS AND METHOD

Plant materials:

Almond (*Prunus dulcis*) bark were freshly collected from Captain Elechi Amadi Polytechnic. washed with distilled water for serval times and dried in the sun. Air dried bark is grounded into powdery form in the Chemistry Laboratory, Department of Chemistry, Faculty of Natural Science, Ignatius Ajuru University of Education . The grounded powder were extracted with acetone and ethanol extract incubated for 48 hours in shaker, whereas the aqueous extract was prepared by incubating for overnight in shaker and it was boiled for 30 minutes till the volume was reduced to half its original. The solvents was then removed by filtration. The extracts were condensed using rotary vacuum evaporator and stored at 40^{o} C. the aqueous extracts was dissolved in water and used for further purpose whereas concentrated extract of acetone and ethanol was suspended in 0.25% dimethyl formamide (DMF) to the concentration of 100mg/ml and was used for analysis.

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Phytochemical Screening.

Crude extracts were subjected to phytochemical tests for presence of saponin,alkaloid,flavonoid and cyanogenic glycosides using standard procedures.

Determination of Alkaloid:

To 5g of the sample in a 500ml beaker was added. 200ml of 10% Acetic acid in ethanol was added and covered. It was allowed to stand for 2hrs, this was filtered and the extract was concentrated on a water bath to one-quarter of the original volume 50mls concentrated ammonium hydroxide was added drop wise to the extract until precipitate was formed. The solution was allowed to settle, the precipitate was collected and washed with ammonium hydroxide and filtered. The residue was dried and weighed.

Determination of Flavonoid: .

10g of the sample was repeatedly extracted with 100ml of 80% aqueous methanol at room temperature. The solution was filtered. The filtrate was later transferred to a crucible and evaporated to dryness over a water bath and weighed to a constant weight.

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Determination of Saponins:

10g of sample was first defatted using acetone solvent by soxhlet continuous extraction method. The residue in the thimble was extracted with methanol solvent into a pre-weighed distillation flask by soxhlet continuous extraction. The extract was distilled to dryness and further placed in an air oven to eliminate all traces of methanol solvent. The flask was then reweighed to obtain the weight of the Saponin in the sample.

Determination of Cyanogenic Glycoside

10g of sieved sample (sieve No. 20) in 800ml Kjeldahl flask was added 200ml water and allowed to stand for 3hrs. Steam distillation was employed and 155ml was distillated into sodium hydoxide solution (0.5g in 20ml H_2O) and diluted to 250ml. 10ml of the distillate was titrated against 0.02N silver nitrate using micro-burette. End-point was determined at permanent mixture turbidity.

SAMPLE IDENTIFIED	SAPONIN	FLAVONOID	ALKALOID	CYANOGENIC GLYCOSIDE

Percentages	%	%	%	mg/10g
Almond bark	6.00	10.24.	8.18	2.50
Almond leaves	4.15	11.32	4.95	1.78

Results of some phytochemical analysis of almond bark are presented in the table above. From our analysis, it shows that phytochemicals; saponin, alkaloid and cyanogenic glycoside are higher in almon bark than in its leaves while flavonoid concentration or percentage is higher in almons leaves than its bark. Flavonoid has the highest percentage in the leaves. The high percentage of flavonoid in the *almon bark* is responsible of its naturally bright colouration and fragrance, it is also interesting to note that flavonoid has the highest concentration or percentage in the bark sample. The different parameters determined were variously distributed in the sample, this could be seen in the following percentages for the *almond bark*, saponin 6.00%, flavonoid 10.24% alkaloid 8.18% and cyanogenic glycoside 2.30% while in *almond leaves*, the percentages of the parameters are saponin 4.15%, flavonoid 11.32%, Alkaloid 4.95% and cyanogenic 1.78%. This confirms that *almond bark* and leaves are good sources of saponin and flavonoid which contain high amount of lipids. The caloric value was high due to high content of lipids. Saponin helps in protecting the plant against microbes and fungi and may also enhance nutrient absorption and aid in animal digestion. The presence of saponins have many health benefits which includes; reduction of blood cholesterol level, cancer and improvement of the immune system. (6) and (4).The results revealed that the phytochemical parameters analyzed in the sample of *almond bark and leaves* are of good health benefits and therefore, *moringa oleifera* is a good source of food. The phytochemical components in *almon leaves* and leaves are useful in treating medical ailments like hypertension, cancer, asthma, atherioscheriosis etc. Also act as anti-cancer, anti-allergic, antioxidants, anti-viral and anti-inflammatory effects (10). The percentage of cyanogenic glycoside in the sample shows that, it is less toxic and will produce a minor quantity of hydrogen cyanide which can easily be detoxified.

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CONCLUSION

Phytochemical analysis of *Prunus dulcis* leaves and flowers reveal the presence of saponins, alkaloid, cyanogenic glycoside and flavonoid which have so much health benefits especially for treatment of some ailments. Industrially, the phytochemicals are also very useful in making food, beverages, drinks, shampoos and some facial cleansers.

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