Phytochemical Properties of Papaya Leaf (*Carica papaya*) Under Soil and Climatic Conditions in Lanao del Sur, Philippines

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ABSTRACT

The study was conducted to evaluated the phytochemicals properties of *Carica papaya*. In particular, the study aimed to determine the phytochemical properties of *Carica papaya* advising the traditional medicine practitioners, herbs users, herb sellers, health institutions and farmers on the health and economic importance of *Carica papaya* leaves. Result revealed T_1, T_2 and T_3 plants showed positive (+) in Alkaloids, Flavonoids, phytosterols, Tannins, phenolics. On the other hand, it showed negative (-) in R. Sugar. This indicates that Alkaloids, Flavonoids, phytosterols, Tannins, Phenolics are present in T_1, T_2 and T_3 while R. Sugar is absent. The result showed that all treatments are safe from harmful phytochemical components.

Keywords : *Carica papaya,* Phytochemical Properties, Alkaloids, Flavonoids, Phytosterols, and Tannins.

1 INTRODUCTION

As of the late, the job and advantageous impacts of numerous phytonutrients from plant sources, for example, products of the soil had drawn in much consideration from food researchers as well as the general population. These phytochemicals are regular cell reinforcement which habitually elevated because of the worries in regards to harmfulness of the manufactured ones. Aside from free revolutionary rummaging action, cancer prevention agents found from the greater part of the plants have antibacterial, antiviral, antimetastatic action, antiulcer movement, antimutagenic, antiallergic and anticarcinogenic (Moure et al., 2001).

Carica papaya L. has a place with the group of *Caricaceae*. An herbaceous plant fills in tropical and subtropical countries (Da Silva et al., 2007). Healthfully, the significant parts of papaya organic mash dry matter are starches. At the beginning phase of organic product improvement, glucose is the primary sugar yet the sucrose content increments during aging and can reach up to 80% of the complete sugars. Papaya, as a tropical natural product, was generally utilized as remedial cure because of its therapeutic properties. *C. papaya* leaves have been used in folk medicine for centuries, to support its efficacy and safety, at the present, there are couple systematically searched and synthesized evidence available.

The average height is about 5 to 10 m. The leaves of the plant are spirally arranged up to the top stem. Normally, the leaves are big with oval shape with about 20–28 in. diameter. All parts of the plant contain white latex. The flowers are 5-parted pale white color petals and highly dimorphic. All parts of papaya have medicinal values and have been used traditionally for the treatment number of diseases globally. (Wadekar A, et al., 2021).

Phytochemical compounds have been identified in papaya leaf, mostly in such classes of flavonoids as apigenin, catechin, deoxyquercetin, hesperitin, isorhamnetin, kaempferol, myricetin, naringenin, protocatechuic acid, quercetin, and rutin. Meanwhile, the fruit is enriched by amino acids, proteins, carbohydrates, fibre, vitamin C, and other nutrients (Hariyono, P, et al., 2021). Interestingly, all parts of papaya mainly express the white latex, which contains high contents of a proteolytic enzyme called papain, which has been studied in relation to its crucial role in the pathophysiology of many diseases, as well as for drug design, and industrial uses such as in meat tenderizers and pharmaceutical preparations (Olmoss, A., 2012). Given the scarcity of previous research, this study determines the phytochemical properties

of *Carica papaya*, also known as papaya leaves.

2 REVIEW OF RELATED LITERATURE

According to the study of Tarkang PA, et al., (2013); Singh P and Rawat P., (2017); Mabley J, et al., (2011), the Papaya leaf extract showed antimicrobial activity against Pseudomonas aeruginosa. The leaf extract showed superior effects against all Gram-positive bacteria as compared to Gram-negative bacteria also reported the antibacterial activity of papaya leaf aqueous and methanolic extracts against Escherichia coli, Staphylococcus aureus, and Candida albicans. The antibacterial activity of the methanolic extract was significant compared to aqueous extract. Another report showed that methanolic seed extract was examined for the antibacterial activity by using Agar well diffusion method.

According to the study of Ugo NJ, Ade AR, Joy AT (2019), Analysis of the vitamins revealed that beta-carotene in the papaya extract was (303.35 mg/100g), Vitamin B2 (295.63 mg/100g). Vitamin B1 recorded (199.31 mg/100g). Vitamin C and E levels were (68.59 and 39.78 mg/100g respectively). Mineral analysis revealed that phosphorus and calcium in papaya extract recorded (1971.17 and 1086.53 mg/100g respectively). In the same vein, potassium recorded (80.13%) while sodium and chromium were (30.42 and 31.10 mg/100g respectively).

2.1 Flavonoids. Flavonoids consist of a large group of polyphenol compounds having a benzoyl-γ-pyrone structure and are ubiquitously present in plants. Tey are synthesized by the phenylpropanoid pathway. Available reports tend to show that secondary metabolites of a phenolic nature including favonoids, are responsible for the variety of pharmacological activities (Mahomoodally et al. 2005; Pandey 2007). Flavonoids are hydroxylated phenolic substances and are known to be synthesized by plants in response to microbial infection (Dixon et al. 1983). In this review, favonoids were detected in most plant species but in some medicinal plants were not present the same plant but diferent solvents like eucalyptus and Agenda Abyssinia leaves.

2.2 Alkaloids. Alkaloids are one of the main and largest components produced by plants, and they are metabolic byproducts that are derived from the amino acids (Naseem 2014). Based on the published articles in these reviews, alkaloids were extracted from the different parts of the plants using different solvents such as ethanol, methanol, chloroform, acetone, hexane, petroleum ether, ethyl acetate, and aqueous (water). These types of solvents extract phytochemical components from medicinal plants like leaves, roots, stem bark, and fruits.

2.3 Tannins. The term tannin is widely applied to a complex large biomolecule of polyphenol nature having sufcient hydroxyls and other suitable groups such as carboxyl to form strong complexes with various macromolecules (Navarrete 2013). In this present review, tannins were detected in most plant species like peel and juice of Citrus medica, mango (Mangifera indica L.) leaves, Avocado fruit (Persea Americana), Dioscorea alata leaf, of Leucas aspera L. leaf and root, Ocimum gratissimum Linn leaf, Rhamnus prinoides root, extract of Rhizomes, Zingiber ofcinale and Curcuma longa and also for diferent solvent give different response for the same plant species like Bersama abyssinica leaf, Flax seeds, Nigella sativa, Ruta chalepensis leaves, and Syzygium guineense and not totally detected in part of plants like Lepidium sativum seeds and love Gilbetii root. Tannins are generally used in the tanning process and used as healing agents in infammation, burn, piles, and gonorrhea (Boroushaki et al. 2016)

2.4 Phytosterols. The word steroid is derived from sterol, which is a natural or synthetic chemically active hormone-like element. A steroid is one of a large group of chemical substances classifed by a specifc carbon structure. Steroids include drugs used to relieve swelling and infammation, such as prednisone and cortisone; vitamin D; and some sex hormones, such as testosterone and estradiol (Hill et al. 2007). For this review, Steroids were detected in most plant species like citrus fruit juice, peel and juice of citrus Medica, Flaxseeds, Nigella sativa, Ocimum gratissimum Linn leaf, Syzygium guineans root, and Root and Stem bark of Vernonia amygdalina in common plant species while in some plant species were shown variable result that depends on the given solvents and not totally detected in the part of the plant like Rhamnus prinoides root. Terpenoid

2.5 Phenolics. Phenolic compounds are secondary metabolites, which are produced in the shikimic acid of plants and pentose phosphate through phenylpropanoid metabolization (Derong Lin et al. 2016). In this review, phenolic was detected in most the medicinal plants like citrus fruit juice, peel and juice of citrus medica, mango (Mangifera indica L.) leaves and Avocado fruit (Persea Americana), eucalyptus leaves, Flax seeds, Rhamnus prinoides root, of Rhizomes, Zingiber ofcinale, and Curcuma longa but some medicinal plant is given different response and depend on the solvents.

3 METHODOLOGY

3.1 Research Design and Locale of the Study

The researchers will use experimental research, which modifies and controls variables based on the scientific approach. The experiments will be carried out in a laboratory setting. The researchers will asses the phytochemical properties of *Carica papaya* under soil and climatic conditions. This will establish the difference among the three obtained *Carica papaya* leaves from different areas in Lanao Del Sur, Philippines.

3.2 Phytochemical Properties. The Phytochemical analysis of *Carica papaya* was performed for the presence of alkaloids, carbohydrates, amino acids, glycosides, protein, phenolic compounds, and tannins from respective solvents such as hexane, ethyl acetate, methanol, and ethanol, according to standard procedure.

3.3 Phytochemical Screening. The concentrated concentrate of chosen plant will be exposed to various compound test for the location of various phytoconstituents utilizing standard techniques.

3.3.1 Test for alkaloids. 1 ml of the sample solution, few drops were added along the sides of the test tube. The appearance of a reddish-brown precipitate indicates the presence of alkaloids.

3.3.2 Test for Carbohydrates. 1 ml of the sample solution, few drops were added and heated for 2 min. The appearance of a colored precipitate indicates the presence of carbohydrates.

3.3.3 Test for Amino acids. 1 ml of the sample solution, two drops were added. The formation of purple color indicates the presence of amino acids.

3.3.4 Test for Glycosides. 1 ml of sample solution 1 ml of glacial acetic acid, few drops of ferric chloride and concentrated sulfuric acid were added. The appearance of a reddish-brown ring at the junction of liquids indicates the presence of glycosides.

3.3.5 Test for Phenolic compounds and tannins. 1 ml of extract, few drops of neutral 5% ferric chloride were added. The appearance of a dark green color indicates the presence of phenolic and tannin compounds.

3.3.6 Test for Protein. 1 ml of extract, one drop of 2% copper sulfate and 1 ml of ethanol and potassium hydroxide were added. The presence of the pink color of the ethanolic layer indicates the presence of protein.

3.3.7 Test for Saponins. 1 ml of extract, few drops of distilled water were added and shaken vigorously. The appearance of foam indicates the presence of saponins.

3.3.8 Test for Quinones. 1 ml of extract, few drops of concentrated hydrochloric acid were added. The formation of a yellow precipitate indicates the presence of quinones.

3.3.9 Test for Oxalate. For 1 ml of extract, few drops of glacial acetic acid were added. The appearance of greenish-black coloration indicates the presence of oxalate.

3.3.10 Test for Anthocyanins. 1 ml extract, 2 ml of hydrochloric acid and 1 ml of ammonia were added. The color change from pink-red to blue-violet indicates the presence of anthocyanins.

4 RESULTS AND DISCUSSIONS

Table 1: Summary of Results on Analysis of Papaya leaves (*Carica papaya*) from three different places in Lanao del Sur

Treatments		Phytochemical Components					
		Alkaloids	**Flavonoids**	**Phytosterols**	**Tannins**	**Phenolics**	**R. Sugar**
T1	Lati Balindong	+	+	+	+	+	-
T2	Poona Bayabao	+	+	+	+	+	-
T3	Cadayonan, Marawi City	+	+	+	+	+	-

Legends: Absent (-) Present (+) Toxic (++)

Based on the result, Table 1 shows that all treatments in R. Sugars show negative (-). The Alkaloids, Flavonoids, Phytosterols, Tannins, and Phenolics shows positive (+) reults. In the study of Tiwari and Hussain (2017) they found that flavonoids are phytochemicals that play significant role in enhancing the human health benefits. They are good sources of natural antioxidants in human diets. Flavonoids neutralize the harmful effects of free radicals in best of ways, and thus help in prevention of diseases.

5 CONCLUSION

The results showed T_1, T_2, and T_3 are safe from harmful phytochemical components and contained the same phytochemical components under soil of climatic conditions of three different areas in Lanao del Sur, Philippines. Which means that *Carica papaya* is advisable for the traditional medicine practitioners, herb users, herb sellers, health institutions and farmers on the health for human consumption.

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