



Phytochemical screening of *Broussonetia luzonicus* (Moraceae) leaves

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ABSTRACT

This is concerned with the identification of the phytochemical that is contained in the leaves of the tree *Broussonetia luzonicus* the leaves of which are commonly eaten in the northern regions of the Philippines. Other studies of other *Broussonetia* spp. have been reported to have antibacterial, antioxidant, antitumor, and pancreatic lipase inhibitory activity. This study sought to identify the phytochemical that the *Broussonetia luzonicus* leaves contain. The study began with the collection and identification of *B. luzonicus* leaves. The crude methanolic extract was collected by percolation and concentrated using a rotary evaporator. It was then tested using qualitative phytochemical screening methods and it yielded carbohydrates, reducing sugars, flavonoids, phenolic compounds, alkaloids, and sterols.

Keywords: *Broussonetia luzonicus*, Alukon, himbabao phytochemical screening, methanolic extract, Moraceae

INTRODUCTION

Plants have been important sources of drug products since ancient times. These plants contain secondary metabolites which are necessary for the survival of the species, and several of these compounds such as digoxin, colchicine, and paclitaxel have been utilized as drugs for men and animals. *Broussonetia luzonicus* is a tree which is endemic in the Philippines. It belongs to the family Moraceae. *B. luzonicus* is commonly known as *Alukon* in Ilocano (a major Philippine language spoken in the northern part of the Philippines) and as *Himbabao* in Tagalog (a major Philippine language spoken in Manila and its surrounding areas). The tree can grow up to 10 meters and 40 cm in diameter and the leaves are simple, alternate, ovately oblong, membranous, 15 cm in length and 7 cm in width, acute or acuminate^[1]. The leaves are commonly eaten as vegetable by the residents of the Ilocos region of the Philippines. According to previous studies of *Broussonetia* spp., *B. kazinoki* has been known to have tyrosinase inhibitory activity which can reduce hyperpigmentation in hypertrophic scars^[2]. While *B. papyrifera* phenolic compounds have been reported to have estrogen synthesis-inhibiting and antioxidant activity^[3]. It was also reported that *B. papyrifera* flavonoids showed antimicrobial properties^[4]. And that *B. kazinoki* alkaloids can inhibit α -glucosidase activity^[5]. Presently, there has been only one study of *B. luzonicus*, that undertaken by Ragasa^[6] which identified the constituents of the DCM extract of *B. luzonicus* leaves. The study indicated the presence of lupenone, squalene, β -carotene, vitamin K, β -sitosterol, and epitaraxerol.

Statement of the Problem

The problem that this researcher sought to answer was the following: What are the phytochemical constituents of *Broussonetia luzonicus* leaves.

This present study sought to determine the constituents of the crude methanolic of *Broussonetia luzonicus* leaves using qualitative phytochemical screening methods to assess the potential of the plant for drug discovery. The results of the result of the experiment indicate of the presence of carbohydrates, reducing sugars, flavonoids, phenolic compounds, alkaloids, and sterols.

EXPERIMENTAL SECTION

Collection and Authentication of *Broussonetia luzonicus* leaves

One thousand and three hundred grams (1300g) of fresh leaves was collected at Santa Fe, Nueva Vizcaya. The plant specimen was authenticated by Manuel D. Ching, a botanist from the Bureau of Plant Industry (BPI). The specimen was deposited with the document number (PLT-ID-CRD-256-15) as certification for plant authentication.

Extraction of the crude methanolic extract of *Broussonetia luzonicus* leaves

The leaves were air-dried and ground using a blender. The ground leaves were extracted by percolation using methanol as the solvent. Exhaustive extraction was used to obtain more extracts from the leaves. After collecting the extracts, it was concentrated under reduced pressure using a rotary evaporator.

Phytochemical screening of the crude methanolic extract of *Broussonetia luzonicus* leaves

The phytochemical screening was done at the Institute of Pharmaceutical Sciences, National Institutes of Health using the following qualitative methods: Molisch test for carbohydrates, Fehling's test for reducing sugars, alkaline reagent test, lead acetate test, and magnesium hydrochloride test for flavonoids, ferric chloride test and gelatin test for tannins, Borntrager's test for anthraquinones, Keller-Kiliani's test for cardiac glycosides, Wagner's test, Mayer's test, and Hager's test for alkaloids, Liebermann-Buchard's test and Salkowski's test for sterols and terpenoids, froth test for saponins, and acetone-water test for risins.

RESULTS AND DISCUSSION

Percentage yield of the crude methanolic extract of *Broussonetia luzonicus* leaves

The percentage yield was computed using the formula:

$$\frac{\text{Weight of crude methanolic extract (g)}}{\text{Weight of the dried plant sample (g)}} \times 100$$

The amount of extract obtained from 1300 grams of dried leaves was 273.663 grams and it yielded 21.048%.

Phytochemical screening of the crude methanolic extract of *Broussonetia luzonicus* leaves

The phytochemical screening produced the following result:

As seen in Table 1, the tests are indicative of the presence of carbohydrates, reducing sugars, flavonoids, tannins, alkaloids, and sterols. Phytochemicals such as flavonoids which are polyphenolic compounds have been known to have powerful antioxidant activity that can reduce risk of coronary diseases, it can also exhibit a wide range of activity such as anti-inflammatory, antiviral, antibacterial, antiulcer, antiosteoporotic, antiallergic, and antihepatic action^[7]. Tannins are also polyphenolic compounds which is also known to possess powerful antioxidant activity which are used against heart disease through reducing lipid oxidation^[8]. Alkaloids are basic nitrogenous compounds which are pharmacologically-active, and which may exhibit tranquilizing and stimulating activity on the nervous system, hypertensive and hypotensive action, vasoconstrictor and vasodilator effect on the cardiac system, Alkaloids they can also affect the transmitter actions on the muscular system^[9]. Phytosterols or plant sterols have a chemical structure similar to cholesterol which have been reported to decrease cholesterol absorption and plasma Low Density Lipoprotein (LDL) values^[10]. These results suggest that *Broussonetia luzonicus* may be a potential candidate to be further developed in to a drug compound.

Table 1: Phytochemical Analysis of *Broussonetia luzonicus* leaves

Phytochemical Analysis of <i>Broussonetia luzonicus</i> leaves				
Phytochemical	Name of Test	Theoretical Result	Actual Result	Indication
Carbohydrates	Molisch Test	Violet ring at the junction	Formation of violet ring at the junction	(+)
Reducing Sugars	Fehling's Test	Formation of brick red precipitate	Formation of brick red precipitate	(+)
Flavonoids	Alkaline Reagent Test	Yellow coloration which disappears upon the addition of dilute acid	With alkaline reagent: Yellowish green color persisted With dilute acid: Discharge of yellow tinge in the solution	(+)
	Lead Acetate Test	Formation of yellow colored precipitate	Formation of yellowish green colored precipitate	(+)
	Magnesium Hydrochloride Reduction Test	Red or orange coloration of the solution	Appearance of a green colored solution	(-)
Tannins	Ferric Chloride Test	Blue or green to black coloration of the solution	Formation of a green colored solution	(+)
	Gelatin Test	Formation of white precipitate	Formation of a turbid yellowish green solution	(-)
Glycosides	Borntrager's Test (Anthraquinone Glycoside)	Pink, red or violet coloration in the ammoniacal layer	Appearance of a pale yellow solution	(-)
	Keller Killiani's Test (Cardiac Glycoside)	Appearance of reddish brown or purple ring at the junction	Appearance of a green to brown ring at the junction	(-)
Alkaloids	Wagner's Test	Formation of reddish brown precipitate or turbidity	Formation of turbid solution	(+)
	Mayer's Test	Formation of white precipitate or turbidity	Formation of turbid solution	(+)
	Hager's Test	Formation of yellow precipitate or turbidity	Formation of turbid solution	(+)
Steroids and Terpenoids	Liebermann-Burchard's Test	Formation of reddish brown ring / deep red (triterpenoid) or green (sterol) coloration on the upper layer of the solution	Appearance of a brown ring at the junction with a green color on the upper layer	(+)
	Salkowski's Test	Red (sterol) or yellow (triterpenoid) coloration in the lower layer of the solution	No change in the color of the original solution	(-)
Saponins	Froth Test	Formation of honey-comb froth greater than 2 cm from the surface of the extract	No formation of honey-comb froth	(-)
Resins	Acetone – Water Test	Solution becomes turbid	Appearance of a clear yellow solution	(-)

+ = Present; - = Absent

CONCLUSION

In this study, the phytochemical screening of *Broussonetia luzonicus* indicated the presence of carbohydrates, reducing sugars, flavonoids, tannins, alkaloids, and sterols. These secondary metabolites could be a source of potential drug compounds which can be used against various diseases such as cardiovascular diseases, cancer, obesity, diabetes, and infections. The results of the study confirm the finding of the study of Ragasa. This study suggests that *Broussonetia luzonicus* contains active compounds which are interesting for further pharmaceutical research. It is therefore, recommended that further research be conducted in the pharmacologic activity, characterization, and isolation as well as toxicology of the constituents of *Broussonetia luzonicus*.

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