Botanical Studies and Phytochemical Screening of *Peperomia pellucida* (L.) Kunth (Thit-Yay-Gyi)

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Abstract

Peperomia pellucida (L.) Kunth. (Thit-yay-gyi) is a herbal plant which belongs to the family Piperaceae. Both vegetative and reproductive plant parts were collected from Hinthada and Laymyaethnar townships during the flowering season in June to December, 2015. Precise locations of specimens were collected by using Global Positioning System (GPS) device. The local people used Thit-yay gyi plant for vegetables and salad as well as treatment for diuretic and gout diseases. In phytochemical screening; the presence of alkaloid, glycoside, reducing sugar, flavonoid, tannin, steroid, terpenoid, α-amino acid, neutral compound, phenolic compound and starch were detected. Cyanogenetic glycoside was absent in the powdered samples. Saponin was present the powdered sample of leaves and absents in the powdered sample of stems. And also physico-chemical properties of the powdered sample were determined by using the method given in Harbone (1989). The determinations of nutritional values were studied by Association of Official Analytical Chemist (AOAC) method.

Keywords: *Peperomia pellucida* (L.) Kunth. (Thit-yay-gyi), Morphology, Phytochemical screening and Nutritional value

Introduction

Peperomia pellucida (L.) Kunth. is a wild type of plant and distributed throughout Myanmar. The local people use the plants for salad, vegetables and cure of gout disease.

This plant is commonly called Shiny Bush, Slate pencil plant, pepper elder, rat's ear and silver bush. This plant belongs to the family Piperaceae and abundantly found in Laymyethnar and Hinthada townships. It is well known for its medicinal values because of the presence of flavonoid and other compounds.

The family of Piperaceae contains eight or nine genera and variously estimated to include 2000-3000 species (Qui-ming, 2007). *Peperomia pellucida* (L.) Kunth. (Thit-yay-gyi) are annual herbs, stems erect, translucent and epiphytes. Leaves are simple, alternate, membranous, cordate at the base and acute at the apex, petiole short, the inflorescences are spike and minute flowers, perianth absent, stamens 2, bisexual, ovary superior. The fruits are globose, green colour when immature and gradually turn to yellow and then black.

These plants contain flavonoids and essential oil. The flavonoid compounds are found in these plants. The activities of flavonoids are antioxidant properties, anticancerous properties and cardiotonic properties. The functions of flavonoids are attraction of pollinators to flowers or animals that eat the fruits.

Materials and Methods

The specimens were collected from Laymyethnar and Hinthada townships. They were collected during the flowering and fruiting periods from June to December in 2015. The fresh parts of this plant were used for morphological characters.

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The collected specimens were washed with water to remove impurities. After washing, the specimens were weighed and air dried at room temperature and weighed intermittently. When constant weight was obtained the samples were completely dried. Then specimens were pulverized by grinding machine and stored in air tight containers to prevent moisture changes, contamination and kept for phytochemical screening (Harbone, 1989).

Results

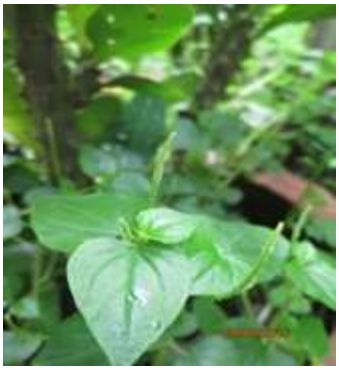
Scientific name	-	*Peperomia pellucida* (L.) Kunth.
English name	-	Shiny bush
Myanmar name	-	Thit-yay-gyi
Family	-	Piperaceae

Morphological characters of *Peperomia pellucida* (L.) Kunth.

Habit annual fleshy herb, about 6-45 cm heigh, translucent. Stem initially erect, mostly striated, epiphyte. Leaf simple, alternate, about 0.3-4 cm long equal to wide; petiolate, exstipulate, petiole cylindrical with longitudinal furrow, about 0.1-0.7 cm long, fleshy, ovate triangular, leaf cordate at the base and acute at the apex, margin entire, 3-5 veined from the base. Inflorescence terminal and axillary spike, leaf-opposed, about 0.8-9.2 cm long. Flower zygomorphic, bisexual, hypogynous, cream colour, bracteate, bract suborbicular, about 0.2-0.8 mm long; perianth absent; stamen two, filament short, anther oblong. Carpel one, monocarpellary, ovary superior, one ovule in each locule; style short, stigma one. Fruit globose; 0.8 mm long, green colour when immature and gradually to turn then black. Seed with endosperms, about 0.7 mm long, black, warty. Flowering and fruiting period June-December.

Preliminary phytocheimcal screening of powdered sample

In phytochemical screening; the presence of alkaloid, glycoside, reducing sugar, saponin glycoside, steroid, terpenoid, phenolic compound, flavonoid compound, α-amino acid, carbohydrate, tannin, neutral compound and starch were detected. Saponin was present in the powdered samples of leaves and absent in the powdered samples of stems. Cyanogenetic glycoside was absent in leaves and stems of *Peperomia pellucida* (L.) Kunth. The results were shown in Tables 1 and 2.



Habit

Inflorescences

Inflorescences

Leaves

Flowers with Initial Fruits

Fresh Fruits and Dry Fruits

Fig. (1) *Peperomia pellucida* (L.) Kunth.

Table 1 Preliminary phytochemical screening of powdered samples on leaves and stems from *Peperomia pellucida* (L.) Kunth.

No.	Chemical Constituents	Extract	Reagent used	Observation		Result	
				leaves	stems	leaves	stems
1.	Alkaloid	1% HCL	1.Mayer's 2.Dragendroff's 3.Wagner's	White ppt Orange ppt Yellow ppt		+ + +	+ + +
2.	Glycoside	H_2O	10% lead acetate solution	White ppt		+	+
3.	Reducing sugar	H_2O	Benedict's solution	Reddish ppt		+	+
4.	Saponin glycoside	H_2O	Distilled water	Marked frothing	No frothing	+	-
5.	Cyanogenetic glycoside	H_2O	Conc: H_2SO_4 acid Sodium picrate paper	No change in colour		-	-
6.	Steroid	Pet-ether	Acetic anhydride Conc: H_2SO_4 acid	Deep green colour	Green colour	+	+
7.	Terpenoid	$CHCL_3$	Acetic anhydride Conc:H_2SO_4 acid	Reddish brown	Brown	+	+
8.	Phenolic Compound	H_2O	$FeCL_3$ solution	Deep brown		+	+
9.	Flavonoid compound	MeOH	Conc: HCL, Mg turning	Pink colour		+	+
10.	α-amino acid	H_2O	Ninhydrin	violet		+	+
11.	Carbohydrate	H_2O	10% α-naphthol solution Conc:H_2SO_4 acid	Red ring		+	+
12.	Tannin	H_2O	1%gelatin solution	White ppt		+	+
13.	Acid/Base/Neutral compound	H_2O	Bromocresol green	Green colour		Neutral	Neutral
14.	Starch	-	Iodine solution	Blue colour		+	+

\+ = Present

\- = Absent

Table 2 Physico-chemical characterization of powdered samples on leaves and stems of *Peperomia pellucida* (L.) Kunth.

No.	Physico-chemical properties	Quantity determined percent (%)	
		leaves	stems
1.	Moisture content	6.47	7.13
2.	Total ash	2.55	2.22
3.	Acid insoluble ash	11.6	12.01
4.	Water soluble ash	32.02	26.55
5.	Ethanol soluble matter	4.58	4.11
6.	Methanol soluble matter	4.24	4.03
7.	Pet-ether soluble matter	0.96	0.64
8 .	Ethyl-acetate soluble matter	3.43	3.10
9.	Chloroform soluble matter	2.74	2.08
10.	Acetone soluble matter	3.02	3.00
11.	Aqueous soluble matter	11.33	10.64

In this experiment, the yield of water soluble ash was more than other soluble matters. The yield of pet-ether was less soluble than other soluble matters.

Table 3 Nutritional values of the powdered leaves and stems in *Peperomia pellucida* (L.) Kunth. (According to FIDSL)

Sr. No.	Test Parameter	Test Method	Result	
			Leaves	Stems
1.	Moisture	AOAC-2000(934.01)	11.29%	11.73%
2.	Ash	AOAC-2000(942.05)	19.10%	27.23%
3.	Crude Protein	AOAC-2000(920.103) (Kjeldahl Method)	23.20%	12.07%
4.	Crude Fiber	AOAC-2000(978.10) Fiber Cap Method	10.43%	19.13%
5.	Ether Extract (Crude Fat)	AOAC (BuchiSoxhlet Method)	4.29%	1.77%
6.	Carbohydrate	By Difference	31.69%	28.07%
7.	Eergy Value (Kcal/ 100g)		256	178

In the determination of nutritional values, the powdered leaves and stems in *Peperomia pellucida* (L.) Kunth were found as shown in table 3.

Discussion and Conclusion

In this research, *Peperomia pellucida* (L.) Kunth. belonging to Piperaceae family and which is a herbal plant was studied. Morphological studies on both vegetative and reproductive parts were presented as a result.

In this study, it is found out that *Peperomia pellucida* (L.) Kunth. was an annual herb and glabrous. Stems were erect, branched. Leaves were simple, alternate, opposite, leaf blade membranous, broad ovate, ovate-triangular, translucent, base cordate, apex acute and obtuse. The flowers were small, perianth absent, bracts suborbicular, bisexual, sessile and ovary superior. The fruits were globose and one seeded. These characters are in agreement with those given by Soe Myint Aye, (2003).

In the phytochemical screening, the phytochemical constituents present in leaves and stems of *Peperomaia pellucida* (L.) Kunth. were alkaloid, glycoside, reducing sugar, flavonoid, terpenoid, steroid, tannin, α-amino acid, neutral compound, phenolic compound and starch. But cyanogenetic glycoside was absent from both powdered samples of leaves and stems, whereas saponin was present in the powdered sample of leaves but absent from the powdered samples of stems. These characters are in agreement with those given by Majumder, (2011).

In physico-chemical characterization, the yield of water soluble ash is found to be more soluble than other soluble matter in the powdered samples of leaves and stems. The yield of pet-ether is less soluble than other soluble matter in the powdered samples of leaves and stems.

In the determination of nutritional values, it was found that the powdered leaves and stems in *Peperomia pellucida* (L.) Kunth, consist of moisture, ash, crude protein, crude fiber, ether extract (crude fat), carbohydrate and energy value.

So, the herbal plant of *Peperomia pellucida* (L.) Kunth. can be used for medicinal purposes. It is used for treating headaches, rheumatic pain and boils. Leaves and stems are used as vegetables and salad. This plant has carbohydrrate, crude fat and crude fiber. It is

used for good health. This plant has antimicrobial activity and other bioactive compound should be isolated, identified and their bioactivities of this plant such as anticancer and cure for gout of this plant should be carried out for further research.

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