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Different Factors affecting Dried Herbal Tea Production from *Premna Serratifolia* Leaf

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Abstract.

Premna serratifolia L. is an important plant belonging to the family Verbenaceae. It is a vital medicinal herb contains different therapeutic characteristics. The whole plant possesses medicinal properties, useful in the treatment of disease. Objective of this study focused on the effect of blanching temperature and time; heat pump drying temperature and storage condition to Flavonoid (mg/100g Quercetin E), color (sensory score) of the dried *Premna serratifolia* tea. Results showed that *Premna serratifolia* should be blanched in hot water 95^{o}C at 10 seconds in ascorbic acid 1.0% and then beeing dried by heat pump dryer at 50^{o}C until 8% moisture. The final herbal tea could be preserved under vacuum in PET/AL/PE bag at 4^{o}C to maintain antioxidant activity for 12 months. *Premna serratifolia* is most important for plant prospecting.

Keywords: *Premna serratifolia, herbal tea, blanching, drying, vacuum, flavonoid*

I. INTRODUCTION

The plant *Premna serratifolia* L widely distributed in Vietnam. In Vietnamese traditional medicine, the leaves of this plant are used to treat indigestion, dysuria, and dysentery.[1] *Premna serratifolia* are potential source for natural antioxidants due to the presence of polyphenols.[2] Flavonoids are proven antioxidants constitute a wide range of molecules that play important role in protecting biological systems against the harmful effects of oxidative burst on macromolecules such as proteins, lipids and DNA.[3] It has also reported to have p-methoxy cinnamic acid, linalool, linoleic acid, β-sitosterol and flavone luteolin, iridoid glycoside, premnine, ganiarine and ganikarine, premnazole, aphelandrine, pentacyclic terpene betulin, caryophellen, premnenol, premna spirodiene, clerodendrin-A, etc., phytoconstituents in its various.[4] It has significant towards antimicrobial activity and potent phytochemical constituents.[5, 6] The extract is comparable with the standard drug silymarin.[7] It's shown good activity as compared with standard ascorbic acid.[8]

Various parts of plant like leaves, stem, stem barks, root, root barks and wood are used to treat different diseases.[9] It is used in folk medicine primarily to treat inflammation, immune-related diseases, stomach disorders, wound healing, and skin diseases.[10] The various biological activities including antioxidant, antibacterial, anti-inflammatory, cytotoxic and heapatoprotective have been displayed both at extract and pure compound level.[11] Premna serratifolia possess significant anti-ulcer and cytoprotective effect.[12] The flower extract also showed potent antioxidant activity. The flowers of the plant showed potent antiinflammatory effect due to the presence of flavonoids.[13]

There were several researches mentioned to the phytochemical constitution as well as functional propeties of *Premna serratifolia.* All parts of the plant have medicinal properties. Taking into consideration the medicinal importance of the plant, the volatile organic constituents were analyzed using GC-MS (gas chromatography-mas spectrometry) and the structures were confirmed by genesis.[14]

However there was not any research mentioned to the production of herbal tea from *Premna serratifolia.* Therefore, objective of this study focused on the effect of blanching temperature and time; heat pump drying temperature and storage condition to Flavonoid (mg/100g Quercetin E), color (sensory score) of the dried *Premna serratifolia* tea.

II. MATERIALS AND METHOD

2.1 Material

We collected *Premna serratifolia* in Bac Lieu province, Vietnam. After collecting, they must be conveyed to laboratory within 8 hours for experiments. They were washed under tap water to remove foreign matters. The samples were then washed with Perasan to avoid contamination. Besides *Premna serratifolia* we also used another material during the research such as ascorbic acid. Lab utensils and equipments included digital weight balance, cooker, heat pump dryer.

Figure 1. ***Premna serratifolia***

2.2 Researching procedure

2.2.1 Effect of blanching temperature and time to* Flavonoid (mg/100g Quercetin E) *and color (sensory score) in the dried Premna serratifolia tea

Premna serratifolia leaves were blanched in water solution with 1.0% ascorbic acid at different temperature and time (100^{o}C, 5 second; 95^{o}C, 10 seconds; 90^{o}C, 15 seconds; 85^{o}C, 20 seconds). Then they were dried by heat pump at 60^{o}C until 8% moisture. All samples were analyzed Flavonoid (mg/100g Quercetin E), color (sensory score) to validate the appropriate blanching condition.

2.2.2 Effect of drying temperature by heat pump to Flavonoid (mg/100g Quercetin E), and color (sensory score) in the dried Premna serratifolia tea

Raw *Premna serratifolia leaves* were blanched in water solution with 1.0% ascorbic acid at 95^{o}C in 10 seconds. Then these samples would be dried under heat pump dryer at different temperature (35^{o}C, 40^{o}C, 45^{o}C, 50^{o}C, 55^{o}C, 60^{o}C) until 8% moisture. All samples were analyzed Flavonoid (mg/100g Quercetin E), color (sensory score) to validate the appropriate drying temperature.

2.2.3 Effect of storage condition to Flavonoid (mg/100g Quercetin E) in the dried Premna serratifolia tea

After completion of drying treatment, the dried *Premna serratifolia* tea was subjected to storage. They were kept in PET/AL/PE (zipper top), PET/AL/PE (vaccum) bag at different 4^{o}C, 28^{o}C. The Flavonoid (mg/100g Quercetin E) will be analyzed in 3 months interval for 12 months.

2.3 Physico-chemical and sensory analysis

Flavonoid content (%) in *Premna serratifolia* was analyzed by by $AlCl_3$ method.[15] Color (sensory score) of *Premna serratifolia* tea was assessed by a group of panelist. They were required to evaluate the odour, colour, taste, sweetness and overall acceptance using the 9-point hedonic scale (1 = dislike extremely, 9 = like extremely).

2.4 Statistical analysis

The experiments were run in triplicate with three different lots of samples. Data were subjected to analysis of variance (ANOVA) and mean comparison was carried out using Duncan's multiple range test (DMRT) Statistical analysis was performed by the Startgraphics.

III. RESULT & DISCUSSION

3.1 *Effect of blanching temperature and time to* Flavonoid (mg/100g Quercetin E) *and color (sensory score) in the dried Premna serratifolia tea*

Premna serratifolia leaves were blanched in water solution with 1.0% ascorbic acid at different temperature and time (100^{o}C, 5 second; 95^{o}C, 10 seconds; 90^{o}C, 15 seconds; 85^{o}C, 20 seconds). Then they were dried by heat pump at 60^{o}C until 8% moisture. All samples were analyzed Flavonoid (mg/100g Quercetin E), color (sensory score) to validate the appropriate blanching condition. Results were mentioned in table 1. From table 1, the *Premna serratifolia* leaves should be blanched at 95^{o}C in 10 seconds to maintain the most Flavonoid (mg/100g Quercetin E) and sensory score in the dried *Premna serratifolia* herbal tea.

Table 1. Effect of blanching temperature and time to Flavonoid (mg/100g Quercetin E) and color (sensory score) in the dried *Premna serratifolia* tea

Blanching	Flavonoid (mg/100g Quercetin E)	Sensory score
100^{o}C, 5 seconds	7.19±0.02^{b}	7.1±0.01^{b}
95^{o}C, 10 seconds	7.75±0.01^{a}	7.5±0.03^{a}
90^{o}C, 15 seconds	6.44±0.03^{c}	6.5±0.01^{c}
85^{o}C, 20 seconds	5.11±0.00^{d}	5.6±0.00^{d}

Note: the values were expressed as the mean of three repetitions; the same characters (denoted above), the difference between them was not significant (α = 5%).

Blanching and dehydration by drying are processes commonly used in preservation of vegetables. Blanching, as a vegetable processing method, involves the heating of the vegetables to a temperature sufficiently high to destroy the enzymes present in the tissue. It is a popular method of processing vegetables. The antioxidant activity of selected leafy vegetables was found influenced by processing treatments (blanching and drying), drying has more influence on antioxidant activity than blanching.[16]

3.2 Effect of drying temperature by heat pump to Flavonoid (mg/100g Quercetin E), and color (sensory score) in the dried *Premna serratifolia* tea

Raw *Premna serratifolia leaves* were blanched in water solution with 1.0% ascorbic acid at 95^{o}C in 10 seconds. Then these samples would be dried under heat pump dryer at different temperature (35^{o}C, 40^{o}C, 45^{o}C, 50^{o}C, 55^{o}C, 60^{o}C) until 8% moisture. All samples were analyzed Flavonoid (mg/100g Quercetin E), color (sensory score) to validate the appropriate drying temperature. Results were mentioned in table 2. From table 2, they should be dried at 50^{o}C to maintain the most Flavonoid (mg/100g Quercetin E) and sensory score in the dried *Premna serratifolia* herbal tea.

Table 2. Effect of drying temperature by heat pump to Flavonoid (mg/100g Quercetin E), and color (sensory score) in the dried *Premna serratifolia* tea

Drying temperature	Flavonoid (mg/100g Quercetin E)	Sensory score
35^{o}C	7.62±0.01^{a}	8.2±0.02^{a}
40^{o}C	7.59±0.03^{a}	8.2±0.01^{a}
45^{o}C	7.57±0.01^{a}	8.2±0.01^{a}
50^{o}C	7.55±0.03^{ab}	8.1±0.03^{a}
55^{o}C	7.03±0.00^{b}	7.3±0.01^{b}
60^{o}C	6.42±0.01^{c}	6.9±0.02^{c}

Note: the values were expressed as the mean of three repetitions; the same characters (denoted above), the difference between them was not significant (α = 5%).

Blanching caused a decrease in the total phenols, flavonoids and antioxidant activity in leafy vegetables studied while drying caused increase in concentration of nutrients and also increase in phenol, flavonoid content and antioxidant activity.[17]

3.3 *Effect of storage condition to Flavonoid (mg/100g Quercetin E) in the dried Premna serratifolia tea*

After completion of drying treatment, the dried *Premna serratifolia* tea was subjected to storage. They were kept in PET/AL/PE (zipper top), PET/AL/PE (vaccum) bag at different 4^{o}C, 28^{o}C. The Flavonoid (mg/100g Quercetin E) will be analyzed in 3 month interval for 12 months. Dried *Premna serratifolia* tea should be stored under vacuum in PET/AL/PE bag at 4^{o}C to maintain antioxidant activity (mmol·Fe^{2+}/kg_{DW}) for 6 months.

Table 3. Flavonoid (mg/100g Quercetin E) in the dried *Premna serratifolia* tea by the effect of packaging material and storage temperature

Storage time (month)	Dried *Premna serratifolia* tea by the storage temperature (^oC) kept in PET/AL/PE (zipper top)		Dried *Premna serratifolia* tea by the storage temperature (^oC) kept in PET/AL/PE (vaccum)	
	4 ^oC	28 ^oC	4 ^oC	28 ^oC
0	7.55 ± 0.03^{a}	7.55 ± 0.03^{a}	7.55 ± 0.03^{a}	7.55 ± 0.03^{a}
3	$7.40.\pm0.02^{ab}$	7.38 ± 0.01^{ab}	7.47 ± 0.01^{ab}	7.42 ± 0.01^{ab}
6	7.35 ± 0.01^{b}	7.30 ± 0.00^{b}	7.44 ± 0.02^{b}	7.38 ± 0.02^{b}
9	7.24 ± 0.01^{bc}	7.19 ± 0.03^{bc}	7.32 ± 0.01^{bc}	7.24 ± 0.00^{bc}
12	7.11 ± 0.03^{c}	7.05 ± 0.01^{c}	7.29 ± 0.01^{c}	7.11 ± 0.01^{c}

Note: the values were expressed as the mean of three repetitions; the same characters (denoted above), the difference between them was not significant (α = 5%).

The dried leaves can be easily incorporated in different traditional recipes at acceptable levels. They can also be used as natural fortificants in our daily diet for enhancing the micronutrient content.[17]

IV. CONCLUSION

Medicinal plants are source of important therapeutic aids for alleviating human ailments. *Premna serratifolia* is an important woody, medicinal plant. The isolated compounds include iridoid and their glycosides, diterpenoids, sesquiterpenoids, triterpenoids, flavonoids, isoflavones, lignans, xanthones and other classes of compounds. Infusion and decoction of *Premna serratifolia* leaves have antidiabetic effect and potential antioxidant activity. The decoction of the leaves may increase its antidiabetic capacity. From this investigation, *P. serratifolia* leaves could be exploited for antidiabetic herbal tea.

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