

Effect of Blanching and Drying to Production of Dried Herbal Tea from *Pouzolzia zeylanica*

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Abstract.

Pouzolzia zeylanica (L.) Benn. is a perennial herbaceous plant belonging to the Urticaceae family. *Pouzolzia zeylanica* could be considered as natural antioxidants and may be useful for curing diseases arising from oxidative deterioration. It is consumed as food and as a traditional herbal medicine for the treatment of numerous diseases. Objective of the present study focused on the effect of blanching temperature and time; drying temperature and storage condition stability of the dried *Pouzolzia zeylanica* herbal tea. Results showed that *Pouzolzia zeylanica* should be blanched in hot water 95°C at 4 seconds in the present of citric acid 0.5% and then being dried by heat pump dryer at 40°C until 12% moisture content. The final herbal tea could be preserved under vacuum in PET/AL/PE bag at ambient temperature to maintain total phenolic, flavonoid and tannin for 12 months.

Keywords: *Pouzolzia zeylanica*, herbal tea, blanching, drying, total phenolic, flavonoid, tannin, stability

I. INTRODUCTION

Pouzolzia zeylanica is considered as a perennial herb. Leaves are ovate or ovate-lanceolate, obtuse, acute or acuminate, entire. Their leaves contains flavone, flavonoids, tannin, carotene, carotenoids, ascorbic, tartaric, malic and pectic acids, gum, minerals and -β-D-glucopyranoside; β-sitosterol3-O-βtheir salts; quercetin, vitexin, isovitexin, phylanthin, metyl sterate and sitosterol, daucosterol, oleanolic acid (Fu et al., 2012); leaf powder also contains carbohydrates, gums, reducing sugar, alkaloids, steroids, glycosides, tannins, flavonoids and saponins (Saha and Paul, 2012). Phytochemical derived from plant consisting of phenols and flavonoids possess antioxidant properties, which are useful to scavenge reactive oxygen species (Peiyuan Li et al., 2010; Md Solayman Hossain et al., 2016; Lujun Wang et al., 2018). Leaves are anthelmintic and vulnerary; used as a cicatrizant for gangrenous ulcers, in syphilis and gonorrhoea. Leaf juice is used as galactagogic. Poultice of the herb is applied to sores, boils and to relieve stomachache. Steroids (Stigmasterol and β-Sitosterol) and triterpenoid (friedelin) has antitumor or pesticidal activity (Brazendranath Sarkar et al., 2014). The plant *Pouzolzia indica* claimed to be useful in treating snake poison in the Indian system of medicine (Ahmed et al., 2010). *Pouzolzia zeylanica* plant can be used as fresh or dried plant, decoction drunk to treat cough, pulmonary tuberculosis, sore throat, enteritis, dysentery. Extracts of *Pouzolzia zeylanica* possessed antibacterial, antifungal and cytotoxic activities (Paul and Saha, 2012; Saha et al., 2012; Saha and Paul, 2012). *Pouzolzia zeylanica* extracts very good antibacterial activity against *Staphylococcus aureus* and *Escherichia coli* (Dibyajyoti Saha et al., 2012). Therefore, *Pouzolzia zeylanica* was used to control fly larvae during food processing due to insecticidal activity (Nguyen Ngoc Bao Chau et al., 2017). The extraction of phenolic compounds from *Pouzolzia Zeylanica* L. Benn was conducted by using pure water as a solvent. Total polyphenol, flavonoid and

tannin content extracted by these optimized conditions were achieved (921 mgGAE/100g dried material (DM), 563 mgQE/100g DM and 643 mgTAE/100g DM, respectively) (Nguyen Duy Tan et al., 2017). A study investigated effect of blending three types of different gum (arabic, carrageenan and xanthan) in *Pouzolzia zeylanica* extract together with maltodextrin as well as encapsulated material during spray-drying process on the stability of antioxidant components and physical properties of products (Nguyen Duy Tan, Nguyen Minh Thuy, 2017). A study aimed to optimize additional carrier concentration for spray drying of *Pouzolzia zeylanica* extract (Nguyen Duy Tan and Nguyen Minh Thuy, 2018).

Pouzolzia zeylanica has been a Vietnamese traditional medicine plant used as remedy of a cough, urination difficulty, bacterial infection, helminthic. The objective of the present study was to evaluate the effect of blanching and drying to production of herb tea from *Pouzolzia zeylanica*.

II. MATERIAL AND METHOD

2.1 Material

We collected *Pouzolzia zeylanica* from Nga Nam district, Soc Trang province, Vietnam. After collecting, they were stored at a temperature of 20°C and conveyed to laboratory within 8 hours for experiments. They were washed thoroughly under tap water to remove dirt, dust and adhered unwanted material. Besides *Pouzolzia zeylanica* leaves another material was also used during the research such as citric acid. Lab utensils and equipments included digital weight balance, cooker, heat pump dryer.



Figure 1. *Pouzolzia zeylanica*

2.2 Researching method

2.2.1 Effect of blanching temperature and time to the total phenolic (mg GAE/100 g), flavonoid (mg QE/100 g) and tannin (mg TAE/100 g) in the dried herbal tea from *Pouzolzia zeylanica*

Raw *Pouzolzia zeylanica* leaves were blanched in water solution with 0.5% citric acid at different temperature and time (100°C, 2 second; 95°C, 4 seconds; 90°C, 6 seconds; 85°C, 8 seconds). Then they were dried by heat pump at 55°C until 12% moisture. All samples were analyzed the total phenolic (mg GAE/100 g), flavonoid (mg QE/100 g) and tannin (mg TAE/100 g) to validate the appropriate blanching condition.

2.2.2 Effect of drying temperature to the total phenolic (mg GAE/100 g), flavonoid (mg QE/100 g) and tannin (mg TAE/100 g) in the dried herbal tea from *Pouzolzia zeylanica*

Raw *Pouzolzia zeylanica* leaves were blanched in water solution with 0.5% citric acid at 95°C in 4 seconds. Then these samples would be dried under heat pump dryer at different temperature (35°C, 40°C, 45°C, 50°C, 55°C, 60°C) until 12% moisture. All samples were analyzed the total phenolic (mg GAE/100 g), flavonoid (mg QE/100 g) and tannin (mg TAE/100 g) to validate the appropriate drying temperature.

2.2.3 Stability of dried *Pouzolzia zeylanica* herbal tea under storage

After completion of drying treatment, the dried *Pouzolzia zeylanica* herbal tea was subjected to storage. They were kept in PET/AL/PE (vaccum) bag at 28°C. The total phenolic (mg GAE/100 g), flavonoid (mg QE/100 g) and tannin (mg TAE/100 g) will be analyzed in 3 months of interval for 12 months.

2.3 Chemical and microbial evaluation on dried herbal tea

Chemical composition (total polyphenol content, flavonoid, and tannin) in different spices and herbs was examined. Total polyphenol content (mg GAE/100 g) was determined

by FolinCiocalteu reagent method (Hossain et al., 2013). Aluminum chloride colorimetric method was used for flavonoids (mg QE/100 g) determination (Eswari et al., 2013; Mandal et al., 2013). Tannin content (mg TAE/100 g) was determined by Folin-Denis method (Laitonjam et al., 2013).

2.4 Statistical analysis

The Methods 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 Statgraphics Centurion XVII.

III. RESULTS & DISCUSSION

3.1 Effect of blanching temperature and time to the total phenolic (mg GAE/100 g), flavonoid (mg QE/100 g) and tannin (mg TAE/100 g) in the dried herbal tea from *Pouzolzia zeylanica*

The blanching process can denature the proteins in cell walls and make the porosity of membranes. The higher porosity increased permeability of cell walls and improved solvent diffusivity, resulting in an increase of yield extractability (Stamatopoulos K et al., 2016; Deylami MZ et al., 2016). Raw *Pouzolzia zeylanica* leaves were blanched in water solution with 0.5% citric acid at different temperature and time (100°C, 2 second; 95°C, 4 seconds; 90°C, 6 seconds; 85°C, 8 seconds). Then they were dried by heat pump at 55°C until 12% moisture. Results were mentioned in table 1. From table 1, the *Pouzolzia zeylanica* leaves should be blanched at 95°C in 4 seconds to maintain the most total phenolic (mg GAE/100 g), flavonoid (mg QE/100 g) and tannin (mg TAE/100 g) in the dried *Pouzolzia zeylanica* herbal tea.

According to Nguyen Duy Tan et al., (2017), total polyphenol, flavonoid and tannin content in *Pouzolzia zeylanica* were achieved at 921 mgGAE/100g dried material, 563 mgQE/100g and 643 mgTAE/100g, respectively.

Table 1. Effect of blanching temperature and time to the total phenolic (mg GAE/100 g), flavonoid (mg QE/100 g) and tannin (mg TAE/100 g) in the dried *Pouzolzia zeylanica* herbal tea

<i>Blanching</i>	<i>Total phenolic (mg GAE/100 g)</i>	<i>Flavonoid (mg QE/100 g)</i>	<i>Tannin (mg TAE/100 g)</i>
100oC, 2 seconds	907.23±0.01b	526.34±0.03b	621.04±0.03b
95oC, 4 seconds	919.48±0.00a	541.19±0.02a	635.28±0.02a
90oC, 6 seconds	897.39±0.02c	511.02±0.01c	602.11±0.02c
85oC, 8 seconds	882.17±0.00d	477.74±0.00d	587.39±0.01d

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

Table 2. Effect of drying temperature to the total phenolic (mg GAE/100 g), flavonoid (mg QE/100 g) and tannin (mg TAE/100 g) in the dried *Pouzolzia zeylanica* herbal tea

<i>Drying temperature (oC)</i>	<i>Total phenolic (mg GAE/100 g)</i>	<i>Flavonoid (mg QE/100 g)</i>	<i>Tannin (mg TAE/100 g)</i>
35	922.92±0.03a	544.90±0.00a	641.90±0.03a
40	922.89±0.01a	544.85±0.00a	641.74±0.00a
45	922.15±0.02ab	543.29±0.03ab	640.29±0.01ab
50	920.76±0.02b	542.04±0.01b	639.12±0.01b
55	919.48±0.00bc	541.19±0.02bc	635.28±0.02bc
60	915.21±0.01c	537.27±0.00c	633.20±0.03c

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

Table 3. Stability of dried *Pouzolzia zeylanica* herbal tea under storage

Storage (months)	Total phenolic (mg GAE/100 g)	Flavonoid (mg QE/100 g)	Tanin (mg TAE/100 g)
0	922.89±0.01a	544.85±0.00a	641.74±0.00a
3	922.83±0.02ab	544.67±0.03ab	641.68±0.03ab
6	922.79±0.03b	544.59±0.00b	641.61±0.02b
9	922.73±0.00bc	544.50±0.01bc	641.57±0.02bc
12	922.70±0.01c	544.46±0.02c	641.49±0.01c

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

3.2 Effect of drying temperature to the total phenolic (mg GAE/100 g), flavonoid (mg QE/100 g) and tanin (mg TAE/100 g) in the dried herbal tea from *Pouzolzia zeylanica*

In tea processing, drying temperature ranges between 50°C-85°C with 80-90 minutes drying time. Drying temperature could affect on the chemical components of tea are produced. Higher drying temperature chemical constituents contained in the tea leaves will diminish and disappear as the content of antioxidants and others. The active component in tea that has the most effective antioxidant capabilities are polyphenols. However, the polyphenol components are easily damaged by heat. Therefore, in the process of drying the tea leaves should be noted that the drying temperature is used, it aims to maintain the active components contained in tea leaves is maintained. Tea processing by using specific drying temperature greatly affects the chemical components contained in tea products produced (Sahadi Didi Ismanto et al., 2017).

Raw *Pouzolzia zeylanica* leaves were blanched in water solution with 0.5% citric acid at 95°C in 4 seconds. Then these samples would be dried under heat pump dryer at different temperature (35°C, 40°C, 45°C, 50°C, 55°C, 60°C) until 12% moisture. Results were mentioned in table 2. From table 2, the *Pouzolzia zeylanica* leaves should be dried at 40°C to maintain the most total phenolic (mg GAE/100 g), flavonoid (mg QE/100 g) and tanin (mg TAE/100 g) in the dried *Pouzolzia zeylanica* herbal tea. Antioxidant properties are easily damaged by light and high temperature. The higher the temperature and duration of drying the antioxidant activity produced higher until a certain time limit, then decreased. Effect of different gum types on stability of antioxidant components and physical properties of spray dried *Pouzolzia zeylanica* powder was examined. The results showed that the sample which was blended with arabic gum and maltodextrin maintained well bioactive compounds and obtained powder had better quality characteristics than others (Nguyen Duy Tan, Nguyen Minh Thuy, 2017).

3.3 Stability of dried *Pouzolzia zeylanica* herbal tea under storage

After completion of drying treatment, the dried *Pouzolzia zeylanica* herbal tea was subjected to storage. They were kept in PET/AL/PE (vaccum) bag at 28°C. From table 3, we could see that dried *Pouzolzia zeylanica* herbal tea was stable for 12 months under ambient temperature.

IV. CONCLUSION

In Viet Nam, *Pouzolzia zeylanica* (L.) Benn is a native plant and has been demonstrated its applicability as a medical plant. In the dried *Pouzolzia zeylanica* leaf production, the blanching and drying has been obviously affected to product quality. Fresh leaves of *Pouzolzia zeylanica* can be blanched and dried for purpose of making dry product that can be preserved long time to make product for healthy as dried herbal tea.

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