

# Dried Herbal Tea Production from *Eclipta Prostrata*

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## Abstract.

*Eclipta prostrata* (L.) is an annual herbaceous plant. It has a bitter, hot, sharp, dry taste. It is popularly known as hepatoprotective drug. The use of medicinal herb as a source of antioxidants is significant. Objective of this study focused on the production of herbal tea by investigation of the effect of blanching temperature and time; heat pump drying temperature and storage condition to flavonoid (mg/g), antioxidant activity ( $\text{mmol}\cdot\text{Fe}^{2+}/\text{kg}_{\text{DW}}$ ), color (sensory score) of the dried *Eclipta prostrata* tea. Results showed that *Eclipta prostrata* should be blanched in hot water 95°C at 4 seconds in the present of  $\text{CaCl}_2$  3% and then being dried by heat pump dryer at 40°C until 7% moisture. The final herbal tea could be preserved under vacuum in PET/AL/PE bag at 4°C to maintain antioxidant activity for 12 months

**Keywords:** Antioxidant, blanching, drying, *Eclipta prostrata*, herbal tea

## I. INTRODUCTION

*Eclipta prostrata* (L.) L. is well known traditional medicinal herb. *Eclipta* is a small annual herb whose stem is usually erect, flat or round, blackish green, profusely branched and pubescent (Soni Kk and Soni S, 2017). The plant is used to treat different diseases in human in traditional medicine (Shafi Parrey M. and Imtiyaz Ahmad, 2016). The herb has known for its curative properties (Shikha Sharma et al., 2017). Traditionally, it is extensively used against jaundice, in treatment for night blindness, headache (Goutam Mukhopadhyay et al., 2018). It was used for treatment of gastrointestinal disorders, respiratory tract disorders (Rownak Jahan et al., 2014). It is commonly used as a hair tonic for nourishment, blackening and strengthening, antidandruff of hair (Sorna Kumar et al., 2016; Hyeon Yong Lee, 2017). Leaf extract of *Eclipta prostrata* is good liver tonic (Kamble V.M. and Pawar S.G., 2017). The plant has been reported to contain flavonoid, phytosterol,  $\beta$ -amyryn, triterpenes, coumestans, alkaloids, polyacetylenes (Love S. Chokotia et al., 2013; Mohamed Saleem Gani A. & Nalini Devi D., 2015). The plant also has several phytoconstituents like wedelolactone, eclalbasaponins, ursolic acid, oleanolic acid, luteolin, and apigenin (Rownak Jahan et al., 2014).

Several pharmacological properties of *Eclipta prostrata* reported such as anti-inflammatory (Karthikummar, S. et al., 2007), antimicrobial (Peraman M.K. et al., 2007), antihyperglycemic (Ananthi J. et al., 2003), antioxidant (Mohamed Saleem Gani A. & Nalini Devi D., 2015; Nalini Devi D. and Mohamed Saleem Gani A. 2015), cytotoxic (Chaudhary H. et al., 2011), antihepatotoxic (Lal V.K. et al., 2010; Arun. K, Balasubramanian. U, 2011; Satheesh Naik K. et al., 2018), analgesic (Sawant M. et al., 2004), anti-venom (Pimolpan Pithayanukul et al., 2004), anticancer (Harshita Chaudhary et al., 2014). It could inhibit in-vitro ADP-induced platelet aggregation (Ni Made Dwi Sandhiutami et al., 2018).

This plant plays a momentous role in medicinal field. Therefore, objective of this study focused on the effect of blanching temperature and time; heat pump drying temperature and storage condition to flavonoid (mg/g), antioxidant activity ( $\text{mmol}\cdot\text{Fe}^{2+}/\text{kg}_{\text{DW}}$ ), color (sensory score) of the dried *Eclipta prostrata* tea.

## II. MATERIALS AND METHOD

### 2.1 Material

We collected *Eclipta prostrata* from surrounding area of Hau Giang province, Vietnam. After collecting, they must be conveyed to laboratory within 4 hours for experiments. They were washed under portable tap water to remove foreign matters. The samples were then washed with Perasan 20 ppm to avoid contamination. Besides *Eclipta prostrata* we also used another material during the research such as  $\text{CaCl}_2$ . Lab utensils and equipments included digital weight balance, cooker, heat pump dryer.



Figure 1. *Eclipta prostrata*

### 2.2 Researching procedure

**2.2.1 Effect of blanching temperature and time to flavonoid (mg/g), antioxidant activity ( $\text{mmol}\cdot\text{Fe}^{2+}/\text{kg}_{\text{DW}}$ ) and color (sensory score) in the dried *Eclipta prostrata* tea**  
Raw *Eclipta prostrata* were blanched in water solution with 3%  $\text{CaCl}_2$  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 60°C until 7% moisture. All samples were analyzed flavonoid (mg/g), antioxidant activity ( $\text{mmol}\cdot\text{Fe}^{2+}/\text{kg}_{\text{DW}}$ ), color (sensory score) to validate the appropriate blanching condition.

**2.2.2 Effect of drying temperature by heat pump to flavonoid (mg/g), antioxidant activity ( $\text{mmol}\cdot\text{Fe}^{2+}/\text{kg}_{\text{DW}}$ ) and color (sensory score) in the dried *Eclipta prostrata* tea**  
Raw *Eclipta prostrata* were blanched in water solution with 3%  $\text{CaCl}_2$  at 95°C in 4 seconds. Then these samples would be dried under heat pump dryer at different temperature

(10°C, 20°C, 30°C, 40°C, 50°C, 60°C) until 7% moisture. All samples were analyzed flavonoid (mg/g), antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>), color (sensory score) to validate the appropriate drying temperature.

**2.2.3 Effect of storage condition to antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>) in the dried *Eclipta prostrata* tea**

After completion of drying treatment, the dried *Eclipta prostrata* were subjected to storage. They were kept in PET/AL/PE (zipper top), PET/AL/PE (vacuum) bag at different 4°C, 28°C. The antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>) will be analyzed in 3 months interval for 12 months.

**2.3 Physico-chemical and sensory analysis**

Flavonoid (mg/g) content of the *Eclipta prostrata* was determined by chromatographic method (María Susana Hernández Zarate et al., 2018). The antioxidant capacity of *Eclipta prostrata* was assessed using a ferric reducing antioxidant power (FRAP) assay (Benzie I. F. and Stain J. J. 1999; Pulido R. et al., 2000). Color (sensory score) of *Eclipta prostrata* 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 Statgraphics Centurion XVI.

**III. RESULT & DISCUSSION**

**3.1 Effect of blanching temperature and time to flavonoid (mg/g), antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>) and color (sensory score) in the dried *Eclipta prostrata* tea**

Raw *Eclipta prostrata* were blanched in water solution with 3% CaCl<sub>2</sub> 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 60°C until 7% moisture. All samples were analyzed flavonoid (mg/g), antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>), color (sensory score) to validate the appropriate blanching condition. Results were mentioned in table 1. From table 1, the *Eclipta prostrata* should be blanched at 95°C in 4 seconds to maintain the most flavonoid (mg/g), antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>), and sensory score in the dried *Eclipta prostrata* tea.

Blanching is a thermal treatment that is usually performed prior to food processes such as drying. It is essential to preserve the product quality during the long-term storage. The main purpose of blanching is to inactivate quality-changing enzymes responsible for deterioration reactions that contribute to off-flavors, odors, undesirable color and texture, and breakdown of nutrients. Another purpose is to destruct microorganisms contaminating produce (Arroqui C. et al., 2001; Bahçeci K. et al., 2005).

**3.2 Effect of drying temperature by heat pump to flavonoid (mg/g), antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>) and color (sensory score) in the dried *Eclipta prostrata* tea**

Raw *Eclipta prostrata* were blanched in water solution with 3% CaCl<sub>2</sub> at 95°C in 4 seconds. Then these samples would be dried under heat pump dryer at different temperature (10°C, 20°C, 30°C, 40°C, 50°C, 60°C) until 7% moisture. All samples were analyzed flavonoid (mg/g), antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>), color (sensory score) to validate the appropriate drying temperature. Results were mentioned in table 2. From table 2, they should be dried at 40°C to maintain the most flavonoid (mg/g), antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>) and sensory score in the dried *Eclipta prostrata* tea.

**Table 1. Effect of blanching and time to flavonoid (mg/g), antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>) and color (sensory score) in the dried *Eclipta prostrata* tea**

Blanching	Flavonoid (mg/g)	Antioxidant activity (mmol·Fe <sup>2+</sup> /kg <sub>DW</sub> )	Sensory score
100°C, 2 seconds	27.55±0.02 <sup>b</sup>	5.04±0.02 <sup>b</sup>	6.3±0.02 <sup>c</sup>
<b>95°C, 4 seconds</b>	29.19±0.01 <sup>a</sup>	5.13±0.01 <sup>a</sup>	7.1±0.01 <sup>a</sup>
90°C, 6 seconds	24.13±0.03 <sup>c</sup>	4.65±0.01 <sup>c</sup>	6.7±0.00 <sup>b</sup>
85°C, 8 seconds	19.45±0.00 <sup>d</sup>	4.11±0.02 <sup>d</sup>	6.1±0.03 <sup>d</sup>

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%).

**Table 2. Effect of drying temperature by heat pump to flavonoid (mg/g), antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>) and color (sensory score) in the dried *Eclipta prostrata* tea**

Drying temperature	Flavonoid (mg/g)	Antioxidant activity (mmol·Fe <sup>2+</sup> /kg <sub>DW</sub> )	Sensory score
10°C	33.20±0.02 <sup>a</sup>	5.93±0.01 <sup>c</sup>	8.6±0.03 <sup>a</sup>
20°C	33.20±0.01 <sup>a</sup>	5.92±0.02 <sup>a</sup>	8.6±0.02 <sup>a</sup>
30°C	33.18±0.01 <sup>a</sup>	5.92±0.00 <sup>a</sup>	8.6±0.01 <sup>a</sup>
<b>40°C</b>	33.15±0.03 <sup>a</sup>	5.90±0.01 <sup>a</sup>	8.6±0.00 <sup>a</sup>
50°C	30.44±0.00 <sup>b</sup>	5.45±0.01 <sup>b</sup>	7.7±0.01 <sup>b</sup>
60°C	29.19±0.01 <sup>c</sup>	5.13±0.01 <sup>c</sup>	7.1±0.01 <sup>c</sup>

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%).

**Table 3. Antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>) in dried *Eclipta prostrata* by the effect of packaging material and storage temperature**

Storage time (month)	Dried <i>Eclipta prostrata</i> by the storage temperature (°C) kept in PET/AL/PE (zipper top)		Dried <i>Eclipta prostrata</i> by the storage temperature (°C) kept in PET/AL/PE (vaccum)	
	4 °C	28 °C	4 °C	28 °C
	0	5.90±0.01 <sup>a</sup>	5.90±0.01 <sup>a</sup>	5.90±0.01 <sup>a</sup>
3	5.82±0.01 <sup>ab</sup>	5.80±0.03 <sup>ab</sup>	5.84±0.02 <sup>ab</sup>	5.82±0.01 <sup>ab</sup>
6	5.78±0.03 <sup>ab</sup>	5.75±0.02 <sup>ab</sup>	5.80±0.02 <sup>ab</sup>	5.77±0.02 <sup>ab</sup>
9	5.70±0.01 <sup>ab</sup>	5.67±0.01 <sup>ab</sup>	5.75±0.01 <sup>ab</sup>	5.70±0.00 <sup>ab</sup>
12	5.65±0.03 <sup>b</sup>	5.63±0.01 <sup>b</sup>	5.67±0.00 <sup>b</sup>	5.65±0.03 <sup>b</sup>

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%).

Drying of herbs and spices is essential to extend their shelf life. This is because low moisture contents prevent the growth and reproduction of microorganisms that cause decay (Hong-WeiXiao et al., 2017). Drying is usually applied in the processing of herbs to preserve their bioactivity and to expand the shelf life (Georgé, S. et al., 2011). The removal of the moisture content by drying is another reason that facilitates the preservation of the bioactivity of the dried materials during storage (Ahmed Mediani et al., 2014). Drug quality and consequently earnings are significantly influenced by the drying regime. Conventionally, low drying temperatures between 30 and 50°C are recommended to protect sensitive active ingredients. They must be dried at low temperatures for longer periods of time resulting in large power requirements for dryer operation.

### 3.3 Effect of storage condition to antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>) in the dried *Eclipta prostrata* tea

After completion of drying treatment, the dried *Eclipta prostrata* were subjected to storage. They were kept in PET/AL/PE (zipper top), PET/AL/PE (vaccum) bag at different 4°C, 28°C. The antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>) will be analyzed in 3 months interval for 12 months. Dried *Eclipta prostrata* should be stored under vacuum in PET/AL/PE bag at 4°C to maintain antioxidant activity (mmol·Fe<sup>2+</sup>/kg<sub>DW</sub>) for 12 months.

Medicinal herbs are usually subjected to drying and longtime storage during production, and drying is considered a beneficial way to protect their phytochemical efficiency (Ahmed Mediani et al., 2014). The preservation of the safety and quality of herb is another aspect that should also be taken into consideration. The association of drying with chilling during storage could augment the shelf life of the product.

## IV. CONCLUSION

Medicinal plants containing different natural antioxidant polyphenolics have been shown to have reactive oxygen species scavenging and lipid peroxidation preventing effects. *Eclipta prostrata* (L.) with different chemical constituents has an important role in any therapeutic activity. It is considered as a medicinal herb with a wide range of application in the indigenous medicinal system. Application of a suitable blanching and drying technology with a selection of appropriate conditions are of great importance, since they will directly affects the quality of the dried herb in terms of its physical and nutritional property. The study is of great importance to generate

information about the drying process in preserving dried *Eclipta prostrata* herb quality and bioactivity.

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