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*"Innovating Indigenous Functional Food and Agro- Biotechnology"*

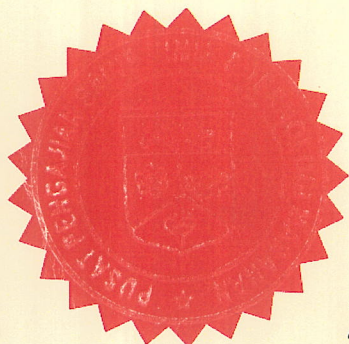
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# ISEFAS 2012

## 2<sup>nd</sup> INTERNATIONAL SEMINAR ON FOOD & AGRICULTURAL SCIENCES

# BOOK OF PROGRAMME AND ABSTRACTS

### INNOVATING INDIGENOUS FUNCTIONAL FOOD & AGRO-BIOTECHNOLOGY

4 - 6 SEPTEMBER  
2012

PURI PUJANGGA  
UNIVERSITI KEBANGSAAN MALAYSIA

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Faculty of Agricultural Technology,  
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Kasetsart University,  
THAILAND



OR25

## Antioxidant Properties of Gambier Cinnamon Tea

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### ABSTRACT

Gambir cinnamon tea is a new product which has been developed recently by Faculty of Agricultural Technology, Andalas University. It has potential as a health drink because it contains the antioxidant of catechin. There are two types of gambier tea were compared in this research: green gambier tea and black gambier tea, with the addition of 0%, 2%, 4% and 6% of ground cinnamon respectively. Antioxidant activity was tested by using DPPH and catechin content was measured by using spectrophotometer at a wavelength of 279 and 300 nm. In comparison, the catechin content of *commercial green herbal slimming tea* and *black tea* were also analyzed. The results showed that the content of catechins were 14.0716%, 5.8258%, 4.2028% and 3.0133% for *gambier green tea*, *commercial green herbal slimming tea*, *commercial black tea* and *gambier black tea* respectively. In this study the antioxidant activity and tannin content of gambier cinnamon tea (with the addition of 0%, 2%, 4% and 6% of ground cinnamon) were also analyzed. The results show that gambir cinnamon tea is a potential product for herbal tea.

*Keywords: gambir (Uncaria gambir Roxb.); cinnamon (Cinnamom burmannii); antioxidant; catechin, tea*

## Antioxidant Properties of Gambier Cinnamon Tea

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### ABSTRACT

*Gambier cinnamon tea* is a new product which has been developed recently by Faculty of Agricultural Technology, Andalas University. It has a potential as a health drink since it contains the antioxidant of catechin. Two types of gambier tea were compared in this research: gambier green tea and gambier black tea, blending with the substitution of 0%, 2%, 4% and 6% of ground cinnamon respectively. Antioxidant activity was tested by using DPPH and the catechin content was measured by using spectrophotometer at a wavelength of 279 and 300 nm. In comparison, the catechin content of *commercial green herbal slimming tea* and *black tea* were also analyzed. The results showed that the content of catechins were 14.0716%, 5.8258%, 4.2028% and 3.0133% for *gambier green tea*, *commercial green herbal slimming tea*, *commercial black tea* and *gambier black tea* respectively. In this study the tannin content of gambier cinnamon tea (with the substitution of 0%, 2%, 4% and 6% of ground cinnamon) was also analyzed. The results show that *gambier cinnamon tea* is a potential product for herbal tea.

Keywords: gambier (*Uncaria gambier* Roxb.), cinnamon (*Cinnamomum burmannii*), antioxidant, catechin, tea

### INTRODUCTION

Gambier is one of the most important commodities of West Sumatra, Indonesia, because more than 80% of gambier which is consumed by international market comes from this area (Nazir 2000). It has a potential for high economic value and multi-purpose species.

Gambier (*Uncaria gambir*) is a member of the Rubiaceae family and contains an officially recognized pharmacological compound (Heitzman *et al.* 2005). Certain *Uncaria* species contain tannins and catechin with antioxidant properties, which are responsible for some of *uncaria*'s pharmacological effects (Desmarchelier *et al.* 1997). Gambier containing tannin and catechin (flavonoids) can be used as raw material for the manufacture of drugs of anti-hepatitis B, anti-diarrhea (Dharma 2005) inhibiting dental plaque formation (Kozai *et al.* 1995 *cit.* Nazir 2000], antimicrobial, antinematoda (Allen *et al.* 2004 and Bakhtiar 1991) and other benefits in support of various pharmaceutical, cosmetics, and agriculture (Nazir 2000). The result showed that various gambiers are very active as antioxidant, indicated by IC<sub>50</sub> of catechin of ethyl acetate extracts which were 4.6 to 18.2  $\mu$ g/mL for DPPH inhibition. The

IC<sub>50</sub> for  $\alpha$ -glucosidase inhibition is ranged from 40.45 to 52.43  $\mu$ g/mL, so they can be classified as anti-diabetic (Widiyarti *et al.* 2011.)

Although gambier has been traded for a long time the processing technology, however, is still simple; Gambier is sold in the form of "raw Gambier". Moreover, bargaining position (bargaining power) of the farmers is still weak. This condition has to be anticipated throughout development of product diversification and utilization. One product which can be developed is Gambier Tea which can be used as an antioxidant herbal tea. Herbal tea are brewed from the leaves, flowers, seeds, fruits and roots of plant species other than *C. Sinensis* (Deetae *et al.* 2012).

The presence of catechin in green tea and fermented tea is associated with health protective and cancer preventive properties in animal models, due to its antioxidant activity (Sang *et al.* 2002). Cytotoxicity test by Anggraini *et al.* (2011), proves that the antioxidant in gambier is safe to consume.

Beside gambier, West Sumatra also has cinnamon (*Cinnamomum burmannii*), an essential commodity which also has several pharmacological effects with a distinctive aroma.

To obtain the herbal tea products with a distinctive aroma and a better pharmacological effects, the gambier tea has to be blended with cinnamon.

Cinnamon contains tannin, flavonoids and other chemical component which are supposed to act as antioxidants (Dalimartha, 2002; PROSEA 13, 1999). A research conducted by Marliyati (1995), reveals that cinnamon contains high tannin compared to other spices. Many studies have reported that the tannin content of vegetables or plants may play a important role in preventing or reducing the risk of coronary heart disease. It is expected that compounds in cinnamon are also able to act as an antioxidant and protects the body from diseases caused by oxidative events such as the oxidation of LDL (low density lipoprotein) which leads to of atherosclerosis or other degenerative deseases (Azima 2004). Cinnamon may also have additional roles in glucose metabolism and blood pressure regulation (Preuss *et al.* 2006). Khan *et al.* (2003) reported that 1, 3, and 6 grams of cinnamon per day had beneficial effects on blood glucose, cholesterol and triglycerides of people with type 2 diabetes.. The functional drink of *C. burmannii* was found to be non-toxic (Safithri 2012).

The focus of this preliminary research was to compare the antioxidative activity of *U. gambir* which was processed by different tea processing techniques and blending variation of ground cinnamon substitution.

## MATERIALS AND METHODS

### Raw materials

Two or three leaves and the terminal apical buds of Gambier (*Uncaria gambir* Roxb.) young leaves were collected from Gambier plantations in Siguntur, West Sumatra, Indonesia (Figure 1). Ground cinnamon taken from bark of cassia vera (*Cinnamomun burmannii*) was originated from Batusangkar, West Sumatra-Indonesia.

### Chemicals and reagents

DPPH, ethyl acetate and catechin were obtained from Sigma.

### Preparation of black gambier tea

Black tea processing technique is a simple process. This type of tea is allowed to be fully fermented before dried. Oxidizing enzymes change the

chemical constituents in the tea leaves, and this results in brown- or red-colored brews (Sato *et al.* 2007).

Gambier leaves were spreaded on a single layer on a screen over a wire shelf rack in a relatively dry withering room with temperature  $\leq 30^{\circ}\text{C}$  overnight for 16 hours. The leaves were rolled using blender and then fermented at temperature  $28\text{-}29^{\circ}\text{C}$ , for 90 minutes. Then, the drying process was carried out for 25 minutes.



FIGURES 1. Gambier young leaves which will be processed by black and green tea processing techniques

### Preparation of green gambier tea

Green tea processing technique is the least oxidized tea. Fermentation is prevented. Green tea keeps its color because oxidizing enzymes (i.e., polyphenol oxidase, peroxidase) that would turn the leaves dark are inactivated with heat, which generally takes place soon after they were harvested. In inactivation process, the enzymes are not able to break down the chlorophyll tissue which contributes to the green color of tea (Sato *et al.* 2007).

The inactivation of enzyme in gambier leaves was carried out for 5 minutes at  $90^{\circ}\text{C}\text{-}100^{\circ}\text{C}$ . After that, the gambier leaves were rolled using blender. The drying process was carried out in two steps. Step 1, the leaves were dried at temperature of  $100^{\circ}\text{C}$  for 20 – 22 minutes until a 30% - 35% moisture content was reached. Step 2, the leaves were dried at temperature of  $80^{\circ}\text{C}$  for 60 – 80 minutes until 3% - 4% moisture content was reached.

### Blending treatments with cinnamon

Gambier cinnamon tea is gambier tea which is blended with ground cinnamon. In this research, gambier tea were blended with substitution of 0%, 2% , 4% , and 6% of ground cinnamon.

**Catechin content**

Catechin content was measured using spectrophotometry method according to SNI 01-3391-2000. Gambier tea was extracted by ethyl acetate before it was measured by using spectrophotometer at a wavelength of 279 and 300 nm.

**Tannin content**

Tannin content was measured by titrimetric method using KMnO4 0.1 N aqueous solution (Atanassova and Bagdassarian 2009)

**DPPH radical scavenging activity**

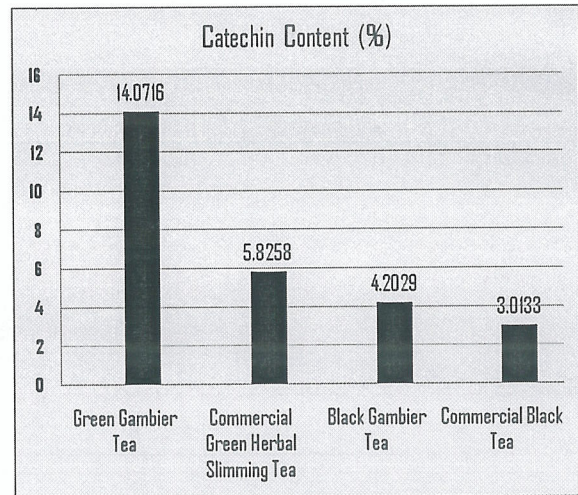
DPPH radical scavenging activity was determined according to the method of Blois (1958) with a slight modification. The absorbance of the samples was measured at 517 nm. Radical scavenging activity was expressed as the inhibition percentage of free radicals by the sample and was calculated using the following formula:

$$\text{DPPH radical scavenging activity(\%)} = [1 - (\text{extract absorbance} / \text{control absorbance})] \times 100$$

**RESULTS AND DISCUSSION**

Gambier Tea which is processed using green tea processing techniques is the highest catechin content. Catechin content of Gambier Tea which is processed using black and green tea processing techniques in comparison with Commercial Green Herbal Slimming Tea dan Black Tea is shown in Figure 1.

The terms 'green tea' and 'black tea' refer to products manufactured from the tea leaves which are chemically very different. Green tea is manufactured from fresh leaf and is very rich in flavonoids, especially of the catechin group of the flavanols. In contrast, black tea manufacture includes an enzymatic oxidation step in which most catechins are converted to complex condensation products (e.g. theaflavins and thearubigens)(Tijburg 1997). A number of variables affects tea components such as cultivar type, growth conditions (season, climate, soil), horticultural practices and different technologies used (Carloni *et al.* 2012).



FIGURES 2. Catechin content of Gambier Tea which is processed using black and green tea processing techniques in comparison with Commercial Green Herbal Slimming Tea dan Black Tea

**Tannin content of Gambier Cinnamon Tea**

Tannin content of Gambier Cinnamon Tea is higher than Commercial Green Herbal Slimming Tea dan Black Tea (Table 1). Gambier tea which is processed through green tea processing techniques has higher tannin content than black gambier tea. This result shows that tea processing techniques has different effect on chemical content of tea (Tijburg 1997).

TABLE 1. Tannin content of Gambier Cinnamon Tea in comparison with Commercial Green Herbal Slimming Tea dan Black Tea

Products	Cinnamon substitution (%)	Tannin Content (%)
Commercial Green Herbal Slimming Tea		32.580
Gambier Green Tea	0	36.720
Gambier Green Tea	2	36.719
Gambier Green Tea	4	36.718
Gambier Green Tea	6	36.717
Commercial Black Tea		32.170
Gambier Black Tea	0	35.680
Gambier Black Tea	2	35.679
Gambier Black Tea	4	35.678
Gambier Black Tea	6	35.677

## The DPPH radical scavenging activity

The evaluation of gambier antioxidant activity is increasingly important as its phenolic compounds are one of the most effective antioxidants (Anggraini *et al.* 2011). The high total phenolic content in gambier is due to the presence of catechins (Widiyarti *et al.* 2011). With respect to DPPH radical scavenging activity, the results indicated that green gambier tea showed a higher antioxidant activity than gambier black tea (Table 2). Compared to that of green tea, reports on antioxidant activity of black tea are relatively less (Gupta *et al.* 2002).

TABLE 2. The DPPH radical scavenging activity of Gambier Cinnamon Tea in comparison with Commercial Green Herbal Slimming Tea dan Black Tea

Products	Cinnamon substitution (%)	The DPPH radical scavenging activity (%)
Commercial Green Herbal Slimming Tea		93.18
Gambier Green Tea	0	92.10
Gambier Green Tea	2	91.69
Gambier Green Tea	4	91.27
Gambier Green Tea	6	91.08
Commercial Black Tea		91.15
Gambier Black Tea	0	88.01
Gambier Black Tea	2	87.87
Gambier Black Tea	4	87.39
Gambier Black Tea	6	85.91

## CONCLUSIONS

The results showed that (1) the content of catechins were 14.0716%, 5.8258%, 4.2028% and 3.0133% for *gambier green tea*, *commercial green herbal slimming tea*, *commercial black tea* and *gambier black tea* respectively; (2) The DPPH radical scavenging activity range from 91.08%-92.10% for green gambier tea and from 85.91% to 88.01% for black gambier tea; (3) *Gambier cinnamon tea* is a potential product for herbal tea.

## ACKNOWLEDGMENTS

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