

(RESEARCH ARTICLE)



## Ethnobotanical study of *Bir Pletok* as a traditional health drink for Betawi ethnic (Indonesia)

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### Abstract

The Betawi ethnicity is an indigenous Indonesian ethnic group, most of whom live in Jakarta and its surroundings, have long used plants to make *bir pletok*. The *bir pletok* is a health drink developed from the local wisdom of the Betawi ethnic group by using various types of plants. The aims of the research are (1) to know the process of making *Bir pletok*; (2) to know the diversity of plants used as an ingredient in *bir pletok*. The method was carried out using an ethnobotanical approach through participatory surveys and observations. Respondents are ethnic Betawi who are married and know the process of making *bir pletok*. Some of the questions asked to respondents such as the plants used, the manufacturing process and the efficacy of *bir pletok*. The data analysis was qualitatively using descriptive statistics. The process to make *bir pletok* 6 stages are preparation of ingredients, cutting/slicing, brewing, filtering, storage and serving. A total of 9 species (10 local names) belonging 9 genera and 8 family to make *bir pletok*. The bioactivity of the main ingredient of *Bir pletok* has activity as an antimicrobial, anti-cancer, anti-oxidant and has a relaxing effect.

**Keywords:** *Bir pletok*; Betawi ethnicity; Anti-microbial

### 1. Introduction

Betawi ethnicity is an indigenous ethnic group in Jakarta (Indonesia) and its surroundings. Based on their origins, the Betawi ethnic group is thought to have existed since prehistoric times (17th century AD) and is often referred to as "Proto Betawi" [1]. Like other ethnic groups, the Betawi ethnic group has a variety of local wisdom and culture developed from environmental biodiversity, such as food, drink and traditional arts. Several types of traditional Betawi food and drinks include *sayur asem* (likes vegetable soup with a sour taste) [2], *dodol* (a snack made of sticky rice, brown sugar and coconut milk), and *bir pletok* [3]. Modernization and cultural acculturation with other ethnicities, directly or indirectly have an impact on the preservation of local wisdom [4], including the Betawi ethnic in Jakarta.

The *bir pletok* is a health drink developed from the local wisdom of the Betawi ethnic group by using various types of plant ingredients [5]. The use of the word beer (producing foam) is often connoted with alcoholic beverages, but not for *bir pletok*. The addition of the word "*pletok*" to this drink is related to the sound produced when the lid of the container (bottle) of this drink is opened, a *pletok* sound will be heard [3]. Muliari [6] states that *bir pletok* has the potential to be developed and served as a welcome drink at banquets. The *bir pletok* is a traditional health drink non-alcoholic spicy taste has Indonesia [7]. Those was introduced by the Betawi people during the Dutch colonial period as a substitute for halal beer.

Empirically, it can be seen that the public's knowledge of *bir pletok* has decreased. The factors causing the degradation of local knowledge such as: oral inheritance, modernization, knowledge is only owned by certain circles, raw materials are starting to be difficult to find and the manufacturing process is complicated [8]. Preserving local wisdom is one way

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to preserve biodiversity [9] including *bir pletok*. This relates to the raw materials used in the manufacture of these drinks come from biodiversity, especially plants. The plants to make *bir pletok* vary greatly depending on the knowledge of the maker. The cloves (*Syzygium aromaticum*), cinnamon (*Cinnamomum burmannii*) and nutmeg (*Myristica fragrans*) are the main ingredients used in making *bir pletok*, while other ingredients vary from one recipe to another [5,7].

The diversity of basic ingredients used in making *bir pletok* has implications for its color, taste and properties. To increase the efficacy of *bir pletok* in health, it is necessary to optimize the dosage of basic ingredients, the manufacturing process and sources [7]. The *bir pletok* has been shown to have antioxidant activity [7]. Henidar and Tiadeka [10] reported that the differences in the composition of ginger (*Zingiber officinale*) and sappan (*Caesalpinia sappan*) wood have implications for differences in aroma, color and taste.

Urbanization has resulted in some ethnic Betawi moving from Jakarta to Jakarta's buffer zones such as Bekasi and still retaining their local wisdom, such as the habit of drinking *bir pletok* because it is considered to have a healthful effect. This study aims to determine the process of making *bir pletok* and the diversity of plants made from *bir pletok*

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## 2. Material and methods

The research used an ethnobotanical approach, namely participatory surveys and observations. Respondent criteria are ethnic Betawi, married and know the process of making *bir pletok*. Respondents were determined by means of purposive sampling. Some of the things that were asked were the plants used in making *bir pletok*, the manufacturing process, and the efficacy of *bir pletok*.

Specimen vouchers are made from the results of plant exploration in the surrounding environment or market. Identification using the book Flora of Java II [11]. Additional information recorded is local name, stature, benefits, source of income. Modified research instrument from Silalahi et al. [12] and Franco et al. [13]. The data were analyzed qualitatively and quantitatively using descriptive statistics. Qualitative data in the form of the distribution of plants in their taxon (families, genera and species) and the benefits of plants. Bioactivity data was taken from secondary data, namely scientific articles that have been published by other researchers.

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## 3. Results and discussion

### 3.1. Characteristics of Respondents

Respondents in this study were health drink *bir pletok* traders (Figure 1A). The knowledge to makes *bir pletok* is passed down from generation to generation from parents, especially mothers to their daughters. This is related to the fact that Betawi ethnic food/beverage processing is generally done by women. Empirically, it can be seen that the number of *Bir pletok* traders is decreasing and many young people do not know/recognize *bir pletok*. The buying and selling of health drinks [9] and medicinal plants [12] is generally carried out by women. This is related to the fact that women have a lot to do with household activities.

The *bir pletok* traders use the profits from the trade as additional income. Promotion was carried out by respondents to increase sales volume through social media, but in fact word of mouth or relatives had a higher impact. *Bir pletok* production volume depends on the order. The *bir pletok* health drinks are generally served at traditional ceremonies such as weddings, Eid al-Fitr or other ceremonies. The selling price of *bir pletok* is around Rp. 50,000/ liter, but to reach a wider range of consumers, *bir pletok* packages are made in a variety of 200-250 mL with a selling price of 15,000 IDR (1 US\$).



**Figure 1.** Respondents and plants. Ingredients of *bir pletok*. A. The respondent is preparing the ingredients for the *bir pletok*. B. Dry ingredients are stored in bamboo baskets

### 3.2. The *Bir Pletok* Making Process

The *bir pletok* raw materials are easily obtained from the surrounding environment such as markets, traveling vendors or cultivated in the yard. This is related to the fact that most of the plant ingredients for *bir pletok* are also used as cooking spices. To maintain the quality of raw materials, therefore, the ingredients are in the form of fresh ingredients that are purchased or harvested just before the process of making *bir pletok* such as pandan leaves (*Pandanus amaryllifolius*), lemon grass (*Cymbopogon citratus*), kaffir lime leaves (*Citrus hystrix*), and ginger (*Z. officinale*). The dry raw materials such as sappan wood shavings (*Caesalpinia sappan*), cloves (*Syzygium aromaticum*), nutmeg (*Myristica fragrans*), cardamom (*Amomum compactum*) and cinnamon (*Cinnamomum verum*) are stored at home in baskets (made of bamboo as shown in Figure 1B) so that the air circulation runs.



**Figure 2** The raw plant of *bir pletok*. A. Pandan leaves (*Pandanus amaryllifolius*); B. Ginger rhizomes (*Zingiber officinale*); C. Lemongrass (*Cymbopogon citratus*); D. Cinnamon (*Cinnamomum verum*); E. Nutmeg (*Myristica fragrans*); F. Cardamom fruit (*Amomum compactum*); G. Kaffir lime leaves (*Citrus hystrix*); H. Sappan stem shavings (*Caesalpinia sappan*); I. Clove flower (*Syzygium aromaticum*)

The raw materials used in making *bir pletok* affect its properties. For example, the content of secondary metabolites of *M. fragrans* has hypolipidemic hypocholesterolemia, antimicrobial, antidepressant, aphrodisiac, memory enhancing, antioxidant and hepatoprotective properties [14]. Tallei and Kolondam [15] stated that secondary metabolites of *M. fragrans* have health benefits, so they are widely used in the food, beverage and beauty industries. Plants as raw material for pletor beer have complementary activities such as *C. citratus*. Some of the bioactivity of *C. citratus* such as anti-inflammatory [16-18], antimicrobial [16], antioxidant [17], and analgesic [18].

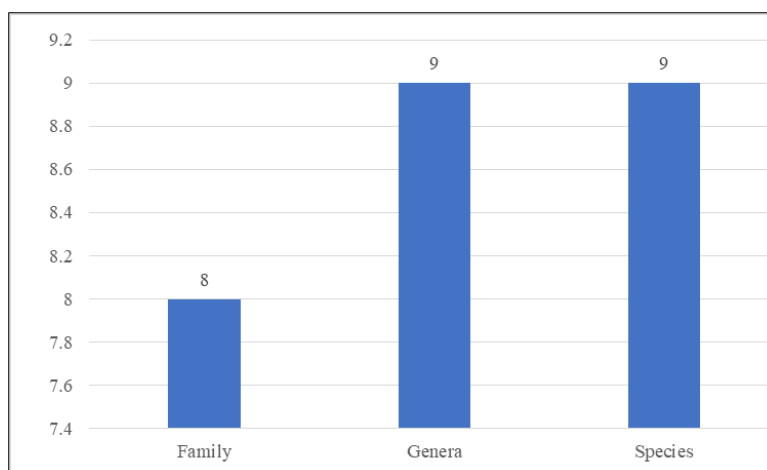


**Figure 3** *Bir pletok*. A. Unfiltered *Bir pletok*; B. *Bir pletok* is ready to be consumed

The making *bir pletok* following stages: (1) Material preparation: all ingredients used are cleaned under running water, weeded and peeled (Figure 2); (2) Each ingredient is prepared in a different way, namely chopped and then crushed (ginger, lemongrass), sliced (pandanus leaves), sliced (nutmeg seeds); (3) Decomposition (water is boiled first in the pot, then the plant ingredients are added together except for the sappan shavings which are added last), boiling is carried out for 30-45 minutes (Figure 3.A); (4) Filtering: carried out after the boiled material cools down; (5) Storage: put in a 500 mL bottle and then stored in the refrigerator; and (6) Serving: can be put in a glass and to add sweetness can be added sugar (Figure 3.B).

### 3.3. The Diversity of Plant Ingredients *Bir pletok*

Plants are the main ingredient to meet their nutritional needs, including health drinks such as *bir pletok*. Based on interviews, 9 species were found with 10 local names belonging 9 genera and 8 families (Table 4.1 and Figure 2). Each family has 1 species except Zingiberaceae (2 species). Empirically it can be seen that the plants used produce a distinctive aroma which is thought to be an essential oil.

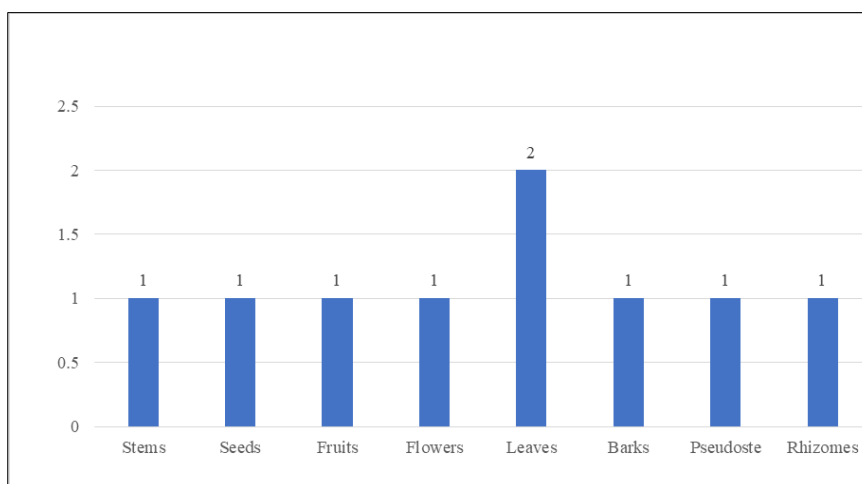


**Figure 4** Diversity of plants to making *bir pletok* by Betawi ethnic, Indonesia

**Table 1** The Plant diversity as raw material for traditional *bir pletok* drinks by the Betawi ethnic

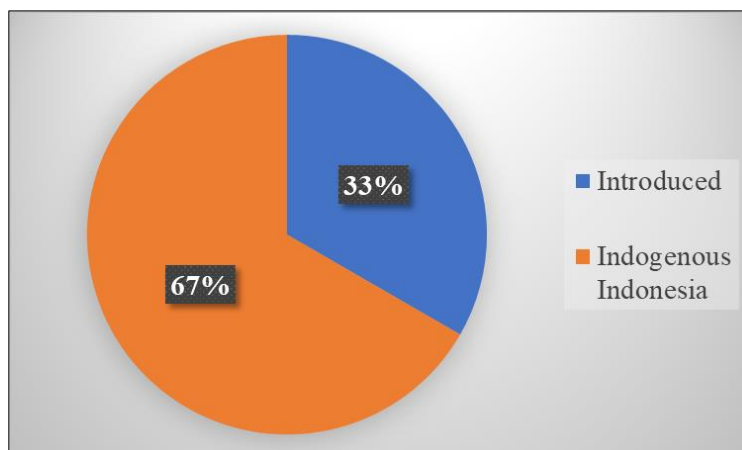
Family	Scientific Name	Local Name	Part of Uses	Floristics region
Fabaceae	<i>Caesalpinia sappan</i> L.	Secang	Stems	Introduced
Lauraceae	<i>Cinnamomum verum</i> J.Presl	Kulit manis	Bark	Indigenous Indonesia
Myristicaceae	<i>Myristica fragrans</i> Houtt	Pala	Seeds	Indigenous Indonesia
Myrtaceae	<i>Syzygium aromaticum</i> (L.) Merr. & L.M.Perry	Cengkeh	Flowers	Indigenous Indonesia
Pandanaceae	<i>Pandanus amaryllifolius</i> Roxb. ex Lindl.	Pandan wangi	Leaves	Indigenous Indonesia
Poaceae	<i>Cymbopogon citratus</i> (DC.) Stapf	Serai	Pseudostem	Introduced
Rutaceae	<i>Citrus hystrix</i> DC.	Jeruk purut	Leaves	Indigenous Indonesia
Zingiberaceae	<i>Amomum compactum</i> Sol. ex Maton	Kapulaga	Fruits	Indigenous Indonesia
Zingiberaceae	<i>Zingiber officinale</i> Rosc	Jahe	Rhizomes	Introduced

Figure 5 shows the diversity of *bir pletok* ingredients when viewed from the organs used. The organ has diverse such as: leaves (2 species) while other organs each have 1 species. This is thought to enrich the nutritional composition, the content of secondary metabolites that have healthful functions. The secondary metabolites used complement each other. In addition to increasing the taste and aroma, the addition of *P. amaryllifolius* increased the activity of *Bir pletok* as an anti-microbial. Various researchers have succeeded in demonstrating the ability of *P. amaryllifolius* leaf extract to inhibit the growth of various types of bacteria including: *Shigella dysenteriae* [19], *Staphylococcus aureus*, *Escherichia coli* [20], *Staphylococcus aureus*, and *Pseudomonas aeruginosa* [21]. The *S. dysenteriae* is a pathogenic bacterium that causes dysentery which causes ulcers in the colon [19].

**Figure 5** The diversity of the ingredients of *bir pletok* by Betawi ethnic, based of organs used

The total ingredients of *Bir pletok* as much as 67% are Indonesian indigenous plants such as nutmeg (*M. fragrans*), cinnamon (*C. verum*), cloves (*S. aromaticum*), cardamom (*A. compactum*), fragrant pandan (*P. amaryllifolius*), and kaffir lime (*C. hystrix*) (Table 1. and Figure 6). If we trace it further, the making of *bir pletok* developed during the Dutch colonial occupation, where they were used to serving beer (alcoholic drink) at parties, even though the local Betawi people are generally Muslim (alcohol is forbidden).





**Figure 6** The plants used as ingredients for *bir pletok* based of the floristic region.

Spices such as nutmeg, cloves, cinnamon and cardamom were very expensive herbs at that time. To increase the dignity of the Betawi people, a drink made from spices (at that time the price was very expensive) but halal, which we now know as *bir pletok*. The name beer is given because when the drink is shaken in the bottle it produces "foam" similar to beer and when the bottle cap is opened it makes a popping sound. To produce an attractive color, sappan stem shavings are added which makes the *bir pletok* a brownish-red color. In the following, the main ingredients of *bir pletok* will be discussed further, including cardamom (*A. compactum*), ginger (*Z. officinale*), kaffir lime (*C. hystrix*), nutmeg (*M. fargrans*), pandanus (*P. amaryllifolius*), and lemongrass (*C. citratus*).

In the Jabodetabek (the buffer zone of the Indonesian National Capital) traditional market, many vendors buy and sell the ingredients of *bir pletok*, especially cooking spices as well as ingredients. T complementary ingredients of *Bir pletok* is *C. hystrix* leaves and cardamom. When *C. hystrix* leaves are compared with other kaffir lime leaves, the aroma is sharper compared to other kaffir lime leaves. This is related to volatile oil compounds (compounds that easily evaporate), especially essential oils [22]. Various researchers have succeeded in revealing the bioactivity of *C. hystrix*, especially antioxidant and anti-microbial related to its essential oil [23]. Key aroma compounds in *C. hystrix* include others ( $\alpha$ -pinene, limonene, citronellal, linalool, terpinen-4-ol, myrcene,  $\alpha$ -terpineol, and citral) [24].

Utilization of cardamom as an ingredient in *bir pletok* will complement the properties of other plants. The bioactivity of cardamom is an asthma, cancer and anti-bacterial drug [25]. Asthma is a disease of the respiratory tract, one of which is characterized by mucus hypersecretion [26,27], which is associated with increased mucin and increased secretion from inflammatory cells [28]. The medicinal plants for asthma are plants that produce compounds that can suppress mucus secretion. Jin-Ah et al [25] stated that the ethanol extract of cardamom reduced infiltrate eosinophils and mucus hypersecretion in rats.

#### 4. Conclusion

- The process of making *bir pletok* 6 stages are material preparation, cutting/slicing, blending, filtering, storage and serving
- A total of 9 species (10 local names) belonging 9 genera and 8 family used to make the *bir pletok*.
- The bioactivity of the main ingredient of *bir pletok* has activity as an antimicrobial, anti-cancer, anti-oxidant and has a relaxing effect.

#### Compliance with ethical standards

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##### Disclosure of conflict of interest

No conflict of interest to be disclosed.

*Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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