The Diverse Collection of Exotic Tropical Fruits in The Indonesian Tropical Fruit Research Institute (ITFRI)

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ABSTRACT

Indonesian Tropical Fruit Research Institute (ITFRI) known as an institute collecting exotic tropical fruits in Indonesia. The present study was carried to evaluate the characters of five exotic fruits in the Indonesian Tropical Fruit Research Institute (ITFRI), Solok, West Sumatra, Indonesia. The experiment used field observation. The characters considered were leaf character (leaf shape, leaf margin, leaf tip, leaf base, the color of upper leaf, color of under leaf, leaf surface, leaf length, leaf width), and fruit character (fruit shape, fruit peel texture, fruit length, fruit width, fruit weight, the color of mature peel, the color of mature flesh, taste, fruit weight, seed weight, seed number). Data were analyzed descriptively using tables. The five exotic fruits' morphological characteristics have demonstrated that every species of fruit has specific characteristics. These fruits have the potential to be raw materials for the pharmacy industry.

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1. INTRODUCTION

Asia has more than 70 different fruits; however, there are only about 20 species for large-scale commercial cultivation (Arora & Rao, 1994). The South-East Asian region is an ideal area to grow fruit crops. The fruits have different appearance, taste, and texture (Yaacob & Subhadrabandhu, 1995). Fruits are enriched with essential nutrients and low in calorie content. They can increase people's health (Devine, et al., 1998).

Indonesia has many genetic resources. Thirty thousand plants grow in the forest, including exotic fruits; however, only about 4,000 species have been used by people (Uji, 2007). Some of them have the potency to be used in domestication program. The exotic fruits need to maintain because of the economic value as traditional medicine or flavor adding in food (Zurriyati, et al., 2018). Because some exotic fruits have almost gone extinct, people need to conserve these fruits. Conservation strategies involve cultural aspects, socio-economic, and plant diversity (Gulati, 2018). Education and tourism are objectives of plant diversity conservation (Hutabarat & Wilkie, 2018).

Indonesian Tropical Fruit Research Institute (ITFRI) collects exotic tropical fruits in Indonesia. The present study was carried to evaluate the characters of five exotic fruits in the Indonesian Tropical Fruit Research Institute (ITFRI), Solok, West Sumatra, Indonesia.

2. MATERIALS AND METHODS

The research was carried out at Indonesian Tropical Fruit Research Institute (ITFRI), Arian experimental site, Solok, West Sumatra, Indonesia, from January 2012 to December 2014. The experiment used field observation. The characters considered were leaf character (leaf shape, leaf margin, leaf tip, leaf base shape, the color of upper leaf, color of under leaf, leaf surface, leaf length, leaf width), and fruit character (fruit shape, fruit peel texture, fruit length, fruit width, fruit weight, the color of mature peel, the color of mature flesh, taste, fruit weight, flesh thickness, seed weight, seed number). Data collected were analyzed descriptively using tables.

3. RESULTS AND DISCUSSIONS

3.1 Fruit Collection

a. *Diospyros blancoi*

Diospyros blancoi belongs to the Ebenaceae of Ericales family. The fruit is eaten fresh. Its wood is used for carving (Jensen, 2008). Verheij & Coronel (1992) noted that this tree has some vernacular names, i.e., hong nhung (Indo-China); marit (Thailand); mabolo, kamagong, tabang (Philippines); buah lemak, buah mentega

(Malaysia); buah mentega, bisbol, mabolo (Indonesia); Mabolo, velvet apple (En); Pommier velours (Fr). The leaf shape is oblong with a length of 22-28.5 cm and a width of 7.6 – 10.0 cm. The leaf color is green (Table 1). Putri & Chiknawati (2016) informed that the leaf is dark green in a mature step. The fruit weight is 236.7 – 399.93 grams (Table 2). The fruit varies greatly at different times. Hung, et al. (2015) recorded that the fruit's size depends on the time it is harvested.

The leaf has the potential to be a raw material for the pharmacy industry. The leaf extract has antioxidant compounds. It can function as an antidiabetic because it can reduce blood glucose (Demetillo, et al., 2018). The leaf extract has antimicrobial properties (Howlader, et al., 2012). The fruit shape is globose with a strong odor or unpleasant aroma (Pobar, 2003). Hung, et al. (2016) found that *D. blancoi* contains 39 different volatile aromas; esters and α -farnesene are the important aroma compounds.

b. *Eugenia uniflora*

Eugenia uniflora is a tree in the family Myrtaceae. This plant is called Brazil cherry. It is a nutritious fruit growing in the tropics and sub-tropics areas (Griffis, et al., 2009). The leaf characteristics are smallness (1.8-2.5 x 2.1-2.5 cm), ovate, and a glossy surface. The fruit weight of *E. uniflora* is 5.1-9.6 grams and red with 1-3 seeds (Table 1). The pulp juice is sweet-acid. It can function as a raw material for commercial products, such as jellies, jams, desserts, and juices (Griffis, et al., 2008). The pulp has the potential to be food colorants (Borges, et al., 2016).

E. uniflora has biological activities as a medicinal plant. The fruit extract has the potential to function as an antioxidant and antidepressant because it against metabolic alteration (Oliveira, et al., 2017). The leaf extract has phenolic content (Bakr, et al., 2017; Ramos, et al., 2017), flavonoids (Rattmann, et al., 2012), anti-inflammatory, antibacterial properties (Falcao, et al., 2018), antioxidant (Migues, et al., 2018). The ripe fruit has analgesic properties (Ogugofor, 2018).

c. *Pometia pinnata*

Pometia pinnata belongs to the family Sapindaceae. The leaf is elliptical and large (28.3 - 36.5 cm x 8.6 – 11.1 cm) (Table 1). The leaf is suitable for ants' habitat because the tree provides leaf domestic and food (Moog, et al., 2008). The pulp flavor of *Pometia pinnata* is sweet, TSS value is 9.8 – 31.2° Brix (Furay, et al., 2019).

The fruit of *Pometia pinnata* commonly used as a traditional medicine. The flesh contains tannins, phenolic and steroid. It can be antioxidant agents (Irawan, et al., 2017). The extract of fruit peel has antioxidant properties (Faustina & Santoso, 2014). The leaf extract can decrease blood pressure (Purwidyaningrum et al., 2017). The stem bark contains triterpenoid (Trimedona, et al., 2015). The

fruit has a seed that can function as a medicine for diabetes since it has anti-diabetic properties (Sukiman, et al., 2018).

d. *Cynometra cauliflora*

Cynometra cauliflora is a plant in the family Fabaceae. *C. cauliflora* (namnam) is a small or shrub tree. The fruit shape is kidney shape, and the taste is sour (Table 2). It is suitable for salad (Verheij & Coronel, 1992). The composition of *Cynometra cauliflora* per 100 g edible portion is moisture 87.27%, ash 1.41%, protein 0.66%, fat 0.18%, fiber 1.72%, carbohydrate 8.77%. The mineral content in *Cynometra cauliflora* per 100 g samples is calcium 6.14 mg, zinc 0.48 mg, iron 1.01 mg, sodium 0.55 mg (Rabeta & Faraniza, 2013).

The tree is an underutilized fruit, but it has medicinal values. The fruit can function as a cytotoxic to cure the human promyelocytic leukemia (Tajudin, et al., 2012). The leaf extract can function as an antibacterial agent (Abd. Wahab, et al., 2019; Ulpiyah, et al., 2019) and antioxidant (Ado, et al., 2013). Those components are useful in the pharmacy industry or drug formulations.

e. *Manilkara kauki*

Manilkara kauki belongs to the family Sapotaceae. The leaf shape is obovate (7.7–9 cm x 5.9–4.9 cm). The leaf color is yellow-green group 148 C. Fruit shape is ellipsoid, medium (2.9–3.3 cm x 2.2–2.8 cm), and the taste is slightly sweet (Table 1 and 2). This plant can be a roadside tree (Sarwadi, et al., 2018), and it can be an herb. The leaf extract contains polyphenol and dolichol (Basyuni & Wati, 2018).

Figure 1. The appearance of five exotic fruits (A. *Diospyros blancoi*, B. *Eugenia uniflora*, C. *Pometia pinnata*, D. *Cynometra cauliflora*, E. *Manilkara kauki*).

3.2 Morphological Characters of Collected Fruits

Table 1. Leaf character

Leaf Character	<i>Diospyros blancoi</i>	<i>Eugenia uniflora</i>	<i>Pometia pinnata</i>	<i>Cynometra cauliflora</i>	<i>Manilkara kauki</i>
Leaf shape	Oblong	Ovate	Elliptical	Ovate-oblong	Obovate
Leaf margin	Entire	Entire	Sinuate	Entire	Entire
Leaf tip	Acute	Obtuse	Long acuminate	Emarginate	Acute
Leaf base	Rounded	Rounded	Acute	Acute	Acute
Color of the upper leaf	Green N137A	Green N137B	Green N 137 D	Green group N 137 A	Green group N 137 A
Color of under leaf	Green 137D	Green 138 B	Green 137 C	Green group N 137 D	Yellow-green group 148 C
Leaf surface	Shiny	Glossy	Shiny	Glossy	Glossy
Leaf length(cm)	22-28.5	2.9-7.1	28.3-36.5	5.9-8	7.7-9
Leaf width (cm)	7.6-10.0	1.3-3.8	8.6-11.1	2.2-3.1	5.9-4.9

Table 2. Fruit character

Fruit Character	<i>Diospyros blancoi</i>	<i>Eugenia uniflora</i>	<i>Pometia pinnata</i>	<i>Cynometra cauliflora</i>	<i>Manilkara kauki</i>
Fruit shape	Globose	Globose	Ellipsoid	Kidney	Ellipsoid
Fruit peel texture	hairy	Soft	Soft	Rugose	Shiny
Fruit length (cm)	7.75-8.7	1.8-2.5	2.88-3.27	4.36-5.04	2.9-3.3
Fruit width (cm)	8.27-9.12	2.1-2.5	2.51-3.12	3.19-3.48	2.2-2.8
Fruit Weight (g)	236.7-399.93	5.1-9.6	15.3-20.84	16.79-25.43	9.7-13.01
Color of mature peel	Orange-red 34A	Red group 44 A	Purple group N77A	Yellow-green group 152 A	Orange-red group 33 B
Color of mature flesh	White 155A	Red group 44 A	Yellow- white 158 B	Yellow group 11 C	Yellow- white group 158 D
Taste	Slightly sweet	Sour	Sweet	Sour	Slightly sweet
Seed weight (g)	33.95-50.9	4.4-7.8	5.2-6.53	5.51-6.25	1.5-3.1
Number of seeds	1-8	1-3	1	1	2-4

4. CONCLUSION

Indonesian Tropical Fruit Research Institute (ITFRI) collects exotic fruits to ensure that endangered are conserved. The result of the five exotic fruits' morphological characteristics demonstrated that every species of fruit has specific characteristics. They have the potential to be raw materials in the drug pharmacy. Hence, it needs more observation to determine the utilization of these fruits in the future, whether as traditional medicine or as edible fruit.

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