

Distribution of a local variety of national leading commodities

Siti Sehat Tan^{1*}, Catur Oktivian Indri Hastuti¹, Chandra Indrawanto¹, and Amisnaipa Amisnaipa¹

¹National Research and Innovation Agency (BRIN), Bogor, Indonesia

Abstract. While wild relatives and introduced varieties can be employed as parents for pest and disease resistance, local variations play a significant role as adaptive parents in site-specific conditions. Local variations continue to disappear as a result of population growth encouraging the transfer of productive agricultural land to marginal land. Thus, the goal of this article is to create a distribution map of the local variants of superior goods that have spread across Indonesia and have become of national superiority. Using the field observation method to several chosen regions for local variety identification the observation site is an agro-ecological region where locals have long produced and grown many plant kinds. Each person in charge of a province's genetic resources receives a form as part of the data collection technique, which is then used to tabulate the results after conducting a qualitative analysis. The study's findings demonstrate that potential local products with the potential to become superior national products are widely distributed throughout Indonesian provinces and have characteristics that allow them to thrive in a range of topographic conditions, from highlands to lowlands, making it possible for them to be developed throughout Indonesia.

1 Introduction

Indonesia is one of 17 countries that have "mega biodiversity" or various biological resources, and together with Malaysia and the Philippines, is called the "big 3 Southeast Asia" in biodiversity [1]. Genetic resources (SDGs) in this biodiversity are the basis for breeding [2], and can support the growth of the domestic seed industry and the availability of raw materials for the manufacturing industry.

The government places a high importance on better SDG management in the future given how significant and strategically valuable the SDGs are. Law Number 12 of 1992 Concerning Plant Cultivation Systems [3], Law Number 5 of 1994 Concerning the Convention on Biological Diversity [4], Law Number 21 of 2004 Concerning the Ratification of the Cartagena Protocol [5], Law Number 4 of 2006 Concerning the Ratification of ITPGRFA [6], Law Number 13 of 2010 Concerning Horticulture [7], and Law Number 11 of 2013 Concerning the Ratification Nagoya [8]. Ministry of Agriculture Number 37 of 2011 Concerning the Preservation and Utilization of Plant SDGs is one of the Ministry of Agriculture documents connected to plants. However, the loss of biodiversity has not been

* Corresponding author: sititan2010@gmail.com

sufficiently stopped by these legal protective measures. According to Keong [1], Indonesia lost 40% of its more than 12 million ha of forested land between the years 1985 and 2008 as a result of the growth of the pulp and paper industry, the introduction of oil palm plantations, and illegal logging. This poses a threat to local SDGs as well as biodiversity.

Through the registration of plant varieties, other initiatives, such as the preservation of biodiversity as a sustainable genetic resource, can be accomplished. According to Law Number 29 of 2000 about the Protection of Plant Varieties' mandate (Article 7), local varieties are under the responsibility of the State, and the government is required to provide for their naming and registration.

The government places a high priority on protecting certain regional variations, including horticulture crops like banana, pineapple, mangosteen, lemongrass, and ginger; foods like porang; and plantations like sugar cane, coffee, cocoa, and coconut. Leading plantation products are being exported at a high rate, and the number of destinations is expanding. Global pricing changes have a significant impact on the Indonesian market [9]. Indonesian coconut has a very significant comparative advantage, especially given the popularity of its raw coconut [10]. Because of its various advantages, including its processed products that have been exported to numerous foreign nations like Japan, China, Taiwan, and South Korea, the food crop commodity known as porang offers economic prospects [11]. In addition to these two commodities, horticulture products like bananas, one of the world's top banana producers, have a high economic value and are highly competitive [12].

This study aims to provide information on the distribution of local varieties of horticultural, plantation, and food commodities in Indonesia based on location and agro-ecosystem. This information is expected to help the community to obtain and develop these varieties in other areas.

2 Assessment method study

2.1 Time and place

In 2020, observations on regional variants were made in a few chosen locations. Direct observations were made in the Banten, Tanah Toraja, and South Sulawesi Regencies. conducted at the in-field, on-site location of farmers, keeping the issue in focus.

2.2 Assessment implementation

Visual observations are made of the chosen kinds to gather qualitative and quantitative character information. Color information from the Royal Horticultural Society (RHS) Color Chart is used in conjunction with the qualitative data collecting for color parameters. Several objects were seen during the quantitative data collection process for leaves and fruit, and the results were presented as range data. Observed morphological characteristics include both qualitative and quantitative ones (Table 1).

Table 1. Examples of morphological characters.

1.	Tree	Height, canopy width shape, overall appearance and plant height, stem circumference and stem character
2.	Stem	There are several primary, secondary, and tertiary branches.
3.	Branch	Average internode length and stipule shape
4.	Leaf	Colors of the shoot, immature leaves, older leaves at the top and bottom, leaf shapes, leaf tip shapes, and leaf length
5.	Fruit	Fruit form, average fruit length, average leaf width, average number of fruit arrangement, average number of seeds/fruit arrangement, ripe fruit color, unripe fruit color, and average number of ripe fruit
6.	Seed	Standard seed dimensions, including length, breadth, thickness, shape, and color
7.	Production	Weight of each fruit tree in kilograms, and weight of each seed (gram)

2.3 Data evaluation

The Center for Plant Variety Protection and Agricultural Licensing (PVTTP Center) in Jakarta conducted the analysis of observational data by tabulating data, where the data obtained were directly based on the results of direct observations as well as the results obtained from observation and registration of varieties. An accumulation of observations yields temporary descriptive data. The modified IPGRI was used to guide observations of morphological characteristics (1980).

3 Results and discussion

3.1 Benefits and distribution of local varieties

The genetic resources of native plants are extremely diverse in the tropical nation of Indonesia. For example, horticultural products like different varieties of mangosteen, banana, pineapple, and lemongrass have been produced and farmed for generations in almost every region. Along with food crop commodities like porang, plantations also grow coffee, cocoa, and sugar cane.

Mangosteen (*Garcinia mangostana* L.) is one of the local Indonesian varieties, is a tropical fruit that has a distinctive taste and many benefits. The benefits of mangosteen fruit after being processed into a formula significantly increase antioxidant capacity and have anti-inflammatory benefits without side effects on liver and kidney function even though consumed in the long term. It is traditionally consumed to treat skin infections, diarrhea and anti-cancer [13]. In addition to the flesh, mangosteen peel has antioxidants with EC50 values equivalent to $\mu\text{g} / \text{ml}$ 8.5539 and NIALI EC Vitamin C 3.3676 $\mu\text{g} / \text{ml}$ and anthocyanins 59.3 mg / 100grams [14]. With these advantages, mangosteen has a high selling value in the local and foreign markets so that it is nicknamed the queen of tropical fruits (Queen of tropical fruit).

One of Indonesia's native kinds, mangosteen (*Garcinia mangostana* L.), is a tropical fruit with a unique flavor and a number of health advantages. Even when ingested over an extended period of time, the benefits of mangosteen fruit have no negative effects on the liver or renal function and greatly improve antioxidant capacity. Historically, people have used it to treat cancer, diarrhea, and skin problems [13]. In addition to the flesh, the peel of the mangosteen fruit contains antioxidants with an EC50 value of 8.5539 g/ml and an EC value of 3.3676 g/ml for vitamin C and 59.3 mg/100 g for anthocyanins [14]. Mangosteen is known

as the "queen of tropical fruits" due to its high selling value in both domestic and international markets (Queen of tropical fruit).

In addition to mangosteen, popular international cultivars include lemongrass, pineapple, and banana. Banana, pineapple, and mangosteen are virtually evenly distributed across Indonesia's whole land. The Goroho banana from North Sulawesi and the Palalawan honey pineapple from Riau are two of the most well-known fruits. Due to its many health benefits, pineapple is in relatively high demand worldwide. It contains a variety of vitamins as well as carbs, crude fiber, water, and a number of minerals that are high in calcium, potassium, and vitamin C [15]. Pineapple is a great fruit in the country because of these benefits. Bananas are similar. The natural sugars in bananas, such as sucrose, fructose, and glucose, as well as a mix of fiber, are known to help relax the nervous system. rapid and long-lasting source of energy for the body [16].

The essential oil produced by lemongrass, which is used in medicine, offers exceptional benefits. To combat bacteria that weaken the body's immune system, Citronella Oil, one of nature's active substances, can be used as a natural antibiotic in place of antibiotics. Citronella serves as the primary antibacterial component of citronella oil, which also contains geraniol [17].

The benefits of the local varieties mentioned above should receive special attention by the local government as the owner of the local varieties. Unfortunately, there are still many local varieties that have not been further researched and commercially cultivated. Exploration activities to obtain local varieties are still limited to only registering varieties for clarity of owners. Local government efforts are urgently needed for the maintenance and commercialization of local varieties by introducing more advanced cultivation technologies, expanding cultivation, and increasing markets. Distribution of local varieties of national leading commodities by location can be seen in Table 2.

Table 2. Distribution of local variations of the nation's leading commodities by location.

Province	Local Variety	District	Subdistrict	Village
Horticultural Crops				
Banten	Manggis Macakal	Lebak	Cipanas	
East Java	Pisang Embuk Merah	Lumajang	Guci Alit	Pakel
	Pisang Mas Jabal	Jombang	Wonosalam	Gunten
	Manggis Manglumsari	Blitar	Gandusari	Slumbung
	Manggis Penataran	Blitar	Penataran	Penataran
West Java	Seraiwangi Puncak Sirna 1-4	Cianjur	Cikadu	Cisaranten
	Nenas Gati	Bogor	Cijeruk	Tajurhalang
Central Java	Pisang Rojo Bawuk	Karanganyar	Tawangmangu	Nglebak
	Pisang Bawen Hijau	Karanganyar	Tawangmangu	Nglebak
	Pisang Bawen Karanganyar	Karanganyar	Tawangmangu	Nglebak
Bali	Pisang Mas Bali	Jembrana	Mendoyo	Perung
	Pisang Raja	Jembrana	Mendoyo	Perung
North Sumatera	Manggis Manggi	Central Tapanuli	Sorkam Barat	Sorkam Kanan
West Sumatera	Pisang Tubas	West Pasaman	Pasaman	Aur Kuning
Jambi	Pisang Raja/Puan Rahayu	West Tanjung Jabung	Pangabuan	Teluk Nilau
	Pisang Tanduk/Bintik Pangabuan	West Tanjung Jabung	Pangabuan	Teluk Nilau
	Pisang Tanduk/Polos Senyerang	West Tanjung Jabung	Pangabuan	Teluk Nilau
	Pisang Kesat Kinci	Kerinci	Bukit Kerman	Muak
	Pisang Badgok	Kerinci	Bukit Kerman	Muak
	Pisang Iku Simpai	Kerinci	Bukit Kerman	Muak
	Pisang Kurik Kerinci	Kerinci	Bukit Kerman	Muak

	Pisang Raha Jerangkang	Kerinci	Bukit Kerman	Pondok
	Pisang Puti Kinci	Kerinci	Bukit Kerman	Muak
	Pisang Puti Kinci	Kerinci	Bukit Kerman	Muak
Riau	Nenas Moris Bengkalis	Bengkalis	Sungai Apit	Tanjung Kuras
	Nenas Madu Pelalawan	Pelalawan	Kuala Kampar	Teluk
	Nanas Tua Tunu	Kota Pangkalpinang	Air Kelapa Tujuh	Tua Tunu
Babel	Nanas Badau Belitong	Belitong	Badau	Badau
South Sumatera	Pisang Rotan (Mura)	Musi Rawas	Selangit	Taba Remanik
Central Sulawesi	Pisang Mbilao Lare	Sigi	Many Villages	
	Pisang Kepok Moico	Bombana	Poleang Selatan	Kali Baru
Southeast Sulawesi	Pisang Raja Moico	Bombana	Tontonohu	Tetehaka
North Sulawesi	Pisang Goroho	Nort Minahasa	Semua Kecamatan	Semua Desa
	Pisang Mas Jarum	Minahasa	Pineleng	Warembungan
	Nenas Lobong	Bolaang Mongondow	West Passi	Lobong
West Sulawesi	Manggis Mambi	Mamasa	Mambi	Mambi
East Kalimantan	Pisang Sunking	Kutai Kartanegara		
	Pisang Rutai	Kutai Kartanegara	Loa Kulu	
	Pisang Gerecek	East Kutai	Kaliorang	
	Nanas Mahkota	Kutai Kartanegara	Samboja	
Southeast Kalimantan	Manggis Malinau	Malinau		
West Kalimantan	Jahe Mananjak	Kubu Raya	Terentang	Teluk Empening
Nort Maluku	Pisang mulu bebe	West Halmahera	Sahu Timur	Goal
Papua	Pisang Rotrowi	Jayapura	Sentani	Sereh
	Pisang Hikeba	Jayapura	Sentani	Yahim, Kehiran
Plantation Crops				
Central Java	Kopi Karanganyar Lawu	Karanganyar	Tawangmangu	Kalisoro
West Papua	Kakao CKR - 1 s.d CKR 44	South Manokwari	Ransiki	
Papua	Tebu Merah Kuning	Jayapura	Sentani	Yahim, Kehiran
	Tebu Batik	Jayapura	Sentani	Yahim, Kehiran
	Tebu Botol	Jayapura	Sentani	Sereh
Food Crops				
Gorontalo	Porang Hutihu Uwanengo	North Gorontalo	Kwandang	
Banten	Porang	Serang	Mancak	
	Porang	Gunung Kencana	Lebak	

3.2 Local varieties distribution based on agroecosystem

Development in regions with comparable agroecosystems requires knowledge of the distribution of varieties based on those systems. Agro-ecosystems with lowland dry climates (LKDRIK), dry lowland wet climates (LKDRIB), dry land upland wet climates (LKDTIB), and dry land upland dry climates (LKDTIK) are where local varieties typically flourish in Indonesia. Government support and attention are needed for Indonesia's diverse agroecosystems, notably in arid regions. Distribution of local variations of the nation's leading commodities by agroecosystem can be seen in Table 3.

In order to improve agriculture, particularly on dry ground, Matheus et al. [18] contends that the government must play a significant role. The local government needs to include it on

its agenda. the requirement for cooperative coordination, farmer growth, institutional empowerment, and community empowerment. Kazakova-Mateva and Radeva-Decheva [19] and Matheus et al. [18] agree that simultaneous action at the local, national, and international levels is necessary to address the diversity of agricultural agro-ecosystems, as well as the need for institutional, policy, and market development assistance.

Table 3. Distribution of local variations of the nation's leading commodities by Agroecosystem.

Province	Crops	Local Variety	Agroecosystems
Banten	Mangosteen	Manggis Macakal	LKDRIB
	Porang	Porang	LKDRIB
East Java	Banana	Pisang Embuk Merah	LKDRIB
	Banana	Pisang Mas Jabal	LKDRIB
	Mangosteen	Manggis Manglumsari	LKDRIB
West Java	Pineapple	Nenas Gati	LKDRIB
	Lemongrass	Seraiwangi Puncak Sirna 1	LKDTIB
	Lemongrass	Seraiwangi Puncak Sirna 2	LKDTIB
	Lemongrass	Seraiwangi Puncak Sirna 3	LKDTIB
Central Java	Banana	Varietas Pisang (All Varieties)	LKDTIB
Bali	Banana	Pisang (All varieties)	LKDTIB
North Sumatera	Mangosteen	Manggis Manggi	LKDRIB
West Sumatera	Banana	Pisang Tubas	LKDRIB
Jambi	Banana	Varietas Pisang (All varieties)	LKDRIB
Aceh	Banana	Pisang Ambon Gayo	LKDRIB
Riau	Pineapple	Varietas Nenas (All varieties)	LKDRIB
Bangka Belitung	Pineapple	Varietas Nenas (All varieties)	LKDRIB
South Sumatera	Banana	Pisang Rotan (Mura)	LKDRIB
Central Sulawesi	Banana	Pisang Mbilao Lare	LKDTIB
Southeast Sulawesi	Banana	Pisang Kepok Moico and Pisang Raja Moico	LKDRIB
North Sulawesi	Banana	Pisang goroho and Pisang mas jarum	LKDRIB
	Pineapple	Nenas Lobong	LKDRIB
West Sulawesi	Mangosteen	Manggis Mambi	LKDTIB
East Kalimantan	Banana	Pisang Sunking, Rutai, dan Pisang Gerecek	LKDRIB
	Pineapple	Nanas Mahkota	LKDRIB
	Mangosteen	Manggis sanga-sanga	LKDRIB
Papua	Sugarcane	Tebu Merah Kuning	LKDRIB
	Sugarcane	Tebu Batik	LKDRIB
	Sugarcane	Tebu Botol	LKDRIB
	Banana	Pisang Hikeba	LKDRIB
Gorontalo	Porang	Porang Hutihu Uwanengo	LKDRIB

3.3 Agronomic and morphological features

The physical and agronomic characteristics of the three varieties that are representative of the three observed commodities can be characterized based on the findings of observations. Toraja Langda coffee is a commodity from South Sulawesi's Tana Toraja Regency, and according to observations of qualitative morphological characteristics, it has a stipule shape that is primarily triangular, a canopy width of 6.8 m, and stem characteristics that include numerous primary, secondary, and tertiary branches. The fruit is spherical, the seeds are rectangular, and the leaves have lanceolate shapes with apiculate leaf tips. The final quality test score analysis yielded excellent results, with a score of 84.50.

One banana with a good reputation in Indonesia is the Ambon banana. Banana Ambon Gayo, a particular variety of banana, is found in Aceh Province. With its vivid yellow color,

it seems rather appealing. With a stem circumference of 90–100 cm, a round cross-section, and light green outer and inner stems, this plant is native to Central Aceh and grows to a height of 5.10 meters.

Porang (*Amorphophallus muelleri* blume) is a plant that can tolerate 60 to 70 percent shade and grow in any type of soil at an elevation of 0 to 700 m above sea level. It is a common tuber plant in Indonesia. It is utilized as an export food for raw industrial products and has a reasonable amount of nutritional value. Porang has a base that forms a primary base and starts to take shape in 7–14 days. At the base, roots start to take shape, some of which emerge around the tuber. Porang stems are one stem type that can split into three secondary stems and then further split into leaf stalks. On plants that are four years old, tubers will produce flowers. flowers are in bloom when patterned in pink and shaped like a trumpet. Table 4 gives specifics about the morphological and agronomic traits of the three local varieties that were chosen.

Table 4. Lists the morphological and agronomic traits of the Toraya Langda, Ambon Gayo, and Porang local varieties of Arabica coffee.

No	Character	Description of Varieties		
		Toraja Langda Coffee	Ambon Gayo Banana	Porang
1.	Plant:			
	plant age	60 years	-	4 years
	flowering age		8-9 months	2 years
	harvest age		12-13 months	3 years
	plant form	height \geq 5 m		Upright
2.	Tree:			
	Canopy width (m)	6,8		
	Overall appearance	Triangle		Upright
	Plant height (Cm)	573	510	150
	Rod Circumference (Cm)	105	90-100	
	Rod Diameter (Cm)	-	31-33	
	Stem character	Many branches of primary, secondary and tertiary	-	
3.	Branch			
	Average length (Cm)	6		
	Stipule Shape	Triangle		
4.	Leaflet			
	Leaf Shape	-	Flat Length	Elips
	Shoot Color	152 A (Light olive)		
	Young leaf color	139 B (Moderate Yellowish Green)		Light green
	Higher leaves' color	139 A (Dark Yellowish Green)	Dark Green/ Light Green	Dark Green
	Lower leaves' color.	139 C (Moderate Yellowish Green)	Light Green	
	Leaf shape	Langset	Soaring Up	Finger
	Leaf tip shape	Apiculate		Pointed
	Average leaf length (Cm)	15,32	375–387	
Average leaf width (Cm)	6,8	95-100		

5.	Fruit			
	Average number of group	6		
	Average fruit/group	16		
	Unripe fruit color	138 A (Moderate Yellowish Green)	Green	
	Ripe fruit color	185 A (Deep Red)	Yellow	
	Fruit shape	Round	Curved	
	Fruit tip shape		Tapered	
	Average fruit length(mm)	16,8	85	
	Fruit width average(mm)	12,8	20-22	
	Flesh thickness (mm)		5-6	
	Bulb weight (gram)		190-200	
	Fruit skin thickness (gram)		490	1500
6	Flower			
	Flower shape			Trumpet
	Flower color			Pink white spot
	Heart shape		Oval round	
	Heart length		33-35 cm	
	Heart Circumference		20-22 cm	
7.	Seed			
	typical seed length (mm)	13,8	-	
	typical seed width (mm)	8,5	-	
	typical seed width (mm)	5,2	-	
	Seed Form	Oblong	-	
	Color Seed	156 B (Yellowish Grey)	-	
	Hue of young tubers			Green
	Age of Bulb			Rusty orange
8.	Production			
	Production/Ha			10 ton
	Fruit weight per tree (kg)	3,40	-	
	Fruit weight per seed		490	
	Weight 100 seeds (gr)	39		
	Amount of tillers		4-5	
8.	Superiority	Resistant to rust and amazing taste	Sweet and Fragrant	Can be cultivated on forest land and in the shade of stands of other plants
	Fruitconsumption rate in percentage		80 %	

4 Conclusion

Indonesia has a variety of indigenous genetic resources that are potentially superior to those found in other countries, such as local varieties of mangosteen, banana, pineapple, lemongrass, Toraja coffee and porang that have developed in both domestic and international markets. Local varieties have characteristics that allow them to thrive and thrive in a variety of topography, including highlands, lowlands as well as dry climates and wet climates. Unfortunately this potential has not been fully explored and developed. Three local varieties

that have great potential for development are the Ambon Gayo Banana, Porang and Toraja Coffee, local coffees that offer an ideal taste for beverages and are consumed worldwide. Local governments need to consider these three commodities to be developed through the introduction of innovation, institutional formation, and market development.

References

1. C. Y. Keong, *Int. J. Environ. Sci. Dev.* **6**, (2015)
2. S. Ceccarelli, S. Grando, M. Maatougui, M. Michael, M. Slash, R. Haghparast, M. Rahmani, A. Taheri, A. Al-Yassin, and A. Benbelkacem, *J. Agric. Sci.* **148**, 627 (2010)
3. Presiden Republik Indonesia, 1 (1992)
4. Presiden Republik Indonesia, 1 (1994)
5. Presiden Republik Indonesia, 1 (2004)
6. Presiden Republik Indonesia, 1 (2006)
7. Presiden Republik Indonesia, 1 (2010)
8. Presiden Republik Indonesia, 1 (2013)
9. Fitriani, B. Arifin, and H. Ismono, *J. Socioecon. Dev.* **4**, 120 (2021)
10. T. F. Yulhar and D. H. Darwanto, *Agro Ekon.* **30**, 125 (2019)
11. N. Utami, *Viabel Pertan.* **15**, 72 (2021)
12. M. U. Kurniawan, A. E. Cahyono, Sukidin, and S. Kantun, in *First Int. Conf. Environ. Geogr. Geogr. Educ.* (2019), p. 012089
13. Z. Xie, M. Sintara, T. Chang, and B. Ou, *Food Sci. Nutr.* **3**, 342 (2015)
14. W. Supiyanti, E. D. Wulansari, and L. Kusmita, *Maj. Obat Tradis.* **15**, 64 (2010)
15. F. Hossain, S. Akhtar, and M. Anwar, *Int. J. Nutr. Food Sci.* **4**, 84 (2015)
16. S. Kumar, K. P. Bhowmik, S. Duraiavel, and M. Umadevi, *J. Pharmacogn. Phytochem.* **1**, 51 (2012)
17. W. Bota and M. Martosupono, in *Semin. Nas. Sains Dan Teknol.* (2015), pp. 1–8
18. R. Matheus, M. Basri, M. S. Rompon, and N. Neonufa, *Partner* **22**, 529 (2017)
19. Y. Kazakova-Mateva and D. Radeva-Decheva, *The Role of Agroecosystems Diversity towards Sustainability of Agricultural Systems* (2015)