

Inventory and Characterization of Sweet Potato (*Ipomoea batatas* (Linn. Lam) at Semangga District Merauke Regency

Amelia Agustina Limbongan and Joko Prastiyono

Agriculture Faculty, Musamus University Merauke
Jl. Kamizaun Mopah Lama, Merauke, INDONESIA
Email: ameliaa664@gmail.com

ABSTRACT

Sweet potato was the main food of Papua. Sweet potato production decreased in Indonesia, but in Papua the availability of rice only 10 kg per year, while sweet potato's is 90 kg per year. This research aimed to inventory and characterize the sweet potato clones. The result will be used as information for sweet potato clones and most importantly to preserve the local clones in Merauke Regency. The research was held in Matara Village Semangga District Merauke Regency, for 5 (five) months. The research method was descriptive and the sampling method was purposive sampling. The samples were observed based on Guidelines for the Conduct of Test for Distinctness, Homogeneity and Stability of sweet potato characterization, which are: plant type, twinning ability, vines length, leaf shape, tuber shape etc. The primary data were retrieved with measuring and observing the sweet potato plant samples. The result indicates that there are 12 accessions of sweet potato, with 10 accessions have few similarity with sweet potato's varieties and 2 accessions have no similarity with sweet potato's varieties.

Key words : inventory, characterization, clone, sweet potato, preserve

INTRODUCTION

Sweet potato (*Ipomoea batatas* (Linn.) Lam.) is a carbohydrate resource commodity after rice, corn and cassava in Indonesia. Beside that, it also contains vitamin A such as β -caroten, vitamin C such as ascorbic acid and minerals such as Zn, Fe, P and Ca (Bradbury and Holloway, 1988; Manrique and Roca, 2007). Its leaves contain low carbohydrate but high protein (up to 29%), so that it can be used as livestock food for higher meat quality (Peters, 2008).

In Papua the availability of *I. batatas* per year is 90 kg, while rice is only 10 kg per year (Guidance Agency for Food Security Papua Province, 2007). It was the main food commodity in Papua, but after years its production kept on decreasing because most of Papuanese is now consumed rice for carbohydrate needs (Sarwono, 2005). In 2006, *I. batatas* availability increased to 147.17 kg per year, while the consumption level in Papua only 129.51 kg per year (Guidance Agency for Food Security Papua Province, 2007). Papuanese's lack of desire to optimize *I. batatas* production shows how important it is to inventory and characterize the clones, especially in Papua in order to preserve its existence.

Sutoroan and Minantyorini (2003) has characterized the size and shape of 50 *I. batatas* storage root germplasm. The result showed that all of them has high level of variability and sizes of the storage root varies from large, medium and small. The size and formation of the storage root are non-significant to storage root's weight, variability and *I. batatas* production.

Survey and germplasm collection of Karuniawan *et. al.* (2012) followed by cytogenetics and field experiments at UNPAD experiment station showed result of 200 accessions wild relatives and 100 clones of *I. batatas* from various region in West Java. The collection has high level of genetic variability based on the morphology and agronomy characterization.

Research conducted by Logo (2011) in Kurulu District Jayawijaya regency described 43 accessions morphology. Ten of them specially used for baby food ingredient, 22 of them as adults main consumption, seven accession for livestock food and 4 accessions for local mores.

This research aimed to inventory and characterize the sweet potato clones in Merauke to preserve its existence for commodity development in Merauke.

MATERIALS AND METHODS

This research was conducted at Matara village, Semangga district, Merauke regency. It was started in April 2015. The observation conducted with descriptive method and purposive sampling. The amount of the samples on every repetition was 40 samples. The samples were observed based on parameters from Guidelines for the Conduct of Test for Distinctness, Homogeneity and Stability of sweet potato characterization (Central Plant Varieties Protection, 2007) about the characteristic of *I. batatas*, which were:

1. Plant type and twinning ability.
2. Length of the main vines, internode diameter, internode length, predominant color, density of purple spots, secondary color, tip color, node color and tip pubescence.
3. Type of the leaves' lobes, number of lobes, leaf color, anthocyanin coloration and distribution of abaxial leaf vein, anthocyanin coloration and distribution and petiole length.
4. Storage root shape, cortex thickness, predominant skin color, predominant color, secondary color, distribution of secondary color and storage root hardness.

The data taken by measuring and observing *I. batatas* on the spot at the field were primary data, while interviewing *I. batatas* farmers.

The research began with a survey of where the *I. batatas* farmer grows theirs. After deciding which field as the research location, then the tillage, cultivation and treatment phases were conducted. The growth phase characteristic data were taken when the samples were 90 days after plantation, while the development phase characteristic data were taken at harvesting time. The data analysis method is descriptive.

RESULTS AND DISCUSSION

The research had inventory of 12 accessions of sweet potatoes. Those accessions were got from another district in Merauke regency, which is Tanah Miring district. The observation was done on seven land belong to seven sweet potato farmers. The farmers are Marindnese, the original tribe of Merauke. Forty samples were chosen based on the researchers' interview with the farmers. The samples then observed and measured according to the parameters.

The twelve accessions concluded from characterization of leaf and vines result are outlined in Table 1. The twelve accessions were determined by the difference of their morphology characterization. If there was no morphology differences from the growth phase, then storage root morphology characterization was used to determine an accession.

Storage root morphology is the most determine character in describing a clone or accession. It is because the level of storage root morphology varieties were higher than the leaf or vines morphology varieties. The result of morphology characterization of storage root is outlined in Table 2.

Result in Table 1 and Table 2 is analyzed if it has any similarity with the *I. batatas* varieties description in Indonesia, according to varieties description from Research Center of Legume and Tuber Crops (Balitkabi) (Suhartina, 2005). From twelve Matara accessions, Matara accession 3, Matara accession 8 and Matara accession 11 had similarity with the sweet potato varieties description. Matara accession 3 description matched the description of Mendut varieties as in Figure 1, Matara accession 8 probably matched the description Suku varieties as in Figure 2. Matara accession 11 matched the Cangkang varieties description.

Matara accession 3 had several similarities with Mendut varieties, which was green leaf color, green vines color, pink predominant skin color and cream predominant color. While Matara accession 8 had similarities with Suku varieties, which were cordate leaf shape, 1 lobe, predominant skin color white, predominant color white and had soft texture. Matara accession 11 had similarities with Cangkang varieties, which were 5 lobes, green leaf color, green vines, dark red predominant skin color and white predominant color.

Description similarity between varieties with Matara accession 3, 8 and 11 were not supported by observation parameter similarity. Guidelines for the Conduct of Test for Distinctness. Homogeneity and stability of sweet potato characterization about *I. batatas* characteristics had several different parameters with varieties description from Balitkabi. Balitkabi varieties description also doesn't have

any pictures to describe the varieties so that comparison with local clones don't have high level similarity percentage.

Matara accession 1 had similarity only in cordate leaf shape with Daya, Borobudur, Prambanan, Sewu and Kidal varieties as in Figure 3 (a) and (b). Matara accession 2, 4, 7, and 10 were the same with Matara accession 1. Matara accession 5 only had similarity with Mendut varieties in predominant skin color pink and predominant color white as in Figure 3 (c) and (d). Matara accession 6 only has similarity with Canguang varieties in number of leaf lobes which are 5 lobes.

Matara accession 9 and 12 had no similarities with *I. batatas* varieties. Matara accession 9 had predominant green vines color and had 7 green leaf lobes. The storage root shape was long irregular or curved with thick cortex, purple red predominant skin color and cream predominant color. Matara accession 12 had purple predominant vines color, reniform leaf, has only 1 green lobes. The storage root shape is long irregular or curved with thick cortex, purple red predominant skin color and white predominant color.

Table 1. Growth phase morphology character of *I. batatas* at Matara village

Matara Accession	Plant		Vines								
	Type	Twinning ability	Length of the main vines	Internode diameter	Internode length	Predominant color	Density purple spot	Secondary color	Tip color	Node color	Tip pubescence
1	Spreading	Non twinning	Short	Thin	Medium	Purple	Dense	Purple at tip	Purple	Purple	Moderate
2	Spreading	Non twinning	Medium	Thin	Short	Green	Few	Green at base	Green	Green	Moderate
3	Spreading	Non twinning	Medium	Thin	Short	Green	Few	Green at base	Green	Green	Moderate
4	Spreading	Non twinning	Medium	Thin	Short	Green	Few	Green at base	Green	Green	Heavy
5	Spreading	Non twinning	Long	Thin	Very short	Green	Few	Green at base	Green	Green	Moderate
6	Spreading	Non twinning	Short	Thin	Short	Purple	Dense	Purple at tip	Purple	Purple	Moderate
7	Spreading	Non twinning	Medium	Thin	Short	Purple	Dense	Purple at tip	Purple	Purple	Moderate
8	Spreading	Non twinning	Medium	Thin	Very short	Green	Few	Green at base	Green	Green	Moderate
9	Spreading	Very twinning	Medium	Thin	Short	Green	Few	Green at base	Green	Green	Moderate
10	Spreading	Non twinning	Long	Thin	Short	Green	Few	Green at base	Green	Green	Moderate
11	Spreading	Non twinning	Short	Thin	Medium	Green	Few	Green at base	Green	Green	Sparse
12	Erect	Non twinning	Short	Medium	Medium	Purple	Dense	Purple at tip	Purple	Purple	Absent

Matara Accession	Leaf				Petiole		
	Shape	Type of lobes	Number of lobes	Color	Anthocyanin coloration and distribution of abaxial leaf vein	Anthocyanin coloration and distribution	Length
1	Cordate	Slight	1	Purple	All vein mostly purple	Totally or almost all purple	Intermediate
2	Cordate	Slight	1	Green	Green	Green	Intermediate
3	Cordate	Slight	1	Green	Green	Green	Intermediate
4	Cordate	Slight	1	Green	Green	Green	Intermediate
5	Almost divide	Absent	7	Green	Green	Green	Intermediate
6	Hastate	Deep	5	Purple	All vein mostly purple	Totally or almost all purple	Intermediate
7	Cordate	Slight	1	Purple	All vein mostly purple	Totally or almost all purple	Intermediate
8	Cordate	Slight	1	Green	Green	Green	Long
9	Almost divide	Absent	7	Green	Green	Green	Long
10	Cordate	Slight	1	Green	Green	Green	Very long
11	Hastate	Very deep	5	Green	Green	Green	Long
12	Reniform	Slight	1	Purple	All vein mostly purple	Totally or almost all purple	Long

Table 2. Development phase (storage root) morphology character of *I. batatas* at Matara village.

Matara accession	Shape	Cortex thickness	Predominant skin color	Predominant color	Secondary color	Distribution of secondary color	Texture/Hardness
1	Long irregulate or curved	Thick	Purple red	Dark cream	Cream	Broad ring in cortex	Medium
2	Long elliptic	Very thick	Purple red	Purple	Purple	Broad ring in cortex	Medium
3	Long elliptic	Very thick	Pink	Dark cream	Cream	Covering most of the flesh	Medium
4	Long elliptic	Thick	Red	Pale orange	Orange	Broad ring in cortex	Soft
5	Long oblong	Very thick	Pink	White	White	Covering most of the flesh	Medium
6	Long oblong	Thick	Dark purple	White	White	Broad ring in cortex	Hard
7	Long oblong	Thick	Dark purple	Dark orange	Orange	Broad ring in cortex	Soft
8	Long oblong	Thick	White	White	White	Broad ring in cortex	Soft
9	Long irregulate or curved	Thick	Purple red	Cream	Cream	Broad ring in cortex	Medium
10	Long oblong	Thick	White	Purple	Purple	Broad ring in cortex	Hard
11	Long elliptic	Thick	Purple red	White	White	Broad ring in cortex	Hard
12	Long irregulate or curved	Very thick	Purple red	White	White	Broad ring in cortex	Medium

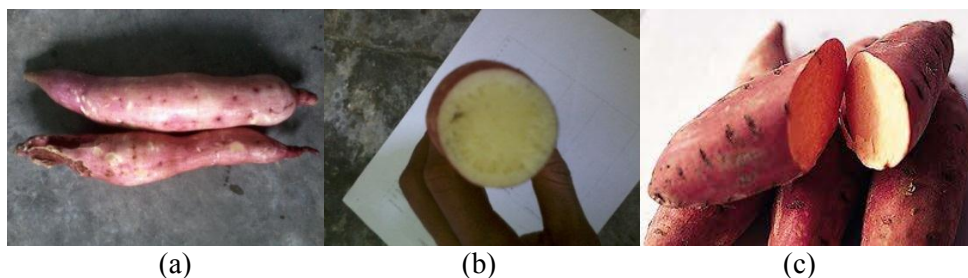


Figure 1. (a) and (b) are Matara accession 3; (c) Mendut varieties.

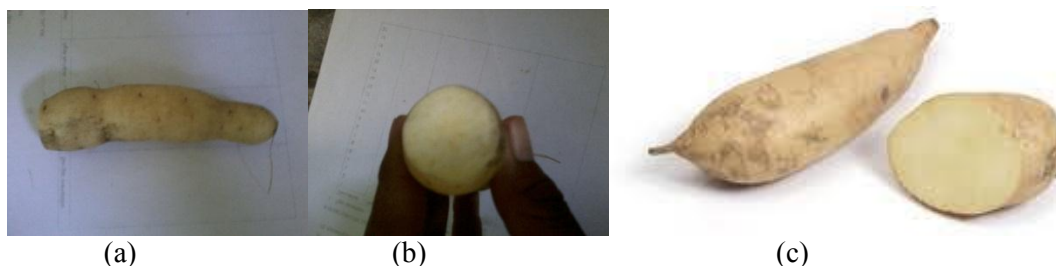


Figure 2. (a) and (b) is Matara accession 8; (c) Sukeh varieties.

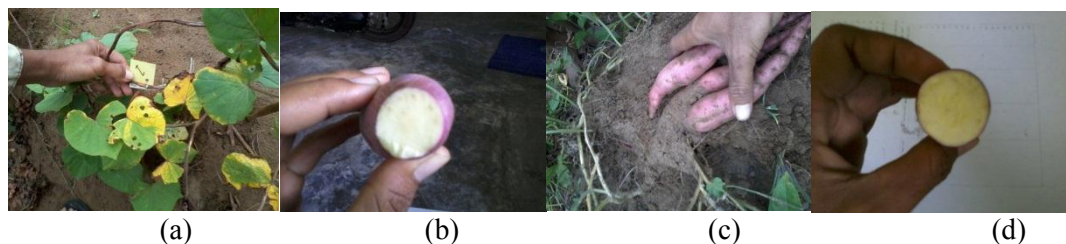


Figure 3. (a) and (b) Matara accession 1. (c) Pink predominant skin color of Matara accession 5; (d) white predominant color of Matara accession 5

CONCLUSIONS

From all twelve Matara accessions, Matara accession 3 had similar description with Mendut varieties, Matara accession 8 had similar description with Sukuh varieties and accession 8 had similar description with Cangukang varieties. Matara accession 1, 2, 4, 7 and 10 had similarity only in cordate leaf shape with Daya, Borobudur, Prambanan, Sewu and Kidal varieties. Matara accession 5 only has similarity with Mendut varieties in predominant skin color pink and predominant color white, while Matara accession 6 only had similarity with Cangukang varieties in number of leaf lobes which is 5 lobes. Standardized *I. batatas* observation parameters from Guidelines for the Conduct of Test for Distinctness, Homogeneity and Stability was a little bit different with *I. batatas* varieties description from Balitkabi so that describing an accession becomes limited.

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