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

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## 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 characterizedthe 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 MataraVillage 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, Homogenity and Stabilityof 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 comodity after rice, corn and cassava in Indonesia. Beside that, it is also contains vitamin A such as $\beta$-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 leves 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 comodity in Papua, but after years its production keep 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 optimizing *I. batatas* production shows how important it is to inventory and characterized 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 significance 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 characterized the sweet potato clones in Merauke to preserve its existency for comodity 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, Homogenity 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 Sukuh varieties as in Figure 2. Matara accession 11 matched the Cangkuang 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 Sukuh 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 Cangkuang 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. Homogenity 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 Cangkuang 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.

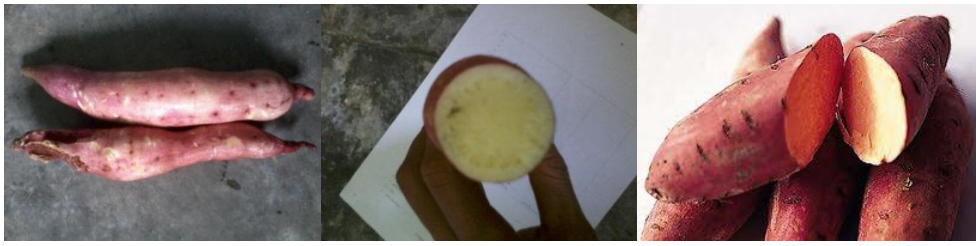
Table 1. Growth phase morphology character of *I. batatas* at Matara village

| 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 |

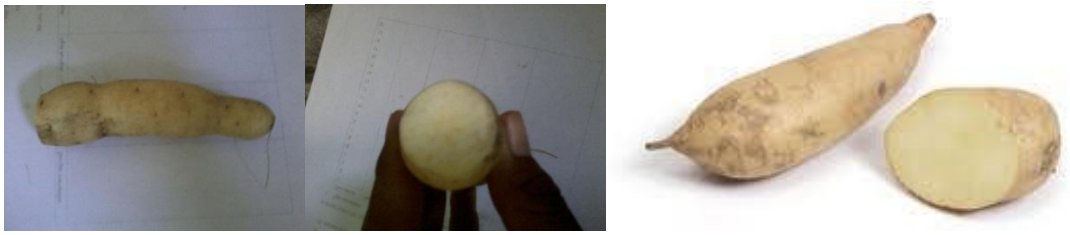
Table 2. Development phase (storage root) morphology character of *I. batatas* at Matara village.

| 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 |



(a) (b) (c)

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



(a) (b) (c)

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

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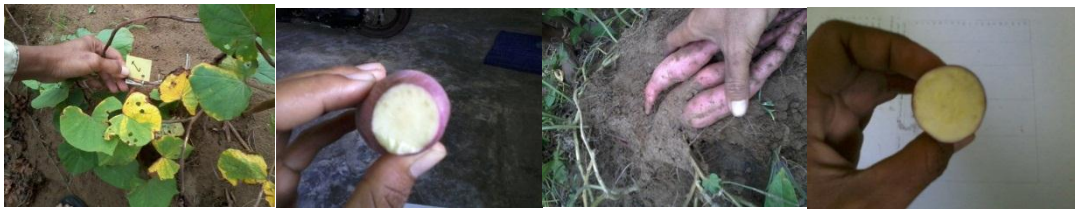

(a) (b) (c) (d)

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 Cangkuang 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 Cangkuang varieties in number of leaf lobes which is 5 lobes. Standarized *I. batatas* observation parameters from Guidelines for the Conduct of Test for Distinctness, Homogenity 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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