

SOP for Sensory Evaluation on Matooke

Kampala, Uganda, November 2019

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This report has been written in the framework of RTBfoods project.

To be cited as:

Kephas NOWAKUNDA (2019). *SOP for Sensory Evaluation on Matooke*. Kampala, Uganda: RTBfoods Project Report, 18 p.

Ethics: The activities, which led to the production of this manual, were assessed and approved by the CIRAD Ethics Committee (H2020 ethics self-assessment procedure). When relevant, samples were prepared according to good hygiene and manufacturing practices. When external participants were involved in an activity, they were priorly informed about the objective of the activity and explained that their participation was entirely voluntary, that they could stop the interview at any point and that their responses would be anonymous and securely stored by the research team for research purposes. Written consent (signature) was systematically sought from sensory panelists and from consumers participating in activities.

Acknowledgments: This work was supported by the RTBfoods project <https://rtbfoods.cirad.fr>, through a grant OPP1178942: Breeding RTB products for end user preferences (RTBfoods), to the French Agricultural Research Centre for International Development (CIRAD), Montpellier, France, by the Bill & Melinda Gates Foundation (BMGF).

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Date: 26/11/2019

Release: 1

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1 SCOPE OF THE STUDY

1.1 Scope

The objective of the study is to establish a sensory profile of cultivars of bananas prepared in Matooke with a trained panel.

1.2 Prerequisite

The setting up and managing a sensory analysis tasting panel was explained in the deliverable: RTBfoods_F.2.2_2018.pdf

2 PRODUCT

2.1 Product Preparation in Laboratory conditions

2.1.1 Step 1: Peeling

- Remove the banana clusters from the peduncle, separate the fingers and mix them up. Randomly, pick and weigh 6 Kg of unpeeled fingers.
- Remove the peel by first cutting off the tips at each end. The skin is then removed by cutting along the length of the skin from the upper tip to the lower end. This is done carefully with a knife to ensure it does not cut deeply into the flesh of the banana. Place the peeled fingers into a pan of clean water to minimize browning. 6Kg of unpeeled fingers will give 3Kg of peeled matooke



Peeling of banana fingers to obtain the edible portion

2.1.2 Step 2: Wrapping in banana leaves

- Wrap the peeled fingers in banana leaves using banana fibres. Tie a string to the wrapped sample and label it for identification, in case you are planning to steam many samples.



Wrapping banana fingers in leaves

2.1.3 Step 3. Steaming

- Steaming is done in a big saucepan whose diameter is 585mm. This can accommodate 5 samples each weighing 3Kg.
- Line the bottom of the saucepan with pieces of peduncle to make a “bed” and add 2 banana leaves to cover them. Put just enough to ensure that the matooke does not get in direct contact with the surface of saucepan during steaming but also to keep the wrap (s) suspended so that they do not get soaked with water, especially at the end of the cooking process.
- Add 10 Litres of water; cover the wrapped matooke in the saucepan with more leaves (3-10, depending on the size of saucepan and number of samples). Cover with another saucepan on top to keep the steam inside during the cooking process.



Each variety of matooke is wrapped in a pack and coded with a colour string for identification



Covering the matooke with banana leaves

Place the saucepan on a gas cooker and steam for about 60 minutes from the start of boiling. Boiling starts 15 minutes after the pan is set on fire. The total steaming time therefore is 75 minutes.



The Matooke saucepan placed on heat-gas oven to steam the Matooke

2.1.4 Step 4: Mashing

- Remove the saucepan off the fire and each sample is mashed in leaves by squeezing the wrapped banana fingers with hands for 2 minutes exactly (Caution: The wrap is hot, protect your hands with industrial gloves or any other heat proof material). Do this for all the samples.



2.1.5 Step 5: Re-steaming after Mashing

The samples are placed back in the saucepan and re-steamed for 60 minutes. The gas flame is reduced to minimum to keep samples hot. Traditionally, it is believed that re-steaming gives it a better taste and aroma and prevents the matooke from cooling.



Steaming matooke on the gas cooker

2.2 Sample storage conditions before sensory tasting

The samples are kept in the saucepan on a low heat. The samples, wrapped in their banana leaves, are transported one after the other every 10-15 minutes in the kitchen. The temperature of each sample was controlled before being opened: it is above 90°C.

3 TASTING SEQUENCE

3.1 General Information

3.1.1 Test Responsible Person/Group Animator

Elizabeth Khakasa, Food scientist, NARL-Uganda, lizkhakasa@gmail.com

Aguti Gloria Grace, Senior Technician, NARL-Uganda, gloaguti@yahoo.co.uk

3.1.2 Date/Time Phase of the test

The tests were done between 16/09/19 and 03/10/2019, and between 12.00 and 1.00 PM.

3.2 Sample

3.2.1 Quantity of sample to be given to each panellist

Each panellist is served between 150 g and 200 g of matooke.

3.2.2 Type of dish

Plastic plate (see photos 3.6)

3.2.3 Temperature of tasting

Serve a reference sample and insert a thermometer ensuring that the probe is in the middle (core) of the sample (see photos in 3.6). Then serve and present test samples to the panellist. The panellist immediately assesses the 2 appearance attributes (Yellowness and Homogeneity of the color). When the reference sample temperature drops to 75°C, the panellists are signalled to start assessing texture attributes in mouth. Then, panellists finished by taste, impression and aroma attributes.

Comment: Over 75°C was found to be too hot while below 75°C the samples begin to harden.

3.2.4 Repeated sample

At each session, a sample is repeated. This is indicated in the codification table below.

3.2.5 Sample Codification

Sample Code	Repetition	Tasting Code	Cultivars	Tasting date
<i>N 4</i>	<i>1</i>	<i>291</i>	<i>NARITA 4</i>	<i>17/09/2019</i>
<i>ENZIRABAHIMA</i>	<i>1</i>	<i>476</i>	<i>ENZIRABAHIMA</i>	<i>17/09/2019</i>
<i>29820S-4</i>	<i>1</i>	<i>480</i>	<i>29820S-4</i>	<i>17/09/2019</i>
<i>NKT</i>	<i>1</i>	<i>756</i>	<i>NAKITEMBE</i>	<i>17/09/2019</i>
<i>N4</i>	<i>2</i>	<i>671</i>	<i>NARITA 4</i>	<i>17/09/2019</i>
<i>N15</i>	<i>1</i>	<i>243</i>	<i>NARITA 15</i>	<i>18/09/2019</i>

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N8	1	514	NARITA 8	18/09/2019
N8	2	597	NARITA 8	18/09/2019
MSKL	1	647	MUSAKALA	18/09/2019
N8	1	638	NARITA 18	18/09/2019
N8	1	849	NARITA 8	24/09/2019
N17	1	709	NARITA 17	24/09/2019
KBZ	1	710	KIBUZI	24/09/2019
N8	2	73	NARITA 8	24/09/2019
N15	1	363	NARITA 15	24/09/2019
N17	1	495	NARITA 17	25/09/2019
MUVUBO	1	771	MUVUBO	25/09/2019
17914S-24	1	228	17914S-24	25/09/2019
27914S-18	1	839	27914S-18	25/09/2019
MUVUBO	2	603	MUVUBO	25/09/2019
N2	1	30	NARITA 2	26/09/2019
N6	1	386	NARITA 6	26/09/2019
N11	1	187	NARITA 11	26/09/2019
NFUUKA	1	400	NFUUKA	26/09/2019
N11	2	549	NARITA 11	26/09/2019
N24	1	945	NARITA 24	1/10/2019
N7	1	995	NARITA 7	1/10/2019
N21	1	461	NARITA 21	1/10/2019
N24	2	614	NARITA 24	1/10/2019
NFUUKA	1	425	NFUUKA	1/10/2019
NAKAWERE	1	160	NAKAWERE	2/10/2019
N21	1	999	NARITA 21	2/10/2019

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<i>Sample Code</i>	<i>Repetition</i>	<i>Tasting Code</i>	<i>Cultivars</i>	<i>Tasting date</i>
NAKAWERE	2	833	NAKAWERE	2/10/2019
N7	1	281	NARITA 7	2/10/2019
KABUCURAGYE	1	973	KABUCURAGYE	2/10/2019
KABUCURAGYE	1	344	KABUCURAGYE	3/10/2019
N14	1	56	NARITA 14	3/10/2019
M32	1	838	M32	3/10/2019
N14	2	793	NARITA 14	3/10/2019
M33	1	288	M33	3/10/2019

3.3 Service

3.3.1 Number of sample tasted per session

Five samples are tasted per session.

3.3.2 Type of service (ex: monadic)

Monadic: the samples are served one after the other, once they have been tasted by all the panellists.

3.4 Panel

3.4.1 Number of panellists who participate in this study

The panel should be between 8-12 members.

Their performance (repeatability and agreement with panel) are provided in the Excel file : "performance of the panel" attached to this SOP

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3.5 Vocabulary

The definition of the sensory attributes is facilitated by the norm ISO standard NF 5492-2009.

Type	Attributes	Definition	How to measure?	Scale
Appearance	Yellow	Color of the surface of the sample from light yellow to bright yellow	When you receive the sample, observe the surface and evaluate the intensity of the color and its homogeneity	0: very light yellow 10: bright yellow
	Homogeneity of colour	Uniformity of color of the surface of the sample		0 : heterogeneous 10 : homogeneous
Texture in mouth	Firmness	mechanical textural attribute relating to the force required to achieve a given deformation, penetration, or breakage of a product.	Put a part of the sample in your mouth, evaluate during the first bite (between molars) how hard is the sample.	0: soft 10 : firm
	Moisture	perception of moisture content of a food by the tactile receptors in the mouth and also in relation to the lubricating properties of the product	Put a part of the sample in the mouth, chew and evaluate the quantity of water within the sample.	0: Dry 10: Moist
	Smoothness	geometrical textural attribute relating to lack of presence of particles in a product	Put a part of the sample in mouth, chew it and after 5 chews, evaluate between tongue and palate the number and the size of the particles.	0: lumpy 5 : grainy 10: smooth

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Type	Attributes	Definition	How to measure?	Scale
Texture by hand	hardness	mechanical textural attribute relating to the force required to achieve a given deformation, penetration, or breakage of a product.	Take a part of the sample between fingers and evaluate how hard the sample is	0: soft 5 : firm 10: hard
	Moldability	mechanical textural attribute relating to the degree to which a substance can be deformed before it breaks	try to make a ball (agglomerate) of the sample and evaluate how easy it is to deform or break the sample	0: crumbly 10: moldable
	Stickiness	mechanical textural attribute relating to the force required to remove material that sticks to the mouth	put a part of the sample between thumb and index fingers and using tapping motions, evaluate the amount of product adhering on them	0: non sticky 10: sticky
Impression	Astringency	complex sensation, accompanied by shrinking, drawing or puckering of the skin or mucosal surface in the mouth, produced by substances such as kaki tannins or sloe tannins	Put a part of the sample in the mouth and evaluate the intensity of astringency impression due to the sample	0 : no intensity 5 : medium intensity 10 : high intensity

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Type	Attributes	Definition	How to measure?	Scale
Taste	Sweetness	basic taste produced by dilute aqueous solutions of natural or artificial substances such as sucrose	Put a part of the sample in the mouth and evaluate the intensity of taste of sweetness	0 : no intensity 5 : medium intensity 10 : high intensity
	Sourness	gustatory complex sensation, generally due to presence of organic acids	Put a part of the sample in the mouth and evaluate the intensity of the sourness	0 : no intensity 5 : medium intensity 10 : high intensity
Aroma	Matooke	Aroma of the local matooke	Put a part of the product and by retro-olfaction evaluate the presence and the intensity of this specific aromas	0 : low intensity 5 : medium intensity 10 : high intensity
	Pumpkin	Aroma of pumpkin		YES / NO
	Grassy	Aroma of fresh grass		YES / NO

3.6 Pictures to illustrate the tasting sessions



Samples stored in the saucepan



A) Thermometer inserted in matooke to monitor temperature.

B) Monitoring matooke temperature before signalling panellists.

C) Serving of Matooke samples on coded plates.



Panellists assessing samples in the sensory booths

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4 REVISION RECORD

Date	Responsible person	Description of change
DD/MM/YYYY	First Name LAST NAME	



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