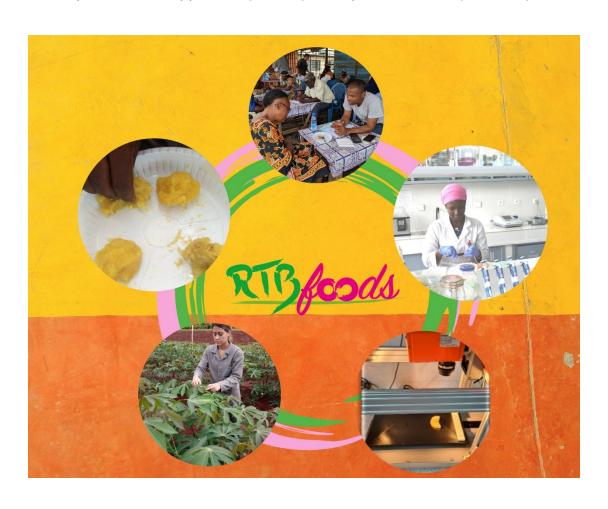# SOP for Sensory Evaluation on Boiled Potato

Biophysical Characterization of Quality Traits, WP2

Kampala, Uganda, January 2020

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RTBfoods **WP2: Biophysical Characterization of Quality Traits**	
SOP: Sensory_EN_Boiled Potato	
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Recommendations of the focal point: the number of sensory attributes is high (26), so we recommend to reduce the number of samples to be evaluated per session.

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ABSTRACT

Efforts to increase adoption of newly released varieties by developing methods that facilitate the measurement of eating quality characteristics of boiled potato in the laboratory are currently ongoing. Descriptive sensory analysis is a method used to objectively measure sensory characteristics of samples. This SOP presents a stepwise procedure to follow when conducting descriptive sensory analysis of potato tubers. It includes various sections providing guidelines on how to handle the tubers from reception to evaluation of cooked samples by trained panelists. For each genotype, uniformly sized tubers with no visible physical or physiological damage are pre-selected, randomly assigned unique 3-digit codes, washed, peeled, and then steamed for 40 minutes over boiling water between layers of banana leaves. Once cooked each tuber is cross-sectionally cut and wrapped in aluminum foil and served to the panelists at 50°C for testing. Samples are served twice in random order over the evaluation period. The panelists rate 24 attributes on 10-point scales according to the established lexicon to give a comprehensive sensory profile following the principles of quantitative descriptive analysis. The odor, texture by hand, appearance, and aroma characteristics, are each described by four terms in the lexicon. In addition, there are seven descriptors for texture in mouth and a single term for aftertaste. The SOP will facilitate the establishment of sensory profiles of various potato breeding lines and screening for end-user preference.

Keywords: descriptive sensory analysis, potato, breeding, quantitative descriptive sensory analysis, RTB, food

1 SCOPE OF THE STUDY

1.1 Scope

The objective of the study is to establish a sensory profile of cultivars of potato prepared by steaming with a trained panel.

1.2 Prerequisite

The procedure for setting up and managing a sensory analysis tasting panel was explained in the deliverable: https://doi.org/10.18167/agritrop/00573

The procedure for evaluating panel performance and data curation and data analysis is presented in the deliverable: https://doi.org/10.18167/agritrop/00582

2 PRODUCT

2.1 Product Preparation in Laboratory conditions

Step 1. Documentation

- Check the nature of the potato tubers received and document the details of the samples in a sample logbook. These should include the sample name, date received, and nature or type of packaging.

Step 2. Sample preselection:

- Select tubers of average size, given the size range of the sample. Selected tubers should be of about the same size and free from any visible damage.

Step 3. Coding and labelling:

- Assign a 3-digit sample code to each sample. The 3-digit random can be obtained from test designs in compusense or in MS Excel. Attach coded labels ensuring to match sample and code correctly. Labelling at this stage blinds the people involved in preparation and contributes to minimising bias. Use and maintain these codes throughout the preparation process to label cooking pots and trays and when during service.

Step 4. Washing and second selection

- Wash the tubers twice with clean water in a basin or saucepan (to remove any soil residue), and rinse under running water. If some of the sample is to undergo mineral analysis, rinse in distilled water.

- Select tubers of the highest integrity: Preselected tubers should be inspected again to ensure no visible physical damage due to corrosion or otherwise, pest and insect damage or rot. They should be as fresh as possible and be close in circumference to facilitate uniform cooking.
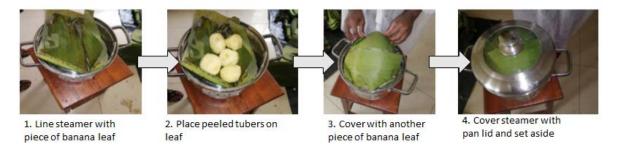
Step 5. Peeling

- Peel the tubers with a high-grade stainless steel or ceramic peeler. Carefully peel to ensure minimal loss of the flesh. At this stage the tubers should be clean. However, if necessary, wash them in clean tap water (distilled water if undergoing mineral analysis) to remove any existing dirt.

Step 6. Cooking (steaming)

- Measure 2000 ml volume of water and transfer into the 24-diameter bottom pan of the steaming pot

- Place a single layer of banana leaf on the bottom of the top steamer layer. Carefully place peeled tubers in a single layer on the banana leaf and cover with another piece of banana leaf and then the pan cover. Put the top steamer layer of the pot containing the tubers to the side.

1. Line steamer with piece of banana leaf
2. Place peeled tubers on leaf
3. Cover with another piece of banana leaf
4. Cover steamer with pan lid and set aside

Figure 1. **Process of placing the sample in steaming pot**

- Place the bottom pan of the steaming pot containing water (without the steamer layer with the tubers) on a gas flame and cover until the water starts boiling. Once the water starts to boil, put the top steamer layer on top of the bottom pan with boiling water to steam the tubers for a timed 40 minutes. If preparing more than one sample, start cooking the next sample 15 minutes after the previous one. Put off the heat and remove the roots from the pan immediately to prevent further cooking

- Put off the fire and remove the tubers from the pan to prevent further cooking

Step 7. Preparing samples for service

- Place the tubers on a labelled tray lined with aluminium foil. Pick one tuber at a time, place on aluminium foil, cut tuber once cross-sectionally, and, keeping both halves together, carefully wrap the sample in foil.

Figure 2. Process of preparing boiled Potato tuber samples for service

- Follow the procedure for sample presentation and service for guidance on how to present and serve sample to the panellists for sensory analysis

2.2 Sample storage conditions before tasting

This SOP is designed such that it is not necessary to store cooked samples before tasting. Samples are presented for tasting immediately they are cooked.

3 TASTING SEQUENCE

3.1 General Information

3.1.1 Test Responsible Person/Group Animator

Mariam Nakitto, CIP-SSA, Uganda (m.nakitto@cgiar.org)

3.1.2 Date/Time Phase of the test

The tests were conducted in February and March to April 2022. Sample tasting took place between 10:00 hrs and 14:00 hrs EAT.

3.2 Sample

3.2.1 Quantity of sample to be given to each panellist

Each panellist is presented with one boiled potato tuber.

3.2.2 Type of dish

The dish on which samples are served is a plastic disposable plate

3.2.3 Temperature of tasting

The samples are served at warm (around 50°C).

3.2.4 Repeated sample

All samples are evaluated twice in random sequence over the tasting period.

3.2.5 Sample Codification:

Sample Code	Replicate	Tasting Code	Cultivars	Tasting date
164	1	164	CIP314926.026	30-Mar
805	1	805	CIP312084.731	30-Mar
313	1	313	DUTCH	30-Mar
474	1	474	CIP314909.279	30-Mar
252	1	252	WANJIKU	30-Mar
786	1	786	CIP314910.019	30-Mar
599	1	599	CIP312010.759	30-Mar
251	1	251	CIP314909.060	30-Mar
677	2	677	WANJIKU	31-Mar
866	1	866	CIP314938.014	31-Mar
261	2	261	CIP312010.759	31-Mar
259	1	259	CIP314915.069	31-Mar
536	1	536	CIP314909.044	31-Mar
351	2	351	DUTCH	31-Mar
638	2	638	CIP314909.044	31-Mar
711	1	711	CIP313011.028	31-Mar
640	1	640	CIP314909.002	1-Apr
394	2	394	CIP314938.014	1-Apr
860	2	860	CIP314909.060	1-Apr
824	1	824	Unica	1-Apr
700	2	700	CIP314909.279	1-Apr
544	1	544	CIP314915.069	1-Apr
650	1	650	SHANGI	1-Apr
491	2	491	CIP314915.069	1-Apr
462	2	462	SHANGI REP 2	4-Apr

Sample Code	Replicate	Tasting Code	Cultivars	Tasting date
537	*2*	*537*	*CIP314926.026 REP 2*	*4-Apr*
771	*2*	*771*	*CIP314909.002 REP 2*	*4-Apr*
986	*2*	*986*	*CIP313001.649 REP 2*	*4-Apr*
389	*2*	*389*	*CIP314910.019 REP 2*	*4-Apr*
749	*2*	*749*	*CIP313011.028 REP 2*	*4-Apr*
899	*2*	*899*	*UNIQA REP 2*	*4-Apr*
577	*2*	*577*	*CIP312084.731 REP 2*	*4-Apr*

3.3 Service

3.3.1 Number of samples tasted by session

There were two sessions per day. In each session the panel evaluated 4 unique samples.

3.3.2 Type of service (ex: monadic, …)

Monadic

3.4 Panel

3.4.1 Number of panellists who participate in this study

We expect about 10 panellists

3.5   Vocabulary

Type	Attributes	Definition	How to measure?	Scale
Odor	Potato	Odor of cooked potato	Open foil and take a whiff	11 point scale, 0: odorless; 1:barely noticeable; 10: very strong
	Green vegetable	Odor of cooked amaranth and beet root		11 point scale, 0: none; 10: very strong
	Root vegetable aroma	Odor of root crops such as sweetpotato, cassava, and balugu (climbing yam)		11 point scale, 0: None; 10 : Very strong
	Cooked carrot	Odor of boiled carrot		11 point scale, 0: None; 10: Very strong
Texture in mouth	Fracturability	Mechanical textural attribute related to the force necessary to break into crumbs or pieces	Place sample between incisors and bite into it to assess the amount of force required to fracture the sample	11 point scale, 0: deforms/does not fracture; 1: easily fractures; 10: needs high force to fracture
	Hardness in mouth	Mechanical textural attribute related to the force necessary to achieve a certain deformation	Place sample between molars and bite into it to access the amount of force required to bite into it	11 point scale, 0: extremely soft, 10: hard
	Crunchiness	Attribute of product to produce low pitched sound during rupturing	While you chew the sample observe the sound	11 point scale, 0: Not crunchy; 10: Crunchy
	Moisture (in the mass)	Textural attribute which describes amount of water present in the sample mass	While you chew, observe the degree of moistness of the sample mass	11 point scale, 0: dry; 10: extremely moist
	Mealiness	An attribute associated with gumminess characterized by powdery mouthfeel	After chewing sample 3 times, feel the extent of the powdery mouthfeel	11 point scale, 0: not mealy, 10: extremely mealy

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Type	Attributes	Definition	How to measure?	Scale
Texture by hand	Smoothness	Geometrical attribute associated with the overall degree of absence of particles within sample	After chewing feel sample between tongue and palate to assess the degree to which mass is free of grains	11 point scale, 0: grainy, 10: very smooth
	Uniformity of texture		After chewing, evaluate the overall uniformity in texture perceived in sample	11 point scale, 0: highly variable, 10: highly uniform
	Hardness by hand	Mechanical textural attribute related to the force necessary to achieve a certain deformation	Using fore finger, press sample in the center it to assess the amount of force required to deform the sample	11 point scale, 0: extremely soft, 10: hard
	Moisture release	Textural attribute related to release of moisture from a product when pressure is applied	Take a piece of sample, press it between the fore finger and thumb and observe how much water is released from sample mass	11 point scale, 0: None, 10: High
	Cohesiveness (moldability)	Textural attribute relating to degree to which a substance can be deformed before it breaks	Take a sizeable piece of sample and using all fingers attempt to make a ball with the sample	11 point scale, 0: falls apart, 10: moldable
	Stickiness	Textural attribute relating to degree to which a substance can be adhere to surfaces of different material	Take a sizeable piece of sample, deform it and press between fore and middle fingers to evaluate how sticky it feels	11 point scale, 0: Not sticky, 10: very sticky
Appearance	Yellow colour	Description of predominant color of potato and its relative intensity	Open foil, visually assess potato surface the surface and evaluate the orange color intensity, its homogeneity, translucency and chalkiness	11 point scale, 0: white; 4-5: cream; 10: yellow
	Homogeneity of color	Evenness of the distribution of the colour across entire sample surface		11 point scale, 0: highly variable; 10: consistent throughout
	Translucency	Attribute of object that allows light to pass through it but not images to be distinguished (observe the cross-section / cut surface)		11 point scale, 0: Chalky/opaque throughout; 10 : Translucent throughout
	Chalkiness	Observe the peeled surface		11 point scale, 0: Not chalky at all; 10 : Mostly chalky

Type	Attributes	Definition	How to measure?	Scale
Aroma	Potato	Distinct aroma of cooked potato	Take a small piece of sample, chew slowly and take a whiff to score the intensity of the aromas you observe	11 point scale, 0: tasteless/bland; 1: barely noticeable; 10: very strong
	Cooked carrot	Distinct aroma of cooked carrot		11 point scale, 0: None; 1: Very strong
	Green vegetable	Distinct aroma of vegetables such as amaranth and beet root		11 point scale, 0: None; 10: Very strong
	Root tuber	Distinct aroma of root drops such as cassava, sweet potato and climbing yam (balugu)		11 point scale, 0: None; 10: Very strong
Aftertaste	Bitter	Gustatory sensation that remains after swallowing product associated with the taste produced by dilute aqueous solutions of substances such as quinine	Take a small piece of sample, chew slowly and swallow and assess whether there is a lingering bitter taste afterwards	11 point scale, 0: Not bitter at all; 10: Extremely bitter

3.6 Pictures to illustrate the tasting sessions

+ Picture credit: Mariam Nakitto, CIP-SSA (Uganda) for all

Picture 1. Panelists evaluating odor of potato samples

Picture 2. Panellists evaluating apperance of potato samples

Picture 3. Panellist assessing for stickiness and cohesiveness of potato samples

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