Field Scientific Report

Participatory Processing Diagnosis of Boiled Potato in Uganda

Understanding the Drivers of Trait Preferences and the Development of Multi-user RTB Product Profiles, WP1, Step 3

Kampala, Uganda, April 2020

Mariam NAKITTO, International Potato Center (CIP), Kampala, Uganda

Samuel Edgar TINYIRO, National Agricultural Research Laboratories (NARL), Kampala, Uganda

Sarah KISAKYE, NARL, Kampala, Uganda

David BAMWIRIRE, NARL, Kampala, Uganda

Anitsha MIREMBE, AGRINET, Kampala, Uganda

Joshua OKONYA, CIP, Kampala, Uganda

Netsayi MUDEGE, CIP, Nairobi, Kenya

Sarah MAYANJA, CIP, Kampala, Uganda

Alexandre BOUNIOL, Centre de coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), Montpellier, France (Validator)

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

To be cited as:

Mariam NAKITTO, Samuel Edgar TINYIRO, Sarah KISAKYE, David BAMWIRIRE, Anitsha MIREMBE, Joshua OKONYA, Netsayi MUDEGE, Sarah MAYANJA, Alexandre BOUNIOL (2021). *Participatory Processing Diagnosis for Boiled Potato in Uganda. Understanding the Drivers of Trait Preferences and the Development of Multi-user RTB Product Profiles, WP1, Step 3.* Kampala, Uganda: RTBfoods Field Scientific Report, 22 p. https://doi.org/10.18167/agritrop/00622

Ethics: The activities, which led to the production of this document, 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).

Image cover page © LAJOUS P. for RTBfoods.

This document has been reviewed by:	
Final validation by:	
Alexandre BOUNIOL (CIRAD)	15/10/2020

CONTENTS

Table of Contents

List of figures

List of tables

ABSTRACT

The aim of this activity was to establish the essential quality characteristics of boiled potato through participatory processing demonstrations with processors at every step from raw material to final boiled product. The activity was conducted in Central (Rakai) and South Western Uganda (Kabale). Boiled potatoes were prepared similarly by boiling in both Kabale and Rakai. When processing, in both regions, ease of peeling (associated with ease of removing 'eyes'), firmness and tubers which were not watery (low water content) were preferred. Potatoes which were not good for processing were; difficult to peel (deep eyes), watery and soft. Average processing yield from peeling to boiled product for Kabale varieties was 79% while for Rakai it was 68%. In Kabale, the most preferred boiled potato characteristics were firmness, mealiness, good potato taste and smell whereas the least preferred were white colour, too soft, watery, not mealy, lacking good potato taste and smell. Processors in Rakai liked mealiness, firmness, softness and smoothness (in the mouth), good potato taste and smell. The poor characteristics were; not mealy, too soft, watery, hard, no potato taste and smell. Generally, in Kabale, the most preferred variety was Rwangume (NAROPOT 4, improved), followed by Kinigi (local), Kachpot 1 (improved) and Victoria (improved). In Rakai, varietal preference for boiled potato in descending order was; Kasumali (local), Deodeo (NAROPOT 4, improved), Kabale (local) and Victoria (improved).

Key Words: boiled potato, quality characteristics, participatory processing, variety preference

1 STUDY CONTEXT AND GENERAL OBJECTIVES

The participatory processing diagnostics activity involved preparation of boiled potato with the assistance of experienced female processors. The aim was to ascertain desired processing characteristics for boiled potato. The activity entailed a two-way discussion guided by a structured questionnaire where both qualitative and quantitative data were collected. The activity was conducted in the processors' conventional conditions with the aim of obtaining a better understanding of the processes that need to be done to obtain a desirable ready to eat boiled potato.

In this way, the key processing unit operations as well as the most and least preferred quality characteristics at each processing step were identified. The activity was conducted as a follow-up to Step 2 (gendered food mapping) and the data that had been obtained therein formed a basis for selection of varieties for this activity (processing diagnostics). Data collected from this activity were later integrated into the consumer questionnaire which was used for Step 4 – Consumer Testing.

2 METHODOLOGY

2.1 Study Area

The activity was conducted in Rakai (Central Uganda) and Kabale districts (South-Western Uganda) in December 2019. The two sites were selected because of their high potato production in the country; and also, because Step 2 had been conducted in the same locations.

2.2 Raw Material Choice

Four potato varieties, both local and improved from each of the two study sites were selected based on preference data obtained from Focus Group Discussions (FGDs), Key Informant Interviews (KIIs) and Individual Interviews (IIs) conducted under Step 2. The varieties were selected to obtain diversity in preference that is; most, intermediate and least preferred varieties from each location. The four varieties selected in Rakai were; Kasumali (local), Kabale (local), Victoria (improved) and Deodeo (NAROPOT 4) (improved) as shown in Fig 1. The Rakai varieties were harvested at 90 days after planting.

Figure 1 Potato varieties from Rakai; Kabale (a), Deodeo (b), Kasumali (c) and Victoria (d)

In Kabale, they were; Victoria (improved), Kachpot 1 (improved), Kinigi (local) and Rwangume (NAROPOT 4) (improved) (Fig 2). These were harvested at 105 days after planting. A total of eight processor demonstrations were conducted, four at each location.

Figure 2 Potato varieties from Kabale; Kachpot 1 (a), Victoria (b), Rwangume (NAROPOT 4) (c) and Kinigi (d)

2.3 Product Profiling

At each site, four experienced processors (domestic and/or semi-commercial) were identified with the help of partners. Rakai District Local Government staff assisted the selection in Rakai while in Kabale, Kachwekano Zonal Agricultural Research and Development Institute (KAZARDI) staff (KAZARDI is affiliated to National Agriculture Research Organization (NARO) assisted the process. Findings from Step 2 showed that food preparation was usually done by women in both locations; therefore, all the selected processors were women. Both qualitative and quantitative data were collected simultaneously. A structured questionnaire was used to collect qualitative data from individual processors. Quantitative data at each preparation step were collected systematically using a protocol developed by WP1 leaders (Fliedel et. al; 2018). The processors were interviewed individually before, during and after each processing operation to obtain views and opinions pertaining to the characteristics of the potato varieties under study. Qualitative data were coded and analysed as described by Forsythe *et al*. (2018). Quantitative data from processing diagnosis were analysed using XL STAT (2014).

3 RESULTS

3.1 Raw Material Characteristics

3.1.1 Weight

The average weight of the processing samples used in the study are shown in Figure 3.

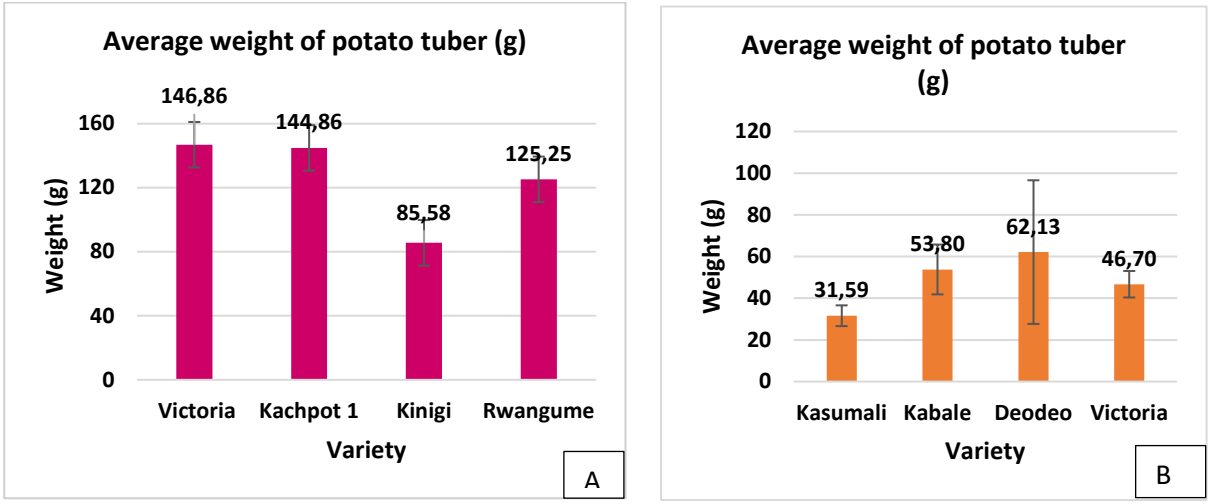

Figure 3 Average weight of potato tuber for varieties in Kabale (A) and Rakai (B)

Among the varieties from Kabale, Victoria was the heaviest followed by Kachpot 1 and Rwangume, in descending order (**Figure 3A**). Kinigi had the lightest tubers. In Rakai, Deodeo was the heaviest and Kasumali the lightest (**Figure 3B**). Deodeo is an improved variety and as such is expected to have superior agronomic and morphological traits which could explain this observation.

3.1.2 Raw material characteristics

General characteristics (good and poor quality) for raw potato by location are summarised in **Table 1**.

Table 1 General characteristics of raw potato in Kabale and Rakai

Location	Good quality	Poor quality
Kabale	medium size tuber firm peel smooth skin yellow flesh hard red skin color heavy	skin peeling off not round (shape) immature small size tuber not firm cracked soiled 'eyes' wrinkled skin
Rakai	smooth skin red skin yellow flesh colour good eyes (not oozing water) firm skin white flesh colour no wrinkles fresh smell shiny skin without cracks absence of a bad smell big size tuber	soft tuber bad smell (diseased) oozing milky substance from the eyes pale skin big and deep eyes rough skin watery white skin

Processors in Kabale preferred potatoes that were medium to big in size, hard, heavy with smooth red skin and firm peel. The least preferred potatoes were those that were not firm, immature, small, cracked, not round in shape; wrinkled skin which easily peeled off and soiled 'eyes'.

The most preferred characteristics by processors in Rakai were; smooth red skin, yellow flesh colour, good eyes (not oozing water) and firm skin whereas soft tuber, bad smell (diseased), oozing milky substance from the eyes, pale skin and big & deep eyes were the least preferred characteristics.

3.2 Product Profiling

3.2.1 Unit operations of product profile process

Boiled potato was prepared in a similar manner in both Rakai and Kabale as shown in **Figure 4 and Figure 5**.

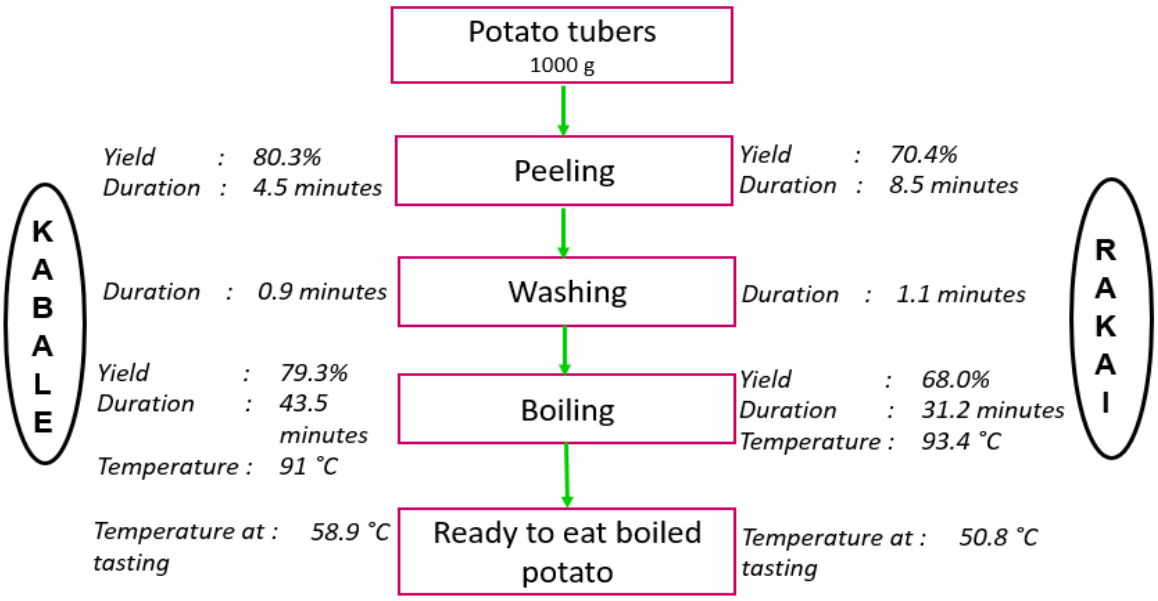

Figure 4 Flow diagram for preparation of boiled potato in Kabale and Rakai

Briefly, preparation commenced with peeling and removal of the 'eyes'. The tubers were then washed (once or twice) until they were clean after which they were immersed directly in a saucepan containing water and covered with either a banana leaf and/or another saucepan prior to boiling. The pan was put on fire and the potatoes were boiled until they were deemed to be ready. Readiness was determined in several ways; when the water for boiling reduced and was nearly used up, olfactory perception of the characteristic good smell of ready to eat potatoes or probing the potato with a fork to gauge whether it had softened.

Figure 5 Process flow for preparation of boiled potato; peeling (a), washing (b), cover immersed potatoes with banana leaf and/or saucepan (c), boiling (d)

3.2.2 Unit operations characterization

Peeling

Yield after peeling

The yield after peeling of the potatoes is shown in **Figure 6**. In Kabale, the yield varied from 77.9 % to 82.7 % wet basis (w.b.), with no significant difference between the varieties (**Figure 6A**). Victoria had the lowest peeling yield. This could be attributed to its soft peel causing loss of flesh during peeling.

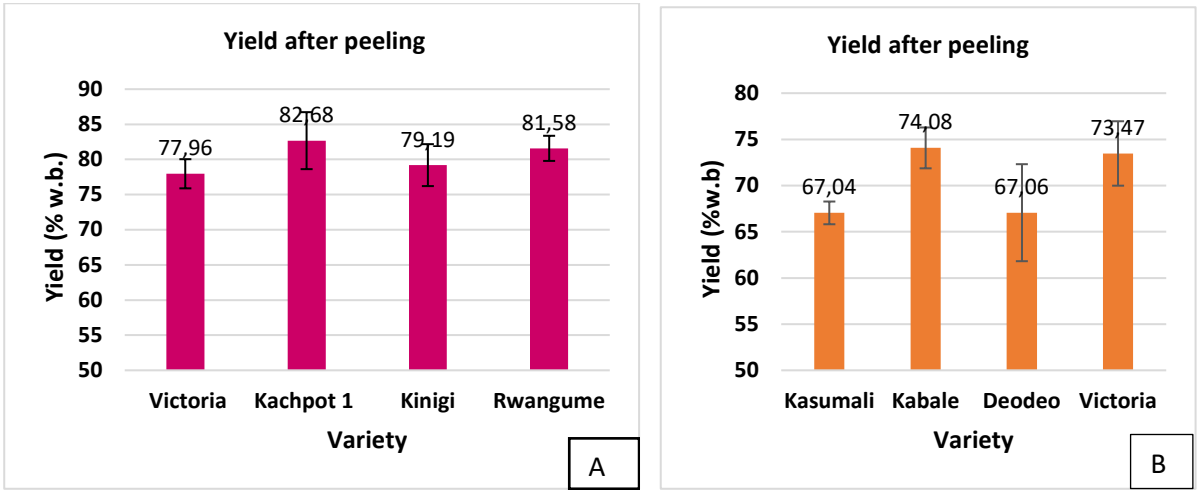

Figure 6 Yield after peeling (% w.b) for potato varieties in Kabale (A) and Rakai (B)

In Rakai, peeling yield ranged from 67.0% (Kasumali) to 74.1% (Kabale) (Figure 6B). However, the difference in yield between the varieties was not significant. The Kabale varieties had a comparatively higher peeling yield compared to the Rakai varieties. This could be attributed to the advanced stage of maturity of the Kabale varieties (3.5 months) compared to those used in Rakai which were harvested at only 3 months. Tuber size increases the longer potatoes remain underground before harvest (Mahmud et al., 2009). In addition, varieties from Kabale had been dehaulmed and therefore had firmer skin (Upadhyay & Bashyal, 2020). As such, less flesh was lost during the peeling operation.

Peeling productivity

Peeling productivity varied from 10.46 kg/hr/processor for Kinigi, to 12.99 kg/hr/processor for Kachpot 1 in Kabale (**Figure 7A**). Kinigi had smaller tubers compared to other varieties and was perceived to be hard to peel . These factors may have affected its peeling productivity.

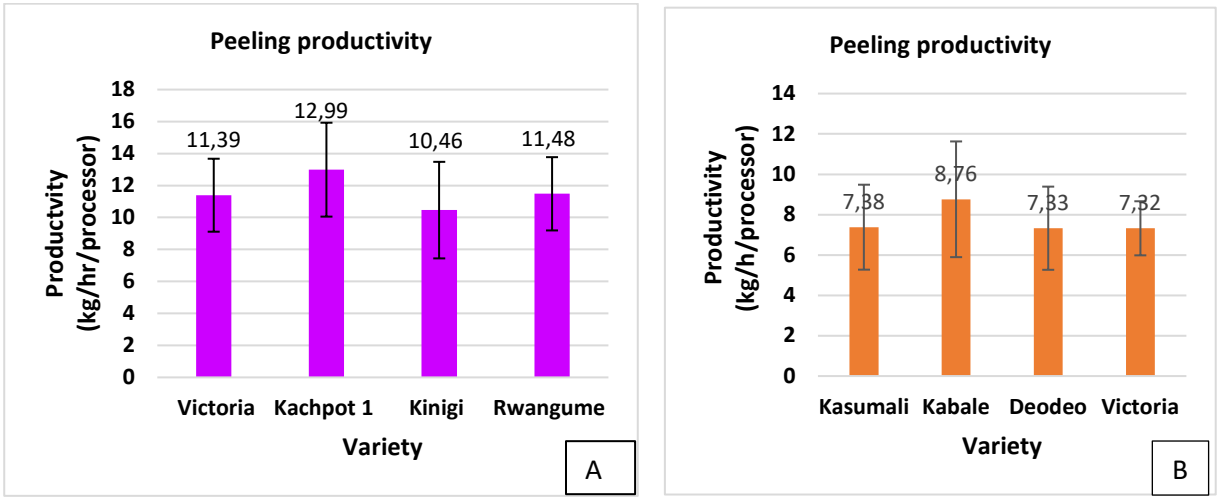

Figure 7 Peeling productivity for potato varieties in Kabale (A) and Rakai (B)

Regarding varieties from Rakai, peeling productivity was highest for Kabale (8.76 kg/hr/processor) and lowest in Victoria (7.32 kg/hr/processor) (**Figure 7B**). Nonetheless, this difference was not significant. Varieties from Rakai had lower peeling productivity compared to Kabale which could be attributed to smaller sized potato tubers which are more cumbersome to peel.

Boiling

Yield after boiling

The yield after boiling for Kabale varieties varied from 76.35% (Victoria) to 80.75% (Kachpot 1) (**Figure 8A**).

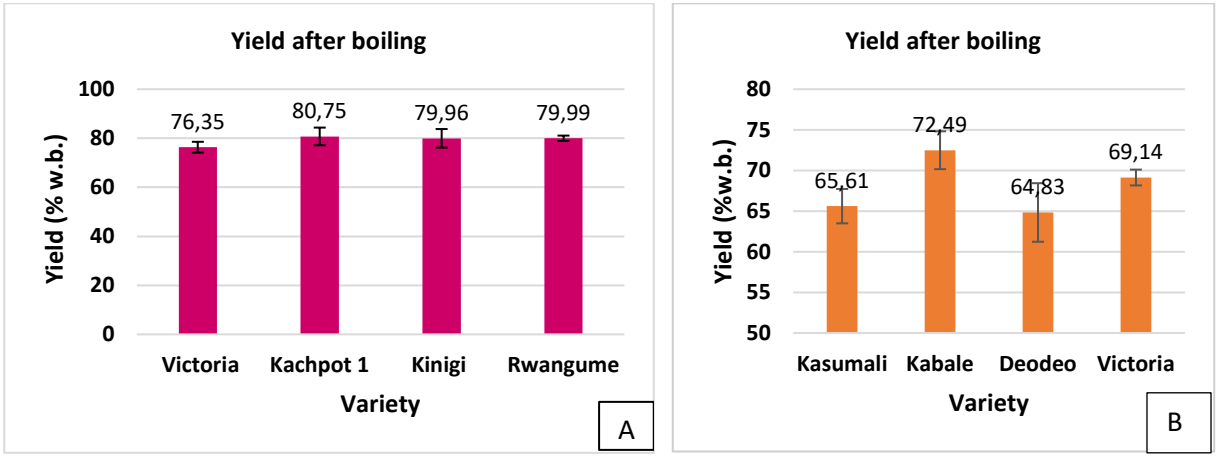

Figure 8 Yield after boiling for potato varieties in Kabale (A) and Rakai (B)

In Rakai, the yield after boiling varied from 64.8% (Deodeo) to 72.5% (Kabale) (**Figure 8B**). The difference between these two varieties was significant. Yield losses at this stage could be attributed to water loss by evaporation and dry matter losses. The differences between the varieties could be due to variation in innate physico-chemical properties such as starch. However, these need to be investigated further. Victoria had the highest yield loss after boiling when comparing varietal losses. This also requires further investigation.

Boiling time

The time taken to boil the different potato genotypes in Kabale is shown in Figure 9A. Boiling time varied from 39.6 minutes (Rwangume) to 48.4 minutes (Victoria). However, these differences between varieties were not significant.

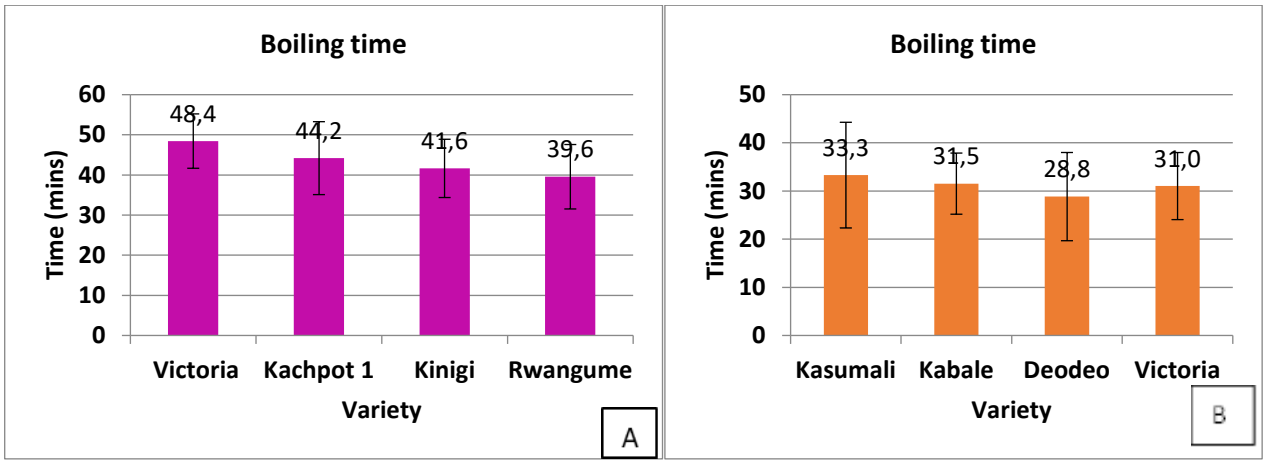

Figure 9 Boiling time for potato varieties in Kabale (A) and Rakai (B)

In Rakai, the boiling time was in a narrow range between varieties 28.8 minutes (Deodeo) to 33.3 minutes (Kasumali). The boiling time was also not significantly different between varieties. Overall, the varieties from Kabale had a longer boiling time than those from Rakai. This could be attributed to the bigger tuber size of the Kabale varieties.

Boiling productivity

In Kabale, boiling productivity varied from 0.99 kg/hr/processor (Victoria) to 1.28 kg/hr/processor (Rwangume) (**Figure 10A**).

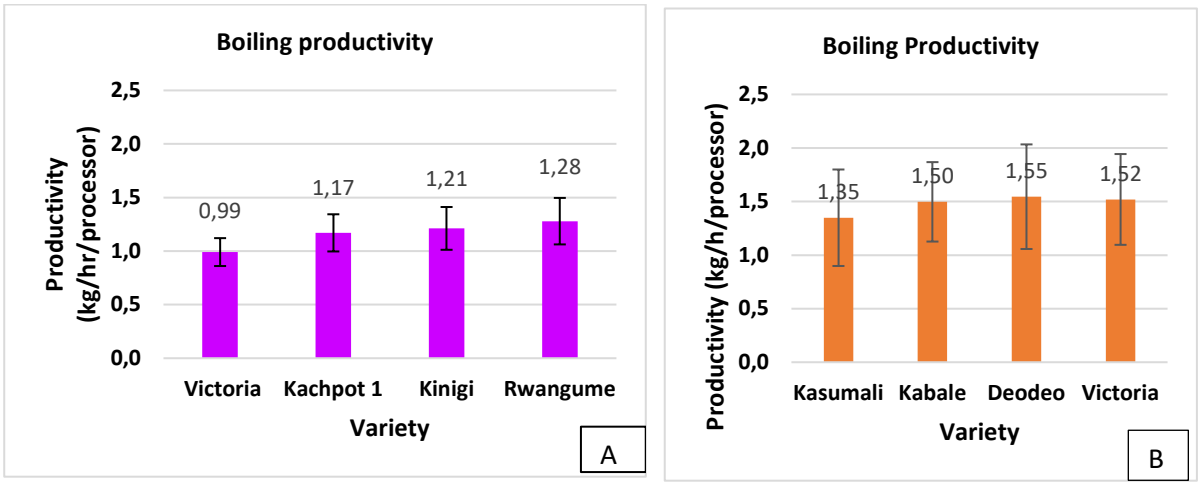

Figure 10 Boiling productivity for potato varieties in Kabale (A) and Rakai (B)

In Rakai, boiling productivity varied from 1.35 kg/hr/processor (Kasumali) to 1.55 kg/hr/processor (Deodeo) (**Figure 10B**). However, there was no significant difference between the varieties. Productivity at boiling was low compared to peeling because of the comparatively longer duration of the boiling unit operation.

3.3 End-product Processor Appreciation

3.3.1 End-product descriptors

Figures 11 and 12 show the ready to eat tubers of the different genotypes studied in Rakai and Kabale respectively, after boiling.

Figure 11 Boiled potato varieties from Rakai; Kabale (a), Deodeo/NAROPOT 4 (b), Kasumali (c) and Victoria (d)

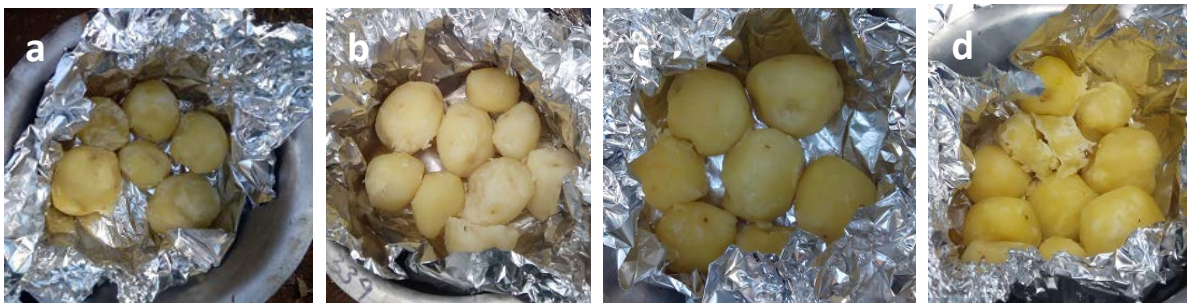

Figure 12 Boiled potato varieties from Kabale: Kachpot 1(a), Victoria (b), Rwangume/NAROPOT 4 (c) and Kinigi (d)

Table 2 shows the most and least preferred characteristics of boiled potato as indicated by processors in Kabale and Rakai. In Kabale, the most preferred characteristics were firmness, mealiness, good potato taste and smell whereas the least preferred were white colour, too soft, watery, not mealy, lacking good potato taste and smell.

Table 2 Characteristics of boiled potato in Kabale and Rakai

Appearance/Colour		**Textural**		**Taste**		**Flavour**	
High quality	Poor quality	High quality	Poor quality	High quality	Poor quality	High quality	Poor quality
KABALE							
• nice colour • white spots • intact	• white colour • watery • mashy	• firm • mealy • soft • not watery • sticky • smooth	• too soft • watery • not mealy • mashy • not sticky	• good potato taste	• lacks good potato taste • bitter • tasteless	• good potato smell	• no potato smell
RAKAI							
• yellow colour • white colour • cream colour	• shiny appearance • white colour	• mealy • firm • soft • smooth • not watery	• not mealy • too soft • watery • hard	• good potato taste	• no potato taste	• good potato smell	• no potato smell

Processors in Rakai liked mealiness, firmness, softness and smoothness (in the mouth), good potato taste and smell. The poor characteristics they noted were; not mealy, too soft, watery, hard, no potato taste and smell.

3.3.2. Preferred and least preferred potato varieties

In Kabale, the most preferred potato variety for the end-product was Rwangume (NAROPOT 4, improved), followed by Kinigi (local), Kachpot 1 (improved) and Victoria (improved), in descending order. All processors unanimously chose Victoria as the least preferred variety. On the other hand, two processors selected Rwangume as their most preferred variety for quality boiled potato.

The variety regarded as the least preferred at raw material level was different from the variety considered to have the poorest final product quality. While all processors identified Kachpot 1 as the variety with the least preferred raw material characteristics, they all went on to discover that Victoria made the poorest quality boiled potato. In fact, one of the processors selected Kachpot 1 as the most preferred final product. The poor characteristics which led to low ranking for raw Kachpot 1 tuber included damaged tubers with cracks, outer skin was peeling off and tubers appeared to be immature.

In Rakai, varietal preference for the final product was Kasumali (local), Deodeo (NAROPOT 4, improved), Kabale (local) and Victoria (improved) in descending order. Kasumali, the most preferred variety was associated with the following end-product characteristics: mealy, attractive yellow colour, firm in the hands, good potato smell, good potato taste and soft in the mouth when chewing. Three of the four processors had also identified Kasumali as their most preferred variety with regards to raw material characteristics such as smooth skin, firm and good 'eyes' (not oozing water). Victoria was least preferred at consumption. Its boiled potato was described as; soft in the hands, not mealy and not tasty like potato. Victoria was also marked as least preferred by two of the four processors in the raw form. The undesirable raw characteristics were; big and deep 'eyes', soft in the hands and watery.

The discrepancies between raw material and boiled potato characteristics especially for the Kabale varieties demonstrate that the indicators for good raw material that processors currently use may not be reliable for selection of raw material for making boiled potato. Therefore, if breeders only focus on the raw material indicators without considering the quality of the final product, they are likely to introduce undesirable varieties for consumption as food hence poor uptake among the populations.

4 CONCLUSION

Processors from both regions preferred raw potatoes with red skin, yellow flesh, smooth skin and medium to big sized tubers. When processing, ease of peeling (associated with ease of removing 'eyes'), firmness and tubers which were not watery (low water content) were preferred. Mealiness, good potato flavour, firmness in the hands and softness in the mouth were preferred characteristics of the boiled potato. We can also conclude that first impressions of good raw material characteristics do not automatically translate into a good boiled potato and vice versa. These findings, in concert with those of the gendered food mapping and consumer tests all contribute towards building the final boiled potato profile and ultimately provide useful information to help strengthen breeding programs.

5 REFERENCES

Mahmud, A. A., Akhter, S., Hossain, M. J., Bhuiyan, M. K. R. & Hoque, M. A. 2009. Effect of dehaulming on yield of seed potatoes. Bangladesh Journal of Agricultural Research. 34(3): 443-448. DOI: 10.3329/bjar.v34i3.3970.

Upadhyay, A. & Bashyal, S. 2020. Effects of Dehaulming in Potato (Solanum tuberosum) Cultivation: A Review. International Journal of Environment, Agriculture and Biotechnology, 5(4). DOI: 10.22161/ijeab.54.20.

6 APPENDICES

6.1 Appendix 1: Summary Table of Quantitative Data

Varieties/Location	Raw material characteristics	Processing quantitative data					
		Peeling unit operation			Boiling unit operation		
	Weight (g)	Peeling time (min)	Yield after peeling (%)	Productivity (kg/h/op)	Boiling time (min)	Yield after boiling (%)	Productivity (kg/h/op)
KABALE							
Victoria	146.86[a]	4.4[a]	77.9[a]	11.39[a]	48.4[a]	76.4[a]	0.99[a]
Kachpot 1	144.86[a]	4.1[a]	82.7[a]	12.99[a]	44.2[a]	80.8[a]	1.17[a]
Kinigi	85.58[b]	5.0[a]	79.2[a]	10.46[a]	41.6[a]	78.0[a]	1.21[a]
Rwangume/NAROPOT 4	125.25[a]	4.5[a]	81.6[a]	11.48[a]	39.6[a]	78.0[a]	1.28[a]
RAKAI							
Kabale	53.8[a]	7.7[a]	74.1[a]	8.8[a]	31.5[a]	72.5[a]	1.5[a]
Kasumali	31.6[a]	8.8[a]	67.0[a]	7.4[a]	33.3[a]	65.6[b]	1.3[a]
Deodeo/NAROPOT 4	62.1[a]	8.8[a]	67.1[a]	7.3[a]	28.8[a]	64.8[b]	1.5[a]
Victoria	46.7[a]	8.6[a]	73.5[a]	7.3[a]	31.0[a]	69.1[ab]	1.5[a]

[a,b,c,d] *indicates membership in significantly different value groups with a P value < 0.05 (between varieties in each district)*

6.2 Appendix 2: Overview of Quality Characteristics of Raw Potato, Potato Processing and Boiled Potato

KABALE									
Name of varieties	**Raw product**				**On the cooked**				
	Agronomical characteristics	**Technological characteristics at each step of the process**			**Sensory characteristics**				
		Peeling	***Washing***	***Example***	**When you look at**	**Texture when you touch**	**When you smell**	**Taste (In mouth)**	**Texture when you chew, After-taste**
VICTORIA (339)	• Medium sized tuber	• Watery • Soft • Easy to peel	• White colour • Watery • Soft • Easy to wash	'feels watery in the hands, soft (probably will not give good boiled potato)'	• White colour • Not mealy • Watery	• Watery • Soft • Not sticky • Not mealy	• Slight potato smell • No potato smell	• Bitter • Tasteless • No good taste of potato	• Too soft • Not mealy • Smooth • Takes long to swallow
KINIGI (146)	• Hard • Medium sized tuber • Firm peel	• Difficult to peel • Soft peel • No watery • Soft flesh	• Light yellow • Firm • Soft • Easy to wash	'hard to peel (peel was not easy to remove) however looks like it will be tasty after boiling'	• White spots • Yellow colour	• Firm • Mealy • Sticky • Soft	• Good potato smell (kahoho' • Good aroma	• Good taste	• Easy to swallow • Mealy • Smooth
KACHPOT 1 (552)	• Skin peeling off • Not round • Immature • Small sized tuber • Not firm • Cracked • Soiled 'eyes' • Wrinkled skin	• Easy to peel • Firm skin • Hard peel • Difficult to peel • Pale yellow colour • Soft flesh	• Easy to wash • Watery • Yellow colour • Hard/firm • Difficult to wash	'Outer skin is peeling off, Does not have a round shape, Looks immature, Eyes are covered in soil therefore may rot easily (was probably harvested during the rain), tuber is not firm, has cracks (misheke)'	• Light yellow • Whitish lines • Cream colour • Split surface • Watery centre • Not mashed • Mashed	• Not sticky • Sticky • Mealy • Firm • Watery centre	• Good potato smell (kahoho'	• Good potato taste	• Smooth • Easy to swallow • Soft • Smooth • Difficult to swallow • Mealy • Dry

Name of varieties	Raw product				On the cooked				
	Agronomical characteristics	Technological characteristics at each step of the process			Sensory characteristics				
		Peeling	*Washing*	*Example*	When you look at	Texture when you touch	When you smell	Taste (In mouth)	Texture when you chew, after taste
RWANGUME (227)	• Smooth skin • Yellow flesh • Hard • Medium sized tuber • Big sized tuber • Red skin colour • Heavy • Hard skin	• Firm • Easy to peel • Hard peel • Soft skin • Yellow flesh • Not watery	• Yellow flesh • Easy to wash • Soft • Hard • Difficult to wash	'yellow colour, easy to wash, a bit soft when pressed with hands, maybe some tubers are not mature enough however looks like will give good boiled potato'	• Yellow colour • Whitish spots • Split surface (cracked) • Not mashed	• Soft • Mealy • Not watery • Sticky • Smooth • Firm	• Good potato smell • Good smell	• Good potato taste • Tasteless	• Easy to swallow • Mealy • Soft Smooth
RAKAI									
Kabale (140)	• Red skin colour	• White flesh • Easy to peel		• easy to peel, however; soft peel and looks watery (visible on surface) implies it might be too soft after cooking	• Has attractive white colour • Looks mealy (has some whitish, powdery patches and has splits on the surface)	• Mealy in the hands (dry, powdery)	•	• Good potato taste	• Mealy in the mouth • Soft in the mouth
Kasumali (513)	• Smooth skin • Firm and intact skin • Good 'eyes' (not oozing water)	• Uniform yellow flesh colour • Easy to peel • Soft peel • Firm tuber when pressed with hands • Not watery (has low water content) • Smooth	• No 'eyes'	• Yellow flesh, easy to peel, soft peel, firm tuber when pressed with hands	• Looks mealy (white powdery patches/spots) • Has attractive yellow colour	• Firm in the hands	• Good potato smell	• Good potato taste	• Soft in the mouth when chewing • Mealy in the mouth

Name of varieties	Raw product				On the cooked				
	Agronomical characteristics	Technological characteristics at each step of the process			Sensory characteristics				
		Peeling	*Washing*	*Example*	When you look at	Texture when you touch	When you smell	Taste (In mouth)	Texture when you chew, after taste
Deodeo (833)	• Red skin colour (including red eyes)	• Yellow flesh • Easy to peel • Not watery • Firm		• Easy to peel, not watery (tepechuka), firm when peeled implies it will be mealy when cooked	• Attractive yellow colour	• Mealy in the hands (crumbles)	• Has good potato smell	• Good potato taste	• Mealy in mouth
Victoria (905)	• Has big and deep 'eyes' • Little soft in the hands • Watery • Has many deep eyes	• White flesh • Watery when peeling • Difficult to peel because of deep eyes		• White flesh, watery when peeling, will not be mealy when cooked	• Nice White colour	• Soft in the hands • Not mealy		• Not tasty like potato	• Not mealy enough in the mouth

Institute: Cirad – UMR QualiSud

Address: C/O Cathy Méjean, TA-B95/15 - 73 rue Jean-François Breton - 34398 Montpellier Cedex 5 - France

Tel: +33 4 67 61 44 31

Email: rtbfoodspmu@cirad.fr

Website: https://rtbfoods.cirad.fr/