Supplementary Tables

Table S.1. Characteristics and sources of sweetpotato genotypes used in different phases of the study

Activity/day	Genotype	Flesh color	Source
Phase 1 : Lexicon development (DSA)			
Day 1	Dimbuka Bukalula	Cream	CIP, Namulonge
	NASPOT 1	Cream	CIP, Namulonge
	NASPOT 8	Yellow-orange	CIP, Namulonge
	NASPOT 11	Cream	CIP, Namulonge
	Resisto	Deep orange	CIP, Namulonge
	Dimbuka-Bukalula, watery	Cream	CIP, Namulonge
Day 3	Local landrace, no name	Yellow	Makerere South market
	Local landrace, no name	White	Makerere South market
Day 4	Ejumula	Orange	CIP, Namulonge
	NASPOT 8	Yellow-orange	CIP, Namulonge
	NASPOT 11	Cream	CIP, Namulonge
Phase 2: Initial panel training sessions (DSA)			
Day 1	Huarmeyano[1]	Yellow	CIP, Namulonge
	Resisto	Deep orange	CIP, Namulonge
	Magabali	Cream	CIP, Namulonge
Day 2	NASPOT 7[1]	Orange	CIP, Namulonge
	NASPOT 10 O	Orange	CIP, Namulonge
	Mugande	Cream	CIP, Namulonge
Day 3	NAROSPOT 1[1]	Cream	Farmer, Kalagi
	Kyadodondo[1]	White	Farmer, Kalagi
Phase 3: Virtual panel training during COVID-19 pandemic and sample evaluation in office settings (DSA)			

Day 1	SPK004[2]	Yellow-orange	CIP, Kabale
	NASPOT 11[1]	Cream	CIP, Kabale
	Resisto	Deep orange	CIP, Kabale
Day 2	MDP 452[1]	Yellow	CIP, Kabale
	Huarmeyano	Yellow	CIP, Kabale
	MDP 510	Cream	CIP, Kabale

Phase 4 : Exploring relationship between sensory texture and instrumental texture parameters and pilot consumer study (DSA, instrumental texture analysis, consumer acceptability tests)

Day 1	D26 [1]	Orange	NARO, Rwebitaba
	D15	Orange	NARO, Rwebitaba
	New Kawogo	White	NARO, Rwebitaba
	NASPOT 8 [3]	Yellow-orange	NARO, Rwebitaba
	Ejumula [1]	Orange	NARO, Rwebitaba
	NASPOT 10 O [3]	Orange	NARO, Rwebitaba
Day 2	NASPOT 11 [3]	Cream	NARO, Rwebitaba
	NKB 3 [1,3]	Orange	NARO, Rwebitaba
	S47 [3]	Orange	NARO, Rwebitaba
	S97	Orange	NARO, Rwebitaba
	NKB105	Orange	NARO, Rwebitaba
	S36	Orange	NARO, Rwebitaba

Phase 5 : Developing relationship between sensory firmness and instrumental firmness (DSA, instrumental texture analysis)

	1.44	Orange	NARO, several locations [4,5]
	D11	Orange	NARO, several locations [4,5]
	D15	Orange	NARO, several locations [4,5]
	D20	Orange	NARO, several locations [4,5]
	D26	Orange	NARO, several locations [4,5]
	NKB3	Orange	NARO, several locations [4,5]

NKB105	Orange	NARO, several locations [4,5]
S36	Orange	NARO, several locations [4,5]
S47	Orange	NARO, several locations [4,5]
S97	Orange	NARO, several locations [4,5]
Ejumula	Orange	NARO, several locations [4,6]
New Kawogo	White	NARO, several locations [4,6]
NASPOT 8	Yellow-orange	NARO, several locations [4,6]
NASPOT 10 O	Orange	NARO, several locations [4,6]
NASPOT 11	Cream	NARO, several locations [4,6]

Phase 6 : Sensory and instrumental texture analysis of on-farm trials in Hoima (DSA, instrumental texture analysis, consumer acceptability tests)

D20 [3]	Orange	NARO, Hoima on-farm trial [5]
Muwulu Aduduma [1,3]	White	NARO, Hoima on-farm trial [7]
NAROSPOT 1 [1,3]	Yellow	NARO, Hoima on-farm trial [6]
NASPOT 8 [3]	Yellow-orange	NARO, Hoima on-farm trial [6]
NKB3 [3]	Orange	NARO, Hoima on-farm trial [5]
NKB105 [3]	Orange	NARO, Hoima on-farm trial [5]
Umbrella [3]	Yellow	NARO, Hoima on-farm trial [7]

The analyses conducted at each phase are indicated in parentheses

DSA = Descriptive sensory analysis conducted by the trained panel

CIP = International Potato Center

NARO = National Agricultural Research Organisation

[1] Genotypes served to trained panel in duplicate

[2] Was sprouting

[3] Genotypes evaluated for consumer acceptability by untrained respondents

[4] Clones from Namulonge : 1.44, D11, D15, D20, D26, NKB3, S36, S47, S97, Ejumula, New Kawogo, NASPOT 8, NASPOT 10 O, NASPOT 11; Clones from Arua : D11, D15, D20, D26, NKB3, S36, S97, Ejumula, NASPOT 8, NASPOT 10 O, NASPOT 11; Clones from Serere : D11, D15, D20, D26, NKB3, NKB 105, S36, S97, Ejumula, NASPOT 8, NASPOT 10 O; Clones from Bulindi : 1.44, D11, D20, D26, NKB3,

S36, S97, Ejumula, NASPOT 8, NASPOT 10 O, NASPOT 11; Clones from Rwebitaba : 1.44, D11, D15, D20, D26, NKB3, NKB105, S36, S97, Ejumula, New Kawogo, NASPOT 8, NASPOT 10 O, NASPOT 11

[5] Test: genotypes being studied for selection and potential release as new varieties

[6] Check: released or local varieties of known agronomic performance

[7] Local: landraces whose agronomic performance is unknown

Table S.2. Sociodemographic characteristics and sweetpotato consumption patterns of consumer respondents in pilot study (n=23)

Characteristic	**Descriptive statistic**
a) Sociodemographic characteristics	Mean ± SD
Age	31 ± 9
Sex	n (%)
Male	13 (57)
Female	10 (43)
Occupation	
Formal	9 (39)
Informal	10 (44)
None	4 (17)
b) Sweetpotato consumption characteristics	
When do you eat sweetpotato	n (%)
Breakfast	3 (13)
Lunch	18 (78)
Supper	2 (9)
Frequency of sweetpotato consumption	
Everyday	3 (13)
Several times a week	12 (52)
Once a week	5 (22)
Several times a month	1 (4)
Once a month	2 (9)

Table S.3. Sociodemographic and sweetpotato consumption characteristics of consumer respondents in on-farm trials (n = 106)

Characteristic	Descriptive statistic
Sex	n (%)
Female	78 (74)
Male	28 (26)
Age category	
18 – 24 years old	15 (14)
25 – 34 years old	21 (20)
35 – 44 years old	23 (22)
45 – 54 years old	19 (18)
55 – 64 years old	16 (15)
65 years and older	12 (11)
Type of occupation	
Formal	4 (4)
Informal	97 (91)
None	5 (5)
Frequency of sweetpotato consumption	
Everyday	13 (12)
Two to six days a week	83 (78)
Two to three days a month	10 (10)

Table S.4. List of terms in initial and final lexicon for steamed sweetpotato

Category	Terms in initial lexicon	Terms in final lexicon
Aroma	Sweetpotato, caramel, pumpkin, yam, cooked banana leaves, boiled corn, posho (cornmeal), boiled 'Irish' potato1, boiled beans1, green/ amaranth1, herbal1, pungent/acidic/rotting sweetpotato1	Sweetpotato, caramel, pumpkin, off-odor
Appearance	Orange color intensity, uniformity of color, degree of translucency, fibrous appearance	Orange color intensity, uniformity of color, translucency, fibrous appearance
Flavor	Sweetpotato, pumpkin, cooked carrot, floral, sweet taste, sour taste, bitter taste	Sweetpotato, pumpkin, cooked carrot, floral, sweet taste, sour taste, bitter taste
Texture in mouth	Surface roughness, springiness, fracturability2, firmness/hardness, crunchiness, moisture release/watery, moisture in mass, adhesiveness/stickiness, uniformity of texture, cohesiveness/moldability, fibrousness, smoothness, rate of breakdown	Fracturability, firmness/hardness, crunchiness, moisture in mass, adhesiveness/stickiness, fibrousness, smoothness, rate of breakdown
Texture by hand		Moisture release/watery, cohesiveness/moldability, crumbliness/mealiness

Italicized terms in initial lexicon were omitted in final lexicon

[1] Aroma terms in initial lexicon combined to make the term off odor in final lexicon

[2] The fracturability scale initially had crumbly on one end and highly fracturable on the other end. After revisions, the scale anchors for fracturabilty changed to range from easily deforms on the low end to easily fractures on the high end of the scale, and crumbliness was made an independent term in final lexicon

Table S.5. List of reference food products, preparation method and associated attributes

Reference sample	Preparation method	Associated attributes
Eggs (market)	Cooked in boiling water for 10 minutes then cooled to room temperature in cold water	Yolk: smoothness, firmness (soft), crumbliness (high), moisture in mass (dry), rate of breakdown (fast) Egg white: white, fracturable
Pumpkin (*Cucurbita* spp.)	Sliced, steamed for 38 minutes	Pumpkin aroma, pumpkin flavor,
French beans (*Phaseolus vulgaris*)	Steamed whole for 11 minutes	Moisture release, translucency, crunchiness, sweetness
Potato (*Solanum tuberosum*)	Steamed whole for 34 minutes	Boiled 'Irish' potato aroma
Carrot (*Daucus carota L.*)	Sliced then steamed for 28 minutes	Cooked carrot aroma and flavor
Amaranth (*Amaranthus* spp.)	Steamed for 10 minutes	Green/amaranth aroma,
Taro aka 'yam' (*Diascorea esculenta)*	Peeled, divided into small portions, and steamed for 26 minutes	Yam aroma
Common bean (*Phaseolus vulgaris*)	Boiled for 25 minutes	Boiled bean aroma
Cassava dough	Cassava flour added to boiling water and stirred to make a thick paste	Adhesiveness/stickiness
Cucumber (*Cucumis sativus*)		
Riham ginger biscuits (Hariss International Limited, Kampala, Uganda)		Smoothness (grainy), Surface roughness (one side rough, other side smooth)
Kericho Gold Green tea and Jasmine		Floral aroma
Heath and Heather Chamomile tea		herbal

Pringles Original Potato Crisps (Kellogg's, Battle Creek, MI, USA)	Uniformity of texture, Uniformity of color, surface roughness, crispiness
Caramel flavored fudge candy	Caramel flavor

Table S.6. Means of sensory attributes of replicated genotypes among samples evaluated by the trained panel in office setting

Attribute	Genotypes				P[1]
	NASPOT 11		MDP 452		
	Rep 1	Rep 2	Rep 1	Rep 2	
Aroma					
Sweetpotato	7 ± 2	6 ± 3	7 ± 2	6 ± 2	0.294
Pumpkin	0 ± 0	0 ± 0	0 ± 0	0.3 ± 0.7	0.407
Appearance					
Orange color intensity	0.4 ± 0.5 [a]	0.4 ± 0.5 [a]	3 ± 1 [b]	3 ± 1 [b]	<0.001
Uniformity of color	7 ± 2	8 ± 1	7 ± 2	8 ± 1	0.525
Degree of translucency	2 ± 2	3 ± 2	1 ± 2	1 ± 2	0.126
Fibrous appearance	1 ± 2	2 ± 2	0.4 ± 1	0.4 ± 1	0.103
Flavors					
Sweetpotato	7 ± 2	6 ± 2	7 ± 2	7 ± 2	0.904
Pumpkin	0 ± 0	0.3 ± 1	0.6 ± 1	0.4 ± 0.7	0.552
Cooked carrot	0 ± 0	0 ± 0	0.1 ± 0.4	0.4 ± 1	0.504
Floral	0 ± 0	0.3 ± 0.7	0 ± 0	0 ± 0	0.358
Sweet taste	6 ± 1	7 ± 1	6 ± 1	5 ± 2	0.407
Sour taste	0 ± 0	0 ± 0	0 ± 0	0.3 ± 0.7	0.171
Bitter taste	0.1 ± 0.4	0 ± 0	0 ± 0	0 ± 0	0.235
Texture in mouth					
Fracturability	3 ± 3 [a]	4 ± 1 [a]	5 ± 2 [ab]	7 ± 3 [b]	0.028
Hardness/firmness	2 ± 2 [a]	3 ± 1 [b]	4 ± 1 [bc]	5 ± 1 [c]	0.001
Crunchiness	1 ± 1	1 ± 1	1 ± 1	2 ± 2	0.327
Moisture in mass	6 ± 2 [b]	5 ± 3 [ab]	4 ± 2 [a]	2 ± 2 [a]	0.031
Crumbliness	3 ± 2 [a]	4 ± 3 [ab]	6 ± 2 [b]	6 ± 2 [b]	0.027

Fibrousness	0.4 ± 1	0.9 ± 2	0.3 ± 0.7	0.1 ± 0.4	0.457
Smoothness	9 ± 1 [c]	8 ± 2 [c]	6 ± 1 [b]	4 ± 2 [a]	<0.001
Rate of breakdown	8 ± 2	7 ± 2	7 ± 2	6 ± 2	0.611
Texture by hand					
Moisture release	1 ± 2	2 ± 2	0.8 ± 2	0.6 ± 2	0.732
Cohesiveness	8 ± 1 [b]	8 ± 1 [b]	5 ± 3 [a]	5 ± 3 [a]	0.001
Crumbliness by hand	3 ± 2 [a]	3 ± 2 [a]	6 ± 2 [b]	6 ± 1 [b]	0.001

Data analysis by using generalized linear models in SPSS using data of replicated genotypes only

Values in the same row with a different superscript are statistically different, $p<0.05$, multiple comparisons by Duncan's Multiple Range test

Rep 1 = first replicate ; Rep 2 = second replicate

[1] P-value by F-test

[2] Genotypes evaluated in duplicate

Table S.7. Means of dry matter (%) and instrumental texture parameters of 12 genotypes of DDBIO advanced trial planted in 2020

Genotype	Dry matter (%)	Instrumental texture parameters				Secondary parameters	
		Peak positive force 1 (gf)	Peak positive force 2 (gf)	Positive Area 1 (gf·s)	Positive area 2 (fg·s)	Cohessiveness	Gumminess (gf)
				Mean ± SD [1]			
D15	30 ± 0.8 [abc]	2917 ± 636 [abcd]	2325 ± 467 [abc]	5415 ± 1347 [abc]	1997 ± 405 [abc]	0.38 ± 0.06 [ab]	1086 ± 239 [ab]
D26	33 ± 2.0 [de]	7181 ± 1382 [f]	6164 ± 1398 [f]	10551 ± 1388 [e]	5677 ± 1444 [f]	0.53 ± 0.08 [d]	3908 ± 1330 [f]
Ejumula	32 ± 1.4 [cd]	4012 ± 618 [d]	3342 ± 375 [cde]	7507 ± 1666 [d]	3402 ± 618 [de]	0.46 ± 0.05 [bcd]	1827 ± 245 [bcde]
NASPOT 11	38 ± 0.3 [g]	3461 ± 650 [bcd]	2785 ± 485 [bcd]	6752 ± 1301 [cd]	2348 ± 618 [abc]	0.35 ± 0.03 [a]	1206 ± 194
NASPOT 8	34 ± 1.0 [e]	5135 ± 646 [e]	3901 ± 816 [e]	9432 ± 1310 [e]	3331 ± 791 [de]	0.36 ± 0.08 [a]	1855 ± 616 [cde]
NASPOT 10 O	31 ± 1.4 [cd]	2791 ± 733 [abc]	2378 ± 634 [abc]	4592 ± 1563 [ab]	2241 ± 648 [abc]	0.51 ± 0.10 [d]	1401 ± 435 [abcde]
New Kawogo	36 ± 1.3 [f]	3998 ± 833 [d]	2848 ± 739 [bcd]	7423 ± 1903 [d]	2367 ± 606 [abc]	0.33 ± 0.10 [a]	1308 ± 377 [abcd]

NKB105	29 ± 0.3 [ab]	2487 ± 349 [ab]	2058 ± 300 [ab]	4636 ± 709 [ab]	1878 ± 268 [ab]	0.41 ± 0.06 [abc]	1020 ± 221 [a]
NKB3	28 ± 0.1 [a]	1942 ± 301 [a]	1618 ± 296 [a]	3007 ± 808 [a]	1438 ± 280 [a]	0.50 ± 0.10 [cd]	969 ± 259 [a]
S36	29 ± 0.1 [ab]	5705 ± 2238 [e]	4116 ± 1629 [e]	10379 ± 410 [e]	3611 ± 1686 [e]	0.34 ± 0.10 [a]	2049 ± 1143 [de]
S47	30 ± 1.0 [bc]	3839 ± 1207 [cd]	3409 ± 1154 [de]	5455 ± 1187 [bc]	2931 ± 951 [cde]	0.53 ± 0.08 [d]	2096 ± 909 [e]
S97	29 ± 0.5 [ab]	3440 ± 732 [bcd]	2908 ± 544 [bcd]	5139 ± 1244 [bc]	2571 ± 574 [bcd]	0.50 ± 0.04 [d]	1730 ± 381 [abcde]

Cohesiveness calculated as the ratio of Positive Area 2 : Positive Area 1

Gumminess calculated as a product of Peak positive force 1 and cohesiveness

[1] Data analyzed in multivariate generalized linear models; mean separation by Duncan's Multiple Range test; values in the same column with different letter superscripts are significantly different, $p < 0.001$

Supplementary Figures

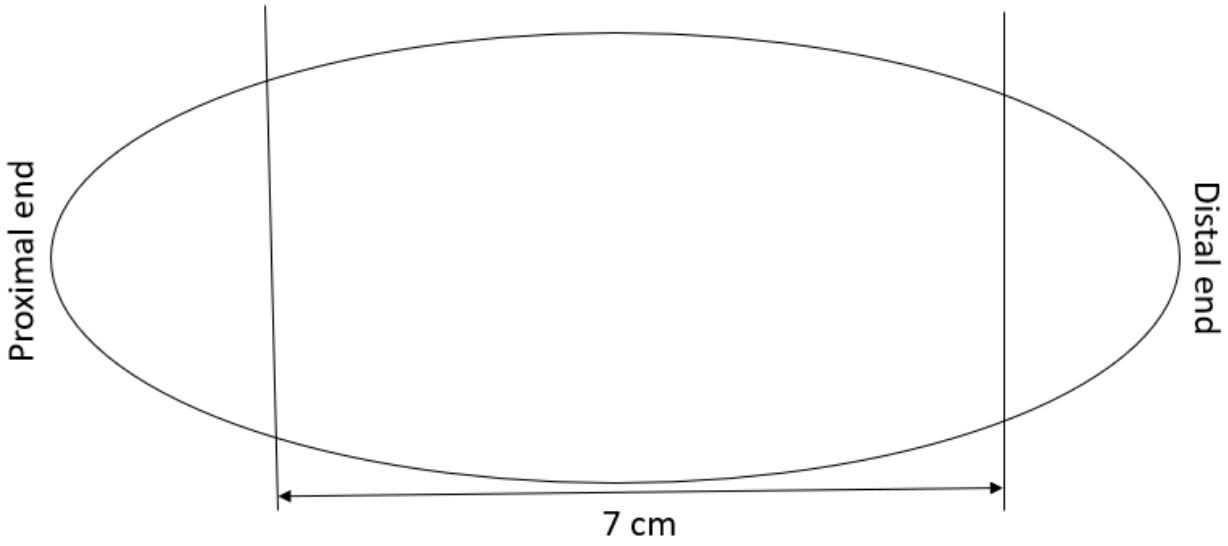


Figure S.1. Diagram showing how the 7 cm portions were cut from the sweetpotato root

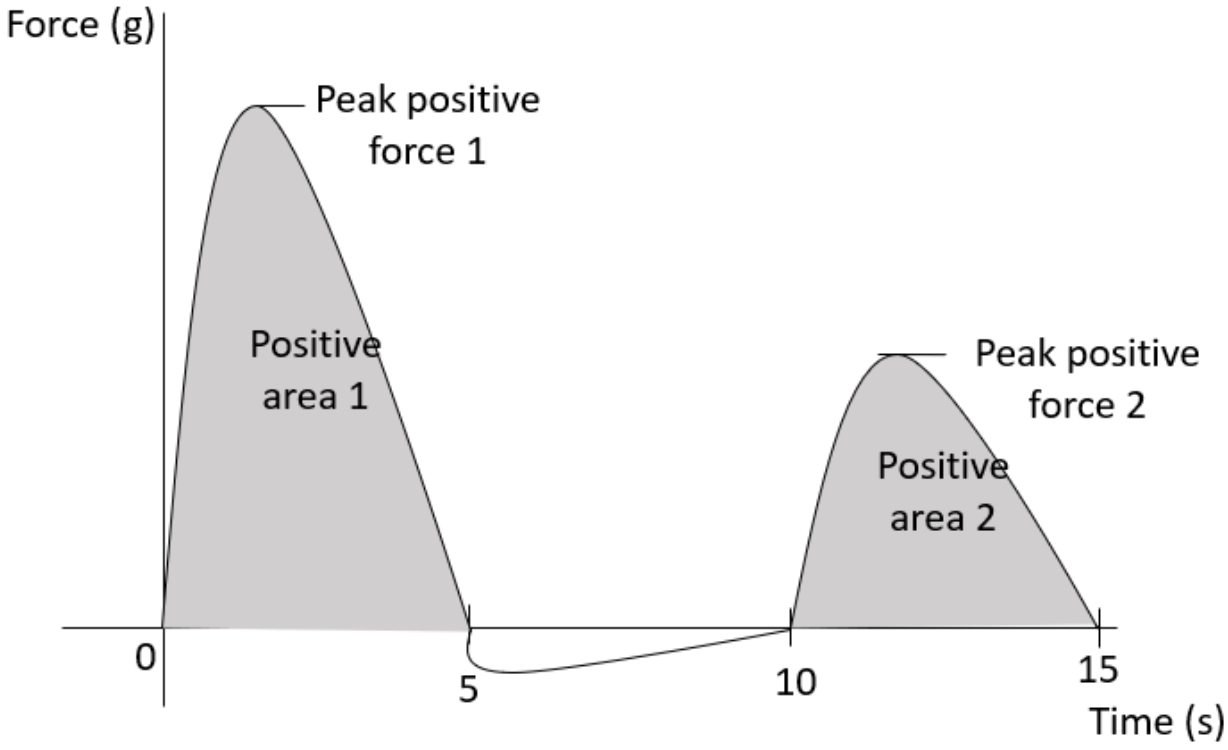


Figure S.2. Diagram showing parameters obtained from instrumental texture curves

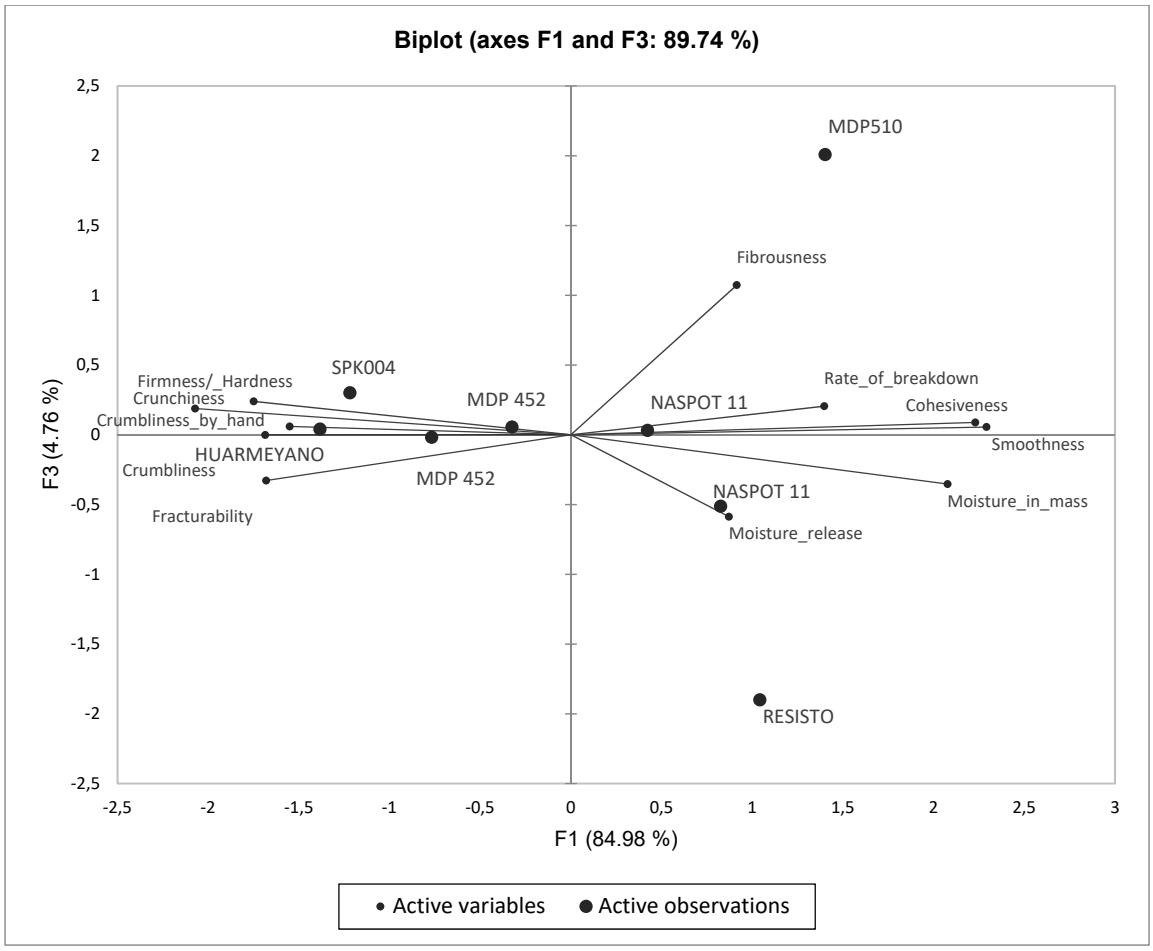


Figure S.3. Principal component analysis (PCA) showing the correlation between sensory textural attributes of 6 sweetpotato genotypes (2 evaluated in duplicate) as evaluated by a trained descriptive sensory panel in the office setting

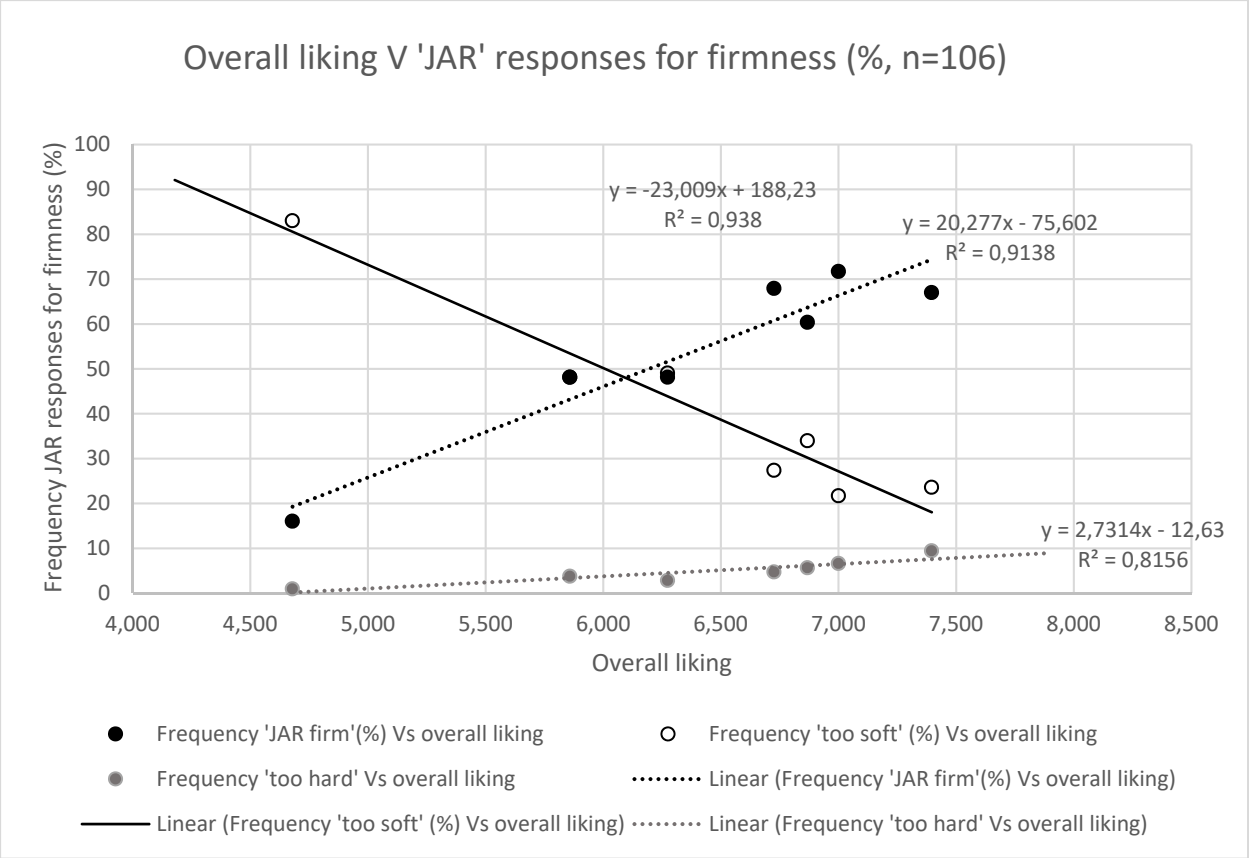


Figure S.4. Plot of proportion of respondents who perceived sweetpotato samples to be 'too soft' responses, 'just-about-right firm' and 'too hard' in on-farm trials versus average overall liking rating

Supplementary Equations

$$\boldsymbol{Firmness\ in\ mouth} = -24.064502296345 + 1.6519365607469 * ln\,(Dry\ matter) + 2.6114789634289 * ln\,(Peak\ Force\ 1) \quad \textbf{(S.1)}$$

Appendices

Appendix S.1. Consumer Questionnaire used during pilot study

CIP and its research partners are conducting research to help ensure that sweetpotato varieties introduced on the market suit consumer tastes and preferences. I will ask you a few personal questions, questions about how you eat sweetpotato. Then I will give you some sweetpotato samples to evaluate.

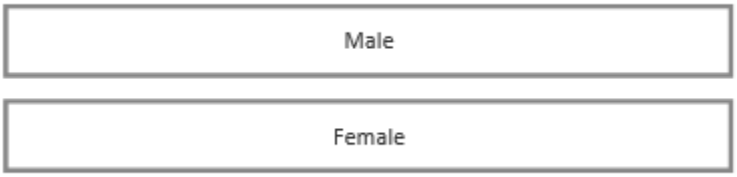
Participation is voluntary and you can opt out at any time.

Click the next button to begin if respondent gives consent

SECTION A: PERSONAL QUESTIONS

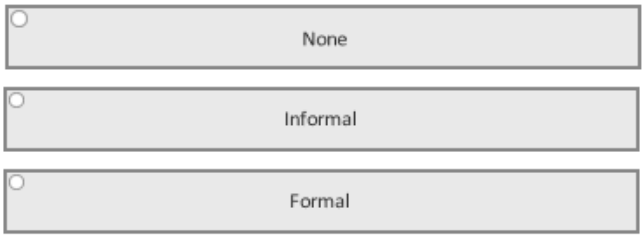
1. Name of respondent:

2. Gender (choose one)



3. Date of birth:

4. Occupation (choose one)

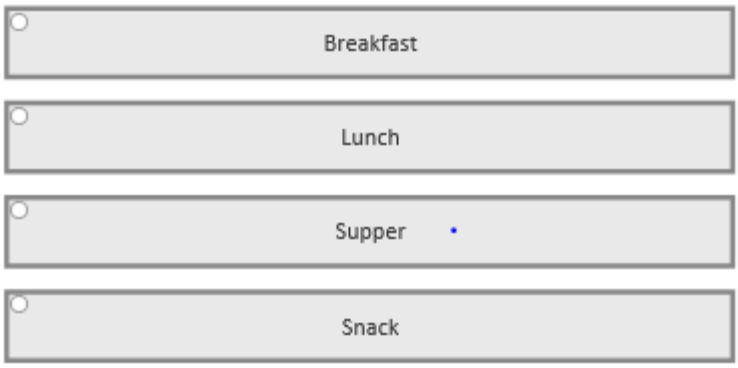


5. Marital Status (choose one)

SECTION B: SWEETPOTATO CONSUMPTION PATTERNS

6. How often do you consume steamed/boiled sweetpotato? (choose 1)

7. At what meal occasion do you consume sweetpotato the most (choose 1)



SECTION C: JUST-ABOUT-RIGHT RATING

Sample n : ###

8. Color intensity JAR

How does the intensity of the color of sample ### suit your preference? Compared to the color intensity of sweetpotato you like, is it…?

9. Sweetness JAR

How do you appreciate the SWEETNESS of sample ###? Compared to the level of sweetness you like in sweetpotato, is it…?

10. Firmness JAR

How do you appreciate the FIRMNESSS sample ###? Compared to the sweetpotato firmness you like, is it…?

11. Mealiness JAR

How do you appreciate the MEALINESS of sample ###? Compared to the level of mealiness you like, is it …?

SECTION C : OVERALL LIKING RATING

12. How much do you like sample ###, overall? Do you like it…?

Appendix S.2. Questionnaire – Community Consumer Testing in On-farm Trial

Respondent ID (or questionnaire ID): ……..

Name of interviewer : …….

Location of study : ……..

Interviewer confirmation that informed consent was given: Yes……. No…….

Name of participant: ……. **Phone number:** …….

Age category : 18-24…….. 25-34…… 35-44…… 45-54…… 55-64 ……. 65 and over…….

Sex: ……..

District: ……..

Sub-County: …….

Occupation :

- ☐ None
- ☐ Informal
- ☐ Formal

Instructions

[Present the samples one at a time, ensuring that all other samples are well covered such that each sample is evaluated independently. Allow the respondent time to observe the sample by looking at it, smelling it, touching it, tasting it before you start asking the questions]

Sample XXX

Sample code : ……. [Enter three-digit code assigned to variety]

1a. Describe something (s) that you really like about this sample, if any. [completely open ended]

……

1b. Describe something(s) that you really do not like about this sample, if any. [completely open ended]

……

2. Overall liking (sample ……..)

2a. Overall, do you like this sample or dislike this sample?

- ☐ I like it (code according to 2b.)
- ☐ I dislike it (code according to 2c)
- ☐ I neither like it nor dislike it (code = 5)

2b. If you like the sample according to 2a, how much do you like it?

- Extremely (code = 9)
- Very much (code = 8)
- Moderately (code = 7)
- Slightly (code = 6)

2c. If you dislike the sample according to 2a, how much do you dislike it?

- Extremely (code = 1)
- Very much (code = 2)
- Moderately (code = 3)
- Slightly (code = 4)

3. Color liking (sample ……..)

3a. Do you like or dislike the color of this sample?

- I like it (code according to 3b.)
- I dislike it (code according to 3c)
- I neither like it nor dislike it (code = 5)

3b. If you like the sample color according to 3a, how much do you like it?

- Extremely (code = 9)
- Very much (code = 8)
- Moderately (code = 7)
- Slightly (code = 6)

3c. If you dislike the sample color according to 3a, how much do you dislike it?

- Extremely (code = 1)
- Very much (code = 2)
- Moderately (code = 3)
- Slightly (code = 4)

4. Aroma liking (sample ……..)

4a. Do you like or dislike the aroma of this sample?

- I like it (code according to 4b.)
- I dislike it (code according to 4c)

□ I neither like it nor dislike it (code = 5)

4b. If you like the sample aroma according to 4a, how much do you like it?

□ Extremely (code = 9)
□ Very much (code = 8)
□ Moderately (code = 7)
□ Slightly (code = 6)

4c. If you dislike the sample aroma according to 4a, how much do you dislike it?

□ Extremely (code = 1)
□ Very much (code = 2)
□ Moderately (code = 3)
□ Slightly (code = 4)

Just About Right test (Sample …….**)**

5. Compared to the intensity of sweetness that you like, is the sweetness of this sample …

Much too low	A little too low	Just as I like it	A little too high	Much too high
□	□	□	□	□

6. Compared to the intensity of firmness of sweetpotato that you like, is this sample …

Much too soft	A little too soft	Just as I like it	A little too firm	Much too firm
□	□	□	□	□

7. Compared to the powdery texture of sweetpotato that you like, is this sample …

Much too waxy	A little too waxy	Just as I like it	A little too powdery	Much too powdery
□	□	□	□	□