



RESEARCH  
PROGRAM ON  
Roots, Tubers  
and Bananas

S E P T E M B E R  
2 0 1 8

# Developing and Naming Low-Sugar Sweetpotato

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## Background and Rationale for non-sweet selection

- Presumption that sweetpotato is not very important in Ghana and West Africa because it is sweet, so not a good staple
- We are interested in developing quality types which may have alternative uses, including frying, since sugars produce undesirable browning
- Measuring sugars in raw sweetpotato is not very useful since amylases act during cooking to hydrolyze starch to maltose and oligosaccharides.
- NIRS have been used to help evaluate sugars in breeding trials in attempt to help explain sweetness

## Sugars in raw versus cooked sweetpotato

	Starch and sugars in raw roots (% fresh wt)					Starch and sugars in cooked roots (% fresh wt)				
Genotype	Starch	Fructose	Glucose	Sucrose		Starch	Fructose	Glucose	Sucrose	Maltose
Apomuden	13.84	0.82	1.39	4.83		11.63	0.46	1.15	5.39	2.55
Bohye	21.78	0.24	0.58	4.14		18.1	0.27	0.72	5.29	2.17
Dadanyuie	24.18	0.56	1.08	4.65		17.68	0.43	1.06	6.04	7.38
Ligri	23.97	0.46	0.92	4.96		20.91	0.26	0.63	5.19	2.82
PGA14008-9	16.95	0.31	0.67	6.13		13.71	0.46	1.05	5.68	2.65
PGA14011-43	16.17	1.11	1.69	4.78		13.89	0.59	1.16	5.1	2.66
PGA14351-4	21.35	0.51	0.92	4.74		17.59	0.53	0.93	5.14	1.61
PGA14372-3	23.25	0.52	0.89	4.8		19.56	0.21	0.64	5.29	5.05
PGA14398-4	21.67	0.48	0.95	3.94		16.93	0.43	0.91	5.33	2.69
PGA14442-1	17.73	0.71	1.19	4.27		13.86	0.56	1.22	5.34	3.83
P-value	<0.001	<0.001	<0.001	0.537		<0.001	<0.001	<0.001	0.428	<0.001
LSD (5%)	3.25	0.33	0.38	1.79		2.56	0.17	0.29	0.79	1.8
CV(%)	23.8	71.2	48.5	40.1		23.4	49.9	37.5	15.7	73.1



## What we are doing?

- Constitute a sensory panel team to help define sweetness together with our instrumental analyses
- Carry out consumer taste testing on some selected sweetpotatoes based on their sweetness levels in selected regions
- Attempt to evaluate brand names for low sweet sweetpotatoes

# Sensory Panel to describe various attributes to assist breeders



# Descriptors of boiled sweetpotatoes generated by Panel

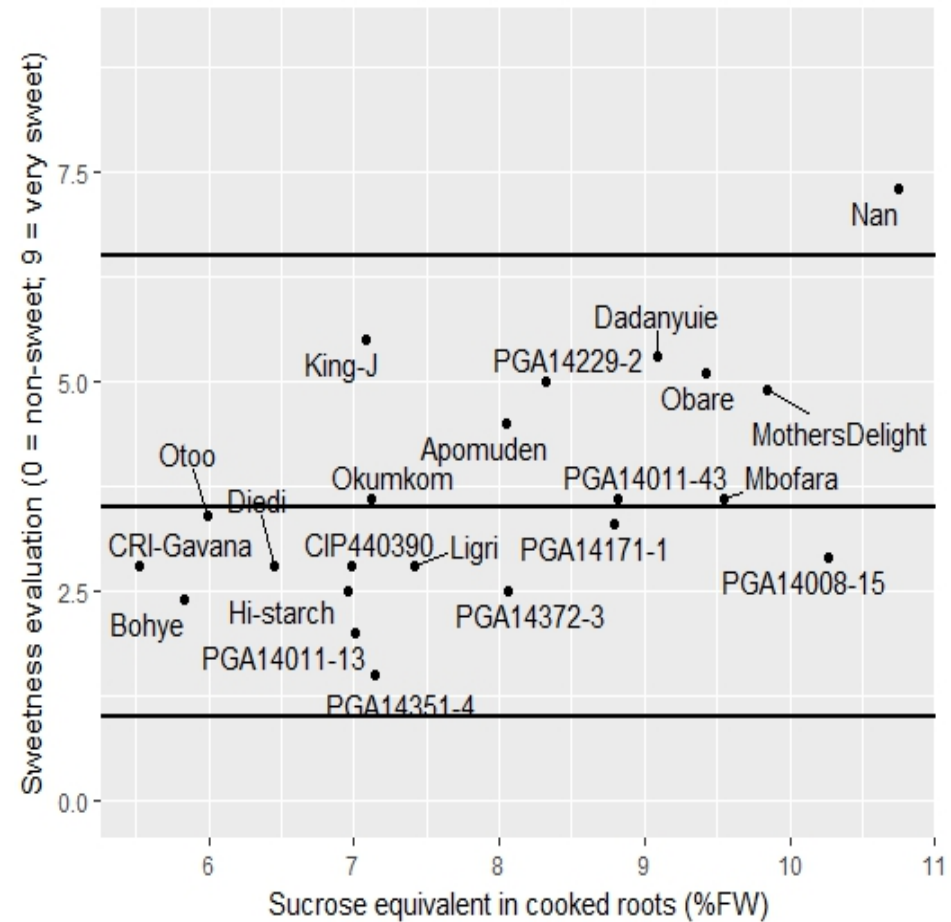
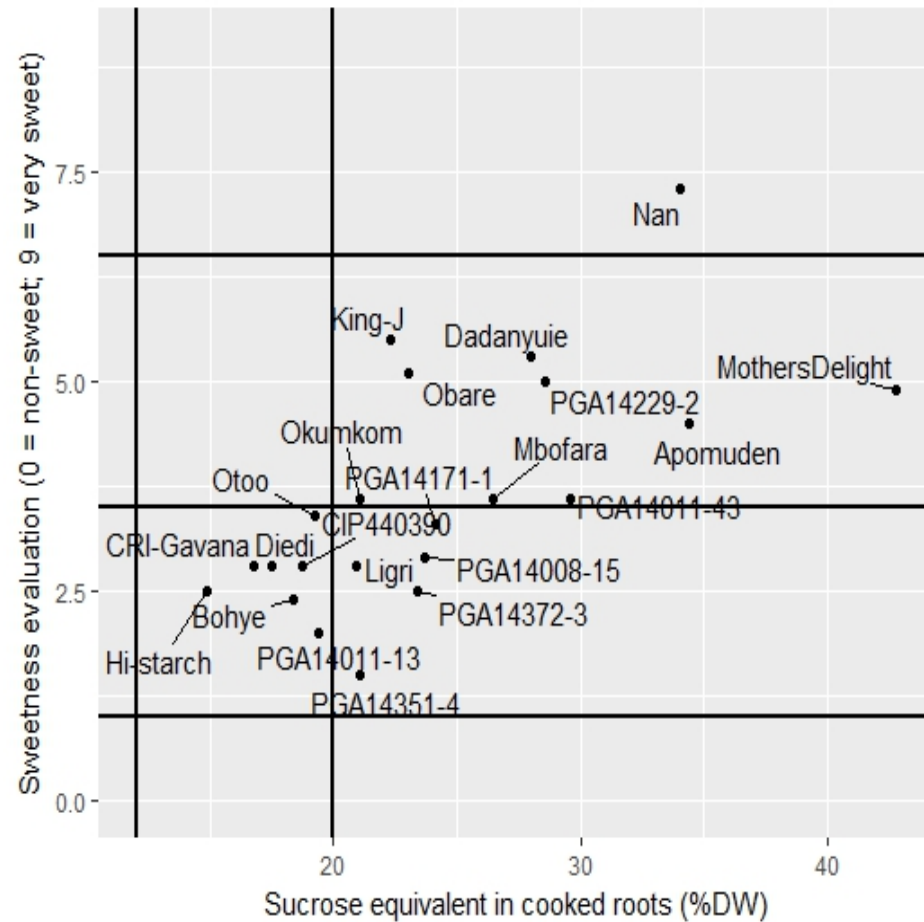
ATTRIBUTES	TERMINOLOGY	DEFINITION	REFERENCE
APPEARANCE	COLOUR	The dominant natural colour using a colour chart when observed with the human eye	Colour chart
	COLOUR UNIFORMITY	The degree of how evenly spread of its dominant natural colour	Pona yam
	DARK PATCHES	The degree of dark patches or spots due to enzymatic browning when observed with the human eye in horizontally (cross section)	
	FIBROUSNESS	The degree of threadlike appearance on the surface of a cross section of sweetpotatoes as observed by the human eye	cassava
	MOISTURE	How moist or dry the surface appears when observed with the human eye	Pona yam
TEXTURE (BY HAND)	MOISTURE	The degree of moisture left on the hand when pressed in between the thumb and the middle finger as well as swiping your middle finger over the surface of the	yam
(BY MOUTH)	STICKINESS	The difficulty in separating your thumb and middle finger when sweetpotato is pressed in between them	Chewing gum
	FIBROUSNESS	The degree of threadlike substances left on your tongue after chewing	cassava
	GUMMINESS	The ability to stick to the upper palate of the mouth when pressed against using the tongue	Milk powder
FLAVOUR	FIRMNESS (COMPACTNESS)	The ability to spread easily in your mouth when after the first chew with your molars	PONA YAM
	SOFTNESS	The ability to bite easily with front teeth (incisors)	Pona yam
	EGG WHITE-LIKE	Flavor associated with freshly boiled egg albumin	Egg Albumin
	YAM-LIKE	Flavor associated with freshly boiled pona yam	Pona Yam
	FERMENTATION-LIKE	Acidic flavor associated with fermented product	Freshly prepared yoghurt
	ROT-LIKE	Flavor associated with rotten yam	Pona
	PALM-NUTTY	Flavor associated with freshly boiled palm nut	Palm nut
	EARTHY	Flavor associated with smell of soil after rain drizzling	Wet soil
	PUMPKIN	Flavour note associated with freshly boiled pumpkin	Pumpkin
	MAIZE-FLOUR	Flavor associated with a freshly milled dry maize	Maize flour
	NEWLY PRINTED SHEET	Flavor associated with freshly printed sheets	Printed sheet
	GRASSY	Flavour associated with freshly cut grass	Cut grass
MOUTHFEEL			Tin tomatoes (salsa brand)
	PASTY	A thick smooth feel in the mouth	
	SMOOTHNESS	The degree of smoothness and roughness feel inside the mouth	Pona yam
BASIC TASTE	DRYNESS	The quantity of saliva needed to soak the sample in your mouth during chewing	Dente yam
	SWEET	Basic taste stimulated by sugar	
	SOUR	Basic taste associated with acid	
	BITTER	Basic taste associated with caffeine	
	UMAMI	Basic taste associated with MSG	



# Descriptors for fried sweetpotatoes generated by panel

ATTRIBUTES	TERMINOLOGY	DEFINITION	REFERENCE
APPEARANCE	COLOUR	The dominant natural colour using a colour chart when observed with the human eye	Colour chart
	COLOUR UNIFORMITY	The degree of how evenly spread of its dominant natural colour	Pona yam
	Browning	The degree of browning or brown spots due to frying when observed with the human eye in horizontally (cross section)	Cream cracker
	FIBROUSNESS	The degree of threadlike appearance on the surface of a cross section of sweetpotatoes as observed by the human eye	cassava
TEXTURE (BY HAND)	Crispiness	The snappy sound heard when breaking the fries	yam
	Sogginess	The degree of oil absorbed by the product when pressed between fingers	Fried ripe plantain
	Oiliness	The degree of oil around the surface of the product when swiping the surface with the fingers	Fried ripe plantain
(BY MOUTH)	FIBROUSNESS	The degree of threadlike substances left on your tongue after chewing	Cassava
	Crunchiness	Loud sound heard after the first few chews	Yam
	Dryness	The degree of how dry the fries are during chewing	PONA YAM
	Mealiness	The degree to which fries feel mealy (“foodie”) in the mouth	Pona yam
FLAVOUR	Sweetpotato-like	Flavor associated with freshly fried sweetpotatoes	Sweetpotato
	YAM-LIKE	Flavor associated with freshly fried pona yam	Pona Yam
	Roasted cocoyam	Flavor associated with freshly roasted cocoyam	Cocoyam
	Ripe plantain	Flavor associated with fried ripe plantain	Pona
	PALM-NUTTY	Flavor associated with freshly boiled palm nut	Palm nut
	“Boflot”-like	Flavor associated with fried fermented bread flour	“Boflot”
BASIC TASTE	SWEET	Basic taste stimulated by sugar	
	BITTER	Basic taste associated with caffeine	

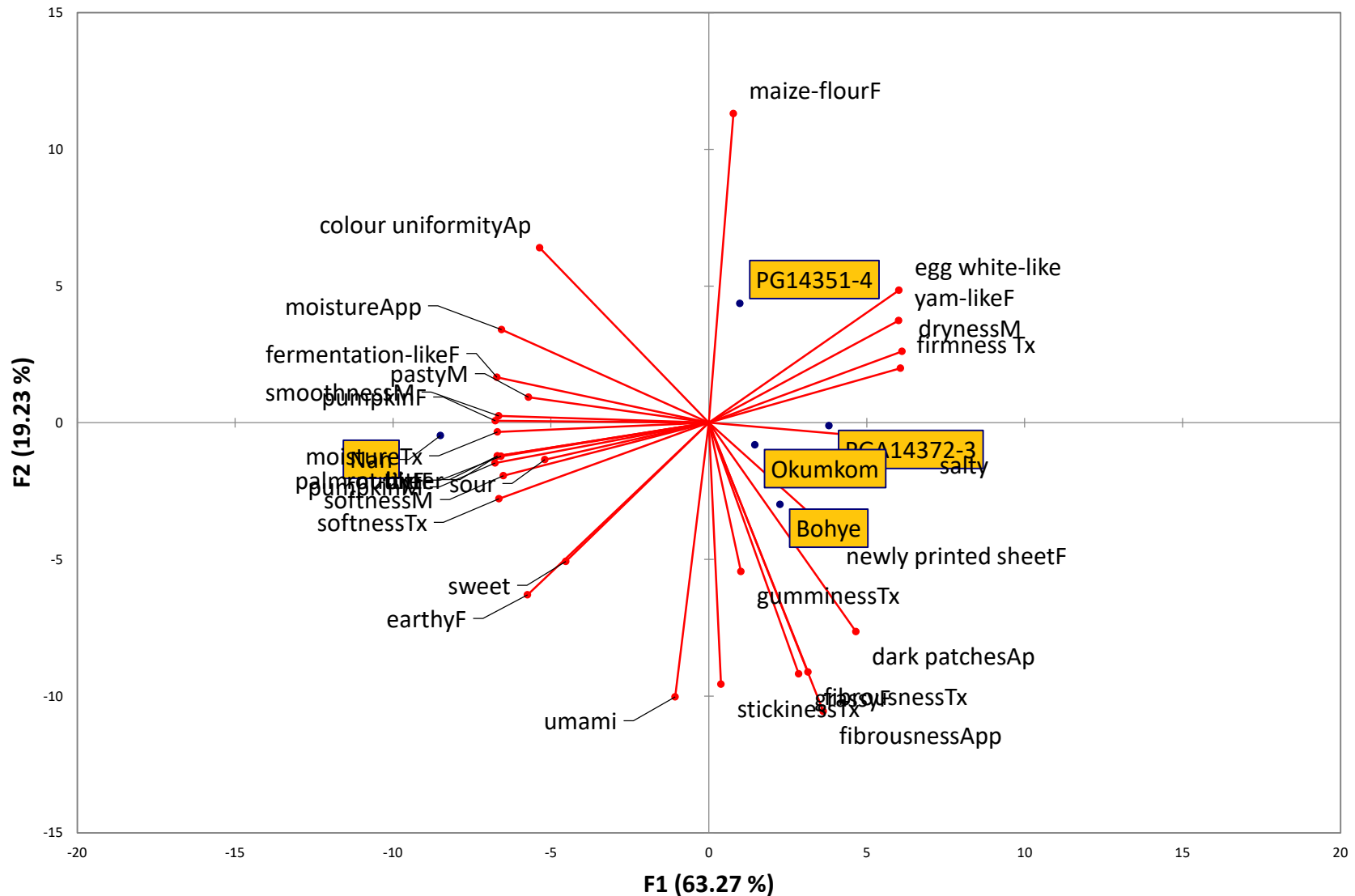
# Sucrose equivalent vs panel assessment on dry weight and fresh weight basis



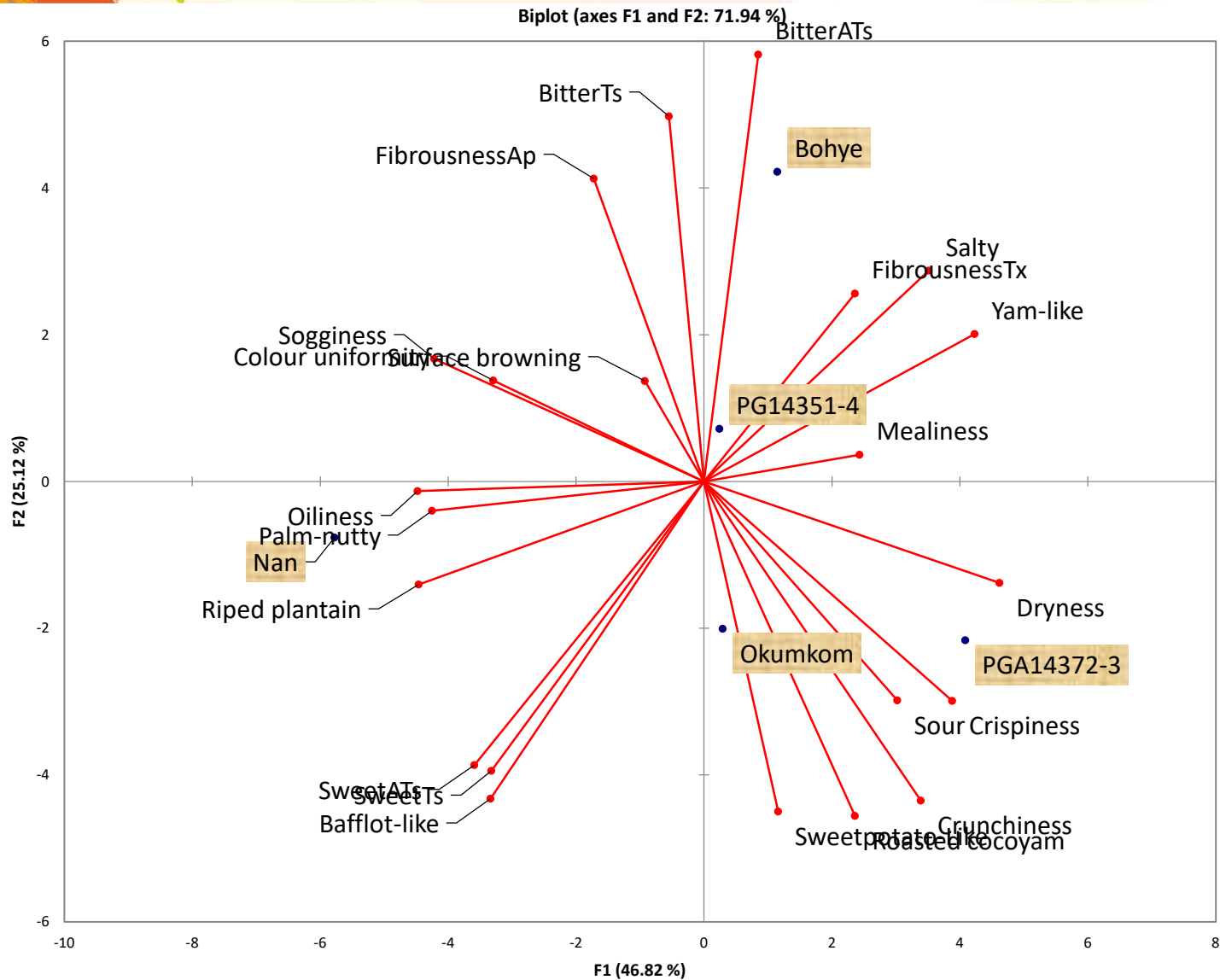


# PCA of all descriptors generated for boiled sweetpotatoes

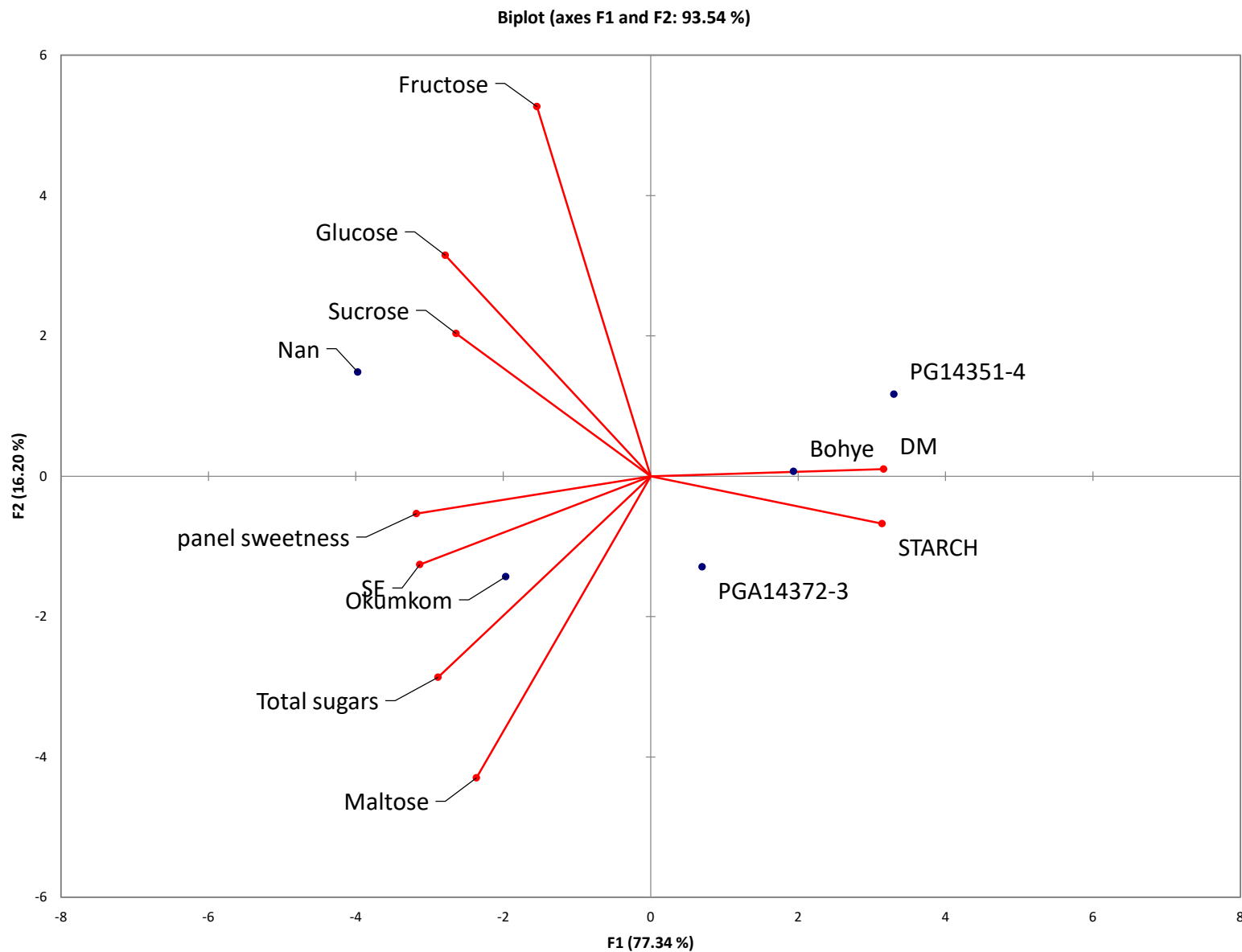
Biplot (axes F1 and F2: 82.50 %)



# PCA of all descriptors generated for fried sweetpotatoes



# sugars, dry matter, and sweetness of selected genotypes



# Consumer Preference Test



# Consumer sensory assessment of fries in Accra and Bawku



Total number of consumers  
so far=486

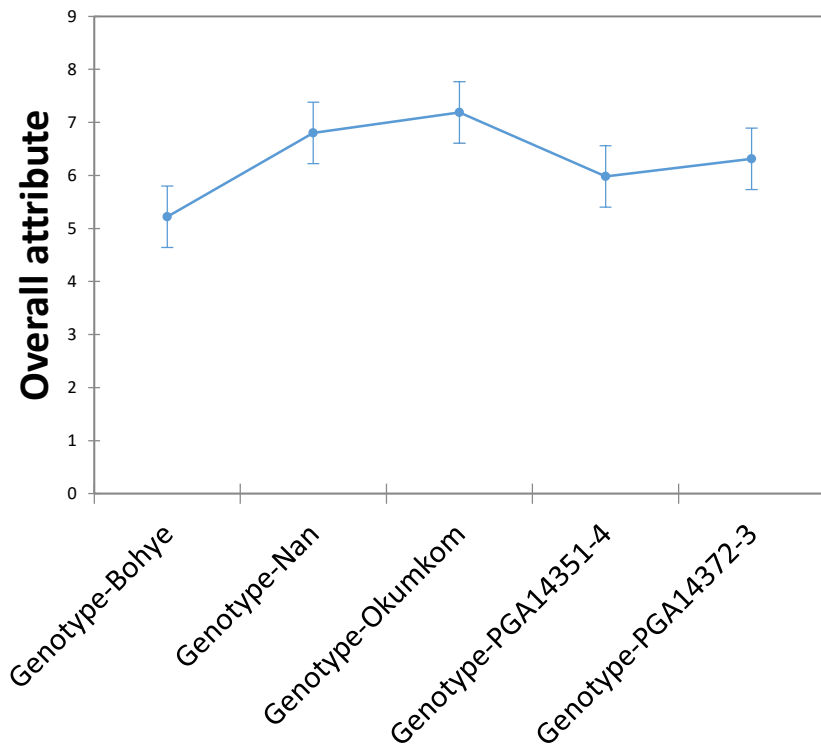
Regions= 2

Markets= 5

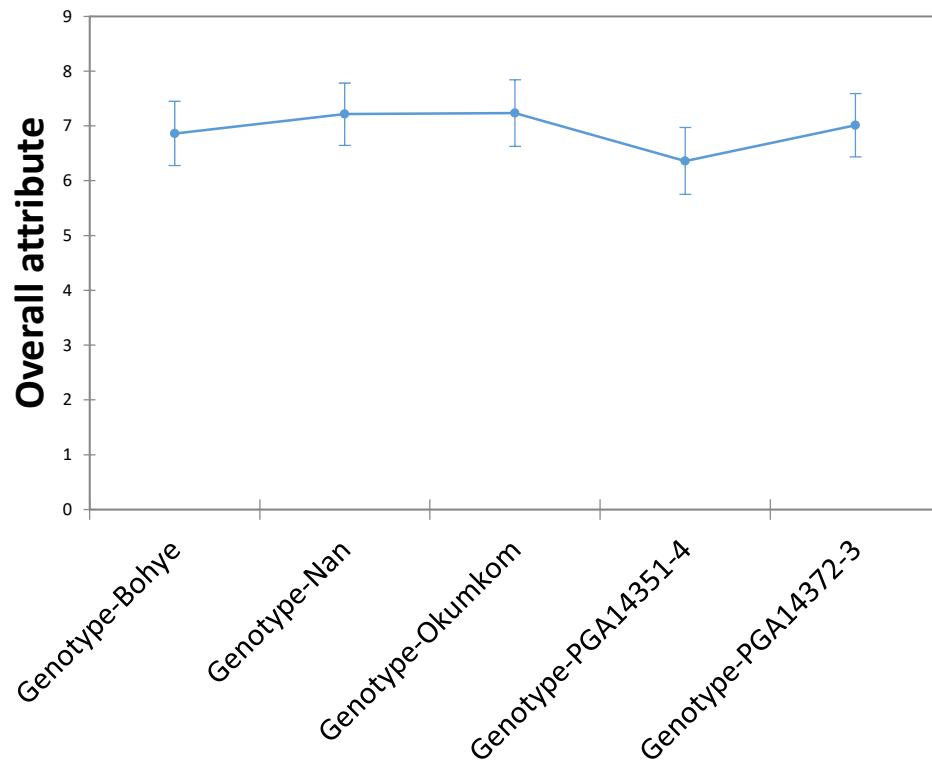
Cooking method= 2

Genotypes=5

## Overall preference for five sweetpotato genotypes



Boiled roots



Fried roots



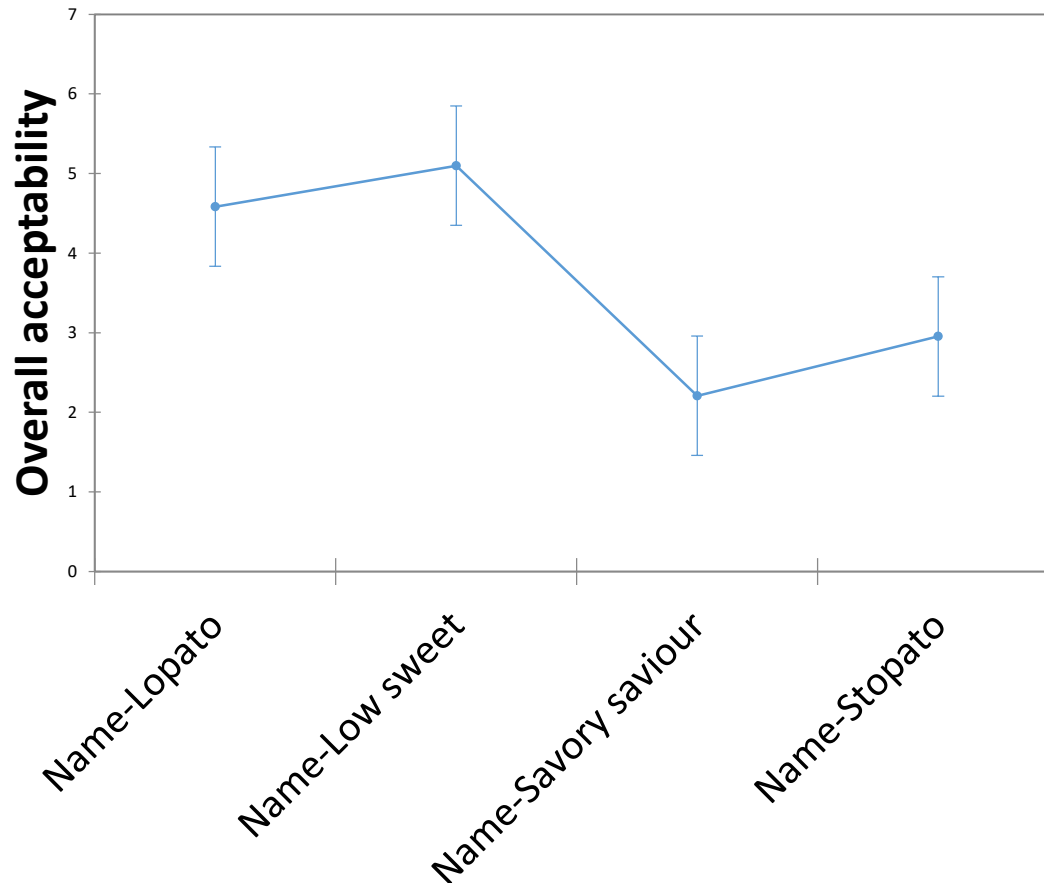
## Consumer reasons for choice of each varieties

Nan	OKumkom	PGA14372-3	Bohye	PGA14351-4
Attractive orange colour	Moderately sweet	Hard texture	Hard texture	Hard texture
Soft texture	Good taste	Good taste	Attractive colours	Low sweet
Sweet flavour	Good texture	Low sweet	Good aroma	Attractive colour

## Consumer reasons for not choosing each variety

Nan	Okumkom	PGA14372-3	Bohye	PGA14351-4
Too sweet	Unattractive colour	Unattractive appearance	Tasteless	Tasteless
Too soft		Bland taste	Dark patches	Unattractive appearance

# Brand Naming Test



Reasons for higher preference of low sweet and lopato

- Name is easy to mention
- Name is easy to remember

Some suggested Names for consideration

- Potalow
- Phogotem
- Salad potato
- Sugarfree potato
- Lovato
- Potart
- Potalino



## Next steps

- Exploit other utilization method for low sweet types eg., pounding to fufu, fries with sauce, etc.
- Marketing is critically important to variety success
- Understanding the relationships between sensory and biochemical analyses
- What are postharvest storage influences on quality (sand or “proper” storage)



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# Thank you Medase

