TROPENTAG 2022 Presentation

Instrumental Texture Profile Analysis of pounded yam produced from yam genotypes of contrasting pounding quality

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Introduction

Pounded yam

- Pounded yam (PY) is a glutinous dough food product made from yams by pounding steamed yams. It is consumed in West and Central Africa.
- The key sensory textural traits preferred by consumers of PY stretchability, mouldability, smoothness, & stickiness. These key texture parameters can be measured instrumentally using a texture analyzer, and correlated with sensory traits.
- A repeatable and discriminant standard operating protocol (SOP) is necessary to regularize the preparation and quantification of PY texture. The SOP will be useful in rapid screening of yams for breeding programs, to meet consumer preferences.

Materials and Methods

4 Yam cultivars

Peeling

Steaming
(~ 20 min)

Pounding
(~ 1min)

Shaping (30mm x 36mm)

Relaxing

Trigger force	5g
Pre-test speed	5 mm/s
Test speed	2 mm/s
Strain	50 %
Time interval	5 s
Temperature	45 °C

Texture Profile analysis (TPA)

Results - ANOVA

- TPA texture parameters showed good repeatability.
- Generally, one and two-way ANOVA reveals all the varieties were significantly different in all textural attributes.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
variety	3	4034033.7	1344678	60.5096	8.51e-23
Error	105	2333366.5	22223		
C. Total	108	6367400.2			

Connecting Letters Report

Level		Mean
TDr 1401593	A	1120.4138
TDr 1400158	B	846.1250
TDr 1401220	C	738.3793
TDr meccakusa	D	607.3333

Levels not connected by same letter are significantly different.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
cooking replicate	1	134830.1	134830	2.3147	1.311e-1
Error	107	6232570.1	58248		
C. Total	108	6367400.2			

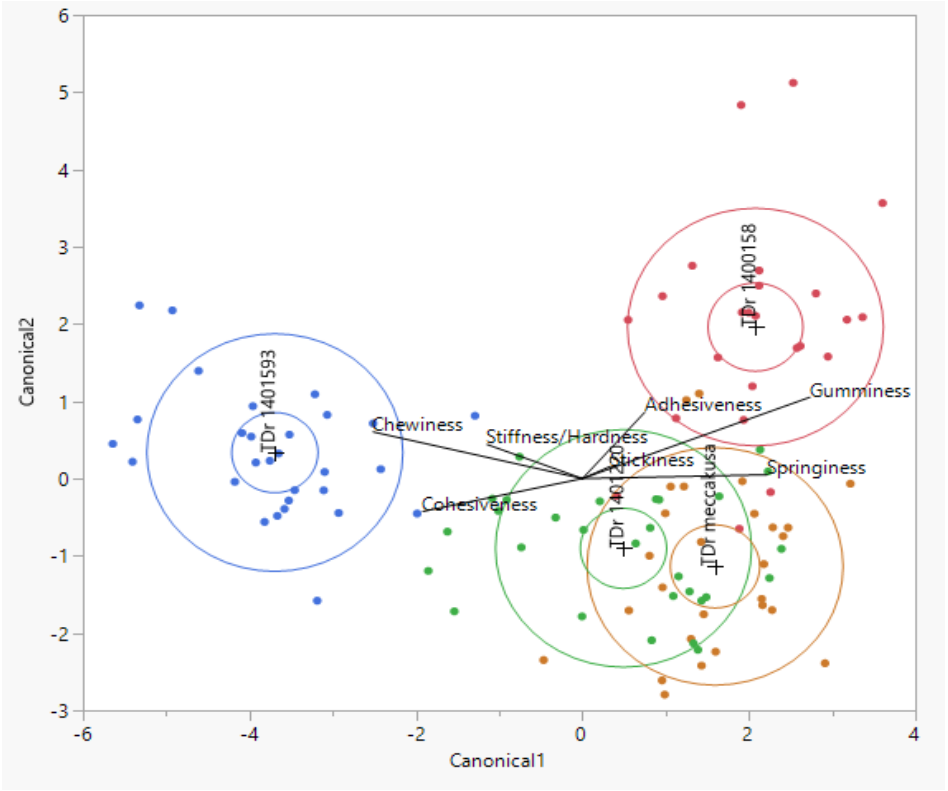
Connecting Letters Report

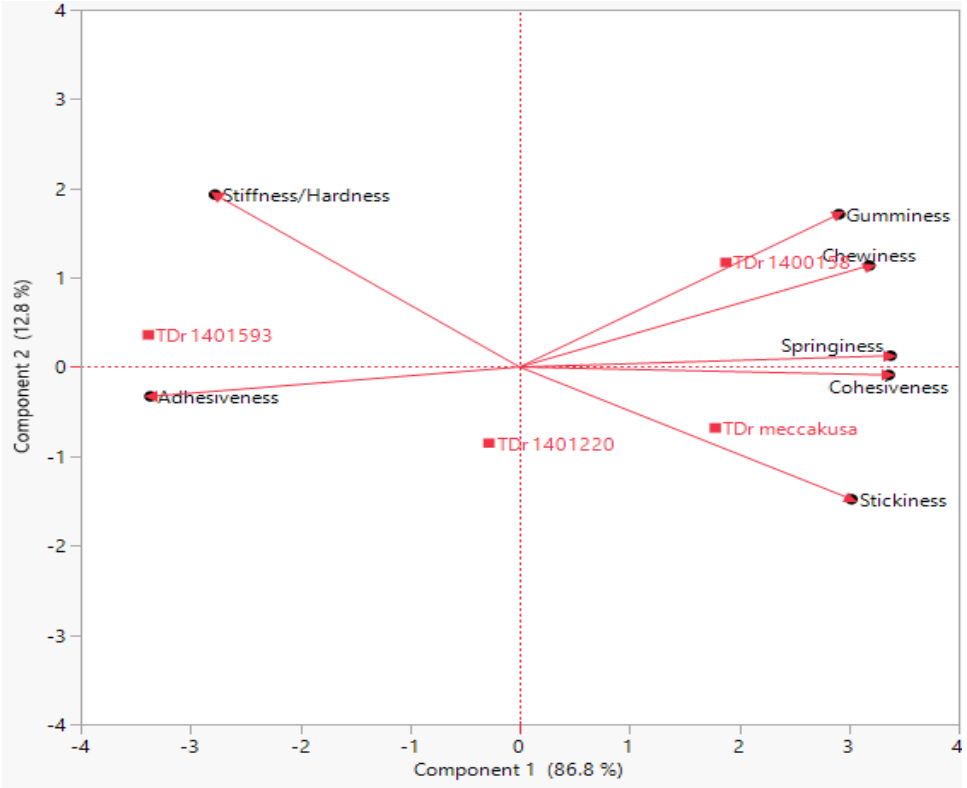
Level		Mean
1	A	865.50000
2	A	795.13208

Levels not connected by same letter are significantly different.

Variable	N	Mean	Std Err	CV	P-value
Adhesiveness	109	-714.97	36.87	53.84	<0.0001
Stickiness	109	-137.38	2.96	22.47	<0.0001
Stiffness/Hardness	109	831.28	23.26	29.21	<0.0001
Chewiness	109	140.28	10.10	75.18	<0.0001
Gumminess	109	21.08	8.09	29.03	<0.0001
Cohesiveness	109	0.39	0.02	49.68	<0.0001
Springiness	109	0.43	0.02	45.68	<0.0001

Results - Discriminant & PCA





- The most discriminant attributes are hardness > springiness > gumminess > cohesiveness > adhesiveness > chewiness > stickiness in that order.

Conclusion and Summary

- The TPA protocol was accurate, repeatable, and discriminant for the measurement of pounded yam texture
- The most discriminating attributes are hardness, springiness, gumminess and cohesiveness.
- The TPA protocol can be used to screen large populations of yams for pounded yam quality for advanced breeding

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