



TECHNICAL SHEET ON GLYCEMIC INDEX OF SOME STREET FOODS PREPARED FROM PLANTAIN IN CLIMATE CHANGE CONTEXT

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ABSTRACT

Among many varieties of plantain with agronomic performance produced in Côte d'Ivoire, only three are the most cultivated because there are more resistant to climate change. There are used for up to ten preferred staple foods in which four are currently consumed notably in urban area. So, this study was focused to determine glycemic index (GI) and glycemic load (GL) of preferred foods based on these plantain so as to provide a nutritional guideline in climate change context. Excepted Roasted plantain with a high GI (GI = 89), findings showed that the most of urban area foods based on plantain have low GI with the values of 44, 39 and 45 for Klaclo, Aloco (aag6), Aloco (aag7) and Chips respectively. But their consumption should be reduced because of their GL which is up to 10. These data are very important for medical organizations and showed that climate change could affect public health in Côte d'Ivoire urban area.

KEYWORDS: Plantain, resistant varieties, urban foods, glycemic index, Côte d'Ivoire

I. INTRODUCTION

Climate change represents a major threat for the coming decades, particularly in Africa which has more climate sensitive economies than any other continent. These changes in climates and environments will force households to adapt their livelihood strategies and diversify their asset base to survive and thrive. More than 70 million people in Africa depend on banana and plantain for food. These major food staples and cash crops are important in the rural and urban economy, and social and cultural life in sub-Saharan Africa (SSA). In Côte d'Ivoire, climate changes has a direct impact on plantain (*Musa sp*) production, through rising temperatures and changing rainfall patterns and seasons. Plantain yields, however, have been seriously declining, threatening food security and the livelihoods of millions of subsistence farmers and their families. Declining yields have been attributed climate changes as a result of decreases in the areas suitable for agriculture. Indeed plantain was grown in many parts of the country with several varieties. But now, plantain is grown mostly by smallholder

farmers in both the East zone and the West humid lowlands for cooking. Among varieties existing, only three plantain (*Musa sp*) varieties are available because they are resisting to the increase of temperature due to climate changes. And in the food system of Côte d'Ivoire, preparation and consumption of plantain causing greater instability in the food supply. The phenomenon of climate changes is having a profound impact on food security affecting food availability, access, uses and stability of the food system, thereby impacting nutrition security. Ensuring that good quality and nutritious food is available and affordable is also one of the key factors for reducing the growing threat of Non-Communicable Diseases (NCDs), such as heart disease, stroke, cancer, and diabetes. And GI has been incorporated into food frequency questionnaire-based assessments of usual diet in large epidemiological studies and should be an important consideration in the dietary management and prevention of obesity and chronic diseases.

These results led to the publication of an article in the peer-reviewed journal "foods" peer-



reviewed journal in September 2017: Glycemic Responses, Glycemic Index, and Glycemic Load Values of Some Street Foods Prepared from Plantain (*Musa spp.*, AAB Genome) in Côte d'Ivoire' (Kouamé et al., 2017).

Objectives

The purpose of this study is to provide a nutritional guideline based on glycemic index of plantain staple foods in urban area in climate change context.

II. MATERIAL AND METHODS

The glycemic index protocol was based on FAO recommendations (FAO/WHO, 2010) and ISO 26642: 2010 (ISO/FDIS 26642:2010; 2010). Randomization was established according to the suggestions of Brouns (Brouns et al., 2005).

- **Subjects (Table 1)**
 - 50 healthy subjects (23 women and 27 men),
- **Design**
 - Randomized cross-over study,
 - 7 tests Periods.
- **Calculation of glycemic index and glycemic Load**
 - $GI = (iAUC \text{ test food} / iAUC \text{ reference food}) \times 100$ (1)
 - $GI = (iAUC \text{ test food} / iAUC \text{ reference food}) \times 100$ (2)
- **Methodology**
 - After overnight fasting, subjects ingested either 50 grams of Glucose pur anhydre or test foods.
 - The glycaemia were observed for 2 hours.
 - Blood was sampled at 0 (time of ingestion of the product), 15, 30, 45, 60, 90, 120 min.

III. RESULTS AND DISCUSSION

Proximate composition of tested foods is shown in Table 2. The GI/GL values and classifications for each test meal are given in Table 3. Fried plantain “Aloco” prepared from fruits at two stages of maturity -the full yellow stage (aag6) and the full yellow with black spots (aag7), fritters plantain “Klacro” from fruit at the black stage of maturity (kam8) and plantain chips from the green stage (Cam1) are low-glycemic foods contrary to charcoal-roasted “Banane braisée” from the light green stage of maturity (raf2).

IV. CONCLUSION AND RECOMMENDATION

Climate changes modify consumption patterns in urban area of Côte d'Ivoire and could provoke metabolic disorders such as diabetes mellitus. According to data (Table 3), even if the most preferred staple foods based on plantain (Klacro, Aloco Chips) have low GI ($GI \leq 55$), their consumption must be limited because their GL is intermediate ($10 < GL < 20$). This is why, for a better control of glycemic response on diabetes mellitus management and its prevention, GI data must be associated to GL data. In the food system of Côte d'Ivoire, it's important to integrate these data in diet. These guidelines should help to find the needed balance between nutrition and climate change in Côte d'Ivoire

This information is intended as a guide only. It should not replace individual medical advice. If you have any concerns about your health, or further questions, you should contact your health professional.

FIGURES, TABLES AND REFERENCES

Table 1. Baseline Clinical and Anthropometric Characteristics (mean ± s.e.m.) of subjects (n = 30) involved in the study

Parameters	Sample		
	Mean	s.e.m.	Range
Age (years)	30	0.5	25 - 35
Gender (male/female)	23/7	-	-
Body weight (kg)	63.3	1.3	47 - 74
Height (m)	1.7	0.0	1.6 – 1.9
BMI (kg/m ²)	21.2	0.3	18.1 – 24.6
Fasting glucose (mmol/L)	4.6	0.1	4.1 – 7
HbA1c (%)	3.0	0.1	2.1 – 4.0
Systolic BP (mmHg)	107.7	1.7	90 - 120
Diastolic BP (mmHg)	73.0	1.3	60 - 90





Abbreviation: BMI = body mass index, HbA1c = hemoglobin A1c, BP = Blood pressure

Table 2: Proximate Composition of Street Foods Prepared from Plantain

Food Samples	Roasted plantain	Klacio	Aloco (aag6)	Aloco (aag7)	Chips
Dry matter (g/100 g)	44.5 ± 0.1 ^d	63.7 ± 0.1 ^b	66.2 ± 0.0 ^c	63.6 ± 0.0 ^b	66.4 ± 0.1 ^a
Ash (g/100 g)	1.4 ± 0.0 ^c	1.1 ± 0.0 ^d	1.0 ± 0.0 ^e	1.5 ± 0.0 ^b	2.0 ± 0.0 ^a
Proteins (g/100 g)	5.3 ± 0.0 ^c	6.1 ± 0.0 ^b	8.8 ± 0.0 ^a	4.4 ± 0.0 ^d	5.3 ± 0.0 ^c
Lipids (g/100 g)	0.3 ± 0.1 ^e	14.1 ± 0.2 ^a	12.4 ± 0.0 ^b	11.6 ± 0.1 ^c	10.9 ± 0.0 ^d
Total CHO (g/100 g)**	93.1 ± 0.1 ^a	78.7 ± 0.2 ^d	78 ± 0.0 ^e	82.6 ± 0.1 ^b	81.9 ± 0.1 ^c
Total dietary fiber (g/100 g)	1.7 ± 0.0 ^a	1.6 ± 0.0 ^b	1.6 ± 0.0 ^{ba}	1.6 ± 0.0 ^{ba}	1.7 ± 0.0 ^a

Data are expressed on dry matter basis. Data in the same row with different superscript letter are significantly different ($p < 0.05$) as assessed by Tukey's test. **Calculated by difference

Table 3. Glycemic Index and Glycemic Load Values of Street Foods Prepared from Plantain

Foods	GI	GI International classification ¹	GI Category	GL	GL classification ²	GL Category	Recommendation (maximum daily consumption)
 Roasted of AAB, True Horn	89	IG > 70	High	28	CG > 20	High	200 - 355 g
 Friter of AAB, French	44	IG ≤ 55	Low	19	10 ≤ CG < 20	intermediate	300 - 450 g
 Fried of AAB, French Horn	38	IG ≤ 55	Low	18	10 ≤ CG < 20	intermediate	300 - 450 g
 Chips of AAB, French	45	IG ≤ 55	Low	21	CG > 20	High	100 - 360 g

GI = Glycemic Index; GL = Glycemic Load; 1 Glycemic indexes were classified as high (≥ 70), medium (56–69), and low (≤ 55); 2 Glycemic loads were classified as high (≥ 20), medium (11–19), and low (≤ 10) (www.glycemicindex.com).



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