



Potential of breadfruit from a food security perspective in Mauritius

(Study of composite wheat-breadfruit flour)

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Overview

- Introduction
- Relevance of study
- Objectives of the study
- Materials and Methods
- Evaluation of dough characteristics and bread quality
- Consumer Hedonic tests
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- Acknowledgements



INTRODUCTION



- Food security is built on three pillars namely food availability, food access and food utilization.
- Food production will have to increase by 70% to feed an additional 2.3 billion people by 2050 (FAO, 2009).
- Food insecurity remains a significant international problem, with developing regions of the world enduring most of the burden.

INTRODUCTION



- Mauritius - net food importer of nearly 80% of its food requirements
- Highly Vulnerable island state
 - High freight rates
 - Exposed to global shocks for staples like rice, wheat and maize
- Wheat imports (2010) - 164000t [83kg/year]
- Rice imports (2010) – 81000t [61kg/year]

INTRODUCTION



- Traditional foods like maize, cassava, sweet potatoes, taro have been overtaken by rice and flour
- Mauritians are being encouraged to consume more locally produced food crops to decrease dependency on food imports
- One potential food crop is **breadfruit**.

INTRODUCTION



- Breadfruit (*Artocarpus altilis*. L.) of the *Moraceae* family
- Multipurpose tree: Construction materials, medicine, fabric, glue, animal feed and many more
- Main drawback: Highly perishable fruits with limited shelf-life





RELEVANCE OF STUDY

- Little formal scientific study on the versatility of breadfruit in Mauritius to date
- Proposals made in many forums to investigate bread making potential of wheat-breadfruit composite flours
- Locally, no published work on the rheological properties and bread quality from wheat-breadfruit composite flours

OBJECTIVES OF STUDY



- To assess the effect of substituting wheat flour with up to 25% breadfruit flour on dough rheological and bread making properties



SPECIFIC OBJECTIVES



- Determination of dough rheological properties (gluten content, water absorption, dough stability and development time, dough extensibility and resistance)
- Assessment of bread quality (weight, volume and crumb softness)
- Consumer hedonic test on pan breads made from wheat flour and wheat-breadfruit composite flour (appearance, taste and crumb softness)

MATERIALS AND METHODS

- All tests have been carried out at Les Moulins de La Concorde Ltee (LMLC)
- Wheat flour: Type (A10) normally milled from French wheat grains (12.4% Protein)
- Breadfruit flour: Bought at Conserverie Sarjua, Plaine Lauzun (6.7% protein)

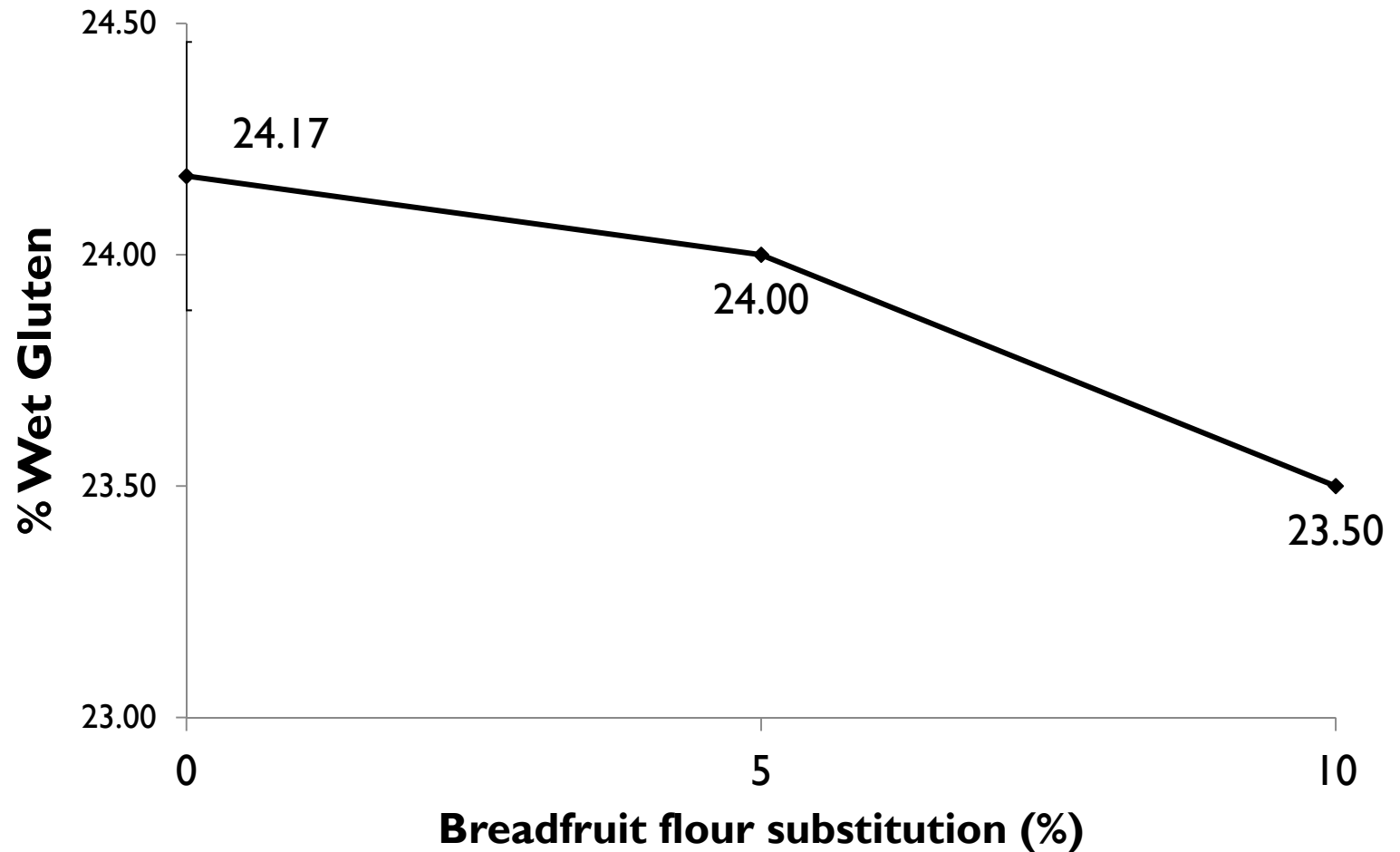




MATERIALS AND METHODS

- Water Absorption, development time and dough stability: Brabender Farinograph
- Gluten content: AACCC method (2000)
- Dough Extensibility and Resistance: Extensograph
- Consumer Hedonic tests: 30 consumers

% Wet Gluten of composite flour



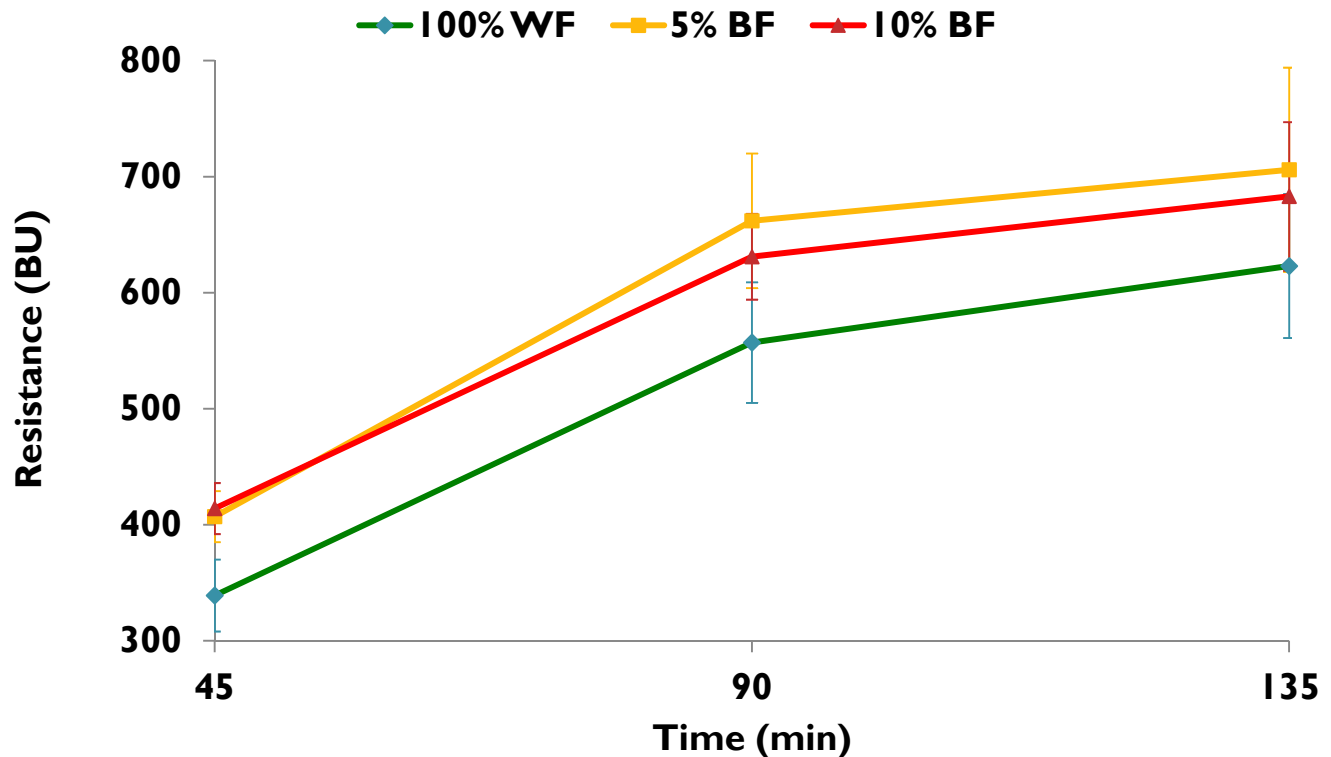
Rheological properties



Breadfruit flour substitution	Water absorption (%)	Dough stability time (min)	Dough development time (min)
0 %	60.2 ± 0.7	3.3 ± 0.3	1.7 ± 0.1
5 %	62.4 ± 0.5	9.1 ± 1.4	1.8 ± 0.1
10 %	64.8 ± 0.3	9.7 ± 1.2	1.9 ± 0.1

EXTENSOGRAPH RESULTS (I)

- The dough became more resistant to extension when breadfruit flour was added to the wheat flour



EXTENSOGGRAPH RESULTS (II)

- The extensibility of dough decreased significantly with higher levels of breadfruit flour
- A considerable decrease in stretching was observed with 5% and 10% breadfruit flour substitution compared to pure wheat flour



Evaluation of bread quality (I)

Breadfruit flour substitution	Bread volume (cm ³)		Bread mass (g)		Specific volume (cm ³ /g)	
0 %	2485.5	62.7	419.3	2.5	5.93	0.13
5 %	2437.9	78.9	422.8	2.8	5.60	0.39
10 %	2010.1	44.1	429.8	2.2	4.68	1.04

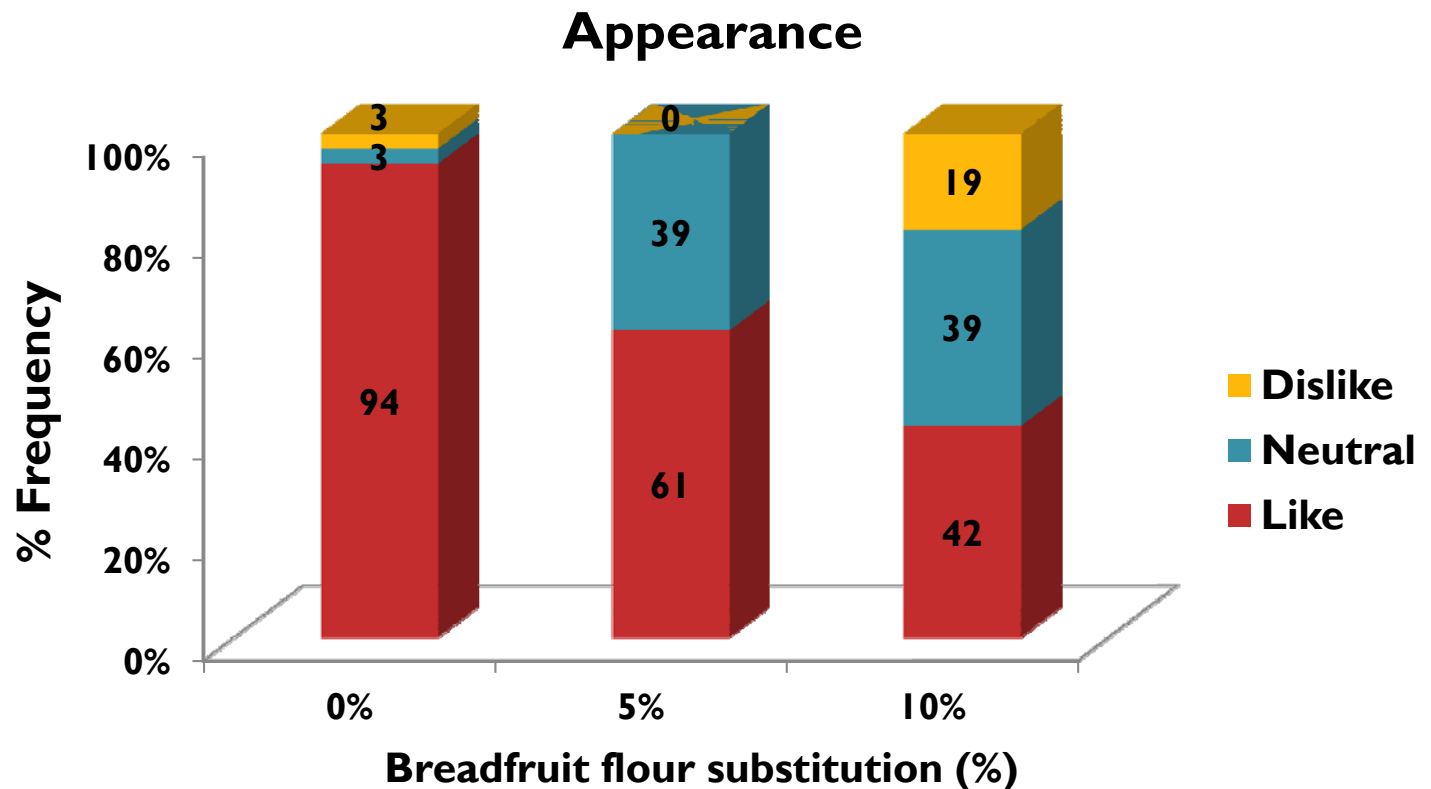
Evaluation of bread quality (II)

- Reduction in the wheat structure forming proteins and a lower ability of the dough to enclose air during proofing, which collectively induce a **volume depressing effect on bread**

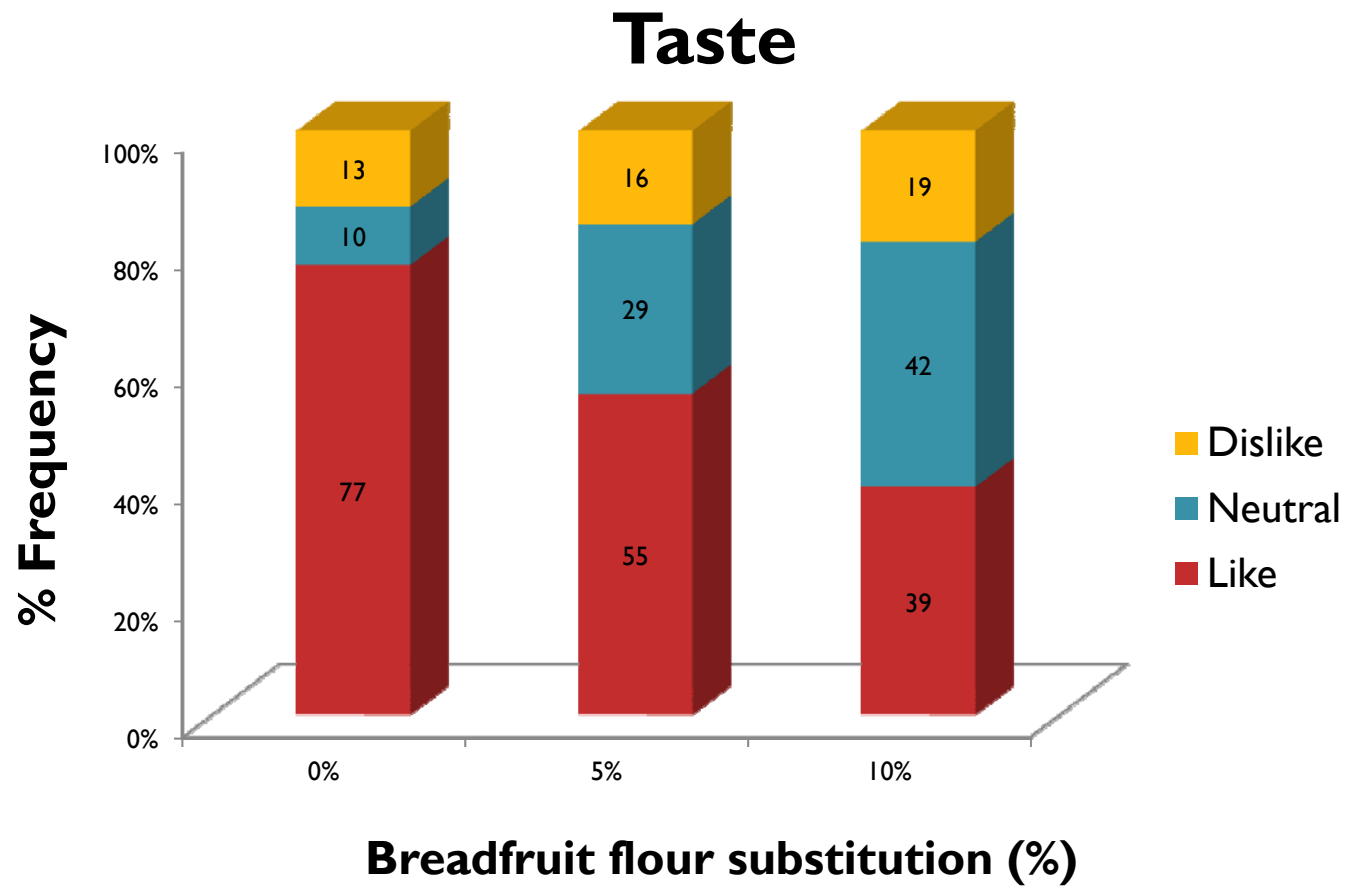


Consumer Hedonic Test (I)

- Most respondents preferred the pan bread made from pure wheat flour in terms of appearance, crumb softness and taste.



Consumer Hedonic Test (II)



PRELIMINARY CONCLUSIONS

- Potential of bread production of acceptable quality from wheat-breadfruit composite flour
- Issues?
 - High cost of breadfruit flour and impact on cost of bread/Consumer acceptability
- Other potential of breadfruit flour?
 - ❖ Farata/Puri (25-50%)/Buns (25-35%)/Biscuits (15%)
 - ❖ Pancakes, Pastries, muffins, doughnuts, pie dough, cookies, tart crust, flat bread pizza or even pasta



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