

QUALITY ATTRIBUTES OF PALM SUGAR CONTAINING CHOCOLATE USING ALTERNATIVE PROCESSING (F.FT.09)



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INTRODUCTION

The most common sugar used in the production of chocolate is sucrose. However, the demand for healthier sweeteners in chocolate, and foods in general, is increasing.

Palm sugar, highly produced in Asian Countries, is claimed to be a healthy alternative :

- ✗ Minerals and vitamins
- ✗ Exhibits a low *glycemic index (GI)*

Also contains small amount of

- ✗ Crude protein
- ✗ reducing sugars etc

However :

- ✗ Contains high moisture

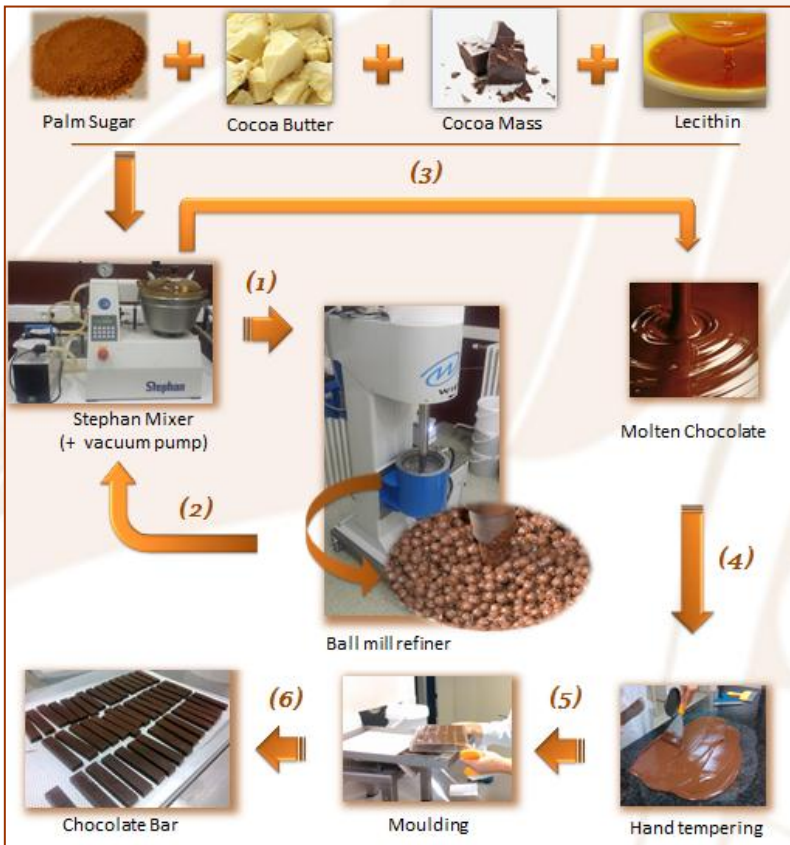
The main objective was to investigate the impact of sucrose replacement by palm sugar on the quality attributes of dark chocolate produced by means of alternative processing.



The production of **palm sugar** is achieved by boiling sap, collected from palm tree flowers, under agitation until supersaturation, whereby crystals are formed.

INTRODUCTION

Chocolate Production



Quality Attributes Analysis

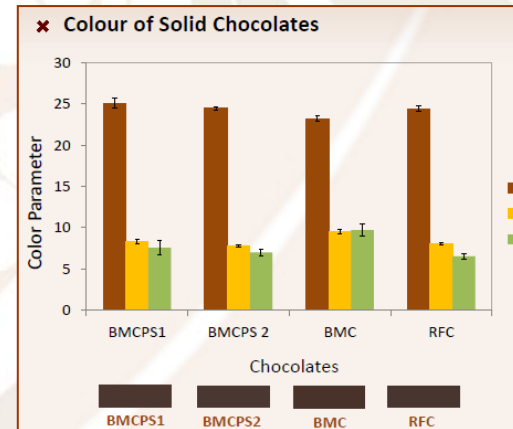
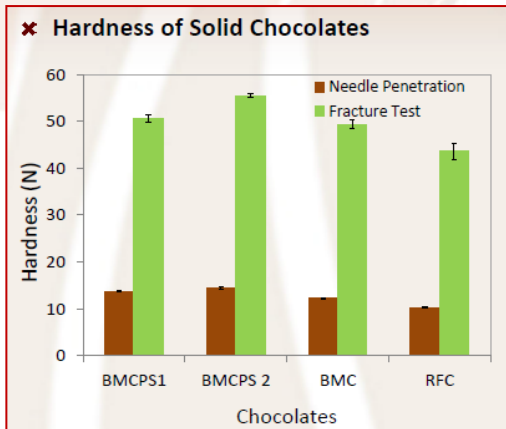
- ✗ Color**
 Minolta Model CM-2500D Spectrophotometer, Tokyo, Japan
- ✗ Hardness**
 Texture analyzer, Instron 5942, Norwood, MA, Canada
- ✗ Melting profile**
 Q1000 Differential Scanning Calorimetry, TA Instruments New Castle, USA
- ✗ Flow behaviour**
 AR2000 rheometer, TA instruments, New Castle, Delaware, USA
- ✗ Fineness**
 Laser Diffraction, Malvern Instruments Ltd., Worcestershire equipped with 300 RF Lens
- ✗ Aroma Profile**
 HS - SPME GC MS

Chocolate Processing :

Processing Method	Chocolate Processing Steps			
	Mixing	Grinding	Flavour Improvement	Liquefaction
Conventional Method	Planetary mixer	Roll-refiner	Conche	Conche
Alternative Method	Stephan Mixer (Low Shear)	Ball mill	Stephan Mixer (Low Shear)*	Stephan Mixer (High Shear)

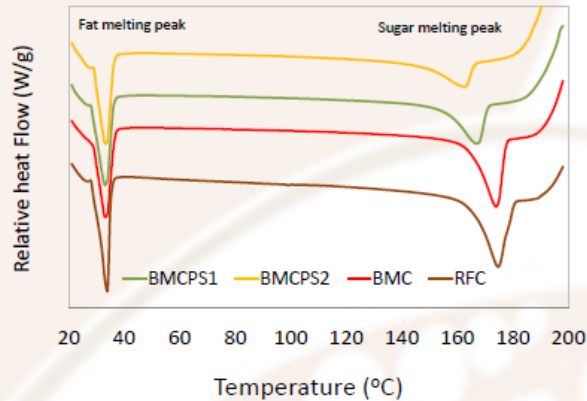
* Prior to ball mill processing

RESULTS



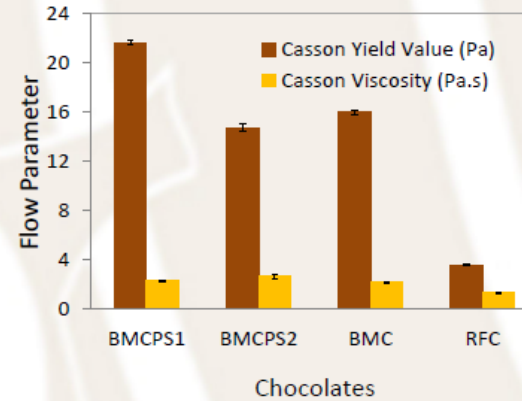
F = (solid particles, moisture, amorphous/crystalline ratio, fat content etc)

✘ Melting Profile of Solid Chocolates



F = (cocoa butter, amorphous/crystalline part, moisture etc)

✘ Flow Behavior of Liquid Chocolates

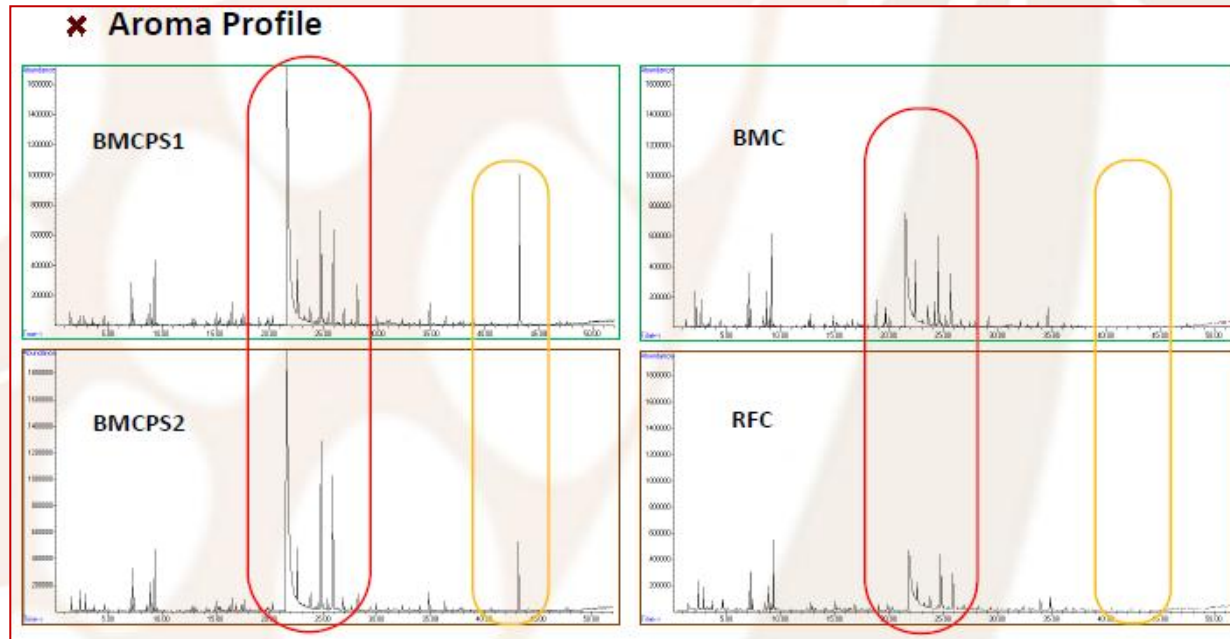


F = (particle size distribution, fat content, moisture, particle density etc)

✘ Fineness of Chocolates

Chocolates	Particle Size Distribution (PSD)				
	Distribution Percentiles (μm)			Derived Diameter (μm)	
	D (v,0.9)	D (v,0.5)	D (v,0.1)	D (4,3)	D (3,2)
BMCPs1	18.9 ± 0.7	5.6 ± 0.3	1.1 ± 0.1	8.1 ± 0.3	2.1 ± 0.0
BMCPs 2	14.9 ± 0.3	5.2 ± 0.2	1.1 ± 0.1	6.9 ± 0.2	2.0 ± 0.1
BMC	15.8 ± 0.5	5.4 ± 0.2	1.2 ± 0.1	7.3 ± 0.2	2.3 ± 0.1
RFC	20.4 ± 0.6	6.6 ± 0.2	1.3 ± 0.1	9.0 ± 0.3	2.6 ± 0.1

F = (grinding duration etc)



F = (sugar and cocoa composition etc)

Conclusions

- ✘ Sucrose replacement in dark chocolate by palm sugar results in somewhat different physical quality attributes due to increased particle-particle interactions (higher residual moisture, lower sugar density, higher amorphous/crystalline ratio).
- ✘ Palm sugar has potency to be used as sweetener of dark chocolate with an improved health and distinct flavour profile.
- ✘ Flavour improvement using alternative processing needs to be further adapted for the production of high-quality chocolates.

Thank you for your attention

 **lpdp** *Lembaga Pengelola
Dana Pendidikan*



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