# Extraction, Characterization and Application of Indian Mango (Mangifera indica L.) Peel Pectin

Geraldine G. Gantioque<sup>1</sup>, M.Sc., Darene Cargo<sup>1</sup>, Ming Vincent Dela Cruz<sup>1</sup>, Jerald Puza<sup>1</sup>, Ma. Cristina Gragasin<sup>2</sup>, Ph.D.

<sup>1</sup>Department of Food Science and Technology, College of Home Science and Industry Central Luzon State University, Science City of Muñoz, Nueva Ecija 3120 Philippine

<sup>2</sup>Philippine Center for Postharvest Development and Mechanization Science City of Muñoz, Nueva Ecija, 3120 Philippines

## I RATIONALE

- Indian Mango (Mangiferia indica L.) is a major fruit crop in the world with worldwide production amounting to 28.51 million Metric Tons.
- The Philippines is the 7th top producer of mangoes -- 825, 676 MT.

Mango peel and kernel which accounts for 40-50% of total fruit weight are deemed

as waste.

- Transformation of this waste by-product is very important in an environmental and economic point of view.
- This study determined if Indian mango peel can be a new source of good quality pectin.

# I METHODOLOGY



Collect Indian mango peels Dry in cabinet drier (60°C; 9 hours)

> Boil (100°C; 60 min.), filter, and collect pectic liquor

Precipitate liquor with 95 % ethyl alcohol

Filter to obtain fibrous pectin

PECTIN

Re-wash with 95% ethyl alcohol to purify pectin



Dry and pulverize extracted pectin

## Figure 1. Process Flow Chart for the production of pectin

## III KEY FINDINGS



Physical characteristics and yield of half-ripe and full-ripe Indian mango peel

### Table 1. Physical characteristics of Indian mango



→ Full-ripe mangoes showed a more intense yellow flesh and less firmness compared to half-ripe mango.

Table 2. Effect of ripeness in the pectin yield

PARAMETERS	INDIAN MAN (gran	PROB.	
	Half-ripe	Full-ripe	
Initial weight of fresh mango	60,000	60,000	
Final weight of fresh peel	7,650	7,400	0.810 <sup>ns</sup>
Weight of dried peel	826.9	1,071.2	
Extracted pectin powder	382.8	358.5	

<sup>ns</sup> – not significant (p>0.05)

→ Higher yield of pectin was obtained in half-ripe Indian mango peels accounting to 15% yield difference.

Physico-chemical characteristics of extracted Indian mango peel pectin

## Sensory characteristics and acceptability of extracted Indian mango peel pectin as applied to yoghurt

Table 4. Mean hedonic ratings of different sensory attributes of yoghurt

	MANGO P			
ATTRIBUTES	Indian	Philippine carabao	PROB.	
Overall Liking	6.4	6.5	0.68 <sup>ns</sup>	
Color	6.8	7.4	0.04"	
Aroma	6.5	6.4	0.78**	
Taste	6.3	6.4	0.77 <sup>ns</sup>	
Mouth feel	6.9	7.0	0.60**	
Thickness	6.9	7.0	0.61**	

Based on a 9point hedonic scale where 1 - extremely dislike, 5 - neutral, 9 - extremely like <sup>ns</sup> – not significant (p>0.05); \* - significant (p<0.05)

 $\rightarrow$  Consumers equally (p>0.05) liked the products in most of the sensory

attributes except for the color. While no significant differences on the general acceptability of yoghurt



#### Figure 2a. Percentage of JAR levels of Indian mango peel pectin



Figure 2b. Percentage of JAR levels of Philippine carabao mango peel pectin

 Majority of the panelists perceived the yoghurt stabilized with Indian and Philippine carabao mango peel pectin as Just-about-Right (JAR) level (>70%) in terms of color, texture and aroma.

#### Table 3. Mean physico-chemical properties of extracted . Indian mango peel pectin

PARAMETERS	INDIAN MANGO PEEL		PROB.	Philippine carabao	
	Half-ripe	Full-ripe		pectin	USP Specification
Equivalent weight	10.8	14.3			Not Specified
Pectin Yield (%)	23.4	16.7	0.45**	20	Not Specified
pH	4.4	4.1	0.02	3.9	
Moisture Content (%)	12.5	12.6	0.7**	12.0	-
TSS	0.4	0.6	0.01	0.4	1
Methoxyl Content (%)	30.3	23.9	1.00**	12.7 - 12.8	Not less than 6.7%
Degree of Esterification (%)	61.1	56.9	0.03'	76 - 79	Not specified
Galacturonic acid (%)	58.2	55.3	0.05	92.8 - 98.7	Not less than 74%
Setting time (min)	3.1	2.5	0.04	2 - 3	
Setting temperature (*C)	71.0	75.0	0.04*	75	
Gel grade	50	50	0.11**	140	

USP = United States Pharmacopeia; <sup>ns</sup> – not significant (p>0.05); \* – significant (p<0.05); \*\* – highly significant → Indian mango peel pectin is comparable with the control (Philippine carabao mango peel pectin).

→ Half-ripe Indian mango peel pectin obtained significantly (p<0.05) higher methoxyl content that gives good spreading and sugar binding capacity; firmer gel due to greater degree of esterification (61.1) and higher galacturonic acid (58.2) that denotes purity of gel. containing either Inidian mango peel pectin or Philippine carabao mango peel pectin.

**IV** CONCLUSION

■ Indian mango peel (half-ripe) is a feasible source of good quality pectin (23%).

Half-ripe Indian mango peel pectin exhibited high quality gel properties which is comparable with Philippine carabao mango pel pectin (control).

Application of Indian mango peel pectin is highly acceptable in terms of sensory attributes (i.e. overall liking, taste, aroma, mouthfeel, texture and thickness).

The authors would like to thank the DEPARTMENT OF SCIENCE AND TECHNOLOGY -Phillipine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD) for the financial assistance.

