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Extraction of Pectin from *Mangifera Indica* Linn. (Indian Mango) Fruit Peel

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ABSTRACT

This study extracted pectin from the fruit peels of *Mangifera indica* Linn. (Indian Mango) sold in Catarman. The Mango fruit peels pectin has greenish light brown color, sweet-dry smell odor and coarse texture. The 0.5% pectin solution has pH of 4, acidic and is soluble in water but insoluble in both hexane and chloroform reagents. Extracted pectin has 280°C to 284°C high melting point and gelling point of 32°C in 10min. The glucose content of extracted pectin is 2% and few from chloride ions. Extracted pectin is comparable in terms of odor, texture, solubility and glucose content to commercial pectin but quit incomparable in color, pH, melting point, gelling point and chloride ion test.

Keywords: *Pectin, Mangifera indica Linn. (Indian Mango), extraction*

INTRODUCTION

Most of us usually does not know pectin, or even know them at all, we may not sense it in our foods, drugs or in fruits we eat but they are present in it, they may not flavor our foods but they play a vital role in thickening your chocolates, jams and yogurts. Pectin is a complex carbohydrate, which is found both in the cell walls of plants, and between the cell walls, helping to regulate the flow of water in between cells and keeping them rigid. This compound of plant is used for making gels and as a gelling agent or the manufacture of food drugs and cosmetics.

Pectin is a structural heteropolysaccharide contained in the primary cell walls of terrestrial plants. It was first isolated and described in 1825 by Henri Braconnot. It is produced commercially as a white to light brown powder, mainly extracted from citrus fruits, and is used in food as a gelling agent particularly in jams and jellies. It is also used in fillings, medicines, sweets, as a stabilizer in fruit juices and milk drinks and as a source of dietary fiber.

The common mango or Indian mango here in the Philippines is the most common fruit that we usually eat during summer seasons, these fruits can be eaten raw with a bit of salts or bagoong, but what relies in these fruit is that it possibly contains pectin. As stated by Wilkinson, F. (2008) mangoes also contain pectin, a soluble dietary fiber, which has been shown to lower blood cholesterol levels.

For this reason, the researcher was interested in extracting the pectin of *Mangifera indica* Linn. or Indian mango to our dialect here in Northern Samar. So that there will be a newer source of pectin that came from a common plant but not from a common pectin source and to help elderly people lower their blood cholesterol level and enjoy life better

METHODOLOGY

The extraction of pectin from fruit peelings of Indian mango used an extraction method, and the physical and chemical properties of the pectin content present in the fruit peelings of Indian mango was determined. The extraction procedure used in the study is from Laguda, G.C (2009) and Acong, R.P. (2011) was employed to extract pectin from the fruit peels of Indian mango. Extracted pectin then analyzed for its physical properties in terms of color, odor, texture, solubility, boiling and gelling points, and chemical property in terms of its glucose test, were identified as stated above for a more detailed study.

Data Gathering Procedures

The sample fruits were first gathered from the designated place. A total of 150 fruit samples were peeled, and the peelings were gathered and cleaned. Then the process of extraction from the author Laguda, G.C. (2009) and Acong, R.P. (2011) were used; the following procedure was used:

One hundred fifty (150) grams of Indian mango fruit peels were prepared, 600 mL of distilled water were added, and the mixture was homogenized in a blender. The homogenate were adjusted into pH of 5 with NaOH and were heated to 90-95°C for one hour with continuously stirring. The pHs were checked in every fifteen minutes and maintained to 4.5 through the use of a digital pH meter. Lost water be replaced during the last twenty minutes. And after one hour, the homogenate was filtered with moistened cheesecloth; the filtrate were collected in a beaker and 90 mL of 55% ethyl alcohol acidified with 1 M HCl (pH= 0.7-10 were added. The

mixture was stirred for ten minutes. After stirring, 50% of 70% ethyl alcohol was added in just a second coagulation occured, then washed with 150 mL acetone and was filtered through a filter paper. The obtained fibrous pectin were dried at a temperature not to exceed 60°C for 3-4 hours and pounded to fine powder. The fine powder is now the pectin.

After the extraction procedure, the extracted pectin was stored in a bottle and is then identified in terms of its physical properties.

For the determination of the Physical Properties, the following procedures were used:
For Color, the Pectin Extracted was examined carefully in a Petri dish by 5 respondents and the color of the pectin was recorded.

For the Odor, the pectin extracted from the fruit peel of Indian mango was smelled by 5 respondents. Then the overall odor in which the respondents agreed the odor of the extracted pectin from the mango peels.

For the texture, the extracted pectin was observed by touching it with bare hands by 5 respondents. Then the overall texture in which the respondents agreed the texture of the extracted pectin from the mango peels.

About 0.5 g of pectin was dissolved in 10 mL of neutral distilled water. Then a pH paper was dipped into the pectin solution. After dipping, the pH of the pectin solution was analyzed using a pH indicator. The procedure was repeated thrice.

For the Solubility test, a small portion of the extracted pectin was dropped in three different solvents namely; water, hexane and chloroform. Then observation begins if the pectin extracted from the fruit peel of Indian mango fruit is soluble on water, or in hexane, or in chloroform solvents.

For the melting point determination, the powder pectin extracted was placed in a sealed capillary tube, the capillary tube with the pectin tied to a thermometer and then it was placed in an oil solvent, then the oil was heated for a given period of time, when the pectin started melting in the tube, the rate of temperature reading in the thermometer was recorded.

About 1 gram of the prepared pectin from the mango peels was dissolved in water. The pectin-water mixture was subjected to heating in a water bath. After 15 minutes the pectin solution was taken out from the water bath and shaken. Then, it was allowed to stand for a time until a gel starts to form. The time and temperature at which the gel formed was recorded.

For the glucose test, a five pinch of pectin was placed in a test tube and a Fehling's solution was added. The mixture was mixed well and was placed in boiling water for 10 minutes. After the boiling process, a green color was formed. The color reaction indicates the amount of sugar present in the sample, if green color forms, it is 0.5% glucose, if yellow, it is 1% glucose and if orange, it is a t 2% glucose (Laguda, 2009).

For the chloride ion test, drops of dilute nitric acid was added to the solution of pectin and distilled water followed by a few drops of silver nitrate solution. If chloride ions are present white precipitate of silver chloride will be visible.

RESULTS AND DISCUSSIONS

The extraction of pectin from the peels of Indian mango was done at the Chemistry Laboratory of the College of Science, University of Eastern Philippines. Catarman, Northern Samar. The total one hundred fifty grams (150 g) of Indian mango peel used yielded about only 3 grams of fibrous pectin. After the extraction, physical and chemical assay was established to further characterize the pectin taken from the Indian mango. The following results were obtained from the different experimentations: 2% of glucose and the chloride ions are negative.

Percent Yield

Only 3g of pure pectin was extracted from the total 150g of the mango fruit peels. The percent yield of the mango peels pectin was 2%, which means that it takes more peels to make isolate and extract pectin the mango fruit. The computation is as follows;

$$Percent\ Yield = \frac{3g\ pectin}{150g\ fruit\ peel} x100$$

$$Percent\ Yield = 2\%$$

Physical Properties

Most respondents perceived the color that it was greenish light brown, the black consistency of the pectin might be due to be overheated in the oven. The odor was perceived mostly by the respondents to be sweet dry smell; the sweet smell might be characterized by the presence of sugar molecules on the pectin powder. And lastly, the texture was also perceived by the respondents to be coarsely powder, this is due to the fibrous pectin obtained from the Indian mango fruit and the poor pounding and powdering of the pectin in the mortar and pestle.

All three trials for pH using a pH paper resulted in a consistent number of pH which is 4, which further indicates that the isolated pectin from the mango peel was acidic.

The pectin obtained from the peels of the Indian mango fruit was soluble in all trials using water solvent. But in the hexane and chloroform solvents, all trials resulted in an insoluble conclusion. This result can be a basis of using the pectin in making water soluble products.

The melting point of the extracted pectin from the peels of the mango fruit ranges from 280°C to 284°C with an average melting point of 282°C which indicates that the pectin of the mango peels has a high melting point.

The gelling process of the pectin from the mango peels is slower than the commercial pectin which is 3 minutes, while the pectin from the mango peels was 10 minutes. The gel forms an inconsistent color and texture of slimy gel.

Chemical Properties

The extracted pectin from the mango peels has a 2% glucose, which is evidenced by the three trials with an orange coloration after heating it in a water bath with drops of Fehling's reagent. This means that the pectin from the mango peels has the same glucose content with the commercial pectin.

Results show that chloride ion is not present in the extracted pectin of the mango peels after the administration of a few drops of silver nitrate. This indicates that the pectin from the mango peels is free from chloride ion which is in contrast with the commercial pectin.

Table 1. Comparing the parameters of Pectin from Indian Mango peel to Commercial Pectin

Physical Properties	Extracted Pectin	Commercial Pectin
Color	Greenish brown	Light brown
Odor	Sweet-dry	Sweet-dry
Texture	Coarse	Coarse
pH	Acidic	Acidic
Solubility in Water Hexane Chloroform	 soluble insoluble insoluble	 soluble insoluble insoluble
Melting point	280 °C -284 °C	236-324 °C
Gelling point	32 °C (10 min.)	30 °C (3 min.)
Chemical Properties		
Glucose point	2%	2%
Chloride ions	negative	negative

It is summarized that the color of the pectin from the mango peels is greenish light brown, odor of sweet dry smell, texture of coarse grains, with a pH of 4, soluble in water but in soluble in hexane and chloroform, has a 282°C of melting point, 2% glucose content, free of chlorine and has a long gelling time.

Figure1. (a) sample pectin from Indian Mango peel and (b) commercial pectin

CONCLUSIONS

There is a small amount of pectin found in the fruit peels of Indian mango. The extracted pectin from the fruit peels of Indian mango is comparable to the commercial pectin in terms of odor, texture, and solubility and incomparable to color, pH, melting point and gelling point. The pectin from the mango peels has a high glucose content of 2% the same with that of the commercial pectin which is comparable to commercial pectin. The pectin from the mango fruit peels is free from chloride ions in similar with the commercial pectin.

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