HIGH FIBER COOKIES MADE FROM PINK GUAVA (PSIDIUM GUAJAVA) DECANTER/ AGRO WASTE

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INTRODUCTION
Guava fruits are rich in vitamins A and C and contains high amount of dietary Fiber (Gorenstein et al., 1999; Jimenez-Escrig et al., 2002 and Ramulu & Rao, 2002). In Malaysia, guava fruits are harvested in abundance, but short lived, rots and decays easily when ripe; resulting in wastage.
Golden Hope Food & Beverages Sdn. Bhd. Malaysia is the largest pink guava producer in Asia with over 500 hectares guava planted that produced 10,000 tons of fruits for pink guava juice for exports to Japan, USA, Australia, Philippines, Korea, Canada, Singapore and New Zealand. From the 10,000 tons of fruits, about 10% (100 tons) of the fruits are considered decanter waste (scrubs, and seeds).
<table>
<thead>
<tr>
<th>Nutritional Content</th>
<th>Per 100gm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guava Fruits</td>
<td>per 100gm</td>
</tr>
<tr>
<td>Decanter waste</td>
<td>120mg ascorbic acid</td>
</tr>
<tr>
<td>Guava seeds</td>
<td>145 aromatic oil</td>
</tr>
<tr>
<td>Protein</td>
<td>15%</td>
</tr>
<tr>
<td>Fiber</td>
<td>36%</td>
</tr>
<tr>
<td>Starch</td>
<td>13%</td>
</tr>
</tbody>
</table>
The waste from guava juice processing could be used to produce value added products. This prompts us to consider the possibility of using different components of guava decanter waste in producing high fiber products such as cookies and flakes.
HEALTH BENEFITS OF GUAVA FRUIT

- High fiber content
- High vitamin content
- High lycopene content
Other health benefits:

It also can be employed for gastroenteritis, diarrhea and dysentery, wounds, ulcers and rheumatic places and also chewed to relieve toothache, remedy for coughs, throat and chest ailments, oral ulcers and inflamed gums, diarrhea, nephritis and cachexia.
<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Per 100 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>512 kcal</td>
</tr>
<tr>
<td>Fiber</td>
<td>41.6 g</td>
</tr>
<tr>
<td>Fat</td>
<td>16.3 g</td>
</tr>
<tr>
<td>Protein</td>
<td>6.2 g</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>0 mg</td>
</tr>
</tbody>
</table>
The purpose of this work is to put into use agricultural waste for wealth and the same time preserving the natural environment.

The objectives are:
- To develop formulation.
- To carry sensory evaluation.
- To determine the chemical and physical characteristics of the cookies.
MATERIALS AND METHODS
Percentage of decanter waste (scrubs and seeds at different ratios: 40 to 70% of total weight)

Basic cookie recipe

- Flour
- Fat
- Sugar
- Egg
Preheat oven

Mix butter, sugar and salt with mixer

Sift the dry ingredients together

Add eggs and vanilla extract to the cream

Roll out the dough

Add sieved flour mixture and guava solids and mix with a rubber spatula

Bake until golden brown

Add eggs and vanilla extract to the cream

Cut with a cutter

Cooking baking procedure
Sensory Analysis during storage

Sensory analysis were conducted at 0, 7, 14, and 30 days of storage.

The criteria were:
- Crispiness
- Colour
- Crunchiness
- Mouthfeel
- Sweetness
- Guava flavour
The sensory panelists' responses were rated based on a hedonic scale with rating of 1 to 9. Test of significant difference was determined by Analysis of Variance (ANNOVA).
CHEMICAL ANALYSIS OF FORMULATED COOKIES

- Total crude protein %
- Total crude fat %
- Total crude fiber %
RESULTS AND DISCUSSION
PHYSICAL CHARACTERISTICS

Effect of guava solid concentration on diameter of cookies
Effect of guava solid concentration on the thickness of the cookies
The spread ratio of cookies as affected by different concentration of guava solids

<table>
<thead>
<tr>
<th>% Guava solid</th>
<th>Width (mm)</th>
<th>Thickness (mm)</th>
<th>Spread ratio (W/T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>47.52</td>
<td>6.55</td>
<td>7.25</td>
</tr>
<tr>
<td>5</td>
<td>47.12</td>
<td>6.6</td>
<td>7.14</td>
</tr>
<tr>
<td>10</td>
<td>47.33</td>
<td>6.83</td>
<td>6.93</td>
</tr>
<tr>
<td>15</td>
<td>47.33</td>
<td>7.15</td>
<td>6.62</td>
</tr>
<tr>
<td>20</td>
<td>47.05</td>
<td>7.33</td>
<td>6.42</td>
</tr>
<tr>
<td>25</td>
<td>46.87</td>
<td>7.33</td>
<td>6.39</td>
</tr>
<tr>
<td>30</td>
<td>46.14</td>
<td>7.5</td>
<td>6.15</td>
</tr>
<tr>
<td>35</td>
<td>45.67</td>
<td>7.63</td>
<td>5.99</td>
</tr>
<tr>
<td>40</td>
<td>45.17</td>
<td>7.65</td>
<td>5.9</td>
</tr>
</tbody>
</table>
Effect of different types of guava waste on percentage of fiber in cookies

![Graph showing the effect of guava waste on fiber content in cookies.](image)

- **Guava Scrub Cookies**
- **Guava Seed Cookies**
- **Guava Seeds & Leaves Cookies**

**Effect of different types of guava waste on percentage of fiber in cookies**
Effect of different types of guava waste on protein content of cookies
Effect of different types of guava waste on fat content of cookies
Texture analysis of guava scrub cookies
40% guava scrub cookies variation

30% guava scrub cookies

40% guava seeds and leaves cookies
40 % guava scrub cookies variation
30% guava scrub cookies
40% guava seeds and leaves cookies
CONCLUSION
Cookies with desirable characteristics were successfully produced by different combinations of pink guava wastes and other ingredients.

Acceptable sensory scores (guava taste, appealing crust colour and appearance, crunchy mouth feel texture), and excellent storage quality were obtained.
Agricultural wastes such as pink guava decanter waste (scrubs, and seeds) are utilizable for preparation of cookies. Other high value added products could be formulated with improved functional and nutraceutical properties.
Highly Nutritious
High Fiber Content
Irresistible Crunchiness
Acceptable Mouthfeel
Excellent Freshness
Marvelous Guava Taste
ACKNOWLEDGEMENTS

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THANK YOU


• Marangoni, F. & Poli, A. 2008. The glycemic index of bread and biscuits is markedly reduced by the addition of a proprietary fiber mixture to the ingredients. *Journal of Nutrition, Metabolism & Cardiovascular Disease* XX: 1-4.
• Ostman, E.M., Frid, A.H., Groop, L.C. and


