Bio coating as Alternate for Wax Coating for Food Grade Paper Board

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Introduction
The use of petroleum-based derivatives as coatings, such as polyethylene, waxes, and/or flour derivatives, typically regulates the barrier resistance and wettability of sheets. Although using these polymers increases surface hydrophobicity, their unfavourable environmental effects, low recycling capabilities, and environmental worries over creating trash without biodegradation have caused them to lose favour. Alternatively, novel methods for entirely bio-based paper coatings can be developed using bio-polymers such as polysaccharides, proteins, and lipids, and biosteplastics. However, the majority of biopolymers may have processing issues because of hydrophilicity, crystallisation behaviour, brittleness, or melt instabilities that prevent complete commercial use. Therefore, it is preferable to blend with other biopolymers, plasticizers, and compatibilizers to enhance the coating performance. The production of bio-based polymers and their composites as paper coatings will be explored, as well as their barrier qualities. Specifically, there are three layers of coating that may act as stability to the paper board, and turmeric is being utilised because it has antibacterial properties. The first layer of paper may have some microorganisms, and the layer of turmeric coating can kill those microbes. Then, the creation of a gum Arabic coating and a hibiscus coating may come next. These layers have binding properties and contribute some waterproofing properties, and the board will also have increased stability and operate as a barrier control. This bio-coating is environmentally friendly, economical, and gives excellent results [Piselli, 2014].

Problem Description
1.45 million tons of paraffin wax-coated boxes of used products enter landfills every year, and 4.5 million metric tons of carbon dioxide is released during the recycling process. Therefore, the goal of the research is to find out an alternative to the synthetic wax coating seen on food product cartons.

Methods
The aim is to replace the wax coating with bio coating [IFT, 2007] which is made from materials like turmeric extract, gum Arabic and hibiscus extract. Each material was selected for its physical and chemical properties. Turmeric with the molecular formula C21H20, contains the major curcuminoids from turmeric (Curcuma longa) of the Zingiberaceae family. It is used for its antimicrobial activity to destroy any microorganisms present in the sample. Then Gum Arabic was used to act as a binder. The high water holding capacity of the gum makes the surface of dry objects smooth. The solubility and low viscosity emulsion properties of Gum Arabic help the use of GA as encapsulated articles for personal care. Hibiscus is used with a barrier coating that acts as a barrier [seas, 2014].

Results
In this section properties of three types of Baker boards ad Bio coated board are tested their results are given in table 1.

<table>
<thead>
<tr>
<th>Test Parameter</th>
<th>Baker Board 1</th>
<th>Baker Board 2</th>
<th>Baker Board 3</th>
<th>Bio Coated Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoothness (%)</td>
<td>4.1</td>
<td>3.9</td>
<td>3.5</td>
<td>2.6</td>
</tr>
<tr>
<td>Burst Strength (Kg/cm²)</td>
<td>18.25</td>
<td>18.75</td>
<td>19.00</td>
<td>21.00</td>
</tr>
<tr>
<td>Moisture Content (%)</td>
<td>7.30</td>
<td>7.50</td>
<td>7.60</td>
<td>8.30</td>
</tr>
</tbody>
</table>

Figure 1 Work Flow of Coating Process
Figure 2 Layer Carton Layer

Table 1 Testing Results

Figure 3 Burst Tester

Discussion / Conclusion
Therefore, this paper concludes that bio-coated paperboard is more efficient in packaging solid food materials. These paperboards can be used in bakery, solid food packaging, pharmaceutical and grocery applications. The project has been pre-planned and implemented to ensure flexibility and economical operation. This revolutionary coating has made many things desirable and economical. This bio-coating is environmentally friendly and highly promising. This project helps us to understand the importance of natural materials and has great applicability in our daily lives. Compared to wax-coated cardboard used in bakeries, bio-coated cardboard has shown good results during testing.

ACKNOWLEDGMENTS
We really appreciate the assistance of our Avinashilingam Institute and Undergraduate students in carrying out the aforementioned testing.

REFERENCES
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