Plastic materials have gained widespread use in the food, clothing, medical, shelter, transportation, construction and leisure industries due to its features of strength, lightweight, easily processable and energy efficient. However, plastics are made of petroleum-based materials called resins (e.g., polyethylene and polypropylene) that are not readily biodegradable.

Each year, tonnes of plastic packaging are discarded as solid waste. The method of disposal for solid waste has been largely through landfilling (90%), recycling (8%) and incineration (2%). Plastics that are disposed in landfill will remain in their original forms for a long time. Their products are therefore not environment-friendly.

MPOB has developed a novel process to produce disintegrable plastics from oil palm and its products together with petroleum-based products.

**MANUFACTURING PROCESS**

Disintegrable plastics are made on combinations of active ingredients from oil palm and their products and compounded with polyethylene, using the synergy potential of both raw materials, renewable and fossil resources. *Figure 1* illustrates the manufacturing process of disintegrable plastics.

**PROPERTIES OF DISINTEGRABLE PLASTICS**

The physical and mechanical properties of disintegrable plastics are shown in *Table 1*.
## TABLE 1. PHYSICAL AND MECHANICAL PROPERTIES OF DISINTEGRABLE PLASTICS

<table>
<thead>
<tr>
<th>Properties</th>
<th>Unit</th>
<th>Disintegrable plastics</th>
<th>Test method used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>g cm(^{-3})</td>
<td>0.84</td>
<td>ASTM D792</td>
</tr>
<tr>
<td>Dart impact test</td>
<td>g</td>
<td>50</td>
<td>ASTM D1709-03</td>
</tr>
<tr>
<td>Tensile at break (MD direction)</td>
<td>MPa</td>
<td>54</td>
<td>ASTM D882-02</td>
</tr>
<tr>
<td>Tensile at break (TD direction)</td>
<td>MPa</td>
<td>15</td>
<td>ASTM D882-02</td>
</tr>
<tr>
<td>Modulus of elasticity (MD direction)</td>
<td>MPa</td>
<td>283</td>
<td>ASTM D882-02</td>
</tr>
<tr>
<td>Modulus of elasticity (TD direction)</td>
<td>MPa</td>
<td>248</td>
<td>ASTM D882-02</td>
</tr>
</tbody>
</table>

## POTENTIAL END USES

Disintegrable plastics can be used in the following applications:

- carrier bag;
- shopping bag;
- trash bag;
- bag-on-roll;
- liners/others;
- packaging material;
- wrapping and shrink film;
- blending component; and
- poly-bags for plant nursery.

## COST COMPETETIVENESS

A price increased in crude petroleum will directly raise the production costs of resin polymer. Thus, the use of active ingredients from oil palm and its products will reduce the amount of resin polymer used and therefore the cost of production of the disintegrable plastic.

For more information kindly contact:

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