The Production of Propolis, Bee Bread, Bee Wax and Honey of Stingless Bee (Trigona Spp) on Various Hive’s Mediums in West District of Seram

Ali Awan¹
¹Lecturer of Biology Study Program
Faculty of Educational Science and Teacher Training
Pattimura University
*Corresponding author, e-mail: aliawanprof@gmail.com

Abstrak
Stingless bee (Trigona Spp) is a type of insect which has significant economic values. The benefit of Stingless bee (Trigona Spp) is that can be the basic commodity of foods, beverages, and medicines. (bee bread, bee wax, honey). WSD is one of the location that has plenty of Stingless bee (Trigona Spp) which dispersed in woods, caves, trees, and other various habitat. So far, demand of this bee’s production is very high. However it is not aligned with the production itself. This is caused by the simple methods applied by the residents, which makes the result is not satisfied.

This research uses the survey and experiment method, with the sample method is taken from Kamariang village, Hatusua village, Kamal village, and the surrounding areas. The mediums utilized for this bee’s production is several hives, which made of bamboo screens, wooden frames, iron frames, and tree trunks. The procedures conducted are survey, maintenance, measurement, and production result analysis. The result of the research shows that making hive out of bamboo screens, wooden frames, iron frames, and tree trunks, can increase the production of bee bread, bee wax and honey of Stingless bee (Trigona Spp) in Kabupaten Seram Bagian Barat. Beside of that, the result of the quality and production analysis shows that Stingless bee (Trigona Spp) is significantly beneficial for human needs, such as foods, beverages, medicines, and other benefits.

Keywords: Stingless bee (Trigona Spp), Propolis, Beewax, Bee Bread, Honey

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Introduction

Stingless Bee (*Trigona Spp*) is a type of bees that produce honey and other commodities, such as foods and beverages. Indonesia is globally known as the country that has plenty variety of bees. Nationally, the honey production is very low, approximately 8,800 tons per year. This is insufficient for the requirements for the national consumption, which is approximately 25,000 tons per year. Therefore, to cover the 16,200 tons shortage, import has been done from the countries that produce bee. This import is mostly done by food industries, medicine industries, cosmetic industries, due to the better guaranteed quality and quantity.

Particularly for this type of bee, the production in mountainous areas, caves, plantations, and other habitats, is still not using the mediums of hives. Therefore, with the consideration of the vast area in Kabupaten Seram Bagian Barat, the cultivation of stingless bee (*Trigona Spp*) can be conducted to produce propolis, foods, beverages, and medicines.

WSD has abundant natural resources, such as stingless bee (*Trigona Spp*). This type of insect is a very potential resource to be developed through cultivation. It is because of there are plenty of food sources for Stingless bee (*Trigona Spp*) (almost every kind of flowers can be the foods source), whether it is forest vegetation, farm vegetation, or plantation vegetation. Product of Stingless bee (*Trigona Spp*) is useful for mankind’s welfare, such as foods, beverages, and medicines.

Method

The method of this research is survey and experiment method. Based on the earlier data, there are a lot of stingless bee population at villages in Kabupaten Seram Bagian Barat, such as, Hatusua, Waisamu, Kamal and Kamariang, which are not yet being used by the local residents. Therefore, with the consideration of the availability of fund, the activities or works conducted are the search for hives, the making of hive mediums, the maintenance, and the measurement. The making of hive mediums involves: bamboo screens, wooden frames, iron frames and tree trunks.

1. Research Location

   The location of the research is on Seram Island, particularly Kabupaten Seram Bagian Barat, Kairatu sub-district. Survey is conducted at villages in Kabupaten Seram Bagian Barat that have hives, such as Hatusua, Waisamu, Kamal and Kamariang. Then, the hive mediums are built. The location of the research can be seen in picture 1.1 below.

![Picture 1.1 Research Location](image)

2. Tools and Materials

   This research uses Tools and Materials, such as, Queen Ecxluder, Queen Cell, Frame Feeder, analytical scale, bee medium, aquades, refractor, prop, digital camera, compass, muslin, iron frame, and wooden frame.
3. Maintenance, Measurement, and Production  
      The search for the Stingless bee (Trigona Spp)’s hives is conducted in the plantation areas and houses of  
      the residents of Hatusua, Waisamua, Kamal and Kamariang of Kabupaten Seram Bagian Barat. The  
      collected data is presented in the form of descriptive narration. Then the medium is built from bamboo  
      screens, wooden frames, iron frames, and tree trunks.  
   b. Maintenance and Measurement of Production  
      Each type of Stingless bee (Trigona Spp) hive’s mediums on each villages are maintained and then  
      disbanded very carefully using saw on bamboo screens, screwdriver and chisel on wooden frame and  
      iron frame, and sawing machine on tree trunk. Before opening the hive’s mediums cigarette’s smoke is  
      being blown into the exit funnel so that the colony becomes pacified. Face, neck, and hands have to be  
      washed to avoid being bitten by the Stingless bee (Trigona Spp) working groups. Propolis, bee bread,  
      and honey are harvested using spoons and forks. The result of each medium’s harvest result is put into  
      a transparent plastic (3 kilograms package), labeled, and weighed. The formulation used to obtain the  
      data of the production (in grams) of propolis, bee bread and honey is as follow:  
      \[ A = B - C, \]  
      where,  
      \[ A = \text{production quantity (propolis/bee bread/beewax/honey)} \]  
      \[ B = \text{plastic weight + production weight (propolis/bee bread/beewax/honey)} \]  
      \[ C = \text{plastic weight} \]  
   c. Measurement of Hive’s Mediums  
      The measurement of Stingless bee (Trigona Spp) hive’s medium are conducted after weighing the  
      production. Each hive’s medium is measured using a meter-roll (3 meters capacity). For bamboo screen  
      and tree trunk, the measurement is conducted on radius and length (height). While for the wooden  
      frame and iron frame, the measurement is conducted on length, width, and height (thickness). The  
      measurement of each hive is meant to discover its volume.  

Result and Discussion

The Kabupaten Seram Bagian Barat has abundant natural resources, such as stingless bee (Trigona Spp),  
which dispersed in trees, bushes, caves, resident’s houses, and various other habitats. Up until now, the local  
residents only harvest Stingless bee (Trigona Spp) straight from the natural environment. Therefore, the  
production is not sufficient for consumption. While Stingless bee (Trigona Spp) has plenty of benefits such used  
to produce foods, beverages, medicines, etc. To produce more Stingless bee (Trigona Spp), hive’s medium is built  
from bamboo screen, wooden frame, iron frame, and tree trunk. The result of hive’s mediums can be seen in  
Picture 1.2, 1.3, 1.4, and 1.5.
The quality of the production result is influenced by the food sources. The cultivation techniques and after-harvest processing techniques are conducted in order to gain high-quality products. In accordance to that, the government has set the standard of honey quality through SNI 01-3545-1994. The requirements for honey composition, based on SNI 01-3545-1994, can be seen on Table 1.

<table>
<thead>
<tr>
<th>Number</th>
<th>Composition</th>
<th>Required Amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water percentile within honey</td>
<td>Max 22%</td>
</tr>
<tr>
<td>2</td>
<td>Ashes percentile</td>
<td>Max 0.5%</td>
</tr>
<tr>
<td>3</td>
<td>Acidity degree</td>
<td>Max 40 ml/kg</td>
</tr>
<tr>
<td>4</td>
<td>Solid matters</td>
<td>Max 0.5 %</td>
</tr>
<tr>
<td>5</td>
<td>HMF (Hidroxymethyl Furfural)</td>
<td>Max 40 mg/kg</td>
</tr>
<tr>
<td>6</td>
<td>Enzyme Diastase’s activities</td>
<td>Min 3 DN</td>
</tr>
<tr>
<td>7</td>
<td>Granulated Sugar</td>
<td>Min 60 %</td>
</tr>
</tbody>
</table>
There are plenty of stingless bee (*Trigona Spp*) benefits, such as: increasing physical endurance, preventing cancer and stroke, accelerating blood flow, increasing hormones, strengthen brain and heart functions, fixing damaged body cells, recovering body, relaxing stressed nerves, removing fatigues, and increasing children’s intellectuality, helping diabetic persons, and assisting the post-operation healing process. The benefits of Stingless bee (*Trigona Spp*)’s propolis are: natural antibiotic, anti-bacterium, anti-fungi, anti-virus, antioxidant, strengthen body’s immune system, antiseptic, immunostimula, used as anesthetic, strengthen and accelerating cell regenerations.

1. **Honey**
   Generally, people know that the product of bee is honey. Honey is sweet liquid from nectars which processed by working bees and preserved on beehive’s cells. Honey contains several components that are beneficial for human’s health. The composition of nutrition contained in honey can be seen in table below:

### Table 2. The Composition of Nutrition Contained in Honey

<table>
<thead>
<tr>
<th>No.</th>
<th>Composition</th>
<th>Amount (%)</th>
<th>Annotations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water</td>
<td>17,0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Fructose</td>
<td>38,5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Glucose</td>
<td>31,0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Maltose</td>
<td>7,2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Carbohydrate</td>
<td>4,2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Sucrose</td>
<td>1,5</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Enzyme, Mineral and Vitamin</td>
<td>0,5</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Energy</td>
<td>29,4</td>
<td></td>
</tr>
</tbody>
</table>

2. **Bee Pollen**
   Bee pollen is flowers’ pollen taken by working bee, preserved on pollen basket, and used as protein sources. Bee pollen is commonly often stated as the core of life because the nutrition composed in it is significantly useful for body health, particularly to build and fix damaged body cell. Bee Pollen contains 10 types of amino acid, essential proteins, essential fatty acids, 10 types of minerals, vitamins (A, B, C, D, E), growth hormones, reproduction hormones, and various types of alkaloids which function to stabilized cell metabolism, regeneration and rehabilitation.

3. **Royal Jelly**
   Royal Jelly is a fluid in the form jelly/cream/milk secreted by young working bees and used as food for larva of the designated queen bee and larvae of working bees. Royal jelly is useful to maintain and preserve physical vitality. The composition of nutrition in royal jelly can be seen in the table below:

### Table 3. The Composition of Nutrition in Royal Jelly

<table>
<thead>
<tr>
<th>Number</th>
<th>Composition</th>
<th>Amount</th>
<th>Annotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water percentage</td>
<td>67,0 %</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Gross Protein</td>
<td>12,5 %</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Total Sugar</td>
<td>11,0 %</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Fructose</td>
<td>6,2 %</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Glucose</td>
<td>4,2 %</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Sucrose</td>
<td>4,2 %</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. Etc.</td>
<td>0,3 %</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Fatty Acid</td>
<td>5.0 %</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>----------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ashes</td>
<td>1 %</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Mineral K</td>
<td>5,500 mg/gr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Mineral Mg</td>
<td>700 mg/gr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Mineral Na</td>
<td>600 mg/gr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. Mineral Ca</td>
<td>300 mg/gr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. Mineral Zn</td>
<td>30 mg/gr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f. Mineral Fe</td>
<td>30 mg/gr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>g. Mineral Cu</td>
<td>25 mg/gr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>h. Mineral Mu</td>
<td>7 mg/gr</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Unidentified</td>
<td>3.5 %</td>
<td></td>
</tr>
</tbody>
</table>

4. **Propolis**

Propolis is resin adhesive matter collected by working bees from buds, barks, or other parts of plants. In beehives, propolis is used to cover gaps, patch cracks, reduce and close holes. Chemical compositions contain within propolis is very complex, such as aromatic substances, fresheners, and minerals. Because propolis also contains antibiotic substances, it is used in pharmaceutical science as the basic commodity of medicines for wounds and for tooth-patching.

5. **Beewax**

Beewax is made out of the secreted wax glands located in the lower part of working bee’s stomach. Beewax is used as the basic commodity for wax-making, cosmetic industry, pharmaceutical industry, and batik-making.

6. **Bee Venom**

Bee Venom is made out of the secreted venom glands on the working bees, in the form of transparent liquid, with specific rotten aroma, bitter and spicy taste, and dried up fast. The chemical compositions of bee’s venom are: Tryptophan, Choline, Glycerin, Phosphoric Acid, Palmitic Acid, Fatty Acid, Vitelin, Apromin, Peptide, Enzyme, Histamine, and Melittin.

In accordance with the improvement of science, bee venom is mostly used in medication through bee’s sting. Several diseases that can be cured with bee’s sting are neurotic diseases, rheumatic, bronchial asthma, capillary arterial diseases, and sexual impotency.

Almost every kind of vegetation that has flowers can be the foods source for bees, whether it is forest vegetation, farm vegetation, or plantation vegetation. Vegetation that can be used as food sources contain:

a. **Nectar**

Nectar is a kind of complex substance produced by plant’s nectaries glands in the form of various concentrated solution, which depended on types and locations of the vegetation. The main components of nectar are sucrose, fructose, and glucose. Nectar also has other sugar substances such as maltose, melibiose, rutinose, other descendants of carbohydrate, organic acid, salty resin, and mineral. Nectar is necessary for bees as the source of carbohydrate/energy, water, vitamin, and mineral.

b. **Pollen**

Pollen is obtained from flowers. It is produced by the antenna as stamens of the vegetation. Pollen is taken by honeybees to be the source of protein, fat, carbohydrate and mineral. A colony of bees requires approximately 50 kilograms of pollen per year. Half of those are assigned for larvae. Pollen is needed as the source of protein for bee’s health and growth.

c. **Extrafloral**

Extrafloral is a sweet liquid which naturally flows out of the tip of immature leaves or stems of the vegetation. This liquid is a complex substance produced by the nectaries glands in the forms various concentrated solution, which depended on types and locations of the vegetation. The main components of nectar are sucrose, fructose, and glucose.

If the food source is a type of vegetation that reduce in dry season, then the bees can be given stimulants in the form of sweet liquid made of 1:1 scale mixture of water and sugar. Beside that, to meet the requirements, pollen can be substituted with small bran, mung bean powder, and sugar palm.
Conclusion

1. The Stingless Bee (Trigona Spp) is a type of insect that has very significant economic values which is to produce propolis, royal jelly, beewax, bee pollen, and bee bread.
2. There are a huge numbers of Stingless bee (Trigona Spp) in Seram Island, dispersed in the woods, trees, caves, and local resident’s houses.
3. There are various forms of more profitable hive’s medium to cultivate Stingless bee (Trigona Spp), such as bamboo screen, wooden frame, iron frame, and tree trunk.

Suggestion

The production of honey from stingless bee (Trigona Spp) requires the consideration of the variety of pests and diseases, and the availability of food source for the conservation of the bees’ life.

References