Identification of Non Timber Forest Product Use of Canarium Nut (Canarium Sp) in Makian Island

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Abstract. Forests as natural resource systems have the potential to provide multipurpose benefits. In addition to timber products, forests can provide benefits in the form of non-timber forest products and the environment. Research results show that timber forest products from forest ecosystems are only 10% while most (90%) of other products are in the form of non-timber forest products (NTFPs) that have not been optimally managed and utilized to improve society welfare. This study aims to identify factors that influence the utilization of canarium nut. The data were performed using survey. The data used in this study came from primary and secondary data. Primary data in this study were collected through direct interviews with respondents. The results showed that out of 150 respondents farmers, 109 people used canarium nut flesh as raw material for chili sauce with a percentage of 72.7%. In addition to processing canarium nut flesh into chili sauce which had the highest percentage, the use as a cooking spice was also not much different, namely as many as 107 people with a percentage of 71.3%. This was because chili sauce and cooking spices were always served every day in complementing the food menu of the Pulau Makian society. Meanwhile, the utilization of canarium nut as raw material for making macaron and bagea cakes, they had a lower percentage by 9.4% and 34.0%. This was because the making of macaron and bagea took quite a long time and required a lot of additional ingredients.

1. Introduction
Forest is an ecosystem unit in the form of land containing biological natural resources dominated by trees. Forests as natural resource systems have the potential to provide multipurpose benefits. Besides wood products, forests can provide benefits in the form of non-timber forest products (NTFPs) that have not been optimally managed and utilized that can improve the welfare of the community such as rattan, walnuts. Walnuts are tropical fruit plants that grow in the Southeast Asian region, especially in Indonesia, Malaysia and the Philippines. Walnuts belong to the division of Magnoliophyta, the Burseraceae family [1] which has many benefits. In Indonesia, walnut trees are widely found in North Maluku which are cultivated by local communities and become one of the leading NTFPs for local communities, especially on the Makian Island.

Walnuts (Canarium indicum), are forest products in the Melanesian lowlands (Papua New Guinea, Solomon Islands, Vanuatu). Indonesia produces walnuts with various preparations, as well as commercial wood and several other products. The results of a review of the biophysical and socio-economic literature shows the domestication and commercialization of the processes taken for the future to improve the livelihoods of rural households, especially in Indonesia [2]. Walnuts come from the genus of canarium which consists of several important species, which are sources of food and timber producers, especially in South Asia and Melanesia. Canarium indicum (Burseraceae) is a tropical
species that is used both as a natural food source in the forest and as a protected forest especially in Melanesia [3]. Walnuts (canarium) are found in the Asia Pacific with tropical climate and found around 100 species. In general, walnuts are classified into groups of nuts that can be consumed [4]. Economic improvements in the walnut industry occur in Vanuatu, Solomon Islands and Papua New Guinea [5]. Walnuts are an important source of minerals that the human body needs as nutrients [6]. Morphological characters of the tree, nutrition and medicinal content of *Canarium indicum* nuts can be found in Ref. [7].

Walnuts can be consumed in fresh conditions and can be used as ingredients for baking and other dishes. In addition, its large stems / wood can be used as building materials such as beams, boards and plywood industry raw materials. In addition to being used for the above products, canary plant seeds can also be used to make baby food, baking ingredients, walnut oil. The shell can be used as cosmetic ingredients [5]. The seeds of the kernel of *Canarium indicum* (Burseraceae) have nutrients which are rich in protein and other micro-nutrients. Because of its high oil content, it is prone to rancidity [8],[9].

The use of hyperspectral imaging methods in determining the value of non-destructive peroxide, total nitrogen and mineral nutrients in walnuts can be found in [10].

2. Materials and Methods

2.1. Material

The chosen research location was based on several considerations, namely the location which is a centre of walnut crop production and a contributor to regional superior non-timber forest products that are expected to contribute to regional economic dynamics and the use of walnuts are the livelihoods of local communities for generations.

2.2. Research Method

Data collection was carried out by survey. The data used in this study comes from primary and secondary data. Primary data in this study were collected through direct interviews with the respondents. Secondary data is obtained from the Central Statistics Agency and other government agencies or related institutions. The steps in sampling depend on the respondent group as follows:

The first step is the deliberate selection of villages based on the consideration that these villages are the villages that become the centre of walnut production. Therefore, purposive sampling is considered appropriate in sampling for villages.

The second step is the selection of key respondents, who are selected based on the recommendations of the village head. The next respondent's determination is done by snow ball method in which the key person recommends the next respondent and the respondent who has been interviewed recommends the next respondent, according to the required criteria. The number of farmers who will be used as respondents in this study is 30 people per village.

The third step is to determine the locations of walnut growth sites based on the distribution of varieties and the estimated number of walnut varieties that grow in that location. To find out these locations, biophysical potential is reviewed by purposive sampling. Collecting data regarding the potential and utilization of walnut commodities needed or called utilization data, is obtained by identifying and seeing directly processed products from walnuts in the form of walnut processing data in the form of food and non-food.

The data collected is as follows:

The data of walnut farmers. The data collected include: age group, level of education, number of family members, livelihoods, average area of community forests, forms of walnuts sold, walnut production, and selling prices. Home industry. Data collected include: products produced, consumers, size and selling prices, wages, and the number of workers.

2.3. Data Analysis

The collected data on the utilization of walnut plants obtained are then processed and analyzed according to the type of data and purpose. The analysis was done by using descriptive statistical techniques that include data tabulation [11].
3. Results and Discussions

3.1. Walnut Utilization

The walnut as a non-food ingredient is also always used by the Makian Island community. Local communities around the forest need to be involved in securing forest sustainability by utilizing NTFPs. The results of the interviews showed that most people use the morphology of walnut from the stem, fruit peel and shell / shell of walnuts. Communities in the five research villages always use walnut parts as fuel and organic fertilizer materials [12].

The production of walnuts that is highly expected is the fruit. The fruit contains seeds wrapped in hard shells with "flesh" that contain high fat and protein and can be eaten. Most people use walnuts for sale in the form of dried fruit of walnuts. As for everyday life, local people not only use walnut as raw material for making food, but also used as non-food ingredients such as making compost using walnut shell, replacing firewood using walnut shells and making cosmetics (masks) using shells of young walnuts. Table 1 shows the use of walnut as a non-food ingredient in Sebelei Village, Talapaon Village, Waigitang Village, Kota Village and Group Village.

Table 1. Utilization of walnut as a non-food ingredient

| Utilization form | Criteria     | Number of Users (person) | Total of Respondent | Percentage (%) |
|------------------|--------------|---------------------------|---------------------|----------------|
|                  |              | D1 | D2 | D3 | D4 | D5 |                   |                    |
| Non-food         | Firewood     | 30 | 30 | 29 | 30 | 29 | 148                | 98.7              |
|                  | Compost      | 2  | 1  | 1  | 1  | 1  | 8                  | 5.3               |
|                  | Cosmetic     | 22 | 21 | 25 | 19 | 17 | 119                | 79.3              |

Information: Sebelei Village (D1), Talapaon Village (D2), Gorup Village (D3), Kota Village (D4), Waigitang Village (D5)

Until now, walnut trees have various uses as non-food ingredients. The wood which has a specific gravity of 0.55 and is included in strength class I and durability class IV can be used for boards, building materials, plywood, furniture, floors and wall boards. The bark produces resin if sliced. Fragrant resin oil and can be used for perfume or soap deodorization industry, although until now, it has not been done on a wide scale. Resin oil can also be used for hair cleansing, incense making materials, and liniment to treat itching. Martono and Hendra (2013) also asserted that the better-known use of walnut gum is for pharmaceutical plaster materials, ointments and providing a stable property in vanish. Figure 1 shows non-timber forest products (NTFPs) of walnut by the Makian Island community.

Figure 1. Non-timber forest products (NTFPs) of walnut plants in Sebelei Village, Makian Island. A. Young Walnut, B. Old Walnut, C. Dried Walnut Seed

The results showed that there was more use of walnuts as a non-food ingredient in the use of walnuts as a substitute for firewood with a percentage of usage of 98.7% (29 people). According to farmers respondents, walnut shells are better than wood if they are used as fuel. Walnut shells are more fire-burning and long-lasting compared to the firewood. As for the lowest percentage of 5.3% or as
many as 8 respondents from 5 villages used walnut shell as the basic material for compost. This is because the average local community does not know about walnut processing as an organic fertilizer (compost). Therefore, walnut shell that has been removed from is just thrown away without being processed.

3.2. Walnuts as Food Ingredient

Walnuts are one type of plant that has many benefits for humans, both for the human body as a source of vitamins and minerals, as well as to increase people's income. Besides being able to be consumed fresh, walnut flesh can also be used as ingredients for baking and for making other dishes [13]. One way to maintain the storage durability and competitiveness of walnuts is to process it into several types of processed food. In addition to being durable, processing walnut flesh will also make the taste more varied.

Small walnut seeds or flesh and defective wallnut shell can be processed into various cakes / snacks. Some respondents said that the use of walnuts as food ingredients such as halua, makron, bagea and walnut bread is made only during holidays or celebrations in the form of parties and traditional ceremonies. For their daily life, local people only use walnuts as spice and sauce. Local people believe that walnut flesh has great benefits for body health. Stated that consuming walnut seeds is believed to prevent prostate cancer, slow and stop tumor growth, improve arterial performance, reduce bad cholesterol, increase muscle growth and body immunity, and optimize the function of brain cells. Therefore, to make local people accustomed to consuming walnut flesh, some housewives try to process it into snacks such as halua, bagea, macron and other processed foods (Table 2), and serve as a business in the home industry scale. Makian Island is the only island known as the walnut island by the people of Ternate City. Kenari is a NTFP that is highly considered on the island of Makian because it can improve the welfare of the people who work on planting this plant that can produce fat and delicious snacks.

Table 2. Walnut as Food Ingredient

| Form of Utilization | Criteria       | Number on people | Total of Respondents | Percent age (%) |
|---------------------|----------------|------------------|----------------------|-----------------|
| Food Ingredient     |                | D1 | D2 | D3 | D4 | D5 |                      |
| Sauce               |                | 10 | 30 | 9  | 30 | 30 | 109                   | 72,7 |
| Spice               |                | 25 | 23 | 21 | 23 | 15 | 107                   | 71,3 |
| Cake (Halua)        |                | 24 | 26 | 23 | 21 | 12 | 106                   | 70,7 |
| Cake (Makron)       |                | 4  | 3  | 3  | 2  | 2  | 14                    | 9,3  |
| Walnut Bread        |                | 21 | 22 | 4  | 20 | 22 | 89                    | 59,3 |
| Walnut Bagea        |                | 7  | 11 | 8  | 14 | 11 | 51                    | 34   |
| Walnut Jam          |                | 21 | 17 | 16 | 18 | 12 | 84                    | 56   |

Information: Sebelei Village (D1), Talapaon Village (D2), Gorup Village (D3), Kota Village (D4), Waigitang Village (D5).

Figure 2. Walnut processing as food (halua) by Makian Island community. A. Peeling the walnut shell, B. Processing walnut, C. Halua, product of walnut.
The results showed that out of 150 farmer respondents, 109 people used walnut flesh as raw material for sauce with a percentage of 72.7%. In addition to processing walnut flesh into sauce which has the highest percentage, the use of walnut as a cooking spice is also not much different, which was as many as 107 people with a percentage of 71.3%. This is because sauce and spices are the dish that is always served every day in complementing the food menu of the Makian Island community. Whereas the utilization of walnuts as raw material for making macron and bagea cakes has a lower percentage of 9.4% and 34.0%. This is because the making of macron and bagea takes quite a long time and requires a lot of additional ingredients.

Processing walnuts into cakes is usually done if there are festivals, traditional ceremonies and others. However, one of the cakes or food that is often made by the local community is walnut halua (Figure 2). Halua is one type of cake that is always made by the Makian Island community. This is because the halua cake is a type of cake that is very easy to make and does not require a large cost in making it. Halua is made using the main ingredients of fertile walnuts on Makian Island. The walnuts are wrapped in sugar that has been melted and then stirred until they blend together and harden with the walnut flesh. The main macro minerals in walnuts (pulp) are K and Ca while in the kernel, there are K, P, and Mg. Walnuts contain Na, Fe, Al, Zn, Mn, Cu, Ni, and Cr. The antioxidant potential is below the limit of quantitation, the same as Pb and Cd [6].

4. Conclusion
The results showed that out of 150 farmer respondents, 109 people used walnut flesh as raw material for sauce with a percentage of 72.7%. Walnut processing as cooking ingredients was done by as many as 107 people with a percentage of 71.3%. The use of walnuts as raw material for making macron and bagea cakes had a lower percentage of 9.4% and 34.0%. The use of walnuts as raw material for sauce and as a spice in cooking is quite high because sauce and spice are dishes that are always served every day in complementing the food menu of the Makian Island community.

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