

## NON-TIMBER FOREST PRODUCT (NTFP) COMMODITIES HARVESTED AND MARKETED BY LOCAL PEOPLE AT THE LOCAL MARKETS IN MANOKWARI – WEST PAPUA

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NON-TIMBER FOREST PRODUCT (NTFP) COMMODITIES HARVESTED AND MARKETED BY LOCAL PEOPLE AT THE LOCAL MARKETS IN MANOKWARI – WEST PAPUA. The biodiversity richness of tropical forests in Papua provides substantial livelihood necessities for most forest people. This includes Non-Timber Forest Products (NTFPs), under-valued, neglected, or minor forest commodities that play a key role for the entire livelihood of the forest people. This paper highlights the diversity of NTFP marketed by the local people of Papua at traditional markets in Manokwari, West Papua. Data were collected from twenty respondents selected randomly from two local markets at Manokwari and field visits to surrounding (primary or secondary) forests, and analyzed using simple statistical analysis. The result indicates that 29 NTFPs commodities were on the market, and grouped into vegetables (9), food (4), fruit (7), medicinal herbs (4), tools (3) and addictive material (2). These commodities give alternative incomes, create unskilled jobs to the female-forest dwellers at Manokwari, and provide daily fresh vegetables and nutritious products for local customers. The marketed NTFPs are harvested from surrounding primary or secondary forest areas of Manokwari. Banana is the most favorable commodity in high demand either serving as food or fruit. Sago (*Metroxylon* spp.) is the only commodity supplied from other areas out of Manokwari, mainly from Wondama, Biak, Jayapura, and Serui. Annual events of Christmas and New Year create the highest demand for sago processed to papeda, that represent cultural or heritage food for most of the Papuanese family gatherings. Cultivation of these NTFPs has to be seriously considered for sustainable harvest due to the current extensive harvesting from the nature which will deplete the resources if no intensive cultivation carried out. To sustain availability of fresh daily needs, and provide alternative income to local people, local government, forest institutions, universities, non government organizations, and motivators need to work together to gain added value and secure sustainable supply of those NTFPs.

Keywords: Non-Timber Forest Product, local market, trade, West Papua

*KOMODITAS HASIL HUTAN BUKAN KAYU YANG DIPERDAGANGKAN OLEH PENDUDUK LOKAL DI PASAR TRADISIONAL MANOKWARI- PAPUA BARAT. Hutan tropis Papua memiliki keanekaragaman komoditas hasil hutan bukan kayu yang tinggi dan mampu memenuhi berbagai kebutuhan hidup masyarakat hutan. Komoditas tersebut cenderung diabaikan dan belum dikelola dengan baik dibandingkan hasil hutan kayu, meskipun kenyataannya hasil hutan ikutan ini berperan penting bagi keberlangsungan hidup masyarakat hutan. Penelitian ini melaporkan tentang keanekaragaman komoditas hasil hutan bukan kayu yang diperdagangkan di pasar tradisional di kota Manokwari Papua Barat. Data dikumpulkan melalui wawancara terhadap 20 responden terpilih dan kunjungan lapangan, dan diolah dengan analisis statistik sederhana. Hasil penelitian menunjukkan bahwa 29 jenis komoditas diperjualbelikan di pasar lokal Manokwari, dikelompokkan ke dalam sayuran (9 jenis), bahan pangan/makanan (4 jenis), buah-buahan (7 jenis), tanaman herbal (4), alat kerajinan (3 produk), dan bahan adiktif (2 komoditas). Perdagangan komoditas ini mampu memberikan pekerjaan alternatif dan penghasilan tambahan bagi masyarakat hutan, khususnya ibu rumah tangga serta memenuhi kebutuhan konsumen akan produk-produk alami segar dan bernilai nutrisi tinggi. Pisang adalah komoditas paling populer, dikonsumsi sebagai buah-buahan atau produk olahannya. Aci sago (*Metroxylon sago*) adalah satu satu komoditas berasal dari luar Manokwari, seperti dari Wondama, Biak, Jayapura dan Serui. Permintaan aci sago mencapai*

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*puncaknya pada perayaan Natal dan Tahun Baru, dimana tradisi keluarga berkumpul dan merayakan kebersamaan dengan menyajikan papeda. Mayoritas, komoditas tersebut adalah hasil pemanenan atau memetik, dan belum adanya usaha untuk menanam atau membudidayakannya. Untuk terus dapat memenuhi kebutuhan konsumen akan produk segar dan bernutrisi, dan memberikan alternatif pekerjaan, serta penghasilan tambahan kepada masyarakat hutan, maka pemerintah daerah, lembaga swadaya masyarakat, kalangan akademisi, dan pemangku kepentingan lainnya perlu bersinergi meningkatkan nilai tambah dan keberlanjutan produksi dari komoditas ini.*

*Kata kunci: Hasil hutan bukan kayu, perdagangan, pasar tradisional, Papua Barat*

## I. INTRODUCTION

Tropical forests have been widely acknowledged for their richness in biodiversity, social-economic roles and supporting livelihood of the forest people (Sarmah & Arunachalam, 2011), balancing global climate and carbon cycling of the universe, as well as being the source of main economic revenues for most rural people living in developing countries. Long term interactions and heavy dependence of indigenous peoples on forest resources have been widely recognized for the improvement of their livelihoods (Andel & Reinders, 2010). Tropical forests provide two main products a) timber, the main or major product, and b) non-timber forest products (NTFPs), the minor or even inferior products. Even though these two forest products are renewable or sustainable products their differences and similarities are very obvious or contradictory (Wahyudi, 2013).

With respect to their economic contributions, timber production is measurable but not NTFPs. More importantly, their ecological, social, and biological values, as well as economic values are contradictory to one another. Timber harvesting or production requires intensive capital investments, resulting in environmental damages, as well as disturbances to the remaining forest ecosystem. On the other hand, the impacts on the environment of harvesting NTFP and the remaining forest ecosystem are much less than those of timber forest products (Arnold & Perez, 2001). More importantly, the ecological, social, biological and economic values of NTFPs are tremendous and immeasurable. It seems that the net values of NTFPs are bigger than those of timber

(Rositawati & Effendi, 2013; Wahyudi, 2013).

Papua Island consists of Papua and West Papua provinces. It has evergreen forest called Papuasias tropical forest with an area of 41.5 million ha. The Papuasias tropical forest is one of the mega-biodiversity hot spots left on the Earth and becomes the last World Heritage, on which the future of medicinal treatment, illness, and drug development are relying (Wahyudi, 2012). Papuasias tropical forest produces high-value, beautifully decorative timbers, such as merbau (*Intsia* spp.), matoa (*Pometia* spp.), dao (*Dracontomelum edule*), and others. The NTFPs, which have already been acknowledged and used widely for medicinal purposes, are red fruit (*Pandanus conneideus* L.), mahkota dewa (*Phaleria macrocarpa* (Scheff) Boerl), sarang semut (*Myrmecodia tuberosa*), and kantong semar (*Nepenthes alata*).

Papua Island is inhabited with various ethnics, including indigenous people speaking 307 languages and consisting of 300 ethnic groups (Language Centre of Papua and West Papua, 2013). They live mostly close to the surrounding tropical forests, and frequently called "forest people" (Wahyudi, 2012) or "forest dwellers" (Arnold & Perez, 2001). These indigenous people depend heavily on these forests for variety of reasons, like food, vegetables, fruits, fresh fish and meat, as well as instant and attractive additional income (Pohle & Reindhardt, 2004). Harvesting forest commodities of NTFPs are relatively easy work to be carried out with no high-skills and special tools are needed. For most indigenous people, forest harvesting is also one of their alternative jobs, in combination with other activities such

as fishing, hunting and shifting cultivation.

Food and Agriculture Organization (FAO) (1998) has acknowledged that regarding their end utilization, NTFPs commodities can be grouped into five purposes, food and their derivative products, ornament of plants, wild animal and their products, non-wood construction material, and bio-organic material. Whereas, for economic, as regards usages and market analysis, NTFPs are divided into three categories, like subsistence level (for own consumption), local used-level, and commercial level. In Manokwari, West Papua, diverse NTFPs are harvested and sold at local markets, the place, where local people, forest harvesters, and local consumers make social contacts and interactions. They provide daily income and subsistence work for the indigenous women. They also become the important sources of fresh nutritious food for local communities. They are complementary to those from agriculturally cultivated food or vegetables. Diversity of NTFPs, traded at local markets in Manokwari, their roles to income generation and creating alternative works to the local people, and the NTFPs commodities with highest demands are not studied intensively yet. Therefore, this paper present the diversity of non-timber forest products harvested and marketed by the local people at two local markets in Manokwari, West Papua. The roles of NTFP commodities in the daily income of the indigenous people or alternative works, and the potential efforts contributing to the sustainability; even production and supply, as well as market chain of the favored NTFP.

## II. MATERIAL AND METHOD

Research was conducted at two local markets, Sanggeng and Wosi, representing traditional and typical markets at Manokwari, West Papua. Wosi (S 00° 51'58".3, E 134° 03'58".1) is approximately 3 km away from Sanggeng (S 00° 52'04".6, E 134° 03'04".6). This research was conducted in 2013, and completed in two months period. Twenty female respondents,

all indigenous people of Papua acting as both suppliers and sellers, were selected purposively according to their NTFP sold. Survey and field visits were conducted to examine the state of the forest areas, where the NTFP were mostly harvested and gathered. The collected data were tabulated and analyzed using simple statistical analysis.

## III. RESULTS AND DISCUSSION

### A. NTFP Commodities

The results show that 29 NTFP commodities were recorded by this research, and grouped into vegetables (31%), food (14%), fruits (24%), medical herbs (14%), tools (10%), and addictives (7%). These commodities are fewer compared to those reported by several other studies. Pohle and Reinhardt (2004) reported that 120 plant species were taken from forest and used in the Nangaritza valley, Southern Ecuador, mostly used for food (27%), medicine (16%), and construction (27%). Collin, Martins, Michell, Teshome, and Arnason (2006) reported that 86 medicinal plants mostly forest vegetation were reported and used in East Timor, ranging from bark, root, stem, leaves, sap, fruit, flower, and wood. The diversity of NTFPs commodities harvested and sold by the local people at the two local markets in Manokwari, West Papua, are illustrated in Figure 1.

Figure 1 shows that numbers of NTFP commodities of vegetables, addictives and food sold at the two local markets, Wosi and Sanggeng, are similar to one another. Vegetables and fruits, consisting of 9 and 7 commodities, respectively, are the two dominant NTFPs, among the others. These vegetables are mostly leaves of wild plants growing in the primary or secondary forest areas. The five favorite vegetables of the customers are leaves of gnemo (*Gnetum gnemon* Linn), fern leaves (*Diplazium esculentum*), young leaves of pakis (*Cyathea contaminans*), gedi leaves (*Abelmoschus manihot*), and cassava leaves (*Manihot utilissima*). These vegetables are rich in vitamin, good sources of antioxidant (Widowati, Safitri, Rumumpuk, & Siahaan, 2005), and protein

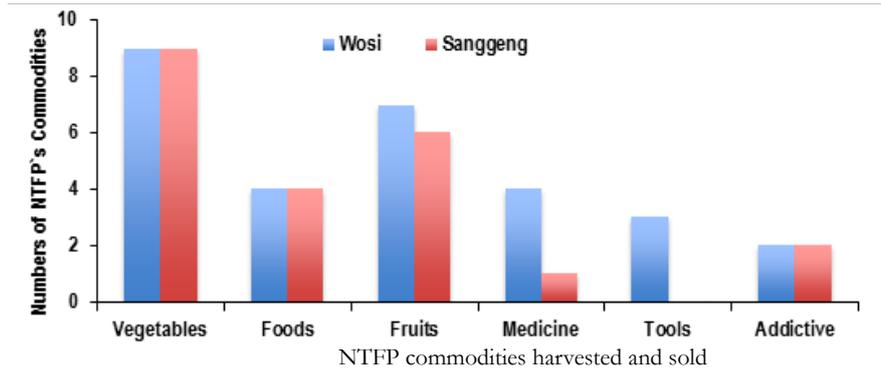


Figure 1. NTFP commodities harvested and sold at the two local markets in Manokwari



(a)



(b)

Figure 2. Fern leaves (a), and cassava leaves (b)

(Khang, Wiktorsson, & Preston, 2005). Fern and cassava leaves are shown in Figures 2a and 2b, respectively.

Local people plant cassava crop for two purposes: 1) narrow leaves for production of vegetables, and 2) broad leaves for producing tuber. It is very important to highlight that indigenous people grow plants for different purposes. For example, cassava planted for producing leaves is different than those planted for producing tuber. Similarly, *Carica papaya* planted for producing leaves or flower are different than those planted for producing fruits. From these practices, it is clear that local knowledge in growing plants for certain purposes does exist in West Papua. It is obvious that harvesting leaves frequently of cassava in big volumes will have a physiological impact on this plant to produce tuber (Khang et al., 2005).

Therefore, to get maximum leaves and tubers, the local people plant two different cassavas, one for leaf production and another for tuber production. These practices are also applied for *Carica papaya* (Zhou, Christopher, & Paull, 2000).

Fresh, un-cultivated, or wild mushroom and bamboo shoot were also sold at both traditional markets. The two wild mushrooms are compost and wooden mushrooms, and are available mainly during the rainy season, but bamboo shoots are available through the season. The wooden mushroom is initiated by felling suitable host trees for mushroom substrates, and compost mushroom grow naturally at any compost litter on forest floor. Mushrooms are rich in protein (Mayun, 2007) and bamboo shoot is effective as anti-cholesterol (Park & John, 2009).

All NTFP commodities are harvested from

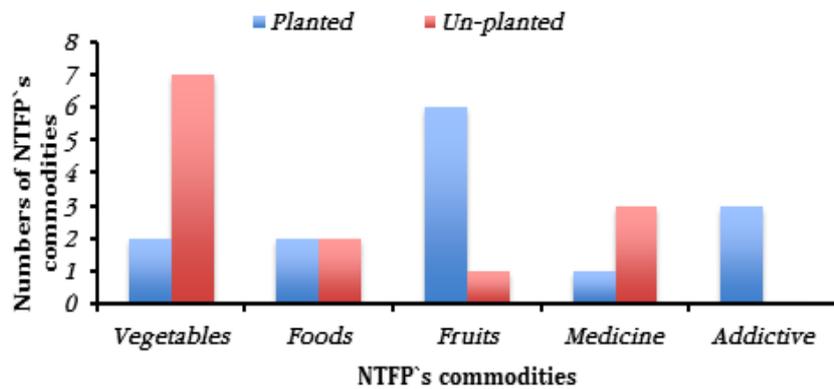


Figure 3. Planted and not planted NTFP commodities



(a)



(b)

Figure 4. Addictive commodities of pinang (a) and sirih (b)

Manokwari and its surrounding areas, but sago (*Metroxylon* sp.) is the only commodity supplied from outside, such as Wondama, Biak, Jayapura and Serui. It is probably due to the fact that those areas are locally known as producer of the best quality sago. As a traditional food, sago is recently disappearing from the traditional market. Best price and high demand of this commodity is close to December, where Christmas and New years Eve are celebrated by most local people, thus the annual time for family gathering.

### B. Planted and Not Planted Commodities

To ensure the sustainability of NTFPs for the next harvesting seasons, cultivation must be carried out as these commodities are planted for earning cash (Kunio & Lahjie, 2015). However, intensive cultivation of planting, weeding, pruning, fertilizing the plants is not common

practices for the local people. They mostly do only enrichment planting or replacing old plants, and leave them grow naturally. These practices are not recommended for long term use as these commodities will be extinct or absent to supply local consumption. Presumably most of the daily NTFP commodities growing in the forest have the ability to renew themselves for the next harvesting season (Arnold & Perez, 2001). Sustainable harvest of renewable NTFPs can contribute to the economic well-being of the forest people and involving them in conservation of the biodiversity (Shankar, Murali, Shaanker, Ganeshiah, & Bawa, 1996). Therefore, levels of extraction, replantation, and enrichment planting are necessary to prevent the loss of these commodities in the future (Perez & Byron, 1999).

The number of planted and not planted NTFP commodities is shown in Figure 3.

This figure clearly indicates that vegetables are mostly harvested from wild plants, where seven of nine vegetables are not planted, ranging from gnemo (*Gnetum gnemon*), fern (*Diplazium esculentum*), pakis (*Cycas* sp.), gedi (*Abelmoschus manihot*), *Carica papaya*'s flower, bamboo shoot, and edible mushroom. These vegetables are classified as wild edible NTFPs that are commonly collected from the forests for self-subsistence, as well as for cash generating income (Sarmah & Arunachalam, 2011). The two-planted vegetables are *Cassava* sp. and *Carica* sp. for producing leaves.

Figure 3 also highlights that NTFP for daily consumption that are available through the season are mostly not planted. Due to their natural potentials, fast growing recovery, and distributed anywhere, they are harvested directly from the secondary forest. Local people usually have several locations for communal territory, where all members of the local community could harvest proportionally both for family consumption and selling for cash. On the other hand, fruits and additives (Figures 4a and b), are two commercial NTFPs for earning cash for local people, and only belonging to the owner of the land. In addition, two other planted vegetables of *Cassava* sp. and *Carica* sp. are planted on any marginal or un-attended land by local people, and only the grower could harvest.

Fruits and additives commodities are mostly planted to earn family income. Durian (*Durio zibethinus* L.), rambutan (*Nephelium lappaceum* L.), and avocado (*Persea americana* Mill.) are very attractive fruit commodities to earn money for the local people. While pinang (*Areca catechu* L.) and sirih (*Piper* sp.), as shown in Figure 4a and 4b, respectively, are the two most favorite addictive commodities for the local community. These commodities are contributing to the dirtiness of public places or offices due to producing a red-resistant and sticky color. Local people ranging from children to adults mostly consume or become addicted to these commodities.

Figure 4 represents two complementary addictive commodities, namely pinang fruits

with cooked lime (Figure 4a), and fruit of sirih (*Piper* spp.). When the demand of these commodities is very high, these commodities are supplied from outside Manokwari. Pinang fruits are sometimes replaced by dried gambir (*Uncaria gambir* Roxb.) fruit.

### C. Harvesting Season

Harvesting season refers to the time period of harvesting, which is divided into two categories, all seasons and seasonal. All seasons mean that the commodities are available throughout the year, while seasonal refers to a definite time of harvesting. Availability of NTFPs or harvesting times, are summarized in Figure 5. It shows that NTFP commodities are mostly available throughout the season. The vegetable that is available all seasons is wild mushroom, while two fruits that are available all seasons are banana (*Musa* spp.) and markisa (*Passiflora quadrangularis* Linn.)

As these commodities are mostly available for harvesting throughout the season, it clearly shows that local people do not experience shortage to the next harvesting. The volume of harvest is quantifiable to their personal capacity and capability, availability of NTFP, as well as market demands. With these approaches, the indigenous peoples are quite reasonable in balancing the production, supply, and demand of the local markets. This means that local people always quantify their NTFP harvest based on their own carrying capacity and the income that could be earned. Complexities of walking tracks or accesses, capacity limitations as well as the next harvesting period are variables for avoiding over harvesting despite market demanding. To sustain productivity and sustainability, local people avoid over extraction or harvest of NTFP commodities (Ros-Tonen, 2000). It seems that this traditional and ancient knowledge of utilization of natural resources reflects the indigenous policy of sustainable management and utilization (Andel & Reinders, 2010; Sarmah & Arunachalam, 2011).

It is also supported by the facts that local people have more than one location

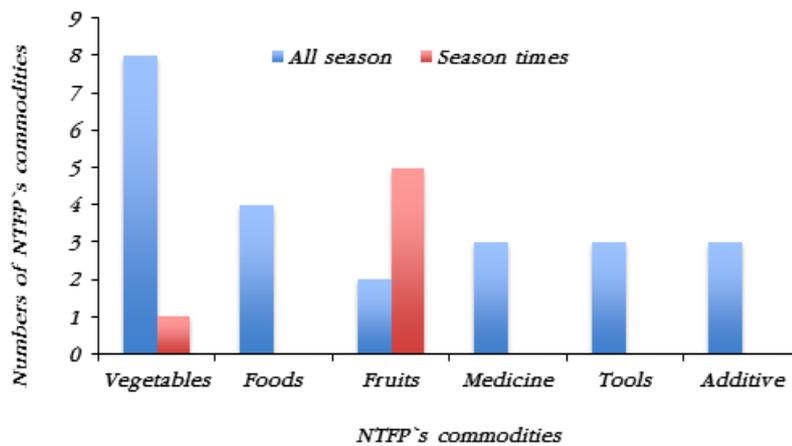


Figure 5. Harvesting seasons for NTFP commodities

for harvesting and collecting these NTFP commodities. They always harvest their commodities using a rotation scheme. Forest dwellers come to the commodities suitable for harvesting, and go to other commodities and locations for the next harvesting, and finally harvesting is back to the first commodities or harvesting cycle or rotation. This is quite reasonable as this method is easy to do, need unskilled work, small investment, low risks, and no special tools are needed. Therefore, in this case NTFP extraction is likely more familiar than other skilled works for forest dwellers.

**D. Food and Agriculture Organization (FAO) classification for NTFPs**

FAO (1998) classified NTFPs according to their end usages into 5 (five) classes, ranging from food and their derivatives, ornamental plants, wild animal and their derivative products, bio-organic chemical, to non-wood construction material. Whereas, for economic, scale of usages, and market analysis, they can be grouped into three levels, subsistence level, local-used level, and commercial level, respectively. Accordingly, the NTFP harvested and marketed at the two local markets in Manokwari town can be summarized as shown in Figures 6a and 6b, respectively.

Figure 6a clearly illustrates that 77% of NTFP commodities sold by the local people at the two local markets in Manokwari belong to food and

their derivative products. Mostly, they are fresh-green ones, which have just been harvested from the surrounding forests, then transported directly to these local markets. According to FAO (1998) classification, these NTFP commodities are dominated by subsistence commodities, and two commodities of medicine, red fruits and lawang's root *Cinnanomum culilawan*, and tool (bamboo comb) are classified to locally used-level commodities. The NTFP commodities are in majority daily consumable goods and categorizes as subsistence level. These findings highlight that they are consumed directly after being harvested from the forest or sold in fresh condition to earn money to meet the daily expenses of the forest dwellers (FAO, 1998).

**E . Local Prices and Scales or Values**

The NTFP commodities marketed at the two traditional markets in Manokwari town employ a local or bargained standard or values, like bunch for vegetables, stacking of fruits or population (packet of 10 pinang, 20 sirih and a sachet of cooked limed (Figures 4a and 4b), for additive commodities. Common scales like kilogram (kg), or gram (gr) are not used frequently. Regular price for a bunch of vegetables is Rp 5.000 (five thousand Indonesian rupiah), equal to \$US 0.52 on average. During harvesting time, approximately 50 bunches of two or three different vegetables are prepared. One-cluster cooking banana, consisting of 10-15 bunches,

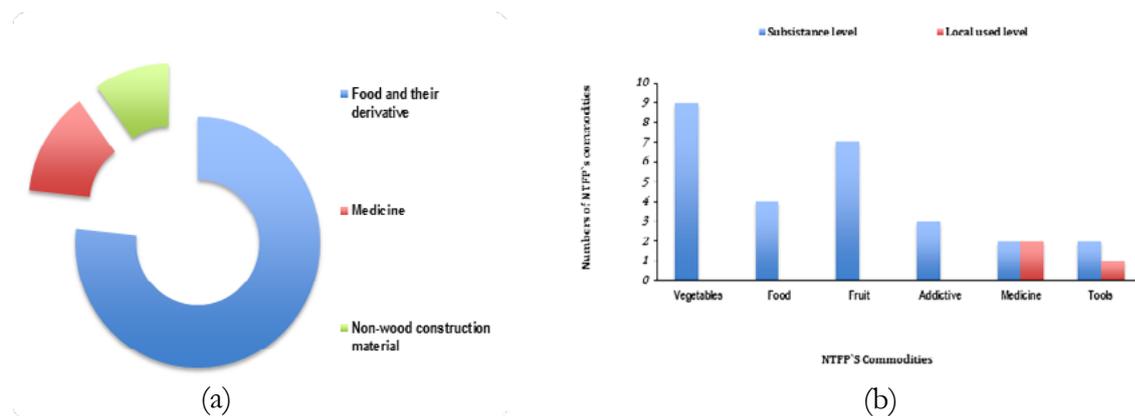


Figure 6. Classification of NTFPs according to their end usages (a) and market analysis (b)

has a price of Rp 150,000 – 200,000, and one-pile mushroom is Rp 5,000, which is enough to make fried vegetables for two persons.

Processed medicinal plants of Red fruit raw extract and a bag of dried-raw Sarang semut were the most expensive NTFP commodities, at a price of Rp 60,000 – 75,000 for 650 ml of red fruit extract, Rp 75,000 (black) and Rp 150,000 (white) for Sarang semut, respectively. Forest dwellers could earn approximately Rp. 350,000 – 650,000 for a single trip to these two local markets, including transportation and meal cost. They could earn a net income from Rp 200,000 to Rp 500,000 on average or fluctuating from Rp 500,000 to 1,500,000 when the commodities marketed are mostly fruits and additives.

The local people involved in these NTFP commodities are old women, mostly from Biak, Wondama, Serui, Sorong, and Manokwari itself. However, those from mountainous areas are major sellers at Wosi traditional market, while those from low land areas surrounding Manokwari are at Sanggeng market. Several non-indigenous people are involved in selling addictive commodities, and two indigenous people are also selling processed medicinal plants, but they are just selling, without processing them. Indigenous people harvest their NTFP commodities from the forest areas, and grouped into vegetables, food, or fruits, using plastic bag made from recycled rice pack, and directly transported to the local market by

car, urban transportation. Stacking, bunching, and dividing of commodities are done at the markets. They sell their commodities by themselves. On the other hand, half processed products of medicinal plant, like Red fruit, dried-sarang semut, and roots of Lawang, are brought from the home processed industry, and sold to the consumer by the local people.

These findings highlight that intensive training on small entrepreneurship for local people are necessary to maximize the added value of their medicinal plant commodities. Also, post harvest treatment, packaging and labeling are such efforts that could be provided to support the local people to optimizing profit from their NTFP commodities harvested from their own forest.

#### IV. CONCLUSION

Papuas tropical rain forest provides substantial and never-ending support to the local people, including consumable products called Non-Timber Forest Products (NTFP). These products also provide substantial nutrition not only for the forest people but also to the local community of Manokwari. For local people, harvesting and selling NTFP commodities could provide instant income, offer alternative work, and earn money to cover their daily expenses.

It is highlighted that in the future NTFP supplied from the natural forest will decrease if intensive cultivations or re-planting are not

undertaken by the local people to ensure that the supply of NTFP commodities of vegetables, fruits, foods are continuously available when needed. This is important not only to secure the income generating sources and alternative works of the indigenous people but also the demand of local communities with green, fresh and nutritious commodities with reasonable prices.

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