

# The Economic Role of Indigenous Wild Food Plant for the Local People: A Case Study of *Arenga Pinnata* Plant Production in North Sulawesi Province, Indonesia

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## Abstract

*Arenga Pinnata* plant is a wild food plant where commonly grows in Indonesia particularly in the tropical forest in this country. This plant for long time has provided valuable economical benefit for the local people Indonesia, such as provided a main resource of job for many local farmers in this country to produce various foods and other product. The main production of this plant is the local alcohol beverage and palm sugar. The reason of local farmers to produce the local alcohol: 1) marketable and 2) provided the highest economic benefit for them. Also, the local alcohol called *cap tikus* (in North Sulawesi Province) was also used as a main element in the traditional rituals event of local people since long time ago. Unfortunately, *cap tikus* has been always blamed as a main trigger of the social problems such as noises and other criminal acts. It was recorded that more than 50% of the social and criminal problems in this province occurred because of alcohol consumption. Whereas, the alcohol *cap tikus* product has provided benefit opportunities to farmers in order to survive their daily live. Therefore, this study attempts to substantiate the aforementioned the economic role of wild food plant, *arenga pinnata*, for the local people particularly for *cap tikus* farmers; and to solve divergence of argumentations regarding to forbid the production and marketing activities of *cap tikus* in this area.

This study was conducted in North Sulawesi Province in Sulawesi Island, Indonesia. In order to reveal the economic role of *arenga pinatta* plant for the local people, 50 *cap tikus* farmers in Minahasa Selatan regency were selected. The data (empirical data) that is used for analysis of this research work was derived from field survey.

The findings of this study suggest to the local government with collaborate with local people particularly farmers, should: ① eager and continuously campaign the utilization of alcohol beverage and its consequences; ② support the *cap tikus* farmers to sell the *cap tikus* to the other market industry such as medicine and cosmetic industry; ③ provided a research center of *arenga pinnata* plant particularly to convert alcohol *cap tikus* to be bio-energy (bio-ethanol); ④ provide simple technology to the *cap tikus* farmers how to produce other benefit products of *arenga pinnata* plant; ⑤ create and promote the production place and how to produce alcohol *cap tikus* in tourism event programs; ⑥ support the sustainability program of *arenga pinnata* plant as a wild food plant which provided high indispensable economical benefit for the local people.

**Keywords:** Wild Food Plant, *Arenga Pinnata*, *Cap Tikus*, Farmer, Local People

## 1. Background and Subject

*Arenga Pinnata*<sup>(1)</sup> plant is a wild food plant where commonly grows in Indonesia particularly in the tropical forest in this country. According data from Agriculture Department Republic of Indonesia in 2004 that the plantation of *Arenga Pinnata* plant are covers 60.482 ha out of the total cultivation areas of agriculture<sup>(2)</sup> in Indonesia and these plants are spread in 14 provinces (Effendy, 2010). This plant for long time has provided valuable economical benefit for the local people Indonesia, even the utilization of this plant has provided a main resource of job for many local farmers in this country to produce various foods and other product<sup>(3)</sup>, but the main production that exploited by the local farmers are alcohol (local traditional beverage) and palm sugar (Pakasi, 1998). Further, the reason of local farmers to produce the local alcohol from this plant, because this product is marketable and provided the highest economic benefit for them, rather than the other products from this plant.

In North Sulawesi province, *arenga pinnata* has grows and spread covers more than 6,000 ha out of the total cultivation area of agricultural<sup>(4)</sup> in this province, this plant has provided benefit opportunity for the local farmers for a long time particularly for *cap tikus*<sup>(5)</sup> farmers. According Lontah (2011) *cap tikus* has been a one of marketable commodity in the local trading activities since 1512. In the recent year, more than 10, 000 farmers<sup>(6)</sup> in this province are producing *cap tikus* and they are totally depending on this production activity as a main job to survive their livelihood. In Minahasa Selatan regency, the highest production place of *cap tikus* in North Sulawesi province, the farmers in this regency had produced more than 10 million liters *cap tikus* every year. Then, government of Minahasa Selatan regency reported that amount of *cap tikus* production has provided market benefit more than 50 billion rupiah<sup>(7)</sup> or more than 5.6 million rupiah every year for the farmers in this regency (Government of Minahasa Selatan Regency, 2005). In addition, as a one of commodity to be traded, *cap tikus* was also used as a main element in the traditional rituals event of local people since long time ago (Lontah, 2011).

Unfortunately, recently *cap tikus* has been blamed as a main trigger of the social problems such as noises and other criminal acts (Manado Post, 2010; Tribun Manado, 2011). By field observation, Roeroe (2011) said that more than 50% of the social and criminal problems in this province occurred because of alcohol consumption. Based on those facts, some people suggested to the North Sulawesi Government to forbid the production and marketing activities of the local alcohol, *cap tikus*. However, in contrary, Pailah (2008) argue that the traditional direct trading of *cap tikus* conducted by farmers has provided income to survive their daily live even they able to support their kids to study until graduated of university level. Also by field observation, Suwartapradja (2003) said that *arenga pinnata* plant has many potentialities as an additional income for the farmer.

Therefore, this study attempts to substantiate the aforementioned the economic role of wild food plant, *arenga pinnata*, for the local people particularly for *cap tikus* farmers; and to solve divergence of argumentations regarding to forbid the production and marketing activities of *cap tikus* in this area. The data that is used for analysis of this research work was derived from field survey. This work is organized as follows: Section 2, describes the reasons for the selection of the surveyed area and the object of the survey. Section 3, analysis the economic role of *arenga pinnata* plant for the *cap tikus* farmers. Finally, the consideration and suggestions are drawn to discuss possible future directions regarding to use the *arenga pinnata* plant for the local people.

## **2. Methodology**

### **(1) Reasons for the Selection of the Survey Area**

The studies were conducted in North Sulawesi province on Sulawesi Island, Indonesia. According data from Health Ministry Office of Indonesia, people in this province is the second highest (17.4%) of alcohol consumption compared the other provinces in this country (Table 1). Moreover, table 1 show that people of North Sulawesi province in the last month of 2008 is the highest of alcohol consumption (14.9%) in Indonesia.

**Table 1. Percentage of Alcohol Consumption of Indonesian People based on Province in 2008**

<b>Provinces</b>	<b>Alcohol Consumption in a year (%)</b>	<b>Alcohol Consumption in last month in 2008 (%)</b>
Nangro Aceh	1.5	0.4
Sumatera Utara	6.1	4.4
Sumatera Barat	1.5	0.7
Riau	3.4	1.3
Jambi	2.7	1.7
Sumatera Selatan	2.9	2.1
Bengkulu	2.8	1.8
Lampung	2.2	1.4
Bangka Belitung	4.4	2.5
Kepulauan Riau	5.9	3.7
DKI Jakarta	4.0	2.7
Jawa Barat	2.6	1.3
Jawa Tengah	2.2	1.1
DI Yogyakarta	3.2	1.7
Jawa Timur	1.9	1.0
Banten	1.6	0.9
Bali	6.4	4.6
Nusa Tenggara Barat	2.0	1.2
Nusa Tenggara Timur	17.7	13.5
Kalimantan Barat	8.8	4.8
Kalimantan Tengah	6.5	3.5
Kalimantan Selatan	1.2	0.5
Kalimantan Timur	3.4	1.7
<b>Sulawesi Utara</b>	<b>17.4</b>	<b>14.9</b>
Sulawesi Tengah	8.9	6.4
Sulawesi Selatan	6.9	3.9
Sulawesi Tenggara	7.7	5.8
Gorontalo	12.3	10.7
Sulawesi Barat	4.0	2.6
Maluku	8.2	5.8
Maluku Utara	7.4	4.4
Papua Barat	8.1	4.9
Papua	6.7	4.4
<b>INDONESIA</b>	<b>4.6</b>	<b>3.0</b>

Resource: Riskesdas, 2009.

## (2) Object of Survey

In order to reveal the economic role of *arenga pinatta* plant for the local people, we selected Minahasa Selatan reGENCY, the largest plantation areas (1,959.5 ha) of the *arenga pinnata* plant in North Sulawesi (Table 2). The amount of the production of *arenga pinnata* plant in Minahasa Selatan reGENCY represented 42% of the total production of *arenga pinnata* plant in North Sulawesi province (North Sulawesi Statistics Office, 2011).

**Table 2. Total Plantation Areas and Total Production of *Arenga Pinnata* based on Cities/Regencies in North Sulawesi Province**

Regencies / Cities	Total Areas (Ha)	Total Production (Ton)
Minahasa Regency	773.5	370
Minahasa Selatan Regency	1,959.5	773
Minahasa Utara Regency	698.7	224
Minahasa Tenggara Regency	880.2	155
Kepulauan Talaud Regency	-	-
Kepulauan Sangihe Regency	-	-
Kepulauan Sitaro Regency	-	-
Bolmong Regency	143.4	53
Bolmong Utara Regency	172.0	101
Bolmong Selatan Regency	82.8	2
Bolmong Timur Regency	149.3	89
Manado City	-	-
Bitung City	96	-
Tomohon City	981	28
Kotamobagu City	65.6	44
<b>North Sulawesi Province</b>	<b>6,002</b>	<b>1,839</b>

Resource: North Sulawesi Statistics Office, 2011.

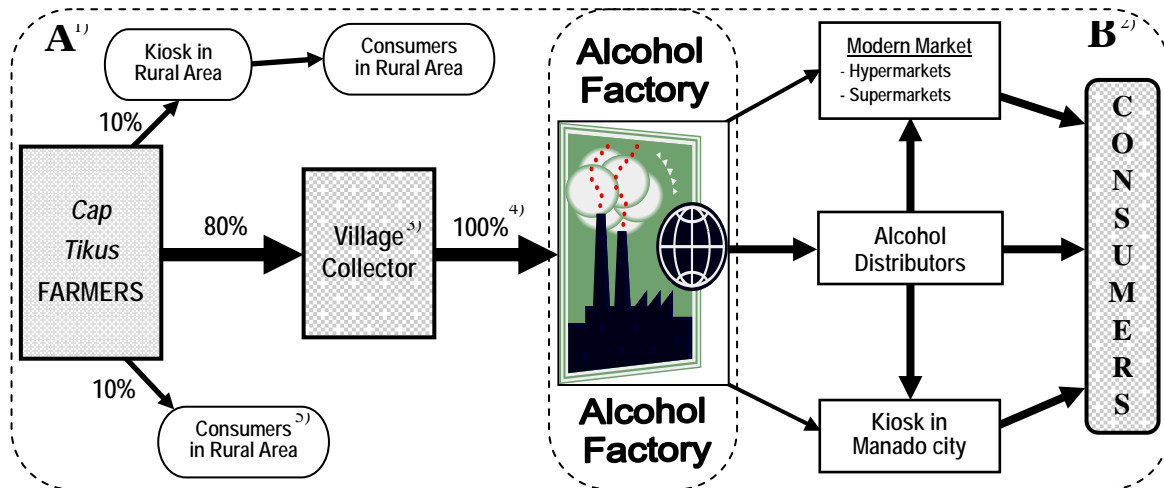
Then, the data on analysis of this survey was collected from surveying *cap tikus* farmers who are living in Wanga village, Motoling district. This village was selected because based on the report from Minahasa Selatan Statistics Office (2011), Wanga village, Motoling district is the largest production and plantation areas of *arenga pinnata* which produce alcohol *cap tikus* in Minahasa Selatan regency. This village was selected because most of the farmers are market-oriented. In this village, Hamlet 4 was selected among 4 hamlets based on the largest producing hamlets. There are 72 *cap tikus* farmers in Hamlet 4, currently. Then, 50 *cap tikus* farmers were randomly selected from this hamlet of Wanga village.

### 3. Analysis and Results

#### (1) The Prominent Marketing Role of the Local Alcohol Product, *Cap Tikus*.

Figure 1 show the marketing channel pattern of the local alcohol, *cap tikus*, from the production area to the markets in North Sulawesi Province. This channel reveals that many people are engaged in this marketing activity of the *cap tikus* product. The people who engaged in *cap tikus* marketing activity are local collectors, the owners of rural kiosks, the alcohol company and their employees, and alcohol company marketing agents. Concerning the farmers' supply, the local

collector is the main selling target (80%) of farmers rather than sell to the rural consumers (10%) or rural kiosks (10%) directly. According *cap tikus* farmers, they keep sell to rural consumers and rural kiosks because they can get daily cash income for survive they daily life.



**Figure 1. Marketing Channel of Local Alcohol *Cap Tikus* in Manado Area North Sulawesi Province**

Source: Based on data collected from 50 *cap tikus* farmers' surveyed in Hamlet 4, Wangra village, Motoling Distric, Minahasa Selatan regency (November, 2011).

Notes : 1) A = Marketing channel of *cap tikus* from farmers in rural area to alcohol factory.

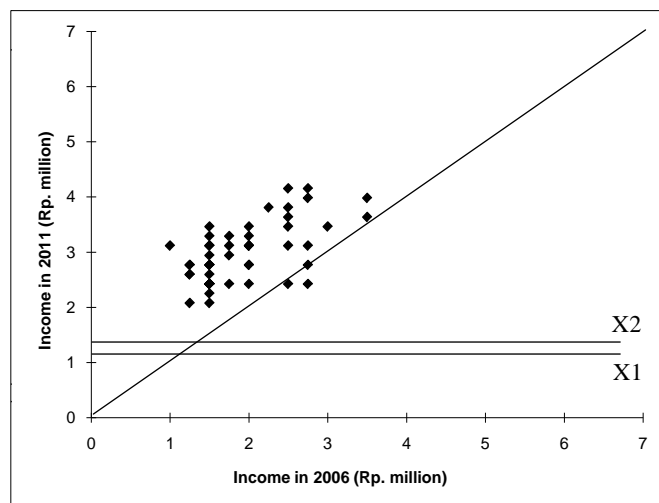
2) B = Marketing channel in urban area of the local alcohol production made from *cap tikus* product.

3) Village Collector is the local people, who buy the *cap tikus* product, also they living together in the same village with *cap tikus* farmers.

4) Village collector supply all the product where collected from *cap tikus* farmers to the alcohol company.

5) Rural consumers buy the *cap tikus* product directly to the *cap tikus* farmers.

Graph 1 show that the real income level of *cap tikus* farmers compared to their income levels of 5 years ago respectively. Based on this comparison, it was found that the incomes of most of the *cap tikus* farmers (96%) had increased more than the minimum incomes in the province during 5 years between 2006 and 2011 (the



**Graph 5.6. Monthly Net Income of *Cap Tikus* Farmers in North Sulawesi Province in 2011 and 2007 Deflated by Normal CPI.**

Source: Same as.

Notes: 1) Deflated by normal CPI (CPI 2011 = 144.5) based 100 (2006), CPI was provided by the North Sulawesi Province Statistics Office.

2) Net income = Gross income – production cost.

3) X1: Provincial Minimum Income (Rp. 1,050,000 in a month) in 2011.

4) X2: Average Provincial Income (Rp. 1,250,000 in a month) in 2011.

5) Rupiah (Rp) is the Indonesian official currency. 1JPY = Rp. 115 (November, 2011).

data of 2006 is deflated to match 2006 prices). Though the incomes of some farmers (4%) are decreased, but it was still far beyond the minimum incomes in the province. Based on the income level, the *cap tikus* farmers in this area are able to sustain their living and production activities even they can reduce the local poverty because they can continuously market their production to the consumers. If the local government will be forbid the production and marketing activities of *cap tikus*, many farmers in this area would not be able to secure even the minimum income in order to survive their family livelihood.

**(2) High Production and Selling Frequency, and Provide Sustainable Economic Benefit for the Local Farmers.**

The survey of farmers reveals that the selling frequency of *cap tikus* product to the consumers is high. Table 3 shows that farmers are selling regularly the *cap tikus* to their consumers almost every day in a week, it because they also able to produce the *cap tikus* product almost every day. Indeed, the habitual selling frequency of the farmers in this area has guaranteed that they get daily cash income.

**Table 3. Production and Selling Times of Cap Tikus Product**

	Production and Selling Frequency of the product	Responses of Farmers	
		Number	Percentage (%)
<b>The production time of the product in a week</b>	Everyday <sup>1)</sup>	48	96 %
	4-5 times a week	2	4 %
	2-3 times a week	-	-
	Others <sup>2)</sup>	-	-
	<b>T o t a l</b>	<b>50</b>	<b>100</b>
<b>The selling time of the products to the consumers</b>	Everyday <sup>1)</sup>	48	96 %
	4-5 times a week	2	4 %
	2-3 times a week	-	-
	Others <sup>2)</sup>	-	-
	<b>T o t a l</b>	<b>50</b>	<b>100</b>

Source: Based on data collected from 50 *cap tikus* farmers' surveyed in Hamlet 4, Wanga village, Motoling Distric, Minahasa Selatan regency (November, 2011).

Note: 1) Working days (6 days).  
2) The frequency of supply is not fixed.

*Cap tikus* product has play a prominent role in providing save condition and sustainable economic benefit for local farmers. Table 4 shows that all the *cap tikus* farmers are local people.

The farmers earn their living entirely from their producing and selling activities of *cap tikus* product, permanently. It means, these activities have provided job opportunities for local people and reduce unemployment as well. Regarding the producing and selling businesses' employees, *cap tikus* farmers in this area only use family labor. Ninety six percent of *cap tikus* farmers have been working for more than 20 years even they said that this farm activity is legacy from their ancients. In production work of *cap tikus* product, the farmers in this area only use their own capital. Further, the selling profit of *cap tikus* product has convinced the farmers to sustain their livelihood, not only to buy their staple food and daily goods but they also able to use its profit for the other valuable purposes of their family. Respectively, 50%, 22% and 16% of the *cap tikus* selling profit use for study allowance of their children, saving and their house renovation.

**Table 4. Characteristics of Farmers and the Selling Profit Uses of *Cap Tikus* Product**

Category	Classification	Total responses of Farmers	
		Number	Percentages (%)
<b>Origin of the farmers</b>	Regency area	50	100
	Other regions	0	0
	Other provinces	0	0
	T o t a l	50	100
<b>Working status</b>	Permanent	50	100
	Seasonal	0	0
	T o t a l	50	100
<b>Established as a <i>cap tikus</i> Farmers</b>	Less than 5 years	0	0
	5 – 10 years	0	0
	10 – 15 years	0	0
	15 – 20 years	0	0
	More than 20 years <sup>2)</sup>	50	100
	T o t a l	50	100
<b>Workers in the production and selling activities of the <i>cap tikus</i> product</b>	Family only	48	96
	Family and employee	2	4
	Employee only	0	0
	Others	0	0
	T o t a l	50	100
<b>The production capital of <i>cap tikus</i> product</b>	Own capital	50	100
	Cooperation	0	0
	Bank loan	0	0
	Others	0	0
	T o t a l	50	100
<b>Purpose of Selling Profit of <i>Cap Tikus</i> Product for Family Allowance<sup>1)</sup></b>	Study Allowance for Children <sup>3)</sup>	25	50
	Saving	15	22
	House Renovation	10	16
	Others	-	-
	T o t a l	50	100

Source: Based on data collected from 50 *cap tikus* farmers' surveyed in Hamlet 4, Wanga village, Motoling District, Minahasa Selatan regency (November, 2011).

Note: 1) Out of buying staple food and daily goods.

2) Family heir, from their ancients.

3) Study until graduated in the university level.



#### 4. Summary and Consideration

This study has analyzed the economic role of wild food plant, *arenga pinnata* for the local people. Through the empirical analyzes, this study has revealed important economic role of the products of *arenga pinnata* plant for the local people particularly for the *cap tikus* farmers. By simple observation during field survey revealed that some people in this area are over consume of the alcohol beverage particularly alcohol *cap tikus*. Then, those people who over consume the alcohol beverage provided inconvenience condition to the other local people (society). However, the empirical data provided by survey farmers revealed that alcohol *cap tikus* product has play a prominent role in providing stable and sustainable economic benefit for local farmers and their livelihood. Moreover, by engaged in this business activity, it's able to reduce poverty and reduce unemployment. It proved that the farmers earn their living entirely from their producing and selling activities of *cap tikus* product. Regarding the marketing activity of *cap tikus* product, many people are engaged in this activity. The people who engaged in *cap tikus* marketing activity are local collectors, the owners of rural kiosks, the alcohol company and their employees, and alcohol company marketing agents. Regarding their income, most of the *cap tikus* farmers' income had increased compared 5 years ago. If the local government will be forbid the production and marketing activities of *cap tikus*, the local farmers will not be able to continue their farm business activities, and may lose their livelihood. In addition, village collectors and the owner of rural kiosks will lose their jobs and livelihoods, moreover the local people will also lose their traditional and culture of local origin beverage.

Therefore, in order to sustain the living of thousands of people and to upkeep the local economy and culture, these findings suggest several actions would be necessary. *First*, the local government with supported by local community leaders eager and continuously to explain the utilization of alcohol beverage and its consequences for over consumption. *Second*, the local government should support the *cap tikus* farmers to sell the *cap tikus* to the other market industry such as medicine and cosmetic industry. *Third*, local government with support local universities

made Minahasa Selatan regency as a research center of *arenga pinnata* plant particularly to convert alcohol *cap tikus* to be bio-energy (bio-ethanol). If this research will be running properly and continuously, in the future this area and Indonesia generally will be solving the oil problem, particularly the fuel energy. *Forth*, provide simple technology to the *cap tikus* farmers how to produce other benefit products of *arenga pinnata* plant such as rope and cleaning equipments from black fibre, handmade or handicraft from leaf, and *kolang kaling*, the cooked endosperm of young sugar palm fruits. *Fifth*, create and promote the production place and how to produce alcohol *cap tikus* in tourism event programs of Minahasa Selatan regency and North Sulawesi province. *Sixth*, the local government should be supporting the sustainability program of *arenga pinnata* plant as a wild food plant which provided high indispensable economical benefit for the local people. For better understanding of the economic role of wild food plant, *arenga pinnata*, for the local people, further research study must be conducted.

This study contributes to unveil the lack of research study on the economic role of the wild food plant particularly *arenga pinnata* for the local people. This study is also expected to bring valuable information in order to solve the divergence of opinions between support and no support the local government regulation to forbid the production and marketing activities of alcohol product, *cap tikus* from *arenga pinnata* plant.

## Notes

- (1) The *arenga pinnata* (Latin) or arrange pinnate (English) or *aren* (Indonesia) is a member of *Palmae* family. This plant commonly grows in the tropical regions. Just like Philippines, Malays and in Indonesia, in ravines a long streams and in semi cultivation. It is naturally a forest species. 85 % of *arenga pinnata* seeds taken from the excrement of Civet (*Musang*) were successfully germinated and grow while those which were taken from the tree and directly planted by man only 44 % succeeded to germinate and grew (Suwartapradja, 2003).
- (2) Total cultivation areas for agriculture in Indonesia are 30,663,604 ha (Balitbang Deptan RI, 2011).

- (3) Beside the main products: the *local alcohol cap tikus* and sugar palm, the other profitable products of *arenga pinnata* are Bio-ethanol; Fuel, old woody leaf bases as well as the long leaves, can be used for fuel (for the energy security) Sago like flour can be ground from the trunk pith and used for cakes, noodles and other dishes; *Kolang kaling*, the cooked endosperm of young sugar palm fruit; Apiculture, a good source of nectar for honey production (for the food security); Fibre: the leaf sheath is a source of a tough, black fibre (*gomuti* or yonot fibre). It is used chiefly for a durable rope; Timber, used for barrels, flooring and furniture; Poison, the roots of *arenga pinnata* are a useful insect repellent; Medicine: roots provide medicinal products, such as a tea decoction used to cure bladder trouble; and The pith of the leaf rachis is an ideal shape for use as a drinking cup (Orwa et al, 2009).
- (4) Total cultivation areas for agriculture in North Sulawesi province is 164.593 ha (Balitbang Deptan RI, 2011).
- (5) *Cap tikus* is a potion with an average content of 40% alcohol even more. *Cap tikus* is obtained through processing of *saguer* (a local potent palm wine); the white fluid that is extracted from the *enau* (*arenga pinnata*) plant, in the Minahasa language called *pohon seho*. The height of the alcohol content of *cap tikus* is determined by the quality of the process. *Saguer* itself already contains alcohol since extracted from the *enau* tree. According to the farmers, the alcohol percentage contained in *saguer* also depends on the way it is extracted and the quality of the bamboo containers where the *saguer* is stored in the moment the *saguer* drips from the *enau* tree. The alcohol content of *cap tikus* depends on the process technology. Until today the farmers use a traditional technique, the *saguer* is cooked and its steam is led through bamboo pipes to the container. Those drops are then known as the beverage *cap tikus*. *Cap tikus* is already known for a long time in the Minahasa. Each Minahasa person who speaks of *cap tikus* will tell you that that drink was already known in the times of their *nenek moyang* (forefathers). It is, however, certain that the *cap tikus* beverage was already favored and popular with Minahasa farmers from the old days.

- (6) Around 85% out of the total number of *cap tikus* farmers in this province occupied by *cap tikus* farmers of Minahasa Selatan regency.
- (7) Rupiah is Indonesia currency.

## References

- [1] Balitbang Deptan RI, Research and Development Board of Ministry Office of Agriculture Republic of Indonesia, “*Ketersediaan Lahan untuk Pengembangan Pertanian Indonesia*”, (Availability of Land for Agricultural Development Indonesia), Indonesian version, 1997 – 2011 [online at: <http://www.litbang.deptan.go.id>].
- [2] Effendi Dedi Soleh.,”*Prospek Pengembangan Tanaman Aren (Arenga pinnata Merr) Mendukung Kebutuhan Bioetanol di Indonesia*” (Prospect of Aren Plant (*Arenga pinnata Merr*) to Support Bio-ethanol Demand in Indonesia), Indonesian version, Indonesian Center for Estate Crops Research and Development Perspektif Vol. 9 No. 1 / Juni 2010. page 36 – 46.
- [3] Government of Minahasa Selatan Regency.,”*Review; Rencana Pembangunan Jangka Menengah Daerah (RPJMD) Kabupaten Minahasa Selatan 2005 – 2010*” (Review: Middle Term Period Development Plan of Minahasa Selatan Regency 2005 – 2010).
- [4] Lontah E. Nicodemus.,”*Batifar Hukum*” (Surge of the Law), 2011, Indonesian version. [Online at: <http://www.bakti.org/komunitas/blogs/batifar-hukum>].
- [5] Manado Post, North Sulawesi Newspaper, ”*Cap Tikus Merusak Sulut*” (*Cap Tikus* has Damaged North Sulawesi people), an article on December 14<sup>th</sup>, 2010, Indonesian version. [Online at: <http://www.manadopost.co.id/index.php?mib=berita.detail&id=83870>].
- [6] Minahasa Selatan Statistics, “*Minahasa Selatan in Figures 2011*”, BPS Kabupaten Minsel, 2011.
- [7] North Sulawesi Statistics Office, “*North Sulawesi in Table 2011*”, BPS Provinsi Sulut, 2011
- [8] Orwa et al, “*Arenga Pinnata*”, Agroforestry Database 4.0, 2009.
- [9] Pailah Steven. Y.,”*Seho: Bio Energi dan Pilihan Pariwisata WOC*” (*Arenga Pinnata: Bio Energy and Tourism Destination of WOC*), 2009, Indonesian version, [online at: <http://arenindonesia>].

wordpress.com/artikel-aren/steven-y-pailah/

- [10] Pakasi C., "*Ekonomi Rumah Tangga dan Pengembangan Industri Alkohol Nira Aren di Kabupaten Minahasa*" (Home Economy/Industry and Alcohol Industry Development of Arenga Pinnata in Minahasa Regency), 1998, Indonesian version, Post Graduate Study of Agriculture Institute of Bogor, Indonesia.
- [11] Roeroe Freddy., "*Minuman Rakyat Cap Tikus, Dilema Ekonomi Rakyat Minahasa*" (Beverage of the Local People Cap Tikus, Economic Dilema of Minahasa People), 2011, Indonesian version, [online at: <http://freddyroeroe.manadogo.com/index.php/tulisan/113-minuman-rakyat-cap-tikus-dilema-ekonomi-rakyat-minahasa>]
- [12] Suwartapradja. Opan. S., "*Arenga pinnata: A Case Study of Indigenous Knowledge on the Utilization of A Wild Food Plant in West Java*", 2003, [online at: <http://arenindonesia.wordpress.com/makalah-aren/opan-s-suwartapradja/>]
- [13] Tribun Manado, North Sulawesi Newspaper, "*Miras Biang Gangguan Kamtibmas*" (Alcohol is the main disturbance for local society), an article on September 23<sup>th</sup>, 2011, Indonesian version. [Online at: <http://manado.tribunnews.com/2011/09/23/miras-biang-gangguan-kamtibmas>].
- [14] Wahr C. Roderick, "*Minahasa Traditional Food and Beverages*", 2004, [Online at: <http://www.theminahasa.net/social/tradition/food/indexid.html>]