



# **INTERNATIONAL SPICES CONFERENCE**

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Ambon, Maluku - Indonesia  
19 - 21<sup>st</sup> August 2018

## **PROCEEDING**

*"Revitalization of Spices Quality and  
Production in the Perspective of Sustainability  
and Environmental Responsibility"*



## **Foreword**

Praise to God the Almighty for his Benevolence and Devine Blessings that have permitted us have strived to make International Spices Conference in Hotel Aston Natsepa Ambon Maluku-Indonesia, in August 19-21<sup>st</sup>, 2013, has been a successful and memorable event for all the attendees.

The International Conference on spice with focusing on **"Revitalization of spice quality and production on the perspective of sustainability and environment responsibility"** has been attended by 363 participants, consists of importers and the Association of Importers of Spices Community, Exporters and Association of Exporters Spices Commodity, Producers of Spices council, researchers, lectures, Academy, Government Institution, Farmer and Participant who are interested on Spices.

This Proceeding consist of all activities during the conference : Conclusion and Suggestion from International Spices Conference, ISC at glance : Programme, ISC Committee, Participants of the Seminar, Greetings from the Organizing Committee, Message from chair of the organizing Committee, Massage from President of the Indonesia Spices Council, Represntative from the Mercy Corps, Minister of Agriculture, Governor of Maluku, Coordinator Minister of Public Welfare.

Paper were presented in plenary as well as parallel session, for the success of this event ISC also conduct the field trip visiting the nutmeg plantation and home industry and processing area to bring with us potential prosperity from the development of spices and culinary demonstrations based on spices which was the beginning of the brighter future for the production of spices in Indonesia.

Along with ISC, there is be an exhibition of spices which will boost the attraction of this event.

After gala dinner and cultural night Balai Pengkajian teknologi Pertanian Maluku with the Regents (Central Maluku, West Seram, Buru, East Seram, Ambon City) signed a Memorandum of Understanding (MoU) and Waterland Indonesia with Unpatti (University Pattimura).

All the activities during the conference covered by documentation; audiovisual as well as pictures.

From the result and conclusion of the conference, could be implemented simultaneously among the many stakeholders in theInternational and local stakeholders in the spices industry and commodities, in order to achieve the goals of the Conference.

  
**Adi Sasono**  
Chairman of  
Indonesian Spices Council

Jakarta, September 2013

  
**Sofiaty Mukadi**  
Chair of the  
Organizing Committee

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## LOCAL KNOWLEDGE COMMUNITY IN THE SELECTION OF SHELTER TREES IN DUSUNG NUTMEG : CASE STUDY ON HUTUMURY VILLAGE IN AMBON CITY

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### ABSTRACT

Local knowledge possessed by Dusung nutmeg farmers in Maluku, acquired from farming experiences, knowledge from generation to generation and interaction with the environment. This greatly affects the productivity of knowledge management Dusung Nutmeg. This study aims to describe and explain the decisions made by farmers in the selection of shelter trees in Dusung nutmeg. This study was designed to use an case study approach and to analyze decision making by Dusung farmers used modified theory of "real-life choice" by Gladwin (1980). Data were gathered through the data collection instruments in the form of field observation, in-depth interviews, and direct observation. Respondents were drawn through purposive sampling method, in which the respondent is represented by a group of clan of Dusung nutmeg. The results showed that the reason for the decision-making by Dusung farmers in selecting a shelter tree to plant nutmeg to select tree species that are naturally available in the phase Kebun of the Sirih Hutan (*Piper betle*), Kayu Raja (*Cassia fistula*), Sengon (*Paraserianthes falcata*), Beringin (*Ficus Benyamina*) as well as the type of Kenari (*Canarium sp.*) and Durian (*Durio sp.*) in phase, among others, 1) Biophysical Conditions, 2) Production orientation, 3) The local society knowledge that the kenari and durian trees are good shelter trees, 4) Parental inheritance, 5) Capability of plants to be planted adjacent to the nutmeg crops, 6. Ease of maintenance and harvesting.

**Keywords:** farmer's decision making, plant species selection, dusung

### Introduction

Communities living around the forest have a close relationship with the forest and forest land so that their efforts in the utilization and use of forests that surround them always left a very good experience for the environment so as to have a good carrying capacity is also against the implementation process. Forest management activities such of it is one form of the systems of land use and forest-based communities that can provide economic benefits, ecological and socio-cultural (Silaya, 2005). One of forests and land use systems that exist in the Moluccas, known as Dusung. Hilanto (2009) suggested that, the society has local knowledge of the ecology, agriculture and forestry are formed from generation to generation. Local knowledge in the community grows and evolves over time. Local knowledge is derived from experience of farming, gardening and interacting with their environment. This is also reflected in Dusung management activities by the farmers in Moluccas.

Study of farmers' decisions to plant and maintain trees have been carried out, but there is an important aspect that has not got the attention in more depth, namely in terms of the views of farmers, especially the reasons for them in selection of plant species. While farmers in Buniwangi-Sukabumi select a species to cultivated crops because they have reasons which indicate the orientation of productivity, usability for family consumption and marketed, and continuity (Suharjito, 2002).

Similarly, Krause and Uibrig (2006) in Febryano, (2008) explained that the decision-making by farmers in selection of plant species is determined by the usability and the money income from plant species. While Snelder et al. (2007) stated that farmers select varieties of fruit trees are not only based on its economic value, but also other essential functions provided by the trees. Therefore, the study conducted paying attention to the decision-making selection of plant species on private land. The main question of this study is: How and why the nutmeg farmers make decisions to choose a particular crop and the cropping pattern and not the type of plants and other cropping patterns, the land tenure system based on their local knowledge.

This study aims to describe and explain the decisions made by farmers in the selection of shelter trees on land owned (Dusung nutmeg) based on local understanding and knowledge. Knowledge and understanding of the farmers reasons will benefit various stakeholders, such as the Forest Service (especially extension), universities, non-governmental organizations, and others, who intend to develop forestry community on private land.

#### **Location and Time Research**

The research was conducted in Dusung nutmeg which owned by the community located in Hutumuri village in Ambon and lasts from May to July 2013.

#### **Framework**

In reviewing the decision-making by farmers, agricultural economists typically aims to evaluate the methodology applying benefit-cost analysis. Different from the economists, anthropologists give more attention to the objectives outlines farmers' selection (Suharjito, 2002). A theory which can be used to analyze the decision making by farmers is the theory of "real-life choice" that was developed by Gladwin (1980), which explained that in the day-to-day decision-making of farmers go through two stages. In the first stage, farmers eliminate all unwanted alternatives and in the second stage, which is the essence of the decision process, farmers eliminate those aspects that are irrelevant, and to develop alternatives on important aspects. Factors that affect decision making were identified, such as: socio-economic conditions, biophysical conditions, markets, availability of technical information, support services and policies.

#### **Research Approach**

This study uses a case study methodology, which is part of the qualitative research. According to Bungin (2006), case studies provide broad access and opportunities to researchers to examine in-depth, detailed, intensive, and thorough review of the social unit under study. Yin (2006) states that a case study is a strategy that is more suitable when the subject of a research question related to how or why, when researchers have little opportunity to control the events that will be investigated, and where his research focus is on contemporary phenomena within the context of real life.

#### **Methods of Data Collection and Analysis**

Interviews and participant observation conducted for data collection, where the sample selection is done intentionally (purposive sampling). The numbers of key informants are as many as 15 farmers adapted to the clan lands (Dusung nutmeg) in the study site. Decision making by farmers to select the plant species on owned land can be studied and explained using the analysis of the choice of plant species developed by Gladwin (1980), and modified by the author for the purposes of this research by focusing on the selection of shelter trees on Dusung nutmeg as the main crop.

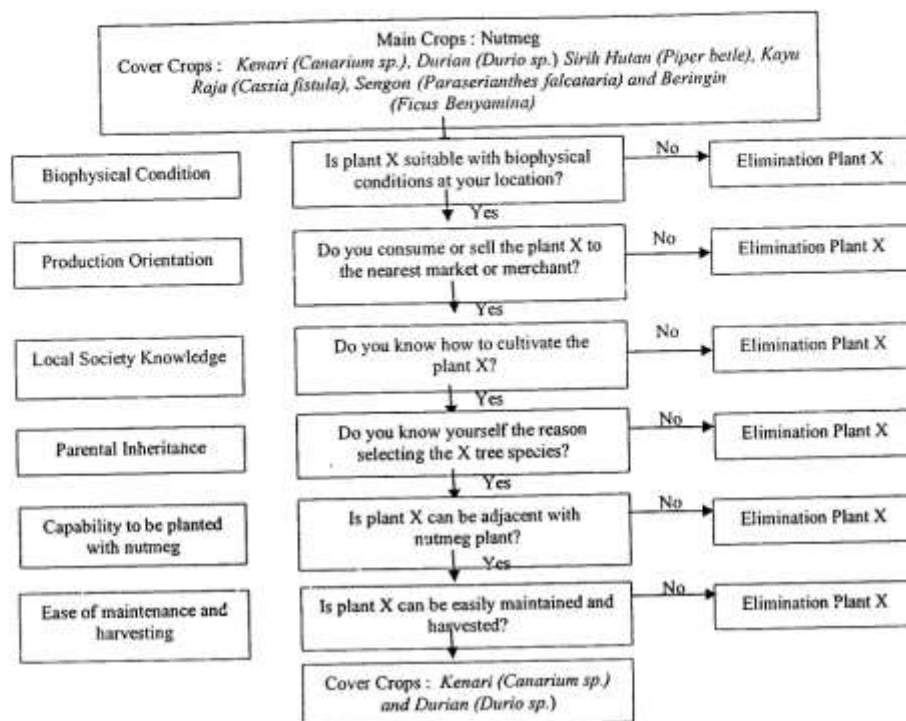


Figure 1. The reason of Cover Crops Selection on Dusun Pala in Hutumuri Village

### Result and Discussion

The tendency of farmers in the management of land in the Hutumuri village, that is using one species main crop which is very dominant, such as cloves and nutmeg; though still interspersed with other crops. Various reasons expressed by farmers related to the properties of a type of plant that fits the expectations of farmers. These reasons are then analyzed by the theory of "real-life choice" that was developed by Gladwin (1980), and modified by the author for the purposes of this study that may explain the steps and reasons in the decision-making process in the selection of shelter trees by farmers Dusun nutmeg.

In stages and reasons for the selection of shelter trees by farmers Dusun nutmeg in accordance with the requirements and understanding possessed, then obtained a number of reasons, namely (1) biophysical conditions, (2) orientation of production, (3) knowledge of the local society, (4) parental inheritance, (5) Capability of plants to be planted adjacent to the nutmeg crops, (6) ease of maintenance and harvesting.

#### 1. Biophysical Conditions

Biophysical conditions are aspects relating to the suitability of plants with height soil and moisture in the local area. Experience farming for many years, farmers stated that the nutmeg and



various types of crops are grown in accordance with the conditions of topography, soil and climate in the Hutumuri village. It can be seen from the growth and development of the nutmeg is very rapid and get more yield. This is supported by the Agricultural technology BPP information where as nutmeg requires a hot climate with high rainfall and rather evenly/not much changed throughout the year. Nutmeg grows well in soils with a sand texture up to clay with the height content of organic materials. Whereas soil pH suitable for nutmeg plant is 5.5 to 6.5. Nutmeg plants can grow well in areas that have a height of 500-700 m above sea level.

Some shelter trees Pala it is : Siri Hutan (*Piper betle*), Kayu raja (*Cassia fistula*), Sengon (*Paraserianthes falcata*), Beringin (*Ficus Benyamina*), Kenari (*Canarium sp*) and durian (*Durio sp*) also have compatibility of biophysical conditions with the nutmeg plant up to grow close together so well.

## 2. Production Orientation

Production orientation is an aspect that shows that more farmers select a crop that results can be sold to meet the consumption needs of everyday households. By selecting the plant that its production yield has much higher prices when compared with food crops, farmers can sell their crops and buy foodstuffs without planting its crops.

Farmers have been doing replacement for some kinds of plants that cultivated in land management of Dusung nutmeg. The alternative crops that have been planted by the farmers in their land owned are food crops (tubers, bananas), vegetables (cucumber, cabbage, long beans), fruit trees (durian, gandaria, gayang, cempedak, walnut, langsung, duku, mangosteen, cempedak, papaya), plantation crops (nutmeg, cloves, coconut, chocolate) adjusted with the stages of formation Dusung agroforestry.

At the process of the establishment of the Dusung, where the early stages are farms which planted generally tubers crops, and the next stage is fallow periods with ages (2-3 years old) had started planting the nutmeg saplings age 1 year old, with a height of 70 cm by some farmers with utilizing the shelter trees that has existing such as Siri Hutan (*Piper betle*), Kayu Raja (*Cassia fistula*), Sengon (*Paraserianthes falcata*), Beringin (*Ficus Benyamina*), while several farmers who plant Kenari (*Canarium sp.*) and Durian (*Durio sp.*) trees on the fallow periods is entering the 3rd years, as shelter trees for nutmeg. In the fallow period also there are some farmers who do not do planting. On the Dusung stage (> 10 years), newly planting carried out the nutmeg.

The nutmeg harvesting are 3 times in a year; and then there are some subsequent fruit which occurred within weekly periods. The production speed is an aspect which shows that farmers select a rapid crop yield, therefore relates to the capital needed of the farmers to wait the plants which grown produce. Kenari (*Canarium sp.*) and durian (*Durio sp.*) have good production speed in which results are used by the farmers to be sold while waiting for the nutmeg harvesting.

Generally nutmeg tree begins to bear fruit at the age of 10-12 years, and at the age of 25 years it has been producing profitably. The production of nutmeg will continue to increase and at the age of 25 years it will reach the highest production. Nutmeg trees continue to produce until the age of 60-70 years. Nutmeg can be picked (harvested) after quite ripe (old), which is about 6-7 months from the start flowering. In Banda area as well as Hutumuri area, known 3 kinds of harvest time each year, namely: (1) great/large harvest (mid-rainy season); fewer harvest (early rainy season) and a small harvest (end of the rainy season). Nutmeg harvest at the beginning of the rainy season gives the best results (high quality) and mace (fuli) is the thickest.

## 3. The Local society knowledge that the kenari and durian trees are good shelter trees

Local knowledge is an aspect that shows the ability of farmers to cultivate the crop. By knowing how to cultivate a-crop properly, then the success rate of the plant business will become

higher. Most of the farmers at the first time, look and learn from other farmers, especially for the generations who have succeeded in planting the nutmeg by using shelter trees that have been frequently used by the society. In addition, there is agricultural extension performed by various parties, such as the Department of Agriculture, Universities, and others.

Local knowledge of farmers nutmeg illustrates that the reasons for selecting a particular plant species mainly Kenari (*Canarium sp.*) and Durian (*Durio sp.*) as shelter trees for nutmeg plant within the mind of the society from generation to generation where these two species are very good, have enough fruits, the leaves easy to decompose and enrich the soil, the trees grow big and tall with wide canopy, and can stimulate the nutmeg fertilization. According to the farmers knowledge that certain species such as Gayang (*Inocarpus fagiferus*), Cempedak (*Artocarpus champeden*) and Gandaria (*Bouea macrophylla*) plants should not be planted close together with nutmeg plants because the leaves are huge so it is hard to decompose properly and when the leaves fall and extremely annoying, even create moisture and easily causes mildew for nutmeg plant.

#### 4. Parental Inheritance

Nutmeg is a native spices plants of Moluccas Island (Purseglove et al., 1995 in Bustaman, 2007), which has been traded and cultivated hereditarily in the form of smallholder plantations in most islands of Maluku.

Dusung Nutmeg farmers in Hutumuri generally select the major crop is nutmeg, with certain shelter trees such as Sirih Hutan (*Piper betle*), Kayu Raja (*Cassia fistula*), Sengon (*Paraserianthes falcataria*), Beringin (*Ficus Benyamina*), Kenari (*Canarium sp.*) and Durian (*Durio sp.*) by reason consideration that such species already exist and are often planted by their parents long ago. The reasons inherited from parents are the ultimate choice when making decisions in the selection of the type. In addition to other aspects such as the already growing naturally to shelter the saplings, loose the soil, leafy leaves so can sheltering and preserve nutmeg plants from extreme weather, as well as a knowledge inherited from parents that the species plants (kenari and durian) are good plants and produce many fruits (economic considerations).

#### 5. Capability of Plants to be Planted Adjacent to the Nutmeg Crops

Capability planted with other crops is an aspect that shows the orientation of the structure and the composition of plants species, whether grown in monoculture or heteroculture. Farmers argued that it is based on the anxiety of disruption of nutmeg productivity. In general, farmers select Sirih Hutan (*Piper betle*), Kayu Raja (*Cassia fistula*), Sengon (*Paraserianthes falcataria*), Beringin (*Ficus Benyamina*) trees/crops as shelter trees that are not planted at the same time but those grows naturally before, while Kenari (*Canarium sp.*) and durian (*Durio sp.*) selected and should be planted as shelter trees on nutmeg because of height and they have a wide canopy that shelter this crop.

Kenari and durian are also used as shelter trees for Nutmeg in order to obtain more profits. Kenari (*Canarium sp.*) and Durian (*Durio sp.*) crops as shelter trees planted in the sidelines of nutmeg crops at a spacing of 5 x 5 meters. The shelter trees is useful to increase the biophysical conditions of nutmeg and gives contribute to the biodiversity and the product diversification for the farmers.

#### 6. Ease of Maintenance and Harvesting

Ease of maintenance and harvesting is an aspect that shows that farmers select crops that can economize the production inputs, especially labor, and resistance to disease. Nutmeg as a main crop is intensively managed where of most farmers have only relatively small capitals. For example, for weeding activities undertaken intensively from the age of 1-3 years. After the canopy of nutmeg began to fuse with the others at age 3-4 years, then the farmers no longer need to perform these activities. At the age of about 10 years farmers just do cleaning and cutting the branches. To overcome pests, nutmeg

farmers handling it based on their knowledge especially to overcome the stem borers (ulat sabeta) by using ash mixed with water rubbed on tree trunks that attacked by the pest. For nutmeg harvesting activities, the labors needed for this activity are only 2-4 people/ha. The working time for nutmeg farmers in Dusun is only about 2 hours per day.

The Shelter trees for nutmeg such as Kenari (*Canarium sp.*) and Durian (*Durio sp.*) have ease of maintenance and harvesting whereby both are resistant to pests and not necessary to be weeded, they easily grows naturally. Ease of postharvest processing is an aspect which shows that farmers select the kind of shelter trees that can economize production inputs, particularly the labor and the time. Kenari (*Canarium sp.*) and durian (*Durio sp.*) harvesting can be done easily as they falling naturally and not necessary to hire a lot of labors for harvesting. Kenari (*Canarium sp.*) and durian (*Durio sp.*) can immediately be sold without further processed.

Bunga Pala (nutmeg Fuli which surrounds the nutmeg seed shaped like a woven nutmeg) is currently in dried form is sold at Rp. 100.000-105.000/kg. Nutmeg seed is sold at Rp. 50.000, - 65.000/kg. Nutmeg meat costs Rp. 7.500/kg and greatly loved by the people if it has been processed into snacks, such as: pickled nutmeg, candied nutmeg, nutmeg jam, juice and nutmeg. While fruit Kenari (*Canarium sp.*) and Durian (*Durio sp.*) if its season could be sold at a price of Rp 15.000/ fruit for Durian and Kenari sold at a price Rp 90.000/kg.

#### Conclusion

1. The Farmers reason in the Hutumuri village in selecting particular plant species as the main crops and the shelter crops by considering aspects such as: (1) biophysical conditions, (2) orientation of production, (3) Knowledge of the local communities that kenari and durian are good shelter crops, (4) Parental Inheritance, (5) capability to be planted adjacent to the nutmeg crop, and (6) ease of maintenance and harvesting.
2. The main plant species selected by farmers is Pala combined with tubers, vegetables, fruit crops and plantation crops. While the shelter trees that grows naturally are often used are Sirih hutan (*Piper betle*), kayu raja (*Cassia fistula*), Sengon (*Paraserianthes falcata*), beringin (*Ficus Benyamina*), kenari (*Canarium sp.*) and durian (*Durio sp.*).

#### References

- Banister ME, Nair PKR. 2003. Agroforestry adoption in Haiti: the importance of household and farm characteristics. *Agroforestry System* 57: 149-157.
- Bungin B. 2003. Teknik-Teknik Analisis Kualitatif dalam Penelitian Sosial. Di dalam: Bungin B, editor. *Analisis Data Penelitian Kualitatif: Pemahaman Filosofis dan Metodologis ke Arah Penguasaan Model Aplikasi*. Jakarta: PT Raja Grafindo Persada.
- Degrande A et al. 2006. Farmers' fruit tree-growing strategies in the humid forest zone of Cameroon and Nigeria. *Agroforestry System* 67:159-175.
- Febryano G.I. 2008. Pengambilan Keputusan Pemilihan Jenis Tanaman dan Pola Tanam di lahan Hutan Negara dan Hutan Milik.Studi kasus didesa Sungai Langka Kecamatan Gedong Tataan Kabupaten Pesawaran Propinsi Lampung. (Thesis) S2 IPB
- Hilmanto, R. 2009. Sistem Lokal Ecological Knowledge dan Teknologi Masyarakat Lokal dalam Agroforestry. Penerbit, Universitas Lampung Bandar Lampung.
- Ibrahim EL. 2009. Keragaan Kelerabagaan Adat Agroforestry Dusun. (Studi kasus Negeri Liang, Kecamatan Salahutu Kabupaten Maluku Tengah dan Negeri Werinama, Kecamatan Werinama, Kabupaten Seram Bagian timur. (Thesis) S2 IPB
- Matinahoru, J.M. 2011.Kontribusi Dusun Bagi Ketahanan Pangan Masyarakat Maluku.Makalah

- Pattinama, M.J, Siwalette, J.D 2012. Ketika Pala Mulai Berbuah: Mengapa Pala? (suatu tinjauan etnobotani dan etnobiografi dalam Agroforestri berbasis Pala di Maluku). Prosiding Agroforestry Berbasis Pala untuk Kesejahteraan Masyarakat Maluku. Hal. 16-23. Penerbit Program Studi Manajemen Hutan PPs Universitas Pattimura. Ambon
- Rahmawati, R. et al. 2008. Pengetahuan Lokal Masyarakat Adat Kasepuhan : Adaptasi, Konflik, dan Dinamika Sosi0-Ekologis. Jurnal Transdisiplin Sosiologi, Komunikasi dan ekologi Manusia. Vol. 2. No.2. p 151-190. 2008.
- Rehatta, H. 2012. Budidaya Pala dalam Sistem Dukung. Prosiding : Agroforestry Berbasis Pala untuk Kesejahteraan Masyarakat Maluku. Hal. 25-29. Penerbit Program Studi Manajemen Hutan PPs Universitas Pattimura. Ambon
- Snelder DJ, Klein M, Schuren SHG. 2007. Farmers preferences, uncertainties and opportunities in fruit-tree cultivation in Northeast Luzon. *Agroforestry Systems* 71:1 17.
- Suharjito D. 2002. Pemilihan jenis tanaman kebun-talun: suatu kajian pengambilan keputusan oleh petani. *Manajemen Hutan Tropika*: VIII(2):47-56.
- Silaya TH. 2005. Kearifan Masyarakat Lokal dalam Pengelolaan Sumberdaya Alam dan lingkungan. Studi Kasus di Kecamatan Taniwel Kabupaten Seram Bagian Barat (Thesis) S2 UGM.
- Yin RK. 2006. Studi Kasus Desain dan Metode. Mudzakir MD, penerjemah. Jakarta: PT Raja Grafindo Persada. Terjemahan dari: *Case Study Research Design and Methods*.
- Zubair M, Garforth C. 2006. Farm level tree planting in Pakistan: the role of farmers' perceptions and attitudes. *Agroforestry Systems* 66:217-229.