Pattern of palm-based agroforestry the Bugis ethnic community in the Regency of Kolaka Indonesia

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Abstract. The study aimed to identify pattern of palm-based agroforestry Bugis ethnic community in Kolaka Regency. This research was conducted in Kolaka Regency. Respondents were determined by purposive sampling. The method data analysis used is qualitative analysis. The results showed that there were fourteen palm-based agroforestry patterns that were cultivated in a subsistence manner in Kolaka Regency. The agroforestry pattern of coconut-palm-cacao-clove is the most agroforestry pattern cultivated by community farmers (28.5%). The variation plant of agroforestry patterns can be describe the welfare level of farmer.

1. Introduction
Native Indonesian agroforestry gardens show characteristics that deserve attention in the framework of agricultural and forestry development, especially for infertile areas. In these areas only annual crops can produce sustainably, while for food crops and other seasonal crops it is only possible through massive fertilization [1]. Meanwhile, Non-Timber Forest Products of palm-based are one of the forest products that have advantages and are most in touch with the surrounding forest communities [2].

One of the most effective models of sustainable agriculture is agroforestry, according to the conditions of farmers [1]. Agroforestry is generally considered only as a "kitchen garden" which is nothing more than a complement to other farming systems, where production is only devoted to own consumption by producing by-products. Economically the application of agroforestry contains four important things, namely: (1) competition, (2) diversified diversification, (3) economic rentability, and (4) sustainability. Associated with aspects of ecosystem sustainability, prosperity and economic prosperity, food security and resilience of the community in the face of economic crisis, it is suspected that the choice of farming by applying agroforestry patterns is the right solution [3].

Many benefits from the agroforestry cropping systems, both in terms of economic, social, and environmental. Palm and coconut plants have very good conservation benefits [4]. Therefore the pattern of agroforestry with palm-based and coconut-based is one of the main supporters of the sustainability of an agroforestry pattern. The pattern of agroforestry has become one of the sources of community livelihoods in Southeast Sulawesi.

Agroforestry patterns are developed with simple and complex agroforestry patterns. There are various patterns of agroforestry based on coconut and sugar palm which are cultivated by the Bugis Ethnic community in Kolaka Regency. This is because besides the conservation benefits of coconut and palm sugar, it is also due to the economic value of palm and coconut sap. This agroforestry pattern has
become part of Bugis people's lives. Thus, this research is important to identify patterns of palm-based agroforestry carried out by the community.

2. Theoretical Background

2.1. Social Culture of Agroforestry

Decision making of farmers in agroforestry exploitation is not always based on financial considerations, or in other hand financial considerations are not always the number one aspect of decision making, but there are more dominant socio-cultural aspects. Although farmers have the highest income from one commodity, farmers do not cultivate the commodity monoculture which is actually more profitable. One of socio-cultural factor that encourage people to develop the agroforestry, if someone can bequeath on agroforestry farm to their children and grandchildren, than the agroforestry are the sense of pride for them, so the agroforestry has bequeath value [5]

Feeding long-term needs is one of the reasons farmer plant trees. Tree production that can be taken continuously is very suitable as a 'old age guarantee plant’. The existence of these plants makes them more confident, because they will not depend on others in their old age. Considering the decreasing power and physical strength, they tend to choose annual plants that do not require intensive and heavy maintenance, but provide continuous income [5]

Systems of land utilization that are applied individually must be in harmony with local culture and vision of people's on their location and relationship with nature. The land utilization landscape and its development form are part of the identity of the people who live in there. Farmers usually have a strong need to side with local culture. History and tradition play an important role in the life, ways and systems of their land utilization. Improvement which doesn’t sinergy with their social, cultural, and spiritual values can create stress and power be at cross purpose [6].

3. Method of the study

The study was conducted in the regency of kolaka. Kolaka is well know by its agroforestry based on coconut and Palm sugar. Respondents were determined by purposive sampling. Number of respondents are as much 30 people. In the study, qualitative analysis was conducted to describe pattern of palm-based agroforestry the bugis ethnic community in Kolaka Regency.

4. Results and Discussion

4.1. The Characteristics of Bugis Ethnic Farmers

Age of ethnic bugis farmers who applied pattern of agroforestry in this was dominated by farmers in productive (83,3 persen). In their age, we assumsed farmers could make the agroforestry production on maximum level. Farmers whose were in productive age criteria will be willing to keep running the palm agroforestry business, because only requires their energy while the raw materials and auxiliary materials were still available in nature around their residence, abundantly. Good education is needed for existence and sustainability a business [7]. Farmers who non productive level keep their agroforestry farming, because its give continous income and has bequeath value for their children.

| No. | Age (years) | Number (People) | Percent (%) |
|-----|-------------|-----------------|-------------|
| 1   | 15-54 (Productive) | 25              | 83.3        |
| 2   | > 54 (Non Productive) | 5               | 16.7        |
|     | Total       | 11              | 100.0       |

Table 1. Distribution of Characteristics Agroforestry Bugis Ethnic Farmers

| No. | Education Level |
|-----|----------------|
|     | Average        |
|     | 45.6           |
| No. | House Condition          | No. | Land Area (ha) | No. | Land of Right Status |
|-----|--------------------------|-----|----------------|-----|----------------------|
| 1   | Emergency                | 1   | < 1            | 1   | Owner                |
| 2   | Semi Permanent           | 2   | 1 - 1.50       | 2   | Rent                 |
| 3   | Permanent                | 3   | > 1.51         | 3   | Total                |
|     |                          |     |                |     | Owner                |

Total 30 100,0 30 100,0 30 100,0

Average 1,08

Education level is one of supporting factor for the successes of farmers in doing their business, cause it influence farmers on make decisions to adopted the innovation. We founded that education level of farmers was dominated by farmer at Senior High School Level (70 percent). The low education level of respondents caused a lack of knowledge and the application of management concepts in the practice of agroforestry business. Next, their business scale was hardly ever increase since the beginning do [7].

4.2. Patterns of Palm-Based Agroforestry The Bugis Ethnic

Agroforestry has several forms in Indonesia, such as home garden (pekarangan) and traditional garden (kebun). Home gardens to some degree resembles natural forest in structure and species diversity [8]. It is encouraging that many villagers maintain their traditional home gardens and gardens. Those traditional agricultural lands as well as forest still provide high diversity of plants to rural community for many purposes [9].

The agroforestry system has long been carried out by farming Bugis Ethnic communities in Kolaka Regency. In practice they did not realize that the farming practices they had carried out were an agroforestry system. The practice of agroforestry is subsistence, so that there are no significant efforts to improve the quality and quantity of products. The agroforestry system in Kolaka Regency is only limited to the diversification of long-term crops in one land area. Farmers only do it as a routine in the techniques of cultivation, harvesting, and marketing that are often without the processing of crops. Farmers also only use the main plant parts, namely the fruit from coconut, cacao, clove, durian, and lansium, as well as sap from the palm tree. However, farmers have not made much use of other plant parts, such as palm sugar has many benefits (leaves, stems, roots, waste from the main product) [6], both for the needs of their families especially for commercialization. Thus, the social, economic and environmental benefits of an agroforestry system have not yet been fully realized.
The patterns of agroforestry found in the communities in Kolaka Regency are very diverse. Based on the biophysical conditions of the land, coconut and or palm sugar grow in almost every plantation area of the farming community in Kolaka Regency. Some of the identified agroforestry patterns can be seen in Table 2.

Table 2 shows that there are fourteen agroforestry patterns based on the combination of types of crops cultivated in each respondent's land area. Coconut and palm sugar plants are quite dominant together in a land area. It is shown that there are eight (8) agroforestry patterns, two of which are coconut and palm sugar.

| No | Pattern of agro forestry                          | Total Respondents (%) | Averages of plants composition (%) | Averages of land hectare (Ha) | Averages of number of trees per Ha |
|----|---------------------------------------------------|-----------------------|-----------------------------------|------------------------------|----------------------------------|
| 1  | Coconut-Palm sugar                                | 7.14                  | 60:40                             | 0.75                         | 133                              |
| 2  | Coconut-Palm sugar-Cacao                          | 17.86                 | 20:15:65                          | 1.10                         | 799                              |
| 3  | Coconut-Palm sugar-Cacao-Clove                    | 28.57                 | 4:2:74:20                         | 1.33                         | 1.015                            |
| 4  | Coconut-Palm sugar-Clove-Durian-Lansium           | 3.57                  | 2:11:22:55:3:7                    | 1.50                         | 303                              |
| 5  | Coconut-Cloace-Durian-Lansium                     | 7.14                  | 6:45:30:13:6                      | 2.00                         | 104                              |
| 6  | Coconut-Cloace                                    | 7.14                  | 1:86:13                          | 2.50                         | 729                              |
| 7  | Coconut-Palm sugar-Cacao-Lansium                  | 3.57                  | 1:1:49:49                        | 0.50                         | 2.030                            |
| 8  | Coconut-Palm sugar-Cacao-Cloace-Lansium           | 3.57                  | 1:1:94:2:2                       | 0.50                         | 936                              |
| 9  | Coconut-Palm sugar-Durian-Lansium                 | 3.57                  | 20:12:34:34                      | 1.00                         | 148                              |
| 10 | Palm sugar-Caio-Durian-Lansium                    | 3.57                  | 10:75:5:10                       | 0.24                         | 1.667                            |
| 11 | Coconut-Palm sugar-Cacao-Durian-Lansium           | 3.57                  | 1:1:94:2:2                       | 1.00                         | 1.012                            |
| 12 | Palm sugar-Lansium                                | 3.57                  | 88:12                            | 3.00                         | 57                               |
| 13 | Coconut-Kakao-Cengke-Durian                      | 3.57                  | 4:70:23:3                        | 1.00                         | 356                              |
| 14 | Palm sugar-Kakao                                 | 3.57                  | 2:98                             | 0.50                         | 820                              |

Based on table 2, it is further known that the combination of palm sugar without coconut is more common in agroforestry patterns, which are as many as five (5) patterns, while the combination of coconut without sugar palm is only one (1) pattern. This means that sugar palm plants are very potential to develop in Kolaka Regency, although they have not been cultivated. The diversity of plant species serves many purposes for community, especially those living in rural areas. Each traditional community may have specific knowledge and use of plants found in their environment. Having many plant species and tribes, Indonesia is rich in biological and cultural diversity [9].

The coconut-based and palm-based agroforestry patterns which applied Bugis ethnic farmers that are dominantly cultivated by respondents are the third pattern, namely Coconut-Palm sugar-Cacao-Clove (28.57%). The four types of plants are planted with irregular distances, are spots. The different thing about sugar palm plants is because these plants are not planted intentionally but grow on their own and then are allowed to grow large and then are used by sap and or palm fiber, leaves, stems. In this third pattern, the main crops are cacao, which is 74% of the total plant. Even so, the results of the clove plant provide the greatest benefit compared to coconut, palm sugar, or cocoa. Cloves have very high economic value, reaching IDR 90,000 per kg. Even, clove give farmer the highest economic value than palm trees but they still keep the palm trees because it give them continous income each day.
The function of traditional garden (forests of community) which was previously conservation, now functions as production forests in the form of wood and non-timber. The average traditional garden is in the form of mixed forests or seasonal forests [10], such as palm sugar that functions as source of palm sugar raw materials (sap) and than provide environmental benefits in favor of soil and water conservation, carbon absorption, flood protection, and water transportation [11].

The average number of trees per ha is still very varied among respondents, with very wide variations. The average number of trees per hectare in pattern 12 is only 57 trees while in pattern 7 it reaches 2,030 trees. This is due to the insignificance of the distance of the plants, especially because of the sugar palm trees that grow wild so without the spacing arrangement. Planting trees is determined by the level of wealth (according to local size) and land status. The number of poor households (controlling narrow land) that plant fewer trees than rich households, as well as the number of trees planted by poor households is less than the number of rich household trees (controlling large areas). Poor households that control narrow land are more likely to use their land for food crops or trade crops than for tree crops [12].

5. Conclusions and Suggestions

5.1. Conclusions

Based on the results and discussion, it can be concluded that:

- We founded there are 14 (fourteen) pattern of palm-based agroforestry Bugis etnic in Kolaka Regency. The 3 pattern of agroforestry (coconut - palm sugar – cacao - clove) were cultivated by farmers more than 25 percent
- The variation plant of agroforestry patterns is can be describe the welfare level of farmer.

5.2. Suggestions

Things that can be suggested from the results of this study include: so that farmers always maintain sugar palm and or coconut plants and even cultivate them better in their agroforestry systems because of the large environmental, economic and social benefits of these crops. Optimizing the economic benefits of agroforestry systems based on coconut and palm sugar crops can be done by planting more cloves, as well as adding more land. Furthermore, it is recommended that the government, private sector, and tertiary institutions collaborate to assist and facilitate farmers in promoting high economic and financially sound agroforestry systems

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