Study of Agroforestry Toona sureni Merr by the Community in Simalungun Regency of North Sumatera - Indonesia

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Abstract : The community of Pematang Sidamanik Sub-district conducted an agroforestry pattern that combines forestry crops with various agricultural crops. This research specifically aims to examine the pattern of agroforestry and suren cultivation techniques. Methods of data collection with interview techniques, and field observation (survey). Data processing with qualitative descriptive analysis method. Cultivation techniques for T.sureni in study site are provision of seeds, maintenance and harvesting done by the community in a simple way. Suren agroforestry pattern conducted by local community as many as 10 patterns, namely: cloves, candlenuts, coffee, mango, chocolate and turmeric. Includes: suren and coffee; suren, coffee and cloves; suren, coffee and candlenut; suren, candlenuts and cloves; suren, coffee, candlenuts and cloves; suren, coffee, cloves and saffron; suren and chocolate; suren, mango and chocolate; suren, coffee, mango and cloves; suren, mango and cloves. Maintenance activities include monitoring and pruning on branches that cover and potentially disrupt the growth of agricultural crops.

1 INTRODUCTION

Agroforestry is the intentional combination of forestry and agricultureto to create for more diverse, productive, profitable, healthy, ecologically sound, and sustainable land-use systems (Latifah, Yunus and Sri, 2018). Agroforestry practically responds to economic, environmental and social problems that are common in most regions of the earth. Various agroforestry practices are part of the agricultural system. These tend to vary from place to place in both intensity and extent of management in line with the varying agro ecological and socioeconomic factors prevailing in those areas (Monica, 2017)

Agroforestry plays a role in helping the forestry sector achieve SFM can be measured by the extent to which agroforestry is relevant to SFM criteria agreed internationally. Mekar Sari Raya Village, Panei District, Simalungun Regency, North Sumatra has cultivated and developed suren and cocoa agroforestry and is financially feasible. (Latifah, 2018). The community of Pematang Sidamanik Sub-district is mostly farmers, where the farmers use a lot of agroforestry patterns that combine forestry and agricultural crops. Communities in Pematang Sidamanik Sub district combine suren trees with various agricultural crops and plantations.

The pattern of utilization of forest resources will be determined by the value of the utilization of forest products (Tati, 2015). The cultivation techniques and the pattern of agroforestry of suren trees have not been identified. Identification is done to search, find, collect and register various data and information.

Data on cultivation techniques and the pattern of agroforestry suren will be the reference of efficient and economic high-value land use. Therefore, it is necessary to identify the cultivation and the pattern of agroforestry suren.

2 RESEARCH METHODS

Research locations that have been conducted in 2017 are in Pamatang Tambun Raya and Sipolha Horisan village, Pematang Sidamanik Sub-District, Simalungun Regency of North Sumatra**.** Method of

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determining the number of respondents based on the Slovin formula (Kusmayadi and Sugiarto, 2000). i.e.:

$$n = \frac{N}{1+Ne^2} \quad (1)$$

Where:
n = number of sample
N = number of population
e = error

The number of families in Pematang Sidamanik districts is 4414 ffamilies with an average of 441 head of families every village (BPS Simalungun, 2015). The data in this study used 48 respondents. The number of respondents has been able to describe /represent the community of study site. We conducted interviews with respondents using open and closed structured questionnaires in face-to-face interviews.

Data collection for primary data was done through a field survey. The primary data was done for Cultivation technique and agro forestry pattern of *T. sureni* Merr).

Secondary data were collected from the libraries and internet-base sources of the institutions. They are general condition of research location include location and state of physical environment, socio-economic condition of society and state of residence include age, sex, livelihood, education, population.

Data processing used in this research is Qualitative Descriptive Analysis. The data collected from the results of questionnaires are presented in the form of tables and diagrams.

3 RESULT AND DISCUSSION

3.1 Characteristics of Respondents

3.1.1 Religion and Ethnicity

All respondents have Protestant and Catholic Christianity. The respondents consist of Batak Simalungun, Batak Toba and Batak Karo.

3.1.2 Age of Respondents

Table 1 indicates that ages range from 40 to -49 year has the largest frequency (25%) and the smallest is at age range 50-59 year and 70-79 years (16.65%).

Table 1. Characteristics of Respondents by age

No	Interval Class	Frequency	Percentage (%)
1	30-39	11	22,9
2	40-49	12	25
3	50-59	8	16,65
4	60-69	9	18,8
5	70-79	8	16,65
	Amount	48	100

3.1.3 Respondents Education Level

Table 2 indicates that education level high school has the largest frequency (37, 5%). The level of community education is good; this is because no one is not in school. Although the education level of the respondent has not yet entered the college

Table 2. Education level

No	Education level	Frequency	Percentage (%)
1	No school	-	-
2	Primary school	12	25
3	Secondary Schools	16	33,3
4	High School	18	37,5
5	Teacher education	2	4,2
6	Higher Education	-	-
	Amount	48	100

3.1.4 Land Area

Table 3 shows the area of land with agroforestry of respondents.

Table 3. Land area of respondent

No	land area (m^2)	Frequency	Percentage (%)
1	80- 360	25	52,07
2	400-6800	13	27,08
3	7200-9600	3	6,25
4	10000-12400	3	6,25
5	12800-15200	1	2,08
6	≥15600	3	6,25
	Amount	**48**	**100**

As shown in Table 3, that land area range from 80- 3600 m^2 has the largest frequency (25 respondents with or f 52.07%). This condition indicates most of the people only have agroforestry land less than 1 hectare.

3.2 Pattern of Agroforestry

Descriptive of the pattern agro forestry in study site are shown in Table 4.

Table 4. Pattern of agro forestry

No	Pattern agroforestry	Frequency	Percentage (%)
1	Suren + coffee	14	29.17
2	Suren + coffee + clove	16	33,13
3	Suren + coffee + candlenut,	7	14. 14
4	Suren + candlenut + clove	2	4.16
5	Suren + coffee + clove + candlenut	2	4,16
6	Suren + coffee + clove + turmeric	1	2,08
7	Suren + Chocolate	1	2,08
8	Suren + mango + Chocolate	2	4,17
9	Suren + coffee + mango + clove	2	4,17
10	Suren + mango + clove	1	2,08
	Amount	**48**	**100**

The most farmers apply agro forestry patterns by planting suren, coffee and Cloves (29 %).The least agro forestry pattern applied by farmers is suren+Coffee+Cloves + Turmeric; Suren + Chocolate; Suren + Mango + Cloves (2.08%). Also shown are proportions of respondents mentioning the species and those who have planted/are planning to plant the species. These priority species are multipurpose that yield products that include edible fruits, timber, and construction. These benefits justify increased investment in the development of agro forestry systems that will contribute to food security (FAO, 2013, p.37).

Based on studies from Asia, Latin America and Africa found in most rural areas, livelihoods depend on non-forest and environmental income. Most of these studies focus on livelihood strategies, forest or overall environmental dependence, non-timber forest products (NTFPs), or conservation and development issues (Angelsen, Jagger and Babigumira, 2014, p.S12-S18).

3.3 Suren Cultivation Technique

Suren tree cultivation techniques conducted by the community include the provision of seeds, maintenance and harvesting. The following describes the cultivation techniques performed:

3.3.1 Provision of Seeds

Provision of seeds the community uses two ways to provide seeds. (i) Seedlings are taken from under the tree. Seeds to be planted are taken directly from under the suren tree whose height has not reached 10 cm. This treatment is intended not to damage the roots when removing the seeds. (ii) Seedlings from the nursery. There is no special treatment in the nursery.

Mature seeds are sorted to obtain a quality seed. Furthermore, it is distributed in nurseries that have been ejected first and mixed with compost. After the seedlings grow to ≥5 cm, it is transferred into polybasic that have been filled with topsoil and compost soil with 60:40 composition. If the seed reaches a height of 10-20 cm planted to the planting location.

3.3.2 Maintenance

The community does not perform significant maintenance, lack of thinning, pruning, or weeding. Communities only do a simple pruning on the branch if the branch has covered the agricultural crops of coffee and other plants that have the potential to disrupt growth.

3.3.3 Harvesting

For tree harvesting, the community hires tree cutting services using a wood sawing machine. Sawing machines are also used in processing tree trunks as home materials such as boards and broti. Harvesting should be done at the time of leaf deciduous or leaf change. It is intended that the stem does not bend after harvesting and processing

4 CONCLUSION

There are ten Agroforestry patterns in study namely: suren and coffee; suren, coffee and cloves; suren, coffee and candlenut; suren, candlenuts and cloves; suren, coffee, candlenuts and cloves; suren, coffee, cloves and turmeric; suren and chocolate; suren, mango and chocolate; suren, coffee, mango and cloves; suren, mango and cloves. The priority species are valued mostly for their edible fruits, timber, and poles especially for construction purposes.

Cultivation technique for *T.sureni* in study site is provision of seeds, maintenance and harvesting done

by the community in a simple way. People use a chain Shaw to harvest *T. sureni.* Maintenance activities include monitoring and pruning on branches that cover and potentially disrupt the growth of Agricultural crops.

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