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2 The study of silvicultural aspects of community forest in Buana Sakti Lampung Province

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Abstract. The silvicultural aspect of forest community is a network of planned activities starting from the type of selection, nursery, land preparation, cultivation, maintenance to planting. This research aims to determine the silvicultural aspects applied by the community in Buana Sakti Village. This research was conducted in January 2013 in Buana Sakti Village, Batanghari District, East Lampung Regency. The sample of respondents in this research amounted 40 persons who were randomly selected using the simple random sampling method. The composition of forest community's plant species was collected using centralized radian plots. The results of research are presented in tabular form and, analysed descriptively. The silvicultural aspects applied by the community of Buana Sakti District are patchwork and simple silvicultural aspects. The type of community forest composition among respondent in Buana Sakti Deistrict consisted of 60% forestry plants, 25% plantation crops, and 15% agricultural crops. The largest intersections for the growth phases of trees and poles were acacia (*Acacia auriculiformis*) with a total of 96 stems/ ha and 1265 stems /ha. Meanwhile, for the seedling and sapling phases, the largest intersection was cempaka (*Michelia champaca*) which was of 2000 stem /ha.

1. Introduction

Timber planting activities have become a profitable investment option for the community, the increasing need for wood as an industrial raw material is a strong reason for people to plant timber species [1]. Most of the wood circulating in the Indonesian market comes from natural forests, but gradually the availability of wood from natural forests is getting limited because the speed of harvesting is not directly proportional to the information on the growth of standing stocks [2], Therefore, the supply of wood from natural forests begins to decrease and the price of wood is relatively expensive.

In line with the increasing demand for wood in the community, forestry activities based on aspirations and community involvement are needed, namely community forest development. This activity will meet the demand for wood and will increase community income [3]. Community forest development was increasingly known because of the support from the Government [4], one of the



support for the development of community forests is by providing capital loans to the community to provide the seeds fast growing species for industrial raw materials. timber [5].

Along with its development, the problem that exists in community forests was relatively simple or traditional management [6]. Several characteristics of community forests in Java Island indicate that community forests owned by farmers were still managed according to their level of knowledge and financial capital [7]. In general, community forest management has an individual character, is only managed by families, there is no formal management, is not responsive and is used as savings by community forest owners [8], therefore, such community forest development will have competitiveness low bargaining power with traders and industry on the quality of wood and the quality of non-timber forest products, and synchronization of forest conservation and sustainability cannot be guaranteed [9].

Buana Sakti Village, Batanghari District, East Lampung Regency, Lampung Province is one of the villages that has developed community forests, however, the management is still very simple because the level of farmers' knowledge about the silvicultural aspects of community forests is still very limited. The area of community forests in Buana Sakti Village is increasing every year. In 2007, the area was 83 ha, increasing to 112.5 ha in 2009, and 137.5 ha in 2011 until now with the status of the land belonging to the people [10]. However, it is suspected that community forest management in Buana Sakti Village still uses simple management that farmers only plant without paying attention to intensive maintenance according to silvicultural principles, so this paper aims to analyze the silvicultural aspects that have been applied by the community in Buana Sakti Village.

2. Materials and methods

2.1. Place and times

This research was done in December 2012 to January 2013 in Buana Sakti Village, Batanghari District, East Lampung Regency which is located between 5 ° 05'33.3 " -5 ° 12'52.8" North Latitude and 105 ° 21'50.7 " -105 ° 22'40.2 " East Longitude and is located at an altitude of 100-126 masl. The maximum temperature is 36 ° C with an average rainfall of 40 mm/month.

2.2. Tools and objects of research

The tools used included ropes with sizes (12.61 m for the tree phase, 6.64 m for the pole phase, 2.8 m for the seedling and weaning phases), a questionnaire, and a tally sheet. The objects used were community forest farmers as respondents and community forest farmer land. The area of community forest land owned by community forest farmers ranges from 0.25 to 1 ha on average. The data that has been collected include data on the types of community forest applied, silvicultural aspects that have been applied by community forest farmers, and also data on the composition of community forest plant types.

2.3. Methodology

Selecting community forest farmers as respondents is to use the simple random sampling method, which is taken randomly. The formula used in this method is if the population is more than 100, then the error limit used is 10-15% or 20-25%. The error limit used in this study is 15% because it will better support the data [11].

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

Where: n : number of respondents

N: the number of community forest farmers in Buana Sakti Village

e : error limit / margin 15%

1 : constant numbers

The population of community forest farmers in Buana Sakti Village is 373 families [10]. So that based on the formula above, the number of respondents in this study were 40 community forest farmers.

Data on silvicultural aspects applied in community forests were collected using direct interviews with community forest farmers, both owners and workers, while data on the composition of community forest plant species was searched by conducting a vegetation analysis method. Vegetation analysis was carried out using a centralized circular plot in each private forest owner's land with a circle radius of 12.61 m for the tree phase, 6.64 m for the pole phase, and 2.8 m for the seedling and weaning phases [12].

2.4. Data analysis

Data on the silvicultural aspects of community forests including type selection, seed procurement, land preparation, planting, maintenance and harvesting will be analyzed descriptively [16]. The data on the composition of plant species that have been collected will be presented based on family group and genus, and the density value will also be calculated. Density is the number of individuals of a species divided by the sample plot area.

3. Results and discussion

3.1. Community forest system

The results of the sample data collection show that 50% of the community forest farmers in Buana Sakti Village apply the agroforestry system, and for others, 30% apply the polyculture system and 20% apply the monoculture system. The agroforestry system is widely applied by the community because with this system farmers can feel more sustainable benefits from mixed types and also plants of different ages [13], this system is also a solution to several problems related to land management such as resilience, food, environmental protection and climate change issues [14].

The agroforestry system applied by farmers tends to be in the agricultural and apicultural systems. Agri silviculture is an agroforestry system by combining forestry and agricultural commodities [14], the agricultural form is preferred because farmers feel that they are getting optimal benefits from both forestry and agricultural commodities. The apiculture system is an agroforestry system that combines forestry activities with bees, the management of bees in this village is managed in the form of a honey bee farm [15], the application of the apiculture system in Buana Sakti Village is located on only one land that has been determined by a combination of farmer groups, This stipulation is made so that the management of honey bees in farmer groups is more intensive and controlled.

3.2. Composition of plant types

The types of trees that grow in the community forest area in Buana Sakti Village are acacia (*Acacia mangium*), teak (*Tectona grandis*), waru (*Hibiscus tiliaceus*), sengon (*Paraserianthes falcataria*), johar (*Cassia siamea*), cempaka (*Michelia champaca*), pulai (*Alstonia scholaris*), walangan (*Pterospermum diversifolium*), butterflies (*Bauhinia tomentosa*) and pulai (*Alstonia scholaris*). The types of MPTs are guava (*Psidium guajava*), Randu (*Ceiba petandra*), jengkol (*Pithecelobium jiringa*), rambutan (*Nephellium lappaceum*), lamtoro (*Leucaena leucopala*) and rubber (*Hevea brasiliensis*).

The types of agricultural plants are cassava (*Manihot utilisima*), turmeric (*Curcuma longa* Linn) and galangal (*Alpinia galanga*). The types of plantation plants are coconut (*Cocos nucifera*), banana (*Musa paradisiaca*) and cacao (*Theobroma cacao*). Most of the community forests consist of forestry plants, farmers were preferred forestry plants because the plants could survive without intensive maintenance and the planting process is not too complicated. Some farmers have the opinion that the more types of plant that grow on their land, it will provide a variety of sources of financial income.

The density is based on the growth phase of the plant, for the tree and pole growth phases, *Acacia mangium* has the highest density, which is 96 stems / ha and 1265 stems / ha. For the phase of seedling and sapling, *Michelia champaca* has the highest vegetation density, which is 2000 stems/ha.

3.3 The silvicultural aspects of community forest

Most of the farmers apply some simple forest management practices on their land, these activities are type selection, seed procurement, land preparation, planting, maintenance and harvesting. The selection of species composition to be planted by more than 60% of farmers is based on farmers' preferences

because it is considered to have economic value and is in accordance with the location where it is grown. The majority of species selected by farmers include acacia (*Acacia auriculiformis*), rubber (*Hevea brasiliensis*) and sengon (*Paraserianthes falcataria*). The seeds provided by farmers come from 3 sources are nurseries, purchases and donations. A total of 52% of farmers procure seedlings with their own purchases and come from donations from the local government and NGOs, only a few farmers do the seedlings independently and this is done by farmers in a simple way by sowing seeds into sowing beds that contain only soil.

Land preparation used by farmers before planting are land clearing and making planting holes. Land clearing activities are carried out by clearing to clear weeds and wild plants that are suspected of having potential to become competitors to the main crops being planted. The planting holes made by farmers vary in size are 60 cm x 60 cm, 40 cm x 40 cm and irregular planting holes. The next activity is planting, planting techniques applied by farmers were the cemplongan technique and the path planting technique. Most of the farmers as many as 85% prefer to plant with the cemplongan technique because they consider this technique easier and do not need to clear the land as a whole.

The planting applied by the community forest farmers of Buana Sakti Village is planting with potted seeds and spinning seeds, 57% of farmers planted with potted seeds because planting potted seedlings was easier and faster, and had a high plant survival rate. The planting technique used by community forest farmers in Buana Sakti Village is the cemplongan and lane technique. Most of the 82.5% of the community forest farmers in Buana Sakti Village planted their crops using cemplongan technique. Cemplongan technique is widely applied by community forest farmers, they think that with this technique planting is easier to do and do not need to completely clear the land, but only in the vicinity of the planting area.

Planting is carried out by community forest farmers by applying spacing. The spacing applied is 3 x 3 m, 4 x 4 meters and irregular spacing. Many people practice irregular spacing at 37.5% because they think the spacing is easier and in accordance with the wishes of the farmers.

Community forest farmers carry out several activities in plant maintenance, these activities include embroidery, fertilization, weeding, land reversal, controlling pests, pruning and thinning. Weeding is done by farmers because it does not cost a lot and is easy to do. However, for forestry plants, weeding is only carried out every 2 months as long as the plants are one year old. Fertilization is done because farmers think that fertilizing will have a good impact on the plants they plant. Fertilization is only done 2-3 times a year, fertilization is applied to agricultural, plantation and forestry crops. The types of fertilizers given to plants are manure and artificial fertilizers. The maintenance activities carried out are then carried out, namely embroidery, embroidery is carried out by farmers in the 1-5 week after planting.

Some of the community forest farmers in Buana Sakti Village do thinning when the needed in order to extract the wood to meet their daily needs. Thinning is only done by community forest farmers in monoculture and polyculture community forests. In addition, farmers control pests and diseases, pest and disease control activities are only carried out according to the wishes of community forest farmers, usually this activity is only carried out for agricultural crops. For plantation and forestry crops, farmers assume that for forestry plant types there is no need for pest and disease control activities because forestry plants are more resistant to pests and diseases [17]. Furthermore, pruning activities are carried out on forestry and plantation types of plants. Types of forestry plants that are pruned include acacia (*Acacia auriculiformis*), while for plantation types, namely rubber (*Hevea brasiliensis*).

The last activity carried out was harvesting. Most of the 70% community forest farmers in Buana Sakti Village had harvested and the rest of 30% had never harvested because it is considered a savings. In harvesting, there are criteria for ripening trees that are applied, namely the diameter and age of the tree. The criteria for ripe felling trees that are most widely applied by community forest farmers is a diameter of 82% and 18% of the criteria for cutting ripe trees are based on the age of the trees. Generally, the harvesting done by the community forest farmers of Buana Sakti Village is a system of needing cutting.

4. Conclusions

The conclusion is the community forest farmers in Buana Sakti Village applies the system of agroforestry, the highest commodity type of plant is forestry plants. Community forest farmers still apply simple silvicultural aspects which are type selection, seed procurement, land preparation, planting, maintenance and harvesting. Because the most common commodity in community forests is forestry plants, so it is advisable for farmers ask to the relevant agencies such as Forestry Government to provide frequent counseling on knowledge in implementing proper and correct silvicultural systems so that the results of community forests can be maximized.

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