UNIVERSITY OF COPENHAGEN
DEPARTMENT OF GEOSCIENCES AND NATURAL RESOURCE MANAGEMENT

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Southeast Sulawesi Province, Indonesia

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A small planting of teak in the outskirts of Makassar in Sulawesi, Indonesia, by Moestrup, S.

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Abbreviations

AgFor	Agroforestry and Forestry in Sulawesi (ICRAF Project)
BPDAS	Balai Pengelolaan Daerah Aliran Sungai, (Regional Watershed Mgt. Office)
BPTH	Balai Perbenihan Tanaman Hutan, (Regional Tree Seed/Seedling Centre)
BP4K	Badan Penyuluh Pertanian, Perikanan, Perkebunan dan Kehutanan, (Extension Agency of Agriculture, Fisheries and Forestry Plantations)
CIDA	Canadian International Development Agency
FEATI	Farmer Empowerment Trough Agricultural Technology and Information
GBHF	G.B. Hartmann Foundation, Denmark
GPS	Global Positioning System
hrs	Hours
ICRAF	World Agroforestry Centre
IGN	Department of Geosciences and Natural Resource Management
MOEF	Ministry of Environment and Forestry
MPTS	Multi-purpose Tree Species
NGO	Non-governmental Organization
OWT	Operasi Wallacea Terpadu
pcs	Pieces
QDAM	Qualitative Descriptive Analysis Method
SE	Southeast
SPSS	Statistical Product and Service Solution
UCPH	University of Copenhagen

Contents

1. Introduction

1.1 Background

In many tropical and subtropical countries, deforestation is ongoing at an alarming rate. It has not only consequences for the subsequent procurement of seed for afforestation and reforestation but, in many cases, it results in loss of valuable gene resources and/or their genetic deterioration. Often the availability of seed is a serious impediment to reforestation. The provision of high quality seed for planting is frequently a problem in many tropical countries. In some cases seed availability of a whole species may be inadequate; in others it may be difficult to procure seed from particular sources which have proved to be best adapted to the environmental conditions for the introducing countries.

Danida Forest Seed Centre now part of Department of Geosciences and Natural Resource Mangement (IGN) under University of Copenhagen (UCPH) has, for many years, worked with the development of decentralized tree seed procurement models to ensure quality tree seed and planting material is available for farmers in Asia and Africa, for whom trees play an important role sustaining their livelihood. Drawing up specific models and testing those in practice is necessary for continuously being able to provide relevant and well founded information about decentralized tree seed procurement models to farmers in tropical countries.

In 2014 IGN initiated the project 'Decentralized Tree Seed Systems in SE Sulawesi, 2014-2015'. The project compiled and obtained new information through surveys and testing about decentralized tree seed procurement models. Based on the results from these activities, the project disseminates knowledge to enable farmers in Asia and Africa to obtain good planting material for their tree planting activities supporting their livelihood.

In the project area in SE Sulawesi IGN worked with three partners: Operation Wallacea Trust (OWT) - an Indonesian NGO, the Regional Tree Seed/ Seedling Centre In Makassar and World Agroforestry Center (ICRAF). The project was active in the same area as a major ICRAF project (AgFor), this project has a major tree planting component and gave therefore excellent opportunities to test a decentralized model for ensuring availability of high quality tree seed.

The objective of this project is to improve the livelihood for poor farmers through improved and sustainable procurement of quality seed for tree planting as part of agroforestry and forestry activities in Sulawesi. This will be achieved through collaboration and provision of support to AgFor partners involved with tree germplasm/nursery in the project area.

In order to support implementation of the project on decentralized tree

seed procurement models to the farmers in SE Sulawesi, in the first stage is needed a baseline data information on tree nursery and tree planting activities. Therefore, a survey on tree nursery and planting was carried out during June-August 2014 in Konawe and East Kolaka District, SE Sulawesi Province.

1.2 Purpose of the Surveys

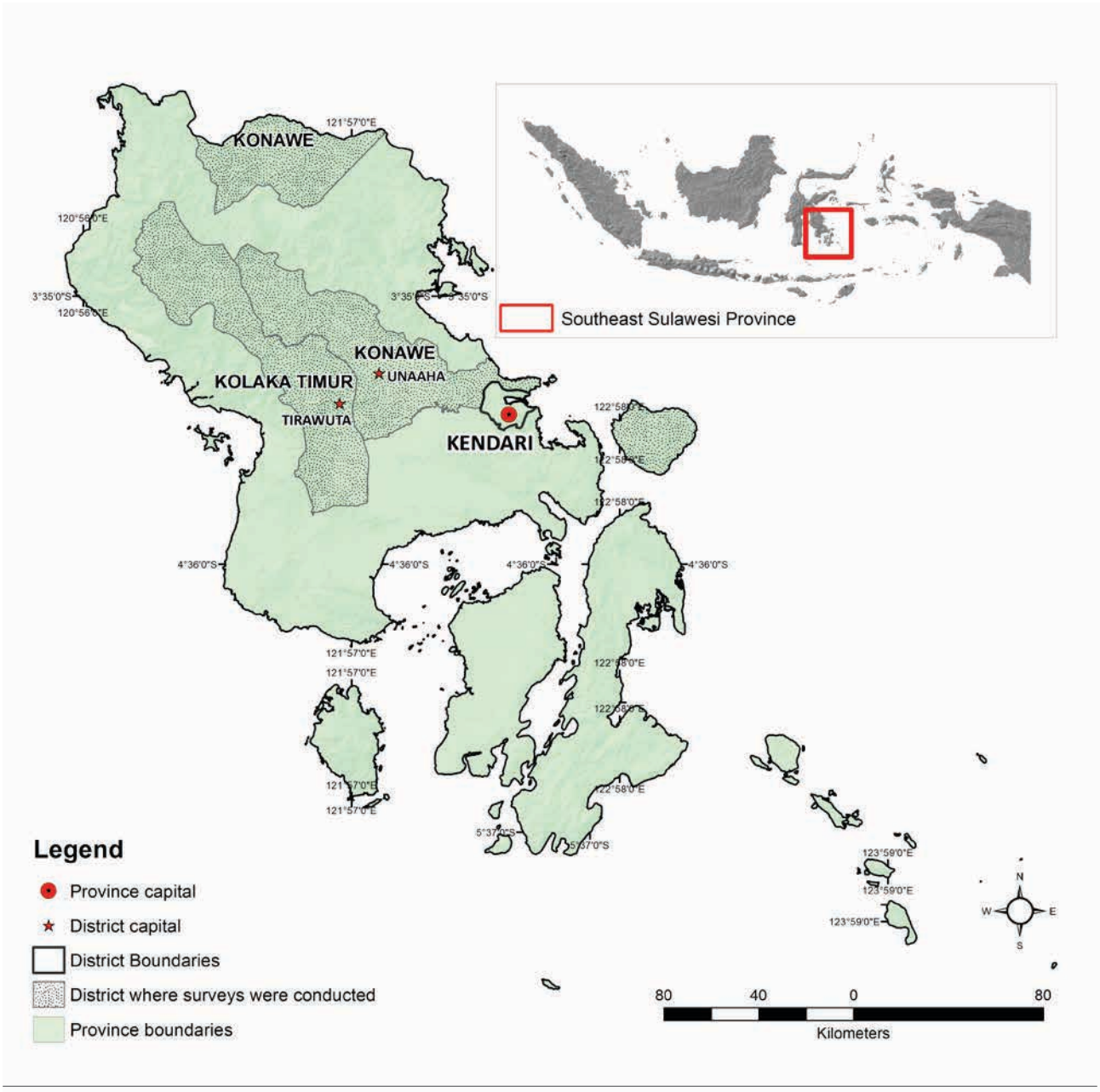
The main purpose of the survey is to know the status of forest tree nursery and tree planting in SE Sulawesi. The specific purposes of the survey is: (i) to identifiy characteristic of community tree nursery, (ii) to know indicator of success of tree nursery, (iii) to know quality of germplasm, (iv) to know status of technical capacity and businees on nursery, (v) to know status of forest tree planting, and (vi) to identify constraints on implementaion of forest tree planting in SE Sulawesi.

2. Method

2.1 Time and Location of Survey

Surveys were conducted in June - August 2014 involving respondents from East Kolaka and Konawe Districts, SE Sulawesi (See Map 1).

Map 1. SE Sulawesi (source: Elissa Dwiyanti, ICRAF, Bogor)



2.2 Materials and Equipment

The materials and equipments used in these interviews and surveys were: detailed questionnaires, stationeries, board base, block note, camera, GPS and sound recording device.

2.3 Data Collection and Analysis

2.3.1 Development of Questionnaires

Based on a questionnaire developed by IGN and ICRAF two questionnaires were made including the following major topics: **(1) Forest tree nursery survey**: (i) household characteristics (owner/group manager), (ii) nursery characteristics, (iii) number of employees/workers in nursery, (iv) indicator of success of tree nursery, (v) quality of germplasm, (iv) technical capacity and businees on nursery; **(2) Forest tree planting survey :** (i) household characteristics, (ii) forest tree planting activities, and (iii) constraints for implementing forest tree planting. The two questionnaires are presented in Annex 1 and 2.

2.3.2 Data Collection

The planned respondents in these surveys were 150 persons in the two districts:

1. East Kolaka District: 90 respondents: (i) Tree planting = 60 respondents and (ii) Nursery = 30 respondents
2. Konawe District: 60 respondents: (i) Tree planting = 40 respondents and (ii) Nursery = 20 respondents

The actual numbers of respondents included in the two surveys were:

1. East Kolaka District: 90 respondents: (i) Tree planting = 45 respondents or 75% and (ii) Nursery = 20 respondents (63%)
2. Konawe District: 60 respondents: (i) Tree planting = 50 respondents or 125% and (ii) Nursery = 19 respondents or 95%

The nursery survey included fewer respondents than planned, as there were fewer forest tree nurseries developed by local communities than foreseen – especially in East Kolaka District. However all existing nurseries in the survey areas were included in the surveys.

Field data collections were carried out through semi-structured interview conducted by trained enumerators. Surveys to determine the status of forest tree nursery and planting in this survey were carried out in two districts (East Kolaka and Konawe Districts, 17 sub-districts and 49 villages).

The total numbers of respondents in the two surveys were: (1) Forest tree nursery survey: 39 respondents and (2) Forest tree planting survey were 95 respondents. Number of respondents in each district are presented in Table 1.

Table 1. Number of respondent for forest tree nursery and planting surveys.

No	District	Number of Respondent		Total
		Forest Tree Nursery Survey	Forest Tree Planting Survey	
1	East Kolaka District	20	45	65
2	Konawe District	19	50	69
	Total	39	95	134

Table 2 shows the characteristics of the 134 respondents in the two surveys: (a) 39 of respondents of forest tree nursery survey and (b) 95 respondents of forest tree planting survey. The data indicates that male dominate the respondent groups in both survey types as 97 % respondents and 89.5% are male in nursery and tree planting surveys respectively; 69.2% of nursery survey respondents are owners of a nursery, while the occupation of most repondents of the tree planting survey are farmers (65.3%). Detailed characteristics of the respondents are presented in Table 2 below :

Table 2. Characteristics of the respondents in the two surveys.

No	Characteristic	Forest Tree Nursery Survey	Forest Tree Planting Survey
1	Sex		
	Male	38 (97%)	85 (89.5%)
	Female	1 (2.6%)	10 (10.5%)
2	Number of Respondent	39	95
3	Respondent age interval	28-68 year old	17-74 year old
5	Status of respondent		
	Owner	27 (69.2%)	
	Relation/share crop	4 (10.3%)	
	Group Chairperson /Group Secretary/Group member	8 (20.5%)	
	Head of village (headman)		6 (6.3%)
	Government officials		9 (9.5%)
	Farmer		62 (65.3%)
	Private employees		11 (11.6%)
	Others		7 (7.4%)

2.3.3 Data Analysis

The results/data from observations and interviews were tabulated in accordance with the categories or groups. The data analysis was done using i) *Qualitative Descriptive Analysis Method* (QDAM), with the frequency distribution tabulation and ii) the statistical program *Statistical Product and Service Solution* (SPSS release 14.0.1) which is an application program that has the ability of statistical analysis as well as data management systems on a graphical environment using descriptive menu and dialog boxes. Furthermore the results of the data analysis are interpreted and presented in descriptive form, in order to present the actual conditions of the survey area.

3. Results and Discussions

3.1 Forest Tree Nursery Survey

Nursery is a place where plants are grown, nurtured and sold or planted from. Generally, various commercial crop growers require a good quality saplings or grafts of genuine type. Nurseries are categorized in different ways. According to time duration nurseries are classified in two types: (1) *Temporary nursery*, this type of nursery is developed only to fulfill the requirement of the season or a targeted project. Likewise temporary arrangement for growing forest seedlings for planting in particular area can also be done in temporary nursery. (2) *Permanent nursery*, this type of the nursery is placed permanently so as to produce plants continuously. These nurseries have all the permanent features. The permanent nursery has permanent mother plants and operated continuously all year round. The nurseries surveyed were mostly permanent forest plant nurseries, established based on the communities' interest in developing tree seedlings for production of commodities for improving livelihoods as well as forest/land rehabilitation.

3.1.1 Characteristic of Nursery

1. Type of nursery ownership

Based on nursery ownership, the survey showed that most nurseries are *individual* and *family* nurseries (46.2% each). Only 5.1% are company nurseries type and 2.6% are school nursery type. The nursery ownership is presented in Table 3.

Table 3. Type of nursery ownership.

Type	Percentage (%)
Individual	46.2
Family	46.2
Company	5.1
School	2.6
Total	100.0

2. Nursery certificate status

High quality seedlings are required to develop good quality tree planting. Seedling quality includes genetic, physical and physiological quality. A problem in the absence of certified tree seedlings is that the consumers have no guarantee of seedling quality. Most of the respondents (97.4%) stated that the nurseries have not been certified; only 2.6% respondents stated that their nursery has been certified by BPTH (Balai Perbenihan Tanaman Hutan, RegionalTree Seed/Seedling Centre) of Sulawesi and forest district agency. Certification status of nursery in the studied site is presented in Figure 1.

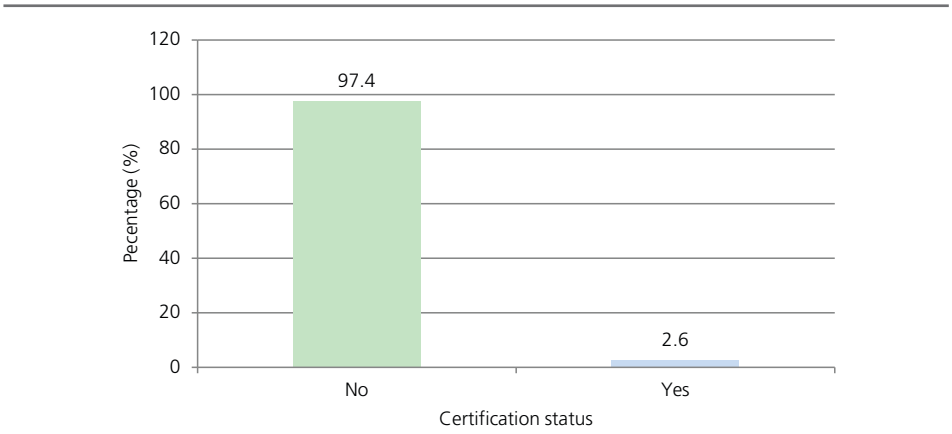


Figure 1. Certification status of nursery in survey site.

3. Land status of nursery site

There were two type of land status of nursery site: i) owner land (this is stated by 79.5% of respondents) and borrowed land (this stated by 20.5% of respondents). There are no respondents stating that the land status of the nursery site is rented, government owned, communal owned, or other land status. Land status of nursery site is presented in Figure 2 below.

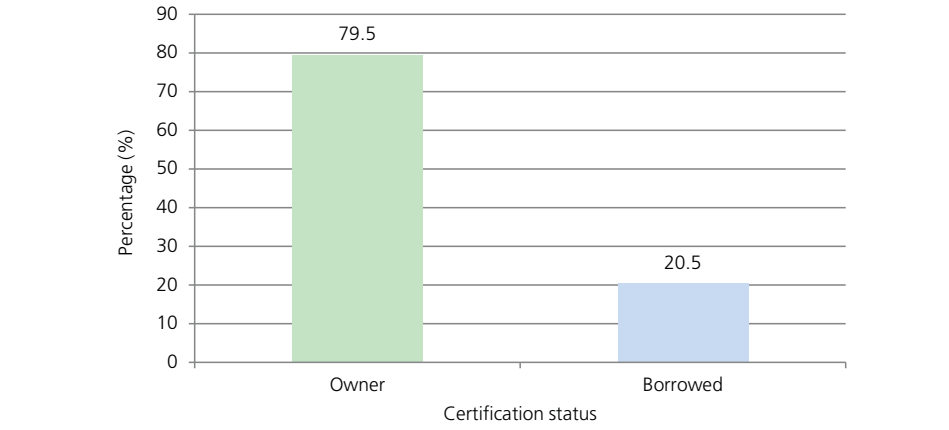


Figure 2. Land status of nursery in survey study site.

4. Nursery establishment

Most of respondents stated that the nursery establishment were carried out by themselves (69.2%), other respondents stated by friends/neighbours (12.8%) and by government (10.3%). Only 5.1% of nurseries were established by NGOs. Starting of nursery establishment is presented in Table 3.

Table 4. Nursery establishment.

Nursery starting	Percentage (%)
Self	69.2
Friends/Neighbors (group)	12.8
NGO	5.1
Government department	10.3
Other	2.6
Total	100.0

5. Financial support for nursery establishment

Most respondents stated that they used their own funds to establish the nursery (51.3%) and followed by government department (28.2%). Others financial support such as NGO, community group, donor project, and other sources were stated by less than 10% of respondents for each source. See Table 5.

Table 5. Financial support for nursery establishment

Financial support source	Percente (%)
Self	51.3
Government department	28.2
Community group	7.7
NGO	5.1
Other	5.1
Donor project	2.6
Total	100.0

6. Reason for establishing nurseries

This survey found that about 41% of respondents stated that the reason for establishing nursery was to 'meet own seedlings need' and 'sell seedlings', 38.5 % stated to meet own seedlings needs only, while 15.4% respondents stated for other reasons. It could be concluded that up to 79.5% of the respondents established their own nursery to meet own seedlings needs and up to 46.1% for selling seedlings. Reason of respondents to start nursery establishement is presented in Table 7. Most of respondents (97.4%) stated that they still operate the nurseries due to those reasons.

Table 6. Reason for establishment of nurseries

Reason	Percentage (%)
Both, meet own seedlings need and selling	41.0
Meet own seedling needs only	38.5
Other	15.4
Sell seedlings only	5.1
Total	100.0

7. Number of employees/workers in the nurseries

Number of employee/workers in the nursery is presented in Table 7 below. The table shows that most of employee/workers (220 persons or 39.6%) are working as »paid worker-part time less than 20 hrs/week«, 156 persons (28.1%) are »only owner or family members« working in the nursery, 83 persons (14.9%) are »paid worker – full time >20 hrs/week«, and 97 persons (17.4%) are »group members«. There are no »non family member working as unpaid worker part time < 20 hrs/week and full time > 20 hrs/week«.

Percentage of employee category is presented in Figure 3.

Table 7. Total number of employee of each category

Type of worker	**(1)** Only owner (family members) working in the nursery		**(2)** Paid worker – part time < 20 hrs/week		**(3)** Paid worker – full time >20 hrs/ week		**(4)** Non family member Unpaid worker part time < 20 hrs/week		**(5)** Non family member Unpaid worker – full time > 20 hrs/week		**(6)** Group member	
Gender	F	M	F	M	F	M	F	M	F	M	F	M
East Kolaka	48	24	9	11	0	0	0	0	0	0	48	49
Konawe	17	67	82	128	51	32	0	0	0	0		
Sub-total	65	91	91	139	51	32	0	0	0	0	48	49
Total		156		220		83		0		0		97

Figure 3. Percentage of employee category.

3.1.2 Indicator of Success

1. Total Seedling Production (ready to use/mature)

The number of seedlings produced in the respondents nurseries are divided into three groups of seedlings based on their use: (i) Rehabilitation of forest and land for forestry government programs, (ii) Seedlings for selling, and (iii) Seedlings for self use.

Table 8 shows that the highest number of seedling production in East Kolaka was in year 2012 (117,563 seedlings) followed by year 2013 (71,215 seedlings). During 2009-2011 seedlings production in East Kolaka were still low (less than 5,000 seedlings/year). Table 7 also shows that no of seedling production in Konawe is higher than in East Kolaka, production of seedlings in this district was more than 500,000 seedlings/year (between 639,00 -1,575,500 seedlings during 2009-2013) while the highest production is in year 2010 (1,575,500 seedlings).

Numbers of seedlings produced in year 2009 to 2013 in the two districts are presented in Table 8. Number of seedling produced of the different tree species in East Kolaka and Konawe are presented in Figure 4, 4a and 5 respectively.

Table 7. Number of seedlings produced in each district during 2009-2013.

District	2013	2012	2011	2010	2009	Total
East Kolaka	71,215	117,563	4500	2800	210	196,288
Konawe	639,000	989,150	864,200	1,575,500	907,000	4,974,850
Total	710,215	1,106,713	868,700	1,578,300	907,210	5,171,138

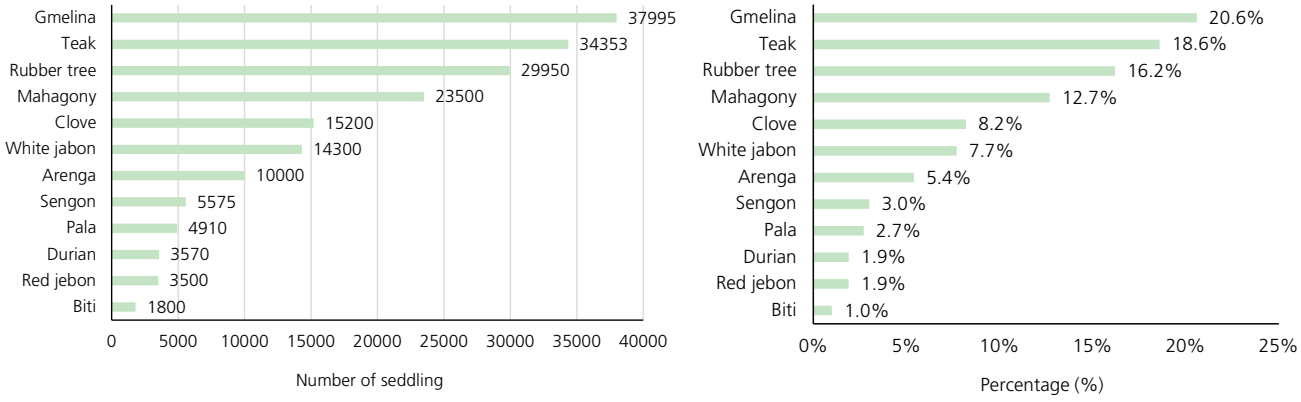


Figure 4. Number of seedlings (left) and percentage of seedlings (right) produced at community nurseries in East Kolaka, 2009-2013.

Figure 4 above shows that white teak (*Gmelina arborea*) seedlings were produced in the highest number in East Kolaka, followed by teak (*Tectona grandis*), rubber tree (*Hevea brasiliensis*), mahoni (*Swietenia macrophylla*), and clove (*Syzygium aromaticum*). While in Konawe most of respondents produced mostly teak, less of respondents produced sengon (*Paraserianthes falcataria*), biti (*Vitex cofassus*), white teak, white jabon (*Anthocephalus cadamba*), and durian (*Durio zibethinus*). The Indonesian, English and scientic names of the tree species are given in annex 1.

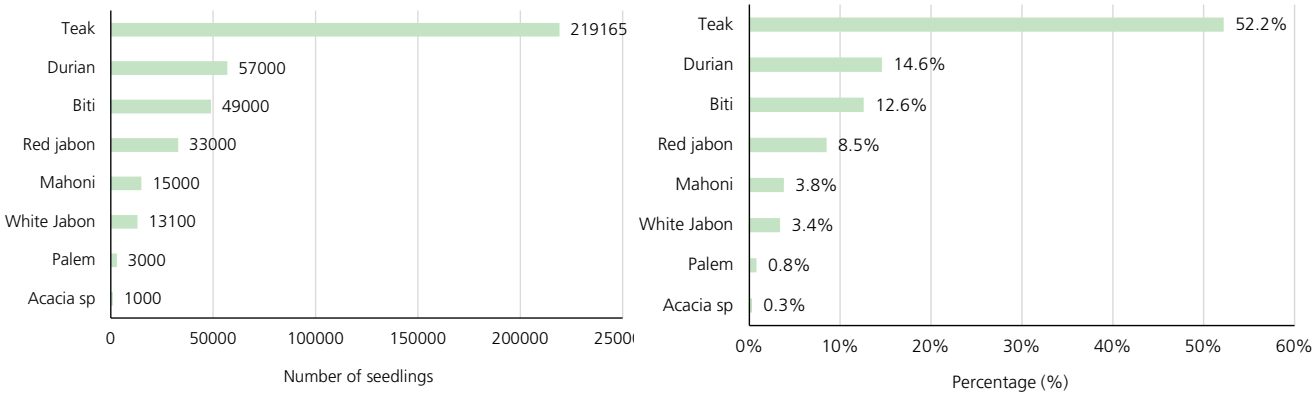


Figure 4a. Number of seedlings (left) and percentage of seedlings (right) produced at communtiy nurseries in Konawe.

Different with seedlings production in East Kolaka, production of seedlings in Konawe district was divided into two group: (i) Seedlings produced at community nursery only and (ii) seedlings produced in both community and government program nursery. Figure 4a shows that the highest seed-

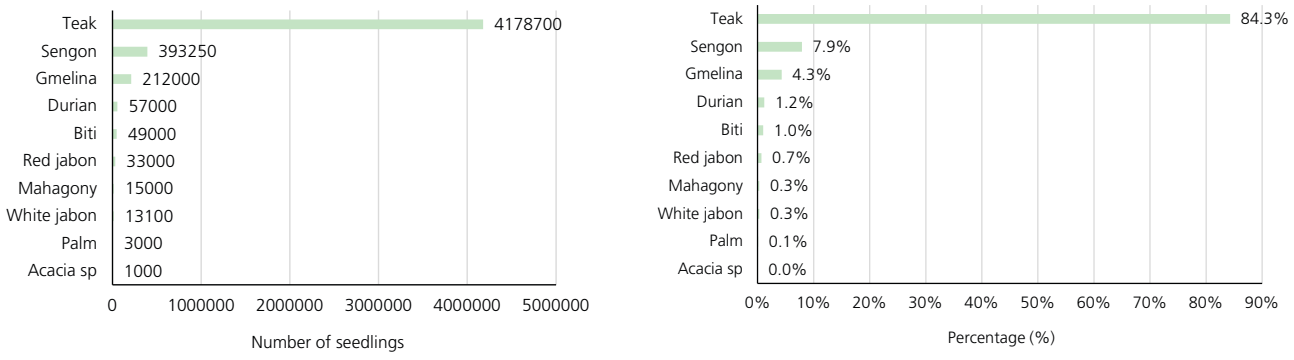


Figure 5. Number of seedlings (left) and percentage of seedlings (right) produced at community and government programme nurseries in Konawe.

ling production in community nursery is of teak (56.2%) and followed by durian (14.6%), biti (12.6%), and red jabon (*Anthocephalus* macrophyllus) (8.5%). Teak is also the most produced in nursery of community and government programs (84.3%), and followed by sengon (7.9%), and gmelina (4.3%).

2. Total Seedling Sales

The respondents stated that some of the produced seedlings were sold to customers. Table 8 shows that during 2009 and 2010 no seedlings were sold by respondents in East Kolaka. The selling of seedlings were started in year 2011 (4,000 seedlings) and increased to 28,125 seedlings in year 2013. In Konawe the numbers of seedlings sold were higher than in East Kolaka. More than 30,000 seedlings were sold yearly since year 2009, and the number increased during 2010-2013. The highest selling was in year 2013 with total number of 77,000 seedlings. In East Kolaka, white jabon was the most sold seedling (Figure 6), while in Konawe is was teak (Figure 7).

Table 8. Number of tree seedlings sold during 2009-2013 (community nursery)/non permanent nursery.

District	2013	2012	2011	2010	2009	Total
East Kolaka	28,125	15,033	4,000	0	0	47,158
Konawe	77,000	57,300	57,500	56,800	35,000	283,600
Total	105,125	72,333	61,500	56,800	35,000	330,758

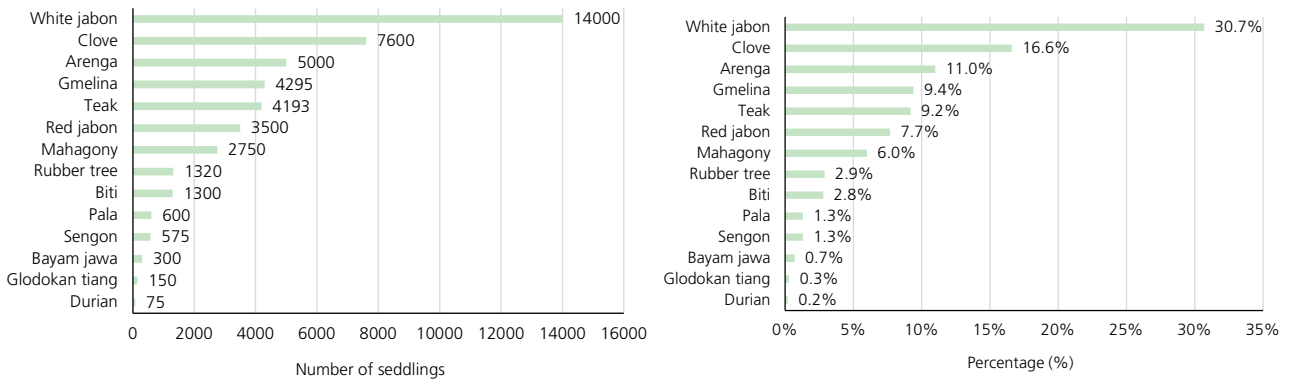


Figure 6. Number of seedlings (left) and percentage of seedlings (right) sold in East Kolaka.

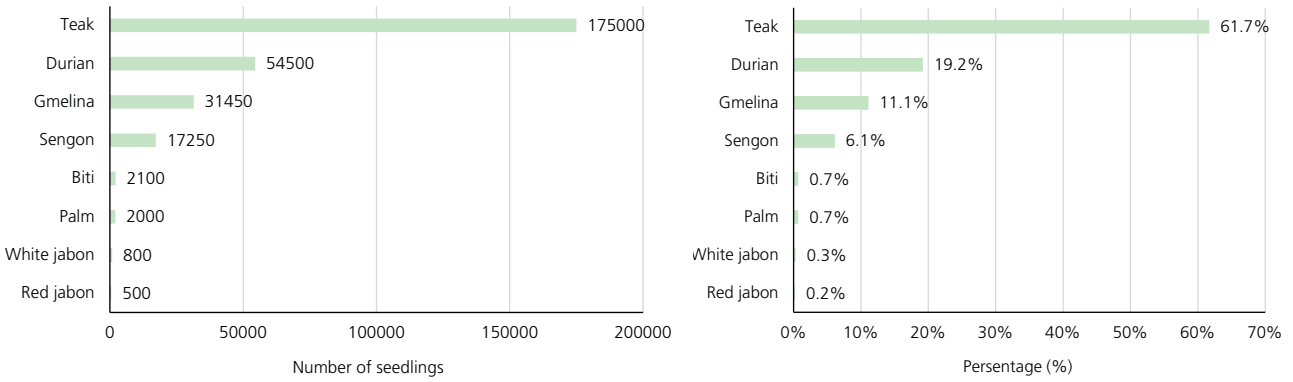


Figure 7. Number of seedlings (left) and percentage of seedlings (right) sold in Konawe.

3. Seedling produced for Self-Use

The survey found that the total number of seedlings produced for self use was 39,665 in East Kolaka during 2009-2013, while in Konawe it was 82,015 seedlings. But, in East Kolaka self use of seedlings increased substantially in year 2013 (19,085 seedlings) compared to year 2009 (5,010 seedlings), while in Konawe it fluctuated from year to year. List of numbers of seedlings produced for self use is presented in Table 9.

Table 9. Number of self use seedlings.

District	2013	2012	2011	2010	2009	Total
East Kolaka	19,085	6,730	2,030	6,810	5,010	39,665
Konawe	1,215	250	59,350	4700	16,500	82,015
Total	**20,300**	**6,980**	**61,380**	**11,510**	**21,510**	**121,680**

3.1.3 Type and Quantity of Germplasm used

1. List of tree species produced in nursery

Seeds followed by wildings are the most frequently types of germplasm used for production of seedlings in nurseries in both East Kolaka and Konawe. The use of vegetative propagation technique (cutting, grafting, air layering) is not common and is mainly used for fruit tree and some multi-purposes tree species (MPTS). List of germplasm type and quantities used for producing the different species in nurseries in East Kolaka and Konawe are presented in Table 10 and Table 11 respectively.

Table 10. List of seedlings species produced in nursery in East Kolaka.

No	Name of Species	Type of germplasm	Quantity of germplasm received
1	White jabon (*Anthocephalus cadamba)*	Seed Wilding	832,000 seeds 1,000 pcs
2	White teak (*Gmelina arborea*)	Seed Wilding	55,000 seeds 6,500 pcs
3	Teak (*Tectona grandis*)	seed wilding	69,000 seeds 1,000 pcs
4	Red jabon (*Anthocephalus macrophyllus)*	Seed	30 gram
5	Mahoni (*Swietenia macrophylla*)	Seed Wilding	21,300 seeds 10,000 pcs

6	Sengon (*Paraserianthes falcataria*)	Seed	8000 seeds
7	Rubber tree (*Hevea brasiliensis*)	Seed Wilding	28,500 seeds 3,000 pcs
8	Biti (*Vitex cofassus*)	Seed Wilding	2,500 seeds 500 pcs
9	Kayu afrika (*Maesopsis eminii*)	Seed	2,200 seeds
10	Durian (*Durio zibethinus*)	Seed Vegetative	1600 seeds 810 pcs

Table 11. List of seedlings species produced in nursery in Konawe.

No	Name of Species	Type of germplasm	Quantity of germplasm received
1	Local teak Super teak Nusantara teak	Seed Seed Seed	1,597,500 seeds 67,500 seeds 11,250 seeds
2	Gmelina	Seed Wilding	34,750 seeds 600 pcs
3	Sengon	Seed	237,500 seeds
4	Red jabon	Seed	49,000,000 seeds
5	White jabon	Seed Wilding	2,300,000,000 seeds 300 pcs
6	Durian	Seed	40,000 seeds
7	Biti	Seed	84,000 seeds
8	Trembesi (Samanea saman)	Wilding	100 pcs

2. Seed source class (category of source) of seed collection

In East Kolaka most of the seed used by farmers for producing seedlings came form *community farm* (other's farm). There were no vegetative propagule source for propagation of seedlings, neither in East Kolaka nor in Konawe. Two species, sengon and rubber tree, were collected from improved seed stands. The survey also found that seed of white teak with the highest number of seedlings produced in East Kolaka, are mostly collected from respondent's farm and community farm, no seed were collected from improved seed stands or seed trees.

In Konawe district, a number seed were collected from improved stand (teak, gmelina, sengon, white jabon, and biti). The respondents also collected the seed from natural forests and community farms. Seed of Teak, with the highest number of seedlings produced in Konawe, was collected from several of seed source categories (natural forest, own farm/respondents farm, plantation forest, improved stand, and seed trees). Details of seed source classes (category of source) used for seed collection in East Kolaka and Konawe is presented in Table 12.

Table 12. Seed source class (category of source) where seed is collected in East Kolaka and Konawe

Top ten species	Source of seed						
	Natural Forest	Own Farm	Other's Farm	Plantation Forest	Improved Stand Seed Orchard *	Vegetative pro-pagules source	Identified Seed Trees
East Kolaka District							
Biti		+	+				
Durian		+	+				
Rubber tree			+		+		+
Red jabon	+	+	+				
White jabon	+	+	+				
Teak		+	+				
Gmelina		+	+				
Kayu afrika			+				+
Mahoni			+				+
Sengon			+		+		
Konawe District							
Local teak Super teak Nusantara teak	+ +	+		+	+ + +		+
Gmelina	+	+	+		+		
Sengon	+		+		+		
Red jabon	+		+				
White jabon	+		+		+		
Durian					+		
Biti					+		
Trembesi			+				

*Note : * = improved Stand could be any type of Seed Orchard*

3. The major reason for selecting the germplasm sources used

The survey found that availability of seed was the major reason for selecting seed source to use for seed collection, this reason was stated by 56.4% of respondents. It seems the respondents in general are NOT considering seed quality, when selecting seed sources for their seed collection, as only 25.6% of the respondents mentioned good quality of source as their reason for selection of seed sources. This survey also found that easy access to obtain seed was an important reason for selecting seed source as 15.4% of respondents gave this answer. The major reason of respondents to use the germplasm sources is presented in Figure 8.

The use of good quality seed is a prerequisite for the satisfactory production of good quality tree products. Based on the data in figure 8, there seems to be a need for more awareness raising on the importance of using good quality tree seeds. It is always a question of using the *best possible seed* available. This might not be very high quality, but if nursery owner and tree planters consider seed quality, they can get the best seed available and at the same time work on improving the quality step by step.

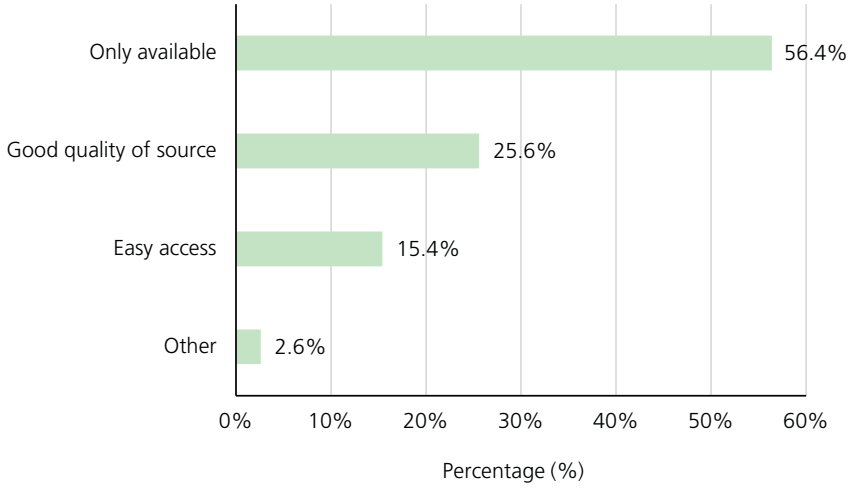


Figure 8. The major reason of respondents for using the germplasm sources.

4. Achievement of seedling production targets

The survey found that 84.6% of respondents stated they have not produced as many seedlings as they would have liked, only 15.4% of respondents stated they have achieved their target, see Figure 9.

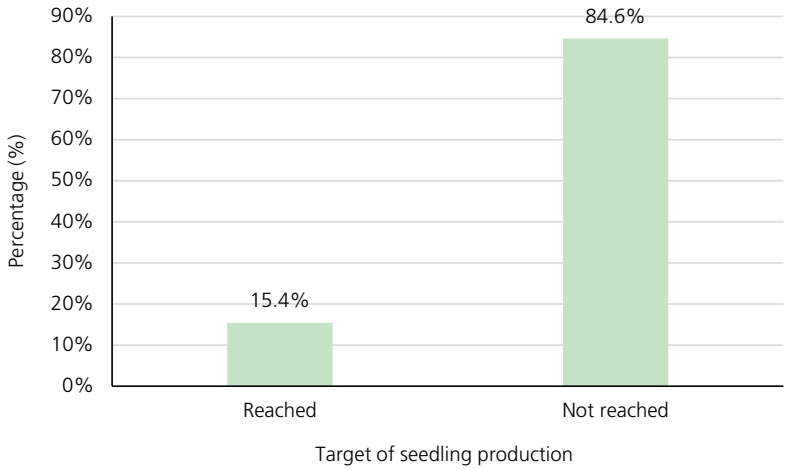


Figure 9. Achievement of seedling production targets.

5. Factors limiting production of seedlings

Most of respondents stated the limiting factor for producing seedlings is unavailability of germplasm, this is stated by 71.8% of respondents. Limitation of capital is another important factor (17.9%). The survey also found that only 2.6% of respondents stated the limitation of seedling production caused by technical prodcution difficulties. Limitation of time/labour was the answer for 5.1% and 2.6% answered lack of customers. Details on limiting factors for producing seedlings are presented in Figure 10.

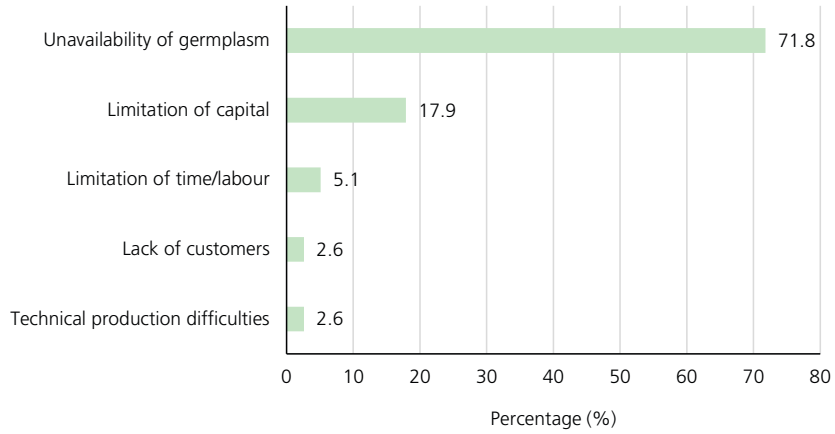


Figure 10. Limitating factor producing seedlings.

6. List of species prioritized for production and major reason for not producing them

The major reason for not producing the priority species is that seed are not available for own collection (82.1%) and followed by too expensive to purchase (7.7%). No respondent stated the factor caused by uncertain demand and seed not availble for free. List of prioritized species for production are presented in Table 13, while major reasons for not producing these species are presented in Figure 11 below.

Table 13. List of species prioritized for production.

No.	East Kolaka District		Konawe District	
	Timber Trees	**Non Timber Forest Product**	**Timber trees**	**Non Timber Forest Product**
1	Kayu afrika	Clove	Biti	Gaharu
2	Biti	Cacao	Jabon merah	Glodokan Tiang
3	Red jabon	Duku	Jati emas	
4	White jabon	Durian	Gmelina	
5	Teak (Jati emas)	Gaharu	Kayu Afrika	
6	Local teak	Glodokan tiang	Kayu Bayam	
7	White teak	Orange	Kayu uru	
8	Teak	Rubber tree	Mahagony	
9	Kayu bayam (*Maesopsis eminii*)	Cinnamon	Sengon	
10	Kayu besi (*Eusideroxylon zwageri*)	Melinjo	Tanjung	
11	Kayu kalapi (*Kalappia celebica*)	Nutmeg	Trembesi	
12	Kayu kolaka (*Maranthes corymbosa*)			
13	Kayu pondok			
14	Kayu uru (*Magnolia ovalis*)			
15	Mahoni			
16	Nyatoh (*Palaquium* sp)			
17	Samponi			
18	Sengon			
19	Trembesi (*Samanea saman*)			
20	Kampala			

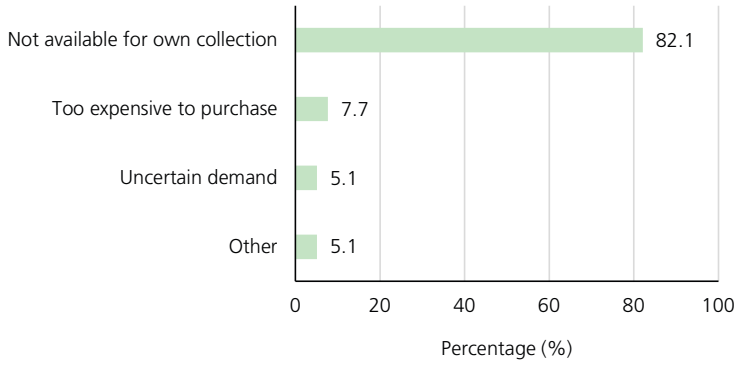


Figure 11. Major reason for not producing prioritized seedlings.

There were nine trees species prioritized for production both in East Kolaka and Konawe Districts: *Gmelina arborea, Tectona grandis Anthocephaluus macrophyllus, Anthocephalus cadamba, Swietenia macrophylla, Paraserianthes falcataria, Maesopisi eminii, Vitex cofassus, and Samanea saman.*

3.1.4 Technical Capacity

1. Training received in nursery operation

The survey found that 64.1% of respondents stated that they have not had training in nursery operation, whereas 35.9 % of the respondents have had, see Figure 12. Topics of training already received by the respondents is presented in Table 14. The data in the table indicates, that respondents in East Kolaka have obtained more trainings than the respondents in Konawe.

However, the three major training providers in the two districts (AgFor/OWT/ICRAF) agree that approximately the same number of trainings occurred in each district. One possible explanation for the survey having captured so different results could be that most training was implemented over a series of 1-day events, conducted weekly of bi-weekly, to fit farmers availability. Respondents in Konawe may consider those 1-day events as part of the nursery development process and not as separate »training«. This explanation is supported by fact, that only training sessions of 2 to 14 days duration were reported in Konawe.

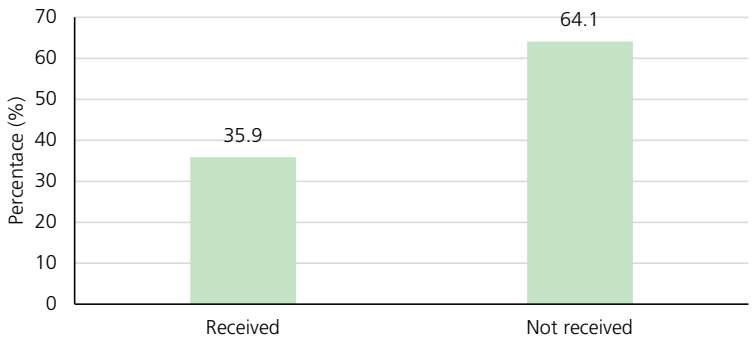


Figure 12. Respondents trained in nursery operation.

The training topics were: Cacao cultivation and seedlings propagation, durian cultivation, pepper cultivation, nursery establishment and maintenance, identification of seed source, development of tree seedlings and vegetative propagation technique and pest and disease management.

Table 14. List of topics of training received by the repondents in East Kolaka and Konawe.

No	Trainings	Length of Trainings (how many days)	Subject	Who Provide Training	Who supported the training
East Kolaka					
1	Nursery of cacao	1 day	Cacao seedlings propagation	Agriculture and plantation district agency	District government
2	Cacao cutting	1 day	Right cacao cutting	Extension worker	Pemkab Kolaka
3	Seed	2 days	The important of tree plantation, certification, red jabon seed	District givernment	BPTH
4	Cacao cultivation	1 day	Cacao cultivation	ICRAF	CIDA
5	Durian cultivation	1 day	Durian cultivation	ICRAF	CIDA
6	Pepper cultivation	1 day	Pepper cultivation	ICRAF	CIDA
7	Community nursery	1 day	Nursery establishment	BPDAS	District givernment
8	Rubber tree cultivation	1 day	Nursery and plant maintenance	OWT Agfor	ICRAF
9	Clove cultivation	1 day	Nursery and plant maintenance	OWT Agfor	ICRAF
10	Cacao cultivation	3 days	Nursery and plant maintenance	OWT Agfor	ICRAF
11	Durian cultivation	1 day	Nursery and plant maintenance	OWT Agfor	ICRAF
12	Coffee cultivation	1 day	Nursery and plant maintenance	OWT Agfor	ICRAF
13	Community nursery	2 days	Technique on nursery establishment	BPDAS	Province government
14	Procurement of good quality tree seed	4 days	Identification of seed source, nursery esatblishemnt, generative and vegetative propagation	OWT Agfor, IGN	IGN, Agfor
15	Pest and Disease	7 days	Pest and disease management	Dinas Pertanian	Dinas Pertanian
16	Plant Cultivation	5 days	Plant cultivation	Dinas Perkebunan	Dinas Perkebunan
17	Plant Cultivation	3 days	Budidaya Tanaman	NGO	LSM
18	Forest timber	15 days	Community forest	Forestry district agency	Forestry district agency
19	Cacao cultivation	2 days	Maintenance	Plantation district agency	Plantation district agency
20	Coffee cultivation	1 day	Coffee cultivation	AgFor Sultra	OWT
21	Durian cultivation	1 day	Durian cultivation	AgFor Sultra	OWT
22	Pepper cultivation	1 day	Pepper cultivation	AgFor Sultra	OWT
23	Nursery	2 days	Propagation technique	Forestry district agency	Forestry district agency
24	Coffee cultivation	1 day	Coffee cultivation	OWT	AgFor Sulawesi
25	Nursery	1 time	Propagation technique	Forestry district agency	Forestry district agency
Konawe					
1	Propagation technique	2 Weeks	Seedlings maintenance	Forest province agnecy	BP4K
2	Tree seedlings propagation	2 day	Propagation technique	Forestry district agency	-
3	Nursery	1 Week	Nursery establishment	BPDAS	-

2. Experience in nursery work before starting own nursery

a. Type of nursery where experience were obtained

Data presented in Figure 13 shows that 71.8% of respondents did not have any experience in nursery work before starting establishment of their own nursery. Some respondents had experience from: private (7.7%), community (5.1%), project facilitators (2.6%), and NGO (2.6%), and other experience (10.3%). This fact indicates that most of the respondents starting to establish nursery with limited technical knowledge, this corresponds with the limited number of respondents who had been trained in nursery management, see Figure 12.

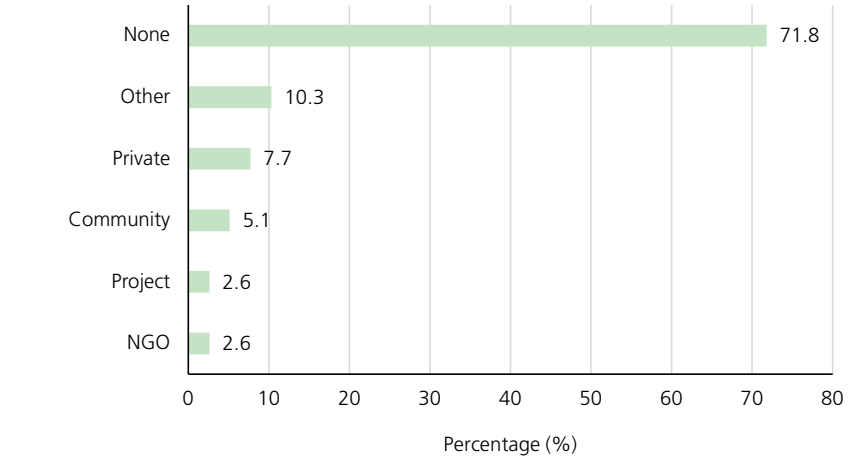


Figure 13. Nursery experience from working in other nurseries.

b. Access to technical support

About 64.1% of respondents did not have access to technical support on nursery operation and 35.9% had, see Figure 14. Type of technical support on nursery operation is presented in Table 15. Major support areas were: Germination technique, forest tree seed, fertilizing and planting technique, seedlings transplanting, and seedlings propagation.

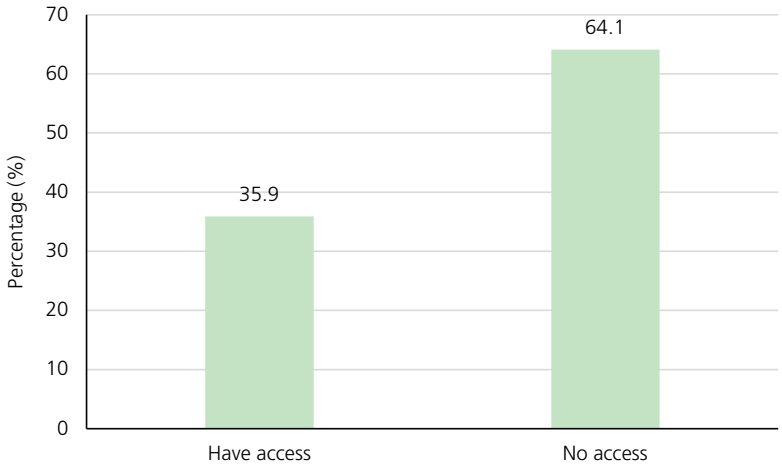


Figure 14. Access to technical support

Table 15. Type of technical support available on nursery operation.

Technical Support	How often	Subject	Who Provide Technical support	Who supported the training
East Kolaka				
Cultivation	Every 2 months	Cultivation, fertilizing, maintenace of plant	Crop extension worker	Crop district agency
Germination technique of jabon	Any time	Discussion and training	Forest district agency	Masmuman (Forest extension worker)
Forest tree seed	Any time	Discussion and training	OWT	AgFor Sultra
Cover plastic of pepper	1 time/month	AgFor	OWT AgFor	OWT
Counseling	1 time/month	Forest farmer group meeting	Extension worker, OWT	OWT AgFor
Training	1 time/week	NGO	NGO	NGO and government
Training	often	Farmer	AgFor	OWT
Fertilizing, planting, and marketing	4 times	Extension workeran	Dinas Forestry	District government
Nursery	1 time	Seedlings propagation	OWT AgFor	Extension worker
Forest farmer group	1 times/ month	Meeting and discussion	Extension worker of forestry	OWT
AgFor training	1 time/ month	Training on mixed garden	OWT AgFor	AgFor Sultra
Konawe				
Seedlings transplanting	1 Weeks	-	Forestry extension worker	-
Palm tree cultivation	Often	-	Dinas Forestry	BPDAS
Tree seedlings propagation	1 time	Teak propagation	Extension worker / OWT	OWT

3. Other sources for obtaining knowledge on nursery operation

It is found that self learning (43.6%) and reading (35.9%) were two other major ways in which respondents obtained technical knowledge on nursery operation. These data could indicate that the training manuals and other extension material on nursery operation are in high demand by local communities, see Figure 15.

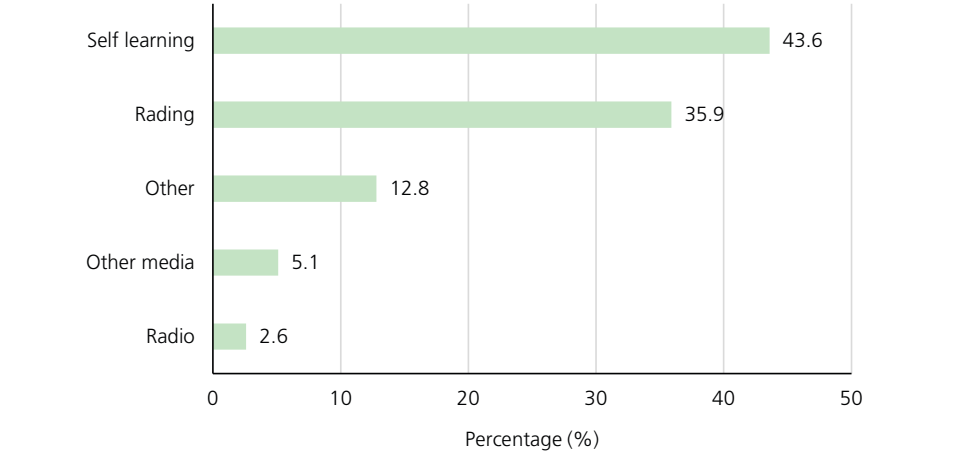


Figure 15. Other sources for obtaining knowledge on nursery operation.

4. Major constraints in operating the nursery

Major constraints in operating nurseries are lack of technical knowledge (stated by 23.1% of respondents), lack of capital (20.5%), limitation of tree seed (10.3%), lack of adequate nursery space (10.3%), water scarcity (7.7%), pest (7.7%), damaged by livestock (5.1%), and high labour demand (2.6%), see Figure 16.

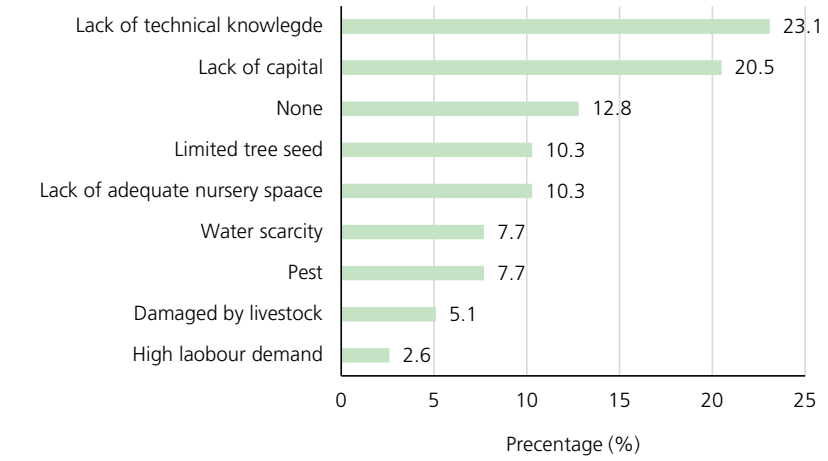


Figure 16. Major constraints in operating the nursery.

5. Single most important constraint in operating nurseries

Almost similar with major constraints in operating nurseries, is the single most important constraint in operating the nurseries: Limited capital (stated by 30.9% of respondents) and lack of knowledge (25.7%). Other single constraint are: Limited material and equipment (7.8%), land scarcity (7.8%), lack of seed sources (7.8%), lack of seed (2.6%), weather (2.6%), water scarcity (2.6%), tree seed burnt (2.6%), lack of seedlings (2.6%), pest and disease (2.6%), livestock destroyed (2.6%), and busy (2.6%), see Figure 17.

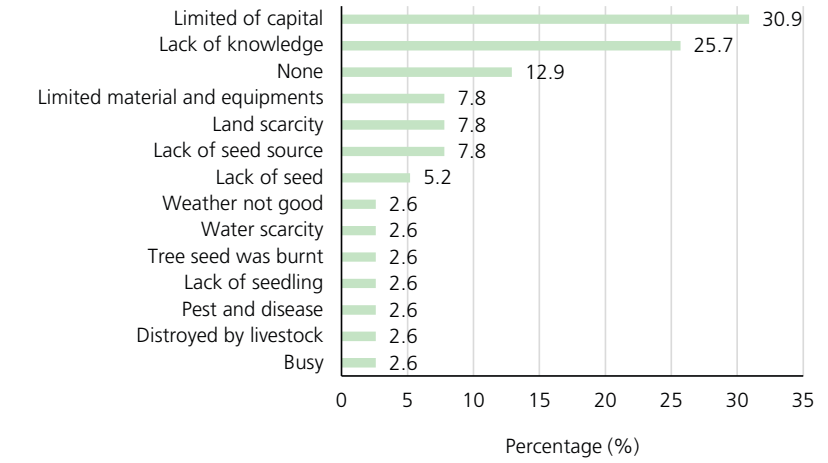


Figure 17. Single most important constraint in operating nursery.

6. Need to have additional support/training

Figure 18 shows respondents need for having additional support/training. Almost all respondents need to have additional support/traning to develop

their nurseries, this was stated by 94.9% of respondents. Only 5.1% of respondents do not need additional supporttraining.

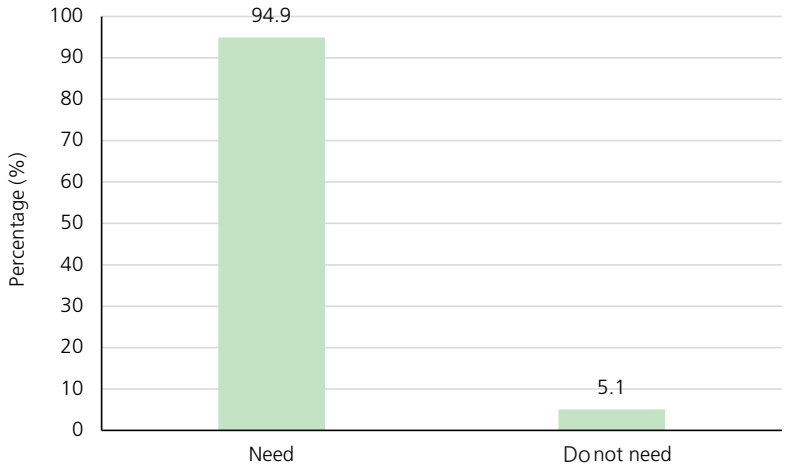


Figure 18. Respondents need to have additional support/training.

7. Type of additional support/training needed

Technical knowledge is a type of additional support/training needed by 79.5% of respondents for further developing their nurseries. There was still limited need on superior plant material (7.7%) and business planning (7.7%) in nursery development and material and equipement for nursery (2.6%), see Figure 19.

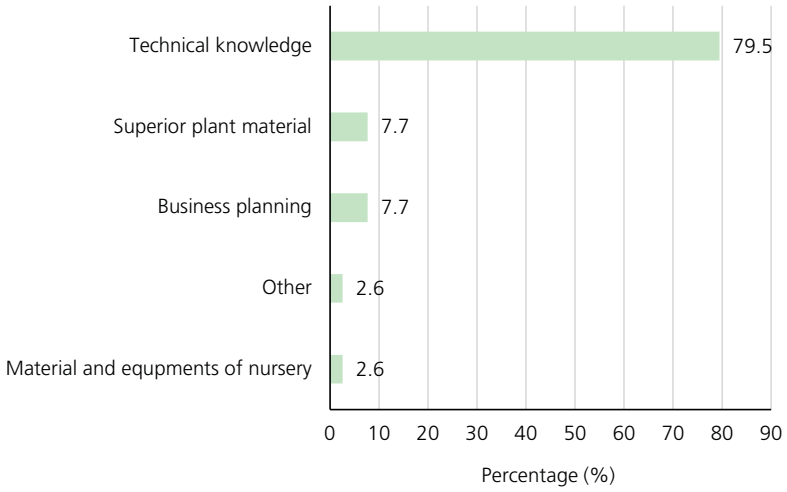


Figure 19. Type of additional support/training needed.

3.1.5 Business Capacity

1. Status of Business Plan

Almost all respondents (94.9%) in the survey stated, that they already have business plan, while only 5.1% of respondents do not have business plan, see Figure 20.

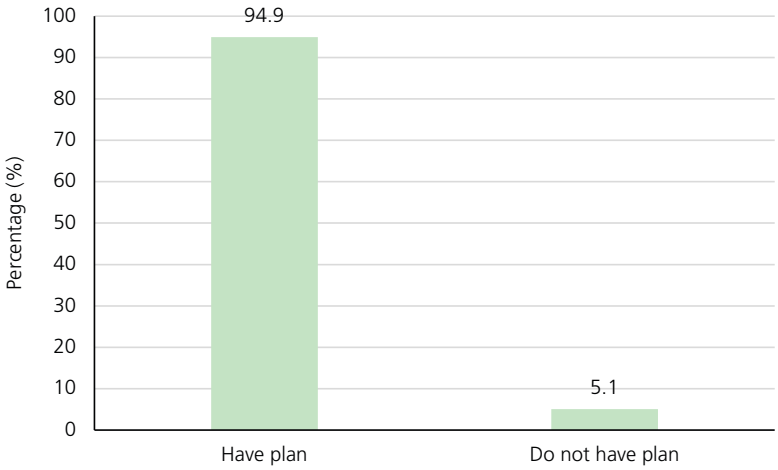


Figure 20. Status of business plan.

2. Status on received training in business management, marketing or related topic

It was found that 59% of respondents have not received training in business management, marketing or related topics, while 41% of respondents have, see Figure 21.

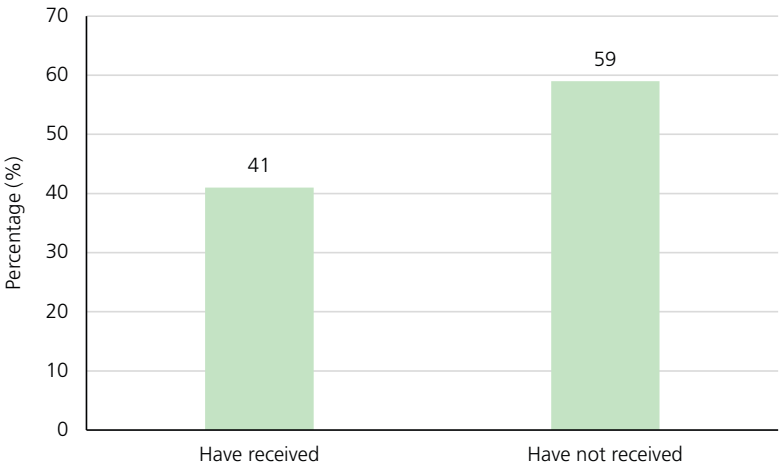


Figure 21. Status on received training in business management, marketing or related topic.

3. Training supporting agents

Figure 22 below presents training supporting agent who delivered and supported (funding) the training. Most repondents answered there were no training supporting agents on nursery (79.5%). Supporting agents were: AgFor SE Sulawesi (10.3%), NGO (5.2%), Farmer Empowerment Trough Agricultural Technology and Information/FEATI (2.5%), and East Kolaka Forest District Agency (2.5%).

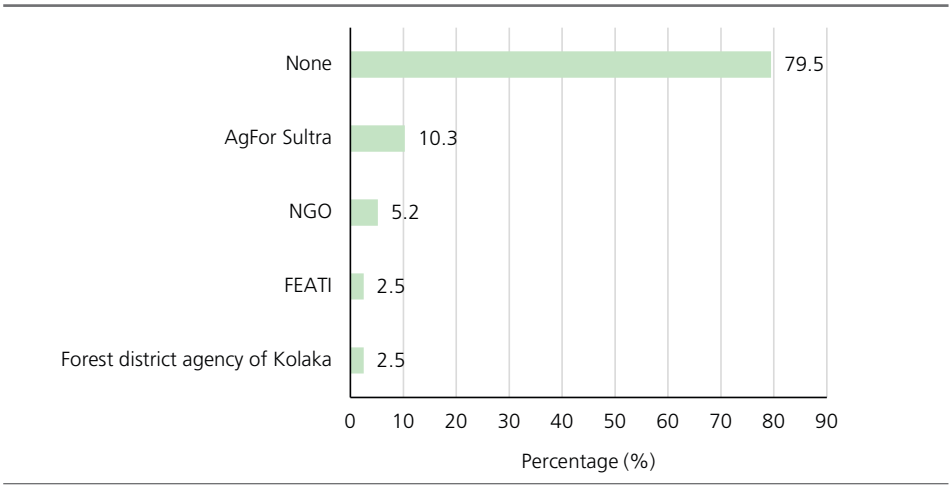


Figure 22. Training supporting agent.

4. Customers buying seedlings from the nurseries

Customers buying seedlings from the nurseries are dominated by private individuals according to 94.9% of respondents, while customers from the government only accounted for 5.1% of the buying of seedlings, see Figure 23.

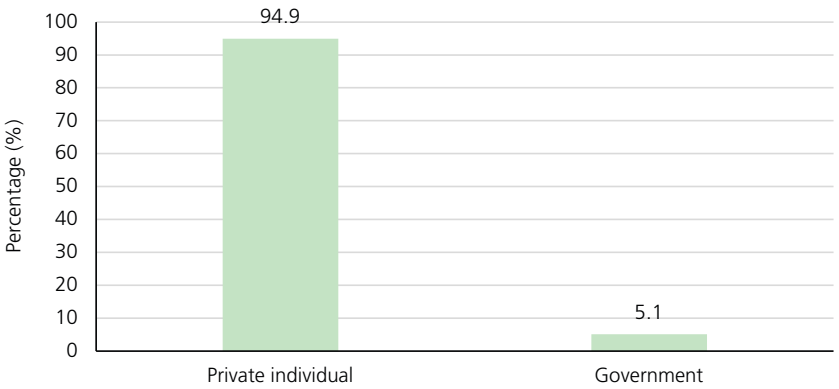


Figure 23. Customers buying seedlings.

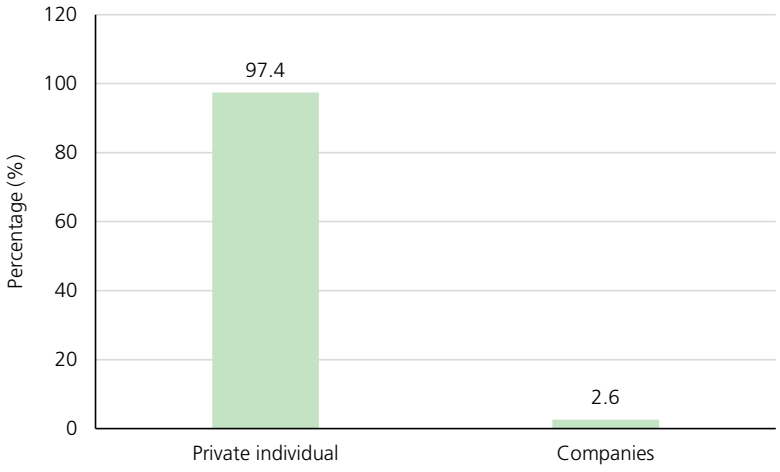


Figure 24. Permanent customers buying seedlings.

5. Permanent customer buying seedlings from the nurseries

In response to a question »who is the permanent customer«, almost all of respondents stated that private individual as permanent customers (97.4%). Only 2.6% stated companies as their permanent customers, see Figure 24.

6. Constraints in reaching customers

The contraints in reaching customers are presented in Figure 25. The survey revealed that the majority of respondents (64.1%) did not know the constraint in reaching their customers. The other 35.9% of respondents stated their constraints in reaching customers were: Transportation (7.8%), did not have transportation vehicle (5.2%), information and communication (5.2%), did not know how to market the seedlings (2.6%), communication and infrastructure (2.6%), low species variety of seedlings stock (2.6%), difficult access (2.6%) and not familiar with the customers (2.6%).

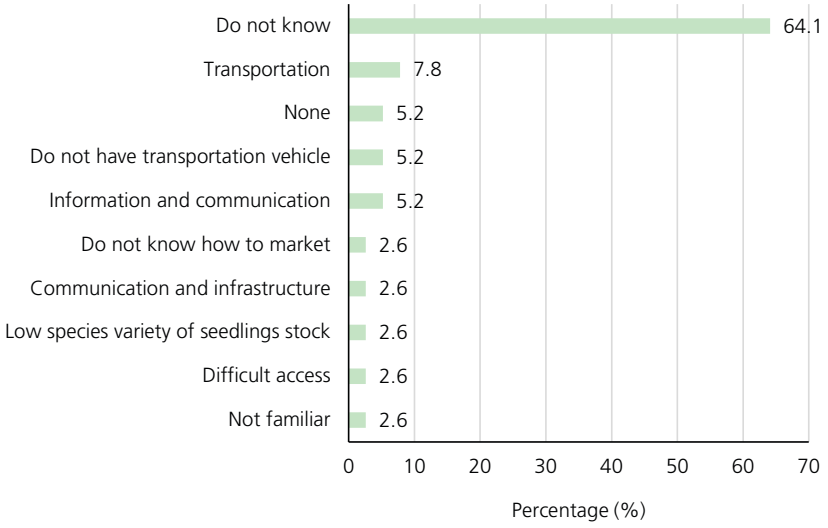


Figure 25. Constraints in reaching customers.

7. Constraints in expanding the customer base.

Figure 26 next page indicates that the majority of respondents (64.1%) did not have contraints in expanding of customer base or to gain new customers. However, the data also indicates several contraints in expanding of the customer base, such as: Limited number of seedlings stock (7.7%), limited capital (7.7%), limited information access (5.2%), transportation (2.6%), do not have vehicle (2.6%), lack of promotion (2.6%), market too far away (2.6%), damaged road (2.6%), and have not yet been active to expand the customer base (2.6%).

8. The way to maintain proactive links with customers

There were several ways in which the respondents maintained proactive links with their customers. Media campaigns were considered as the most suitable way to maintain proactive links with customers (66.7%). Other ways were: Extension services (12.8%), networking (12.8%), and other ways (7.7%). The way to maintain proactive links with customers is presented in Figure 27.

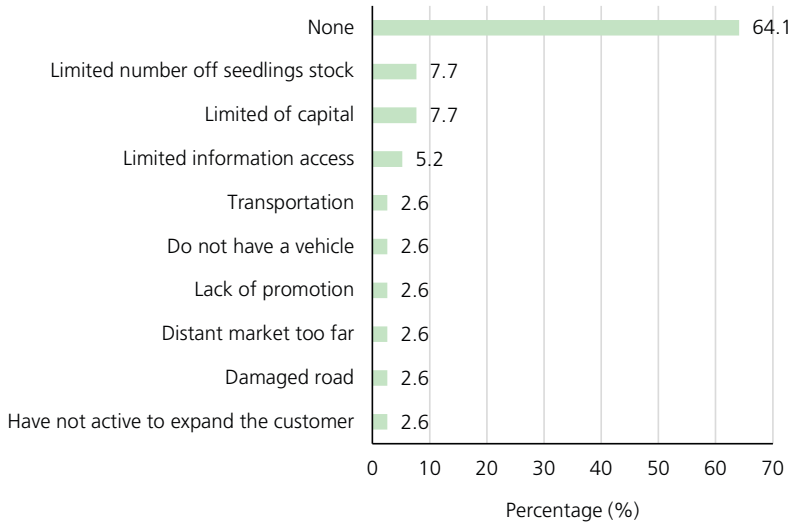


Figure 26. Constraints in expanding of customer base.

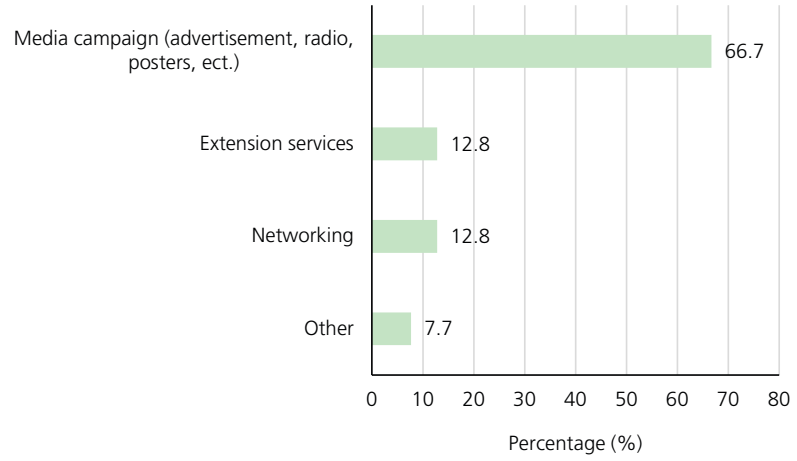


Figure 27. The way to maintain proactive links with customers.

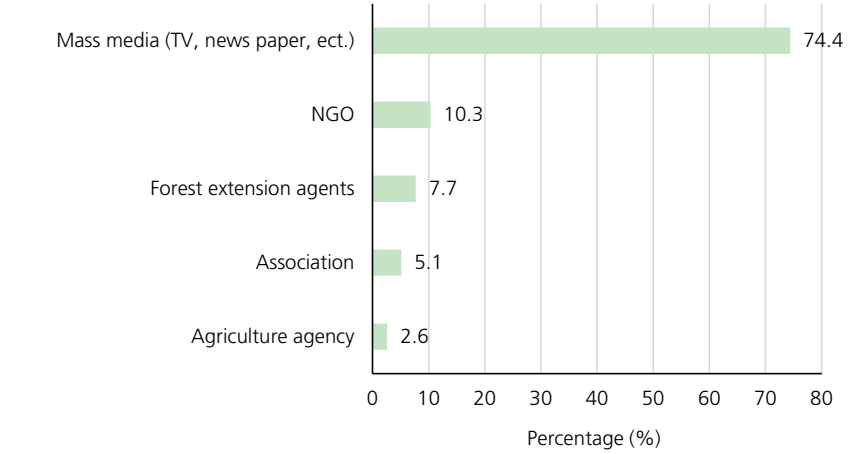


Figure 28. The way to get information related to marketing of nurseries/seedlings.

9. The way to obtain information related to marketing of nurseries/seedlings

The respondents used a number of sources to obtain information related to marketing of nurseries/seedlings. Mass media (tv, news paper, etc.) is the most important information source related to marketing of nurseries/seedlings (74.4%). The other sources of information were: NGO (10.3%), forest extension agents (7.7%), associations (5.1%), and agriculture agency (2.6%), see Figure 28.

10. Respondents status on nursery networks/associations

Most of respondents did not belong to a network/association of nurseries (87.2%), only 12.8% did, see Figure 29.

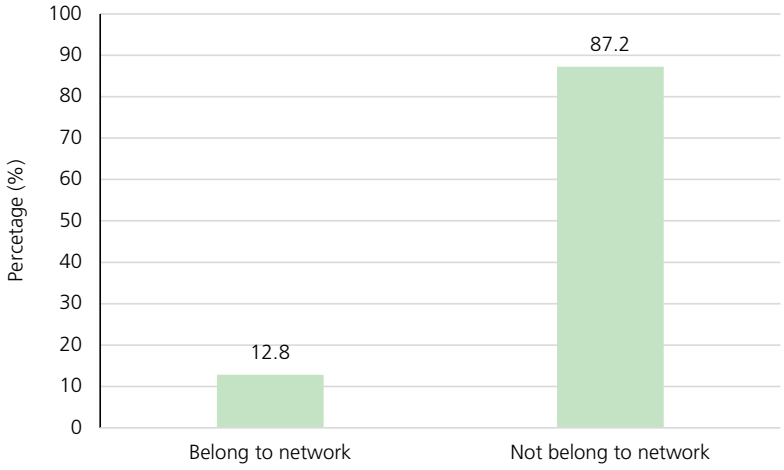


Figure 29. Respondents status on nursery network/association.

3.1.6 Communication

1. Nursery location

More than half of respondents stated that their nurseries were located in their home yard (59%), other locations of nurseries were: The road side (28.2%), field (7.7%), and other locations (5.1%), see Figure 30 below.

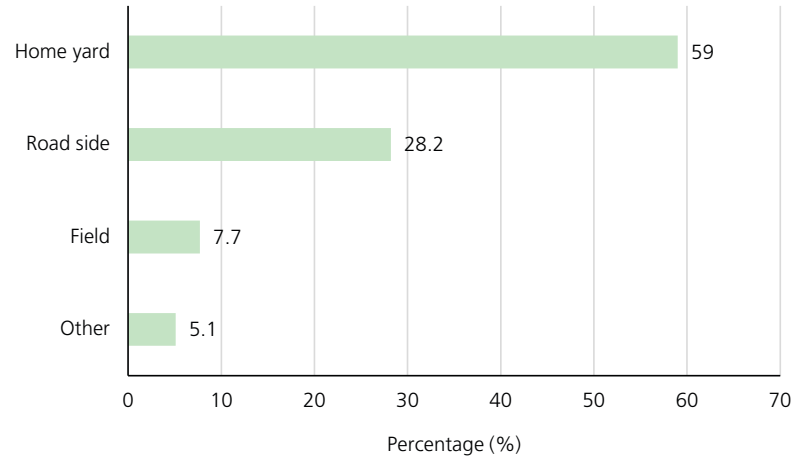


Figure 30. Nursery location.

2. Number of nurseries

Almost all respondents did not have multiple sites (production or commercial nursery), they stated that they only have one single nursery site (94.9%). Only 2.6% of respondents have two or more nurseries, see Figure 31.

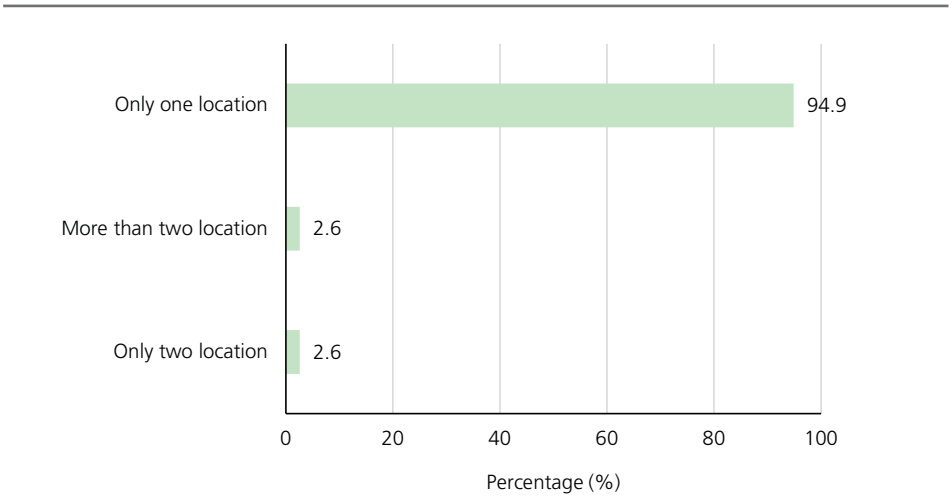


Figure 31. Number of nurseries which were owned by respondents.

3. Distance from nursery to the nearest main road

Approximate distance from nursery to the nearest main road (kilometers or time traveled by car, motorcycle, bicycle, etc.) was dividied into five groups:

(i) boundary road (0 m),
(ii) 5-50 m,
(iii) 100-250 m,
(iv) 1 km, and
(v) > 1 km.

Most of the nurseries were located around 5-50 m from the nearest main road (56.4%), followed by boundary road (25.7%). While 12.9% of respondents have their nurseries around 100-250 m from the nearest main road, only 7.8% of respondents stated that their nurseries were 1 km or more from the nearest main road, see Figure 32 below.

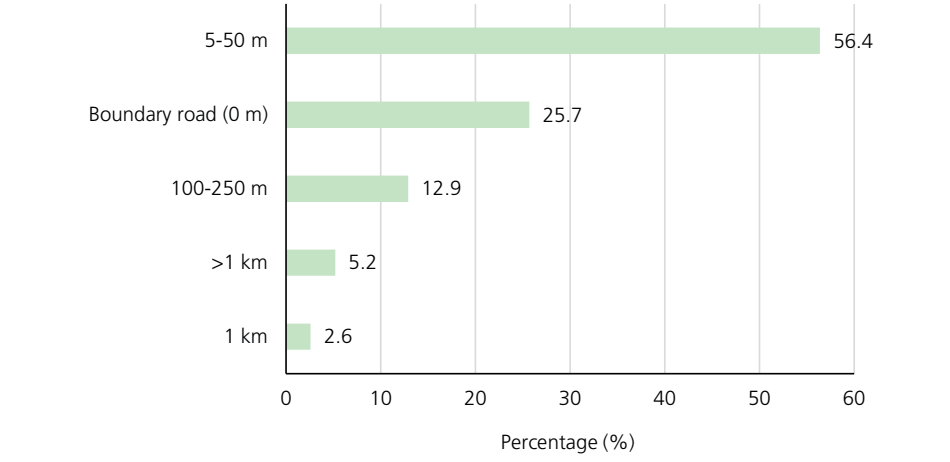


Figure 32. Nursery distance from the nearest main road.

4. Status of the use of mobile phones

To support nursery business, the use of mobile phone can be very useful. No matter what type of business people run, it is almost certain that telephone communication plays a vital role in communication with customers and business partners. People consider the ability to communicate by phone across the country as common.

There are several advantages using mobile phones, i.e.:

(i) Accessibility: the biggest advantage of having a business mobile phone is that it becomes much easier to contact everyone;
(ii) Common: mobile phones are now so common that most people have one;
(iii) Time: a mobile phone gives people more time to communicate;
(iv) Details: a mobile phone allows people to confirm and check details quickly;
(v) Bookings and appointments: using a mobile phone can make it easier to make and to keep bookings and appointments;
(vi) *Email messages*: there is no need to go without email messages on the move, etc.

The survey found that 38.5% of respondents using mobil phone to support their business in nursery, while 61.5% of them did not use mobile phone. See Figure 33.

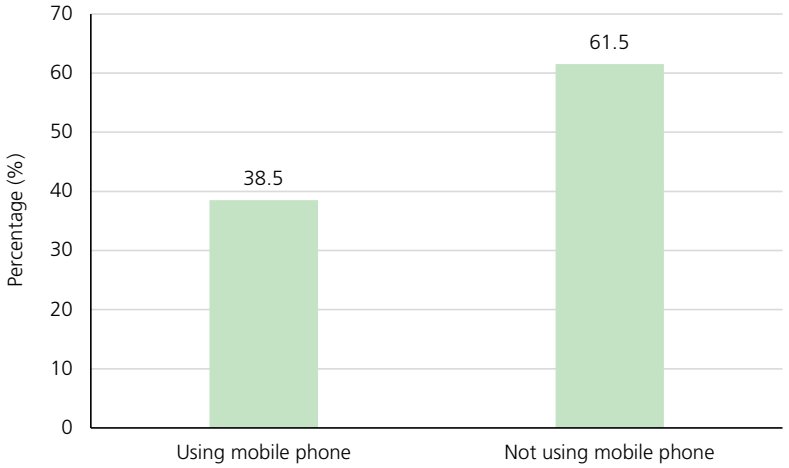


Figure 33. Status of the use of mobile phone.

3.2 Forest Tree Planting Survey

3.2.1 Forest Tree Planting Activities

1. Type of forest tree planting

Most respondents (97.9%) stated that they carried out private plantings, only 2.1% did other type of plantings. There were no planting campaigns in schools or villages reported, see Figure 34.

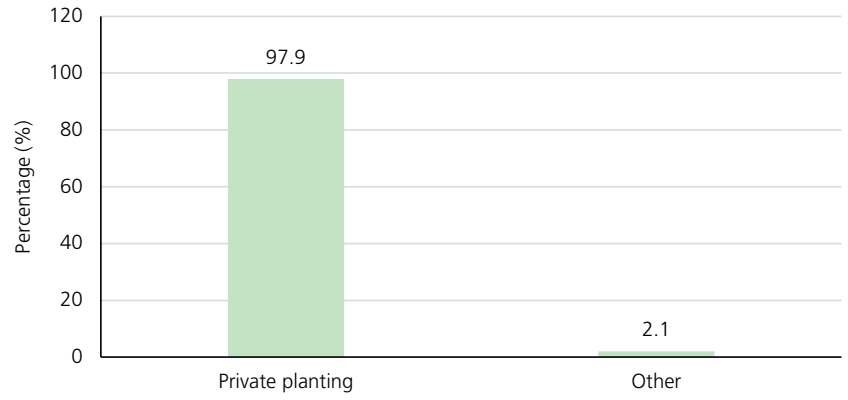


Figure 34. Type of forest tree planting.

2. Land status of planting site(s)

Similar with type of forest tree planting, most of respondents (96.8%) stated, that they planted on private land (96.8%), only 1.1% planted on borrowed land, and 2.1% of respondents planted at communal land, see Figure 35.

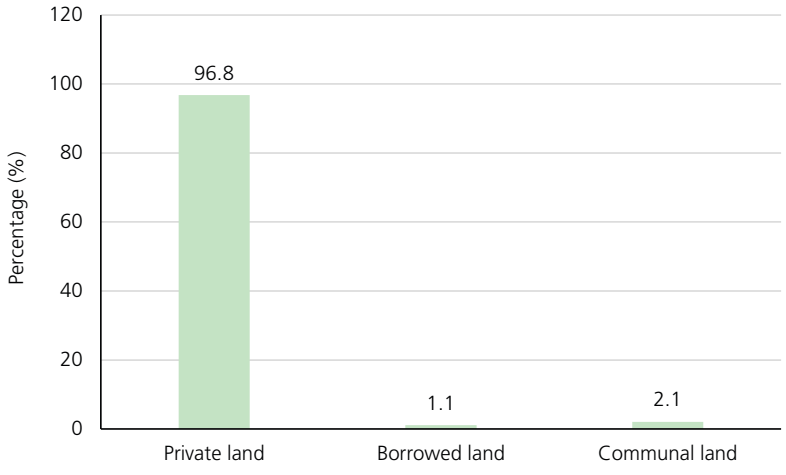


Figure 35. Land status of planting site.

3. Actors who started tree planting

Figure 36 below shows that tree plantings were initiated by four types actors, that are: Self/family, friend/neighbor, government and donor project. Most of respondents started tree planting by themselves (76.8%) followed by government program (12.6%), friend/neighbors (7.4%), and donor project (3.2%).

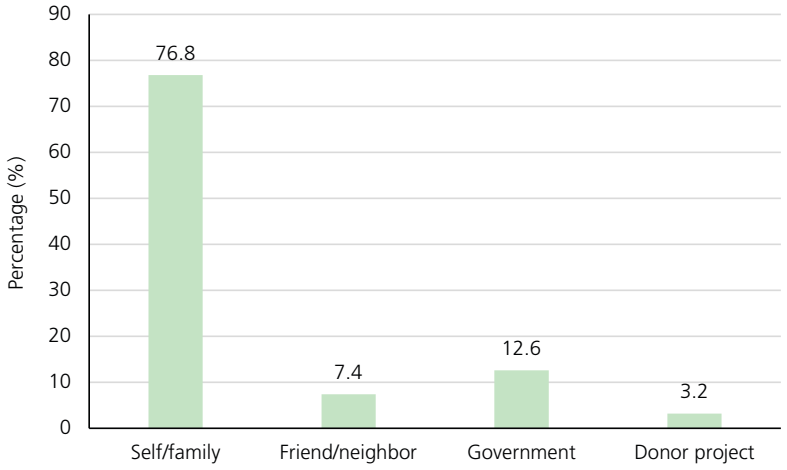


Figure 36. Actors who started tree planting.

4. The actors who providing financial support to start tree planting

Most of respondents stated that financial support to start planting forest trees were provided by themselves/family (70.5%), while 26.3 % of respondents stated by the government, and only 2.1% by donor project and 1.1% stated other, see Figure 37.

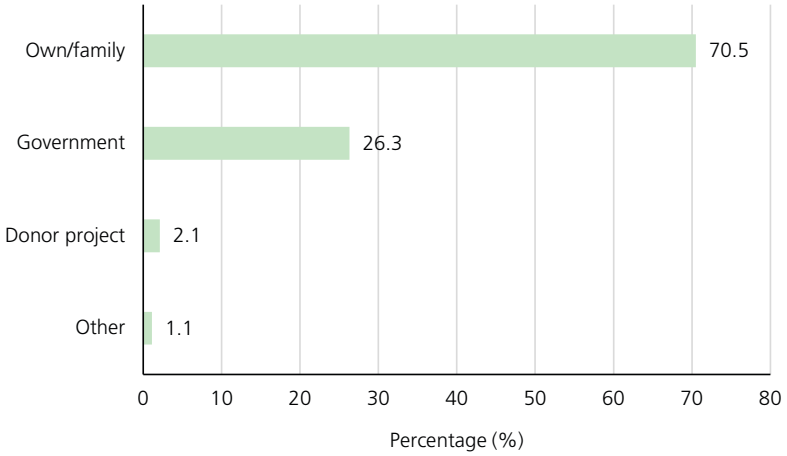


Figure 37. The actors who providing financial support to start tree planting.

5. The reasons for starting planting forest trees

The most common reason for starting tree planting was to meet own needs for wood and other tree based products (66.3%); 20 % of respondents stated to sell product from trees; 11.6% stated that the reason of tree planting is for land protection/rehabilitation, see Figure 38 next page.

6. Are these reasons the same for continuing planting trees?

This survey showed that most respondents gave the same reasons for continuing planting trees as for starting planting, see Figure 39 next page.

Figure 38. The reasons for planting trees.

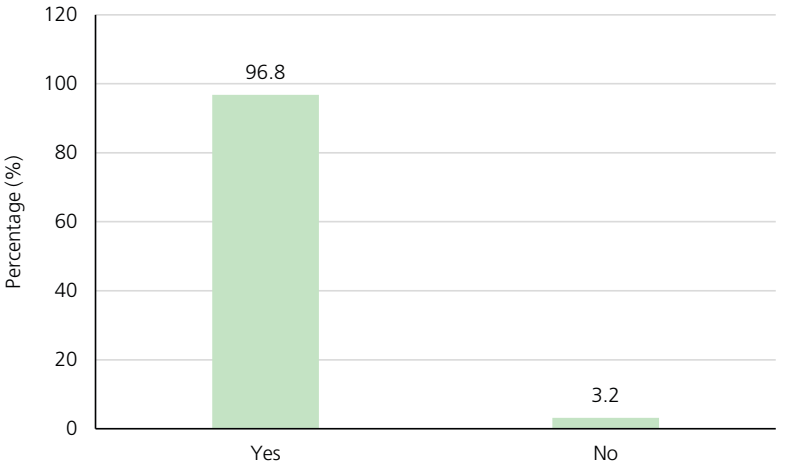


Figure 39. Are the reasons for starting and continuing planting trees the same?

7. Number of forest tree species planted

The survey found several tree species planted: biti, red jabon, white jabon, teak, gmelina, rubber tree, mahoni, sengon, durian, nutmeg, etc. The survey also indicated that number of tree planted decreased during year 2009-2013, while the highest number of tree planted was in year 2009 and 2010, around 42,799 and 43,440 trees respectively and the number decreased to 10,302 trees in year 2013, see Table 16.

Table 16. Number of forest tree seedlings planted.

District	**Plantation Year**				
	2013	2012	2011	2010	2009
East Kolaka	4751	5897	4886	9240	21889
Konawe	5551	6785	17020	34200	20910
Total	10,302	12,682	21,906	43,440	42,799

The survey also found that the most planted tree species in East Kolaka was white teak (80%), followed by teak (53.3%), jabon (31.1%) and sengon

(24.4%). While in Konawe the most planted species were teak (84%) followed by sengon (42%) and white teak (16%), see Table 17.

Table 17. List of tree species planted by respondents (%).

District	Biti	Red Jabon	White jabon	Teak	White teak	Rubber	Mahoni	Sengon	Durian	Nutmeg
East Kolaka	17.8	11.1	31.1	53.3	80.0	6.7	22.2	24.4	13.3	8.9
Konawe	0.0	0.0	4.0	84.0	16.0	0.0	4.0	42.0	0.0	0.0

8. Source to obtain the seedlings

Majority of the respondents from Kolaka District obtained the seedlings from wildings (57.7%), other obtained from nurseries (32.9%) and some maintained seedlings growing naturally (9.4%). While in Konawe District, most of respondents obtained seedlings from nurseries (77.3%) and wildings (21.6%). Only 1% of respondents maintained seedlings growing naturally, see Table 18.

Table 18. Source to obtain the seedlings.

District	Nursery (own, private or government)	Wildings (buy or collect by yourself)	Other Source (growth naturally)	Total
East Kolaka	32.9%	57.7%	9.4%	100%
Konawe	77.3%	21.6%	1.0%	100%

9. Type of seed sources used if/when raising seedlings

The type of seed sources used when the respondents made seedlings by themselves is presented in Table 19. Most seeds were obtained from own/neighbor farm – in East Kolaka by 48.9% of the respondents and in Konawe by 59.8%. Vegetative seedlings propagation was not used by respondents from East Kolaka, while by 2.4% in Konawe.

Table 19. Type of seed sources used.

District	Source of Seed						Total
	Natural Forest	Own/neighbors Farm	Plantation	Improved Stand Seed, Orchard	Vegetative propagules source	Identified Seed Trees	
East Kolaka	9.9%	48.9%	4.3%	24.8%	0	12.1%	100%
Konawe	3.7%	59.8%	0	22%	2.4%	12.2%	100%

10. The major reason for using selected germplasm sources

Most of respondents stated that the major reason for using selected germplasm source was because it was the only type available (57.9%), see Figure 40 next page.

11. Have you been able to obtain as many seedlings as you would like to plant?

About 84.2% of respondents stated that they have not been able to obtain as many seedlings as they would like to plant. Only 15.8% obtained as many seedlings as they would like to plant, see Figure 41 next page.

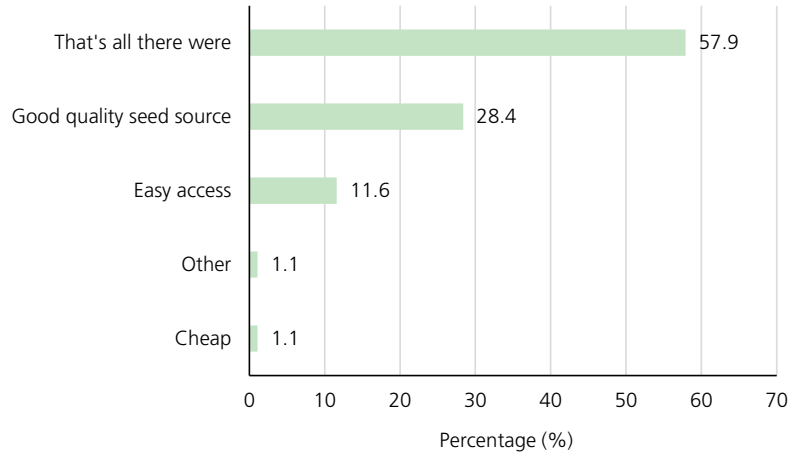


Figure 40. Major reason for using selected germplasm sources.

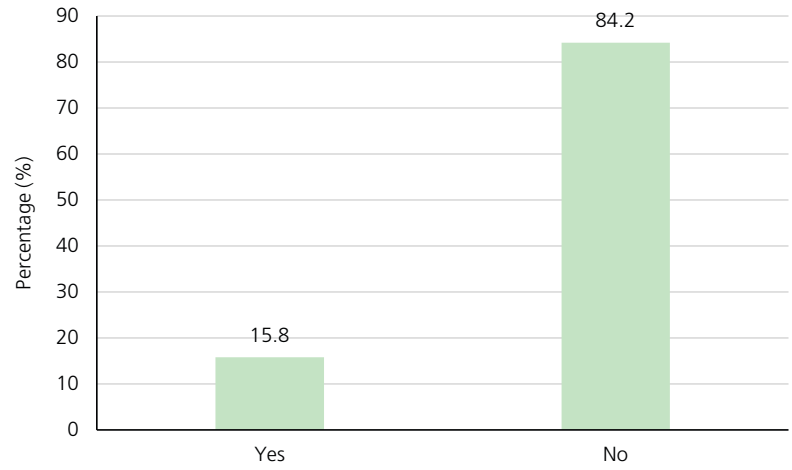


Figure 41. Respondents obtained as many seedlings as they would like to plant.

12. The limiting factors in obtaining the required number of seedlings

The most important limiting factor in obtaining required number of seedlings is lack of capital, this was stated by 51.6% of respondents, then followed by seedlings not being available for purchasing (31.6%) and no time to produce more seedlings (15.8%), see Table 20.

Table 20. Limitation factor to obtain number of seedlings.

No	Limitation factor	Percent (%)
1	Limitation of capital	51.6
2	Seedlings not available for purchasing.	31.6
3	No time to produce more seedlings	15.8
4	Others	1.1
	Total	100.0

13. Reasons why tree planters could not get the seedlings of the species they preferred

No seed of the preferred species available for own seedling production is the major reason for not getting the seedling of the preferred species (67.3-

72.2%), followed by the fact that the seedlings of the preferred species were too expensive (9.6-20.4%), see Table 21.

Table 21. Reasons why tree planters could not get the seedlings of the species they preferred.

No	Major reason	East Kolaka (%)	Konawe (%)
1	No seed available for own seedling production	67.3	72.2
2	Too expensive to purchase	9.6	20.4
3	Seedling not available for purchasing	21.2	7.4
4	Other (limited of land area for plantation)	1.9	0.0
	Total	100.0	100.0

14. The major reasons for not planting trees

The major reason why respondents did not plant trees was lack of seed for own seedlings production (81.1%), see Table 22.

Table 22. Major reason why respondents did not plant trees.

No	Major reason	Percentage (%)
1	No seed available for own seedling production	81.1
2	Seedlings too expensive to purchase	10.5
3	Seedling not available for purchasing	7.4
4	Other (limited of land area for plantation)	1.1
	Total	100.0

3.2.2 Constraints to forest tree planting

1. Sources of getting information about planting of forest trees

There are six sources from which respondents are getting information on planting of forest trees: Other farmer/neighbor (33.7%), self learning (29.5%), family (12.6%), reading (8.4%), radio (4.2%), and other sources (11.6%), see Table 23.

Table 23. Sources of getting information about planting of forest trees.

No	Source of information	Percent (%)
1	Other farmers/neighbors	33.7
2	Self learning	29.5
3	Family	12.6
4	Other	11.6
5	Reading	8.4
6	Radio	4.2
	Total	100.0

2. Major constraints for planting of forest trees

Lack of adequate seedlings was the major constraint for doing forest tree planting, this stated by 42.1% of the respondents, other respondents stated beacuse of land scarcity (26.3%), and other constraints were: water scarcity (13.7%), difficult to maintain trees (1.1%), lack of technical knowledge

(5.3%), limited tree seeds (1.1%), high labour demand (1.1%), and lack of benefit from planting trees (3.2%). Only 6.3% of respondents stated no constraints, see Table 24.

Table 24. Major constraints for doing planting of forest trees.

Major constratint	Percent (%)
Lack of adequate seedlings	42.1
Scarcity of land for planting	26.3
Scarcity of water	13.7
None	6.3
Lack of technical knowledge	5.3
Lack of benefits from planting forest tree	3.2
Difficult to maintain trees	1.1
Limited tree seed	1.1
High labor demand	1.1
Total	100.0

3. The single most important constraint for doing tree planting

The single most important constraint for doing tree planting was limited access to adequate seedlings (27.4%), followed by land scarcity for planting (16.8%), see Table 25.

Table 25. The single most important constraint for tree planting.

No	Single most important constraint	Percentage (%)
1	Limited of adequate seedlings	27.4
2	Land scarcity for planting	16.8
3	Limitation of capital	13.7
4	Limited of water source	10.5
5	Lack of knowledge	9.5
6	Limited of adequate seed	5.3
7	None	4.2
8	Time	2.1
9	wild catle	2.1
10	Flood	1.1
11	Weather	1.1
12	Insect	1.1
13	Unfertil land	1.1
14	Access to far	1.1
15	Dry season	1.1
16	Busy	1.1
17	High of labour number need	1.1
	Total	100.0

4. Need for additional support/training related to planting of forest trees

Most of respondents (96.8%) stated that they need to have additional sup-

port/training related to planting of forest trees, only 3.2% of respondents didn't need additional support/training, see Table 26 .

Table 26. Need for additional support/training.

Answer	Percentage (%)
Yes	96.8
No	3.2
Total	100.0

5. Type of additional support/training needed

The type of additional support/training needed were related to technical knowledge (84.2%), planting tools (5.3%) and marketing and business planning (7.4%).

Table 27. Type of additional support/training.

Type of supprot/training	Percent
Technical knowledge	84.2
Marketing and business planning	7.4
Planting tool	5.3
Other	3.2
Total	100.0

6. Additional comments regarding planting of forest trees

- There is a need for more seedlings for planting.
- Technical trainings are needed to enhance capacity on nursery and tree plantation.
- Role of government to solve problem on land scarcity for planting trees.
- Lack of knowledge on seedlings propagation techniques. This is given as the main reason for using wildings (natural seedlings) instead of seedlings from nurseries for their plantings.

Annexes

Annex 1. Indonesian, English and Scientific Names of Tree Species

No	Indonesian Name	English Name	Scientific Name
1	Biti	New Guinea teak	*Vitex cofassus*
2	Kakao	Cacao	*Theobroma cacao*
3	Kayu manis	Cinnamon	*Cinnamomum verum*
4	Cengkeh	Clove	*Syzygium aromaticum*
5	Duku	Langsat	*Lansium domesticum*
6	Durian	Durian	*Durio zibethinus*
7	Gaharu	Agarwood	*Aquilaria sp*
8	Glodokan tiang	False ashoka	*Polyalthia longifolia*
9	Jabon merah	Red jabon	*Anthocephalus macrophyllus*
10	Jabon putih	White jabon	*Anthocephalus cadamba*
11	Jati	Teak	*Tectona grandis*
12	Jati putih	Gmelina	*Gmelina arborea*
13	Kayu afrika	Umbrella tree	*Maesopsis eminii*
14	Kayu Bayam	Borneo Teak, Kayu afrika	*Maesopis eminii*
15	Kayu besi	Iron wood	*Eusideroxylon zwageri*
16	Kayu kalapi		*Kalappia celebica*
17	Kayu kolaka	Coco plum	*Maranthes corymbosa*
18	Kayu uru	Champak	*Magnolia ovalis*
19	Mahoni	Mahagony	*Swietenia macrophylla*
20	Melinjo	Buko	*Gnetum gnemon*
21	Pala	Nutmeg	*Myriistica Fragarant*
22	Nyatoh		*Palaquium sp*
23	Jeruk	Orange	*Citrus sp*
24	Karet	Rubber tree	*Hevea brasiliensis*
25	Sengon	Moluca, batai	*Paraserianthes falcataria*
26	Tanjung	Spanish cherry, bullet wood	*Mimusops elengi*
27	Trembesi	Rain tree	*Samanea saman*

Annex 2. Questionnaire for Forest Tree Nursery Survey

Questionnaire

Forest Tree Nursery Survey, SE Sulawesi 2014.

No of Respondent: _ _ _ _ _ _ _ _ _

1. GENERAL INFORMATION

1.1 Survey Detail

Interviewer	:
Date of Interview	:
Address/Contact	:
Province	:
District	:
Sub District	:
Village	:
Coordinates (GPS)	:

1.2 Household Characteristic (Owner /Group Manager)

1.2.1	Name of Respondent		
1.2.2	Age of Respondent	_____ Years old	
1.2.3	Sex of Respondent	(1) Male (2) Female	☐
1.2.4	Household Size, No of:	a.	
	a. Spouses		
	b. Children	b.	
	c. Other Dependent	c.	
1.2.5	Status of Respondent	Owner Employee Relation /share crop Group Chairperson /Group Secretary/ Group member Government Employee (6) Other, please specify	☐

1.3 Nursery Characteristic

1.3.1	Type of Nursery	1 = Individual 2 = Family 3 = Group (explain & number of members?) 4 = Company 5 = School 6 = Other	☐
1.3.2	Is the nursery certified? If YES by who?		☐
1.3.3	Land status of nursery site	1 = Owner/Private land 2 = Borrowed 3 = Rented 4 = Government land 5 = Communal land 6 = Other (Specify)	☐
1.3.4	Who started this nursery?	1 = Self 2 = Friends/Neighbors (group) 3 = NGO (please specify) 4 = Government Department (Specify) 5 = Donor Project (Specify) 6 = Other (Specify)	☐
1.3.5 Explain a short history of how you started your nursery			
1.3.6	Who provided financial support to establish the nursery?	1 = Self 2 = group 3 = NGO (please specify) 5 = Government Department (Specify) 6 = Donor Project (Specify) 7 = Other (Specify	☐
1.3.7	Why was this nursery started? (Multiple answer is allowed)	1 = Meet own seedling needs 2 = Sell seedlings 3 = both 4 = other, please specify	☐
1.3.8	Are these still the reasons for operating the nursery?	1 = Yes 2 = No	☐

1.3.9. Number of employees/workers in nursery

Type of worker	(1) Only owner (family members) working in the nursery		(2) Paid worker – part time < 20 hrs/week		(3) Paid worker – full time >20 hrs/week		(4) non family member Unpaid worker part time < 20 hrs/week		(5) Non family member Unpaid worker – full time > 20 hrs/week	
Gender	F	M	F	M	F	M	F	M	F	M
Number of worker										

2. INDICATOR OF SUCCESS

2.1 Total Seedling Production (ready to use/mature)

Name of Species	Total production 2013		Total production 2012		Total production 2011		Total production 2010		Total production 2009	
	Unit		Unit		Unit		Unit		Unit	

2.2 Total Seedling Sales

Name of Species	Total production 2013		Total production 2012		Total production 2011		Total production 2010		Total production 2009	
	Unit		Unit		Unit		Unit		Unit	

2.3 Total Seedling for Self Use

Name of Species	Total production 2013		Total production 2012		Total production 2011		Total production 2010		Total production 2009	
	Unit		Unit		Unit		Unit		Unit	

3. QUALITY OF GERMPLASM

3.1 List of Species Produced in Nursery

No	Name of Species (top ten species)	Type of Germplasm (seed, seedling, wildling, vegetative, other)	Quantity of germplasm received
	Total		

Indicate type of germplasm as seed/seedling/wildling/cutting/scion (top graft)/root stock, or other (specify)

3.1.1 Indicate seed source class (category of source) where seed is collected

Top ten species and type of germplasm (eg. Teak seed, teak wildling)	Source of Seed							
	Natural Forest (proportion)	Own Farm (proportion)	Other's Farm (proportion)	Plantation (proportion)	Improved Stand – Seed Orchard _____)*	Vegetative propagules source _____)	Seed Trees (proportion)	Total amount of Seed Collected

** Improved Stand could be any type of Seed Orchard*

3.1.2	What is the major reason for using those germplasm sources?	1 = Good quality source 2 = Easy access 3 = Only available 4 = Cheap 5 = Others (specify_____)	☐
3.1.3	Have you produced as many seedlings as you would have liked?	1= Yes 2 = No	☐
3.1.4	If No, what was the limitation (Multiple answer is allowed)	1 = Unavailability of germplasm 2 = Technical production difficulties 3 = Limitation of time/labor 4 = Limitation of capital 5 = Lack of customers 6 = Other (Specify)	☐

3.2 List of species you want to produce but you cannot

No	Name of Species	Major reason for not producing? 1 = Not available for own collection 2 = Not available for free 3 = Too expensive to purchase 4 = Uncertain demand 5 = Other (specify)	☐

4. TECHNICAL CAPACITY

5.1	Education level of the Owner	1 = No education 2 = Primary 3 = Junior High school 4 = High School 5 = Diploma 6 = University (please specify)	☐

5.2 Have you ever received training in nursery operations? Yes or No _____
If YES complete the following table

Trainings	Length of Trainings (how many days?	Subject	Who Provide Training	Who supported the training

5.3 Years of nursery experience before starting own nursery, if any? _____ Years

5.3.1	Type of nursery where you worked	1 = Government 2 = NGO 3 = project 4 = community 5 = private 6 = none 7 = other (specify)	☐
5.4	Do you have access to technical support?	1= Yes 2 = No	If yes complete the following table

Technical Support	How often	Subject	Who Provide Technical support	Who supported the training

5.5	Other source of Nursery Knowledge?	1 = Radio 2 = Reading 3 = Other media (specify) 4 = Self learning 5 = Other (specify)	☐
5.6	What are your major constraints in operating the nursery (circle relevant constraints)? Multiple answer is allowed e.g. three)	1 = None 2 = Pests on seedlings 3 = Scarcity of water 4 = Lack of adequate nursery space 5 = Damage by livestock 6 = Lack of technical knowledge 7 = Limited tree seed 8 = High labour demand 9 = Transporting seedlings 10 = Lack of market for seedlings 11 = Theft 12 = Lack of nursery supplies and equipment 13 = Access to capital 14 = Other (Specify)	☐
5.7	What is the single most important constraint?		☐
5.8	Would you like to have additional support/ training?	1 = Yes 2 = No	☐
5.9	If yes, what type of additional support/ training?	1 = Technical knowledge 2 = Nursery supplies and tools 3 = Marketing 4. = Business planning 5=superior plant materials e.g. tree seed 6 = Other (specify)	☐

6. BUSINESS CAPACITY

6.1 Skill

6.1.1	Do You Have Business Plan?	1 = Yes 2 = No	☐
6.1.2	Have you received training in business management, marketing or related topic? (if Yes complete following table)	1 = Yes 2 = No	☐

6.1.3 List of Training in Business Management/Marketing/Related

Technical Support	**Period of Training (and how often)**	**Subject**	**Who provided the training?**	
			1 = Friends/Family	
			2 = Government staff	
			3 = NGO	
			4 = Project	
			5 = Formal education (institution training)	☐
			6 = Employment at nursery (Specify_____)	
			7= group leaders	
			8 = Other (Specify _____)	

6.1.4	Who supported (paid for) the training?	

6.2 Customer

6.2.1	Who is your customer	1 = Private individuals (proportion of seedling sales/revenue) 2 = Projects (proportion of seedling sales/revenue) 3 = NGOs (proportion of seedling sales/revenue) 4 = Government orgs (proportion of seedling sales/revenue) 5 = Companies (proportion of seedling sales/revenue) 6 = Others (Specify) (proportion of seedling sales/revenue)	☐
6.2.2	Who are your permanent customers?	1 = Private individuals 2 = Projects 3 = NGOs 4 = Government organizations 5 = Companies 6 = Others (Specify)	☐
6.2.3	What are your constraints in reaching your current customers?		
6.2.4	What are your constraints in expanding your customer base (gaining new customers)?		
6.2.5	How do you maintain proactive links with customers?	1 = Network 2 = Periodic letter or newsletters 3 = Media campaign (advertisement, radio, posters … specify) 4 = Extension services 5 = Use of mobile	☐

6.3 Network/Information

6.3.1	How do you get information related to nursery / marketing	1= Mass Media e.g. /TV,News paper 2= Radio 4= Agriculture agency 5= Association 6=NGO 7=Forest extension agents	☐
6.3.2	Do you belong to a network/ association of nurseries? If yes answer the following table	1 = Yes 2 = No	☐

6.3.2.1 Table of Affiliated Association

Contacts with other nurseries (names & locations)	**Contact with seed traders (names & locations)**	**= Contact with other networks/ association (names & locations)**	**Contact with NGOs (names & locations)**	**Contact with Government organisations (names & locations)**	**Contact with other groups (names & locations)**

6.4 Communication

6.4.1	Do you use a mobile phone (mp) to support your nursery business? If yes continue	1 = Yes 2 = No	☐
6.4.2	If yes, what type of information is received, exchanged, or disseminated?		
6.4.4	How does the mobile phone contribute to your operation?		

6.5 Location of the Nursery

6.5.1	Where's the location of your nursery?	1 = Road side 2 = Home yard 3 = Field 4 = City or town 5 = Other (specify)	☐
6.5.2	Do you have multiple sites? One site for production nursery and one site for commercial (market) nursery?		
6.5.3	Approximate distance from the main road (kilometers or time traveled (car, motorcycle, bicycle, etc.)		

6.6 Prospect

6.6.1 Is a nursery enterprise a good business? Yes or No, Please describe

6.6.2 Do you have additional comments regarding the nursery enterprises or related subjects?

Annex 3. Questionnaire for Forest Tree Planting Survey

Questionnaire

Forest Tree Planting Survey, SE Sulawesi 2014.

No of Respondent: _ _ _ _ _ _ _ _ _

1. GENERAL INFORMATION

1.1 Survey Detail

Interviewer	:
Date of Interview	:
Address/Contact	:
Province	:
District	:
Sub District	:
Village	:
Coordinates (GPS)	:

1.2 Household Characteristic

1.2.1	Name of Respondent		
1.2.2	Age of Respondent	_____ Years old	
1.2.3	Sex of Respondent	(1) Male (2) Female	
1.2.4	Household Size, No of:	a.	☐
	a. Spouses		
	b. Children	b.	
	c. Other Dependent	c.	
1.2.5	Status of Respondent	(6) Farmer (7) Private Employee (8) Village Head (9) Government Employee (6) Other, please specify	☐

2. FOREST TREE PLANTING ACTIVITIES

2.1	Type of Forest Tree Planting	1 = Private planting 2 = Village Planting 3 = School Planting 4 = Other	☐
2.2	Land status of planting site(s)	1 = Private land 2 = Borrowed 3 = Rented 4 = Government land 5= Communal land 6 = Other (Specify)	☐
2..3	Who started the tree planting?	1 = Self /family 2 = Friends/Neighbors (group) 3 = NGO (please specify) 4 = Government Department (Specify) 5 = Donor Project (Specify) 6 = Other (Specify)	☐
2.4 Explain a short history of how you started planting forest trees:			
2.5	Was financial support provided to start planting forest trees? If YES, who?	1 = Self/family 2 = group 3 = NGO (please specify) 5 = Government Department (specify) 6 = Donor Project (Specify) 7 = Other (Specify	☐
2.6	What was the reason(s) for starting planting forest trees? (multiple answer is allowed)	1 = Meet own needs for wood or other products from the trees- 2 = To sell products from the trees. 3 = Land protection/rehabilitation 4 = other, please specify	☐
2.7	Are these still the reasons for continuing planting trees?	1=Yes 2=No	☐

2.8 Number of forest tree species planted.

Name of Species	**Total trees planted 2013**	**Total trees planted 2012**	**Total trees planted 2011**	**Total trees planted 2010**	**Total trees planted 2009**

2.9 From where do you obtain the seedlings?

Name of Species (Top ten species)	**Nursery (own, private or government)**	**Wildings (buy or collect by yourself)**	**Other Source**

2.9.1 IF you made your own seedlings, what type of seed sources were used? (category of seed sources were collected)

Top ten species	**Source of Seed**					
	Natural Forest (proportion)	Own/neighbors Farm (proportion)	Plantation (proportion)	Improved Stand –Seed Orchard _____)*	Vegetative propagules source _____)	Seed Trees (proportion)

* Improved Stand could be any type of Seed Orchard

2.9.2	What is the major reason for using those germplasm sources?	1 = Good quality source 2 = Easy access 3 = Only available 4 = Cheap 5 = Others (specify_____)	☐
2.10	Have you been able to obtain as many seedlings as you would like to plant?	1= Yes 2 = No	☐
2.10.1	If not, what was the limitation (Multiple answer is allowed)	1 = Seedlings not available for purchasing 2 = No time to produce more seedlings 3 = Limitation of capital 4 = Other (Specify)	☐

2.11 List of species you want to plant, but you cannot get

Name of Species		Major Reason for not being able to plant? 1 = No seed available for own seedling production 2 = Seedling not available for purchasing 3 = Too expensive to purchase 4 = Other (Specify)	

3. CONTRAINTS FOR DOING FOREST TREE PLANTING

3.1	Sources of getting information about planting of forest trees.	1 = Radio 2 = Reading 3 = Other farmers/neighbours 4 = Family 5 = Self learning 6 = Other (specify)	
3.2	What are your major constraints for doing planting of forest trees? Multiple answer is allowed.	1 = None 2 = Scarcity of land for planting 3 = Scarcity of water 4 = Lack of adequate seedlings 5 = Difficult to maintain trees 6 = Lack of technical knowledge 7 = Limited tree seed 8 = High labour demand 9 = Lack of benefits from planting forest tree 10 = Other (Specify)	
3.3	What is the single most important constraint?		
3.4	Would you like to have additional support/training related to planting of forest trees?	1 = Yes 2 = No	
3.5	If yes, what type of additional support/training?	1 = Technical knowledge 2 = Planting tools 3 = Marketing and business planning 4 = Other (specify)	

3.6 Do you have additional comments regarding planting of forest trees?

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