PANDA MITI KIBIASHARA
PRIVATE FORESTRY PROGRAMME

PRIVATE FORESTRY PROGRAMME

SURVIVAL AND QUALITY ASSESSMENT OF SMALLHOLDER PLANTATIONS ESTABLISHED WITH PFP SUPPORT DURING 2014-2015

United Republic of Tanzania
MINISTRY OF NATURAL RESOURCES AND TOURISM
Forestry and Beekeeping

FORMIN.FINLAND.FI
MINISTRY FOR FOREIGN AFFAIRS OF FINLAND

PANDA MITI KIBIASHARA
PRIVATE FORESTRY PROGRAMME

Survival and Quality Assessment of Smallholder Plantations Established with PFP Support during 2014/15

Results of assessment conducted at the end of first dry season

---

11 April 2016, Iringa, Tanzania

United Republic of Tanzania
MINISTRY OF NATURAL RESOURCES AND TOURISM
Forestry and Beekeeping Division

FORMIN.FINLAND.FI
EMBASSY OF FINLAND
DAR ES SALAAM

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

GPS	Global Positioning System
PFP	Private Forestry Programme
PPI	Progress out of Poverty Index
SUA	Sokoine University of Agriculture
TGIS	Tree Growing Incentive Scheme

NOTE:
In this report the following terms are used:

Woodlot An area of single tree species with single planting year and with single holder. This equals to "plot" used often by the Private Forestry Programme.

Sample plot An area selected for assessing the health and quality of the trees. This survey used circle-shaped sample plot size of 54 m^2.

EXECUTIVE SUMMARY

The Private Forestry Programme (PFP) carried out a survival and quality survey of tree plantations established during planting season 2014/15 with PFP support. The survey was carried out in November 2015.

Through the Tree Growing Incentive Scheme (TGIS), the PFP supported a total of 834 hectares during the 2014/15 planting season. Out of this total, sample plots representing 503.5 hectares were assessed.

The survey had a special attention towards socio-economic issues. The aim was to link the performance of the woodlots to the beneficiaries and to investigate if socio-economic factors affect the performance.

The field teams assessed a total of 478 PFP-supported TGIS woodlots representing 536.28 hectares. Out of which 449 woodlots were in fact planted representing 503.51 hectares.

The following are the main findings of the survey:

I. Overall average survival after the first dry season was 84.5%.
II. Planting date had a clear effect on the average survival of the trees.
III. There is no clear connection on survival of the trees and wealth (PPI) of the respective household.
IV. 13 hectares out of the 503.5 hectares (2.58%) had evidence of partial or total fire damage. 2.6 hectares had total fire damage.
V. Out of the reported areas some 94% were actually planted and some 66% were of high quality (survival over 80%).
VI. Weeding was rare. Circle weeding was not done in 61% of the assessed woodlots and slash weeding was not done in 64% of the woodlots assessed.

The following observations follow from the survey:

I. Timing of planting activities is essential for high survival rates. Late planting results in poor performance of the plantations and high mortalities.
II. Share of acceptable (high quality) tree plantations established needs to be increased. If only 66% of the reported plantations are of high quality, the programme needs to plant over 22,000 hectares in order to reach its overall target.
III. Importance of weeding should be emphasised. The quality of weeding work has been poor and in most cases weeding was not done at all.

1. INTRODUCTION

1.1 Background

This report presents findings of the survival and quality survey that was carried out for the Private Forestry Programme (PFP) in November 2015 after the first dry season after planting. The data collection for the study was outsourced to Sokoine University of Agriculture (SUA) and the final report including data analysis was prepared by PFP staff based on draft report and dataset provided by SUA.

The survey was carried out in 8 villages in districts of Ludewa, Makete and Njombe. The areas included in the study were planted during planting season 2014/15 through the PFP in-kind support scheme, Tree Growing Incentive Scheme (TGIS). The total area planted through the TGIS in 11 villages during the period in question was reported as 834 hectares.

In addition to basic survival parameters, the study connected the assessed woodlots to each tree grower supported so that possible effects of socio-economic status to tree planting performance could be studied.

1.2 Objectives of the study

The objectives of the study were identified as:

1. Overall survival of the trees
2. Survival and height of trees by species
3. Survival by household PPI
4. Losses due to fire and other causes
5. Intact plantation areas
6. Quality of the planted trees (visual quality assessment)

1.3 Deliverables

The deliverables for the assignment were:

1. Dataset
2. Report

2. METHODOLOGY

2.1 Sampling

A grid of 90 meters was overlaid on maps of PFP-supported plantations. Within each cell that fell on a PFP-supported plantation, a sample plot was located. The aim was to ensure that at least one sample plot falls within each woodlot. The sample plot size used was 54 m^2. This sample plot size is based on what was used previously for assessment of tree survival and quality for PFP-supported plantations. Circular sample plots with radius of 4.15 m were used, which means that approximately 6 trees were expected within each sample plot because the planting space used was 3 x 3 m. The final number of sample plots that were assessed was 1249, which is equivalent to sampling intensity of 0.8% for the total planted area of 834 ha. Ultimately, data from two villages had to be excluded from the data set, because of errors in the GPS coordinates used.

2.2 Data on survival and quality

Data were collected on slope position, number of stems within the sample plot, number of dead and alive trees, stem quality, circle weeding status, slash weeding status and comments on the observations about these variables. Stem quality was assessed on a score of 0, 1 or 2 meaning dead, alive but poor health and good health, respectively. If the sample plot was damaged, the cause of damage was also assessed.

2.3 Data on socio-economic status of tree growers

Socio-economic status was previously assessed using the Progress out of Poverty (PPI). This information on socio-economic status was linked to the quality of the tree plantations through locations of the woodlots which were known beforehand. Furthermore, the PFP had information on the woodlot location and the owner of the woodlot so that this connection could be made.

3. RESULTS

3.1 Overall survival of the trees

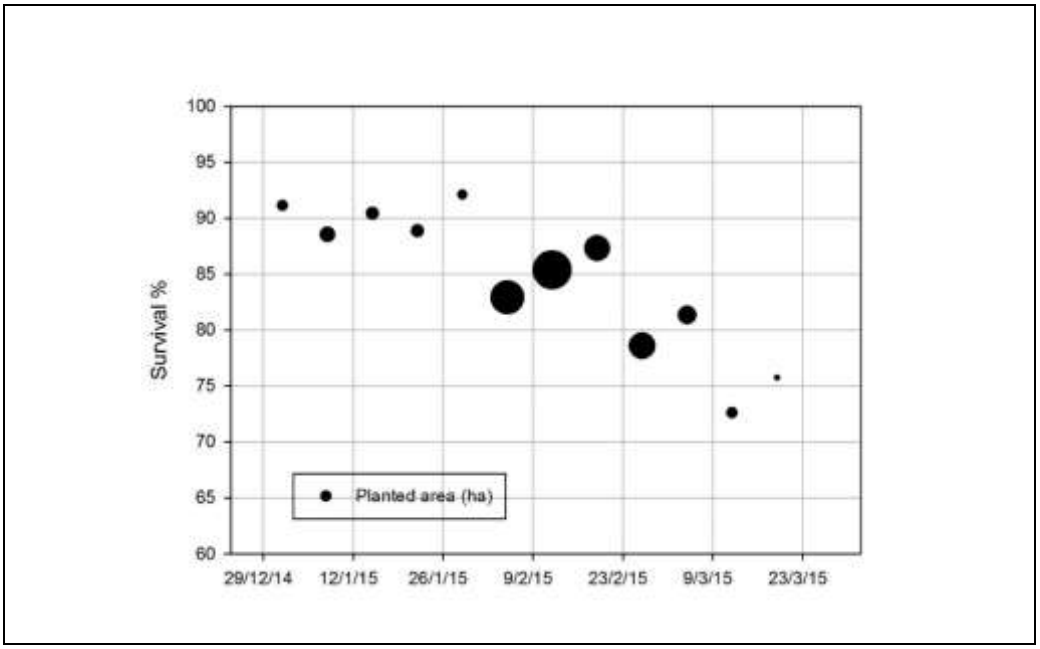
The overall average survival was 84.5%. The area-weighted average that considers the size of the assessed woodlot as a weight for the average was measured at 83.3%. This means that smaller woodlots overall had a slightly better survival than larger ones. The total and village level survival percentages are presented in Table 3.1. It should be noted that unless otherwise stated, the area statements used in the following analyses exclude areas that were found as “not planted” by the field team. The issue of “not planted” is discussed in Chapter 3.5 in more detail.

Table 3.1 Average survival and area-weighted average survival of TGIS areas assessed

Villages	TGIS woodlots assessed	Area (ha) represented	Average survival	Area weighted survival average
Iboya	55	105.8	75.58%	81.82%
Ikang'asi	62	63.3	77.99%	75.76%
Lusala	174	97.7	87.95%	86.98%
Mavanga	61	23.5	86.34%	86.95%
Mgala	20	53.8	77.86%	79.81%
Ngalanga	40	126.01	84.12%	83.59%
Ng'elamo	25	23.28	93.11%	94.39%
Usagatikwa	12	10.12	93.75%	91.30%
Total	449	503.51	84.49%	83.30%

Based on the data, it was seen that planting date had a clear effect on the average survival of the trees. The later the trees were planted the lower the survival would be. As seen in Figure 3.1, most planting during the 2014/15 season took place between end of January and mid-February.

Figure 3.1 Survival % against planting week



Note: planting area indicated by relative size of the bubbles

3.2 Survival and height of trees by species

The average survival percentage by species is presented in Table 3.2. The averages of heights of the tallest trees in each sample plot assessed varied between 0.32 metres to 0.79 metres for Eucalyptuses and 0.40 metres to 0.69 meters for Pines. Table 3.2 shows also the average heights of the assessed tallest trees.

Table 3.2 Average survival-% and average height of tallest tree per tree species

Species	TGIS woodlots assessed	Area (ha) represented	Average survival %	Average of height of tallest tree (m)
Eucalyptus camaldulensis	1	3.5	74.44%	0.32
Eucalyptus grandis	1	0.8	100.00%	0.79
Eucalyptus urograndis	85	109.8	74.72%	0.45
Eucalyptus sub-total	87	114.1	75.00%	0.45
Pinus maximinoi	109	77.2	90.61%	0.69
Pinus oocarpa	62	49.5	87.48%	0.54
Pinus patula	189	259.7	84.83%	0.43
Pinus tecunumanii	2	3.1	38.89%	0.40
Pinus sub-total	362	389.4	86.77%	0.53
Grand Total	449	503.5	84.49%	0.51

3.3 Survival by household PPI

The PFP has adopted the Progress out of Poverty Index (PPI) as one of its main tools for measuring its beneficiaries' wealth. Currently, the PFP has data of over 1,400 tree growers PPI scores. This linked the PPI score with the performance of the tree plantations in order to better understand the significance of wealth in the success of tree planting. Table 3.3 shows the hectares of assessed plantation areas by tree species and by PPI score group.

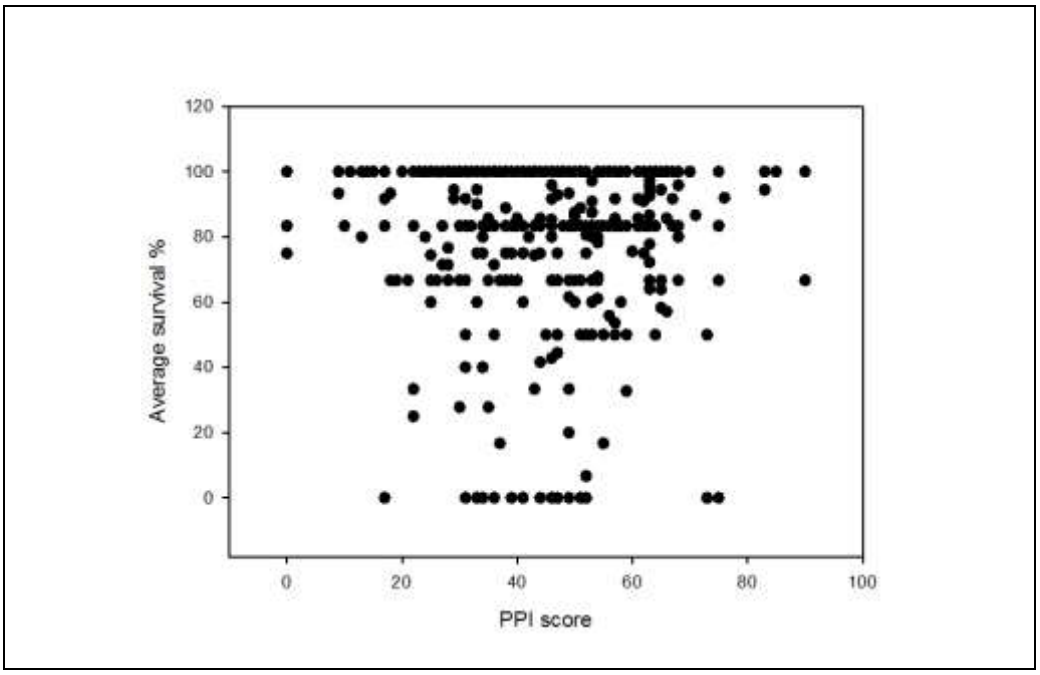
Table 3.3 Hectares assessed by species and tree growers' PPI score

	PPI score					
Species	N/A*	0-24	25-49	50-74	75-100	Grand Total
Eucalyptus camaldulensis	-	-	3.5	-	-	3.5
Eucalyptus grandis	0.8	-	-	-	-	0.8
Eucalyptus urograndis	6.3	4.4	38.5	60.7	-	109.8
Eucalyptus sub-total	7.1	4.4	42.0	60.7	0.0	114.1
Pinus maximinoi	7.6	12.0	24.3	32.5	0.8	77.2
Pinus oocarpa	0.8	1.0	21.3	20.0	6.4	49.5
Pinus patula	27.2	23.4	78.6	120.1	10.5	259.7
Pinus tecunumanii	-	-	-	3.1	-	3.1
Pinus sub-total	35.6	36.4	124.2	175.6	17.7	389.4
Grand Total	42.6	40.8	166.1	236.3	17.7	503.5

*N/A = there is no PPI score for these households

Based to the Pearson Product Moment Correlation test, there are no significant relationships between the survival percentage of the trees and the PPI score of the household. This can be also observed from Figure 3.2 that shows the survival percentage of the woodlot against PPI score of the household.

Figure 3.2 PPI scores against average survival-%



3.4 Losses due to fire and other causes

Out of the assessed 503.5 hectares, 2.6 hectares were associated with total fire damage. This equals to 0.52% frequency of fire within the sample. Partial fire damage was reported in 10.4 hectares. Overall, 13 hectares, some 2.58% of tree plantations had evidence of fire. Other loss causes than fire were not recorded.

3.5 Intact plantation areas

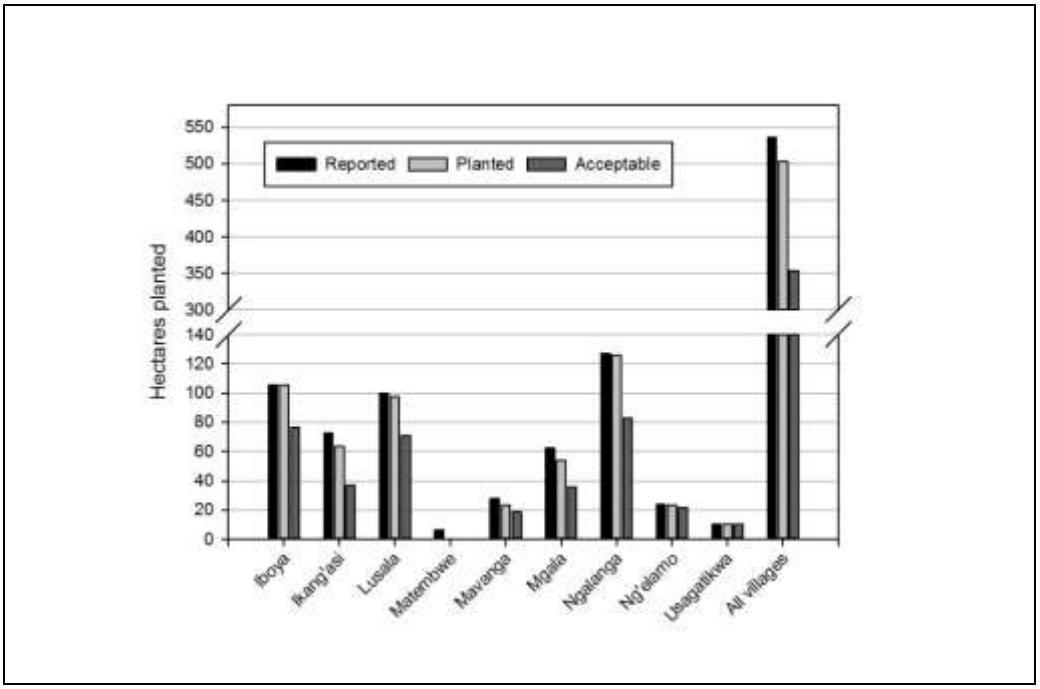
The PFP has an overall target of reaching 15,000 hectares of high quality plantations during the first four-year phase. After the first planting season, the programme reported that 834 hectares were planted through the TGIS. In the villages assessed here, 536.3 hectares were reported as planted. However, the field teams reported that some 33 hectares seemed not to have been planted leaving 503.5 hectares planted in the assessed villages.

High quality has not yet been well-defined by the programme. The programme monitors height and survival of the planted trees. Tree height according to the logical frame works should be 1, 2 and 3 meters for each year after planting.

Acceptable quality is here defined as survival-% higher than 80%. Figure 3.3 presents the areas reported as planted, areas actually verified as planted by the field team and the area that has an average survival percentage of 80 or more.

Based on the findings on intact plantation areas, it is possible to estimate that by reportedly planting 834 hectares during the first season through TGIS, the programme achieved an estimated 550 hectares of intact (or high quality) plantations. This is based on the assumption that the estimated ratio acceptable/reported (353.9/536.3) is applicable to all reported 834 hectares reported by the programme.

Figure 3.3 Areas (ha) reported, actually planted and of acceptable quality per village in all 9 villages assessed



3.6 Quality of the planted trees

The quality of the planted trees was visually assessed on a three-level scale: dead, poor health and god health. Altogether a total of 4,719 stems were visually assessed and some 13.3% were dead, 15.8% were of poor health and 70.9% were of good health.

Table 3.4 Numbers of stems dead, of poor health and of good health by species

	Dead		Poor health		Good health	
Species	#	%	#	%	#	%
Eucalyptus camaldulensis	4	25.0%	1	6.3%	11	68.8%
Eucalyptus grandis	0	0.0%	1	20.0%	4	80.0%
Eucalyptus urograndis	165	18.8%	136	15.5%	575	65.6%
Eucalyptus sub-total	169	18.8%	138	15.4%	590	65.8%
Pinus maximinoi	84	8.9%	91	9.6%	769	81.5%
Pinus oocarpa	49	8.7%	99	17.5%	418	73.9%
Pinus patula	312	13.6%	408	17.8%	1568	68.5%
Pinus tecunumanii	12	50.0%	11	45.8%	1	4.2%
Pinus sub-total	457	12.0%	609	15.9%	2756	72.1%
Grand Total	626	13.3%	747	15.8%	3346	70.9%

The quality of weeding was also assessed by a scale. 0 was given to a sample plot with no weeding done, 1 was given if work was done, but poorly and 2 was given if the weeding work was done well. None of the villages received good marks in both circle and slash weeding. The average scores by village and in all assessed villages are presented in Figure 3.4.

Table 3.5 shows the numbers of woodlots with respect to their weeding quality. Based on the table it is evident that weeding is most often not done at all. Circle weeding was not done in 61% of the assessed woodlots and slash weeding was not done in 64% of the woodlots assessed.

Figure 3.4 Average weeding scores by village

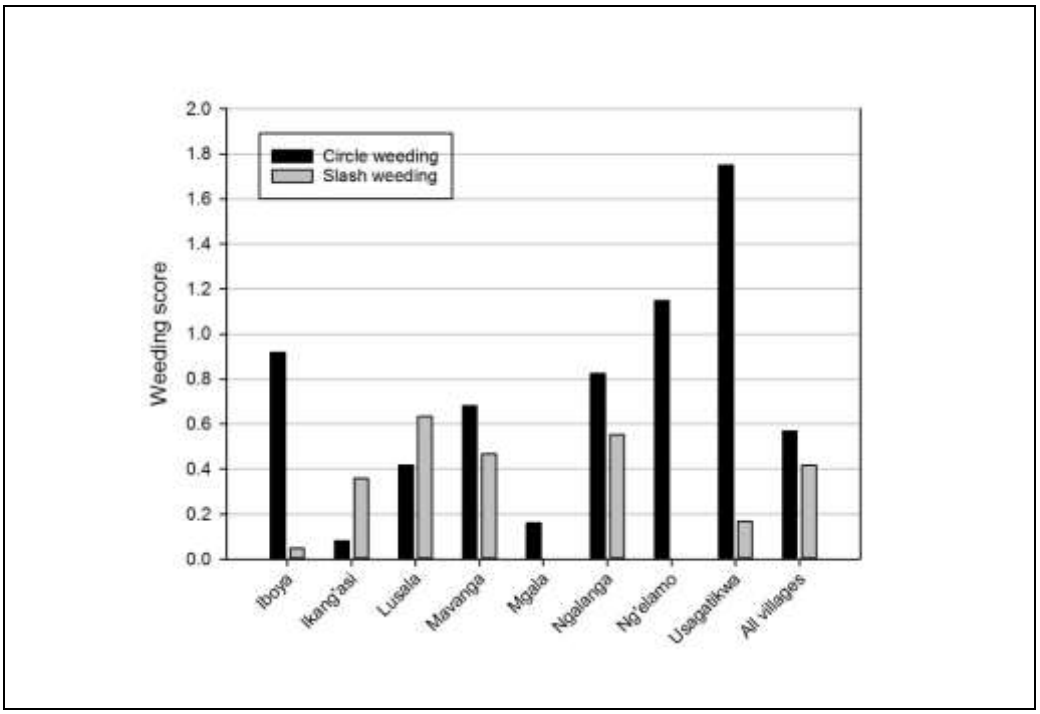


Table 3.5 Number of woodlots with respect to their circle weeding and slash weeding score

	Circle weeding			Slash weeding		
	Not done	Poor	Good	Not done	Poor	Good
Iboya	18	26	11	54	0	1
Ikang'asi	58	3	1	41	20	1
Lusala	126	23	25	86	70	18
Mavanga	30	20	11	32	29	0
Mgala	16	2	2	20	0	0
Ngalanga	17	9	14	19	20	1
Ng'elamo	10	2	13	25	0	0
Usagatikwa	1	1	10	11	0	1
Total	276	86	87	288	139	22

4. FINDINGS AND RECOMMENDATIONS

I. Timing of planting activities is essential for high survival rates. Late planting results in poor performance of the plantations and high mortalities.

II. Share of acceptable tree plantations established needs to be increased. If only 66% of the reported plantations are of high quality, the programme needs to plant over 22,000 hectares in order to reach its overall target.

III. Importance of weeding should be emphasised. The quality of weeding work has been poor and in most cases not done at all.

Indufor ...forest intelligence

NIRAS