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PRIVATE FORESTRY PROGRAMME

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MAIN RESULTS AND LESSONS LEARNED FROM THE FIELD EXERCISE ASSESSING TREE GROWING CASH INCENTIVE PILOT IN SEASON 2015/16

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Main results and lessons learned from the field exercise assessing tree growing cash incentive pilot in season 2015/16

Post-survey report
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Final version

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EXECUTIVE SUMMARY

Private Forestry Programme piloted a cash incentive mechanism in villages of Lusala and Mgala during the second growing season of the programme, 2015/16. The rationale behind the pilot was to test cash incentive enhancement to the standard tree growing incentive scheme of the programme with the purpose of maintaining high plantation quality and survival. The tree growers were provided with technical instructions concerning the required two weeding types (circle weeding and slash weeding) and a calculation stating the sum of cash they were entitled to if the activities were conducted according to the given standards.

A field exercise was organized in May-June 2016 to visit every woodlot included in the pilot and determine whether they would be eligible for payment through the cash incentive based on the observed level of weeding. A reference group of woodlots in various other PFP villages was also included in the exercise in order to get data for verification of effectiveness of the piloted cash incentive mechanism.

The study showed mixed results in relation to cash incentive effectiveness. There were no statistical differences in the survival of seedlings and the level of circle weeding between the pilot villages and the reference group villages based on the collected data. Eucalypts showed reduced survival in the reference group, but the difference was not statistically significant. A difference that was statistically significant was observed in the level of slash weeding, which had been conducted generally better in the pilot villages. Different villages showed generally large differences in the whole data. Approximately half of the woodlots included in the pilot were determined as eligible for payment.

If the cash incentive is to be further applied, it is recommended to assess the scope of the mechanism, revise the weeding requirements and place increased emphasis on communication with the tree growers through capacity building of the tree growers' associations. Further experience on applying the cash incentive and data with larger geographical coverage within the programme area is needed to assess the efficiency of the mechanism thoroughly. An interview-based follow-up study of the tree growers' motivations would be necessary in order to be able to properly address the observed shortcomings in the level of weeding.

1. INTRODUCTION

1.1 Background of the cash incentive pilot

> For detailed information on cash incentive pilot background, see draft proposal *Proposal for a pilot cash incentive under the tree growing incentive scheme for the second growing season*.

During the second operative year 2015/16 of the Private Forestry Programme, a cash incentive mechanism was piloted in addition to the programme standard TGIS in-kind support. The rationale derives from securing the high quality of plantations, as referred to in programme output 2.3. The programme management was given a task to prepare a proposal to add a cash incentive, which would aim to ensure good maintenance of the established plantations during their second growing season 2015/16. Documents related to the mechanism background and the field exercise are listed in Table 1.

Two PFP operating villages, Lusala and Mgala, were chosen to be included in the pilot. They were set to be compared later with villages not in the scope of the pilot mechanism in order to determine viability of the system.

Table 1   List of documents related to the pilot cash incentive

Document type	Title	Publisher	Year
Consultancy reports	A Feasibility Study on Establishing a Subsidy Scheme for Commercial Plantation Forestry in Tanzania	Indufor	2011
	Assessment of the Planned Options for the Tree Growing Incentive Scheme	Indufor	2014
Draft proposal	Proposal for a pilot cash incentive under the tree growing incentive scheme for the second growing season	PFP	2016
Implementation material	TGIS cash information letter for beneficiaries	PFP	2016
	PFP weeding instructions	PFP	2016
	TGIS cash study – Guidelines for field work	PFP	2016

1.2 Practical implementation of the mechanism

The responsible programme extension officers were tasked to disseminate information of the cash incentive pilot launch in the target villages, and to be available for further support on the subject. Weeding activities were required to be done during the rainy season.

Each of the potential cash pilot beneficiaries were also contacted personally by the programme through a personalised information letter, stating their area-dependent maximum revenue potentially accessible through conducting required weeding activities on an acceptable level. The requirements for management per individual woodlot were stated in the letter as follows:

1. Circle weeding: clear 75 cm radius around the tree and no damage to the soil, trunk and/or roots.

2. Slash weeding: All weed cut lower than 20 cm high, and no damage to the tree seedling.

3. Overall maintenance: No less than 80% survival rate (of the original number of planted trees).

Additionally, the PFP weeding instructions infosheet containing illustrative photographs was delivered to the extension officers, for them to support the demonstration of required level of management in the field.

A field exercise for follow-up and verification was set to take place in the beginning of the dry season.

1.3 Objectives of the field exercise

The field exercise had two primary objectives:

Objective 1: Provide data for determination of the final beneficiaries eligible for payment within the scope of the incentive pilot

Objective 2: Provide data for comparison of performance between the cash incentive woodlots and non-cash incentive woodlots supported by the programme.

The objective 2 was set to provide the necessary information for decision-making concerning possible continuation and adjustments of the cash incentive mechanism.

2. METHODOLOGY

2.1 Sampling

> For detailed information on sampling, see Annex 1 of the field guidelines *TGIS cash study guidelines.*

The population concerned by the study was formed by all woodlots planted under the programme TGIS in-kind support during planting season 2014/15 (N=704), and hence undergoing their second growing season by the time of the cash incentive pilot. In order to meet the objective 2, the population was stratified into two strata: target group and reference group. The former included the woodlots in pilot villages Lusala and Mgala, while the latter included the rest of the population. The number of woodlots included were 229 and 475 respectively.

To provide general cost-effectivity, a random sample of 163 was drawn out of the 475 woodlots in the reference group. The sampling considered both statistical strength and practical limitations especially with logistics, the latter of which led into exclusion of three villages that PFP had operated with in the first growing season from the study. In order to meet the objective 1 of the study, no sampling was applied within the target group and all 229 woodlots were set to be surveyed. See Table 2 for the woodlot distribution after sampling.

Table 2   Distribution and number of woodlots in the sample

Village	District	Sample size	*Surveyed woodlots*
Lusala	Ludewa	201	*200*
Mgala	Njombe TC	28	*25*
Target villages subtotal		229	*225*
Iboya	Njombe TC	28	*20*
Ikang'asi	Njombe DC	39	*7*
Itambo	Njombe DC	14	*3*
Mavanga	Ludewa	40	*21*
Ngalanga	Njombe TC	22	*16*
Ng'elamo	Njombe TC	20	*19*
Reference villages subtotal		163	*86*
Grand Total		392	*311*

2.2 Field survey procedures

> For detailed information on methodology of the field work, see the separate field guidelines *TGIS cash study guidelines.*

The programme GIS personnel prepared sets of working maps on village level and pre-installed sample plot coordinates on GPS devices for the field team.

The field work took place in May-June 2016. The surveyors were required to perform assessment on two levels in each sampled woodlot: 1) sample plot based measuring of seedling survival in the pre-determined centroid of the woodlot, and 2) visual assessment and classification of quality of the weeding activities in the woodlot as a whole. The latter was done on a four-level scale, with two approved and two rejected categories (Table 3). The two weeding types were assessed jointly.

Additionally, a landscape photo was taken on every plot and stored in the PFP archives for post-exercise verification.

Table 3   Classification of the level of weeding on woodlots

Category	Title	Definition
0	No weeding done	There are practically no signs of weeding activities done during the past rainy season
1	Some weeding done, but not acceptably	There is clear evidence of weeding activities taken place during the past rainy season; however they have not been done sufficiently to ensure tree survival, good quality and good growth in the woodlot.
2	Weeding activities done acceptably	There are some shortcomings in the weeding activities, but the overall level is clearly sufficient to help ensure tree survival, good quality and good growth in the woodlot.
3	Weeding activities done completely	There are practically no signs of shortcomings, and all weeding activities appear to be conducted throughout the woodlot.

2.3   Practical limitations encountered on field

Topographic conditions and land cover present proved to be highly challenging on part of the survey areas, seriously limiting the field team ability to reach certain pre-determined sample plots without excessive use of time and resources. This was addressed by adjusting the survey mid-exercise, so that the target group was preferred at the expense of reference group in order to reach the objective 1 of the study. The final number of surveyed woodlots is included in Table 1.

2.4   Approval of final beneficiaries

The decision of approval of each individual woodlot was done in the office by a committee including programme Team Leader, National Private Forestry Advisor and Senior Forestry Expert, supported by two International Junior Experts having been involved in the design of the study. The decisions were based on the field measurement and assessment data with support of the landscape photos.

Applying the weeding requirements categorically was considered unfeasible in the approval process. A typical example case would be a woodlot with more fertile soil and rapid weed growth. Intensive weed management would have secured relatively good growth and quality of the seedlings, yet resulting in having some weeds notably taller than the original reference value of 20 cm on the woodlot most of the time. The committee adopted an approach which considered the overall effort put to the weeding of the woodlot and the resulting state and quality of each stand. The survival threshold of 80% was also amended in cases that showed seedling loss without strong apparent dependency on the level of management observed.

3. RESULTS

3.1 Field survey results

Table 4 describes the statistics of the final sample of woodlots covered in the study. In target villages Lusala and Mgala there were 1 and 3 woodlots out of 201 and 28 respectively that were left unmeasured (Table 2). In Lusala, the one woodlot was found to be not managed by other means. In Mgala, 1 woodlot was located outside the village and 2 woodlots were found to be in fact overlapping with other woodlots of the same owner. The samples concerning the rest of the villages included in the study were covered with varying intensity (Table 2).

Table 4   Basic statistics of the woodlots surveyed in the study

	Pine plots	Euca plots	Plot area (ha)			Ownership (%) male-female-institution
			Average	Max	Min	
Lusala	194	6	0.6	6.8	0.1	78-19-03
Mgala	19	6	2.5	9.7	0.4	76-08-16
Target subtotal	213	12	0.8	9.7	0.1	78-18-04
Iboya	17	3	2.3	18.8	0.3	65-30-05
Ikang'asi	0	7	1.2	10.4	0.1	100-00-00
Itambo	2	1	1.3	3.4	1.0	67-33-00
Mavanga	21	0	0.4	3.0	0.1	81-19-00
Ngalanga	15	1	2.6	5.8	0.3	69-31-00
Ng'elamo	16	3	0.9	3.3	0.3	74-26-00
Reference subtotal	71	15	1.4	18.8	0.1	74-24-01
Grand Total	284	27	1.0	18.8	0.1	77-20-03

The number of surveyed pine woodlots was significantly higher than eucalyptus woodlots (Table 4). An exception was Ikang'asi, where all measured sample plots were eucalyptuses, though the sample size of 7 was relatively small. Ikang'asi also did most poorly in terms of observed seedling survival with an average survival rate of 75.9% (Table 5).

Ownership structure was relatively constant throughout the villages, with male-female-institution categories following roughly ratio $^3/_4$ to $^1/_5$ to $^1/_{20}$ respectively with few exceptions (Table 6).

Table 5   Average weeding score and survival rate by village

	Circle weeding score	Slash weeding score	Survival-%
Lusala	1.12	1.46	88.2%
Mgala	1.32	0.60	89.5%
Target subtotal	1.15	1.37	88.4%
Iboya	1.45	0.00	77.2%
Ikang'asi	0.57	1.00	75.9%
Itambo	0.50	0.00	65.7%
Mavanga	1.43	0.86	93.9%
Ngalanga	1.25	0.19	92.4%
Ng'elamo	0.84	0.63	95.2%
Reference subtotal	1.18	0.47	88.0%
Grand Total	1.15	1.12	88.3%

Notably, the average scores calculated for both circle and slash weeding remained below the original threshold value of 2 in all calculated subgroups as shown in Table 5 and Table 6. On 78 woodlots – a quarter of the sample – no signs of weeding activities were observed at all. The figure excludes plots that had been left unplanted.

All but three villages exceeded on average the original 80% threshold of seedling survival, and two out of these three remaining close to 80% as well (Table 5). Itambo stands out in the data with poor seedling survival, yet the very limited sample size renders conclusions undrawable. A notable difference between the two strata in seedling survival is the lower performance of eucalyptuses in the reference group.

Table 6　Field survey results by tree species in target village woodlots and reference village woodlots

	Target group	Reference group
Average circle weeding score (scale: 0–3)		
Pines	1.17	1.30
Eucalyptuses	0.75	0.60
Total	1.15	1.18
Average slash weeding score (scale: 0–3)		
Pines	1.38	0.47
Eucalyptuses	1.08	0.47
Total	1.36	0.47
Average seedling survival-%		
Pines	88.8%	90.4%
Eucalyptuses	83.9%	73.8%
Total	88.6%	88.0%

In target villages, 38% and 51% of the woodlots reached the score 2 or above in circle and slash weeding respectively, while the respective figures within reference villages were 49% and 15%.

3.2　Statistical analysis

The results in target and reference groups were compared using two-sample t-test (assuming equal variances) with 95% confidence interval. The only discovered statistically significant difference was in slash weeding scores between the villages included and not included in the cash incentive pilot. Survival-% of eucalyptuses, though demonstrating a difference of 10 percentage points between the groups, was not statistically significant.

3.3　Additional issues discovered on field essential to the programme performance

The field team repeatedly encountered woodlots that had been reported to office as planted, including submitted GIS data, but had no existing planted seedlings on the field (Table 7). Often the site had been prepared in terms of removing any remaining woody vegetation, while in some cases a degraded stand of pre-existing woody vegetation still dominated the site. The field team also discovered piles of unplanted seedlings abandoned across some of the planting sites, however not in numbers high enough to awoke serious concern.

Table 7　Share of woodlots with no seedlings encountered in the study

No. of plots surveyed	No. of plots with no seedlings	% of plots with no seedlings
311	17	5.5%

One common reason given by TGA representatives occasionally escorting the field team concerning unplanted sites was that the seedlings had ran out before the planting would have occurred. The field team was also told repeatedly that weeding activities compete as an investment of time and effort against other livelihood activities such as agricultural chores. There were also speculations about people securing their land tenure with being involved in the tree planting scheme without a real intent to practice commercial forestry.

Other issues encountered in the field included high variation in the promoted planting density of 3 x 3 m or 1,111 seedlings/ha (Table 8), and local low-quality seedlings being used in filling in dead seedling gaps after the original planting.

Table 8   Observed planting densities (seedlings/ha)

Village	Mean planting density	Minimum planting density observed	Maximum planting density observed
Lusala	1,099	389	2,277
Mgala	1,174	833	1,389
Iboya	1,240	833	1,555
Ikang'asi	1,379	944	2,111
Itambo	1,000	778	1,111
Mavanga	1,092	833	1,333
Ngalanga	1,092	889	1,333
Ng'elamo	1,247	889	1,444

3.4   Woodlots approved for payment

A total of 101 woodlots owned by 67 individuals were approved to be eligible for payment out of the theoretical maximum of 229 woodlots; see Table 9 for statistics.

Table 9   Statistics of woodlots approved for payment; figures by village

	No. of approved woodlots	Circle weeding score (av.)	Slash weeding score (av.)	Survival (%)	Total area (ha)	Total support to be paid (TZS)
Lusala	96	1.73	2.49	96%	53.4	2,403,000
Mgala	5	3.00	2.40	99%	7.1	319,500
Total	101	1.79	2.49	96%	60.5	2,722,500

4.   CONCLUSIONS AND RECOMMENDATIONS

4.1   Conclusions

According to the field exercise results, the TGIS cash incentive pilot was not fully successful in securing quality of the previously planted seedlings. The differences in the level of weeding activities and survival rate between the cash incentive pilot villages and the villages of the reference group were generally narrow and statistically not significant. The differences within the target and the reference group were generally larger than the differences between the two groups. An exception was slash weeding, which demonstrated improved results in the target villages.

The results suggest that the implementation of promoted activities, including or excluding the cash incentive, is heavily dependent of the given village/TGA. Hence, the results acquired from the two villages included in the piloting are not sufficient for drawing sound conclusions of the cash incentive over the whole PFP operating area, and more information would be needed with wider geographical coverage.

The piloted cash incentive mechanism may have been seen by the tree growers as a win-win situation, where a grower only has additional benefit to gain depending on the level of time and effort (s)he is able or willing to put in. If the latter is seen too much of a burden by the tree grower, depriorisation does not cause any apparent losses compared to the baseline scenario from the grower's point of view. Again, more information on the rationale and decision-making of the tree growers would be needed to draw sound conclusions.

The survey data showed eucalyptus survival rate drop together with the lack of weeding, while similar effect was not observed with pine. The field observations did show pine also suffering from reduced growth while experiencing lack of weeding, especially on more fertile lands, however this effect is not visible in the data since the growth and quality of the seedlings was not assessed beyond dead-alive -classification.

The survey data also showed that generally, when either of the two types of weeding had been conducted well, the woodlot demonstrated high survival rate.

4.2   Recommendations

1. The piloted cash incentive mechanism could be further adjusted to provide the tree growers a stronger incentive for adequate woodlot management.

    a. An example of a possible future way is presented by an early sketch drafted under Result area 2: tree growers, though subsidised, would also invest their own money in tree seedlings. The motivation for management would come from the programme paying back part of their seedling investment, if an acceptable level of weeding is observed in a survey conducted in the end of the second growing season.

2. In order to be able to draw sound conclusions of the efficiency of the cash mechanism applied either with the current or an adjusted design, the programme needs more experience and data of it from wider geographic coverage within the programme operating area.

3. TGA capacity building should have a heavy emphasis, so that the activities promoted by the programme would get stronger implementation on field. This action is complementary to any incentive mechanisms. Quality and intensity of extension services delivered by the programme appear to be highly important for the woodlot management results.

4. Better results can be expected for the level of weeding if the technical weeding instructions and requirements can be tailored and delivered with some level of site-specificity, since the negative effect that weeds induce to the trees varies greatly between different types of growing sites.

5. Targeting the management of eucalypt plantations could be the first priority of the cash incentive, since their quality appears to suffer more from the lack of weeding than quality of pines.

6. The programme would benefit from a qualitative follow-up study addressing the rationale behind individual tree growers' decisions whether or not to conduct weeding, and what are the factors determining the effort they are ready to put in the woodlot management work.

7. Generally, programme monitoring and communication system should be improved to prevent submission of erroneous reporting data and ensure the flow of information between the office and the field personnel.