BASELINE TREE GROWER SURVEY REPORT
JULY, 2015

BASED UPON THE FINDINGS OF THE FOLLOWING RESEARCH:

FDT HOUSEHOLD SURVEY (2014)
FARMER REGISTRATION SURVEY (2015)
# TABLE OF CONTENTS

1. **INTRODUCTION** .............................................................................................................. 6  

2. **METHODOLOGY** ............................................................................................................. 7  
   2.1. **HOUSEHOLD SURVEY (2014)** ................................................................................. 7  
      2.1.1. PILOT STUDY ............................................................................................................. 7  
      2.1.2. SAMPLING STRATEGY ............................................................................................... 7  
      2.1.3. SURVEY DESIGN ..................................................................................................... 8  
      2.1.4. ENUMERATION ....................................................................................................... 8  
      2.1.5. LIMITATIONS .......................................................................................................... 8  
   2.2. **REGISTRATION SURVEY (2015)** .......................................................................... 11  
      2.2.1. SAMPLING STRATEGY ............................................................................................. 11  
      2.2.2. SURVEY DESIGN .................................................................................................... 11  
      2.2.3. ENUMERATION ...................................................................................................... 11  
      2.2.4. LIMITATIONS ........................................................................................................ 11  

3. **RESULTS** ....................................................................................................................... 12  
   3.1. **POVERTY PROFILE OF TREE GROWERS** ................................................................. 12  
      3.1.1. GENDER .................................................................................................................. 15  
   3.2. **LAND USE** .............................................................................................................. 16  
      3.2.1. TOTAL LAND SIZE .................................................................................................. 16  
      3.2.2. WOODLOTS ............................................................................................................ 17  
      3.2.3. OTHER CROPS ...................................................................................................... 19  
      3.2.4. UNUSED LAND ..................................................................................................... 20  
      3.2.5. LAND USE COMPETITION ..................................................................................... 22  
   3.3. **SILVICULTURAL PRACTICES** .................................................................................... 23  
      3.3.1. WOODLOT ESTABLISHMENT .................................................................................. 24  
      3.3.2. WOODLOT MANAGEMENT ..................................................................................... 26  
      3.3.3. DISEASE, PESTS AND ANIMAL MANAGEMENT ..................................................... 27
3.3.4. FIRE
3.3.5. “GOOD PRACTICES”

3.4. HARVESTING
3.4.1. PREMATURE HARVESTING

3.5. ACCESS TO INFORMATION

3.6. ENERGY

3.7. TREE GROWERS ASSOCIATIONS

3.8. CONSTRAINTS

4. CONCLUSIONS

ANNEX 1: HOUSEHOLD SURVEY (2014)

ANNEX 2: REGISTRATION SURVEY (2015)

ANNEX 3: GUIDANCE NOTE ON ADOPTION OF IMPROVED SILVICULTURAL PRACTICES
EXECUTIVE SUMMARY

INTRODUCTION

FDT’s original household survey was conducted in 2014, covering 3,436 households across the Southern Highlands. In early 2015, the Monitoring, Evaluation and Learning (MEL) team used FDT’s farmer registration exercise as an opportunity to collect additional data to clarify and elaborate on a number of issues from the original survey. The findings of these surveys are presented here.

POVERTY PROFILE OF TREE GROWERS

Whilst not the “poorest of the poor” in Tanzania, the tree growers of the Southern Highlands are characterised by small landholdings, low levels of educational attainment, and limited asset ownership.

LAND USE

Pine is ubiquitous across the highlands, grown by over 90% of tree growers, whilst around a third of growers cultivate eucalyptus.

An expansion of small-scale forestry since the mid-2000s has seen significant land use shifts from agriculture to forestry, although there also remains a lot of “unused” land in the Southern Highlands. More work is required to fully understand the food security and environmental impact of the growth in the forestry sector.

SILVICULTURAL PRACTICES

Most tree growers are not practicing even a basic set of good silvicultural practices at present, whilst more advanced practices are rarely applied, even by larger growers.

Fire poses the greatest threat to tree growers, with around a third having personally experienced woodlot damage in recent years.

Fortunately, pests and diseases are less problematic at present, but the lack of diverse, high-quality planting material, coupled with weak or absent response mechanisms, could pose a major threat to Tanzanian forestry.

HARVESTING

The recent boom in small-scale planting means that most current growers have never harvested before, whilst access to information on harvesting and markets is particularly weak. The average age of standing woodlots currently ranges from 4 to 6 years. At the same time, rotation lengths are falling, and small growers are supplying greater volumes every year.

Premature harvesting due to unforeseen cashflow problems seems relatively rare, with small growers most likely opting for shorter rotations as a rational response to market forces.

ACCESS TO INFORMATION

Very few growers have access to relevant information and training at present. The most common source of information is from government extension officers, whose coverage of the highlands is very uneven - extension officers only reached some 5% of growers in the Southern Highlands in 2012-14.

Information on harvesting and markets is particularly scarce.

ENERGY

The vast majority of farmers use freely harvested local firewood to satisfy their energy needs.

TREE GROWERS ASSOCIATIONS

Around a quarter of farmers are members of TGAs at present, with the main perceived benefits being access to credit and training. Few TGAs offer services around marketing, and most are not linked to financial institutions.

CONSTRAINTS

Access to finance poses the greatest constraint to tree growers, followed by fire risk and access to improved seeds.
1. INTRODUCTION

The following report sets out the findings from the Forestry Development Trust’s two major farmer surveys conducted to date.

The Forestry Development Trust’s original household survey, conducted in early 2014, was intended to set a baseline for monitoring and evaluation purposes, as well as to generate a range of insights into the sector that could be used to inform other actors in Tanzanian forestry, whilst also shaping FDT’s own emergent strategy.

In late 2014, FDT’s Monitoring, Evaluation and Learning (MEL) team set about consolidating the wealth of evidence gathered by the Trust to date, as well as designing complementary data collection activities to inform a comprehensive new results framework. During the 2014/15 planting season, FDT’s farmer registration process was used as an opportunity to gather additional information to clarify and expand upon a number of issues originally addressed in the 2014 household survey.

Whilst many of the findings have already been extremely helpful in guiding FDT’s internal strategy, this report seeks to comprehensively set out the results for a wider audience.

The structure of the report is as follows. Section 2 sets out the respective methodologies of each survey, before Section 3 presents the full range of results. The original survey instruments, as well as a note on definitions around the adoption of improved practices, are annexed for reference.

Finally, it should be noted that the work presented here is part of a wider body of continuous research and learning at FDT, and indeed the findings set out below frequently directed us to new lines of inquiry. Each section therefore concludes with a summary of issues for further research, much of which is already underway.
2. METHODOLOGY

The respective methodologies of the 2014 household survey and 2015 registration survey are set out below.

2.1. HOUSEHOLD SURVEY (2014)

2.1.1. PILOT STUDY

A pilot study was conducted in four villages in Kilolo in early 2014, with 15% of tree growers in each village being randomly sampled based upon village registries of tree growers. The pilot study was used to generate estimates of the proportion of farmers in a given village engaged in forestry. Key findings from the pilot that informed the full survey included:

- Very few villages have tree grower registers. As such, registers could not be relied upon for the full survey.
- Whilst the pilot attempted to visit a number of woodlots in order to verify farmer statements through visual observation, this proved too time consuming, and was dropped from the final survey (subsequent work by the MEL team has focused upon direct woodlot observation using smaller sample sizes).
- Manual data entry was particularly time consuming, leading to the decision to use smartphones and an open-source data collection app (see below).

At the pilot stage, estimates were also made of the total number of tree growers active in the Southern Highlands, triangulating the information from the pilot with information from other sources, and ultimately arriving at an estimate of 60,000 tree growers.

2.1.2. SAMPLING STRATEGY

It was decided to sample 5% of the population of 60,000 growers, leading to a target sample of 3,000 growers. The final sample was arrived at through the following steps:

- The sample was stratified proportionally across the project area districts.
- Within each district, wards suitable for tree growing were selected based upon agro-climatic conditions.
- 158 sample villages were chosen at random within suitable wards.
- Villagers were chosen at random from village census records, with the help of village government.
- Once villagers had been selected, enumerators visited households to ascertain whether or not they were tree-growing households. If not, the enumerator moved one house to the right until a tree-growing household was found.
- In each village, a small sample of non-tree farmers were also interviewed.
Through this methodology, 3,436 households were sampled in total. Figure 1 displays the sample coverage of the project area.

2.1.3. SURVEY DESIGN

The household survey instrument is included in Annex 1.

The original survey was an ambitious attempt to capture a comprehensive range of information on all aspects of forestry activities, as well as information on land, income, assets, plus other crops and livestock. In retrospect, the scope of the household survey was perhaps too great, leading to weaknesses in some elements of the data, particularly relating to income (see “Limitations”, below).

2.1.4. ENUMERATION

Enumeration was conducted on smartphones using the open-source survey application, ODK. Smartphone data collection was chosen as the most cost-effective means of managing and processing such a large survey, allowing real-time transmission and supervision of data collection, and removing the need for manual data entry.

Four teams of enumerators conducted the survey in the field, with each team being headed by a senior enumerator who was responsible for engaging with village government and conducting in-village sampling.

The four teams were overseen by two supervisors. One supervisor was field-based, responsible for making district-level introductions, conducting spot checks for data verification purposes, and providing support as necessary to the teams.

The second supervisor was office-based at FDT, coordinating the overall exercise and monitoring incoming data in real-time.

2.1.5. LIMITATIONS

The original household survey encountered a number of challenges, including:

- **Farmer response bias**: As woodlots are often located some distance from the household (or even the village itself), direct woodlot observation was ruled out for such a large sample on the grounds of being prohibitively expensive and time consuming.

  This meant, however, that a range of questions – particularly relating to practices applied by farmers – had to rely upon farmers’ own accounts, without enumerators being able to verify results in the field. As such, it is believed that a number of questions may be subject to bias (discussed in relevant sections below).

  Further fieldwork, including direct woodlot observations on smaller samples, is being conducted by FDT to verify information collected to date where it is believed bias may have been introduced in the original household survey.

- **Household income data**: The collection of comprehensive household income data is always fraught with difficulty – it is extremely time consuming, subject to bias and recollection errors, and complicated by multiple informal income streams. The case of forestry is particularly challenging, as there is (typically) no annual income from woodlots.
Following careful cleaning and analysis of the income data collected, it was decided that the data was not robust enough to form reliable estimates of household income, due to a combination of the factors outlined above.

The revised FDT monitoring, evaluation and learning (MEL) frameworks (as of Q4 2014/15) focus upon income from forestry alone, rather than total household income. The MEL team is working to establish means of monitoring impacts on forestry income.
Figure 1: Households surveyed by district (2014 household survey)
2.2. REGISTRATION SURVEY (2015)

The farmer registration survey was carried out by FDT’s Component 2 (Skills and Knowledge) team during the planting season of 2014/15. The primary objective of the exercise was to register tree growers for involvement in FDT’s programme, particularly relating to training exercises.

However, the newly-recruited MEL team took this as an opportunity to collect additional data in order to clarify and elaborate upon a number of topics originally addressed by the 2014 household survey.

2.2.1. SAMPLING STRATEGY

The Component 2 team worked through the planting season to register farmers across all districts of the project area. The registration survey was a requirement for all farmers being registered, ultimately leading to 2,696 farmers being surveyed by the end of the season.

2.2.2. SURVEY DESIGN

The farmer registration survey instrument is included in Annex 2.

The survey was designed so as to clarify and elaborate on a number of topics originally addressed in the household survey. It was designed to be a much shorter survey, thereby not overly hindering the activities of the Component 2 team.

2.2.3. ENUMERATION

Enumeration was once again carried out using smartphones and the open-source ODK application. Enumeration was carried out by FDT’s newly established network of 80 village-based Community Agents (CAs), with close oversight from the Component 2 and MEL teams at FDT.

2.2.4. LIMITATIONS

For the same reasons as outlined above, direct woodlot observation was not possible as part of the farmer registration survey due to the time and expense involved. As such, the survey again relied on farmer responses given at the village or household. As such, the survey deliberately focused on lines of inquiry that were not believed to be subject to significant bias – such as land use, planting and harvesting plans, and constraints faced.

In order to enable the Component 2 team to proceed with farmer registration and training as fast as possible, the survey instrument was kept relatively short, limiting the amount of data that could be captured. However, other issues – such as farmer knowledge, adoption of improved practices, and nursery performance – were addressed in separate data collection exercises, often involving direct woodlot observation, and more qualitative information drawn from smaller samples. Results from these exercises will be published separately.
3. RESULTS

The following sections set out the main results of the household and farmer registration surveys, beginning with the ‘poverty profile’ of the target beneficiaries, before moving on to issues of land use, silvicultural practices, harvesting, access to training, energy, tree growers associations (TGAs) and constraints faced by tree farmers.

3.1. POVERTY PROFILE OF TREE GROWERS

Key findings
- The tree farmers of the Southern Highlands are by no means the “poorest of the poor” in Tanzania. However, they are characterised by low levels of educational attainment, small landholdings, and limited asset ownership.
- Furthermore, their ability to invest in small-scale forestry alongside their food crops is likely create poverty reduction opportunities not presented by other crops. Further work is being conducted to better understand these dynamics.

The household survey included a range of proxy indicators for poverty, including educational attainment, asset ownership and purchases, and food security. With a higher altitude and average rainfall than much of Tanzania, the Southern Highlands outperforms much of the country on many poverty indicators. However, whilst the small tree growers of the Southern Highlands are not typically considered to be subject to “extreme poverty”, they may still be considered relatively “poor” in a number of respects. Further work is underway to gain a better understanding of the poverty profile of tree growers (see “limitations and areas for further research”, below).

Figure 2: Highest level of educational attainment

![Figure 2: Highest level of educational attainment](image)
Figure 2 shows that the tree growers of the Southern Highlands have, on average, a higher level of educational attainment than the Tanzanian average (Table 1), with almost 80% having completed primary school, compared to less than 50% nationally, whilst just 4% have received no schooling at all, compared to more than a quarter of all Tanzanians. However, very few tree growers have levels of educational attainment beyond primary level.

Table 1: National levels of educational attainment

<table>
<thead>
<tr>
<th>Level of schooling</th>
<th>Percentage of population (aged &gt;25, 2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No schooling</td>
<td>26.1%</td>
</tr>
<tr>
<td>Primary</td>
<td>49.0%</td>
</tr>
<tr>
<td>Secondary</td>
<td>1.2%</td>
</tr>
<tr>
<td>Tertiary</td>
<td>0.5%</td>
</tr>
</tbody>
</table>


Household assets were assessed as a proxy for overall income levels, as summarised in Figure 3. High levels of mobile phone ownership are above national trends, with the World Bank putting mobile phone subscriptions at 56 per 100 people nationally in 2013.

High radio ownership suggests that radio outreach could also be a useful means of knowledge dissemination for FDT.

In terms of farm equipment, a lack of mechanisation prevails, with just 9% owning a plough.

Figure 3: Household assets

CONSUMER DURABLES

<table>
<thead>
<tr>
<th>Item</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>House</td>
<td>73%</td>
</tr>
<tr>
<td>Motorbike</td>
<td>18%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>52%</td>
</tr>
<tr>
<td>Radio</td>
<td>83%</td>
</tr>
<tr>
<td>Phone</td>
<td>7.6%</td>
</tr>
<tr>
<td>TV</td>
<td>12%</td>
</tr>
</tbody>
</table>

FARM EQUIPMENT

<table>
<thead>
<tr>
<th>Item</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pruning tools</td>
<td>62%</td>
</tr>
<tr>
<td>Wheelbarrow</td>
<td>4%</td>
</tr>
<tr>
<td>Plough</td>
<td>9%</td>
</tr>
</tbody>
</table>

Source: FDT household survey (2014)

In terms of food security, the tree growers of the Southern Highlands again fare better than the average Tanzanian, with just 9% experiencing food insecurity in 2013 (Figure 4), compared to 24% of Tanzanians nationally in 2010/11\(^2\).

Food security varied considerably by district however, from as low as 2% in Ludewa, to 34% - well above the national average – in Kilolo.

Of those experiencing food insecurity, some 13% claimed to have subsequently harvested trees in order to pay for food. This amounts to just 1% of all tree farmers in 2013.

**Limitations and areas for further research**

- A more detailed study of the poverty profiles of Southern Highlands tree farmers is currently underway in collaboration with the Finnish *Private Forestry Programme* (PFP). This will use more extensive asset registers and control groups to better understand the poverty levels of tree farmers relative to other farmers in the Southern Highlands, as well as to farmers elsewhere in Tanzania.

- FDT intends to conduct further work on the poverty reduction potential of small-scale forestry, focusing on the unique role of forestry as an investment vehicle that can ultimately generate substantial pay-offs at harvest, and the associated transformative power of this relative to small, regular payments for field crops.

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3.1.1. GENDER

Tree grower respondents were disproportionately male, with less than a quarter of all respondents being female, compared to a much more even split between male and female non-tree growers (Figure 5).

*Figure 5: Gender of respondents (tree growers versus non-tree growers)*

However, the majority of respondents claimed that decisions relating to forestry (as with household expenditure more generally) tended to be a joint responsibility between husband and wife (Figure 6). Notably, there was little variation in this response depending on the gender of the respondent.

*Figure 6: Responsibilities for household decision making by gender*
3.2. LAND USE

Key findings

- Tree growers tend to have larger landholdings on average than non-tree growers, as they are themselves predominantly maize farmers with small woodlots alongside their food crops.
- Pine, and particularly *pinus patula*, is ubiquitous in the highlands, with eucalyptus now being grown by around a third of farmers.
- There have been some significant shifts in land use from agriculture to forestry in recent years, as small-scale forestry expands rapidly in the highlands.
- However, there also remains a lot of “unused” land in the Southern Highlands, currently unproductive due to a lack of capital with which to invest.
- A more detailed understanding is required of the food security and environmental impacts of the current expansion in small-scale forestry.

Issues around land use were initially investigated through the 2014 household survey, with further details sought in the 2015 registration survey, particularly around unused land.

Landholding sizes were categorised as small (less than five acres), medium (five to twenty acres), and large (more than twenty acres). Whilst strict definitions of “smallholder” farmers by farm size are scarce, average landholding size in Tanzania has been estimated variously at 2 hectares (5 acres)\(^3\) and 1 to 3 hectares (2.5 – 7.5 acres)\(^4\).

3.2.1. TOTAL LAND SIZE

The household survey revealed that median land holdings of tree growers are around double those of other farmers – some six acres compared to just three acres for non-tree growers (Figure 7). However, this median remains close to the average landholding for Tanzania as a whole, and only one in ten tree growers had landholdings greater than 20 acres. Furthermore, low land prices and population densities in many parts of the Southern Highlands means that those classed as “medium” sized farmers under these definitions are unlikely to be particularly well-off.


3.2.2. Woodlots

The 2015 registration survey sought to further clarify issues around land usage. Tree growers on average dedicate some 42% of their land to forestry in the Southern Highlands, with this figure rising to more than half of the total land in areas with stronger tree growing traditions such as Mufindi and Njombe (Figure 8). The data revealed wide variety in the acreage dedicated to trees across districts, ranging from 1 acre in Mbeya, where land competition is particularly high, to 14 acres in the more sparsely populated Songea.

Pine (and particularly *Pinus Patula*) is the dominant species of the highlands, with the vast majority of tree growers cultivating at least some pine (Figure 9). Close to 100% of farmers registered in the 2014/15 season claimed to be growing pine in a number of districts.
This lack of diversity poses a number of threats, including vulnerability to pests and disease due to a lack of genetic diversity, but also a lack of product differentiation on the marketing side.

**Figure 9: Pine woodlots**

The picture is much more varied for eucalyptus, with only around a third of tree growers currently cultivating eucalyptus (Figure 10). Variation by district is also more pronounced than with pines, ranging from three quarters of growers cultivating eucalyptus in Busokelo, to almost no eucalyptus presence in Makete. Some of this variation can be explained by agro-climatic conditions, but much also depends on historic growing traditions and local familiarity with particular species.

**Figure 10: Eucalyptus woodlots**

Where eucalyptus is grown, the average acreage is typically lower than that of pines (above). This is likely due to the greater intensity of management (and associated expense) required to successfully raise eucalypts.
3.2.3. OTHER CROPS

Across the Southern Highlands, the dominant field crop is maize, with some 97% of tree growers citing it as their “primary crop” (Figure 11). Beans were cited as the “secondary crop” for almost three-quarters of tree growers, with potatoes also being significant. It is crucial to note this holistic view of small farmer activity – in most cases, tree growers are maize farmers first and foremost, with annual income streams and food security natural taking priority for the household. The success of small-scale forestry is therefore inextricably tied to agricultural productivity in most cases.

*Figure 11: Primary and secondary non-tree crop grown by tree farmers*

This said, agroforestry (the “taungya” system of directly intercropping trees and other crops) is rarely practiced at present, with around one in ten farmers implementing this approach (Figure 12). District variation is again prominent, with almost a quarter of farmers adopting the taungya system in Kilolo and Wanging’ombe, compared to a notable absence of intercropping in Makete and Busokelo.

*Figure 12: Farmers practicing agroforestry*
### 3.2.4. Unused Land

As landholdings increase in size, the percentage dedicated to intensively-cultivated field crops drops significantly (Figure 13).

*Figure 13: Average land use by farm size*

At the same time, the proportion dedicated to forestry – which requires less intensive cultivation – is slightly larger on larger plots. However, the share of unused land is most notably higher on larger farms – from just 6% of small farms recorded as ‘unused’, to over a quarter of large farms.

*Figure 14: Tree growers reporting unused land*

Almost three-quarters of all tree growers reported having at least some unused land (Figure 14). This again varies greatly by district, with close to 100% of farmers in Ludewa, Iringa Rural, Busokelo and Songea...
reporting at least some amount of unused land. In these more sparsely populated districts, the average area of unused land per farmer reached as high as 10 acres or more. This suggests potential for greater land use efficiency in certain areas, although further research is required to fully understand competing land uses, particularly from an environmental perspective (see “Limitations and areas for further research”, below).

Conversely, around Mbeya, only 15% of farmers reported having any amount of unused land. The role and future potential of forestry in areas of already high land competition requires further investigation.

Figure 15: Reasons for unused land

Of the three-quarters of farmers reporting unused land, around a quarter noted that this was fallow land intended for agriculture (Figure 15, also reflected in the land use breakdown in Figure 13, above). However, close to half said they were simply “undeveloped” as to how to use the land. A similar percentage also cited insufficient funds to invest as a reason for leaving land unproductive. Quality of land and availability of labour, on the other hand, did not appear to be major constraints.

Figure 16: Access to finance and unused land

Of the three-quarters of farmers reporting unused land, around a quarter noted that this was fallow land intended for agriculture (Figure 15, also reflected in the land use breakdown in Figure 13, above). However, close to half said they were simply “undeveloped” as to how to use the land. A similar percentage also cited insufficient funds to invest as a reason for leaving land unproductive. Quality of land and availability of labour, on the other hand, did not appear to be major constraints.
The degree to which a lack of funds to invest was cited as a reason for leaving land unused was much higher in some areas than others, ranging from just 2% of those with unused land in Wanging’ombe to 59% in Busokelo (Figure 16). Further research is required to unpick these results – differences across districts could be driven simply by income differentials, but could also indicate variation in access to financial services.

**Figure 17: Access to labour and unused land**

![Access to labour and unused land](image)

Whilst access to labour was not cited as a common problem, it was markedly more prevalent in some districts (Kilolo, Iringa Rural) than others (Figure 17).

### 3.2.5. LAND USE COMPETITION

The original household survey found that very few tree growers had ever converted woodlots to agricultural land, whereas conversion rates in the other direction (agriculture to forestry) were almost three times as high (Figure 18, Figure 19).

**Figure 18: Woodlots converted to agriculture**

![Woodlots converted to agriculture](image)
The precise dynamics behind these results are difficult to interpret from this data alone, although it is indicative of shifting land use patterns, and some degree of competition between forestry and agriculture.

Figure 19: Agriculture converted to woodlots

The notable shift towards forestry is consistent with the boom in new small-scale planting noted in Section 3.4, below. In Mbeya Rural – where land availability is notably limited – more than half of current tree growers have at some point converted agricultural land to forestry. However, in the districts most afflicted by food insecurity (Kilolo, Mufindi - Figure 4, above) have seen a notably higher conversion from woodlots to agriculture.

Limitations and areas for further research

- The shifting dynamics of land use competition touched upon here require further investigation in order to fully understand the implications of the rapid expansion of small-scale forestry on issues such as food security and the environment in the Southern Highlands.
- At the same time, areas with a greater degree of land availability could pose significant opportunities for further investment and expansion of commercial forestry.
- Access to finance in particular should be explored as a potential constraint to the development of small-scale forestry in Tanzania.

3.3. Silvicultural Practices

Key findings

- Most tree growers in the Southern Highlands are not practicing a basic set of good silvicultural practices at present. More advanced practices – such as mechanised land preparation, fertiliser use and appropriate thinning regimes – are rarely applied, even by larger growers.
- Moreover, the results presented in this section are thought to be positively skewed by bias in farmer responses, and are likely to be revised downwards following further fieldwork.
Fire is the greatest threat faced by tree growers at present, with around a third having personally experienced fire damage to their woodlots in the past.

Whilst pests and diseases have a limited impact at present, the current lack of genetic diversity puts the Southern Highlands at significant risk, especially given the apparent lack of effective response mechanisms.

The original household survey sought to establish a baseline for a range of silvicultural practices, against which the effectiveness of FDT’s Skills and Knowledge component would be assessed. Practices are divided into those relating to woodlot establishment (land preparation, spacing, planting, fertiliser use, etc.) and those relating to woodlot management (weeding, thinning, pruning, fire protection, disease and pest management).

It should be noted here that direct observation of woodlots was not carried out as part of the household survey. As such, enumerators had to rely upon the accounts of the farmers themselves, which is believed to have generated significant positive bias in the results summarised below. The MEL team is planning to re-examine the baseline scenario in the second half of 2015/16 using direct field observations to correct for any bias.

For an explanatory note on how FDT defines “good” and “best” silvicultural practices, see Annex 3.

3.3.1. WOODLOT ESTABLISHMENT

Almost two thirds of farmers claimed to do some form of land clearing prior to planting, whilst ploughing and burning were less common practices (Figure 20).

*Figure 20: Land preparation*

Only one in ten farmers hired equipment for mechanised land preparation. This figure falls to just 4% of small farmers.
Around three quarters of all farmers claimed to be using a deliberate spacing regime of either 3m x 3m, 2.5m x 2.5m or 2m x 2m, with 3m x 3m being the most common (Figure 22). The uniformity of spacing regimes is, however, subject to field inspection in order clarify these claims.

The accuracy of spacing regimes may be hindered (and the above claims therefore challenged) by the fact that the vast majority of farmers measure out spacing in terms of paces rather than in metres (Figure 23).
Finally, the use of inputs such as manure, fertiliser and lime is rare, particularly among smaller farmers (Figure 24). Subsequent fieldwork and discussions with farmers has revealed that the use of fertiliser on trees is a relatively unfamiliar concept to farmers of the Southern Highlands (even to those who regularly apply fertiliser to food crops).

Figure 24: Use of manure, fertiliser and lime

MANURE
- Yes: 16%
- No: 84%

FERTILISER
- Yes: 15%
- No: 85%

LIME
- Yes: 2%
- No: 98%

MANURE USE
- Small farmers: 10%
- Medium farmers: 18%
- Large farmers: 21%

FERTILISER USE
- Small farmers: 11%
- Medium farmers: 16%
- Large farmers: 20%

LIME USE
- Small farmers: 1%
- Medium farmers: 2%
- Large farmers: 3%

n=3,296
Source: FDT household survey (2014)

3.3.2. WOODLOT MANAGEMENT

With regards to woodlot management, significant numbers of farmers claim to be weeding and pruning (Figure 25). However, other field observations have raised reason to doubt these figures, which are believed to be significantly inflated by the positive bias inherent in the original survey design. Further fieldwork will seek to re-examine these figures.
However, even given the potential for positive bias in the survey, most farmers admitted to not practicing thinning in their woodlots.

For most of the metrics discussed above, large farmers are more likely to apply improved practices than small farmers. However, even amongst larger farmers, practices such as mechanised land preparation, fertiliser use and thinning are applied by the minority.

3.3.3. Disease, Pests and Animal Management

Fortunately, there are at present limited problems from disease and pests in the forests of the Southern Highlands. However, the limited genetic diversity and quality of plantations in Tanzania means that the country is extremely susceptible to diseases and pests arriving from other parts of the continent.

Around one in five farmers claimed to have suffered woodlot damage due to diseases, most of which are concentrated geographic incidences (Figure 26). In Kilolo, over a third of farmers claimed to have encountered problems, compared to just 5% in Makete. FDT is in the process of using ward and village-level data to trace and investigate localised incidence of disease - Figure 28 presents the incidence of disease by ward.

Of farmers claiming to have suffered losses from disease, 90% said that their response was to take “no action”. Just 4% applied chemicals to treat the disease, whilst the remainder reported the case to the authorities. These response figures suggest a worrying lack of preparedness in the event of more widespread disease outbreaks in the Southern Highlands in future.
Figure 26: Farmers experiencing woodlot damage from disease

The picture is very similar for insect attacks (Figure 27) – fortunately there have been limited problems to date except in concentrated geographic areas, but the response is overwhelmingly one of “no action”.

Figure 27: Farmers experiencing woodlot damage from insects

The ward-level incidence of insect damage is presented in Figure 29.
Figure 28: Percentage of tree growers suffering woodlot damage from diseases by ward
Figure 29: Percentage of tree growers suffering woodlot damage from insects by ward
Finally, animal damage (most likely from rodents or cattle) are similarly rare, although a more pro-active response is taken in many case, with some 41% of cases being reported to the authorities (Figure 30).

Figure 30: Farmers experiencing woodlot damage from animals

More work is required to better understand the specific pests and diseases afflicting the Highlands at present, as well as to understand current and potential future response mechanisms.

3.3.4. Fire

Fire is perhaps the primary risk to the tree growers of the Southern Highlands, with over a third have suffered personally from fire damage to their woodlots in the past (Figure 31).

Figure 31: Farmers suffering personally from fire damage in the past
Furthermore, the vast majority of farmers – some 83% - reported at least one incidence of forest fire in their village in the past five years (Figure 32).

**Figure 32: Farmers reporting a fire in their village in the last five years**

Despite these worrying frequency of forest fires, the overwhelming majority of farmers claim to be aware of village bylaws relating to the prevention of fires (Figure 33). More work is needed to understand current fire protection practices.

**Figure 33: Awareness of village fire bylaws**

3.3.5. “GOOD PRACTICES”

Following the definitions set out in Annex 3, Figure 34 provides a summary of the baseline level of farmers considered to be applying “good” practices at present – some 37% applying good establishment practices, 45% applying good management practices, and 19% applying both.

These figures must be heavily caveated at this stage. Firstly, as described above, the survey did not involve direct woodlot observation, and instead relied upon farmer accounts of their own practices, which is
subject to potential positive bias. Secondly, further work is required to understand the current practices relating to certain issues not covered by the household survey, such as fire protection. These estimates will be revised through additional fieldwork in the latter half of 2015/16.

**Limitations and areas for further research**

- Suspected positive bias in farmer responses is believed to have skewed the results on current practices. FDT will seek to verify these findings through direct woodlot observations in the latter half of 2015/16.
- More work is required to better understand the pests and diseases currently afflicting the Southern Highlands, as well as current and potential future response mechanisms.
- Further research is required to understand current practices relating to fire protection.

### 3.4. Harvesting

**Key findings**

- **Small-scale forestry is a fast-growing activity** in the Southern Highlands. Most growers have never harvested, and the current stock of pine and eucalyptus is, on average, relatively young, suggesting a boom in planting in the mid- to late-2000s.
- **Rotation lengths for both key species are falling** as a greater proportion of farmers harvest each year. *Supply from the current stock of small-scale woodlots is expected to peak in 2018-22.*
- **Premature harvesting due to unforeseen cash flow problems seems relatively rare**, with farmers across the Highlands instead deliberately opting for shorter rotation lengths in response to market forces.
The relatively recent boom in small-scale forestry in the Southern Highlands is illustrated in Figure 35, which shows that almost two-thirds of current tree growers have never previously harvested.

Figure 35: Farmers who have ever harvested previously

![Pie chart showing percentage of farmers who have harvested](image)

<table>
<thead>
<tr>
<th>DISTRICTS</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kilolo</td>
<td>42%</td>
</tr>
<tr>
<td>Njombe</td>
<td>42%</td>
</tr>
<tr>
<td>Rungwe</td>
<td>41%</td>
</tr>
<tr>
<td>Makete</td>
<td>41%</td>
</tr>
<tr>
<td>Busokelo</td>
<td>40%</td>
</tr>
<tr>
<td>Wangingombe</td>
<td>34%</td>
</tr>
<tr>
<td>Mufindi</td>
<td>31%</td>
</tr>
<tr>
<td>Mbeya Rural</td>
<td>28%</td>
</tr>
<tr>
<td>Ludewa</td>
<td>17%</td>
</tr>
</tbody>
</table>

n=3,296
Source: FDT household survey (2014)

The ratio is more pronounced in districts such as Ludewa, where only 17% of tree growers have ever harvested before.

The relative infancy of the small-scale forest industry is again highlighted in Figure 36, with the average ages of standing pine and eucalyptus being around four and six years respectively (as of 2014). As such, it can be expected that the bulk of small-scale production – including a lot of first-time harvesters - will come to market around 2018-22\(^5\).

\(^5\) Based upon average rotations of 10 years for eucalyptus and 12 years for pine (see Figure 38 and Figure 39, below).
Figure 36: Average ages of currently planted woodlots by species

<table>
<thead>
<tr>
<th>Species</th>
<th>DISTRICT AVERAGES</th>
<th>n=3,296</th>
</tr>
</thead>
<tbody>
<tr>
<td>PINE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Makete</td>
<td>4.7</td>
<td></td>
</tr>
<tr>
<td>Kilolo</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td>Njombe</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>Mufindi</td>
<td>3.7</td>
<td></td>
</tr>
<tr>
<td>Ludewa</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Wangingombe</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Rungwe</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>Busokelo</td>
<td>..</td>
<td></td>
</tr>
<tr>
<td>Mbeya Rural</td>
<td>..</td>
<td></td>
</tr>
<tr>
<td>EUCALYPTUS</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Rungwe</td>
<td>6.4</td>
<td></td>
</tr>
<tr>
<td>Njombe</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>Wangingombe</td>
<td>5.1</td>
<td></td>
</tr>
<tr>
<td>Mufindi</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td>Busokelo</td>
<td>..</td>
<td></td>
</tr>
<tr>
<td>Kilolo</td>
<td>..</td>
<td></td>
</tr>
<tr>
<td>Ludewa</td>
<td>..</td>
<td></td>
</tr>
<tr>
<td>Makete</td>
<td>..</td>
<td></td>
</tr>
<tr>
<td>Mbeya Rural</td>
<td>..</td>
<td></td>
</tr>
</tbody>
</table>

Note: Districts with fewer than 50 observations were omitted. Source: FDT household survey (2014)
Figure 37: Woodlot age and species by district
The spatial distribution of woodlots by age and species across the Southern Highlands is presented in Figure 37. With regards to species, pine is ubiquitous throughout the highlands, whilst eucalypts are concentrated in the central highlands, and cypress becomes an increasingly common species in the west around Mbeya.

In terms of age, relatively young woodlots are found across the project area, although average ages are higher in the core tree growing districts of Mufindi and Njombe Rural, as well as Makete and Mbeya Rural. Further south (Ludewa, Songea Rural) and east (Kilolo) show average ages of just 3-4 years in some cases.

This said, the amount of wood coming to market from small woodlots is already on the rise. Whereas 1% of tree growers harvested pine in 2008, this figure is expected to rise to 9% in 2015 (Figure 38).

Figure 38: Recent harvesting trends - pine

Figure 38 also presents findings on the average rotation lengths for pine, combining information from the 2014 household survey and 2015 farmer registration survey. Whereas the former asked farmers how old their woodlot was at last harvest (the orange line), the latter asked (different) farmers what their planned rotation lengths for pine were when planting in 2015. The two are roughly aligned, averaging around 12 years for pine.

However, rotation lengths appear to be falling slightly for pines, as a greater proportion of farmers harvest each year. This suggests a response to rising prices, although further market research is required to verify this.

The picture is similar for eucalyptus (Figure 39). The proportion of farmers selling is rising year-on-year, and rotation lengths are shortening slightly, currently at just over 10 years (with both surveys again being roughly in agreement on rotation lengths).
### 3.4.1. Premature Harvesting

When asked if they had ever been forced to harvest earlier than planned, only 7% of farmers said “yes” (Figure 40). This is of course subject to potential underestimation through response bias, but reveals interesting information on farmer perceptions of “early” harvesting – most farmers consider harvesting at any time up to year 7 (all species) as premature.

#### Figure 40: Farmers claiming to have harvested prematurely in the past

Of those harvesting prematurely, around half explained that this was to pay for school fees. Medical bills and “other family demands” were also common.
However, even taking into account the potential for bias in the responses here, it seems that instances of farmers being forced to harvest earlier than desired due to cash flow problems are relatively rare.

### Limitations and areas for further research
- More work is needed to fully understand the market dynamics driving these harvesting trends, as well as the volume, location, and quality of timber coming to market in the coming years from small woodlots. Research on these issues is currently being conducted under FDT’s Sector Insight component, through a combination of market research, remote sensing and spatial analysis.

### 3.5. ACCESS TO INFORMATION

#### Key findings
- **Very few tree growers have access to relevant information and training** at present. Government extension officers are currently the most common source of information, although they only reached around 5% of all growers in 2012-14, whilst district level coverage was very uneven.
- **Access to information is stronger around the key forest industry districts** of Mufindi and Njombe, suggesting a degree of spillover benefits to small growers.
- **Information on harvesting and markets is particularly scarce** for small growers.

When asked about access to information on silvicultural practices, only around a quarter of tree growers claimed to have access to “best practice information” (Figure 41). The district-level figures are significantly higher in the traditional tree-growing areas of Mufindi and Njombe, suggesting spillover benefits to small growers from the forest industry there.

The potential benefits in terms of access to information of connecting small growers to larger industry is an area to be further explored by FDT.

*Figure 41: Farmers accessing ‘best practice’ information*

<table>
<thead>
<tr>
<th>ALL FARMERS BY SIZE</th>
<th>ALL FARMERS BY DISTRICT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large farmers</td>
<td>Mufindi: 31%</td>
</tr>
<tr>
<td>Medium farmers</td>
<td>Njombe: 28%</td>
</tr>
<tr>
<td>All farmers</td>
<td>Ludewa: 27%</td>
</tr>
<tr>
<td>Small farmers</td>
<td>Kilolo: 27%</td>
</tr>
<tr>
<td></td>
<td>Makete: 26%</td>
</tr>
<tr>
<td></td>
<td>Rungwe: 24%</td>
</tr>
<tr>
<td></td>
<td>Mbeya Rural: 23%</td>
</tr>
<tr>
<td></td>
<td>Wangingombe: 20%</td>
</tr>
<tr>
<td></td>
<td>Busokelo: 18%</td>
</tr>
</tbody>
</table>

n=3,296
Source: FDT household survey (2014)
When asked about access to information on specific practices, the spread of responses is much wider, with around half of all tree growers claiming to be able to access information on fire control, compared to around one in ten farmers having access to information on pest management (Figure 42). Information on harvesting and marketing is also notably scarce.

**Figure 42: Access to and receipt of information on specific practices**

<table>
<thead>
<tr>
<th>Practice</th>
<th>Information Available</th>
<th>Training Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire control</td>
<td>23%</td>
<td>50%</td>
</tr>
<tr>
<td>Spacing</td>
<td>22%</td>
<td>54%</td>
</tr>
<tr>
<td>Pruning</td>
<td>19%</td>
<td>49%</td>
</tr>
<tr>
<td>Weed control</td>
<td>16%</td>
<td>36%</td>
</tr>
<tr>
<td>Nursery...</td>
<td>15%</td>
<td>32%</td>
</tr>
<tr>
<td>Farm sanitation</td>
<td>14%</td>
<td>29%</td>
</tr>
<tr>
<td>Harvesting</td>
<td>12%</td>
<td>27%</td>
</tr>
<tr>
<td>Marketing</td>
<td>7%</td>
<td>15%</td>
</tr>
<tr>
<td>Fertiliser</td>
<td>3%</td>
<td>8%</td>
</tr>
<tr>
<td>Pest management</td>
<td>3%</td>
<td>9%</td>
</tr>
</tbody>
</table>

![Figure 42](source: FDT household survey (2014))

Figure 42 also shows a significant difference between the proportion of farmers who claim that information is available on a given practice on the one hand, and the proportion who have actually received training on the other – the latter cohort is typically less than half the size of the former.

**Figure 43: Farmers having received training in past two years**

![Figure 43](source: FDT household survey (2014))
This lack of access to training is emphasised in Figure 43, which shows that just one in ten farmers received training of any kind in the past two years. Of these, training was delivered through government extension officers in almost half of cases – suggesting that government extension officers are only reaching around 5% of all tree growers in a two-year period. Other sources of training included NGOs and the private sector.

Once again, significant district-level disparities are observed, with one in five farmers having received training in Mufindi in the past two years, compared to just one in twenty in Busokelo and Rungwe.

Figure 44: Farmers claiming availability of extension officers

On government extension officers, just one in ten farmers claimed that extension officers were “available” in their locality (Figure 44). Of these, around a third “rarely” visited, whilst over half visited just once or twice per year. Availability of government extension officers is unevenly spread across districts, with only 2% of growers in Busokelo noting availability of extension officers, compared to almost a quarter of growers in Kilolo.

Limitations and areas for further research

- Further research is required to understand the effectiveness of different information sources, and in particular the spillover effects of interaction with (or simply proximity to) larger forest industry.

### 3.6. Energy

#### Key findings

- At the village level, firewood remains by far the most prevalent source of energy, with the vast majority of farmers collecting it freely from local woodlots and indigenous forest.
At its inception, FDT originally had goals relating to bioenergy markets. Whilst these have been put on hold whilst other intervention areas take priority, the Trust intends to continue scoping this area for potential future intervention.

Almost all farmers use firewood as a fuel source, with charcoal being used by some 14% of respondents (Figure 45). Electricity and gas remains extremely rare in the villages, although solar power is of increasing relevance.

Only a third of farmers claimed that they sourced firewood from natural forests, although this figure is likely to be understated due to a reluctance to admit to harvesting from natural forest. The remainder of respondents claimed to source firewood from their own woodlots, or those of other local farmers. Fewer than one in ten farmers are currently paying for firewood, suggesting that at the village level it will be some time before bioenergy markets formalise and present investment opportunities.

**Figure 45: Sources of energy used**

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewood</td>
<td>98%</td>
</tr>
<tr>
<td>Charcoal</td>
<td>14%</td>
</tr>
<tr>
<td>Solar</td>
<td>8%</td>
</tr>
<tr>
<td>Electricity</td>
<td>4%</td>
</tr>
</tbody>
</table>

**Source:** FDT household survey (2014)

On the issue of charcoal production, most farmers claimed to prefer wattle as the input wood, with eucalyptus being preferred by around a quarter of farmers (Figure 46). However, the role of indigenous forests in charcoal production may have been underestimated for the same reasons as outlined above.

**Figure 46: Preferred species for charcoal production**

- **Wattle:** 59%
- **Eucalyptus:** 24%
- **Indigenous:** 7%
- **Other:** 9%
- **Grevillea:** 1%

**Source:** FDT household survey (2014)
Limitations and areas for further research

- A significant amount of further work is required to fully understand bioenergy markets in Tanzania, as well as the potential implications for the conservation of indigenous forest, if this intervention area is to be pursued.

3.7. Tree Growers Associations

Key findings

- Around a quarter of tree growers are currently members of Tree Growers Associations (TGAs), with the main perceived benefits being access to training and credit.
- Very few TGAs appear to offer benefits around collective marketing, and the majority are not linked to financial institutions.

Around a quarter of all tree-growers claimed to currently be members of Tree Growers Associations (TGAs), with significant variation in membership observed across the districts (Figure 47).

Figure 47: Tree Grower Association membership

<table>
<thead>
<tr>
<th>OVERALL</th>
<th>DISTRICTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Ludewa 32%</td>
</tr>
<tr>
<td></td>
<td>Rungwe 29%</td>
</tr>
<tr>
<td></td>
<td>Busokelo 27%</td>
</tr>
<tr>
<td></td>
<td>Njombe 27%</td>
</tr>
<tr>
<td></td>
<td>Makete 25%</td>
</tr>
<tr>
<td></td>
<td>Mufindi 24%</td>
</tr>
<tr>
<td></td>
<td>Wangingombe 23%</td>
</tr>
<tr>
<td></td>
<td>Kilolo 22%</td>
</tr>
<tr>
<td></td>
<td>Mbeya Rural 13%</td>
</tr>
<tr>
<td>No</td>
<td>74%</td>
</tr>
</tbody>
</table>

n=3,296
Source: FDT household survey (2014)

Current members of TGAs claimed the primary benefits to be access to training and credit (Figure 48). As with the issue of information access (above), marketing came low on the list, with fewer than one in ten TGA members claiming it to be a benefit of membership at present.
When those not currently part of TGAs were asked for reasons for non-membership, common answers included the absence of a local TGA, a lack of perceived benefits, and excessive membership conditions (Figure 49).

Of existing TGAs, female membership is reasonably strong (Figure 50), and appears disproportionate to the gender split of foresters noted earlier.
Figure 50: Female membership of TGAs

Finally, only around a quarter of respondents claimed that their TGA had links to financial institutions such as banks or savings and credit cooperatives (SACCOs) (Figure 51).

Figure 51: TGAs with links to financial institutions

Limitations and areas for further research

- Further work is required to understand how TGAs currently provide credit and training - the two most commonly perceived benefits - to their members.
- The potential power of TGAs to provide other services and take an expanded role in the market should be explored.
3.8. CONSTRAINTS

Key findings
- Lack of access to finance is by far the main constraint noted by tree growers, followed by fire risk and lack of access to improved seed.

Lack of access to finance was highlighted by almost half of all growers as the primary constraint that they faced (Figure 52). Fire risk and lack of access to quality planting material were other significant constraints.

**Figure 52: Primary constraint faced by tree growers**

FDT interventions are currently targeting a range of key constraint areas, including fire risk management, improved access to seeds and training, and access to market information.

Limitations and areas for further research
- More work is required to unpack the access to finance issue – what exactly are the financial needs of small-scale foresters, and why is the market not currently serving these needs? Is there scope for intervention in this area?
4. CONCLUSIONS

This report set out the findings of the two major tree grower surveys conducted by FDT to date, which have served to guide internal strategy and form a baseline for the Trust’s results framework.

Follow-up work is already underway on a number of issues raised in this report, particularly with regards to the design of FDT’s training efforts in the Southern Highlands.

FDT hopes to continue to collaborate with partners and share research findings going forwards.
TANZANIA FORESTRY DEVELOPMENT TRUST (TFDT), is implementing its Forestry Development Program to catalyze the growth of forestry and wood product markets in Tanzania. The five-year Phase I program seeks to reach over 30,000 smallholder tree grower farmers in the Southern Highlands region of Tanzania with training to expand smallholder tree planting, to raise net income to tree growers, to increase the production of higher value wood products and energy from sustainable sources and to ensure sustainable quality services by sector institutions. The purpose of this questionnaire is to provide information with which to determine the key constraints to tree growers and assess the Program’s performance and effectiveness during implementation and after the program is completed. All information will remain confidential and will only be used for constructive purposes towards the achievement of the program goal.

We humbly thank you in advance for all your cooperation and we ask for your participation consent.

- Name of interviewer (Text)
- Date
- Start time (Numeric – in 24hrs)
- Region (Text)
- District (Text)
- Ward (Text)
- Village (text)
- Home GPS coordinates (1. Longitude____; Latitude ____; accuracy_______)
- Altitude (Numeric)

Alerting questions

i. Was the GPS point taken at the household or the interview site? (1. Household, 2. Interview site)
ii. Do you plant trees? (1. Yes, 2. No)
iii. Did the tree planter agree to the interview? (1. Yes, 2. No)

1.0 General information about the respondent

1.1 Name of the respondent (Text – at least two names)
1.2 Age of respondent (Numeric)
1.3 Telephone number (Numeric)
1.4 Gender of respondent (1. Male; 2. Female)
1.6 How many household members are adults (18 years and above) – (Numeric)
1.7 How many household members are below 18 years old (Numeric)
1.9 Education level of respondent 1. Adult literacy; 2. Primary school; 3. O’ level secondary; 4. A ‘level secondary school; 5. College or University; 6. None
1.10 Religion of respondent 1. Muslim 2. Christian 3. Other (good to specify ____________)
1.11 Are you a native of this village? (1. Yes 2. No)
1.12 If no, when did you move into this village (1. Within 5 years ago 2. Between 5 -15 years ago; 3. Within 15 – 30 years ago; 4. Above 30 years ago)

2.0 Land and woodlot information

2.1 Land ownership and usage

Now I will ask you some questions on land ownership and usage. This part is important for you because .................

2.1.1 What is the total amount of land that you own? (This is the total amount of land NOT JUST TREES). (Numeric)
2.1.2 How much of your land is planted with trees? (Acres)
2.1.3 How much of this land is used for agricultural crops? (Acres)
2.1.4 How much of your land is not under any use? (Acres)
2.1.5 A confirmation question about land ownership and usage
   1. Total land= _________
   2. Land used for trees= _______
   3. Land used for crops= _______
   4. Land not being used= _______
   5. This means there is= _______
   6. Confirm that the information above is correct 1. Yes, 2. No

2.1.6 How was your land acquired? 1. Bought it; 2. Inherited 3. Given to me by the village Government; 4. Leased; 5. Share Cropping; 6. Don’t know; 7. Other (good to specify ______________)

2.2 Tree woodlots

Now I will ask you some questions on your woodlots. It is important for you and the program because this is one of the areas we will be working together to improve

2.2.1 Why did you decide to plant trees? Please list all reasons 1. Land protection; 2. Income generation; 3. Environmental reasons; 4. Other people are doing it; 5. Tree planting campaigns; 6. Seen people benefiting from a course; 7. Other (good to specify __________________)

2.2.2 How many woodlots do you own? Give a name to woodlots For instance, Woodlot 1, woodlot 2, woodlot 3 etc.
2.2.3 What is the size of each woodlot? Woodlot 1 ____, Woodlot 2 ____, Woodlot 3 ____, Woodlot 4 ____, Woodlot 5 ____, Woodlot 6 ____, Woodlot 7 ____ (all numeric)

2.2.4 What types of trees have you planted in woodlot 1 ____, woodlot 2 ____, woodlot 3 ____, woodlot 4 ____, woodlot 5 ____, woodlot 6 ____, woodlot 7 ____? - 1. Pine; 2. Eucalyptus (Mlingoti); 3. Cyprus; 4. Wattle; 5. Grevillea; 6. Other (good to specify _____________)

2.2.5 What is the age of trees in woodlot 1 ____, woodlot 2 ____, woodlot 3 ____, woodlot 4 ____, woodlot 5 ____, woodlot 6 ____, woodlot 7 ____? (Years)

2.2.6 How much time do you take to travel to woodlot 1 ____, woodlot 2 ____, woodlot 3 ____, woodlot 4 ____, woodlot 5 ____, woodlot 6 ____, woodlot 7 ____? (Minutes)

2.3 Woodlot establishment (Production of seedlings)

2.3.1 Do you own a tree nursery? (1. Yes; 2. No)

2.3.2 If yes, where do you source your tree seeds? (1. Collected on my own; 2. Bought seeds from local farmers; 3. Bought from seed agencies/companies (good to specify _____________); 4. Government; 5. NGOs (good to specify ________); 6. Other (good to specify _____________)

2.3.3 How easy is it to obtain tree seeds? 1. Very easy; 2. Easy; 3. Somehow difficult; 4. Very difficult

2.3.4 What is the source of seedlings planted in your woodlots? 1. from my won nursery; 2. Bought; 3. Produced collectively; 4. Relatives; 5. Given for free; 6. Other (good to specify _____________)

2.3.5 How many seedlings did you produce last year? (numeric)

2.3.6 Did you sell any of the seedlings? (1. Yes; 2. No)

2.3.7 If yes, how many seedlings did you sell? _______ (Numeric)

2.3.8 How much were seedlings sold for? (price per seedling – in Tshs) _____________

2.4 Woodlot establishment (Planting)


2.4.2 How do you plant trees in your farm? 1. in rows 2. At random

2.4.3 If in rows, what is the average spacing between trees? 1. 2X2; 2. 2.5 X 2.5; 3. 3X3; 4. Other (good to specify _____________); 5. Random; 6. Don’t know

2.4.4 Which unit of measurement do you use? 1. Meters; 2. Paces

2.4.5 Do you plant trees and agricultural crops in the same woodlot? 1. Yes; 2. No
2.4.6 If yes why? 1. Ease of weeding; 2. Food security; 3. Better tree growth; 4. Other (good to specify ______________) 

2.4.7 Which crops do you plant together with trees? 1. Leguminous; 2. Cereals; 3. Legume and cereals; 4. Other crops (good to specify ______________) 

2.4.8 Have you ever converted a woodlot into an agricultural land? 1. Yes; 2. No 

2.4.9 If yes why? 1. Productivity reasons, 2. Land scarcity, 3. Difficult to manage woodlot, 4. Legal/ bylaws reasons; 5. I simply decided so, 6. Other 

2.4.10 Have you ever converted agricultural land into a woodlot? 

2.4.11 If yes why? 1. Soil fertility reasons; 2. Land protection reasons; 3. Economic reasons; 4. I simply decided to; 5. Other 

2.4.12 Do you hire equipment for land preparation? 1. Yes; 2. No 

2.4.13 If yes, what equipment? (Mention – text) 

2.4.14 How do you transport seedlings to planting site? 1. Manually 2. Mechanically 

2.4.15 Do you use any of the following for soil improvement? 

2.4.15.1 Manure? (1. Yes; 2. No) 
2.4.15.2 Fertilizer? (1. Yes; 2. No) 
2.4.15.3 Lime? (1. Yes; 2. No) 

2.4.16 Please summarize the cost of the following inputs per acre over the last year: 

2.4.16.1 Land clearing (Tsh per acre spent in 2013- write 88 if activity never carried out) ______________

2.4.16.2 Digging holes (Tsh per acre spent in 2013- write 88 if activity never carried out) ______________

2.4.16.3 Seedling transport (Tsh per acre spent in 2013- write 88 if activity never carried out) ______________

2.4.16.4 Equipment rental (Tsh per acre spent in 2013- write 88 if activity never carried out) ______________

2.4.16.5 Cost of manure (Tsh per acre spent in 2013- write 88 if activity never carried out) ______________

2.4.16.6 Cost of fertilizer (Numeric) (Tsh per acre spent in 2013- write 88 if activity never carried out) ______________

2.4.16.7 Labor for applying manure or fertilizer (Tsh per acre spent in 2013- write 88 if activity never carried out) ______________

2.4.16.8 Planting costs (Tsh per acre spent in 2013- write 88 if activity never carried out) ______________

2.5 Woodlot Management 

2.5.1 Do you weed your woodlot? 1. Yes; 2. No 

2.5.2 If yes, how many times have you weeded your woodlot in the last 2 years? (Numeric)______
2.5.3 How did you do the weeding? 1. Chemical; 2. Spot weeding; 3. Line weeding; 4. 100% weeding
2.5.4 Do you carry out pruning on your trees? 1. Yes; 2. No
2.5.5 If yes, how often do you prune your farm in a year? 1. Once per year; 2. Twice per year; 3. As much as needed
2.5.6 Do you thin your woodlots? 1. Yes; 2. No
2.5.7 If yes, how often do you thin your woodlot? 1. Once per year; 2. Twice per year; 3. As much as needed

2.6 Woodlot Protection
2.6.1 Were there any wild fires in your village in the last 5 years? 1. Yes; 2. No
2.6.2 How many wild fires were there in your village last year? ______
2.6.3 Have you experienced fire damage in your woodlots? 1. Yes; 2. No
2.6.4 What was the cause of the fire? 1. Land preparation; 2. Local beliefs; 3. Clearing woodland for agriculture; 4. Unknown; 5. Other (good to specify ____________)
2.6.5 How do you rate the wild fire problem in your village? 1. High, 2. Low; 3. Very low, 4. No fire problem at all
2.6.6 Do you know of any Government or village by-laws that control wild fires? 1. Yes; 2. No
2.6.7 Have you experienced any attack on your woodlots by:
   2.6.7.1 Animals? 1. Yes, 2. No
   2.6.7.2 Insects? 1. Yes, 2. No
   2.6.7.3 Diseases? 1. Yes, 2. No
2.6.8 If yes, what action did you take?
   2.6.8.1 Animals 1. No action, 2. Applied chemicals, 3. Reported to authorities
   2.6.8.2 Insects 1. No action, 2. Applied chemicals, 3. Reported to authorities
   2.6.8.3 Disease 1. No action, 2. Applied chemicals, 3. Reported to authorities

3.0 Harvesting of products from woodlots
3.1 Have you ever harvested wood from your woodlots? 1. Yes, 2. No
3.2 How many years ago did you last carry out harvesting from any of your woodlots? (In years) ______
3.3 How old was the harvested woodlot? (In years) ______
3.4 Which species were harvested? 1. Pine; 2. Eucalyptus (Mlingoti); 3. Cyprus; 4. Wattle; 5. Grevilllea; 6. Other (good to specify ____________)
3.5 How did you identify the person to whom you sold the wood? 1. through a colleague; 2. Through a middle man; 3. They just came asking; 4. Other
3.7 Have you ever sold young woodlots? 1. Yes; 2. No
3.8 If yes, what age was the woodlot? (Years) ______
3.9 Why did you sell the woodlot at this age? 1. for school fees; 2. Medical reasons; 3. House construction; 4. Other family demands

4.0 Household incomes

4.1 Income from woodlots

4.1.1 Which of the following products did you sell in 2013 (write 88 if the interviewee will not answer)?

4.1.1.1 Transmission polls
   4.1.1.1.1 Number of transmission polls sold ______
   4.1.1.1.2 Price per transmission poll ______

4.1.1.2 Sawn wood
   4.1.1.2.1 Pieces of sawn wood/timber sold ______
   4.1.1.2.2 Price per sawn wood/timber piece ______

4.1.1.3 Scaffolding
   4.1.1.3.1 Pieces of scarf folding sold ______
   4.1.1.3.2 Price per scarf folding piece ______

4.1.1.4 Building poles
   4.1.1.4.1 Number of building poles sold ______
   4.1.1.4.2 Price of a single building pole ______

4.1.1.5 Fencing poles
   4.1.1.5.1 Number of fencing poles sold ______
   4.1.1.5.2 Price of a single fencing pole ______

4.1.1.6 Standing trees
   4.1.1.6.1

4.1.1.7 Fuel wood:
   4.1.1.7.1 Unit measure? 1. Headload; 2. Tonnes
   4.1.1.7.2 Number of fuel wood unit sold ______
   4.1.1.7.3 Price per fuel wood unit ______

4.1.1.8 Charcoal
   4.1.1.8.1 Bags of charcoal sold ______
   4.1.1.8.2 Price per charcoal bag ______

4.2 Income from livestock

4.2.1 What was your income in 2013 from the following livestock if you sold any in Tshs (write 88 if the interviewee will not answer)?

4.2.1.1 Cows ______
4.2.1.2 Goats ______
4.2.1.3 Chickens ______
4.2.1.4 Pigs ______
4.2.1.5 Sheep ______

4.2.2 Do you keep any other livestock for income generation? 1. Yes; 2. No
4.2.3 If yes, what other animals do you keep to generate income? ________________

4.3 Income from agricultural crops
4.3.1 Which of the following crops did you grow and sell in 2013 in Tshs (write 88 if the interviewee will not answer)?
4.3.1.1 Maize __________
4.3.1.2 Beans __________
4.3.1.3 Banana __________
4.3.1.4 Sweet potatoes __________
4.3.1.5 Irish potatoes __________
4.3.1.6 Cabbages __________
4.3.1.7 Tomatoes __________
4.3.1.8 Onions __________
4.3.1.9 Vegetables __________
4.3.1.10 Mangoes __________
4.3.1.11 Avocado __________
4.3.1.12 Cassava __________
4.3.1.13 Peas __________
4.3.1.14 Other 1
4.3.1.14.1 Name of the other crop __________
4.3.1.14.2 Income of the crop __________
4.3.1.15 Other 2
4.3.1.15.1 Name of the other crop __________
4.3.1.15.2 Income of the crop __________
4.3.1.16 Other 3
4.3.1.16.1 Name of the other crop __________
4.3.1.16.2 Income of the crop __________
4.3.1.17 Other 4
4.3.1.17.1 Name of the crop __________
4.3.1.17.2 Income of the crop __________
4.3.1.18 Other 5
4.3.1.18.1 Name of the crop __________
4.3.1.18.2 Income of the crop __________

4.3.2 Do you grow any other crops for income generation? 1. Yes; 2. No
4.3.3 What other crops do you keep to generate income? ________________

4.4 Income from non-agricultural activities
4.4.1 Could you also provide information from your non-agricultural incomes over the last 30 days in Tshs, if any (write 88 if the interviewee will not respond)
4.4.1.1 Pension/salary/wages __________
4.4.1.2 Remittances __________
4.4.1.3 Business __________
4.4.1.4 Others __________

4.5 Household expenditure
4.5.1 Did you purchase any of the following items in the last 12 Months?
   4.5.1.1 TV (1. Yes; 2. No)
   4.5.1.2 Radio (1. Yes; 2. No)
   4.5.1.3 Mobile phone (1. Yes; 2. No)
   4.5.1.4 Plough (1. Yes; 2. No)
   4.5.1.5 Bicycle (1. Yes; 2. No)
   4.5.1.6 Motor cycle (1. Yes; 2. No)
   4.5.1.7 Wheelbarrow (1. Yes; 2. No)
   4.5.1.8 Pruning (1. Yes; 2. No)
   4.5.1.9 Residential building (1. Yes; 2. No)

4.5.2 Did you purchase any of the following services in the last 12 Months?
   4.5.2.1 Medical fees (1. Yes; 2. No)
   4.5.2.2 Transportation (1. Yes; 2. No)
   4.5.2.3 Education/School fees (1. Yes; 2. No)

4.6 Household income management and food security
4.6.1 Who is responsible for selling Forestry products in the family? 1. Husband; 2. Wife;
   3. Both; 4. All
4.6.2 Who makes decision about what is done with household income? 1. Husband; 2.
   Wife; 3. Both; 4. All
4.6.3 Last year, how many months did you face limited food availability (Numeric)?
   __________
4.6.4 What strategy do you use to mitigate this situation? 1. Reduced number of meals; 2.
   Reduced portion size; 3. Reduced the quality of food consumed in favor of children;
   4. Received food subsidy; 5. Sold some trees; 6. Other; 7. None

5.0 Access to information
5.1 In the last 2 years, have you received any training on tree production? (1. Yes; 2. No)
5.2 If yes, who was the main training provider? 1. Government ext. officer; 2. NGO (Good to
   specify__________); 3. Private company; 4. Other
5.3 Have you ever received any of the following trainings?
   5.3.1 Nursery management (1. Yes; 2. No)
   5.3.2 Tree planting and spacing (1. Yes; 2. No)
   5.3.3 Pruning (1. Yes; 2. No)
   5.3.4 Pest management (1. Yes; 2. No)
   5.3.5 Weed control (1. Yes; 2. No)
5.3.6 Use of fertilizers (1. Yes; 2. No)
5.3.7 Farm sanitation (1. Yes; 2. No)
5.3.8 Harvesting (1. Yes; 2. No)
5.3.9 Fire control (1. Yes; 2. No)
5.3.10 Marketing (1. Yes; 2. No)

5.4 Do you have access to any of the following trainings?
5.4.1 Nursery management (1. Yes; 2. No)
5.4.2 Tree planting and spacing (1. Yes; 2. No)
5.4.3 Pruning (1. Yes; 2. No)
5.4.4 Pest management (1. Yes; 2. No)
5.4.5 Weed control (1. Yes; 2. No)
5.4.6 Use of fertilizers (1. Yes; 2. No)
5.4.7 Farm sanitation (1. Yes; 2. No)
5.4.8 Harvesting (1. Yes; 2. No)
5.4.9 Fire control (1. Yes; 2. No)
5.4.10 Marketing (1. Yes; 2. No)

5.5 Is there any Forestry extension officer who provides you technical services on tree farming? (1. Yes; 2. No)
5.6 How often does he/she come to assist or advise you? (1. Once a year; 2. Twice a year; 3. Almost every Month; 4. Rarely; 5. Not at all ;)
5.7 Do you have access to information materials on tree growing best practices? (1. Yes; 2. No)
5.8 What is the best source of information on tree growing best practices? (1. Radio; 2. Government extension agents; 3. NGOs; 4. Relatives or friends; 5. Buyer; 6. Mobile phone services; 7. TV)

6.0 Bioenergy
6.2 What is the source of firewood and charcoal in your village? (1. Own farm; 2. Natural forest; 3. Other colleague’s farms; 4. None)
6.3 Have you heard or attended any sustainable Bio-energy campaigns? (1. Yes; 2. No)
6.4 What kind of trees are the best for making charcoal? (1. Eucalyptus (Mlingoti); 2. Wattle; 3. Grevillea; 4. Indigenous trees e.g. Brachystegia)
6.5 What do you do with the left overs after harvesting the trees? Especially eucalyptus? (1. Convert to charcoal; 2. Leave to rot; 3. Use as firewood; 4. Sell it; 5. Transport material/boxes; 6. Other
6.6 If natural forests e.g. Brachystegia is not available, what trees would you use to make charcoal? (1. Eucalyptus; 2. Wattle; 3. Grevillea)

7.0 Membership in farmer organization
7.1 Are you a member of any farmer organization? (1. Yes; 2. No)
7.2 If not, why don’t you belong to any? (1. I don’t see any benefit; 2. There is no any farmers organization in my village; 3. I do not know)
7.3 If yes, how do you benefit? (1. Access to input; 2. Access to training; 3. Access to credit; 4. Assistance in marketing; 5. Assistance in social issues; 6. Sharing of resources)
7.4 What is the name of your organization? (Text) __________
7.5 What activities does your group engage in? (1. Trees; 2. Crops; 3. Livestock; 4. Saving and credit; 5. Community support; 6. Other)
7.6 How many members does your organization have? (Numeric) ______
7.7 What proportion of members are women? (1. Less than 25%; 2. Between 25-50%; 3. 50%; 4. Above 50%; 5. I don’t know)
7.8 How do you rate the strength of your organization? (1. Weak; 2. Strong; 3. Very strong)
7.9 Does your group have a relationship with any financial institution? (1. Yes; 2. No)
7.10 Which financial institution does your group have relationship with? (1. Commercial bank; 2. SACCOS; 3. Other)

8.0 Constraints to tree farming
8.1 Do you consider the followings constraints to tree farming?
 8.1.1 Expansion of your farm (1. Yes; 2. No)
 8.1.2 Accessing planting materials (1. Yes; 2. No)
 8.1.3 Accessing organic fertilizers (1. Yes; 2. No)
 8.1.4 Accessing chemical fertilizers (1. Yes; 2. No)
 8.1.5 Pruning (1. Yes; 2. No)
 8.1.6 Accessing chemical pesticides (1. Yes; 2. No)
 8.1.7 Accessing farm equipment (1. Yes; 2. No)
 8.1.8 Getting hired labor (1. Yes; 2. No)
 8.1.9 Weeding (1. Yes; 2. No)
 8.1.10 Farm record keeping (1. Yes; 2. No)
 8.1.11 Accessing markets (1. Yes; 2. No)
 8.1.12 Accessing trainings (1. Yes; 2. No)
 8.1.13 Accessing loans (1. Yes; 2. No)

End time (numeric – in 24 hours format) __________
ANNEX 2: REGISTRATION SURVEY (2015)

Tree Growers Registration for Community Agents

- Name of interviewer _______________________(text)
- Village name ______________________(text)
- Where is the interview taking place?
  (a) Farmer’s household
  (b) Farmer’s woodplot
  (c) Other (specify) ______

1. General information
   1.1. Name of respondent ______________________(text)
   1.2. Gender (a) Male  (b) Female
   1.3. Age of respondent ________ (numeric)
   1.4. Telephone number ________________________(numeric)

2. Current land use
   2.1. What is the total amount of land that you own? _______ (acres)

   2.2. How much of your land is planted with trees? _______ (acres)
      If >0:
      2.2.1. Please specify how much of each species:
             (a) Pine _____ (acres)
             (b) Eucalyptus _____ (acres)
             (c) Other (please specify) ____ (acres)

   2.3. How much of your land is used for agricultural crops? _______ (acres)

   2.4. How much of your land is not under any use? _______ (acres)
      If >0:
      2.4.1. Why is the aforementioned land currently unused?
             (a) Fallow land (not intended for forestry)
             (b) Fallow land (undecided future use)
(c) Land of insufficient quality for cultivation
(d) Insufficient funds to invest in the land
(e) Insufficient labour to work the land

3. New planting

3.1. Are you planning to plant any new trees this season? (a) Yes (b) No

If yes:

3.1.1. How many acres do you plan to plant of the following species:

(a) Pine ______ (acres)

If >0:

a. Where do you plan to source your seedlings from?
   i. Raised own seedlings
   ii. Local nursery (please specify ________)

b. How long do you intend to grow the trees for before harvesting?
   _____ (years)

(b) Eucalyptus ______ (acres)

If >0:

a. Where do you plan to source your seedlings from?
   i. Raised own seedlings
   ii. Local nursery (please specify ________)

b. How long do you intend to grow the trees for before harvesting?
   _____ (years)

(c) Other (please specify) ______ (acres)

If >0:

a. Where do you plan to source your seedlings from?
   i. Raised own seedlings
   ii. Local nursery (please specify ________)

b. How long do you intend to grow the trees for before harvesting?
   _____ (years)

4. Harvesting and selling

4.1. Do you intend to harvest and sell any of your trees in the next:
(a) Year (yes/no)

If yes:

4.1.1. Which species? (pine/eucalyptus/other [please specify])

4.1.2. Why will you sell in the coming year?

*NOTE: Do not show the farmer the options – select anything that the farmer mentions.*

a. The trees are the right age for harvesting

   If yes:
   
   Please note the estimated age of these trees: ______ (years)

b. The market price is high at the moment

c. Money needed urgently for a specific use (e.g. medical or school bills)

(b) 2-4 years (yes/no)

If yes:

4.1.3. Which species? (pine/eucalyptus/other [please specify])

5. Constraints and information requirements

5.1. What are the main difficulties that you face as a tree grower? Issues could relate to forest planning, establishment, management, protection, harvesting, sales etc. *Select up to three main constraints.*

(a) Lack of access to finance

(b) Lack of access to improved seeds

(c) Lack of information/training on best practices

(d) Lack of information on markets/prices

(e) Lack of land

(f) Risk of fire

(g) Poor relationship with buyers / receiving ‘unfair’ prices

(h) Other (please specify)

Thank you for participating in this survey. Your inputs help us to design better products and services for tree farmers across the Southern Highlands, and we look forward to working with you in future.
ANNEX 3: GUIDANCE NOTE ON ADOPTION OF IMPROVED SILVICULTURAL PRACTICES

The following note is intended to clarify the definitions used by FDT when assessing farmer adoption of improved silvicultural practices. Due to the wide range of practices promoted, distinction is made between “good” and “best” practices.

Whilst the “best practices” set out below are considered optimum silvicultural standards (in accordance with FDT’s Forest Plantation and Woodlot Management Guidelines, produced in collaboration with Sokoine University of Agriculture), they may not be relevant or feasible to all growers. This could be due to a lack of access to finance, or markets not currently rewarding optimal practices, or a host of other reasons.

As such, a set of “good practices” are defined that specify an acceptable standard for small-scale forestry, and one which should see improved returns to many existing tree growers if they were to adopt this level of silviculture.

DEFINITIONS

The following definitions have been developed in accordance with FDT’s Forest Plantation and Woodlot Management Guidelines. The definitions also take into account PFP’s Tree Growing Incentive Scheme milestones, which should allow for comparability of the effectiveness of the respective programmes’ interventions.

Table 1: Guidance on “good” and “best” practice definitions

<table>
<thead>
<tr>
<th>Establishment</th>
<th>“Good” Definition</th>
<th>“Best” Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Site selection:</td>
<td>Good practices,</td>
</tr>
<tr>
<td></td>
<td>Appropriate site</td>
<td>plus:</td>
</tr>
<tr>
<td></td>
<td>selection for the</td>
<td>• Land preparation: Mechanical land</td>
</tr>
<tr>
<td></td>
<td>given species.</td>
<td>• Planting:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Application of fertiliser at planting.</td>
</tr>
<tr>
<td></td>
<td>Land preparation:</td>
<td>• Weeding: Strip or clean weeding at planting.</td>
</tr>
<tr>
<td></td>
<td>Some form of land</td>
<td>• Blanking: Conducted within 1 month of planting.</td>
</tr>
<tr>
<td></td>
<td>clearing has</td>
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<td></td>
<td>taken place (</td>
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<td></td>
<td>manual or</td>
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<td></td>
<td>mechanical;</td>
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<td></td>
<td>burning</td>
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<td></td>
<td>permitted but</td>
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<td></td>
<td>discouraged in</td>
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<tr>
<td></td>
<td>most cases).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Planting: Orderly row planting, with spacing regime chosen according to desired end product.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weeding: Spot weeding (diameter 1m) around the pit at planting.</td>
<td></td>
</tr>
</tbody>
</table>
**Management**

<table>
<thead>
<tr>
<th>Management</th>
<th>Definition</th>
<th>Good practices, plus:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weeding</strong></td>
<td>At least manual spot weeding (diameter 1m) conducted until canopy closure.</td>
<td>• <strong>Weeding</strong>: Strip or clean weeding (manual, mechanical and/or chemical) conducted until canopy closure.</td>
</tr>
<tr>
<td><strong>Pruning</strong></td>
<td>Not required for eucalypts. For pines, at least low pruning from around year 3 (for access and fire protection).</td>
<td>• <strong>Pruning</strong>: High pruning optional according to desired end product.</td>
</tr>
<tr>
<td><strong>Fire protection</strong></td>
<td>Preparation and maintenance of firebreaks.</td>
<td>• <strong>Thinning</strong>: Thinning regime applied according to desired end product.</td>
</tr>
</tbody>
</table>

**USE OF IMPROVED SEEDS**

FDT’s MEL framework currently seeks to capture farmers who adopt “improved seeds and/or practices” as a result of FDT intervention. However, it is noted that the use of improved seed without some basic degree of “good” practices will severely limit any gains to be made.

As such, in our results framework we will count:

(a) Any farmer adopting “good” practices (as outlined above) as a result of FDT intervention, regardless of the type of seed used.

(b) Any farmer using improved seed as a result of FDT intervention, so long as basic “good” practices are also adhered to.

In practice, this means that the silvicultural practices applied by users of improved seed under point (b) need not be attributable to FDT intervention. The Trust will make an assumption as to the percentage of farmers likely to be successfully raising the improved seeds brought to market through FDT interventions.

**DATA COLLECTION TO DATE**

The key data collection activities conducted prior to these definitions having been finalised were the 2014 household survey and 2015 adoption survey. The following sections provide a summary of the definitions used and results obtained in these instances.

**HOUSEHOLD SURVEY (2014)**

The 2014 household survey sought to establish a baseline level of silvicultural practices against which the performance of FDT’s Skills and Knowledge component would be assessed.

Based upon the information generated in the household survey, “good” practices were defined as follows:
**Table 2: Adoption of practices according to the 2014 household survey**

<table>
<thead>
<tr>
<th>Application of “good” practices</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment</td>
<td></td>
</tr>
<tr>
<td>• <strong>Land preparation</strong>: Either “land clearing”, “ploughing” or “burning” was selected.</td>
<td></td>
</tr>
<tr>
<td>• <strong>Spacing</strong>: “Row planting” was selected, and spacing of either 3m x 3m or 2.5m x 2.5m was selected.</td>
<td></td>
</tr>
<tr>
<td><strong>Limitations</strong>: Likely positive bias in farmer responses on land preparation and spacing due to a lack of woodlot observation by enumerators. No information on site selection or weeding.</td>
<td></td>
</tr>
<tr>
<td>Results</td>
<td>37% of farmers were found to be applying good establishment practices.</td>
</tr>
<tr>
<td>Management</td>
<td></td>
</tr>
<tr>
<td>• <strong>Weeding</strong>: Farmers indicated that they conducted weeding.</td>
<td></td>
</tr>
<tr>
<td>• <strong>Pruning</strong>: Farmers indicated that they conducted pruning.</td>
<td></td>
</tr>
<tr>
<td><strong>Limitations</strong>: Likely positive bias in farmer responses on weeding and pruning due to a lack of woodlot observation by enumerators and simple yes/no questions. No information on fire protection.</td>
<td></td>
</tr>
<tr>
<td>Results</td>
<td>45% of farmers were found to be applying good management practices.</td>
</tr>
<tr>
<td>Combined</td>
<td>19% of farmers were found to be applying good establishment and management practices.</td>
</tr>
</tbody>
</table>

**ADOPTION SURVEY (2015)**

The 2015 adoption survey focused solely upon woodlot establishment practices. Unlike the household survey, the adoption survey involved direct observation of the newly established woodlots of farmers who received FDT support in the 2014/15 season. As such, the inherent bias of the household survey relating to overstatement of practices applied was removed.

**Table 3: Adoption of practices according to the 2015 adoption survey**

<table>
<thead>
<tr>
<th>Application of “good” practices</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment</td>
<td></td>
</tr>
<tr>
<td>• <strong>Land preparation</strong>: Either “manual cutting or slashing”, “burning”, “spraying with herbicide” or “mechanised land clearing” was selected.</td>
<td></td>
</tr>
<tr>
<td>• <strong>Spacing</strong>: Either “uniform spacing” or “somewhat regular spacing” were observed, and either 3m x 3m or 2.5m x 2.5m spacing was observed.</td>
<td></td>
</tr>
<tr>
<td>Results</td>
<td>60% of farmers were found to be applying good establishment practices following FDT training.</td>
</tr>
</tbody>
</table>
**Figure 1:** Farmers applying “good” establishment practices before and after FDT support

**BASELINE**

- **Yes**: 37%
- **No**: 63%

**AFTER FDT SUPPORT**

- **Yes**: 60%
- **No**: 40%

Source: FDT household survey (2014)

Source: FDT adoption survey (2015)