Forest Research

Social Research for Community Tree Nurseries (CTN)

Final Report – January 2023

Bianca Ambrose-Oji, Maddy Pearson, Sarah Pohlschneider, Robert Hattersley, Lucy Archer, Olivia Fitzgerald, Mathew Bursnell

The Research Agency of the Forestry Commission

Forest Research is the Research Agency of the Forestry Commission and is the leading UK organisation engaged in forestry and tree related research.

The Agency aims to support and enhance forestry and its role in sustainable development by providing innovative, high quality scientific research, technical support and consultancy services.

Table of Contents

Table of Contents 3
List of Figures 5
List of Tables 6
Executive Summary 7
1 Introduction 14
1.1 Background 14
1.2 Aims and objectives 14
1.3 Research approach 15
2 Methods 16
2.1 Understanding CTNs (Module 1) 16
2.1.1 Rapid Evidence Review 17
2.1.2 CTN case studies 17
2.2 Assessing interventions with pilot CTNs (Module 3) 19
2.2.1 Monitoring survey 19
2.2.2 Semi-structured interviews 19
2.3 National Survey (Module 4) 20
3 Results 21
3.1 Understanding CTNs and opportunities for intervention (Module 1) 21
3.1.1 Characterising CTNs through the evidence review 21
3.1.2 Characterising CTNs through the case studies 23
3.1.3 Success and sustainability 29
3.1.4 Key barriers and challenges 32
3.1.5 Knowledge and information gaps 34
3.2 Assessment of CTN pilot interventions 35
3.2.1 What kinds of CTNs did the Pilot Project engage with? 35
3.2.2 How did the Pilot Project support CTNs and what difference (impact) did that support make? 38
3.2.3 What were the challenges and barriers experienced by CTNs in the Pilot Project? 42
3.2.4 What additional support/actions would enable CTNs to develop and become sustainable? 44

3.2.5 What is the potential for Pilot Project CTNs to up-scale? 47
3.3 National Survey 47
3.3.1 Characteristics of the sample 47
3.3.2 Production, distribution and turnover 49
3.3.3 Income sources and costs 54
3.3.4 Volunteers and staff 56
3.3.5 Biosecurity 57
3.3.6 Sustainability 60
4 Conclusions 61
5 References 68
Appendix 1. Assessment Framework for Boosting Community Tree Nurseries pilot CTNs 69
Appendix 2. Rapid Evidence Review: Annotated Bibliography 70
Appendix 3. CTN case study interview guide 89
Appendix 4. Case study evidence record sheet 91
Appendix 5. Pilot Project CTNs interview guide 92
Appendix 6. Pilot Project CTNs evidence record sheet 95
Appendix 7. Pilot Project CTNs Monitoring Survey 96
Appendix 8. National Survey Questions 106

List of Figures

Figure 1. A schematic description of the project approach and plan 15
Figure 2. Strategic planning documents used by case study CTNs (n=12)* 25
Figure 3. Size of case study CTNs by numbers of trees produced (n=16) 27
Figure 4. Type of trees and other horticultural products produced by case study CTNs (n=16)* 28
Figure 5. Other products and services provided by case study CTNs (n=10)* 28
Figure 6. Tree production methods used by case study CTNs (n=16) 29
Figure 7. Use of local provenances by case study CTNs (n=15) 29
Figure 8 Extent to which pilot CTNs achieved intended outcomes of Pilot Project involvement (n=10) 41
Figure 9. Type of CTNs in national survey sample (n=67) 48
Figure 10. Age of CTNs in national survey sample (n=67) 48
Figure 11. Geographic distribution of CTNs in national survey sample (n=67) Intervention nurseries are shown in red 49
Figure 12. Number of trees produced (Oct 21-March 22 season) by CTNs in national survey (n=67) 50
Figure 13. Financial turnover (last 12 months) of CTNs in national survey (n=67) 50
Figure 14. Number of trees produced (Oct 21-March 22 season) by financial turnover (last 12 months) of CTNs in national survey (n=67) 51
Figure 15. Average % of production by source shown by CTN type (n=67) 52
Figure 16. Distribution by % of production across CTN in the national survey by size of endeavour (n=67) 53
Figure 17. Distribution method and end customer rated by average score across CTNs in the national survey (n=67) 54
Figure 18. Importance of income source rated by average score by different types of CTNs (n=67) 55
Figure 19. Cost of running CTNs per annum estimate by type of CTN in national survey (n=67) 56
Figure 20. Main reasons CTNs in the national survey engage with volunteers (n=67) 57
Figure 21. Biosecurity policy/plans held by different kinds of CTNs (n=67) 58
Figure 22. Biosecurity policy/plans held by number of trees produced (Oct 21-March 22 season) (n=67) 58
Figure 23. Current biosecurity practices of CTNs in the national survey (n=67) 59
Figure 24. Interest in attaining Plant Healthy certification amongst CTNs in the national survey (n=67) 60
Figure 25. Threats and challenges to sustainability of CTNs in the national survey (n=67) *more than one response was possible 60
Figure 26. Main ways CTNs could be supported to ensure long term viability (n=67) 61

List of Tables

Table 1. Summary description of the 16 case study CTNs 18
Table 2. Summary characteristics of CTNs by different governance models (2021 case study data) 24
Table 3. How CTNs became involved with the Pilot Project (n=12) 35
Table 4. Summary table of Pilot Project CTNs and CTN support network (n=14) ... 39
Table 5. What items pilot CTNs used their financial awards for (n=13) 40
Table 6. CTN % of production by product format (n=67) 51
Table 7. CTN % of production by type of source (n=67) 52
Table 8. Importance of income by source (rated by score 1-10 of) for CTNs in national survey (n=67) 55
Table 9. Importance of costs by source (rated by score 1-10) for CTNs in national survey (n=67) 55
Table 10. Differences in numbers of volunteers and volunteer hours over the last 12 months by CTN type 57
Table 11. Summary characteristics of CTNs by different governance models 65

Executive Summary

i. The Trees Outside Woodlands (TOW) Project is led by Defra, alongside Natural England and the Tree Council. It is funded by HMT's Shared Outcomes Fund. The project includes the development of five pilots, one of which is *Boosting Community Tree Nurseries*. This pilot is testing how to establish Community Tree Nurseries (CTNs) and their role in increasing the supply of healthy, biosecure and sustainable trees in England.

ii. Research was commissioned by *Boosting Community Tree Nurseries*, to meet the following specific research objectives:

   a. Understand different Community Tree Nursery (CTN) models, and detail the range of benefits, costs, challenges, and unique selling points associated with each.

   b. Synthesise and assess the evidence to identify potential interventions for CTNs in the pilot project.

   c. Develop an evaluation framework to monitor and assess the interventions with pilot CTNs.

   d. Evaluate differences between different pilot CTNs and assess sustainability, benefits and any potential support needs associated with different CTN models.

iii. **A rapid evidence review** was undertaken that collated and assessed 54 studies and toolkits. A synthesis of the available information about different models of CTNs, and the specific successes and challenges associated with each was produced.

iv. **Case study** research was undertaken in 2021 with 16 CTNs across the UK, selected purposively according to criteria including location, site type (public or private), size (determined by numbers of trees produced), governance, and development stage. Evidence was synthesised to generate a characterisation of CTNs, and the specific successes and challenges associated with each.

v. **Assessment of interventions with 13 pilot project CTNs** was undertaken in late 2022. This recorded the development history of the CTNs, the specific successes and challenges experienced, and the impact of Pilot Project support. Interventions included, e.g., training, funding to cover new staff costs, funding for infrastructure such as fencing, poly tunnels, irrigation, or essential equipment such as label printers.

vi. A **National survey** was undertaken in autumn 2022 generating 67 responses from CTNs across the UK. This provided baseline information about the sector, recording production methods and volumes, biosecurity measures and concerns, use of staff

and volunteers, and the specific successes and challenges experienced across the sector.

vii. The **rapid evidence review suggested that**:

- **Size matters.** The size of the community group involved (i.e. the numbers of people supporting the nursery) and business size (by number of trees produced) matters when considering sustainability and success. Medium/middle sized CTNs (c. 10,000 trees), were reported to perform better than smaller and larger CTNs.
- **Markets for trees are uncertain and unstable**. Markets for trees are poorly developed or unstable; combined with low selling prices and high labour inputs, this makes it challenging to achieve a steady income. Grants and incentives were shown to be critical to the viability and sustainability of many CTNs.
- **Market development can be disrupted by other programmes**. There were examples in the evidence which showed that CTNs have built markets for their trees, but this may take between 5 to 10 years. Free trees from other government or NGO projects can disrupt CTN development, even where these free tree schemes only last a short period of time.

viii. The **case study research in 2021 found that**:

- It is possible to characterise CTNs both by size (production volumes) and type according to organisation, governance and objectives. These two broad forms of characterisation reveal patterns of difference and similarity between them, and provide some indication of successes and challenges associated with different CTNs.
- The four different kinds of CTNs were identified from the case studies. This characterisation was used to structure and interpret data through the rest of the research project. The four kinds of CTNs were:
    - **Organisation and project-based CTNs**. These are nurseries managed by a Local Authority, charity or partnership based on a particular site. Paid staff manage the nursery and volunteers.
    - **Enterprises.** Set up as commercial or social enterprises to achieve tree production and other benefits through business methods. Paid staff manage the nursery and volunteers.
    - **Community-based CTNs**. These are CTNs managed and run by established community groups as a community-based initiative. They may or may not have links with Local Authorities or other organisations. They are wholly managed by volunteers.
    - **Networks**. These are CTNs that are not located on a single nursery site but instead rely on a collective of tree growers using different locations and

growing techniques. The growers are mostly volunteers, and may or may not have links with Local Authorities or other organisations.

- Not all CTNs amongst those in the case study sample have either the capacity, or the desire to upscale. These CTNs are mainly established endeavours formed as Organisation or project-based nurseries, and although they recognised opportunities for growth, upscaling would require significant business investment and risk management, or with too much growth would simply change the nature of the initiative to one not desired by those managing the CTNs.
- The evidence suggests a generally poor level of understanding about biosecurity issues and what that means for a particular CTN and its production practices. There is a consequent need for staff and volunteers to develop appropriate knowledge in this area that suits their role, skill level and individual professional competencies.
- Drawing conclusions about the sustainability of different CTNs is difficult. Major challenges to sustainability appear to be:
    - an uncertain income stream,
    - maintaining staff and volunteer engagement and skills,
    - over-reliance on a few community volunteers with no succession planning.
- Looking across the evidence at expressed and identified needs, the following areas of intervention would likely have a positive impact on CTNs in terms of upscaling production, ensuring better quality and biosecure production and supply:
    - Covering the costs of nursery establishment to offset lack of income and cost management over the first two years,
    - Covering the costs of nursery infrastructure and land,
    - Providing financial and other support to maintaining staff and volunteer numbers and contributions,
    - Providing training – nursery skills, biosecurity, leadership and nursery management,
    - Connecting CTNs and members to a wider community of practice.

ix. The **assessment of Pilot Project interventions in 2022 found**:

- Funding to establish pilot CTNs and help manage a step change in production levels was reported as critical.
- The range of financial awards was between £263-£19,350. Despite the challenges brought by supply chain disruptions during the COVID 19 pandemic which altered delivery timelines and impacted pricing, the projects all used their funds to develop their endeavours as expected. The funds achieved the establishment of 10 new nurseries, extended the production of 2, moved one into tree production where it

had not before, and continued the development of the national support network (Community Tree Nursery Collaborative – CTNC).

- It is not just funding which proved important. CTNs recognised the value of the advice and handholding from Project Officers through the establishment phase, and around a third thought that the peer network, i.e. CTNC, was important and valuable support to achieving the objectives of the Pilot.
- Reporting on the ease of utilising the funding (remembering that awards were granted during the 2020-2022 COVID and post-COVID disruption to global and national markets), CTNs experienced a range of issues, including difficulties procuring building materials and other nursery supplies, labour power, and meeting staffing level needs.
- CTNs also reported other challenges to establishment and extending production including:
    - Grants being too small and having to use their own personal resources to pay for nursery essentials, and the costs of volunteering such as petrol money for seed collecting trips
    - volunteer fatigue
    - challenging seasonal environmental conditions – including drought and late frosts.

x. The **national survey in 2022** found:

- There are a large number of recently established or establishing CTNs, c. 66% of the sample were 3 years old or less.
- The most popular source of production is seed collected in the local area. Around 34% of CTNs said >90% of their production came from locally collected seed, of those CTNs c. 24% said they relied on this source for 100% of their production.
- The average number of trees produced by CTNs was c. 3,500. Although this ranged between 0-60,000. Production across the sample October 2021-March 2022 was around quarter of a million trees (239,428), mostly broadleaved species.
- When asked if there was any intention to upscale production by 10% or more, the majority of CTNs (87%) said yes.
- About a third of CTNs (37%) recognised unmet demand for specific tree species and of those 67% said they intended to meet that demand. Most mentioned species were: wild service, hawthorn, small leaved-lime, pear, holly, fruit trees, field maple, blackthorn, black poplar.
- Around 12% (8/67) of CTNs had distributed 100% of their available stock. Around 37% (25/67) said they had not distributed any stock. This can be attributed to 28%

(19/67) of the CTNs reporting that they were not yet producing, and the high number of CTNs in the sample between 1-3 years of age and still needing to build up production across years before having stock to distribute.

- Environmental Non-Governmental Organisations (E-NGOs) appear as the most important customer across all distribution methods and to all kinds of CTNs. Private individuals are important customers of on-site sales.
- For the majority of CTNs in the survey the greater part of income, comes from grants, followed by tree sales. No CTNs in the survey reported involvement in secondary markets[1].
- The majority of CTNs do not have paid staff. The average number of paid staff per CTN across all those in the sample was 1.22 FTE (median 0.2, mode 0, range 0-10).
- The total number of volunteers contributing to CTNs over the last 12 months was reported as 1,233, with the average number of volunteers per CTN being 18 (median 10, mode 10, range 0-220). Estimated volunteer hours returned a total across all CTNs in the sample of 34,995, an average of 522 hours per CTN p.a. This represents 4,729 working days, or 22.5 FTEs.
- The survey asked several questions about aspects of CTNs biosecurity policy and practice. Across the survey sample just 10% of CTNs said they had a formal written policy shared with staff and volunteers, although 37% said they had something informal such as a common understanding of principles and practice, overall 45% had no policy or plan.
- Half or more of the CTNs were able to trace trees from source to sale (54%), and reported conducting regular monitoring for pests and diseases (49%). Around a third or more were checking incoming goods for pests and diseases (39%) and had procedures for cleaning and sterilising items (31%). Just twelve nurseries (c. 18%) had quarantine areas.
- Importantly, when asked if they had any interest in Plant Healthy certification 43% of CTNs said yes, just 17% no, and 40% maybe.

xi. **Summary conclusions** that can be drawn looking across the body of evidence are:

- The size of the sector at this time is estimated at around 80 (+/- 10) CTNs across the UK. With the majority being *Organisation or project-based* and *Community-based*.
- The sector is currently dominated by new entrants between 1-3 years old. The lack of any previous baseline data makes this feature difficult to interpret. it is not possible to ascertain whether the high rate of “new entrants” is normal, and what

[1] A secondary market is one not specific to the actual production of trees, but related to the CTNs nursery endeavour, e.g. selling other horticultural products, running a café, selling training courses.

the reasons for that might be, e.g. linked with high rates of attrition because of the difficult nature of establishing these enterprises. An alternative interpretation is that the sector is growing in response to: the current interest in tree planting; a perceived increase in the national demand for trees; changes to the supply of trees of some species due to new biosecurity regulations; and in the increased interest in home-grown stock perceived to be more biosecure.

- Even though this work reported here has focused on the potential of CTNs to produce quality stock for the market, there are other social, economic and environmental benefits that they bring about. Evidence from across the data streams shows they often have objectives and intentions to build social capital and community cohesion, develop volunteer skills and knowledge, increase volunteer wellbeing, and use engagement with CTNs to bring about greater pro-environmental understanding and behaviours.
- The sector is almost exclusively producing native broadleaves, and local provenances, with some production of fruit trees and trees intended for hedging.
- Amongst CTNs there is recognised unmet demand for trees, including for particular species. Many CTNs are willing to upscale production to some degree, although the cost challenges and barriers differ by CTN type and scale.
- The majority of CTNs are producing small numbers of trees, i.e. <500 p.a.. Those CTNs with significant output are largely *Enterprise* and *Organisation or project-based* types. In terms of making a significant impact to the regional supply of trees, this may be where greatest potential lies.
- Regardless of CTN type, age or size of endeavour awareness of biosecurity issues, and the implementation of appropriate biosecurity practice is inconsistent.
- However, most of the CTNs involved in the research indicated a willingness to improve their biosecurity knowledge and practical application to their nursery management. This could be an opportunity for targeted interventions to make a positive impact on the sector.
- An initial 2-5 year time period appears critical to CTN establishment and integration into local markets. Financial and other support during this period has a significant impact on the short-term viability and to medium term sustainability of CTNs.
- Challenges to CTN sustainability that were raised consistently were around maintaining resources, including: finance streams, staff, and volunteers as well as site infrastructure, and machinery.
- Equally important are resources that support opportunities for CTNs to develop their skills and potential, most valued in this regard are Peer-to-peer learning and communities of practice.

- Training is important to sustainability and ensuring quality trees are produced. Training needs were listed as: scale-appropriate biosecurity measures; business and nursery management; market awareness and entrepreneurship.
- CTNs emphasised the importance of a combination of support mechanisms (e.g. grants, training and skills development, peer-to-peer networking) as being important to establishing their endeavours, maintaining their sustainability over the long term and when expanding their operations.

1 Introduction

1.1 Background

This research has been undertaken as part of the Trees Outside Woodlands (TOW) programme which is developing innovative and sustainable new ways to increase tree cover to address both climate and ecological emergencies. Phase one of the project (2020-2023) was a £2.5M, three-year programme funded by HM Government and delivered in partnership by The Tree Council, Natural England, the Department for Environment, Food & Rural Affairs with five local councils - Chichester District Council, Cornwall Council, Kent County Council, Norfolk County Council and Shropshire Council.

The project includes the development of five pilots, one of which is Boosting Community Tree Nurseries. This pilot which is led by Norfolk County Council is testing how to establish Community Tree Nurseries (CTNs) and their role in increasing the supply of healthy, biosecure and sustainable trees in England.

The vision of the pilot is to support and grow a network of thriving Community Tree Nurseries that can contribute to the supply of diverse, biosecure and high-quality stock for tree planting in England. The key outcomes of the pilot will be:

i. An investigation into Community Tree Nurseries (CTN) to identify ways to enhance their contribution to the production of planting stock for Trees Outside Woodlands.

ii. A knowledge sharing toolkit created to help in setting up and running a new community nursery, with options for different scales and models, and including case studies.

iii. A demonstration hub established to provide inspiration and training/ masterclass sessions, act as a focal point for helping new nurseries to set up and to support existing nurseries.

iv. A pilot CTN Plant Healthy certification group established.

The social research reported in this document represents *outcome i* and contributes to outcome ii.

1.2 Aims and objectives

The specific research objectives (RO) are:

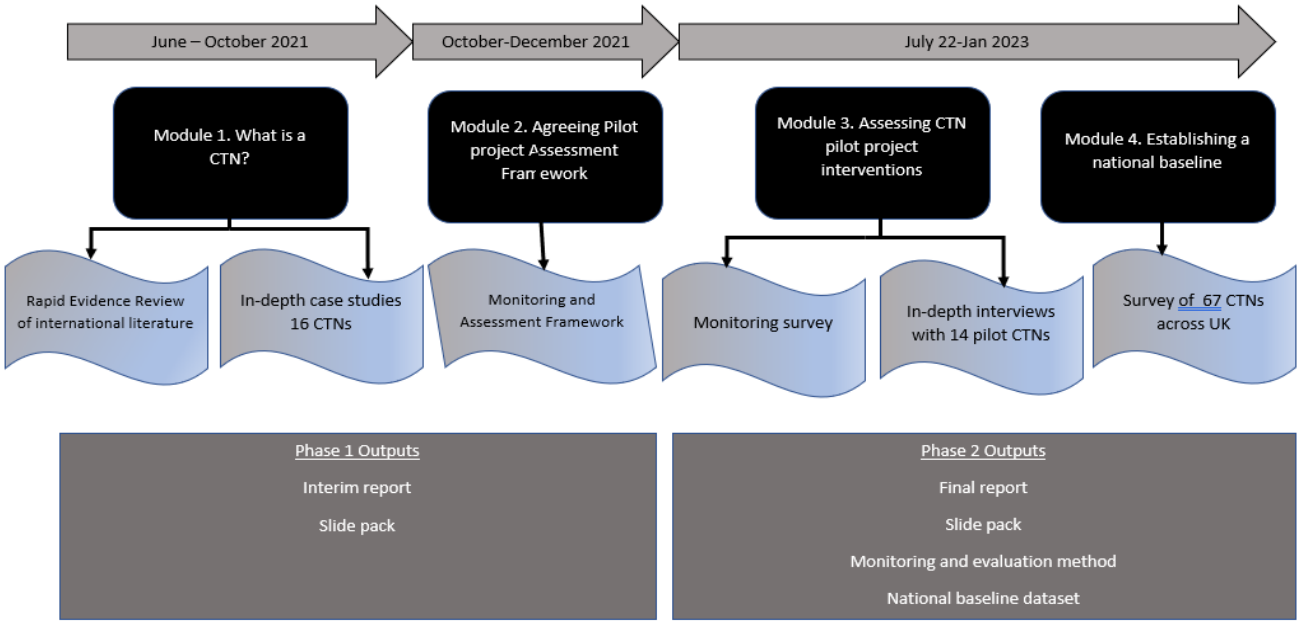
1. Understand different CTN models, and detail the range of benefits, costs, challenges, and unique selling points (USP) associated with each
2. Synthesise and assess the evidence to identify potential interventions to support the establishment and development of CTNs

3. Develop an evaluation framework including key Criteria and Indicators (C&I) to monitor and assess the impact of interventions with Pilot Project CTNs
4. Evaluate differences between different Pilot Project CTNs and assess sustainability, benefits and any potential support needs associated with different CTN models.

1.3 Research approach

A schematic overview of the project approach is illustrated in Figure 1 below. Four distinct sets of research activities, described as "modules", were designed to build the evidence and knowledge required to meet the research objectives. Module 1 was designed to provide information that characterises CTNs; Module 2 built on this and developed an appropriate assessment framework that could be used to evaluate the successes (i.e., achieving their objectives) and potential outcomes of CTNs; Module 3 collected data from CTNs involved in the pilot to assess the effects of the financial and other support provided; and Module 4 collected data from CTNs across the UK to provide national context.

Figure 1. A schematic description of the project approach and plan[2]



Module 1. What is a CTN?

The research in this module contributed to RO1, RO2 and RO4. Research generated a description of different CTN models based on community engagement styles and financial

[2] The in-depth interviews in Module 2 were with 13 CTNs, and the charity that set up the CTN support network, i.e. 14 interventions

models, and illustrated the potential benefits, challenges, tree supply and biosecurity implications associated with each of them.

A workshop in October 2021 deliberated the results and discussed the implications for intervention design and which kinds of CTNs might benefit in what contexts.

Module 2. Agreeing an Assessment Framework

This module contributed to RO3. A simple Assessment Framework was developed to guide the collection of monitoring data to track the outcomes and impacts of the Pilot Project interventions. The framework (see Appendix 1) is in the form of a simple logic model illustrating the basic "if-this, then-that" logic and identifying the key outputs and potential short-term outcomes/impacts of interest to the *Boosting Community Tree Nurseries* pilot.

Module 3. Assessing Pilot Project interventions

Research in this module contributed to RO3 and RO4. Guided by the Assessment Framework, a mixed methods approach collected quantitative (on-line monitoring survey) data, and in-depth qualitative (semi-structured interviews) and from 14 of the CTNs supported by the Pilot Project. The data was used to assess what impacts taking part in the Pilot Project had had on the participating CTNs.

A workshop in January 2023 deliberated the results and discussed the implications for future intervention design and any ongoing support needed to facilitate the success of CTNs.

Module 4. Establishing a National Baseline

The research in this module contributed to RO1 and RO4. CTNs from across the UK were invited to answer an on-line survey to establish a baseline dataset providing initial insights into the types and ages of CTNs present, production volumes, costs and challenges, as well as biosecurity knowledge and practice.

A workshop in December 2023 deliberated the results and discussed the implications for sector production, future intervention design and any ongoing support needed to facilitate the success of CTNs.

2 Methods

2.1 Understanding CTNs (Module 1)

The research in Module 1 focused on understanding more about CTNs and where interventions might support them to achieve the Pilot Project objectives. This involved investigating a range of different types of CTNs, to evidence more about the potential benefits and challenges experienced by CTNs operating in different ways, and to find out

more about tree production methods and the biosecurity implications. This was achieved by conducting:

i. **A rapid evidence review** that collated and assessed the existing evidence base for data and information about different models of CTNs, and the specific successes and challenges associated with each.

ii. In-depth investigation of 16 **case study CTNs** of varying types and sizes in England, Scotland and Wales.

2.1.1 Rapid Evidence Review

A rapid evidence review was conducted using key word searches in databases including Scopus, Science Direct and Google Scholar. The search was not limited by date range or country coverage.

The key word search terms were as follows:

- “tree nurser*” [AND volunteer OR community OR CSR]
- “tree nurser*” [AND small scale OR micro]
- “social enterprise” [AND trees OR growing OR horticulture OR arboriculture OR landscaping OR nurser*]
- “community-based enterprise” [AND trees OR arboriculture OR horticulture]

A total of 35 documents were collated as the evidence set, of which 27 were assessed to have insights of relevance to the UK context. The majority of the studies examined community and small-scale nursery enterprises in Africa and Asia. Three useful handbooks or guides were identified, which again, although focused on developing country contexts were picked up as example “toolkits” with sections and thematic approaches that are of relevance to the UK context. All evidence was used to identify different types and models of CTNs and key lessons learned.

An annotated bibliography of the academic journal papers and documents is included as Appendix 2.

2.1.2 CTN case studies

A list of 49 CTNs across England, Scotland and Wales was produced in collaboration with the *Boosting Community Tree Nurseries* pilot team. We believe this list captured a large proportion of existing CTNs. This sampling frame included information about key variables of interest including, location, site type (public or private), size (determined by numbers of trees produced), governance, and development stage. A final target sample of 16 case studies was purposively selected through discussion with the project team who reached agreement on those case studies best able to provide insight into the range of different types and ages of CTN. A summary of the sample CTNs is included in Table 1.

An interview guide (see Appendix 3) was developed in collaboration with the *Boosting Community Tree Nurseries* pilot team. This was used to structure discussions with representatives from the case study CTNs. The discussions were conducted on-line through Microsoft Teams, between August and October 2021. Each encounter lasted between 25 and 65 minutes. Encounters were recorded but not transcribed. Researchers summarised the key information emerging from the discussions using a recording sheet (see Appendix 4). In addition, informants provided some basic data descriptive data about their CTN using a short Survey Monkey form, which they completed before or after their interview.

Table 1. Summary description of the 16 case study CTNs

No.	Country	Years established	Overview
1	Wales	2	CTN established by NGO to produce rarer tree species to supply local landowners and farmers.
12	Wales	13	CTN with strong educational focus in addition to selling trees locally.
3	Scotland	26	Large, remote CTN managed by a conservation charity. Trees used on the charity's land and also sold to nearby projects.
11	Scotland	10	Established as part of landscape partnership, large CTN selling local and rare trees in remote location.
2	England	14	Large charity-run CTN growing trees on two sites. Sells trees to local landowners and projects.
4	England	25	Small, community-based CTN selling trees locally.
5	England	22	CTN based on council land and providing trees for local parks. Also involved in after-care of trees.
6	England	4	Network of volunteer growers organised by an NGO, to collect seed and grow trees in their gardens.
7	England	1	Project establishing CTNs in a network of institutions, ambition to produce large number of trees while training institutional residents.
8	England	23	CTN which operated for over 20 years, trees were distributed among tree warden network.
9	England	24	CTN which focused on seed collection, most of which was grown-on by a commercial nursery.
10	England	2	Early stage CTN run by key individual with a few other volunteers.
13	England	32	Established alongside Community Forest, to support planting there.
14	England	2	Network of tree wardens growing trees in their gardens. Trees are planted throughout the county.
15	England	1	CTN based within a designated landscape, providing trees for park and wider water catchment.
16	England	5	Large council-run nursery with a volunteer element, producing plants and trees for council, agencies and private customers.

Additional material including notes provided by the project lead, information sourced from case study websites, and documentation provided by CTNs themselves were used with the researcher interview notes to build up a picture of the case study CTNs.

Interview data and supplementary information were discussed by the researchers and the whole Pilot Project team respectively. These discussions helped to define clear areas of

interest to the project. Researchers extracted qualitative data from the interview record sheets relevant to these areas of interest and discussed their significance. The findings of these discussions are found in this report.

Quantitative data from Survey Monkey was cleaned and used to generate simple summary charts.

2.2 Assessing interventions with pilot CTNs (Module 3)

Module 3 collected data from the CTNs involved in the Pilot Project. The assessment comprised a two-step process and contributed evidence against RO3 and RO4. Guided by the Assessment Framework (Appendix 1), an on-line monitoring survey collected quantitative data using key criteria and indicators and a semi-structured interview collected in-depth qualitative data. The data was used to assess the impact of the Pilot Project on participating CTNs, by answering the following research questions:

1. How were Pilot Project interventions received and applied?
2. What were the actual or perceived and felt impacts of the intervention/s?
3. What other reasons may have contributed to changes and developments to the CTN?
4. What challenges and barriers are currently being experienced, and where additional support could potentially make a difference to CTN sustainability?

2.2.1 Monitoring survey

The monitoring survey was co-designed by the Pilot Project team and comprised a short online survey that asked CTNs to provide information on factors relating to the establishment, functioning, and output of their nursery (Appendix 7). This included annual numbers (spanning 2018-2022) of paid staff, volunteer hours, trees produced, percentage of trees lost, as well as specific questions relating to the intervention; what financial support was obtained for, challenges in utilising financial support, proportion of award spent, expected impacts of financial award, and the extent to which expected impacts had been achieved. A link to complete an on-line monitoring survey was emailed to CTNs in November 2022. Monitoring survey responses were analysed using EXCEL and limited to simple descriptives. Analysing monitoring survey responses allowed social scientists to tailor the follow-up semi-structured interviews to each CTN.

2.2.2 Semi-structured interviews

Semi-structured interviews were conducted following the completion of monitoring surveys. Interview guides were co-designed by the Pilot Project team (Appendix 5). Interviews took place on-line via Microsoft Teams or, at the request of the CTN, by telephone. Interviews were conducted between November 2022 and January 2023. Interviews were completed with thirteen CTNs and one Community Interest Company (CiC) running a CTN support network. Interviews ranged in length between 25 to 45 minutes. Length of interview was

not only determined by the completion of guide questions, but also the time availability of nursery staff/volunteers being interviewed, the level of nursery establishment, and the extent to which nurseries engaged in business planning and biosecurity practices. All interviewees gave informed consent to take part in interviews. Semi-structured interviews were recorded but not transcribed. Interviewers completed a record sheet during interviews, recording important insights related to topic guide questions (Appendix 6). A thematic analysis of record sheets was performed in January 2023.

2.3 National Survey (Module 4)

A UK wide survey was co-designed with the Pilot Project team over the summer of 2022. The objective of the survey was to collect "baseline" evidence of the sector that would enable:

i. Assessment of the potential for the sector to supply high-quality stock for tree planting

ii. Repeatable data collection to monitor trends and changes across the sector over time

iii. Baseline description of the kinds of CTNs across the sector, their ages, business models, actual and potential production, main costs, challenges and barriers to sustainability, biosecurity practice, and use of volunteers.

The survey was piloted with 3 CTNs to test for comprehension, salience, time to complete, and that the expected data was produced. As a result of the pilot, the draft survey was shortened, and some questions reformulated to improve clarity and shorten response time.

A final version including 32 questions was opened on Smart Survey for 5 weeks between October and December 2022. The questions were mostly closed, and covered size of CTN in terms of numbers of trees being produced, and financial turnover, what was being produced and in what format, distribution routes, costs, use of volunteers, biosecurity practices, and key challenges to sustainability or upscaling (see Appendix 8).

Inclusion criteria used the invitation to participate in the survey, and the rubric on the consent form at the start of the survey, to define a Community Tree Nursery as '*an enterprise, social enterprise, community-based group, charitable or public sector endeavour or network where volunteer community members and groups take part in growing trees, including seed/wilding collection, nursery management and sales/distribution, and also in some cases planting out*'.

CTNs were recruited to the survey by a variety of methods, including:

- Direct email to all known CTNs from previous years' work (n=31)
- Direct email to all organisations felt likely to have connections to CTNs asking them to send out to their membership (n=16)

- Forums including, APSE and ADEPT[3]
- Twitter and other social media (Forest Research, Tree Council) and onward posting by other relevant organisations.

CTNs completing the survey were offered a copy of the Tree Growers Guide as an incentive/thank you.

Recruitment email and social media were used throughout the survey period to remind potential participants the survey was open.

Analysis of the survey data was conducted in EXCEL. Data was cleaned and some was further categorised. Statistical analysis was not applied. EXCEL was used to generate simple summary descriptives and displays of data using pivot charts. Questions were interrogated to look for patterns of difference (not assessed statistically) between CTNs by:

- Type of CTN (using the scheme developed in Module 1)
- Age
- Size of endeavour, measured by:
    - Number of trees produced p.a.
    - Value of turnover p.a.

3 Results

3.1 Understanding CTNs and opportunities for intervention (Module 1)

3.1.1 Characterising CTNs through the evidence review

Looking across the published evidence, there is no single definition of a community tree nursery. The review illustrates that CTNs have been defined and characterised in different ways, including by:

- function and main objectives,
- governance/ legal arrangements,
- outputs (i.e., numbers of trees and other products produced), and,
- business model.

For example, work across Asia characterised CTNs by lead organisation and purpose, and identified a major division in the effectiveness of working, degree of community

[3] Association for Public Service Excellence (APSE) and Association of Directors of Environment, Economy, Planning & Transport (ADEPT)

engagement and numbers of trees supplied between time-bound project focused CTNs, and those run on semi-commercial models but supported by government or NGOs (Roshetko et al., 2010). Different research looking at CTNs in Africa land North America showed that CTNs are very often established to fulfil specific functions, most frequently to serve tree planting programmes and projects for public benefits where the level of support from conservation agencies and charities is high, and where commercial viability of the CTNs is not the primary concern (Botha et al., 2005, Botha et al., 2007, Eisenman et al., 2021).

Regardless of the type of CTN investigated the evidence did reveal some commonly observed features across countries and all of the examples[4]:

- **Size matters.** The size of the community group involved (i.e. the numbers of people supporting the nursery) and business size (by number of trees produced) matters when considering sustainability and success. Although the evidence characterises CTNs in different ways, there seems to be agreement that medium/middle sized CTNs (c. 10,000 trees), seem to perform better than smaller and larger CTNs. Smaller CTNs may face challenges around the economics of production which may lead to their demise. Larger concerns can be challenged by the scale of production including the need for skilled labour, efficient processes and mechanisation of some parts of the production process, with poorer quality trees a potential outcome.
- **Markets for trees are uncertain and unstable**. Markets for tree seedlings were described as poorly developed or unstable due to significant fluctuations in demand year on year, in all the countries and examples included in the evidence. Fluctuating and uncertain market conditions combined with low selling prices and high labour inputs means that achieving a steady annual net profit or achieving income needed to manage cost offsetting is not at all common among CTNs. Government or organisational incentives or support, including grants, was shown to remain important for CTN viability and sustainability.
- **Market development can be disrupted by other programmes**. There were examples in the evidence which showed that CTNs have built markets for their trees, but this could take between 5 to 10 years. Free trees from other government or NGO projects can disrupt CTN development by displacing demand, even where these free tree schemes only last a short period of time.
- **There are common financial challenges**. The key challenges and barriers that were repeated through the studies included: poor access/availability or high cost of land and space for the CTN; and the capital and recurring costs of nursery infrastructure (e.g. irrigation) and consumables such as good quality growing medium; poor tree quality due to lack of finance to support good growing practice,

[4] These are not presented in any order since they are themes pulled from a synthesis of studies of different sample sizes, methodologies, countries and socio-economic contexts such that ranking or judging importance was not possible.

and lack of expertise or skills training, which damaged CTN reputations and lead to low demand.

3.1.2 Characterising CTNs through the case studies

Looking across the data generated by the case studies, there were some discernible patterns structuring the differences between CTNs. Even though the case studies represent a small amount of evidence from perhaps around a third or less of the total pool of CTNs, these patterns do indicate differences which will have an impact on the likely effectiveness of different intervention strategies, biosecurity practice, and the potential to produce significant volumes of quality trees. The main areas of difference were around:

- organisation and governance model,
- the objectives of the CTN,
- the type of community engagement, and
- the size and type of production.

3.1.2.1 CTN governance models

Looking across these areas of difference a broad characterisation of CTNs suggests there are four governance models discernible amongst the case studies. These are:

- **Organisation and project-based CTNs**. These are nurseries managed by a Local Authority, a charity (e.g. Wildlife Trust) or partnership project (e.g. Community Forest). They were associated with a particular site or a particular project. Paid staff manage the nursery and volunteers. Rangers, project officers, and other role holders were involved in decision making and managing the running of the CTN.
- **Enterprises.** These are CTNs set up as commercial or social enterprises to achieve tree production and other benefits through business methods. Trees are sold at cost or for profit. Paid staff manage the nursery and volunteers. Whether constituted as commercial or social enterprises, these CTNs are concerned with financial sustainability. Those in our sample were responsible for producing the largest number of trees.
- **Community-based CTNs**. These are CTNs managed and run by established community groups who run a tree nursery as a community-based initiative. They may or may not have links with Local Authorities or other organisations. They are wholly managed by volunteers.
- **Networks**. These are CTNs that are not located on a single nursery site but instead rely on a collective of tree growers using different locations and growing techniques. The growers may or may not have links with Local Authorities or other organisations. They may work collectively to gather seed and distribute seedlings, or they may undertake these actions on behalf of a project or organisation. If growing trees for an organisation or project, seeds or plants may be provided to them to grow on.

A summary of the characteristics associated with the different kinds of CTN models is shown in Table 2 below.

Table 2. Summary characteristics of CTNs by different governance models (2021 case study data)

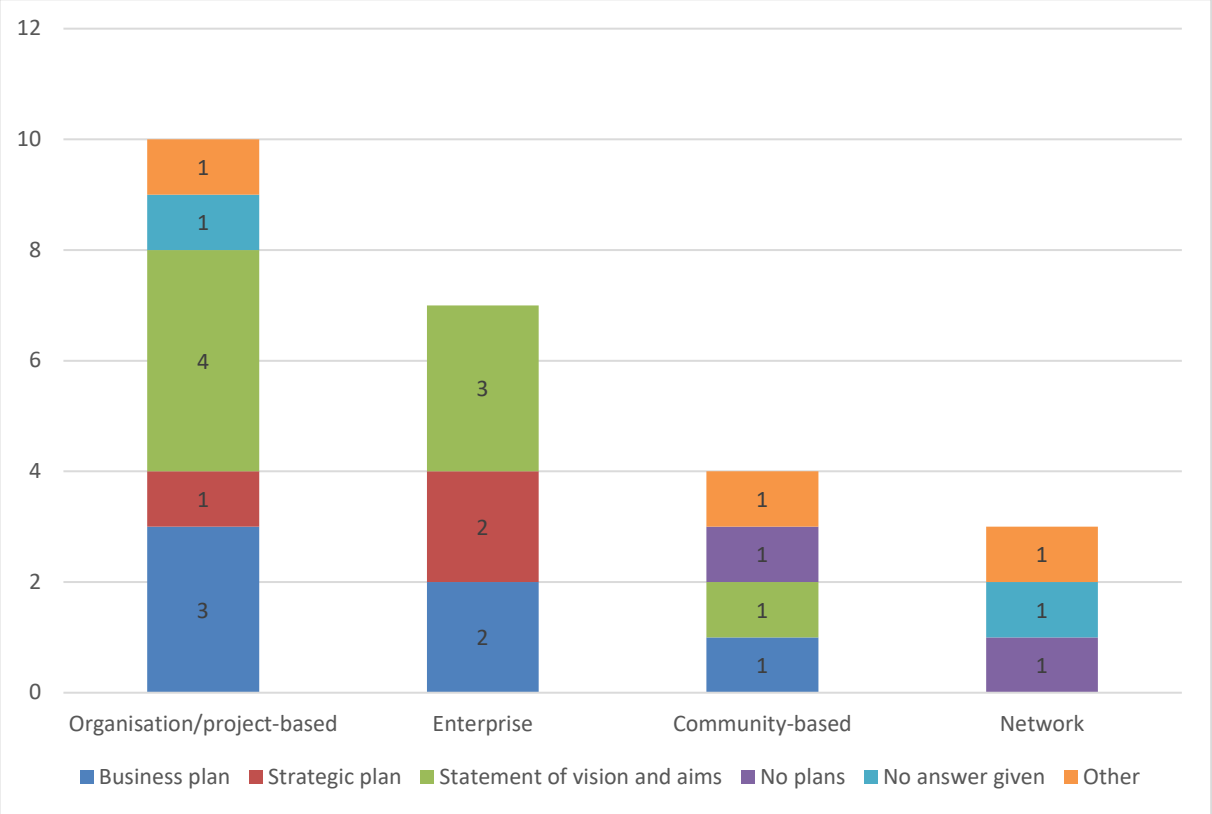
Type of CTN	No in our case studies	Size (production volume p.a.)	Supply	Use of volunteers	Land
Organisation and project-based	7/16	600-130,000	• Sold and donated • 7 supplying direct to organisation or project • 7 offering for sale	2-20 regular volunteers managed by staff	Owned by the organisation/project (6 out of 7)
Enterprise	3/16	3,000-1,000,000	• Sold • 0 supplying direct to organisation or project • 3 offering for sale	4-30 regular volunteers managed by staff	Rented/leased (3 out of 3)
Community-based	3/16	100-1,500	• Sold and donated • 2 supplying direct to organisation or project • 2 offering for sale	4-30 regular volunteers managing themselves	Rented/leased but at peppercorn rates or free (3 out of 3)
Network	3/16	150-3,000	• Donated • 3 supplying direct to organisation or project • 0 offering for sale	4-20 volunteer growers managing themselves or managed by an organisation	On volunteers' own property, parish allotment or land belonging to local groups, e.g. Scouts (3 out of 3)

3.1.2.2 CTN objectives and strategic planning

The CTNs in the sample all had very similar objectives around producing good quality trees for public benefits, and leveraging some social benefits through volunteer and community engagement. It was the balance of those objectives and any objectives around financial sustainability which differed between them.

How the CTNs translated these objectives into strategic planning tools guiding their development, the size and type of production, the degree to which they focused on grant capture, and the type of community engagement integrated with tree production differed. Figure 2 shows that a third of the sample had translated these into either a business plan or a strategic plan. *Organisation/project-based* CTNs and the *Enterprise* CTNs were more likely to have a collection of more than one type of plan, including a business or strategic plan to guide their operations. A statement of vision and aims was the most common strategy document across CTNs. *Network* CTNs were least likely to have any kind of strategic guidance/documentation. It's important to note that just one of the CTNs, a *Community-based* CTN, mentioned having a specific biosecurity plan in place, this was in the form of a biosecurity risk assessment.

Figure 2. Strategic planning documents used by case study CTNs (n=12)*



NB. CTNs could have more than one document type

3.1.2.3 Type of community engagement – activities and benefit flow

Depending on the type of CTN considered community engagement is normally arranged in the form of volunteering sessions, which may be led and managed by members of staff, or by voluntary volunteer organisers. The *Community-based* initiatives were the only examples where decision-making about the running and development of the CTN sat in the hands of community members alone.

The way in which volunteers are engaged is very varied, and included: volunteers joining established and regular working parties and volunteering sessions; taking part as paying guests on “working holidays” or as participants in specific training courses; joining in with educational or special interest events using the CTN as a third party, e.g. working with prisoners, health and wellbeing groups, or with employability and skills focused groups.

The different kinds of activities that volunteers are involved with included:

- Seed collection, which was the most common activity as it was carried out with volunteers in each of the case study CTNs. This also reflects that the most common tree production method across the case studies was through collected seed.
- Collecting wildings, i.e. self-sown trees for growing on or potting up for transplanting
- Growing tree seedlings, which included a variety of contributions depending on the type of CTN, but with all CTNs stating that volunteers take part in all parts of the tree growing and production process
- Planting the trees produced onto a specific site is most commonly associated with *Organisation/project-based* CTNs
- Maintaining the trees planted at specific sites
- Taking part in courses and learning events
- Contributing to the management and maintenance of the nursery itself

Although none of the CTNs involved in the research had assessed or evaluated (i.e. measured), the additional benefits they might be leveraging beyond tree production, a broad range of perceived social benefits were noted regardless of the type or size of CTN being considered. These included:

- Social capital and community cohesion brought about by social interaction, particularly between different types of people within a community, and amongst those meeting regularly
- Health and wellbeing benefits through nature connection, physical exercise and through social contact and socialising
- Learning and skills development
- Employability

- Volunteers and others developing a sense of being useful and contributing to something important
- Environmental improvement in community or particular locale
- Changing community attitudes and perceptions towards trees and nature.

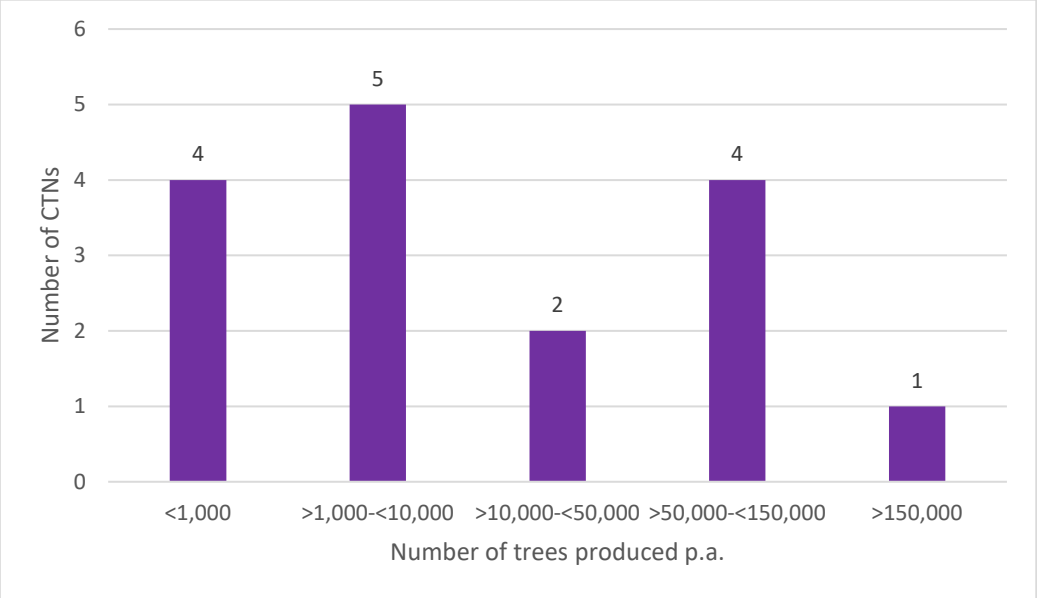
The following statements provide an illustration of the benefits those involved saw from community engagement:

> *People have expressed enormous wellbeing benefits...* (*Enterprise type* CTN)
>
> *We're building communities around the parks…it's like having a little tree warden scheme for each park* (*Community-based* CTN)
>
> *[Volunteers] get a sense of fulfilment from doing something useful – that's what they keep telling us* (*Organisation/project-based* CTN)
>
> *[Volunteering's] great in terms of community involvement but also a resource. There's a reality that councils don't have the staff to plant this many trees, so if we don't do it with volunteers, it's just not going to happen* (*Enterprise type* CTN)

3.1.2.4 Size and type of production

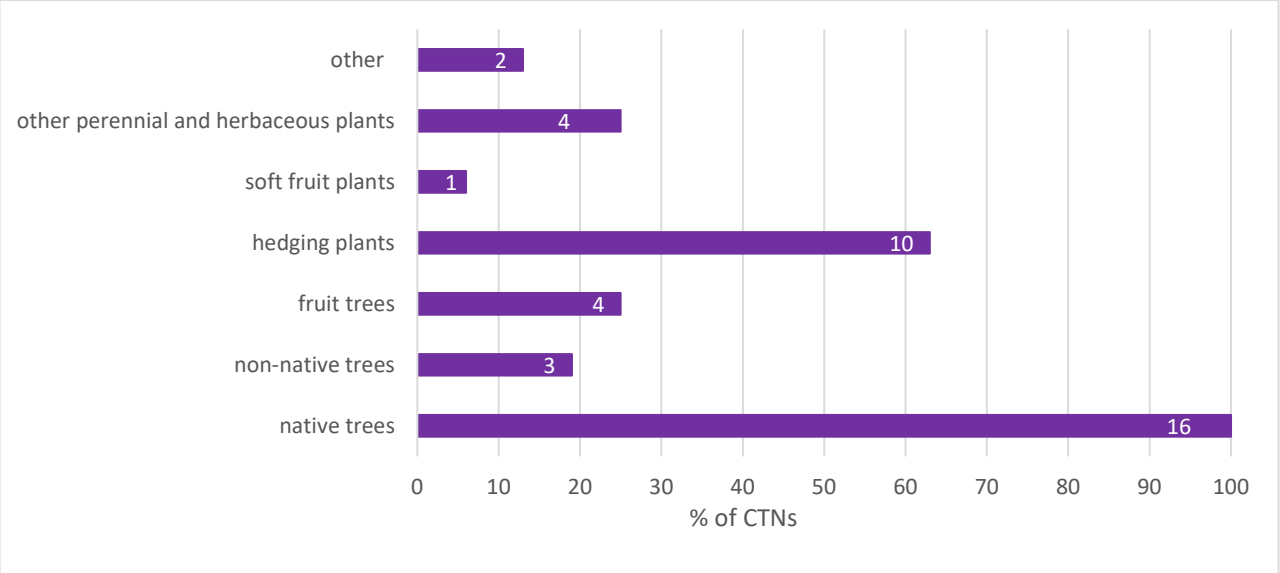
Looking first at production volume, Figure 3 illustrates that there is a significant range across the case studies with smaller CTNs typically producing less than 1,000 trees a year, and the largest producing up to 150,000. Just one CTN was producing more than 150,000 at around 1 million trees a year, which was not typical. The smaller initiatives in our sample were *Community-based* CTNs, larger initiatives included examples of *Organisation/project-based*, *Enterprise* and *Network* CTNs.

Figure 3. Size of case study CTNs by numbers of trees produced (n=16)



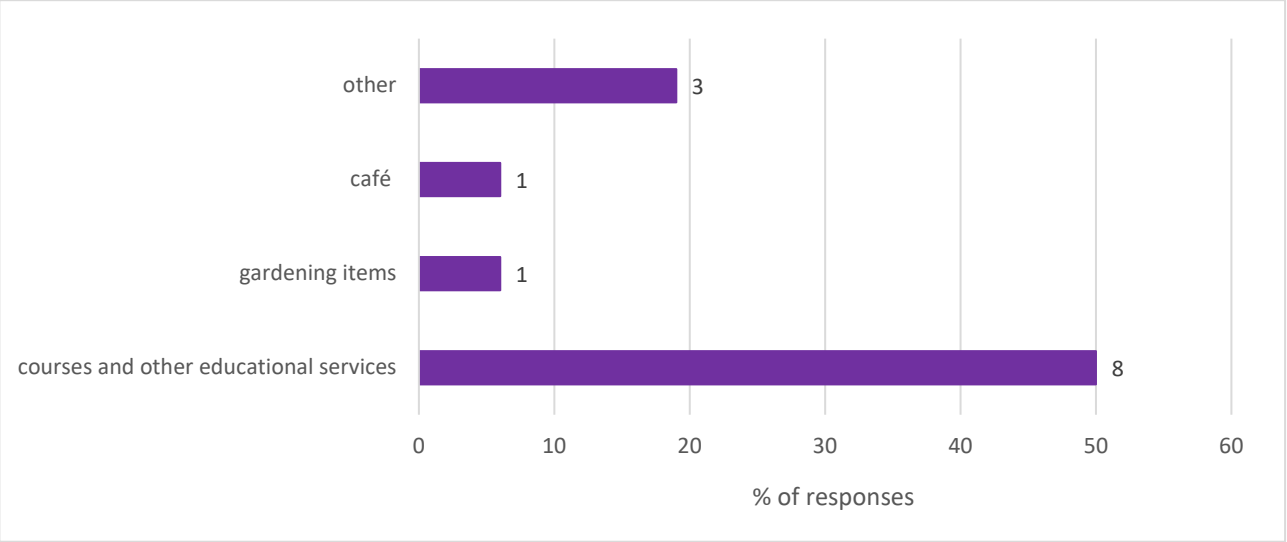
In terms of what is being produced Figure 4 shows that all CTNs are producing native trees and most are producing hedging plants. Around a third of case study CTNs are growing non-native trees and fruit trees, and a third products other than trees. Seven CTNs are selling their trees, nine provide trees free of charge. These CTNs are supplying a range of individuals and organisations, such as an associated project partner, Local Authorities, government agencies and local landowners. About half of the CTNs offer some kind of training or opportunities for educational experiences, one has a café, and one sells gardening items (see Figure 5).

Figure 4. Type of trees and other horticultural products produced by case study CTNs (n=16)*



** Other = annual bedding plants and montane plants*

Figure 5. Other products and services provided by case study CTNs (n=10)*



**Other = none, advice to new tree nurseries, possibly courses in future*

Looking at the production trees, all the case study CTNs are growing from seed (see Figure 6) with a minority collecting self-sown trees for potting-on. A quarter of those sampled bought in plants from other nurseries to grow on. All bar one CTN are sourcing and propagating local provenances, with the majority focusing exclusively on local provenance, and the rest doing so most of the time (Figure 7).

Figure 6. Tree production methods used by case study CTNs (n=16)

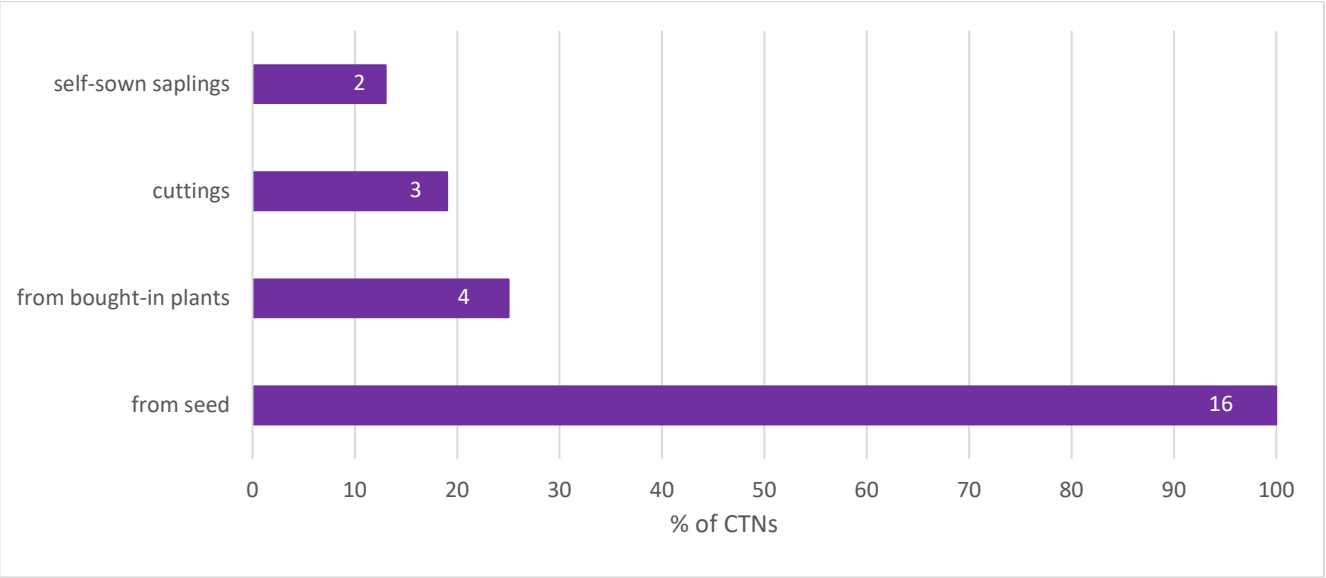
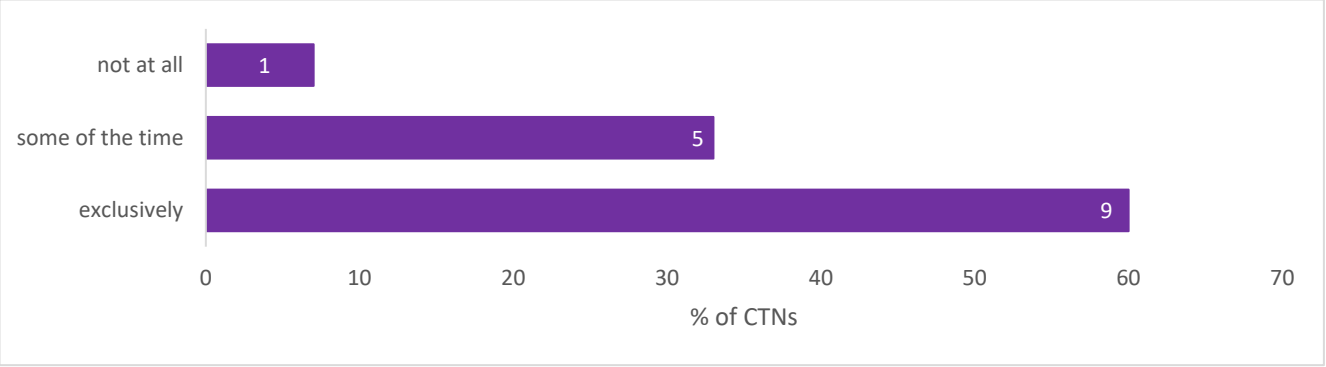


Figure 7. Use of local provenances by case study CTNs (n=15)



3.1.3 Success and sustainability

When asking CTNs about how they achieved their objectives and what contributed to sustainability, the following common factors were mentioned:

- Subsidising start-up
- Articulating a clear vision and aims for the CTN
- Leadership and management

- Being part of a network of practice
- Understanding demand for trees: markets and recipients

Each of these issues is described more fully below.

Subsidising start-up. All the case study CTNs, regardless of type and size, had relied on some kind of financial support as they established, and which they considered to have been essential to their establishment. This was either in the form of an initial grant or financial exemption, as free use or peppercorn rent for land. The range of grants and financial support provided ranged between £1,000 to £15,000. This financial support had contributed to the high capital costs of basic infrastructure and systems, including the costs of managers and volunteers setting these up, and covering the other costs of the first production cycle before any potential income stream from trees.

As one person put it:

> *We do feel…that…the money it would cost for a smaller nursery or someone starting from afresh, to actually get set up and deal with growing trees on any sort of scale…unless there's significant government help it would be very, very difficult because…a lot of businesses need a return on investment and cash flow straight away.* (*Enterprise* CTN)

A clear vision and aims for the CTN. Establishing the primary objectives of the CTN and what it was trying to achieve were mentioned as being key to providing clear direction for the initiative, as well as being able to communicate to volunteers what their efforts were contributing to. This was important to engage them initially, as well as to maintain their interest. Also important is a clear articulation of the expected outcomes. This includes such issues as balancing aims to produce trees and aims to leverage other social or environmental benefits. For example, one case study CTN produces one hundred half-standards a year but places a great emphasis on the care of these trees in the nursery and beyond. Their objectives extend to engaging with and encouraging members of the local community to maintain the trees they produce where they are planted out.

> *I feel this is the most fundamental issue: having a potential project to work towards is essential.* (*Community-based* CTN)

> *It very much wasn't trying to pretend to be a proper nursery; it was much more around the engagement than the productivity.* (*Organisation-based* CTN)

A management plan was mentioned by some CTNs as being important for ensuring continuity in approach to the management of the nursery, as well as providing tangible goals for everybody to work towards.

Leadership and management. It is important to have a person or group of people who can make decisions and lead the organisation and governance of the CTN to achieve its vision and aims. Leadership in CTNs with a paid member of staff appeared strong and clearly defined but comes at a financial cost which cannot be borne by many CTNs.

Furthermore, CTNs supported by a wider organisation or charity often have support around administration and management, enabling the nursery staff member to focus energy on overseeing production and engaging with volunteers. Without this kind of support, it is difficult for a CTN to develop further, as CTN members are occupied with nursery operations. Coordination can be particularly challenging for *Network* CTNs, which by their nature have activity spread across multiple sites. Three *Community-based* CTNs described the difficulty of delegating certain tasks, explaining that it didn't seem right to ask volunteers to do something if they had not expressed an interest in it.

> *We have an employee; they're so much more valuable than a volunteer because they're here week in week out, day in day out, and they really understand working in the place…but there is a cost to that of course.* (*Organisation/project-based* CTN)

Being part of a network of practice. Networking and peer-to-peer learning were consistently mentioned as adding high value to CTN members' confidence and understanding of the sector. Interviewees explained how networking enabled them to learn about a range of things, such as information about grants, technical issues, sector-wide trends, and local demand for stock. A couple of CTNs discussed established networks – either CTN-focussed or with a wider environmental scope – which were seen as useful for connecting with like-minded and supportive contacts; whereas others shared stories of visiting successful CTNs to witness good practice for themselves. It was evident that the social contact and sense of encouragement from these encounters had a profound positive impact on interview participants.

Understanding demand for trees: Markets and recipients. It is important for CTNs to understand the local market and build relationships with individual customers and larger scale tree-planting projects. Demand forecasting is challenging for all CTNs – even *Organisation/project-based* CTNs which often supply other landowners and projects in addition to their own. Demand for species, type of product and quantity are not easy to predict. However, well-established relationships with local stakeholders and customers can help protect against market uncertainty. Part of understanding markets includes competition from other businesses, projects or schemes can impact the viability of CTNs – for example, one CTN cited the Woodland Trust's MOREwoods[5] scheme as partly accountable for its decision to cease operation. One CTN (*Enterprise*) explained how it had an agreement with the Woodland Trust that the MOREwoods scheme would not operate in the area it serves.

[5] https://www.woodlandtrust.org.uk/plant-trees/large-scale-planting/morewoods/ this scheme provides 500 plus saplings, advice and funding to establish new woodlands on at least half a hectare

3.1.4 Key barriers and challenges

The most important barriers and challenges to CTNs achieving their aims and objectives, which have particular relevance to the Boosting Community Tree Nurseries Pilot Project included the following in no particular order:

- Managing biosecurity
- Accessing land and critical infrastructure
- Maintaining income
- Maintaining a volunteer base
- Managing growth and succession
- Planning production for future resilience.

Each of these issues is discussed in more detail below.

Managing biosecurity. This was seen across all the case studies to be a challenge, but CTN response to this challenge was variable. Biosecurity was more likely to be considered carefully if the CTN was managed by an individual with professional horticulture or forestry experience. Such CTNs described making provision for quarantining stock, washing footwear and equipment, and record-keeping. A well-established large CTN is in the early stages of collaborating with an app developer to create an app which could support CTNs with their biosecurity. Out of sixteen CTNs, three had considered Plant Healthy certification, but only one is actively working towards it. Certification, such as Plant Healthy or official documentation such as plant passports, were regarded as too costly and complicated, or not appropriate to the enterprise. In a couple of instances, the administration associated with plant passports had contributed to a decision to not sell produce. A recently established *Community-based* CTN has created its own biosecurity risk assessment after receiving biosecurity guidance from Norfolk County Council. **A common perception** and important narrative were that **'local varieties' and provenances, locally collected seed and 'small-scale' operations pose no, or very minimal, biosecurity risk.** One CTN explained how volunteers sometimes donate plants from their holidays, indicating a dangerous lack of biosecurity understanding. Amongst the interview respondents, there were significantly few mentions of the need for biosecurity support and guidance, which seemed a result of CTNs not knowing what they don't know rather than already following best practice. As one person remarked:

> *There wasn't the strongest adherence to biosecurity protocols by our lead individual…and the volunteers…many of them were certainly more lax than that…it's a challenging area.* (*Organisation/project-based* CTN)

Accessing land and infrastructure. Accessing land is an issue particular to *Enterprises* and *Community-based* CTNs, whereas infrastructure is more of an issue for *Networks* and *Community-based* CTNs. Almost all the CTNs interviewed either pay nothing to rent their

site or pay a negligible/peppercorn rent. This type of arrangement seems critical in allowing CTNs to operate without debilitating rent costs. Most of these arrangements seemed secure, but there were a couple of instances where tenancy had been threatened. Tenancy seemed most secure where the landlord – for example, the local council – is invested in the CTN's objectives and outputs. Access to land was often cited as a barrier for nursery development and potential for increasing production. Sourcing reliable irrigation was critical for CTNs with dedicated sites (less so for those growing in their own gardens). The reliance of good biosecurity upon sufficient space and irrigation should be noted.

Maintaining income and income flow. The majority of the CTNs in the sample are supported by grants which make up the larger portion of income share. The short-term nature of grants – often on a one-year cycle – creates financial instability. Continually finding and applying for grant funding opportunities creates a significant amount of stress and administration for CTN members, and does little to encourage growth and upscaling. It also creates uncertainties around staffing where employees' wages are dependent on grant funding, which can lead to high staff turnover, loss of knowledge and skills, and have an overall impact on levels of production.

Maintaining a volunteer base. All CTNs emphasised the integral role volunteers play in nursery operations. Most CTNs have been successful in recruiting volunteers, but some challenges persist, such as remote locations and high age demographics. Covid-19 restrictions were cited as being a significant setback to some nursery operations. In particular, one CTN – which operates a residential volunteer week model, i.e. where volunteers stay at the project site for a week to volunteer - was forced to employ more staff to mitigate the lack of volunteer labour. Different engagement strategies are employed according to context, but there are opportunities for CTNs to learn how this can be done effectively.

Succession planning. Planning for the future was mentioned as important for a number of reasons, including: ensuring a stable governance structure, ensuring staff and volunteer succession and avoiding over-reliance on a small number of key individuals. *Organisation/project-based* and *Enterprise* CTNs in the sample where a wider pool of staff and volunteers supported the initiative and volunteer management appeared more confident about succession and sustainability. For example, one of the *Enterprise* CTNs explained how they had recently moved the organisation's account names, passwords etc., away from the personal account of the nursery manager to an organisation-wide set of accounts. The same CTN also has 'key man' insurance which would provide financial support for six months should the nursery manager/director be made absent by unforeseen circumstances. The *Community-based* CTNs with little formal support seemed to be overly reliant on just one or two key individuals, which could have negative impacts on the people involved (burn-out for example), or could act as a barrier to change and growth of that particular CTN (e.g. becoming subject to "founder syndrome"). The following quotes are illustrative:

> *When I think of the length of time, I have run our tree nursery voluntarily, I regret not approaching a large local organisation to try and get their sponsorship, as we could never find a grant that paid for staff. As an already established nursery, it was impossible.* (*Community-based* CTN)
>
> *I have tried to find a suitable successor for managing the nursery for a number of years, but being voluntarily run is not an incentive, neither has it bred someone who can deal with responsibility. There is not enough money for a paid worker from the sales of only 1500 or so trees a year, £10-£15 a week at most!* (*Community-based* CTN)

Upscaling capacity and managing growth. On the question of increasing CTN production capacity, four CTNs appeared enthusiastic for expansion, two placed an emphasis on 'sustainable' expansion, one claimed to be incapable of expansion without additional infrastructure, and five stated an aversion for expansion; often motivated by desire to focus on quality over quantity; two CTNs did not discuss expansion and the remaining two no longer operate, so expansion is not applicable. There was some uncertainty over how best to scale operations and manage growth sustainably. A couple of CTNs explained that this had been a point of disagreement among different CTN members, providing a people management challenge as well. For the larger CTNs in the sample, upscaling volumes beyond the 50,000 and 90,000 tree p.a. they currently produced would require an increased investment in order to obtain the necessary additions of land, machinery or site infrastructure. This was not something they were necessarily interested in doing partly due to the risks and efforts, and partly as it represented a different kind of business to them.

Planning production for future resilience. There was some uncertainty from two *Organisation/project-based* CTNs and the *Enterprise* CTNs with professional horticulturalists and CTN personnel, about whether producing trees of local provenance was the most suited to future resilience, or whether producing trees with e.g. more southerly provenances was a better option for production and sale.

3.1.5 Knowledge and information gaps

When we asked CTNs what additional knowledge and information could support the establishment, development and maintenance of CTNs the following list emerged - there was no clear differentiation in the requests by CTN type or size:

- Network establishment and support for peer-to-peer learning and exchange (n=3)
- How to find and apply for grant funding to support CTNs (n=3)
- Mentoring from and visiting example CTNs as a form of peer-to peer learning (n=2)
- CTN business planning and management (n=2)
- Resource navigation – pointing to other existing resources e.g., seed collection guide (n=2)

- Information about tree CTN regulations and biosecurity practices appropriate to different types and sizes of CTNs (n=1)
- CTN record-keeping, e.g. origin of plant, plant movements, origin of materials inc. soil, potting on dates (n=1)
- “How to” technical sheets for volunteers e.g., pruning, seed collection (n=1)

3.2 Assessment of CTN pilot interventions

3.2.1 What kinds of CTNs did the Pilot Project engage with?

3.2.1.1 Which CTNs took part in the research?

The assessment covers fourteen CTNs and one CiC running a CTN support network that were funded in year one of the Pilot Project. The Pilot Project was administered through five local authorities taking part in the Trees Outside Woodlands programme. As a result there was a limited geographical area, comprising CTNs in England in the regions of Chichester, Cornwall, Kent, Norfolk, and Shropshire. In each of these areas a Project Officer working on TOW was responsible for promoting and administering the grants offered to CTNs.

Of the fourteen CTNs the Pilot Project supported, thirteen CTNs took part in the intervention assessment. Of these thirteen CTNs, twelve completed both the on-line monitoring survey and semi-structured interview and one CTN completed the semi-structured interview only. Of the two CTNs that did not take part in the intervention assessment at all, one CTN did not feel itself to be well enough established to take part and one CTN had not yet received its funding.

Table 3 shows how CTNs that took part in the Pilot Projects monitoring survey found out about the Pilot Project.

shows CTNs that took part in the intervention assessment identified by location, year established, grant amount, CTN type and main categories funding was used for

Table 3. How CTNs became involved with the Pilot Project (n=12)

How CTNs heard about the Pilot Project	Number of CTNs
Direct contact from a project officer	n=3
From a local authority contact	n=8
Could not recall	n=1

3.2.1.2 How did these CTNs establish themselves?

All Pilot CTNs were established between 2019 and 2022, thus CTNs ranged in age from less than one year, to between two and three years in operation. The thirteen pilot CTNs that

were interviewed were all established on land they had not purchased, or had not purchased with the original aim of establishing a CTN.

- Five CTNs were established by organisations (public and private sector), on available land under their ownership.
- Three CTNs were established by a newly created group (non-owners), on available land with the permission of an existing landowner.
- Four CTNs were established on the private land of CTN volunteers or staff members.
- One CTN was established on the rented land of volunteer/staff members as well as on available land with the permission of an existing landowner.

Across the four CTNs established on available land not under their ownership, two CTNs explicitly spoke of having the land gifted to them. Land restriction issues arose for two CTNs who had land gifted to them and for one CTN established by an organisation using available land under its ownership. For two CTNs this referred to a lack of public access without the crossing of privately owned property/land. For one *Organisation-project* based CTNs this included further concerns for health and safety due to the CTN being located inside an operational depot. For one *Community-based* CTN, operating on gifted land was experienced as frustrating as it meant *'playing by the rules'* of the landowner and having less autonomy in deciding which tree species to plant.

CTNs ranged in the size of land available to them and were created on land including private gardens, allotments, in raised beds above hard ground such as tarmac/paved areas, on farmland, on green space belonging to parishes, and on park land both private and public. One *Community-based* CTN described operating on a patch of land akin to a small domestic garden. Two CTNs described their CTNs as comprising raised beds which limited both the numbers and species of trees that could be grown. One *Enterprise* type CTN explained that the nursery had been established on three acres of agricultural land available. While ten of the CTNs were single-sited, three CTNs were *Networks*. One *Community-based* CTN explained that while the CTN had begun as a *network* venture for practical reasons –the land for the CTN having been made accessible via different volunteers' gardens – on being offered a single-site for the CTN by a local landowner they were hesitant to accept. The CTN explained that they felt their *Network* CTN might fare better in the face of adverse weather conditions than a singular site which appeared prone to water-logging.

3.2.1.3 What were the critical factors in their establishment?

The most important factors experienced by CTNs in the Pilot Project (in no particular order) included:

- Grant funding for establishment costs
- Access to land

- Time
- The correct skills base
- People management and developing a volunteer base
- A clear vision and aims for the CTN, aligned with volunteer interests

Funding. Across all CTN types, grant funding was a crucial aspect of new CTN establishment and existing CTN development. 11 of the pilot CTNs explicitly stated that the funding awarded through the Pilot Project was critical for their establishment.

Land. The monitoring survey and semi-structured interviews results reveal pilot CTN establishment as being varied and heavily contingent on land availability and cost. The availability and cost of land was a critical factor in determining the location, land type and size of CTNs. One *Enterprise* CTN which had considered buying land but later opted to use the existing land of volunteers stated:

> *[name of CTN] "light" would have cost £50,000 so we went for [name of CTN] "skinny". (Enterprise type CTN)*

Time. Across all CTN types, the time of staff and volunteers were crucial to establishment and /or the day-to-day running of CTNs. The time it took to procure materials, seedlings, and to erect infrastructures such as fencing and raised beds were also important and conditioned the speed at which CTNs could begin or continue planting.

The correct skills base. Across all CTN types, the skills of one, or a small number of volunteers, were critical to the establishment of CTNs. Skills around horticultural practice and tree growing, as well as in sustainability and environmental management were particularly important, but also included land management skills, managerial, business, and administration skills.

People management and developing a volunteer base. In addition, CTNs described the need for volunteer coordination and 'people skills' since their objectives exceed supplying trees, including social objectives (volunteer and community development).

A clear vision and aims for the CTN, aligned with volunteer interests. CTN establishment was closely related to interests of lead staff and volunteers. These interests impacted the establishment of CTNs in three main ways:

i. the governance model and objectives of the CTN, and whether CTNs were devised as an *Enterprise*, an *Organisation/project-based* entity, or operated as a *Community-based* endeavour.

ii. the kinds of volunteers or communities that CTNs engaged with, and the kinds of impact nurseries aimed to have.

iii. the species of trees selected for production with preferences across all CTN types being for native broadleaf species and fruit trees.

3.2.1.4 What are the key aims and objectives of the CTNs?

Data from the interviews illustrated a range of aims, objectives, and differing levels of business planning across the Pilot Project CTNs. These were linked to the type of CTN and the interests of CTN staff and volunteers.

Profit and local economies. The only CTNs that reported profit as an explicit objective were two *Enterprise* CTNs. Alongside profitability these CTNs also aimed to provide trees with job creation, customer demand in mind and conservation.

Improving communities and conservation. The five *Community-based* CTNs had as their main objectives to improve environmental connections and to foster a greener ethos amongst the communities they were working with. They also wanted to provide opportunities for leisure, education, upskilling of staff, volunteers and the community, and to improve the local landscape for communities to enjoy by providing trees for public and communal land as well as for private gardens and estates. The six *Organisation or project-based* CTNs also worked to improve environmental connections and to encourage and contribute towards conservation. One of these CTNs focused on the genetic profiling of trees and the cultivation of trees with specific DNA.

Volunteer focussed. Five of the *Organisation or project-based* CTNs and one *Enterprise* CTN operated with a specific focus on the kinds of volunteers they engaged with, such as adults with learning difficulties, adults in the criminal justice system, adults with substance abuse problems, and other disadvantaged or marginalised groups.

3.2.2 How did the Pilot Project support CTNs and what difference (impact) did that support make?

The Pilot Project supported CTNs in a variety of ways. This support was a combination of:

- financial awards to help achieve intended aims - Grant criteria were kept as open as possible. Both new and established CTNs, could apply for what they needed eg infrastructure, consumables, funding for staff and training. A grant application form was completed which was assessed by the local project officer. Most grants were paid up front.
- guidance from project officers based within the local authorities hosting the Pilot Project
- training on biosecurity issues, and
- the opportunity to join a CTN Facebook support network (i.e. a community of practice) hosted and developed by a group which included access to training events and other supportive resources.

A description of the intervention projects and the support provided through the Pilot Project is outlined in Table 4. The monitoring survey and interview data revealed some evidence of the impact of these different interventions.

Table 4. Summary table of Pilot Project CTNs and CTN support network (n=14)

No.	Location	Established	CTN type	Funding provided	Main categories funding was awarded for
1	Norfolk	2020	Community-based	£263	Fencing materials
2	Norfolk	2021	Organisation/Project-based	£12,000	Infrastructure, equipment, mileage, promotion
3	Norfolk	2021	Organisation/Project-based	£1,280	Infrastructure
4	Norfolk	2021	Organisation/Project based	£4,264	Fencing, tools, water tank, whips
5	Norfolk	2021	Community-based	£1,155	Infrastructure
6	Norfolk	2019	Community-based	£782	Compost, equipment, kit for events
7	Norfolk	2019	Community-based	£281	Root trainers, netting protection
8	Cornwall	2020	Enterprise	£10,000	Seed sowing materials, polytunnel, nursery advisory support
9	Cornwall	2021	Enterprise	£10,000	Capital items – including deer fencing
10	Cornwall	2021	Organisation/Project-based	£9,600	Materials, polytunnel, maintenance equipment
11	Kent	2019	Organisation/Project-based	£15,000	Infrastructure, support, development costs
12	Shropshire	2020	Community-based	£2,987	Watering system, compost, storage, pots, training
13	Shropshire	2021	Organisation/Project-based	£19,350	Infrastructure, drip line irrigation, printer, canes, compost, ties
14	National	2020	CIC - CTN support network	£2,000	Five webinars, six Open Space online drop in sessions, , Facebook group support

Impact of financial support. Table 5 summarises data from the monitoring survey to show how the CTNs in the Pilot Project used their financial awards. Capital items and consumables were the most common items, and important to both those CTNs newly establishing and those CTNs that had been in operation since 2020. The results shown in Figure 5 largely confirm the intended use of the awards outlined in the funding applications.

Table 5. What items pilot CTNs used their financial awards for (n=13)

Financial awards put towards	Number of CTNs
Capital items (e.g. greenhouse, poly tunnel, tractor, fencing, irrigation system installation)	11
Consumables (e.g. compost, pots, tree guards, irrigation replacement nozzles)	9
Staff costs for employees paid hourly (e.g. salaried staff)	2
Staff costs for employees paid annually	1
Land/building costs including maintenance	1
Training for staff and volunteers	1
Other (please specify):	2[6]

Evidence from the interviews suggests the importance of the funding to the establishment of pilot CTNs, as the following quotes suggest:

> *The nursery would never have happened without the funding – it's been fantastic! (Organisation/project-based CTN)*
>
> *The Shared Outcomes fund has been really important. As a tree nursery with limited budget we wouldn't have been able to do it to such a high standard. (Organisation/project-based CTN)*
>
> *Funding made it possible really. We wouldn't have gone ahead without fencing. (Community-based CTN)*

Engagement with CTN support network. The charity confirmed their activities supported by the Pilot Project were: running and monitoring the activity of a Facebook network for CTNs; organising informative webinars for CTNs based on topics of interest/need as raised by members of the Facebook network; facilitating knowledge exchange between CTNs including site visits.

Pilot Project CTNs were asked about their engagement with the network. Three CTNs were actively taking part in the Facebook network and attending various events linked to the platform. For these CTNs the impact was important. Whilst one of them spoke of a:

> *good and vital network of connected groups (Community-based CTN)*

another two CTNs stated that:

[6] Other included: Chlorophyll and cellular DNA testing and resources materials/equipment for display at events.

The peer-to-peer support of the online community has been invaluable as has our trip away to [visit another CTN]. (Organisation/project-based CTN)

Some of the webinars have been really helpful. (Organisation/project-based CTN)

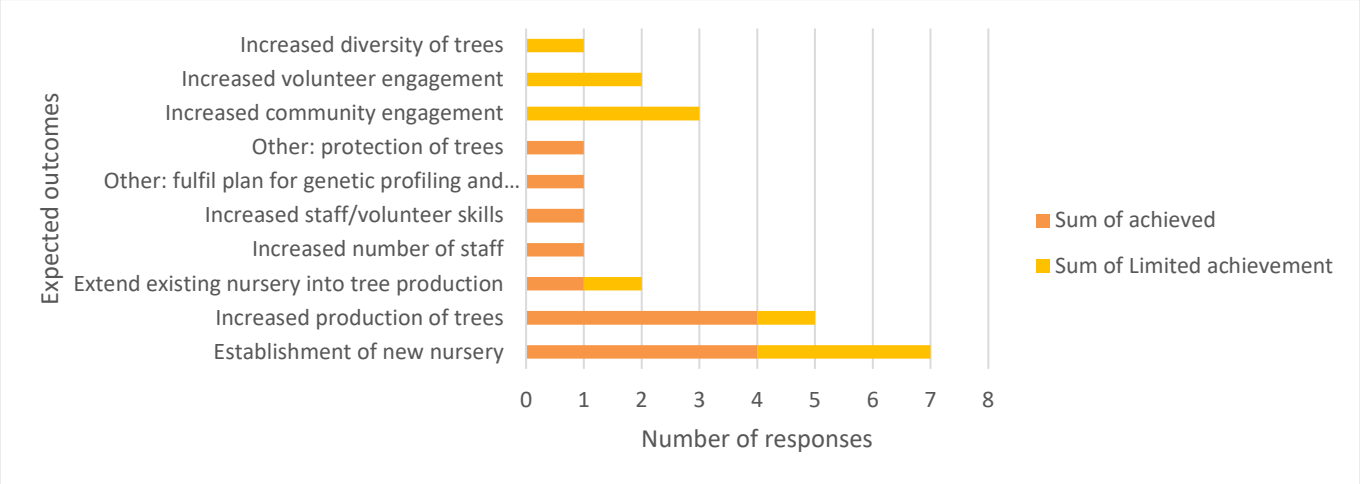
Four CTNs said they were aware of the Facebook network but did not have time to take part, as one of them explained:

It [the CTN] takes up so much time… we have barely any spare time so might not be able to… it would be nice to be connected to others but it's too much. (Organisation/project-based CTN)

Four CTNs were not aware of the Facebook network at all, and thus had not had the opportunity to benefit from the information and knowledge exchange. One CTN said the network was not relevant to them.

Impact on achieving intended outcomes. In the monitoring survey CTNs were asked the extent to which Pilot Project support had helped them to achieve their intended outcomes. CTNs were asked to select all intended outcomes that applied. Two CTNs did not provide an answer to this question. Results are summarised in Figure 8. All CTNs that responded felt they had achieved, to a limited or full extent, the intended outcomes of Pilot Project support. Most impact, was achieved around CTN establishment and production of trees. Considering the early stage in their development journey for so many of the Pilot Project CTNs this emphasis is not surprising.

Figure 8 Extent to which pilot CTNs achieved intended outcomes of Pilot Project involvement (n=10)



Of the 13 CTNs provided grant support, explicit aims were to support the establishment of 9, and increase or extend production of 5, so the results indicate these aims were largely achieved. It was not just the financial award, but the combination of support the Pilot Project was able to extend, including the advice and hand-holding of Project Officers that made the difference to a number of CTNs. One CTN reflecting on the pilot considered how they might have fared without this support:

We could have tried but we would have had failures and challenges and that would have been disheartening. (Organisation/project-based CTN)

3.2.3 What were the challenges and barriers experienced by CTNs in the Pilot Project?

The most important challenges and barriers and to CTNs achieving their aims and objectives, experienced by CTNs in the Pilot Project related to two broad areas, i.e. ensuring a flow of funding, and, the day-to-day running and management of the CTN. This included:

- Difficulties and delays utilising the funding from the Pilot Project
- Problems finding additional grants and funding sources to cover financial shortfalls, and self-funding to cover volunteering and other costs
- Difficulty reaching the volunteer numbers and hours needed for nursery progress on nursery sites with public access restrictions
- Problems recruiting staff
- The wellbeing of volunteers and developing or maintaining a volunteer base
- Managing nurseries through seasonal stresses, particularly drought and frost

Utilising the funds provided through the Pilot Project. Funding from the Pilot Project was imperative to the establishment of CTNs. However, nurseries experienced a range of issues in utilising funding, including difficulties procuring materials, labour power, and meeting staffing level needs. One CTN stated that the procurement process was not straightforward and took more time than had been anticipated. Three CTNs experienced challenges when trying to obtain building materials, consumables, trees, and seeds because of supply-side issues. CTNs explained:

They wanted minimum order levels… that was above our needs and budgets. (Community-based CTN)

We waited 7 weeks for stone… We couldn't get posts to make the lines of trees because HS2 were buying all the posts. (Organisation/project-based CTN)

We will need some native hedging, and when I was looking, it was very difficult to come by. People [are] out of stock… it's hard to come by until next year. (Community-based CTN)

One CTN described that even where materials and a contractor were procured, the contractor already:

Had weeks' worth of work in front of him [on other jobs]. Real-time deadlines don't work in the real world. (Organisation/project-based CTN)

In terms of labour, alongside delays to external contractors who helped to establish nurseries, CTNs found that once established, labour-time remained a challenge. Three CTNs struggled to utilise the funding due to a lack of available staff and volunteer time.

Self-funding. Across the CTNs those who had utilised all of the Pilot Project funding, described situations where they used their own finances to support continued development and operations at their nursery. One person at a *Organisation/project-based* CTN expressed concerns at having already self-funded a considerable financial shortfall. CTN staff and volunteers used their own funds to pay for nursery essentials both in terms of the more obvious physical infrastructures and consumables like trays and compost, as well as the actual costs of volunteering such as petrol money for seed collecting trips. One CTN explained:

> *I didn't charge for the mileage which was 8000 miles, so also a labour of love. (Organisation/project-based CTN)*

Access. Some of the CTNs involved in the Pilot Project described issues accessing the nursery sites, either because of the terms of the land owner/lease, or because of Health and Safety requirements. This impacted the number of volunteers able to get to the CTN and disrupted the supply of labour needed to keep on top of key activities and to stick to planting timelines. The access requirement for lead volunteers and staff to work alongside any volunteers present, prevented scope for ad-hoc volunteer visits on these sites, and placed significant time-strain on lead volunteers and staff. CTNs with these access issues could not see a way to resolve these issues other than relocating CTNs to a different site.

Staffing. One CTN stated that staff posts did not cover enough hours and were hard to fill:

> *If we don't find a way of maintaining that or expanding it going forward, then we will stop. (Enterprise type CTN)*

Another CTN explained that it was hard to find a suitable candidate due to the skill set required to do the job of CTN manager:

> *The right person for the job doesn't seem to exist or is happy where they are. (Enterprise type CTN)*

These two *Enterprise* CTNs described further barriers to recruitment, such as the short-term contracts resulting from short funding timelines and the associated poor job security and attractiveness. Although the funding was gratefully received, the two *Enterprise* CTNs highlighted they would have benefitted from using some of the funding for salaries to secure continuity in CTN management and avoid overreliance on key members such as lead volunteers.

> *Without dedicated capacity it is difficult to do this project unless you got the time. (Enterprise type CTN)*

Volunteers. Fatigue among lead CTN volunteers was common among the CTNs. This was a result of a combination of the above challenges and barriers, with lead volunteers and staff often recognising in themselves signs of burn out. One CTN volunteer lead explained:

> *I've got to the point where it's a lot of work, I'm starting to feel my enthusiasm ebb a bit – we have churned out so many trees, but what is happening when they get out there – I can't control if people are putting them in the right place, is it actually paying off? (Community-based CTN)*

Drought stress and frost. CTNs described the challenges posed by increasing prevalence of drought over the growing season. CTNs described the year 2022 as being particularly challenging for growing with an unseasonably dry and hot July and August and a cold December challenging tree survival. CTNs discussed their concerns that projected climate change would render these challenges even more acute in the future and might lead to a greater percentage of trees lost, to increasing irrigation costs, and to rising costs to secure forest genetic resources from climate matched/ adapted provenances.

3.2.4 What additional support/actions would enable CTNs to develop and become sustainable?

CTNs were asked how they felt about their sustainability and development potential for the future. They were asked to identify additional support and actions that would allow them to achieve these ends. Five main areas of support/action emerged across all the CTNs regardless of type, including:

i. Training in nursery skills and general business management
ii. Biosecurity training
iii. Developing business and governance models
iv. Maintaining a volunteer base and succession planning
v. Ensuring continuing funding

Training, skills and learning. Across the CTNs training and support emerged as central for their development and sustainability. One *Enterprise* CTN again stated the need for skilled staff with a diverse skill set, whilst the other also felt the need to increase existing staff and volunteer knowledge and skill base in areas including how to run a profitable business, managing staff/volunteers, pest and disease identification and broader biosecurity issues (including risk assessments). This CTN highlighted that access to a resource hub with a repository of information would be beneficial. *Organisation/project based* and *Community-based* CTNs who tend to be volunteer-led described various skill and learning needs, including guidance on CTN business management, advanced horticultural knowledge and skills (including soil and growing), training on how to set up and the legal aspects involved in running an association.

Biosecurity training. Across the CTNs there was a limited amount of biosecurity awareness and understanding, including a lack of knowledge of biosecurity principles and practices, a lack of awareness of biosecurity accreditation schemes such as Plant Healthy, and incorrect assumptions that seeds and trees being sourced and sold locally are not a risk for disease-spread. One *Community-based* CTN which did have Plant Healthy accreditation and a rigorous biosecurity regime, explained the difficulties in finding concise biosecurity information relating to specific tree species and nursery activities. The nursery felt that besides one Plant Healthy module, resources were not user friendly, and not aimed at the CTN sector. The CTN explained:

> *It would have been great at the beginning to have a 10-page resource: the top stuff you can do. I'm sure there are loads of common factors [across tree nurseries]… if that was available it would be most useful. (Community-based CTN)*

Developing suitable business and governance models. Most CTNs described an intent to prioritise developing their business and governance models with more though during 2023. For example, one *Community-based* CTN expressed an interest in moving towards a legally recognised Community Interest Company, which would increase the entrepreneurial scope of the CTN. However, they described the need for more knowledge and skills training to enable their thinking, capability and capacity in this area. Generally speaking, the Pilot Project CTNs were operating using a small number of consistent and committed lead volunteers or staff, and pointed again to the problem of having little time to develop their CTNs. For some CTNs a lack of certainty around what a tree nursery could look like, how it might be able to upscale production, if it could be developed into a viable business, and how it might need to operate once past the establishment phase, was tied into a lack of knowledge of the market, uncertainty around future funding, as well as staff/volunteer skills and available time to work through this kind of planning. One CTN described a sense of anxiety in deciding:

> *Where do we go with the trees? Is it going to be selling or gifting? How is that going to be managed? Some funding you have to give the trees away. It's a stumbling block – we don't understand what the outcome needs to be… business model support is what we really need. (Organisation/project-based CTN)*

Maintaining a volunteer base. Due to the reliance on volunteers in key positions, many CTNs identified the availability and continuity of volunteer contributions as important to their sustainability. A *Community-based* CTN emphasised the importance of succession planning for future sustainability:

> *I would like to see the next generation of tree nursery people appear. [Person's name] is important to it – when he's gone it might be difficult, but we will just have to look at that when it happens. (Community-based* CTN)

One *Organisation/ project based* CTN stated that their continuation depended solely on a limited number of motivated key individuals and the knowledge base of local Tree Wardens.

Since basic costs for materials and consumables were covered by the organisation/ project, the CTN only required individuals to lead on planting and care activities. In this case, the volunteer pool was determined and supplied by the organisation concerned. However, another *Organisation/ project based* CTN stated that sourcing sufficient numbers of volunteers was difficult and uncertain, and likely to impact their sustainability.

> *The reality is that we don't know how many [volunteers] we can get down there and for how long. Will have to see how it develops in the future. (Organisation/ project based CTN)*

The issue of volunteer wellbeing and potential burn-out was pertinent here too. The reliance on a small base of key individuals is problematic and decreases CTN sustainability, not only because of the impact on those volunteers themselves, but also because it can dissuade other new volunteers from coming forward. An *Enterprise* CTN stated their need for funding staff wages to a level which attracted and retained staff, and increased job security. As most grant schemes will not fund staff, the structural difficulties within the sector, including uncertainties around market demand and requirements, challenges from the weather and pest and diseases, combined with and high labour demands, meant that the cost of staff and labour would continue to be major financial determinant of CTN's sustainability.

Funding. Most CTNs supported by the Pilot Project are Community-based and just establishing. As such their production is either in the first year, or has not yet got going, so they do not have trees to generate income. For some of the Community-based CTNs, the sale of trees is not part of their ethos or operating objectives. In both cases, CTNs stated their continued need for financial support to cover water bills, consumables and other materials. One *Community-based* CTN explained:

> *In the future there will be the need for more consumables, the trays will run out we will need more compost – because I want to do it, I fund it myself, but someone who may not want to contribute financially would not. (Community-based CTN)*

Two CTNs, one *Organisation/project based* and another *Enterprise* type, highlighted their need for fences or hedges to control deer and allow for larger scale production. Fencing was described as a major cost by the *Enterprise*, at circa £10,000 pounds per half a kilometre (enough to fence circa 10-12 ha). The *Organisation/ project based* CTN clarified that a stock-proof hedge would be preferable to forgo the need to replace fencing in the future.

The length of time funding was provided for was also seen as an important determinant of sustainability. CTNs wanted to know whether further financial support would be available following the Pilot Project, as they saw future funding as imperative to their survival, and the on-off cycle associated with grant funding to be a major threat. *Organisation/ project bas*ed and *Community-based* CTNs appeared to be more concerned over financial security to cover consumables and materials. *Enterprise* CTNs highlighted the need for long-term

funding and financial security which would allow them to attract and retain managerial staff with a diverse skill set.

3.2.5 What is the potential for Pilot Project CTNs to up-scale?

Overall, CTNs across all types suggested that there is a balance to be struck between achieving medium and long-term sustainability and scaling-up production. At present the scale of the challenges and barriers to CTNs, particularly in the early years of their establishment, probably mitigate against serious up-scaling until CTNs are firmly established and routes to overcoming some of those challenges had been found.

The two *Enterprise* CTNs expressed an interest in scaling-up their production or shifting output to meet demands. However, they too would need to find approaches to overcome the challenges of scaling up they identified as a lack of paid staff, volunteer nursery leads, and an assured body of volunteers. One of the *Enterprise* CTNs also explained that there would be a requirement for increased mechanisation and more land to scale up production, both of which were limiting factors because if the capital outlay, and availability of land.

Of the six *Organisation or project-based* CTNs, three would scale up or shift output to meet demands, one would not want to scale up or shift output, and two were not sure. Across the *Organisation/project-based* CTNs the most common challenges in scaling-up output were reported as lack of funding and/or financial capital, and not enough paid staff or volunteer nursery leads. One *Organisation/project based* CTN stated that they do not have the capacity to scale up production but felt that their work with an education institution could be used as a case study, paving the way and inspiring for other institutions to pursue a similar model. In this case, trees for local public and commonly shared areas could be supplied at low costs.

Of the five *Community-based* CTNs, two would scale up or shift output, two would not want to scale up or shift output, and one was not sure. Across the *Community-based* CTNs the main challenges of scaling up were time availability of lead nursery volunteers, and a lack of volunteers. One CTN explained:

> *It's more of us giving to them than them coming to help us as such. (Community-based CTN)*

Across the Pilot Project CTNs one *Organisation/project-based* CTNs and two *Community-based* CTNs that did not want to scale up or shift production, CTNs described being happy at their current size and scale of production.

3.3 National Survey

3.3.1 Characteristics of the sample

Research in Module 1 led us to estimate the size of the CTN sector in the UK at c. 80, which was the target sample for the survey. A total of 67 CTNs completed the survey. The sample

included 7 of the 15 case studies from Module 1 research in 2021, and 14 of the 16 Pilot Project CTNs. Regarding type of CTN, Figure 9 shows the majority were *Community-based* CTNs (30/67 c. 45%). A total of 3 were characterised as "Other" and comprised of individuals working to provide trees for community places and spaces. Figure 10 shows most CTNs in the survey were just establishing themselves or relatively new endeavours (17/67 c. 25% less than a year old, 36/67 c. 54% between 1-5 years). The largest category between 1-5 years was dominated by CTNs between 1-3 years old (27/36) c.40% of the total sample. Figure 11 illustrates the geographic spread of the sample was relatively wide, representing at least 78 sites (not all *Network* sites were mentioned or mappable).

Figure 9. Type of CTNs in national survey sample (n=67)

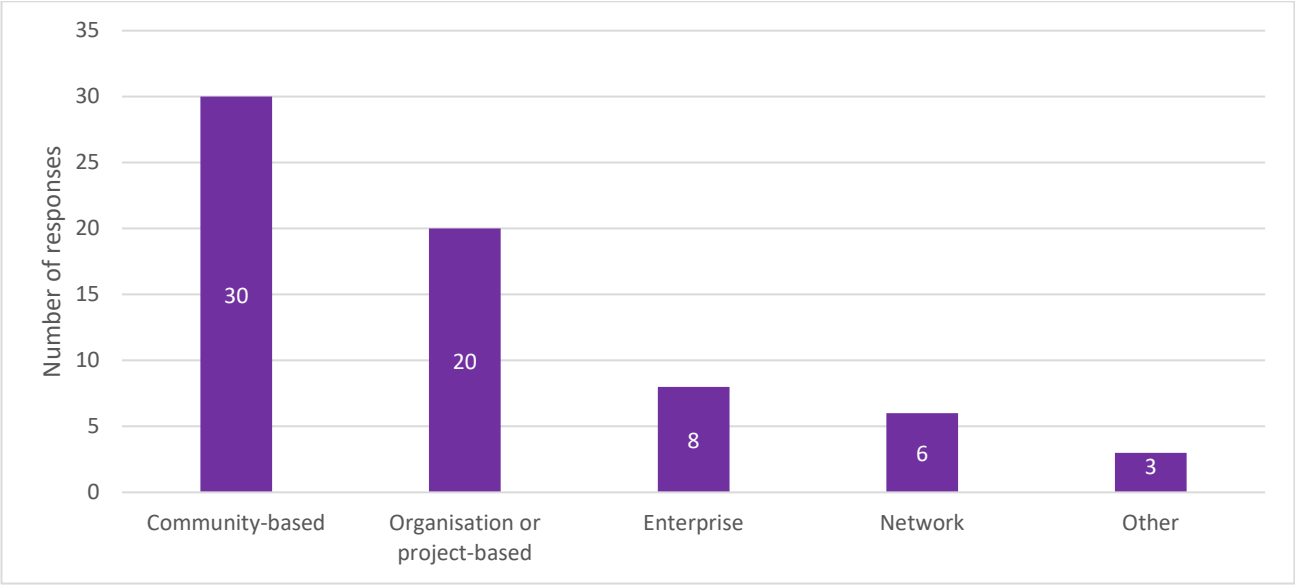


Figure 10. Age of CTNs in national survey sample (n=67)

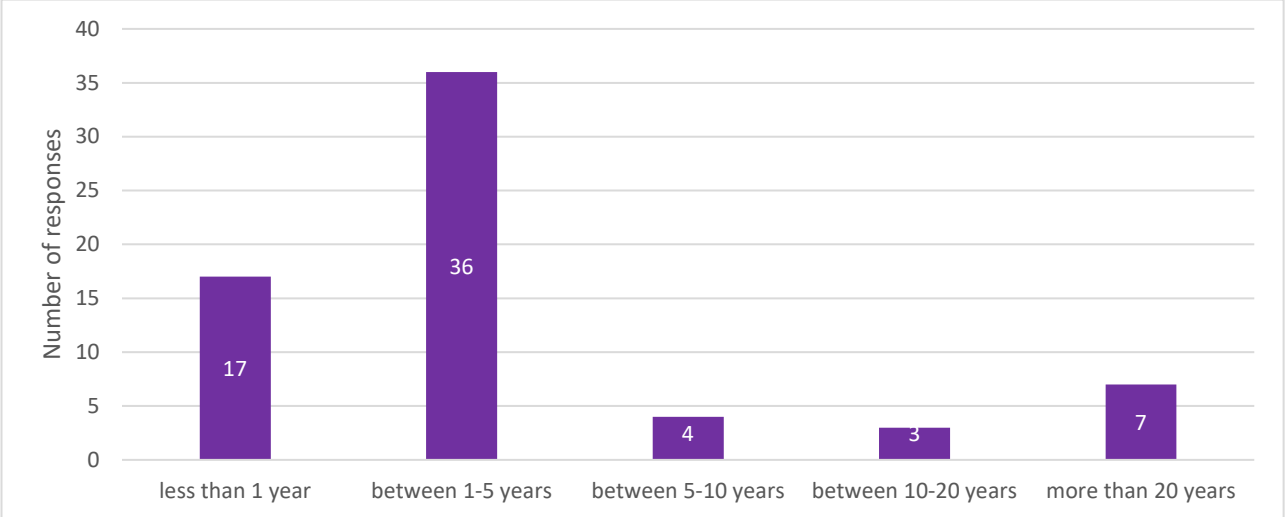


Figure 11. Geographic distribution of CTNs in national survey sample (n=67) Intervention nurseries are shown in red

3.3.2 Production, distribution and turnover

Looking at the production of trees, the total number produced by CTNs in the sample for the growing season October 2021-March 2022 was around quarter of a million (239,428). The average number of trees produced by a CTN was 3,574, (median 180, mode 0, range 0-60,000). Spread of production volumes is illustrated in Figure 12. A large range of species was being produced, although conifers were less common than native broadleaves. The majority of CTNs (70%) said that their production had increased since establishment, just 15% reporting stable/static production levels, and 3% reporting a decrease in their production (12% of the sample were not sure of trends or were just establishing). When asked if there was any intention to upscale production by 10% or more, the majority of

CTNs (87%) said yes. Just 7% said no, and 9% of CTNs said they were not sure. These latter responses were given by different kinds of CTNs and by CTNs of different ages, there was no discernible pattern.

Figure 12. Number of trees produced (Oct 21-March 22 season) by CTNs in national survey (n=67)

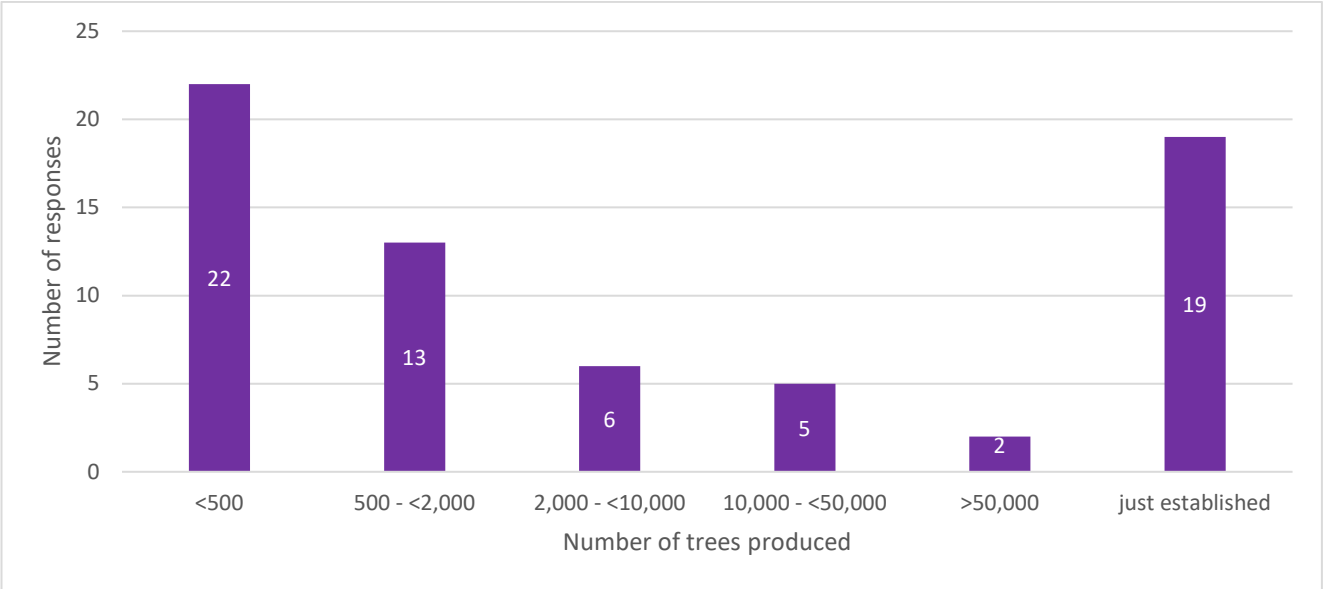
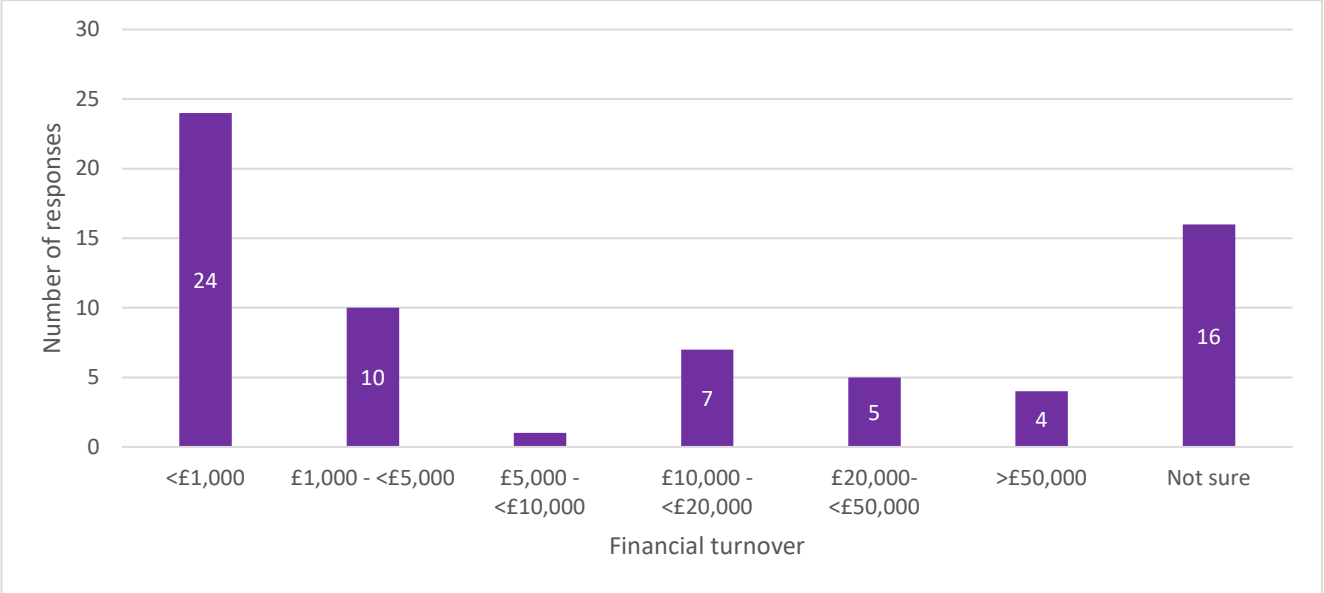


Figure 13. Financial turnover (last 12 months) of CTNs in national survey (n=67)



The range of values reported for turnover in the last 12 months is shown in Figure 13. CTNs of different types and different ages exist across the size of endeavour whether by numbers of trees produced or financial turnover. Figure 14 shows that the relationship

between scale of production and turnover is difficult to interpret. Whilst some of the largest producers have the largest turnovers, one CTN with a large turnover has a low level of production. Age and stage of CTN development are obviously inter-related factors.

Figure 14. Number of trees produced (Oct 21-March 22 season) by financial turnover (last 12 months) of CTNs in national survey (n=67)

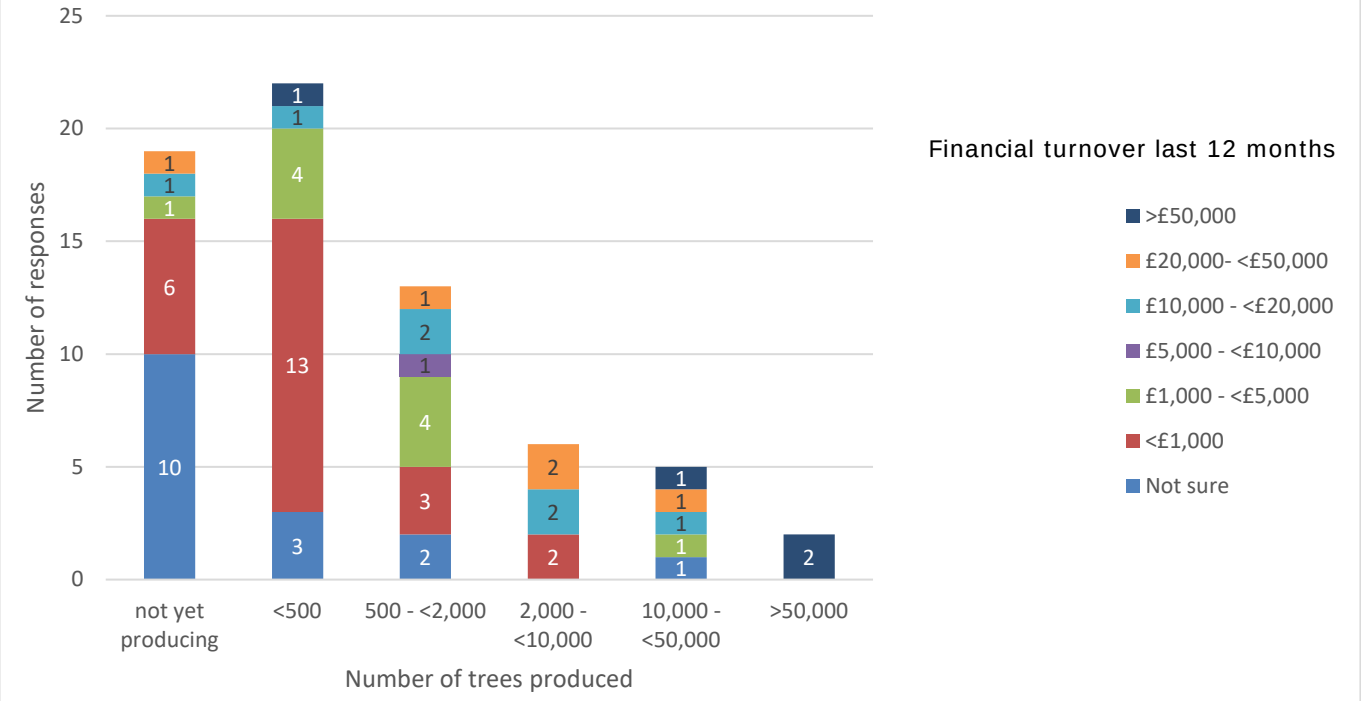


Table 6 shows that the most common tree product formats by percentage of production in the season Oct 21-March 22 were bare root, cell grown and maidens. Most CTNs (54%) produce just one of those types of output, less than half of the sample CTNs (46%) produce a range of formats. Those CTNs producing 100% to a single format:

- 16/67 (c.24%) were growing just bare root
- 14/67 (c.21%) were producing only cell grown plants, and notably, the majority i.e. 8 of these were *Community-based* CTNs
- 6/67 (c.9%) specialised in maidens

Table 6. CTN % of production by product format (n=67)

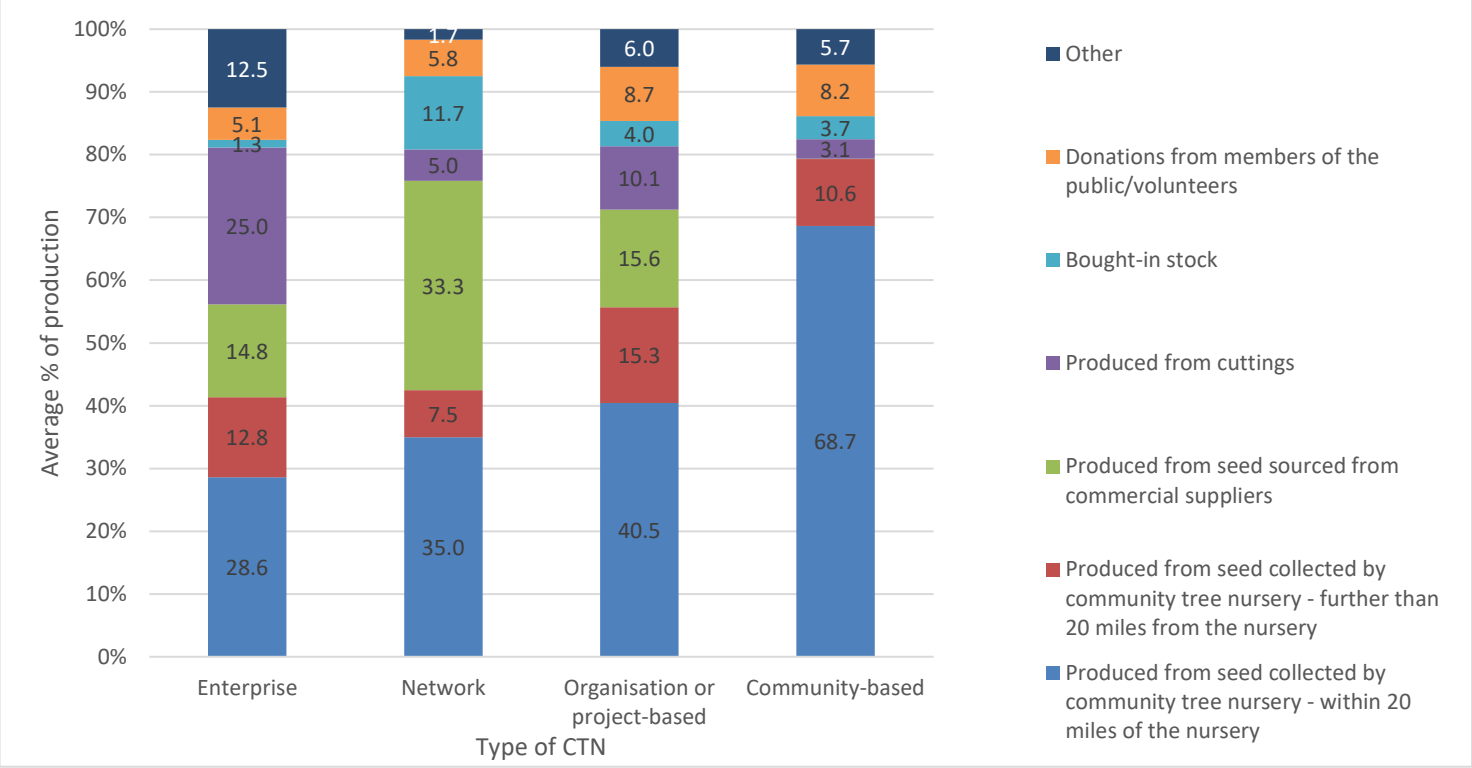
	bare root transplants	cell grown transplants	maiden	half standards	standards
average	72	55	41	11	17
median	85	60	30	5	0
mode	100	100	100	0	0

When asked about production source Table 7 shows that the most popular source is seed collected in the local area. A total of 23/67 c. 34% (14 of which were *Community-based*) CTNs said >90% of their production came from locally collected seed, of those CTNs 16/67 c. 24% (10 of which were *Community-based*) said they relied on this source for 100% of their production. Whilst there was no real discernible pattern of difference in the source of production between CTNs of different ages and sizes, Figure 15 shows that there are some potential differences between different kinds of CTNs. On average, *Enterprises* produced more by cuttings, and less by locally collected seed. *Community-based* CTNs relied most heavily on locally collected seed and did not produce trees using seed from commercial suppliers.

Table 7. CTN % of production by type of source (n=67)

	seed collected by CTN < 20 miles	seed collected by CTN > 20 miles	seed from commercial suppliers	produced from cuttings	bought-in stock	donations from members of the public/volunteers	Other
average	54	12	9	8	4	7	6
median	60	0	0	0	0	0	0
mode	100	0	0	0	0	0	0

Figure 15. Average % of production by source shown by CTN type (n=67)

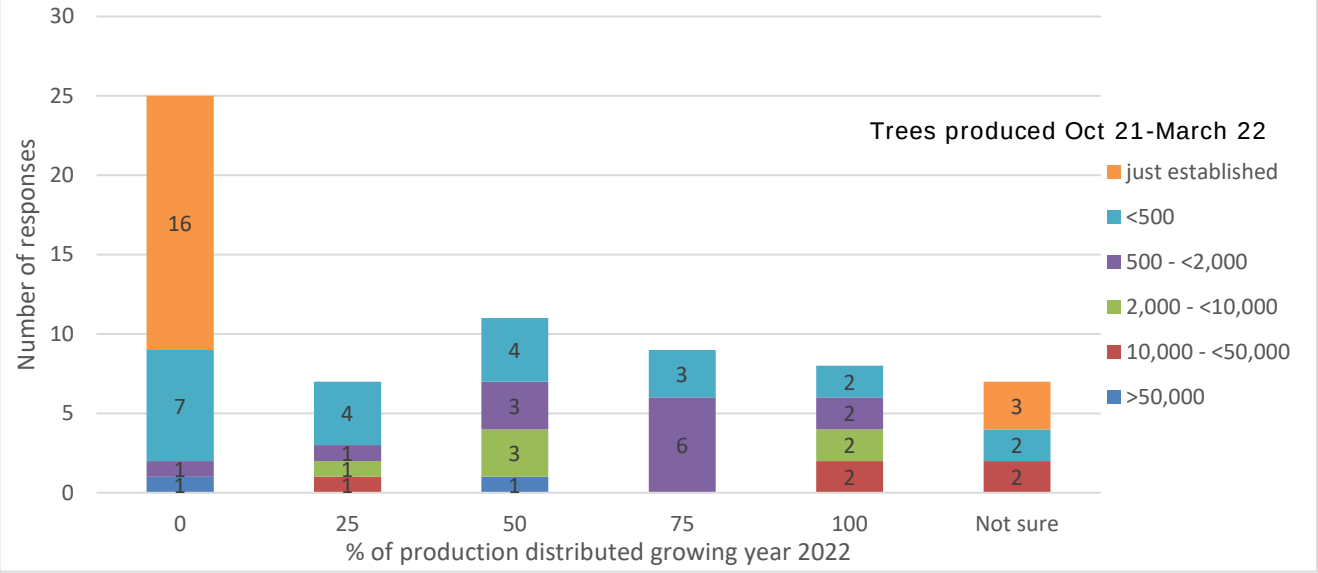


Looking at opportunities for future production, 37% of the CTNs in the national survey said they recognised unmet demand for specific tree species (9% said no and 54% not sure), and of those 67% said they intended to meet that demand (3% said no and 30% not sure). Of the species mentioned as being in demand but short supply, the 9 mentioned most frequently (between 3-10 mentions, in order) were wild service, hawthorn, small leaf lime, pear, holly, fruit trees, field maple, blackthorn, black poplar.

Turning to distribution, Figure 16 shows that 25/67 c. 37% of CTNs had not distributed their stock, this is attributable to the large number of new and establishing CTNs not yet in a position to do so. Around 12% (8/67) had distributed 100% of their stock. There does not seem to be any pattern of difference in levels of stock distributed by size of endeavour or by CTN type.

Figure 17 illustrates the different kinds of distribution methods used by CTNs and the importance of these and different kinds of end customers[7]. Environmental Non-Governmental Organisations (E-NGOs) appear as the most important customer across all distribution methods. Private individuals are important customers of on-site sales. There was no discernible pattern by size of endeavour or by type of CTN.

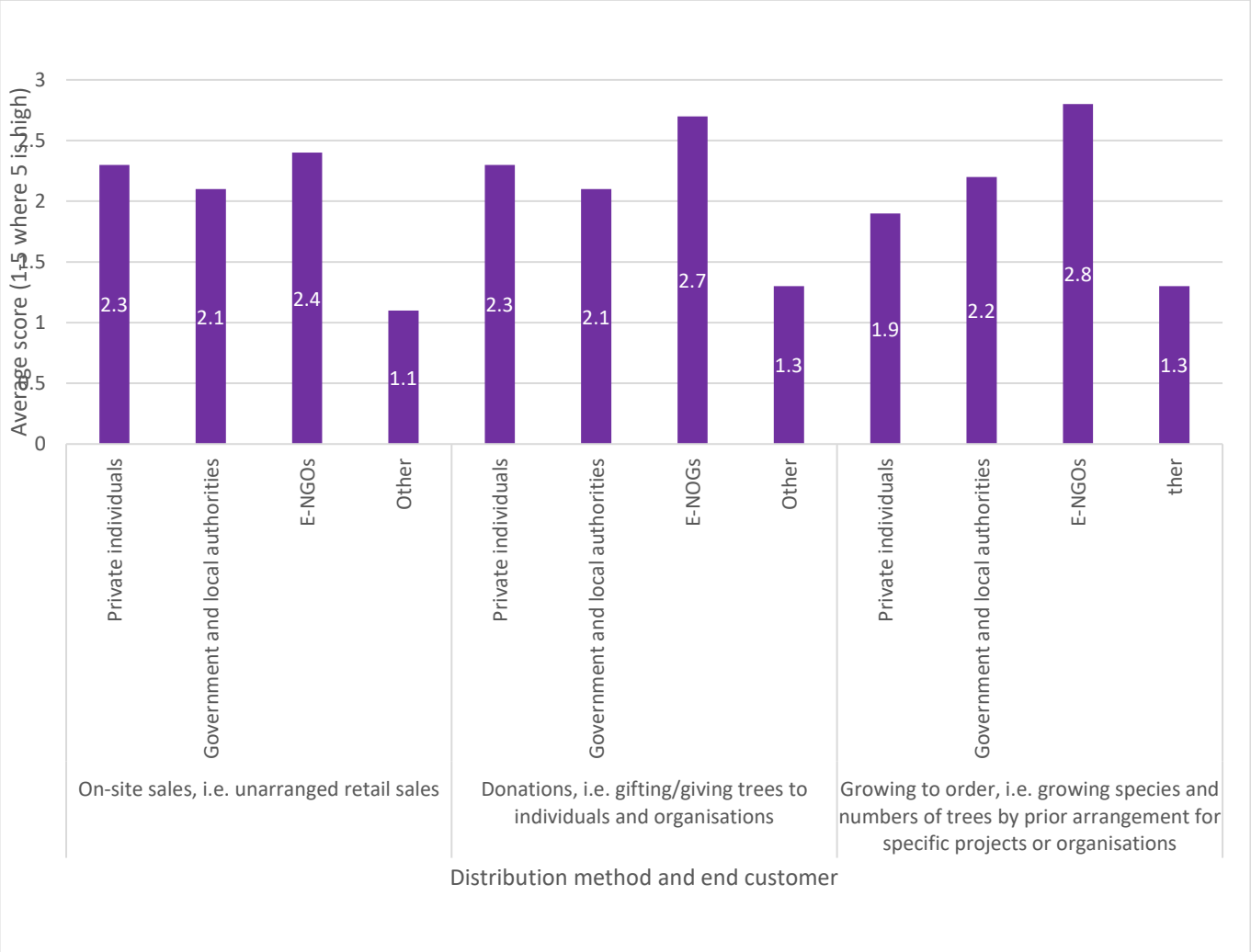
Figure 16. Distribution by % of production[8] across CTN in the national survey by size of endeavour (n=67)



[7] The question asked was “We would really like to know more about where the trees you produce go. Thinking overall about how you distribute your trees, how important are each of the following channels? Please add a number between 1-5 to each box below, where 1= not at all important and 5 = extremely important.”

[8] The question asked was “Looking back at the planting season October 2021 - March 2022, approximately what proportion of the community tree nursery's production was distributed? By 'production' we mean the number of trees that became ready for distribution (rather than total numbers growing in the nursery).”

Figure 17. Distribution method and end customer rated by average score across CTNs in the national survey (n=67)



3.3.3 Income sources and costs

Looking across all CTNs in the survey the most highly rated source of income[9], i.e. representing the greater part of CTNs income, was as grants, followed by tree sales (Table 8). Whilst there was no discernible pattern of difference by size of endeavour, Figure 18 suggests that the importance of the different income sources does vary slightly by CTN type. Grants were particularly important to *Community-based* and *Network* CTNs, which may partly be attributable to many *Community-based* CTNs currently being in the establishment phase. Table 9 shows the importance to CTNs of various annual costs[10].

[9] The question asked was "What contributes to the CTN income? Please score the relative importance of the following options, by assigning points out of 10"

[10] The question asked was "What contributes to CTN annual costs? Please score the relative importance of the following options by assigning points out of 10."

Table 8. Importance of income by source (rated by score 1-10 of) for CTNs in national survey (n=67)

	Grants	Tree sales	Other plant sales	Sale of other items	Providing training/ learning	Café	Other
average	7	5	1	1	2	0	6
median	9	3	0.5	0	1	0	8
mode	10	10	0	0	1	0	10

Figure 18. Importance of income source rated by average score by different types of CTNs (n=67)

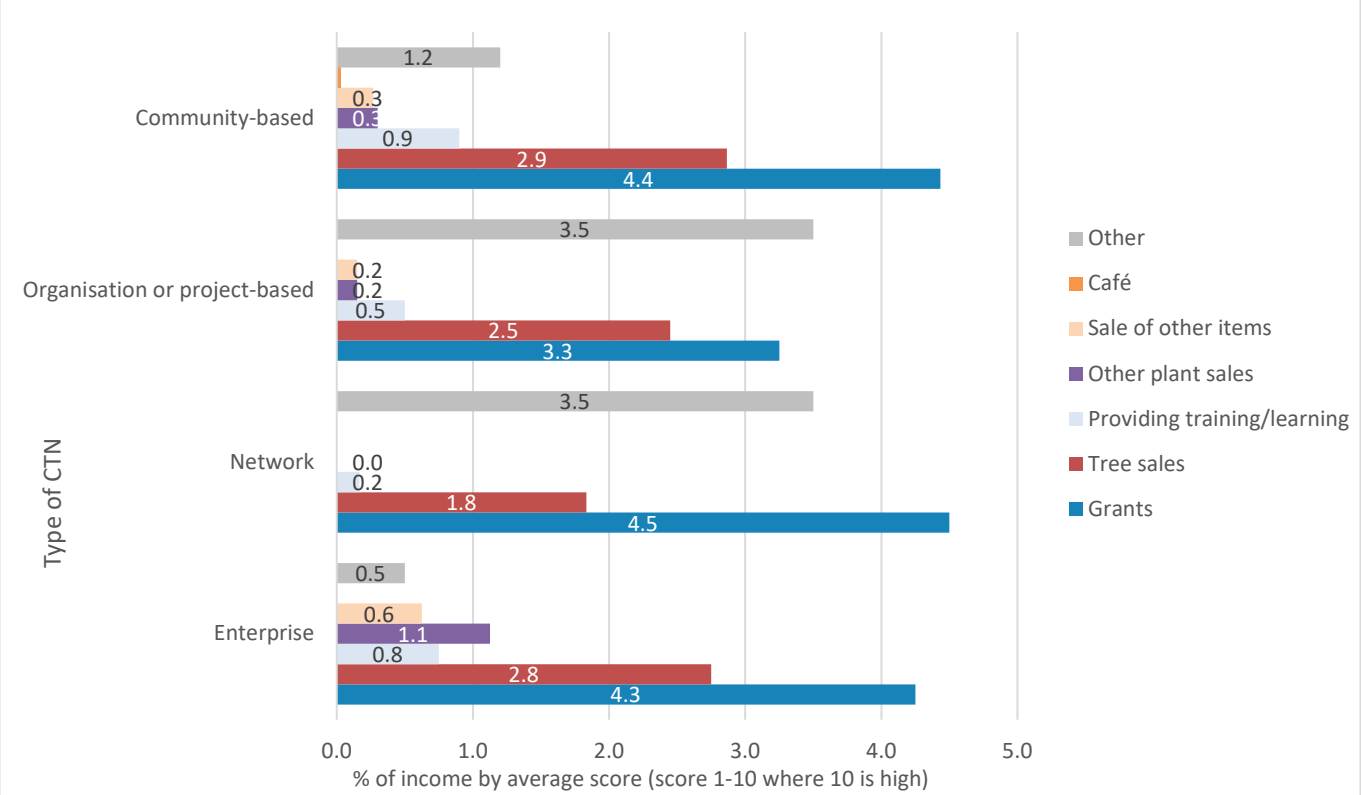


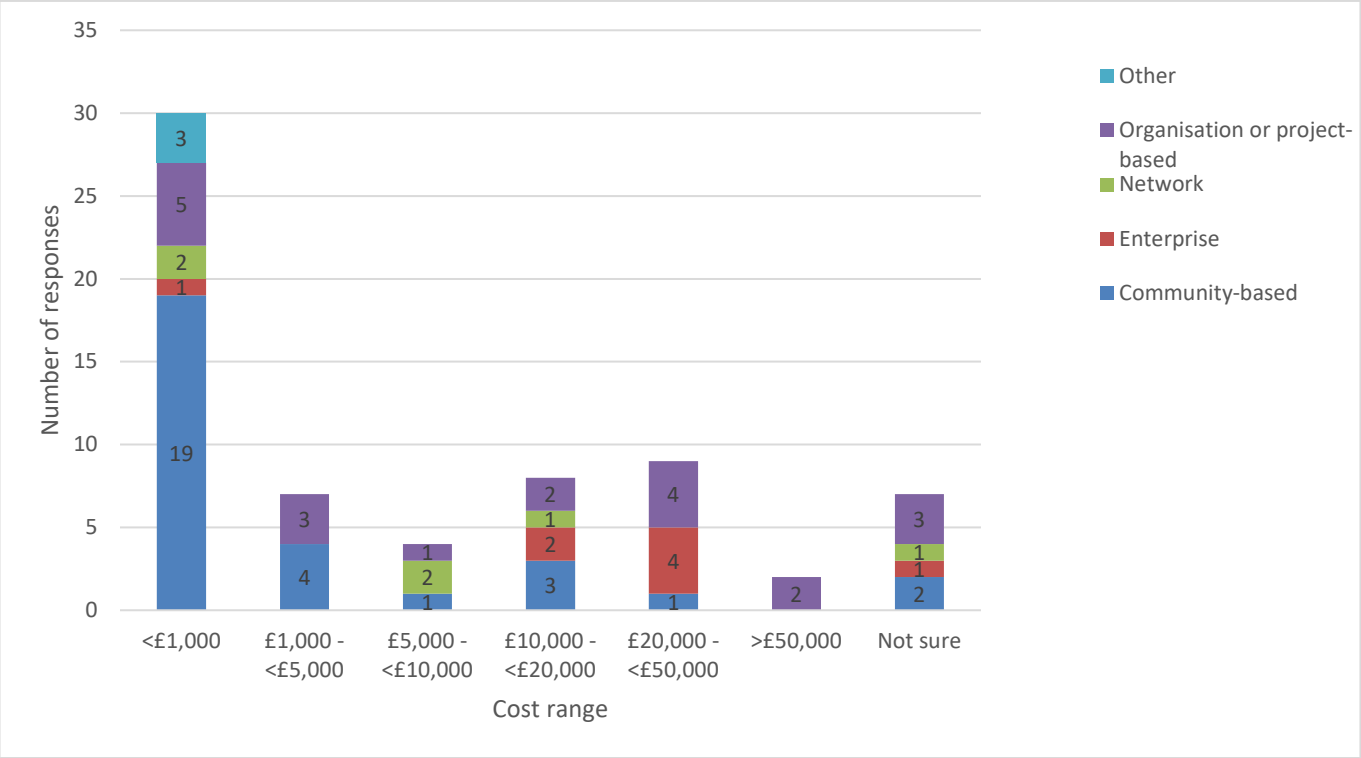
Table 9. Importance of costs by source (rated by score 1-10) for CTNs in national survey (n=67)

	Land/ building costs	Utilities (e.g. heating, water, internet)	Infrastructure and equipment	Consumable items	Staff costs for those paid annually	Staff costs for employees paid hourly	Support for staff or volunteers	Training for staff and volunteers	Marketing and promotion	Other
average	2	1	3	4	3	3	1	1	1	4
median	1	1	3	3	3	2.5	1	1	1	2.5
mode	1	1	2	2	0	0	0	1	1	0

On average consumables were the most important costs, followed by infrastructure and equipment costs, the costs of staff, land and buildings.

There was no discernible difference in the pattern of costs by age or size of endeavour but Figure 19 suggests that the majority of *Enterprises* (6/8 c. 75%) and around 40% (8/20) of *Organisation/project-based* CTNs are incurring annual costs over £20,000.

Figure 19. Cost of running CTNs per annum estimate by type of CTN in national survey (n=67)



3.3.4 Volunteers and staff

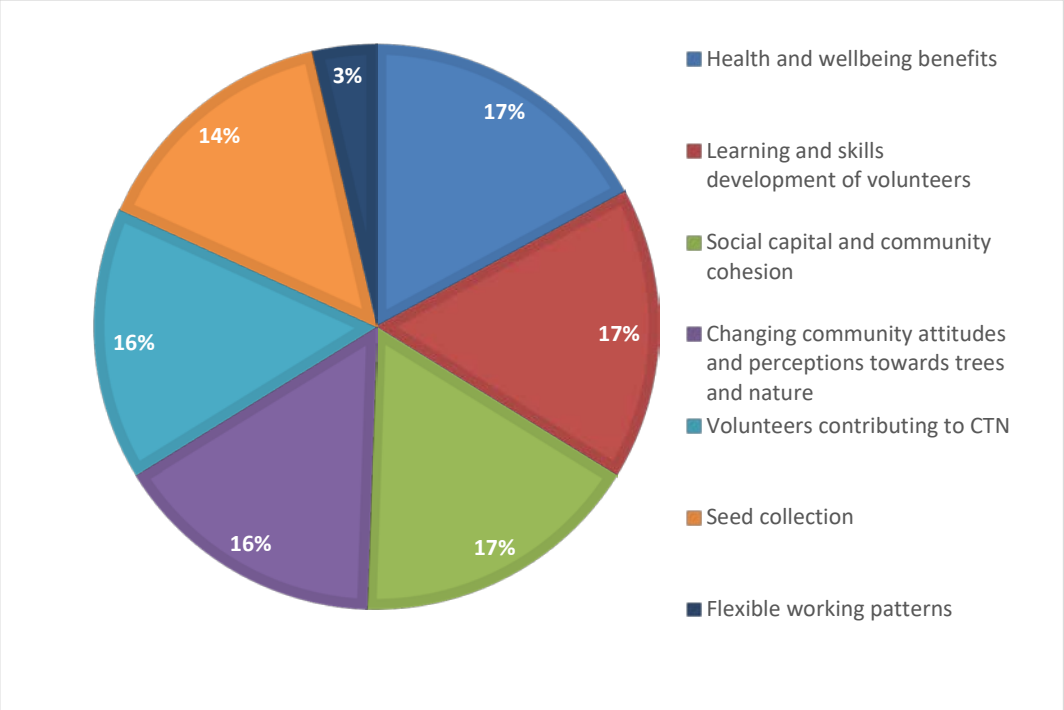
CTNs rely on labour from volunteers and paid staff. Survey respondents indicated that over the last 12 months the average number of paid staff per CTN across all those in the sample was 1.22 FTE although the majority of CTNs did not have paid staff (median 0.2, mode 0, range 0-10). There were differences by type of CTN in the average number of FTE staff employed as follows: Community-based 0.3 FTE; Enterprise 4.6 FTE; Network 0.2; Organisation or project-based 1.8. In terms of volunteer contributions, the total number of volunteers contributing to CTNs over the past 12 months was reported as 1,233, with the average number of volunteer contributors at 18 (median 10, mode 10, range 0-220). Estimates of the number of volunteer hours over the past 12 months returned a total across all CTNs in the sample of 34,995, an average of 522 per CTN (median 250, mode 150, range 0-4,000). This represents 4,729 working days, or 22.5 FTEs. There were differences by type of CTN as shown in Table 10 below.

Table 10. Differences in numbers of volunteers and volunteer hours over the last 12 months by CTN type

	Community-based	Enterprise	Organisation-based	Network
Average number of volunteers last 12 months	9.1	12.5	27.7	47.5
Average volunteer hours last 12 months	410.2	450.9	717.6	737.5

CTNs were asked to identify the main objectives for engaging with volunteers, selecting all options that applied from a closed list. Figure 20 illustrates the results. There was little difference in the frequency of responses for the options presented indicating equal importance, other than 'flexible working patterns' which was not an important criteria compared to the others. CTNs across the sample, regardless of type, age and size, recognised multiple benefits of volunteer engagement.

Figure 20. Main reasons CTNs in the national survey engage with volunteers (n=67)



3.3.5 Biosecurity

The survey asked several questions about aspects of CTNs biosecurity policy and practice. Across the survey sample just 10% of CTNs said they had a formal written policy shared with staff and volunteers, although 37% said they had something informal such as a common understanding of principles and practice, overall 45% had no policy or plan (8%

said they were not sure). Looking for patterns of difference across the type or size of CTN (see Figure 21), a greater proportion of *Organisation-based* CTNs (14/20 c. 70%) had either a formal or informal plan; compared to around half of *Enterprise* (4/8) and *Network* (3/6) types. Of the 30 *Community-based* CTNs around 37% (11/30) had formal or informal plans, but the majority did not. Looking for any differences by size of CTN, Figure 22 shows that there is variation across CTNs in whether they have plans or not.

Figure 21. Biosecurity policy/plans held by different kinds of CTNs (n=67)

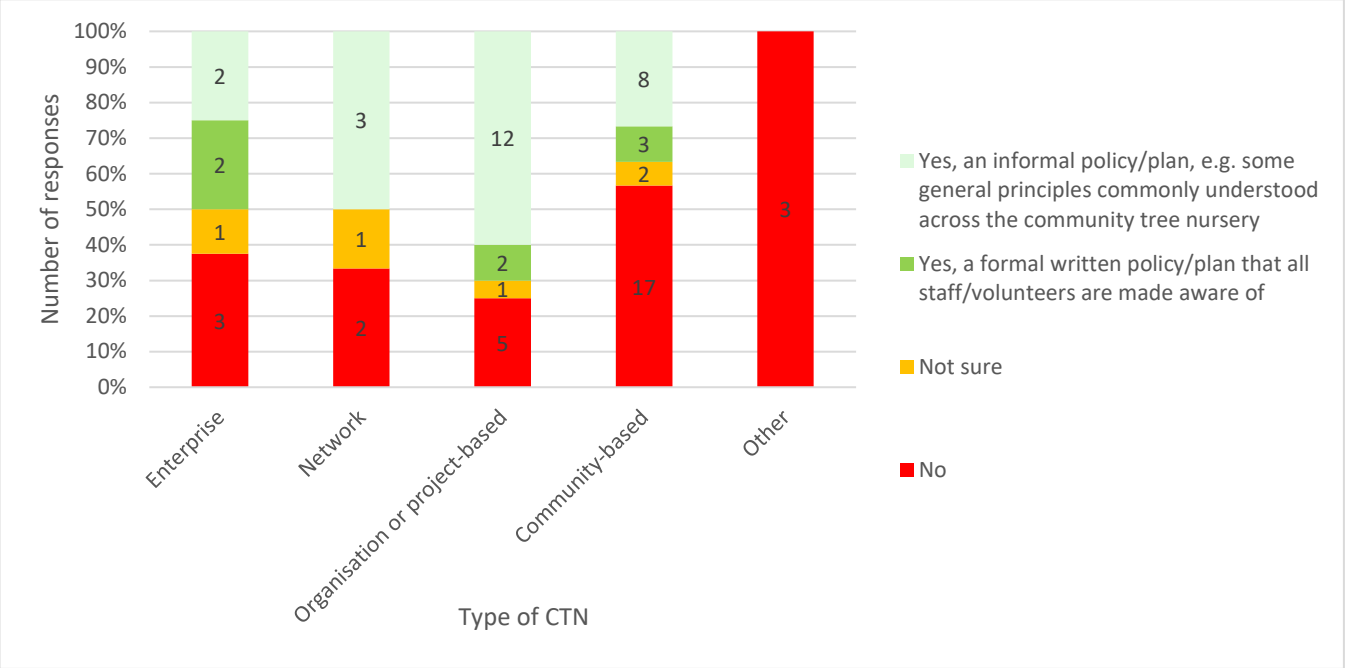
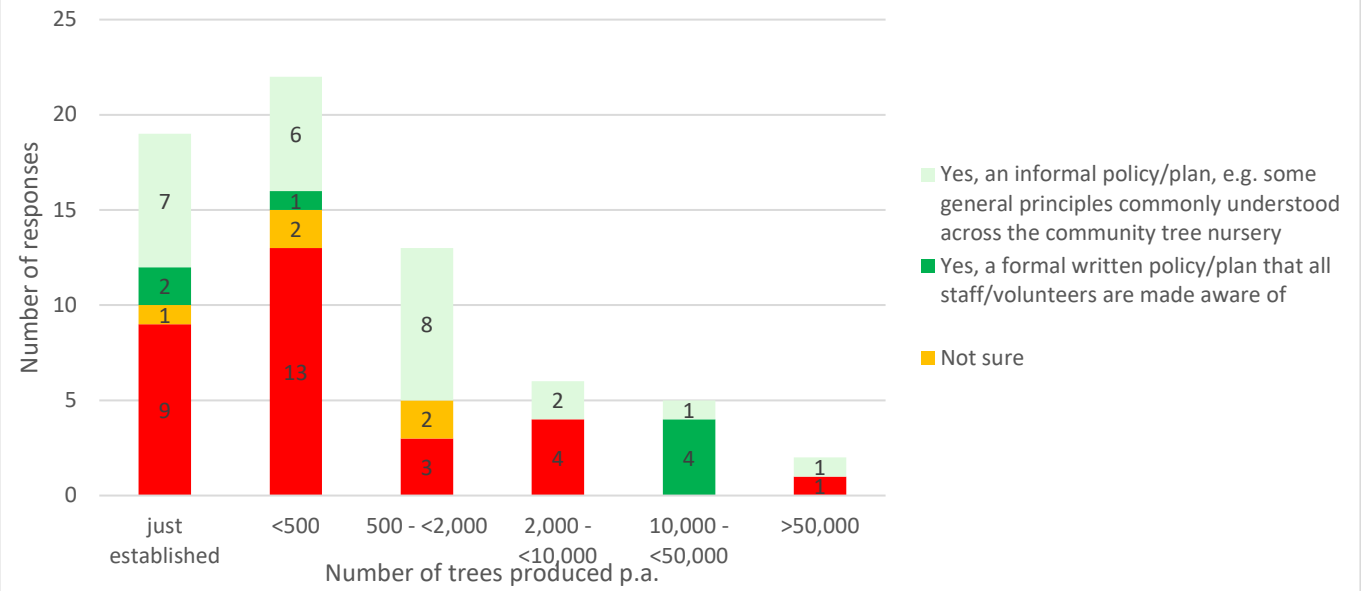


Figure 22. Biosecurity policy/plans held by number of trees produced (Oct 21-March 22 season) (n=67)



Around half of the newly establishing CTNs (9/19) have a formal or informal policy or plan, as do around one third of the smaller producers (7/22). The current practices that CTNs say they undertake are illustrated in Figure 23. Half or more of the CTNs were able to trace trees from source to sale (54%), and reported conducting regular monitoring for pests and diseases (49%). Around a third or more were checking incoming goods for pests and diseases (39%) and had procedures for cleaning and sterilising items (31%). Just twelve nurseries (c. 18%) had quarantine areas, and these were mostly *Organisation-based* CTNs. When asked if further biosecurity training would support the CTN, 85% said yes, although one person commented:

> *We only stock plants that we have grown from seed so biosecurity isn't so relevant*

Respondents identified the following as being useful additional training topics:

- Why biosecurity is important to CTNs
- Nursery hygiene
- Pests and diseases – identification, symptoms and actions required
- Regular updates on threats and challenges – what to look for as things change

Importantly, when asked if they had any interest in Plant Healthy certification 43% of CTNs said yes, just 17% no, and 40% maybe. Figure 24 illustrates the interest across CTNs of different types.

Figure 23. Current biosecurity practices of CTNs in the national survey (n=67)

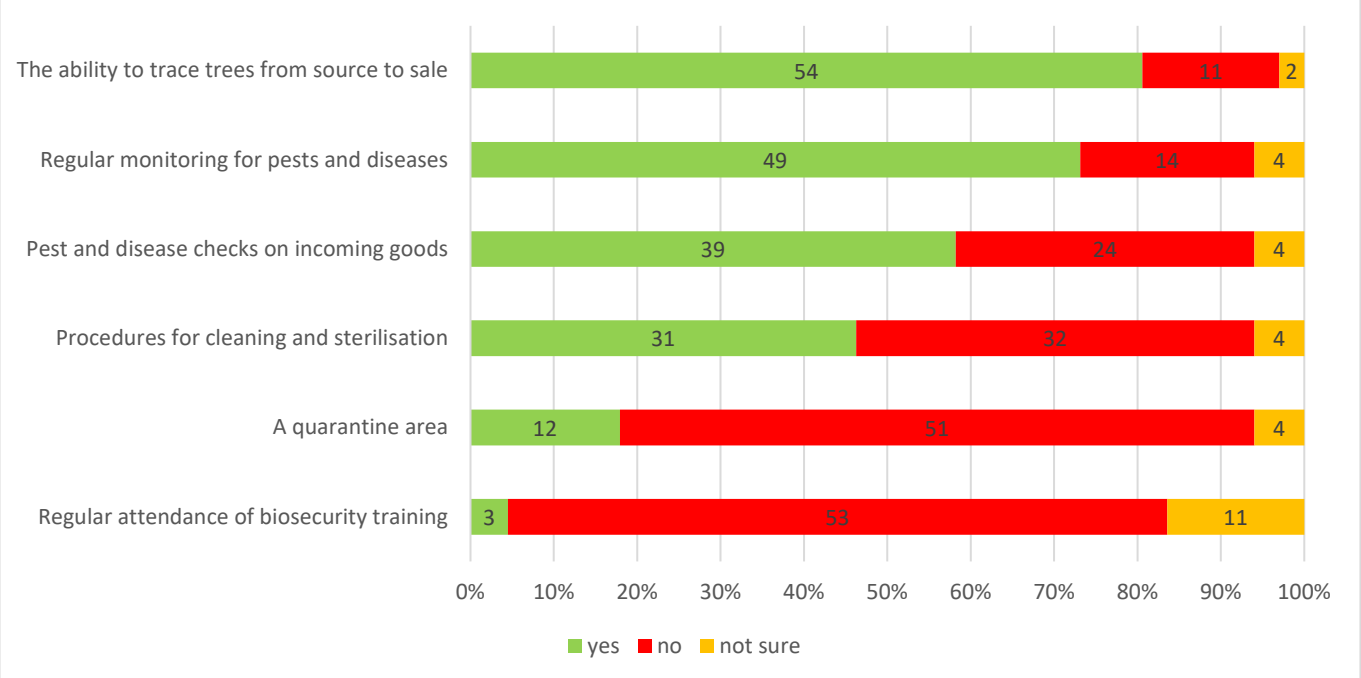
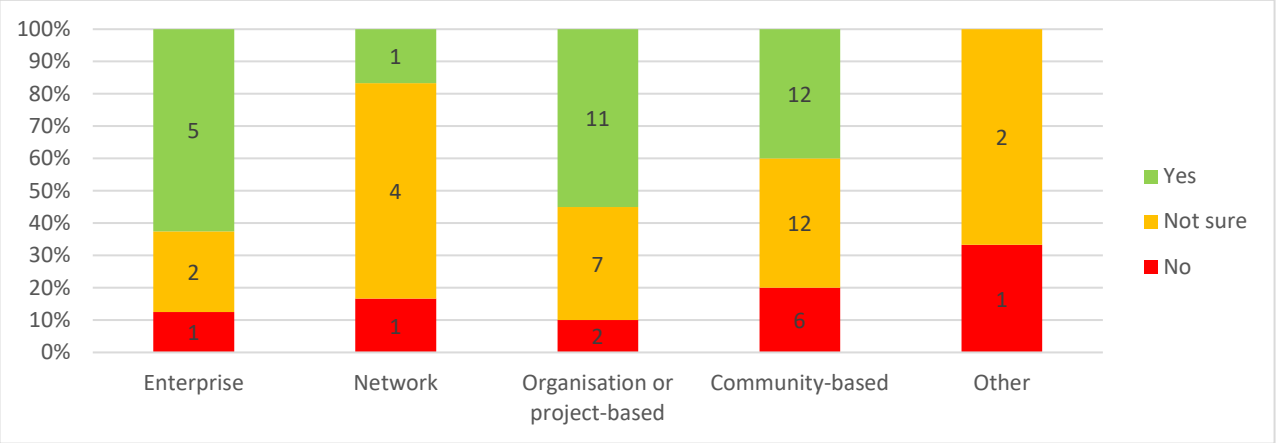


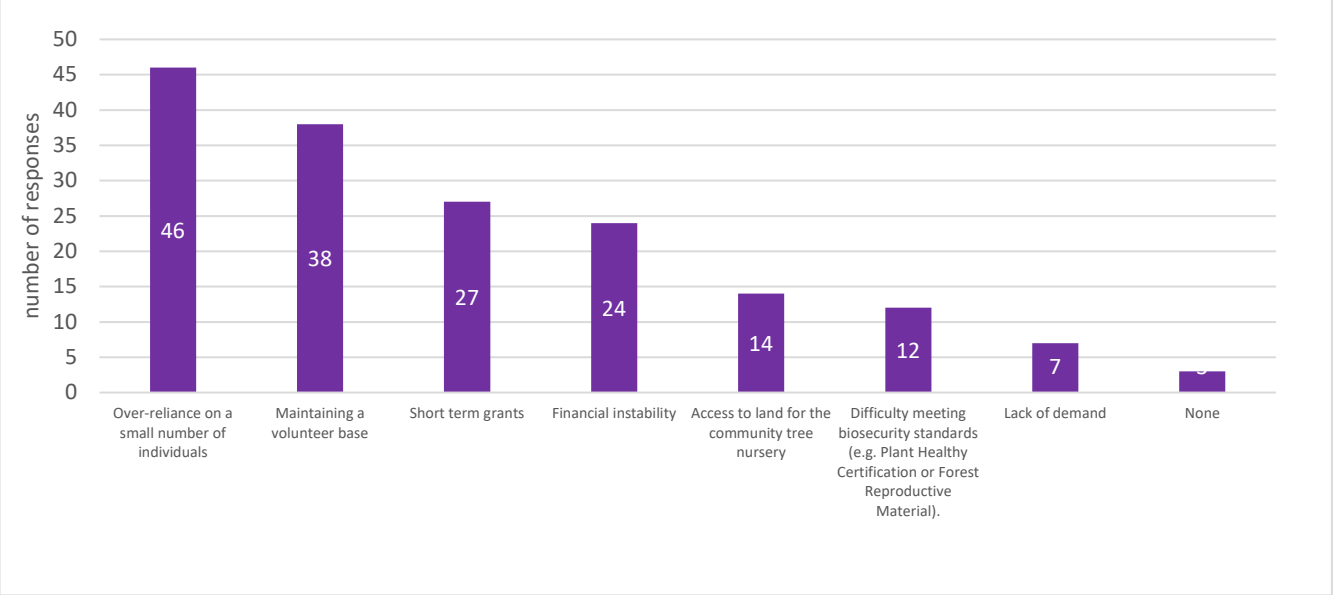
Figure 24. Interest in attaining Plant Healthy certification amongst CTNs in the national survey (n=67)



3.3.6 Sustainability

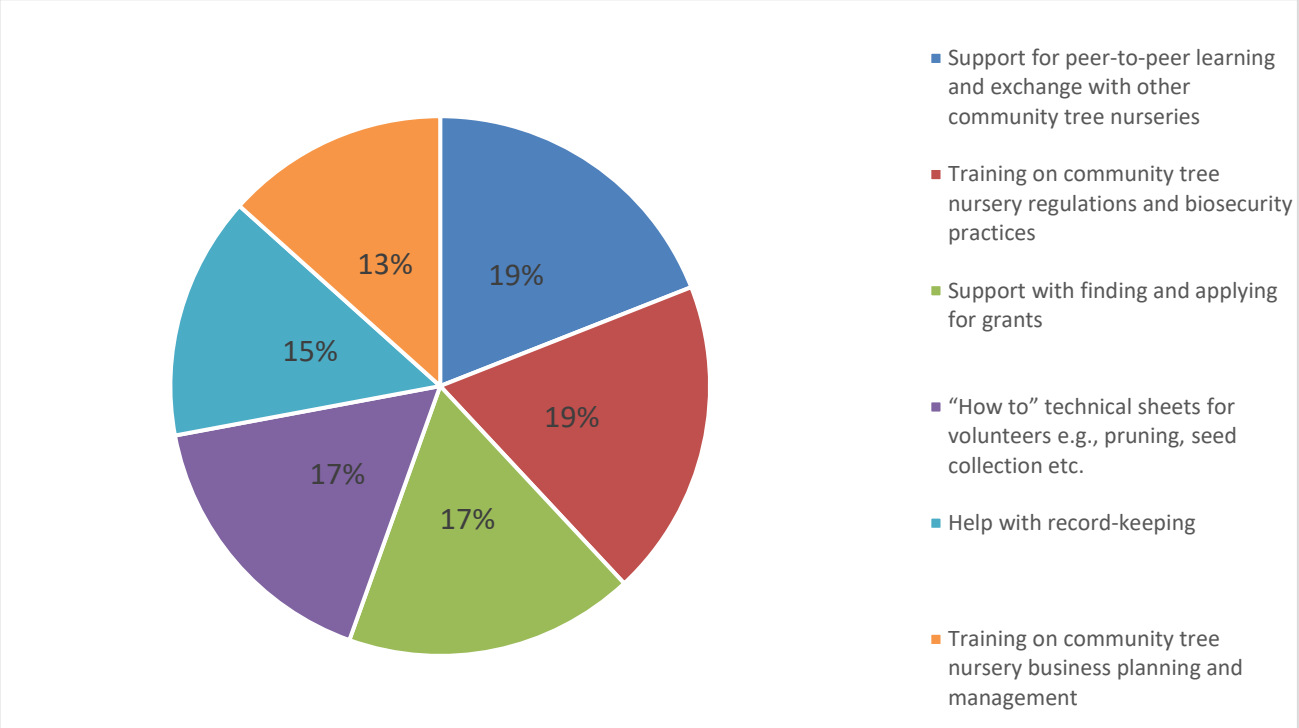
The threats and challenges to sustainability identified as important by CTNs are shown in Figure 25. Over-reliance on one or a small number of people to manage the CTN emerged as the most important (46/67 c.69% of CTNs), closely followed by maintaining the volunteer base (38/67 c. 57% of CTNs). Short term grants (27/67 c. 40% of CTNs) and financial instability (24/67 c. 36% of CTNs) the next most important. The short-term nature of grants were a particular threat to 80% (4/5) of *Networks* and c. 40% (12/30) of *Community-based* endeavours. Just over a third c. 38% (3/8) of *Enterprises* and *Organisation or project-based* CTNs c.35% (7/20) reported the short term nature of grants as a key threat.

Figure 25. Threats and challenges to sustainability of CTNs in the national survey (n=67) *more than one response was possible



CTNs were asked to identify the main ways CTNs could be supported to ensure long-term viability, selecting all options that applied from a closed list. Figure 26 illustrates the results. There was little difference in the frequency of responses for the options presented indicating equal importance, other than 'support for peer-to-peer learning' which was slightly more important than the other options. CTNs across the sample, regardless of type, age and size, recognised the importance of the suggested options for on-going support.

Figure 26. Main ways CTNs could be supported to ensure long term viability (n=67)



4 Conclusions

The social research originally set out to

- Understand different CTN models, and detail the range of benefits, costs, challenges, and unique selling points (USP) associated with each
- Synthesise and assess the evidence to identify potential interventions to support the establishment and development of CTNs
- Develop an evaluation framework including key Criteria and Indicators (C&I) to monitor and assess the impact of interventions with pilot project CTNs
- Evaluate differences between different pilot project CTNs and assess sustainability, benefits and any potential support needs associated with different CTN models.

Looking across the data generated by the different modules it is possible to summarise and draw key conclusions to three key questions generated by these research aims.

1. **How can we characterise different CTN models, and what are the important benefits, costs, challenges, and unique selling points (USP) associated with each?**

The typology characterising CTNs developed in Module 1 was validated in subsequent research, since the categories were recognised by respondents in the national survey and the Pilot Project CTNs. The typology has proven a useful method for distinguishing differences between CTNs by objectives and business model. However, the age of the CTN, as well as the size of the endeavour (measured by numbers of trees produced or income/costs/turnover) are factors which cut across categories in the typology. This makes a difference when assessing particular questions around, e.g. the sustainability of endeavours, or the potential for upscaling production.

Comparing the results of Module 1 Case Studies with the National Survey, we can estimate the size of the sector at this time to be around 80 (+/- 10) CTNs across the UK. The proportion of those by type, shows *Organisation or project-based* and *Community-based* CTNs to account for the majority (around 2/3), with a smaller number of *Enterprise* types and *Networks* making up the rest. At the moment a significant part of the sector is new and establishing. Because of a lack of previous base line information, it is not possible to ascertain whether the high rate of "new entrants" is normal, and what the reasons for that might be, e.g. linked with high rates of attrition because of the difficult nature of establishing these enterprises. An alternative interpretation is that the sector is growing in response to: the current interest in tree planting; an increasing national demand for trees; changes to the supply of trees of some species due to new biosecurity regulations; and in the increased interest in home-grown more biosecure stock. However, evidence from the national survey and case studies does suggest the *Boosting Community Tree Nurseries* Pilot Project also seems to have had a direct impact supporting the establishment of these new endeavours.

Looking at what is being produced, there is no doubt that the sector is almost exclusively producing native broadleaves, and local provenances (i.e. this can mean many things, from ad hoc collections of seed from the local area, through to full Forestry Commission, Forest Reproductive Material (FRM) compliance, this level of detail was not present in the data). The data suggests there is also production of fruit trees and trees intended for hedging. CTNs in the National Survey and the interviews were able to identify unmet demand for a range of species which they knew presented opportunities for a shift in production and up-scaling. These opportunities were also associated with the production of native broadleaves. The implications of this focus on trees of local provenance, and the views expressed by some of those involved in the interviews about the incompatibility of other species and provenances with CTN aims and objectives, probably warrants further discussion and consideration of likely climate change impacts and the evolving demands of

the tree planting market – particularly in urban areas and areas such as the southeast of England. The national survey and case studies indicate that most popular forms of production are bare root and cell grown. The majority of CTNs do little else than produce trees, although a small number (described in Module 1 case studies but not recorded in the National Survey) may be engaging in secondary markets selling other horticultural products, or be associated with endeavours such as a café or providing training and learning opportunities.

Looking across the data, the majority of CTNs are producing small numbers of trees, i.e. <500 p.a. CTNs with significant output are largely *Enterprise* and *Organisation or project-based types*. In terms of making a significant impact to the regional supply of trees, this may be where the potential lies. However, upscaling production for these CTNs relies in part on increasing mechanisation and efficiency of process, which will require capital investment in equipment as well as managing the challenge of staff/volunteer recruitment, retention and upskilling. Although many of the smaller *Community-based* CTNs may have a notional willingness to up-scale production, they have reported a wide range of challenges and barriers to making this possible and feasible. A small number of these CTNs produce specialist products (particular species, particular kinds of outputs, e.g. larger trees), and this might be where their comparative advantage lies. The costs of tree growing enterprises are high, because of the costs of space, infrastructure, materials and significant labour required. In addition, where income is being generated through tree sales, it tends to be seasonal. So, without the potential to generate income from sales of trees enough to cover costs of even consumables, there will continue to be a reliance amongst the smaller CTNs and *Networks* in particular, on grant funding. Important to note, and identify in future, are CTNs wanting to develop their nursery and business management skills, with a view to developing their CTNs further.

There are many reasons beyond producing trees that lie behind the establishment of CTNs. It is clear across the data that regardless of governance and business model, or size of endeavour, there are a host of environmental and social benefits that are being sought through community involvement and the community-based nature of the CTNs. Whilst it has not been possible to track and verify these during this research project, social networking, community connectivity, volunteer and community skills and wellbeing have all been mentioned as benefits leveraged by CTNs. The close connection between *Organisation or project-based* and *Community-based* CTNs and local environments, suggests these are likely realising local environmental benefits. It would be useful to undertake additional research to assess these additional benefits and potential unique selling point of different kinds of CTNs.

Another consistent narrative evidenced through the research is that “being small, local, and growing from locally collected seed, means that CTNs do not need to worry about biosecurity”. Regardless of CTN type, age or size of endeavour awareness of biosecurity issues, and the implementation of appropriate biosecurity practice is inconsistent. There is

an indication that newer CTNs have greater awareness of biosecurity issues, and this may be a direct impact of the *Boosting Community Trees Nurseries* project. Important though is the willingness of most of the CTNs involved in the research to improve this area of their knowledge and nursery management.

Table 11 overleaf summarises the key features of different types of CTNs emerging from this evidence.

2. How sustainable are different kinds of CTNs and what if any, are the potential support needs?

It is hard to assess the sustainability of CTNs. Those involved in the research provided consistent and clearly articulated threats to sustainability which revolved around, site-based considerations (e.g. availability of land, costs of land, site suitability, site security e.g. from deer, and infrastructure including that needed for good biosecurity practice) and the recruitment, retention, skill level and succession of staff and volunteers. Important to all CTNs was the need for continued grant funding to support the costs of operations, and critically, to support the establishment and set-up phase of new CTNs. Developing financially self-sustaining CTNs represents a real challenge. Without data from previous periods, it is difficult to assess the likely success rate of the many new CTNs uncovered by the National Survey. Evidence from the literature review in Module 1 highlighted the 2-5 year time period that was critical to CTN establishment and development of their business/governance model, and building their knowledge of and integration into local markets. If support from funders such as *Boosting Community Tree Nurseries* is not sustained over this establishment period, the short to medium term sustainability of many new CTNs might be questioned. For CTNs already established there were clear opportunities in current market condition and levels of demand to find opportunities for expansion and specialisation of production, and increasing volunteer interest in tree growing that could ensure sustainability.

Consistent evidence across the modules and datasets points to the following areas where support would be helpful.

- Grant support with longer funding periods
- Help with staff recruitment and retention – grants rarely allow for staff wages and other costs to be included, national schemes, e.g. apprenticeships may not be suited to CTN circumstances
- Help with volunteer recruitment and retention – messaging to sell the idea, support and training around volunteer recruitment and management, finding organisations and communities looking for volunteering opportunities
- Peer-to-peer learning and networking – continue to develop the community of practice, funding for field visits and webinars, establishing a mentor network, creating a suite of exemplar case studies

Table 11. Summary characteristics of CTNs by different governance models

Type of CTN	Proportion of sector[11]	Production volume p.a[12].	Benefits[13]	Challenges	USP
Organisation and project-based	30-40%	250-130,000	• Offering trees for sale and supplying direct to local projects and programmes with recognised need • 1-176 volunteers p.a. often managed by organisation/project staff • Land often owned by the organisation/project so reduced costs and improved access for volunteers • Clear identity and aims which attract volunteers	• Production delays caused by procurement and labour delays to timelines • Time pressures on staff and volunteer body, so limited time to take part in training and peer-to-peer contact/network of practice • Time associated with managing volunteers	• Often linked with partnership model and Local Authorities so good integration into large scale and planned projects • Able to manage large numbers of volunteers including more challenging groups
Enterprise	10-15%	1,500-1,000,000	• Offering trees for sale • 5-23 volunteers p.a. managed by staff • Development of professional nursery staff • Skills and social benefits for volunteers	• Costs of land rents/leases • Staff recruitment and retention • Up-scaling dependent on capital investment • Improved biosecurity practice dependent on investment in infrastructure	• Higher production volumes and more diverse outputs • Potential to up-scale production • Better knowledge of market and ability to react to market demands

[11] Based on sample data from Case Study module and National Survey

[12] Ranges are production figures for CTNs more than 1 year old, taken from Case Studies and National Survey data

[13]Figures taken from National Survey and represent calendar year 21/22

Type of CTN	Proportion of sector[11]	Production volume p.a[12].	Benefits[13]	Challenges	USP
Community-based	30-40%	20-10,500	• Offering trees for sale, donation and supplying direct to local projects and programmes with identified need • Close community connections with social benefits for volunteers and community • 1-25 volunteers p.a. usually managing themselves	• Potential for volunteers burn out, and reliance on volunteers carrying financial costs of operations • Funding required to maintain CTN • Availability of suitable land difficult to secure and may have access restrictions • Inability to meet costs of land rent/lease • Growing may be spread over more than one site • Skill level of volunteers	• Able to specialise in particular species or output types • Local social and environmental benefits
Network	5-10%	20-3,000	• Trees donated, provided direct to organisations and projects with identified need, and planted out in the community • 2-220 volunteer growers p.a. managing themselves or managed by an organisation • May work across up to as many as 40 sites	• Funding to support networks identified as a critical issue for these CTNs, particularly where there is no strong group identity or leadership • Reliance on own land (home gardens) – variable production techniques and quality • Availability of open access community land suitable for growing • Coordination between dispersed volunteers may be difficult and present challenges to onward distribution of stock • Biosecurity practice difficult to monitor and maintain	• Local social and environmental benefits • Wide reach • Potential to reduce risks through growing on multiple sites

- Training to develop skills around CTN business planning and management including:
    - Success looking for and applying for grants
    - Biosecurity practice applicable to CTNs
    - Successful recording keeping
    - Market awareness and entrepreneurship
    - Business requirements and legal issues if moving to sell trees
    - Horticultural training for tree growing
- A set of “How To” technical sheets and similar materials that can be used with volunteers

The Pilot Project CTNs clearly illustrated the importance of providing a combination of support mechanisms and actions. Different CTNs at different stages in their development need different forms of support, and they are likely to want to draw down on a range of resources to develop and sustain activity.

3. What framework, Criteria and Indicators (C&I) will enable onward monitoring and assessment of the sector including the impact of interventions with pilot project CTNs?

Without any other established system of recording developments supported by project funding, the assessment framework developed to monitor change amongst the Pilot Project CTNs will probably continue to provide a quick and easy way of monitoring change over time. A limitation of the monitoring survey this year, was that many of the questions were not applicable to the CTNs who had only just received funding and started to establish themselves. This issue will disappear in the years to come and the criteria and indicators likely make better sense. Monitoring could be continued amongst intervention Pilot Project CTNs on an annual basis, after each production cycle. However, if funding from the Shared Outcome Fund does not continue in any form this may not be possible or appropriate.

The National Survey foresaw this issue, and provides an alternative method, using many of the same criteria and indicators, to collect sectoral insights. It may best be repeated on a 5 year cycle, to allow enough time for CTNs to establish, reflect the growing time for trees, and ensure the most efficient capture of high level trend data. Some of the questions, e.g. those with closed lists, using scoring systems) would benefit from refinement. Some additional lines of questioning would be beneficial, e.g. market conditions and awareness, better production cost data.

5 References

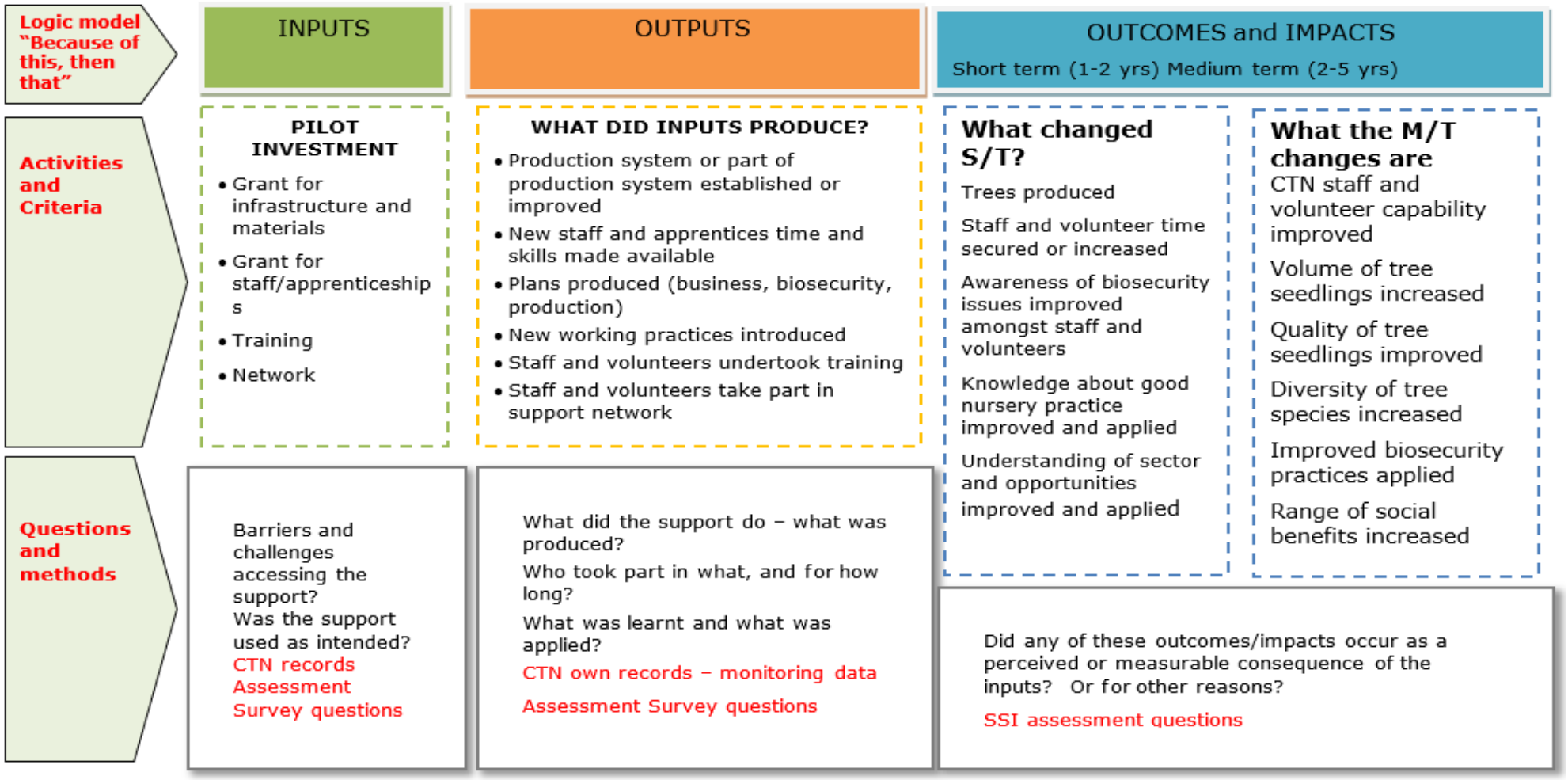
Botha, J, Witkowski, E T F & Cock, J 2005 A review of nurseries as conservation or social forestry outreach tools. *International Journal of Biodiversity Science & Management* 1 33-51.

Botha, J, Witkowski, E T F & Cock, J 2007 Commercial viability of conservation and social forestry outreach nurseries in South Africa. *Agroforestry Systems* 70 135-56.

Eisenman, T S, Flanders, T, Harper, R W, Hauer, R J & Lieberknecht, K 2021 Traits of a bloom: a nationwide survey of U.S. urban tree planting initiatives (TPIs). *Urban Forestry & Urban Greening* 61 127006.

Roshetko, J M, Tolentino, E L, Carandang, W M, Bertomeu, M, Tabbada, A, Manurung, G E S & Yao, C E 2010 *Tree Nursery Sourcebook* World Agroforestry Centre, Winrock International, University of Philippines Los Baños,, Nairobi, Kenya.

Appendix 1. Assessment Framework for Boosting Community Tree Nurseries pilot CTNs



Appendix 2. Rapid Evidence Review: Annotated Bibliography

The bibliography is spilt into three parts as follows

- Toolkits and Guides about establishing and organising CTNs
- Academic papers: Nursery characterisation and performance
- Academic papers: Technical limitations experienced by small scale and community-based nurseries

Toolkits and Guides

1. **Jaenicke, H. (1999). Good tree nursery practices: practical guidelines for community nurseries Nairobi, Kenya International Centre for Research in Agroforestry.**

In the coming decade, farmers in the tropics will plant millions of trees in their fields. Twenty years ago most new trees on farms would have been wildings, nurtured wherever they germinated. What will change is that more trees will be deliberately planted in chosen niches on farms. Some of these plantings will be through direct sowing but in general they will come from seedlings or rooted cuttings raised in a nursery.

Research today into the domestication and performance of hundreds of agroforestry tree species is accompanying efforts to see the results of our research reach more people. The starting point for this is the tree, and the starting point for the tree is the nursery.

A great deal has been published about tree nurseries, but it concentrates on commercial plantation species. In this volume, the author has incorporated ideas and experiences from her own work and that of partners dealing with agroforestry tree species, and findings from published literature, to produce an invaluable technical guide.

Good tree nursery practices for research nurseries is more than a checklist of do's and don't's for nursery managers and researchers. It presents concise but thorough information on all aspects of raising high-quality planting stock, with lists of contacts and nursery suppliers. In addition to general recipes and suggestions, tips are provided for developing specific nursery approaches to cater for the diversity of tree species, locations and nursery resources available.

By producing and using better quality tree seedlings in research nurseries, the results of such research will provide maximum benefit to small-scale farmers who are planting trees. Farmers are asking for tree stock with good survival rates, fast

early growth and predictability of performance. Researchers experimenting to meet these aims need to use high-quality planting materials.

Greater recognition of the role of good tree nursery practices and quality tree seedlings in ensuring sustainable and profitable agroforestry systems is needed. This manual aims to promote such recognition among researchers. A companion volume, Good tree nursery practices for community nurseries, aims to do the same among farmers, NGOs and community groups. Let us hope that they and others change the common slogan of “plant a tree” to “plant a quality seedling”.

2. **Roshetko, J. M., et al. (2010). Tree Nursery Sourcebook. Nairobi, Kenya, World Agroforestry Centre, Winrock International, University of Philippines Los Baños.**

Tree nurseries are a key success factor in many forestry and agriculture development interventions. Over the last two decades, the World Agroforestry Centre (ICRAF), Winrock International, and University of Philippines Los Baños (UPLB) have worked with hundreds of small-scale and large-scale tree nurseries across Southeast Asia. Most of those nurseries were located in Indonesia and the Philippines. The purpose of the nurseries has varied from commercial biomass production, to land rehabilitation and forest conservation, to local capacity building and livelihood enhancement. Partners involved with operating those nurseries have included farmers, entrepreneurs, commercial firms, nongovernment organizations (NGOs), communities, projects, and government agencies.

The size, composition, and longevity of those nurseries have varied also. Individual- and family-run nurseries typically produced from 50 to several thousand seedlings/season. Large commercial or government nurseries produced 100,000 seedlings/season or more. On average group or community nurseries produced 10,000 seedlings/season. Simple backyard nurseries were often established with the resources that could be found locally. Most group and community nurseries were established with external support from projects, NGOs, or government agencies. Some large-scale commercial nurseries were established and operated with the latest state-of-the-art technology. Nursery production focused on timber species, MPTS (multiple purpose tree species), commodity crops (rubber, cacao, coffee, etc), or a combination of those species type. Many of the nurseries associated with projects, operated for 1 to 2 years, or ceased to exist after the project closed. However, many other nurseries evolved from project support to become independent selfsustaining and even commercial enterprises.

Through the experience of working with tree nurseries ICRAF, Winrock, and UPLB have had opportunity to assist hundreds of thousands of farmers, NGO and project staff, community workers, extension agents, researchers, and government officials enhance their technical capacity, establish successful tree nurseries, and contribute to land rehabilitation and livelihood enhancement. ICRAF, Winrock, and UPLB have been enriched by the opportunity and gained profound understanding and insight

regarding the development and evolution of tree nurseries as a component of national reforestation and tree planting programs.

This sourcebook was written to share the learning and insights from those experiences with a broader audience. It is not a technical manual. Rather the sourcebook provides interested individuals and organizations with sufficient information and general principles regarding the identification and development of the right type of nursery for their conditions. Readers are welcomed to use and share the sourcebook freely and encouraged to contact the authors with comments and inputs regarding the sourcebook or tree nurseries in general.

3. **Shanks, E. and J. Carter (1994). The Organisation of Small Scale Tree Nurseries. London, Overseas Development Institute.**

In the first of a series of rural development forestry guides, authors examine the managerial and organisational aspects of supporting small-scale nurseries and explore the benefits and advantages of decentralisation. Illustrated with case studies from Tanzania, Bolivia, Vietnam, Kenya, Nepal and Sudan.

4. **Dewis Gwyllt (2020). Setting Up a Small Scale Tree Nursery. Macynlleth, Wales Llais Y Goedwig.**

There is increased interest in collecting tree seeds by community woodland groups in Wales, to grow-on in small nurseries into seedlings or transplants. The purpose of this short guidance note is to provide a brief checklist of what is needed to grow small quantities of good quality native trees and to point readers towards relevant sources of more detailed information. It is mainly aimed at woodland managers, including community groups, who have collected their own local tree seed and wish to grow trees for their own use

5. **Wong, J. and B. Dickinson (2008). Business Planning Workbook for Local Provenance Tree Nurseries Bangor, Wales, Wild Resources Ltd.**

One of the first steps in the planning of a new enterprise or the expansion of an existing one is a careful appraisal of the opportunity in terms of costs and potential benefits. Conventionally this is done in monetary terms – that is as a financial appraisal of cash costs and income generation. The great range of production systems, available resources and objectives means that it is not possible to develop generic appraisals and it is necessary to undertake an appraisal that is specific to you. The lack of skills or know-how to undertake a financial appraisal is a significant barrier to many people considering nurseries as a business opportunity. In particular, most would like a realistic evaluation of start-up costs and reassurance that their business will be ultimately profitable.
However, costs can also be evaluated in terms of time, the way in which it prevents other activities taking place and benefits can be to fulfil an ambition to contribute to woodland regeneration or to provide suitable employment for less-able workers.

The workbook has been designed in recognition of a range of objectives other than income maximisation and leaves the final decision on whether a tree nursery is a viable opportunity to you. Nevertheless, it is important that you make your decision based on an appreciation of the financial implications of your venture to avoid unpleasant surprises!
The workbook is designed so you can work through it by yourself and provides sufficient background information to evaluate a tree nursery enterprise – however, it is NOT a nursery manual. Also, please be aware of the limitation of a self-help approach and the fact that prices and market conditions can change rapidly, so DO NOT make a decision based solely on the outcome of the workbook spreadsheets. DO seek follow-up professional advice such as that available from Glasu, Business Eye or a professional accountant before committing yourself to any course of action.
Additional online resources that you can consult for advice on starting up a new business can also be found on the Business Link website (www.businesslink.gov.uk).

Please note the following guides which are about growing trees from seed but do not touch on establishing and organising nurseries.

The Tree Council guide to raising trees from seeds: https://treecouncil.org.uk/take-action/seasonal-campaigns/seed-gathering-season/growing-trees-from-seed/

The Woodland Trust guide to raising trees from seeds: https://www.woodlandtrust.org.uk/plant-trees/advice/grow-from-seed/

The Conservation Volunteers guide to raising trees from seed: https://treegrowing.tcv.org.uk/grow

The Conservation Volunteers guide to harvesting tree seed:

https://treegrowing.tcv.org.uk/wp-content/uploads/2019/09/handbook.pdf

The Forest Research guide to raising trees from seeds: https://www.forestresearch.gov.uk/documents/1449/fcpg018.pdf

Academic papers: Nursery characterisation and performance

6. **Basweti, C., et al. (2001). Tree nursery trade in urban and peri-urban areas: A survey in Nairobi and Kiambu Districts, Kenya. Working Paper No. 13. Nairobi, Kenya, Regional Land Management Unit (RELMA), ICRAF, World Agroforestry Centre.**

The urban and peri-urban population in many developing countries is increasing at an alarming rate and it is projected that by 2015 the urban population will equal the rural one. Food and fodder insecurity is foreseen to accompany this increase.

Agroforestry technologies can contribute to increased food and fodder production and minimized risks associated with small-scale agriculture, especially in the peri-urban setting. Tree nurseries play an important role in these areas and to understand their status, 39 nurseries were studied in urban and peri-urban Nairobi, Kenya, with the aim of understanding the technical and managerial nursery practices, germplasm pathways and the current economic situation of these nursery operations.
In the urban nurseries, 47 agroforestry tree species were encountered while the species in the periurban nurseries were 66. Most frequently encountered species - in declining order - in urban nurseries were Grevillea robusta, Dovyalis caffra and Casuarina equisetifolia, and in the peri-urban nurseries Dovyalis caffra, Grevillea robusta and Passiflora edulis. All nurseries visited were commercial enterprises. The majority (76%) of the urban nursery operators have no other source of income, whereas 76% of the peri-urban nurseries contributed between 5% and 90% of household income. Urban and peri-urban nurseries also differed in their approach to nursery management. Irrigation water was drawn from rivers by 36% of the peri-urban and only 11% of the urban nurseries. 30% of the urban nurseries used sewage water or road runoff for irrigation, none of the peri-urban nurseries did. Urban nursery operators generally had a higher education level than the peri-urban operators. Most prevalent constraints were access to water, germplasm availability and quality, and a lack of markets.
The total value of seedlings raised in the 39 surveyed nurseries in January and February 2000 was over USD 320,000.

7. **Botha, J., et al. (2005). "A review of nurseries as conservation or social forestry outreach tools." International Journal of Biodiversity Science & Management 1(1): 33-51.**

Conservation and social forestry outreach nurseries have been implemented extensively with local stakeholders internationally to achieve a variety of conservation and social forestry objectives. In this paper, key issues affecting the development of these projects are reviewed, starting with a brief overview of the development of people-centred approaches to natural resource management, followed by an examination of the concept of 'sustainability', which underpins most of these initiatives. A complex web of inter-related political, socio-economic and environmental factors influence the development of outreach projects, with the transdisciplinary nature of these initiatives posing substantial challenges at both research and implementation levels. A model is presented to facilitate the assessment of projects and the assumptions on which they are based. Management approaches, such as adaptive management, participatory methodologies and asset-based approaches are also discussed, as are group processes, which are seen to be a hitherto neglected but critical part of project development. Although not all outreach nurseries aim to become commercially viable, many do, increasing challenges in implementation as a project must generate sufficient income in the

long term to ensure its survival and to distribute satisfactory benefits to participants. The business attributes of outreach nurseries are compared with commercial sector enterprises.

8. **Botha, J., et al. (2007). "Commercial viability of conservation and social forestry outreach nurseries in South Africa." Agroforestry Systems 70(2): 135-156.**

Nurseries are risky ventures, even in conducive operating environments. Unlike many of their international counterparts, financial objectives are usually important to South African outreach nurseries, to generate funds for projects and/or to enhance local livelihoods. However, most are situated in low-income areas where residents have limited spending power. This paper examines the commercial viability of ten outreach nurseries from six provinces, with a range of conservation objectives. Management performance was assessed through correspondence and financial ratio analyses. Although seven projects had built up steady markets, this took 5–8 years to achieve, even in intensively funded projects. Only one nursery had achieved a steady annual net profit. The prolonged establishment phases impacted negatively on participants' livelihoods and project processes. Marketing difficulties included a lack of markets, nurseries being located far from markets, pricing difficulties, inadequate transport and limited marketing communications. Seasonal factors exacerbated liquidity shortfalls. Conservation activities such as greening and rehabilitation programmes provided markets, but medicinal plant nurseries struggled to achieve both conservation and socio-economic objectives, largely through difficulties experienced in providing seedlings at prices that subsistence sector resource users could afford. To achieve commercial viability, outreach enterprises need to adhere to business fundamentals viz. effective planning, management and coordination of resources, monitoring and control. Thorough viability studies are crucial. Alternate natural resource management and income generating strategies need to be evaluated, as a nursery may not be the best means of achieving these. The current Build–Operate–Transfer approach to projects by many supporting organisations is cause for concern as even small-scale projects usually require intensive support.

9. **Eisenman, T. S., et al. (2021). "Traits of a bloom: a nationwide survey of U.S. urban tree planting initiatives (TPIs)." Urban Forestry & Urban Greening 61: 127006.**

Municipal leaders worldwide are showing substantial interest in urban greening. This encompasses incentives, policies, and programs to vegetate urban landscapes, and it often includes urban tree planting initiatives (TPIs). Over the past decade there has been a seven-fold increase in scholarly use of terms denoting TPIs, and roughly two-thirds of associated studies address TPIs in the United States (U.S.). This reflects a bloom of scholarly interest in TPIs. Yet, there has been

limited research on contemporary TPIs as historically situated cultural phenomena, and there has to the best of our knowledge been no nationwide survey of TPIs across municipal scales. Addressing these gaps, this article presents findings from a survey of 41 TPIs in the United States. We report on typical traits of U.S. TPIs across six themes: background, dates and goals, public awareness, funding and governance, planting, and stewardship. Respondents identified over 115 traits that distinguish TPIs from typical urban tree planting activity, suggesting that TPIs are a discrete form of urban forestry. Over two-thirds of TPIs are funded separate from traditional urban forestry, and lack of institutionalization raises questions about long-term viability. TPIs mobilize political and financial resources for program launch, tree purchasing, and planting, but there may be a need for greater investment in stewardship activities and the social infrastructure that undergirds green infrastructure. Large shade trees for ecosystem services and native trees are the principal factors informing TPI species lists. Beautification and regulating ecosystem functions are, in turn, the principal potential benefits animating tree planting goals, yet few TPIs have conducted research to assess the fulfillment of associated outcomes. This study provides a foundation for future interdisciplinary scholarship on TPIs across the humanities, natural sciences, and social sciences.

10. Glowacki, T. (1989). Evaluating Village-Based Tree Nurseries in Senegal: A Comparative Study of Four Projects, Oregon State University,. Master of Science.

Reforestation projects in Senegal are often the vehicles which administer and implement social forestry activities. Their objectives are to help people solve their wood supply problems, enhance the environment by planting trees on farms and in villages, and introduce reforestation as a self-sustaining practice in village culture. Many projects establish village-based tree nurseries where community members grow seedlings to supplement or replace those supplied by government-owned regional nurseries. Village-based nurseries are promoted by the Division for Conservation of Soil and Reforestation and other Senegalese government agencies. This study, based on a survey of 32 villages, contained within four different projects: 1) investigates village-based tree nurseries in the Peanut Basin of Senegal by evaluating performance in terms of seedling survival and village nursery manager's intention-to-continue,2) compares the structure of four reforestation projects descriptively and quantitatively. Finally, it presents recommendations for future implementation of nursery projects.
Results indicate that village participation is a significant predictor for survival success. Three factors were significant predictors of intention-to-continue: previous nursery experience, water availability in the village, and the commercial sale of seedlings by nursery managers. Analysis of these success factors provides insight into project organization.
Project extension strategies range from very structured methods to informal approaches. Awareness campaigns, field trips, and group training were variations

found among projects in various mixes. Projects were similar in organizational structure, financial incentives, and encouragement of self-sustaining activities. Project design should include: 1) village participation from goal setting through evaluating results, 2) economic incentives that are based on encouraging the sale of seedlings, and 3) financing to improve water sources. Projects could also benefit from well-planned awareness campaigns, practical group training, and the application of more structured extension methods. Future studies are needed on villagers' behavior towards practice, adoption, and continuance.

11. Havyarimana, D., et al. (2019). "Constraints encountered by nursery operators in establishing agroforestry tree nurseries in Burundi." Agroforestry Systems 93(4): 1361-1375.

A nursery operator survey was conducted to identify major constraints encountered by nursery operators for tree nursery establishment in Burundi. The survey covered two main contrasting agro-ecological zones of the country in Muruta commune and Bugesera region in Bugabira and Busoni communes. It was found that most planting materials used by nursery operators were collected from sources of unknown genetic quality. It was also noted that few tree species were raised in nurseries of Muruta and Bugesera areas. The growing medium used in individual and group nurseries was of low quality. The lack of capital and nursery material inputs was another impediment to small-scale nursery sustainability. Most nursery operators lacked sufficient technical knowledge on nursery establishment techniques and had limited skills on vegetative propagation techniques. The low involvement of non-governmental organizations and government agencies impedes the sustainability of nursery operations in the two areas of study. Finally, the low demand and price for tree seedlings do not motivate nursery operators to produce seedlings for income generation. The government intervention may develop a well-structured nursery management system to support sustainable production of high-quality seedlings. It is then necessary to organize trainings of nursery operators on source and collection techniques of germplasm or planting material. The establishment of seed orchards and seed production areas of a large number of tree species is also of great importance. The support of nursery operators in financial and material inputs may promote tree species diversity and increase seedling production. The link of tree operators to good market may improve the sustainability of tree nursery operations.

12. He, J., et al. (2012). "Decentralization of Tree Seedling Supply Systems for Afforestation in the West of Yunnan Province, China." Small-scale Forestry 11(2): 147-166.

At present, China has the highest afforestation rate of any country or region in the world, with 47,000 km 2 of tree plantations undertaken in 2008. While the

prominent role of the central government's afforestation programs is well-known, little is understood of how the system of tree seedling production and distribution supports afforestation efforts. More importantly, little attention is paid to how small-scale farmers access high quality tree germplasm in the afforestation programs. This paper examines the seedling supply system in the west of Yunnan Province in China by focusing on the three types of tree nurseries (state, collective and individual) that are being operated for the development of smallholder forestry especially in the context of decentralization. The research reveals that forestry decentralization has provided support for smallholder access to high quality planting materials and improved the effectiveness of nursery management. The reform has enabled the engagement of various forms of nurseries and created a hybrid system of state nursery operations. However, the state monopoly over the major seedling supply system using its inherent technical, market, policy and institutional advantages has limited the development of small-scale nurseries. The policy implication of this research is that improvements to the governance structure in the supply system of tree seedling may require more investment in nursery techniques, market information and provision of incentives to enhance small-scale nurseries and to contribute to seedling production.

13. Kututa, R. N. (2017). Factors Influencing Sustainability of Tree Nursery Projects in Public Primary Schools in Matuga Constituency Kwale County, Kenya, University of Nairobi. Master of Arts.

The study sought to examine the factors influencing sustainability of nursery tree projects in primary schools in Kwale County. The objectives of the study was: to assess influence of community participation on sustainability of tree nursery projects; to establish influence of training on sustainability of tree nursery projects; to determine financial administration practices influence on sustainability of tree nursery projects as well as evaluate how marketing strategies influence sustainability of the tree nursery projects in primary schools in Matuga constituency, Kwale county. The study used descriptive survey research design. The target population total being 500 people who benefitted from tree nursery fund in public primary schools in matuga constituency, kwale county. The sample size was 50 determined from a blend of stratified and systematic random sampling techniques while; data was collected by use of questionnaires. Data obtained from the field was sorted, edited and organized using statistical package of social sciences and the results presented using tables, frequencies, and percentages followed by a brief explanation. The study revealed that level of community participation in Matuga constituency was generally low. Training of tree nursery project team was generally low which could have affected ability to manage nursery tree projects effectively. Financial practices and general handling of tree nursery project finances was wanting. The study found out that minimal marketing was carried out and prices were relatively low. The study recommends sensitization of the community to participate in such projects since they uplift the people’s lives

and change the environment they live in for their own good. Training that meets the specific needs of the people ought to be conducted before other similar programs are rolled out so as to thorough equip the community with the appropriate skills and gain confidence to tackle such projectss. There is need to be equipped with financial skills and that schools ought to intensify marketing for their products. There is also need to vary tree species in order to cater for varied needs of their clients. The findings of this study may be of benefit to the county government of Kwale as well as the national government in policy formulation in areas of implementing tree projects in schools.

14. Mercado, A. R. and C. Duque-Piñon (2008). "Tree Seedling Production Systems in Northern Mindanao, Philippines." Small-scale Forestry 7(3): 225-243.

This paper examines seedling production systems for small-scale forestry in northern Mindanao, particularly the constraints and opportunities to sustain the operation of smallholder nurseries. Various types of nurseries were identified to examine issues and concerns operators face, and data collected through a survey of nursery operators, discussion with government and NGO personnel, and literature review. Many smallholders in northern Mindanao have been engaged in seedling production, for farm needs and sale in local markets. The interest of smallholder to sustain seedling production depends on market demand and incentives, which translates to financial benefit on sound nursery practices and of reliable access to profitable markets. Activities that will assist smallholder nurseries to achieve full potential have been identified as: available nursery technologies to produce high quality planting materials in sufficient quantity; building farmer groups to facilitate seedling production and enhance the scale of product marketing; building partnerships with various service providers and other stakeholders to address technical, institutional, marketing and policy issues that may hamper the operation of smallholder nurseries; access to markets and market information; and provision of incentives and policy support. Associated benefits from small-scale seedling production accrue to the government, wood processors and to the public in general.

15. Molla, M., et al. (2020). "Socioeconomic contributions of small-scale private urban tree nurseries in Gondar and Bahirdar Cities." Cogent Food and Agriculture 6(1).

There is a growing interest to understand and establishment of urban tree nursery in Ethiopia and the horn of Africa. Socioeconomic contributions of urban tree nurseries, which are vital economic activities in major cities of Ethiopia in general and particularly in Bahirdar and Gondar cities are not adequately studied and well documented. Therefore, this study aims to evaluate socioeconomic contribution of urban small-scale tree nurseries and to evaluate the financial profitability of small-scale tree nurseries. Both qualitative and quantitative data

were from primary and secondary source using urban tree nursery owner's survey, key informant interview and focused group discussion Qualitative data was analyzed descriptively, while financial analysis was conducted for quantitative data. The result revealed that urban tree seedling production was established recently government-owned land and handled by both male and female. On average 18920 ± 15990 and 15464 ± 13363 seedlings were produced per annum per individual in Bahir Dar and Gondar cities, respectively. Urban tree seedling producer in Gondar and Bahirdar generates an annual net profit of 338377–810183 ETB birr. Small-scale nurseries maintain the livelihoods of owners while creating permanent job opportunity to 1–2 jobless individuals per nursery site in both study cities. Generally, the result confirms urban nursery seedling production was profitable and potential business enterprise in the cities. The finding of the research is expected to contribute for the development of nursery expansion to the nursery owner. However, shortage of land for establishments of the nursery is constraining seedling production in the study areas. Therefore, actions such setting set land, during town planning is recommended to engage new entrepreneurs are some of the actions to be taken to strengthen the sector's development.

16. Mudyiwa, S. M., et al. (2015). "Characterisation of Urban Forest Nurseries: A Case Study of Harare Suburbs in Zimbabwe." Journal of Agricultural Science and Engineering 1(3): 101-107.

The study aimed to characterise urban forest nurseries with respect to nine Harare suburbs. Dzivarasekwa, Epworth and Kambuzuma represented high density suburbs, while the medium density was represented by Mabelreign, Waterfalls and Warren Park with Highlands, Chisipiti, and Mandara representing low density suburbs. Stratified random sampling was used to select the study sites. Data collection was carried out using structured and unstructured questionnaires, key informant interviews and observations. Data were analyzed using statistical package for social sciences (SPSS) version 16 through one way Analysis Of Variance (ANOVA). A total of 40 nurseries were identified within the suburbs and the key players in the business were individuals (83 %), non-governmental organisations and public organisations. There was a significant difference between the number of nurseries located in the high and medium density suburbs and those in the low density suburbs. Males dominated the trade (85 %) than women. Most nurseries (65 %) were compliant in terms of registration though few could not meet the registration requirements. Nursery operators were constrained by finance, limited operational space, theft and irrigation water. It is recommended that training be done in nursery management. Associations can also be helpful in gaining recognition by City Council and EMA and this can harness opportunities for thriving business.

17. Nguyen, V. D., et al. (2017). "Branching out to residential lands: Missions and strategies of five tree distribution programs in the U.S." Urban Forestry & Urban Greening 22: 24-35.

Residential lands constitute a major component of existing and possible tree canopy in many cities in the United States. To expand the urban forest on these lands, some municipalities and nonprofit organizations have launched residential yard tree distribution programs, also known as tree giveaway programs. This paper describes the operations of five tree distribution programs affiliated with the Urban Ecology Collaborative, a regional network for urban forestry professionals. We analyzed the programs' missions, strategies, and challenges as reported through surveys and interviews conducted with program staff. The programs were led by nonprofit organizations and municipal departments in New York City, NY; Baltimore, MD; Philadelphia, PA; Providence, RI; and Worcester, MA. These organizations focused their tree distribution efforts on private residential lands in response to ambitious tree canopy or planting campaign goals. We assessed these programs through the framework of urban forests as social-ecological systems and discuss the programs' biophysical, social and institutional contexts. Programs face principle-agent problems related to reliance on individual tree recipients to meet goals; their institutional strategies meant to ameliorate these problems varied. Differing organizational and partner resources influenced the programs' abilities to perform outreach and follow-up on tree performance. Programs attempted to connect with diverse neighborhoods through free trees, targeting areas with low existing canopy, and forging partnerships with local community groups. Given tree recipients' demand for smaller flowering or fruiting trees, as well as lack of resources for tree survival monitoring on private lands, program leaders appeared to have turned to social measures of success – spreading a positive message about trees and urban greening – as opposed to biophysical performance metrics. We conclude with suggestions for outcomes monitoring, whether those outcomes are social or biophysical, because monitoring is critical to the sustainability and adaptive management of residential tree programs.

18. Nieuwenhuis, M. and N. O'Connor (2000). "Challenges and opportunities for small-scale tree nurseries in the East African highlands." Unasylva 51(203): 56-60.

In the highland regions of East Africa, cultivated and managed trees have assumed an important place as one of the many land use options available to small landholders. Most of the seedlings planted by farmers are produced in local small-scale tree nurseries, which have an important role in the sustainable development of the local communities. This article reports on the results of an in-depth survey of the cultural, management and marketing practices in small-scale nurseries in the Murang'a District in the highlands of Kenya. The objective of the survey was to identify the constraints affecting the capacity of nurseries to produce the range and

quality of seedlings needed to fulfil the many and varied functions of trees in the region. A number of recommendations are made on ways to help small-scale nursery owners and managers obtain the knowledge, skills and resources necessary to run their nurseries economically and efficiently.

19. Place, F., et al. (2004). "Assessing the factors underlying differences in achievements of farmer groups: methodological issues and empirical findings from the highlands of Central Kenya." Agricultural Systems 82(3): 257-272.

This paper examines the performance of rural-based community groups in Central Kenya and addresses the methodological issues and challenges faced in doing this. Performance measures included subjective and objective ratings of success, including more objectively verifiable measures at household and group levels, derived from a survey of 87 groups and 442 households within four sites. Empirical evidence regarding explanatory factors for relative performance levels is presented using a special sample of 40 groups involved in tree nursery activities, with both descriptive analysis and regression models. Collective action is desired and practised for many tasks. The incredible number, diversity and dynamic nature of groups make it difficult to standardise and measure achievement. Choice and level of performance measures matters in explaining differences in group achievement. Focusing on groups undertaking similar activities allows deeper analysis of performance drivers. Examining different types of groups engaged tree nurseries found that performance was not linked to any easy-to-measure group characteristic, implying that for this task dissemination need not be targeted towards particular types of groups.

20. The Next Field Ltd (2015). Great London Authority Community Tree Nurseries. London.

On setting out to research the potential for London to support a wider and stronger network of community tree nurseries as volunteer led social enterprises, the study adopts an enterprise led approach and broadly concludes that whilst there is evidence that the market for such enterprises has potential , further work across a range of marketing and business planning themes is required.

In assessing the market for CTNs, the report identifies a range of core markets for locally grown trees as well as secondary markets to support these enterprises. In relation to core business, the market is segmented by landowner as well as by function (i.e. parks, housing, highways, and HS, development etc) and this area requires further research using digital mapping (GIS). Arrange of secondary markets are identified, from training, employee leadership programmes and events through 2 innovative niche market opportunities from green walls to providing instant landscapes for commercial product launches. Financial analysis demonstrates the CTN trees could be marketed at a 90% premium over commercial

suppliers, as long as this price point matches the added value that customers will place on locally grown trees. Overall, the report highlights that the market needs to be developed through a combination of a new planning to support planting from local provenance, be advocacy of the benefits of using locally sourced trees, and see grant funding to help stimulate demand. Having assessed the market for CTNs, the study then explores the complex issues around the benefits of planting local provenance trees when considered within the context of climatic change and the need to ensure that London's tree canopy is resilient with temperature changes of up to 5 degrees centigrade forecast by 2050. In making a number of recommendations relating to local Providence, including considering a broader interpretation to include seed from London's non-native tree population, the headline conclusion is that that the relief partners need to hold a conversation to assess how to balance the benefits of local provenance against the need to ensure canopy resilience.

After exploring some of the practical considerations to establish a viable Katie Ann, focusing on site assessment criteria presented using a risk register, the report looks at business planning for CTNs and covers a range of relevant themes including business models, finance, staffing (including volunteering), and governance options for individual enterprises. This section of the study also considers the spatial requirements of a CTN and seeks to extrapolate this to assess the amount of land and number of nurseries that might be supported across the capital. The conclusion of this analysis, and the financial modelling, is that further detailed work is required based on real business scenarios and there is no single model KTM that can currently be used to support business planning for a London wide network. And additional recommendation relates to the business planning and governance for the network as a whole common based on a coordinated and collaborative hub and spokes model to support each CTN.

The final section of the study addresses funding and fundraising and covers a range of headline themes around funding models and opportunities. In line with the recommendation to manage the expanded network around the CTN hub, the report recommends that the relief partners use their vast collective experience, strengths, and contacts to develop a coordinated fundraising strategy including protocols to explain how they will work together to develop and deliver the CTN programme. The report also highlights some progress and future potential were certain prospective funders who were contacted as part of the study, including commercial, lottery and charitable organisations. Other recommendations cover new and sometimes innovative ways attract resources and finance linked to exploiting you market opportunities including crowdfunding social investment corporate social responsibility (CSR), citizen science, and tree banks to recycle trees affected by development.

Academic papers: Technical issues and limitations

21. Aldentun, Y. (2002). "Life cycle inventory of forest seedling production — from seed to regeneration site." Journal of Cleaner Production 10(1): 47-55.

The objectives of this study were to produce detailed life cycle inventory (LCI) data for forest seedling production and to analyse differences between production units. The study was part of a larger project designed to obtain LCI-data for wood production in Sweden, from seed to delivery of logs at industrial sites. Data were collected regarding the amount of energy and commodities used, and the emissions released to the atmosphere as a consequence of the seedling production were calculated. Four modern, medium-sized nurseries, typifying container seedling facilities in Sweden, were evaluated in the study. Site-specific data regarding energy and commodities were used in the calculations, together with figures collated in relevant databases and literature. The results showed that the use of energy, and the emissions generated, were larger per seedling in southern Sweden than in the north of the country, since the seedlings were larger in southern Sweden. The fossil fuels used for heating the greenhouses and for seedling transportation were the major sources of emissions.

22. Dedefo, K., et al. (2017). "Tree nursery and seed procurement characteristics influence on seedling quality in Oromia, Ethiopia." Forests, Trees and Livelihoods 26(2): 96-110.

Most tree nurseries in Ethiopia overemphasize mass seedling production to the expense of seedling quality. The study aimed at evaluating nursery characteristics and tree seed procurement approaches, and how these influenced seedling quality in eight purposively selected Woredas of Oromia region. A total of 169 respondents from government and non-government organizations, farmer nursery owners and development/extension agents and officers were interviewed. Seed quality was explored through assessing the seed supply sources, the type of seed source and mother tree selection, and the practices in seed physiological quality assessments. Our results revealed that over half (62.5%) of the nurseries were government owned, while 20% were NGO-run nurseries and the remaining 17.5% were owned by farmers. Nine challenges constraining tree seedling production and leading to underperformance were identified, with the two major problems shared by all nursery types being lack of sufficient material and germplasm input and using seeds of low or unknown quality. Informal seed dealers were the main source of seeds (87.6%) for all the nursery types. On the other hand, nursery operator?s own seed collection was from any free-standing trees either planted or retained as these sources were easily accessible. Seeds were, on average, collected from few mother trees, implying a high probability of sourcing seeds of narrow genetic diversity. Analysis of variance revealed statistically significant differences in seedling germination among the different seed

procurement approaches within the same seed type. The seeds obtained from formal seed dealers had the highest germination rates in both hard-coated (87.3%) and soft-coated (79.7%) seeds. Our findings suggest that there is need to improve the seed procurement and the seedling supply system through quality assurance of the seeds used in seedling production.

23. Jaenicke, H. (1999). Good tree nursery practices: practical guidelines for community nurseries Nairobi, Kenya International Centre for Research in Agroforestry,.

In the coming decade, farmers in the tropics will plant millions of trees in their fields. Twenty years ago most new trees on farms would have been wildings, nurtured wherever they germinated. What will change is that more trees will be deliberately planted in chosen niches on farms. Some of these plantings will be through direct sowing but in general they will come from seedlings or rooted cuttings raised in a nursery.
Research today into the domestication and performance of hundreds of agroforestry tree species is accompanying efforts to see the results of our research reach more people. The starting point for this is the tree, and the starting point for the tree is the nursery.
A great deal has been published about tree nurseries, but it concentrates on commercial plantation species. In this volume, the author has incorporated ideas and experiences from her own work and that of partners dealing with agroforestry tree species, and findings from published literature, to produce an invaluable technical guide.
Good tree nursery practices for research nurseries is more than a checklist of do's and don't's for nursery managers and researchers. It presents concise but thorough information on all aspects of raising high-quality planting stock, with lists of contacts and nursery suppliers. In addition to general recipes and suggestions, tips are provided for developing specific nursery approaches to cater for the diversity of tree species, locations and nursery resources available.
By producing and using better quality tree seedlings in research nurseries, the results of such research will provide maximum benefit to small-scale farmers who are planting trees. Farmers are asking for tree stock with good survival rates, fast early growth and predictability of performance. Researchers experimenting to meet these aims need to use high-quality planting materials.
Greater recognition of the role of good tree nursery practices and quality tree seedlings in ensuring sustainable and profitable agroforestry systems is needed. This manual aims to promote such recognition among researchers. A companion volume, Good tree nursery practices for community nurseries, aims to do the same among farmers, NGOs and community groups. Let us hope that they and others change the common slogan of "plant a tree" to "plant a quality seedling".

24. Kung'u, J. B., et al. (2008). "Effect of small-scale farmers' tree nursery growing medium on agroforestry tree seedlings' quality in Mt. Kenya region." Scientific Research and Essays 3(8): 359-364.

Low survival and slow growth rate of multipurpose trees and shrubs as a result of poor quality tree seedlings hamper efforts by small-scale farmers in development of effective agroforestry systems. These may be attributed to the chemical and physical properties of the soil growing media used. With the current high and growing demand for quality agroforestry trees and shrubs, farmers are increasingly raising planting stock on their farms. However, insufficient technical knowledge has often hindered success. Such growing media contribute to physical and chemical conditions that may be inappropriate for quality seedling development. Slow growth and survival rate lead to extra costs in replacement planting as well as delayed benefits. This study assessed the effect of chemical and physical properties of-farm tree nursery growing medium on Tamarindus indica seedling quality and growth rate. Compost based growing medium gave higher seed germination percentage as compared to sand and farm medium. Compost based growing medium also gave higher seedlings survival rate and height growth than sand and farm soil. It also gave seedlings with higher sturdiness quotient. The physical and chemical properties of on-farm tree nursery growing media that had the greatest influence on T. indica seedling quality were the aeration pore volume, total pore volume, wet bulk density, total nitrogen, organic carbon, magnesium and calcium © 2008 Academic Journals.

25. Lindqvist, H. and C. K. Ong (2005). "Using morphological characteristics for assessing seedling vitality in small-scale tree nurseries in Kenya." Agroforestry Systems 64(2): 89-98.

Small-scale tree nurseries are important in fulfilling the goals of reforestation and agroforestry implementation schemes in Kenya and other developing countries. The focus in seedling production has been on quantity, instead of quality, but a change can be seen in recent tree nursery manuals. These manuals are emphasising morphological characteristics as tools for assessing potential field performance of seedlings. However, morphological criteria are debatable and their value is questioned. A survey was carried out among tree nursery operators in the Meru area, in the Eastern province of Kenya, to determine how operators perceived seedling vitality, and how they separated acceptable seedlings from those of poor vitality. Based on the survey, 3 pairs of criteria were chosen, size (tall versus small), colour (green versus yellowish), and sturdiness quotient (sturdy versus lanky). These criteria were tested on survival and growth in a field trial, a controlled bench trial, and in a root growth potential test. The results showed that the nursery operators were aware of quality differences in seedlings, but they did not cull accordingly. The results from the field trial showed that mango (Mangifera indica L.) performed poorly compared to grevillea (Grevillea robusta A. Cunn. ex. R. Br.),

probably due to the high altitude. The altitudinal range for mango and grevillea are 0-1,200 m and 0-2,300 m, respectively, and the trial site was located on an altitude of 1,725 m. In grevillea, small seedlings grew better than tall in the field trial, but no differences could be found in the other trials. In mango, sturdy seedlings grew better than lanky ones in the field trial, while in the controlled trials tall seedlings grew better than small ones. The results showed that morphological characteristics as seedling quality assessment criteria could be unreliable as the effect differs with species and planting site. © Springer 2005.

26. Vogt, J. M., et al. (2015). "Explaining planted-tree survival and growth in urban neighborhoods: A social–ecological approach to studying recently-planted trees in Indianapolis." Landscape and Urban Planning 136: 130-143.

This research seeks to answer the question, what factors of the urban social–ecological system predict survival and growth of trees in nonprofit and neighborhood tree-planting projects? The Ostrom social–ecological system framework and Clark and colleagues' model of urban forest sustainability inform our selection of variables in four categories in the social–ecological system; these categories are the trees, the biophysical environment, the community, and management institutions. We use tree inventory methods to collect data on the survival, growth, and the social–ecological growing environment of recently-planted street trees in Indianapolis, IN to answer our research question. We use a probit model to predict tree survival, and a linear regression model to predict tree growth rate. The following variables are positively related to tree success (survival and/or growth): ball-and-burlap or container packaging, a visible root flare, good overall condition rating, the size of the tree-planting project, planting area width, median household income, percent of renter occupied homes, resident tenure, prior tree planting experience, correct mulching, and a collective watering strategy. The following variables are negatively related to tree success: caliper at planting, crown dieback, and lower trunk damage. Additional variables measured have less clear connections to tree success and should be examined further. Given that models including variables from all four categories of the social–ecological system generally outperform models that exclude some components, we recommend that future research on urban tree survival and growth should consider the holistic social–ecological systems context of the urban ecosystem.

27. Wattenhofer, D. J. and G. R. Johnson (2021). "Understanding why young urban trees die can improve future success." Urban Forestry & Urban Greening 64: 127247.

The first several years after planting a tree, referred to as the establishment period, are recognized to have the highest annual mortality rates; determining those factors that influence survival of young trees should be considered

paramount. This research examined several factors that influence young urban tree mortality: nursery production type (i.e. bare root, gravel bed bare root, container, or balled and burlapped), tree taxa, planting location type, and “planted by” (i.e. “who” planted the tree). The results from this study supported several relationships between project variables and young tree mortality, most notably that trees planted as containerized or balled-and-burlapped rootstock types in boulevards and parks had significantly higher survival rates than bare-root trees. Nursery production type, tree planting location, and tree taxa all had statistically significant impacts on young tree mortality, but “planted by” was not significant. The highest mortality rates were experienced by all trees planted in park/public spaces. The conclusions of this research will help to fill gaps and build upon the existing body of literature that practitioners may draw from to make informed planting and care decisions.

Appendix 3. CTN case study interview guide

1. **About the CTN – a potted history**

1. **What were the key driver(s) leading to the creation of the CTN?**
- Objectives
- Individual/organisational motivations

2. **Can you explain more about how the CTN was established?**
- Who was involved?
- How was the land and other the other resources found/sourced?
- How were the people resources found and paid (or not paid)?
- Was there personal investment? i.e., a person's savings?
- Was there any reliance on specific grants or other forms of support?
- What were and are major costs of establishing and operating the CTN, e.g. land and building purchase, labour, admin, supplies, maintenance costs? (Could it be ranked by value and maybe estimated at least to the order of magnitude, e.g., in tens or hundreds of thousands?)

3. **Looking back over the years of operation what would you say have been the key challenges, and what types of support that have been required at different stages in the CTN development?**
- Early design and establishment
- Two or three years in
- What future challenges do you anticipate?
- Is there any information which would help the running of the CTN? Would any information or support have been useful in the past?

2. **Community Engagement and impacts of that**

1. **How is the community involved and who (what type of people) is involved in the CTN?**
- Has this changed over time?
- Volunteers/paid staff (how many? how are volunteers organised, e.g. regularity, level of responsibility?)
- Interns, apprentices, etc.

2. **Do you have specific objectives for the community engagement?**
- Have these been a requirement from funders?

3. **How do you feel the CTN benefits from community engagement (e.g. costs, plant quality)?**

4. **How do you feel the community benefits from engagement in the CTN?**
- Probe on the range of benefits, e.g.
- 1. Physical Health, 2. Mental Health, 3. Social and Cultural, 4. Nature Connection. 5. Changes in ASB. 6. Inclusion of under-represented groups. 7. Upskilling and employment.
- Are any of these measured or monitored?

3. **Growing and supplying trees**

1. **Please could you explain more about your tree growing / production process?**
    - How are tree products used? (for own/local projects/for sale/other)
- Who is involved at what stage and why (seeds, plants, growing, selling)?
- Production cycles (seeds (bought or collected) or bought in plants? Length of time)
- Who is being supplied? How do/did you make connections with people to supply?
- Do you see any potential to increase production and how could that be supported?
- Do you produce any products in addition to trees?

2. **What biosecurity measures / practices do you employ if any?**

- Seeds and Stock
- Water/Soil/Compost management systems
- Purchased peripherals
- Volunteers and visitors to the site
- Onward supply chain
- **Are you aware of any plant health legislation / regulations? (e.g. notifiable pests and diseases), risk register etc**
- Are you aware of or part of Plant Healthy or other schemes, e.g. UKISG (UK, Ireland Sourced & Grown)?
- What are your most important ongoing costs, and can you compete on price with products already available on the market?
- How do you set your price, and do you sell at breakeven/profit?
- If profit, how is that distributed (e.g., invested back into the CTN)?

4. **Business and governance model**

- Do you have any kind of business plan or forward operating plan? Who takes part in developing, reviewing or implementing this? / Do you have a plan with, e.g., vision and aims?
- Do you have a development plan or any other kind of strategic planning document? Who takes part in developing, reviewing or implementing this?
- How are you managed in terms of governance, do you have advisory and/or supervisory boards, and what are the accountability arrangements (e.g., annual community meeting)?
- Who makes the financial and other important day-to-day decisions for the CTN?
- Do you have any income other than trees? Any funding? If so, how has it been provided and how vital is/was it?

5. **Sustainability**

1. Do you see the CTN developing as a long-term enterprise, or is it something that has a limited lifespan e.g., connected with a project, person etc?
2. Are you actively developing (leadership and) succession planning (capacity, capability and motivation of individuals) to secure the future of the CTN?
3. How do you rate the financial sustainability of the CTN (income generation, reliance on grants)?
4. How do you rate the sustainability of your supply and production (sources, biosecurity, contracts)?

Appendix 4. Case study evidence record sheet

Case Study			
Interview date		**Length of interview**	
Interviewer		**Recording ID**	

Main points to come through from the research interview. An eye on summarising challenges and successes and also for begin to think about what the evaluation C&I are going to be.

1. **Summary history and timeline of the CTN. Key events and challenges**
2. **How the community are involved and what the key benefits are**
3. **How the CTN produces trees and what emphasis is given to biosecurity issues**
4. **How the CTN organises itself, who makes the decisions and how the community is involved**
5. **What are the key issues in the business model that may require intervention or guidance?**
6. **What are the main sustainability issues likely to impact longer term viability?**
7. **Were there any issues that seemed important to include in the Toolkit?**
8. **Were there any other issues that should be recorded?**

Appendix 5. Pilot Project CTNs interview guide

1. About the CTN – a potted history to establish context

1.1. What were the key driver(s) leading to the creation of the CTN?

- Objectives
- Individual/organisational motivations

1.2. Can you explain more about how the CTN was established?

- Who was involved?
- How was the land and other the other resources found/sourced?
- How were the people/resources found and paid (or not paid)?
- Was there personal investment? i.e., a person's savings?
- Was there any reliance on specific grants or other forms of support?
- What were and are major costs of establishing and operating the CTN, e.g. land and building purchase, labour, admin, supplies, maintenance costs? (Could it be ranked by value and maybe estimated at least to the order of magnitude, e.g., in tens or hundreds of thousands?)
- How important was the funding from the Pilot to supporting the CTN set up. Would it have happened without the fund.

1.3. Looking back over the years of operation what would you say have been the key challenges, and what types of support that have been required at different stages in the CTN development?

- Early design and establishment
- Two or three years in
- Longer term? What future changes do you anticipate?

2. Engaging with the Shared Outcomes Fund CTN Pilot Scheme

2.1. Why did your CTN approach/make an application to the CTN Pilot Scheme?

- How important has this funding/support been to the CTN – critical?

2.2. What did you expect the outcomes of this support to be in the short and medium term?

- How far have these been achieved at this stage?
- Have there been any unexpected impacts?
- Have any other factors helped the CTN to achieve these outcomes?

3. Community/Volunteer Engagement

3.1. Do you have specific objectives for community/volunteer engagement?

3.2. Which kind of people are involved in the CTN and how do they contribute?

- Has this changed over time? Probe on why and how.

- Volunteers/paid staff (how many? how you find them? how are volunteers organised, e.g. regularity, time spent, in/formal agreement, level of responsibility?)

3.3. How do you feel the community benefits from engagement in the CTN?

- Probe on the range of benefits, e.g. 1. Physical Health, 2. Mental Health, 3. Social and Cultural, 4. Nature Connection. 5. Changes in ASB. 6. Inclusion of under-represented groups. 7. Upskilling and employment.
- Are any of these measured or monitored?

3.4. Has the Pilot Scheme had any impact on your engagement with volunteers or the wider community?

- Probe for increased time, skills development, knowledge of biosecurity and other

4. Growing and supplying trees

4.1. Please could you explain more about your tree growing/production process?

- What is produced and who is involved at what stage and why (seeds, plants, growing, selling)?
- Production cycles (seeds (bought or collected) or bought in plants (where from, e.g., UK/ abroad)? Length of time)
- Who is being supplied? How do/did you make connections with people to supply?
- Do you see any potential to increase production and how could that be supported?

4.2. Has involvement in the CTN Pilot Scheme had any impact on your production?

- Probe for any changes to quantity, planned uplift in production, types of trees, quality of trees
- Have other factors facilitated change?
- Once the CTN is established would they be interested in increasing production, and would they need more support/funding to do that, would they be meeting demand/gap in the market
- How quickly do they think production could be scaled-up ….. see Jackie's note – when do they think they will be producing more trees?

4.3. What biosecurity measures/practices do you employ if any?

- Probe for detail (Seeds and Stock; Water/Soil/Compost/Waste management systems; Purchased peripherals; Volunteers and visitors to the site; Onward supply chain)
- Are you aware of any plant health legislation/regulations, and does it have an impact on your nursery? (e.g. notifiable pests and diseases), risk register etc
- Are you aware of or part of Plant Healthy or other schemes, e.g. UKISG (UK, Ireland Sourced & Grown)?

4.4. Has involvement in the CTN Pilot Scheme had any impact on your biosecurity practice or your biosecurity awareness and knowledge?

- Have other factors facilitated change?

5. Business and governance model and understanding of sector

5.1. Do you have a development plan or any other kind of strategic planning document? Who takes part in developing, reviewing or implementing this?

5.2. How are you managed in terms of governance, do you have advisory and/or supervisory boards, and what are the accountability arrangements (e.g., annual community meeting)?

5.3. Who makes the financial and other important day-to-day decisions for the CTN?

5.4. Do you have any income other than trees? Any funding? If so, how has it been provided and how vital is/was it?

6. Sustainability

6.1. Skills and training question – needs to pull out where they feel they are at,

6.2. How do you perceive the sustainability of the CTN at this time?

- Probe for particular areas of growth and planned uplift

6.3. Are there any challenges and barriers to the sustainability of the CTN in the medium and long term?

- Probe for particular areas and any potential solutions to these

ENDINGS

Explain what happens next

Thanks

Appendix 6. Pilot Project CTNs evidence record sheet

CTN Pilot interviews			
Interview date		Length of interview	
Interviewer		Recording ID	

GUIDANCE: keep sections 1-3 concise. Ensure majority of time spent on questions 4 onwards.

About the CTN – Potted history of creation / motivations / original objects (1 / 1.1)
CTN establishment of resources / people / details on major costs / importance of pilot funding (1.2)
Key challenges of operation / details of support needed / changes over time / important support prior to now (1.3)
Engagement with the Shared Outcomes Fund Pilot Scheme (2 / 2.1 / 2.2)
Community and volunteer engagement / demographic of people involved / their contribution (3 / 3.1 / 3.2 / 3.3 / 3.4)
Growing and supplying trees / people involved / production cycles / production level (4 / 4.1 / 4.2)
Biosecurity measures and practices (4.3)
Business governance model / understanding of sector (5 / 5.1 / 5.2 / 5.3 / 5.4)
Sustainability (6 / 6.1 / 6.2 / 6.3)

Appendix 7. Pilot Project CTNs Monitoring Survey

1. Welcome and consent

Thank you for agreeing to take part in this research on Community Tree Nurseries. Your participation will help inform our assessment of your experience with the Shared Outcomes Fund, Community Tree Nursery pilot scheme. Your support is very much appreciated.

Below is a brief explanation of the project and how your responses will be used.

Project aims and background:
This research on Community Tree Nurseries (CTNs) is part of the Trees Outside Woodlands (TOW) Programme, funded by HM Government and delivered in partnership by the Tree Council, Natural England, the Department for Environment, Food & Rural Affairs with five local councils. This research aims to understand the role CTNs could play in achieving the UK's ambition for increased tree cover, through the supply of high-quality stock for tree planting.
This specific survey is aimed at those CTNs that have been supported by the Community Tree Nursery pilot scheme.
We are asking you to take part so that we can better understand your experience engaging with the scheme.

Survey process:
During this online survey, you will be asked a series of questions relating to how your CTN operates and how your CTN has engaged with the Community Tree Nursery pilot scheme. The survey will take approximately 8 minutes to complete. This short survey is designed to be completed alongside the longer Community Tree Nursery National Survey that is open to all CTNs whether or not they have taken part in the pilot scheme.
Please make sure you have completed the Community Tree Nursery National Survey which can be found here: https://www.smartsurvey.co.uk/s/HUXJOC/

Your information:
The data collected may be shared with partner organisations and will be used to produce written reports and publications which may be placed in the public domain. Nothing you say will be attributed to you or your CTN, and your details will be anonymised in all publications and outputs. If you have any questions about the project or how we are using your information, please contact the lead researcher, Bianca Ambrose-Oji at Forest Research by email: bianca.ambrose-oji@forestresearch.gov.uk.

Further details:
This survey is being carried out on behalf of all partners by Forest Research the research agency of the Forestry Commission. Their Code of Ethics can be found **here**.
The Forestry Commission's Personal Information Charter can be found **here.**
The Forestry Commission is registered as a data controller under the Data Protection Act

(DPA) 2018 (Registration No: Z6542658). The Forestry Commission's Data Protection Officer can be contacted at informationrights@forestrycommission.gov.uk.
You have a right to lodge a complaint with the supervisory authority the Information Commissioner's Office (www.ico.org.uk).

I confirm that I have read the above information and understand that my participation in this survey is voluntary. I understand that I do not have to answer any of the questions if I don't want to, and that I can leave the survey at any stage. *

- [ ] Yes
- [ ] No

I understand that I can withdraw my consent from the study and my data will not be used in the final outputs of the project if I inform the research team within 14 days of the survey date. *

- [ ] Yes
- [ ] No

I understand that my responses will be confidential, which means my answers to survey questions will not be shared outside the research team and I give permission for these individuals to have access to this data. *

- [ ] Yes
- [ ] No

I understand that data that is used in any reports and other documents produced will be anonymised; meaning the research team will not identify individuals or organisations who have taken part in the survey, unless their express permission is sought and given. *

- [ ] Yes
- [ ] No

I understand that evidence will be presented in the form of written outputs and some of the anonymised research evidence may later be used in documents that are placed in the public domain and/or presented to partner organisations. I understand that the information collected will be treated, stored and analysed in line with the requirements of the Data Protection Act (2018) and Forest Research's Code of Ethics. *

- [ ] Yes
- [ ] No

By entering my name below, I show my consent to participate in this study. Do not write your name if you answered no to any of the questions above. *

2. Information about your community tree nursery

1. Please provide the name of your community tree nursery project *

2. Since 2018, how many paid staff have contributed to the running of the community tree nursery? We are asking about FTE - Full Time Equivalents, so if you have two staff that work 50% part time that would equal 1 FTE. Please select "not applicable" if you are a new community tree nursery and/or there are years when you have not been operating. *

	<1	1	up to 5	more than 5	Not applicable
2018-2019	☐	☐	☐	☐	☐
2019-2020	☐	☐	☐	☐	☐
2020-2021	☐	☐	☐	☐	☐
2021-2022	☐	☐	☐	☐	☐

3. Since 2018, to what extent have volunteers contributed to nursery activities? Please provide your best approximation of the number of volunteer hours. For example, 6 volunteer sessions x 4 hours x 15 volunteers = 360 volunteer hours. Please state "not applicable" if you are a new community tree nursery and/or there are years when you have had not been operating with volunteers. *

2018-2019

2019-2020

2020-2021

2021-2022

3. Production at the community tree nursery

4. Since 2018, how many trees has your community nursery i) produced, ii) sold and iii) what is the total number of trees you have held in the nursery (i.e. including trees ready to distribute and trees you are growing on) on an annual basis? We are asking for your best approximate numbers. *

	Trees produced per planting year	Trees sold or grown to order/provided by arrangement per planting year	Trees held in the nursery per planting year
2018-2019			
2019-2020			
2020-2021			
2021-2022			

5. What percentage of trees did you lose in the last production year? We are looking for your best estimate of trees lost to disease, drought and other factors. *

- [ ] less than 5%
- [ ] 5-10%
- [ ] 10-20%
- [ ] more than 20%

6. Is your community nursery able to supply enough trees to satisfy demand? Please chose all that apply *

- [ ] No, there are more requests from local organisations and businesses than we can satisfy
- [ ] No, there are more requests from national organisations and businesses than we can satisfy
- [ ] Yes, we meet demand

- [ ] Not sure

7. Would you consider either increasing or shifting output to meet this demand? *

- [ ] Yes
- [ ] No
- [ ] Not sure

8. Do any of the following reasons prevent or hinder you increasing or shifting output to meet demand? Please chose all that apply. *

- [ ] We are happy as we are and do not wish to expand/increase production
- [ ] Demand gap filled by other species we already produce
- [ ] Access to land for the tree nursery
- [ ] Availability of seed sources
- [ ] Lack of funding/financial capital
- [ ] Limited staff or volunteer nursery lead knowledge
- [ ] Limited volunteer knowledge
- [ ] Not enough paid staff or volunteer nursery leads
- [ ] Not enough volunteers
- [ ] Other (please specify):

9. What type of trees does your community nursery currently produce? Please provide your best estimate of the percentage of each tree type that your CTN produces. If you do not produce any of these types of trees please enter "0" . *

Native broadleaves	%
Native conifers	%
Non-native broadleaves	%

Non-native conifers	%
Fruit trees	%
Other plants	%
Total:	%

10. How does your nursery decide which tree species to produce? Please select all that apply. *

- [ ] Previous sales
- [ ] Market research
- [ ] Anticipated grant funds
- [ ] Interests of staff and volunteers
- [ ] Anticipated demand from other groups
- [ ] Seed availability
- [ ] Other (please specify):

11. Which of the following markets/sources of demand have the largest influence on decisions about the nursery's future production? Please select all that apply. *

- [ ] Urban amenity tree planting
- [ ] Trees for agroforestry/fruit production
- [ ] Trees for farmed landscapes (i.e., shelter belts)
- [ ] Trees for small scale private planting (i.e., gardens)
- [ ] Trees for conservation areas and projects
- [ ] Other (please specify):

4. Specialist tree production at your Community Tree Nursery

12. Does your community tree nursery produce any specialist tree species? Why? Please list the specialist tree species you grow, and, if possible, provide details on why you are producing them. *

5. Engagement with the Community Tree Nursery pilot Scheme

13. How did you find out about the Community Tree Nursery pilot Scheme? *

- [ ] Direct contact from project officer
- [ ] From another community tree nursery
- [ ] From a Local Authority contact
- [ ] Word of mouth
- [ ] Newsletter
- [ ] Other (please specify):

14. Please tell us how you found the application process by ranking the following statements. *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I was provided with all the information I needed to apply	☐	☐	☐	☐	☐
The application forms were easy to fill in	☐	☐	☐	☐	☐
I was provided with help when I had queries about the application process	☐	☐	☐	☐	☐

15. What was the financial support you received awarded for? Please indicate all that apply. *

- [ ] Land/building costs including maintenance

- [ ] Utilities (e.g. heating, water, internet)
- [ ] Capital items (e.g. greenhouse, poly tunnel, tractor, fencing, irrigation system installation)
- [ ] Consumable items (e.g. compost, pots, tree guards, irrigation replacement nozzles)
- [ ] Staff costs for employees paid annually (e.g. salaried staff)
- [ ] Staff costs for employees paid hourly
- [ ] Support for staff or volunteers not including training (e.g. expenses)
- [ ] Training for staff and volunteers
- [ ] Marketing and promotion
- [ ] Other (please specify):

16. Approximately what percentage of the total financial award has been spent? Please provide an approximate %. *

17. Were there any challenges to using the financial support in the way you intended? Please select all that apply. *

- [ ] Difficulty of the procurement process
- [ ] Difficulties with supply (e.g. materials not available)
- [ ] Lack of staff and/or volunteer time
- [ ] Lack of staff and/or volunteer knowledge and skills
- [ ] Other (please specify):

18. Do you actively engage with the Community Tree Nursery Collaborative Facebook network? *

- [ ] Yes frequently

- [ ] Yes infrequently
- [ ] No: Not aware
- [ ] No: No time
- [ ] No: Not interested
- [ ] Other (please specify):

19. What difference did you expect the support you received would make to the community nursery? Please select all that apply. *

- [ ] Establishment of new nursery
- [ ] Extend existing nursery into tree production
- [ ] Increased community engagement
- [ ] Increased diversity of trees
- [ ] Increased numbers of staff
- [ ] Increased production of trees
- [ ] Increased staff/volunteer skills
- [ ] Increased volunteer engagement
- [ ] Other (please specify):

20. How far would you say these expected impacts have been achieved? Please provide further detail about the impacts you selected in question 13 above. *

21. Besides this grant, have you been in receipt of any other grants over the last 3 years? If you have, please can you provide a list of which ones. *

22. If you have not been in receipt of any other grants over the past 3 years, why is this? Please select all that apply.

- [ ] Not aware of other options
- [ ] Not found options relevant to CTN requirements
- [ ] Too difficult to apply
- [ ] Have applied, but application/s rejected
- [ ] Other (please specify):

Appendix 8. National Survey Questions

1. Welcome and consent

Thank you for agreeing to take part in this research on Community Tree Nurseries. Your participation will help inform our research focused on understanding the ways in which Community Tree Nurseries across the UK operate. Your support is very much appreciated. Below is a brief explanation of the project, who we want to engage with, and how your responses will be used. Who we want to speak to: We would like representatives of Community Tree Nurseries (CTN) in the UK to respond to this survey. We define a community tree nursery as "an enterprise, social enterprise, community-based group, charitable or public sector endeavour or network where volunteers, community groups, and community members take part in growing trees, including seed/wilding collection, nursery management and sales/distribution, and also in some cases planting out". If you do not manage or lead a community tree nursery, thanks for coming through to the survey, but we are not looking to collect any information from you at this time. Project aims and background: This research on Community Tree Nurseries (CTNs) is part of the Trees Outside Woodlands (TOW) Programme. The Trees Outside Woodland programme, funded by HM Government and delivered in partnership by the Tree Council, Natural England, the Department for Environment, Food & Rural Affairs with five local councils, aims to develop new ways of expanding tree cover outside of woodlands to meet the UK's ambition for increased tree cover. This research aims to understand the role CTNs could play in meeting this aim through the supply of high-quality stock for tree planting. Through this survey, we are looking to speak to CTNs across the UK to provide this important national-level baseline. Survey process: During this online survey, you will be asked a series of questions relating to how your CTN operates, the trees that are produced, how your CTN engages with volunteers and the implementation of biosecurity practices. The survey will take approximately 20-50 minutes to complete and we appreciate the time commitment required to complete this survey. As a thank you for your participation, we will provide your CTN with a copy of the 'Tree grower's guide' book. This new publication contains illustrations and identification tips for over 50 species alongside information on seed collection, stratification and growing. It will shortly be available on the Tree council's website priced at £11 plus P&P. Please note this offer for the survey is limited to one book per Community Tree Nursery. If you wish to receive this book, please provide your email and postal address (or that of your CTN) at the end of the survey. We will use this information for the purpose of delivering the book, after which it will be deleted. Your information: The data collected in the survey may be shared with partner organisations and will be used to produce written reports and publications which may be placed in the public domain. Nothing you say will be attributed to you or your CTN, and your details will be anonymised in all publications and outputs. If you have any questions about the project or how we are using your information, please contact the lead researcher, Bianca Ambrose-Oji

at Forest Research by email: bianca.ambrose-oji@forestresearch.gov.uk. Further details: This survey is being carried out on behalf of all partners by Forest Research, the research agency of the Forestry Commission. The Code of Ethics we use can be found here. The Forestry Commission's Personal Information Charter can be found here. The Forestry Commission is registered as a data controller under the Data Protection Act (DPA) 2018 (Registration No: Z6542658). The Forestry Commission's Data Protection Officer can be contacted at informationrights@forestrycommission.gov.uk. You have a right to lodge a complaint with the supervisory authority the Information Commissioner's Office (www.ico.org.uk).

I confirm that I have read the above information and understand that my participation in this survey is voluntary. I understand that I can leave the survey at any stage. *

- [ ] Yes
- [ ] No

I understand that I can withdraw my consent from the study within 14 days of the survey by informing the research team. This means that my data will not be used in the final outputs of the project. *

- [ ] Yes
- [ ] No

I understand that my responses will be confidential, which means my answers to survey questions will not be shared outside the research team and I give permission for these individuals to have access to this data. *

- [ ] Yes
- [ ] No

I understand that data that is used in any reports and other documents produced will be anonymised; meaning the research team will not identify individuals or organisations who have taken part in the survey, unless their express permission is sought and given. *

- [ ] Yes
- [ ] No

I understand that evidence will be presented in the form of written outputs and some of the anonymised research evidence may later be used in documents that are placed in the public domain and/or presented to partner organisations. I understand that the information

collected will be treated, stored and analysed in line with the requirements of the Data Protection Act (2018) and Forest Research's Code of Ethics. *

- [ ] Yes
- [ ] No

By entering my name below, I show my consent to participate in this study. Do not write your name if you answered no to any of the questions above. *

2. Information about your community tree nursery

1. Please provide the name of your community tree nursery project. *

2. Which year was your community tree nursery established? *

3. Please indicate which of the following most closely describes how the community tree nursery is organised. *

- [ ] Enterprise (commercial or social). See tree sales as an important component of sustainability.
- [ ] Network. A collective of tree growers based in different locations.
- [ ] Community-based. Managed and run by established community group as a community-based initiative.
- [ ] Organisation or project-based. Managed or supported by a Local Authority, a charity, or partnership project.
- [ ] Other (please specify):

4. If you selected "Network" in Question 3 above, are you answering on behalf of: *

- [ ] the network of community tree nurseries.

- [ ] one community tree nursery in the network.
- [ ] not applicable

5. Where is your community tree nursery located? If possible, please provide the postcode of your community tree nursery. If your community tree nursery is part of a network, please provide the relevant town or county where the network is based. *

6. Over the past year, how many paid staff have contributed in any capacity to the running of the community tree nursery? We are asking about FTE - Full Time Equivalents, so if you have two staff that work 50% part time that would equal 1 FTE. *

3. Production at the community tree nursery

7. Since the establishment of your community tree nursery, has tree production increased, decreased, or remained stable? *

- [ ] Increased
- [ ] Decreased
- [ ] Remained stable
- [ ] Not sure

8. How many trees did the community tree nursery produce over the last 12 months? By 'produced' we mean the number of trees that became ready for distribution in the last 12 months (rather than total numbers growing in the nursery). *

9. Looking back at the planting season October 2021 - March 2022, approximately what proportion of the community tree nursery's production was distributed? By 'production' we mean the number of trees that became ready for distribution (rather than total numbers growing in the nursery). *

- [ ] None
- [ ] Quarter
- [ ] Half
- [ ] Three quarters
- [ ] Everything
- [ ] Not sure

10. Do you have plans to significantly (by 10% or more) increase production over the next 1-5 years? *

- [ ] Yes
- [ ] No
- [ ] Not sure

11. Over the past 12 months, what tree species has your community tree nursery produced? Please list the species your community tree nursery has produced and provide your best estimate of the number of units in brackets. For example, species (number of units).
Please note that if your community tree nursery produces a large number of species, there is the option instead to upload a file containing this information if you have these records available (see Question 12 below). *

12. Species list file upload option.
If you have records available that you are willing to share, please upload the full list of species produced by your nursery over the past year (including details of units produced per species) using the 'choose file' button.

13. What size of trees does your community tree nursery currently produce? Please provide your best estimate for each category as a percentage. Your answers must total 100%. *

Bare root transplants	%
Cell grown transplants	%
Maiden	%
Half standards	%
Standards	%
Total:	%

14. How does your community tree nursery currently source trees? Please provide your best estimate of the percentage of trees your community tree nursery produces using each of the below methods. Your answers must total 100%. *

Produced from seed collected by community tree nursery - within 20 miles of the nursery	
Produced from seed collected by community tree nursery - further than 20 miles from the nursery	
Produced from seed sourced from commercial suppliers	
Produced from cuttings	
Bought-in stock	
Donations from members of the public/volunteers	
Other	
Total:	

If you answered "Other", please describe:

15. Is there a demand for species your community tree nursery cannot provide (either as trees you have grown or trees you stock)? *

- [ ] Yes

- [ ] No
- [ ] Not sure

If yes, please tell us which species (list up to three).

16. Would you consider either increasing or shifting output to meet the demand for these species? *

- [ ] Yes
- [ ] No
- [ ] Not sure

17. What do you perceive to be the most significant barriers to increasing production or shifting production to meet demand for all species and from all customers and end users (e.g. barriers or reasons that prevent or make increasing production difficult/undesirable)? Please select the 5 most relevant barriers. *

- [ ] Increased upkeep costs
- [ ] Consumable costs
- [ ] Uncertainty around anticipating future demand and funding needs
- [ ] Risks losing the original ethos of the community tree nursery
- [ ] Availability of seed sources
- [ ] Motivation of staff/volunteers
- [ ] Volunteer availability
- [ ] Time required
- [ ] Capital costs or reoccurring costs of community tree nursery infrastructure
- [ ] Staff capacity

- [ ] No barriers
- [ ] Access to land for the community tree nursery
- [ ] Other (please specify):

4. How your Community Tree Nursery operates

18. We would really like to know more about where the trees you produce go. Thinking overall about how you distribute your trees, how important are each of the following channels? Please add a number between 1-5 to each box below, where 1= not at all important and 5 = extremely important.
If you answered 'other, please explain. You are free to add any scores in the boxes, the rows or columns do not need to add up to a particular total. *

	Private individuals	Government and local authorities	Environmental charities and similar organisations	Other
On-site sales, i.e. unarranged retail sales				
Donations, i.e. gifting/giving trees to individuals and organisations				
Growing to order, i.e. growing species and numbers of trees by prior arrangement for specific projects or organisations				

If you answered "Other", please describe:

19. What is the financial turnover generated by the community tree nursery on an annual basis? By turnover we are asking about the total amount of money that comes into the community tree nursery from different sources including grants, tree sales, donations etc.

- [ ] <£1,000

- [ ] £1,000 - <£5,000
- [ ] £5,000 - <£10,000
- [ ] £10,000 - <£20,000
- [ ] £20,000- <£50,000
- [ ] >£50,000
- [ ] Not sure

20. What contributes to this income? Please score the relative importance of the following options, by assigning points out of 10. For example, if tree sales and income from a café are the two sources of income, and the majority comes from tree sales with comparatively little coming from the café, you might score tree sales 9 and café income 1. Your answer must add up to 10. *

Tree sales	
Other plant sales	
Sale of other items	
Providing training/learning	
Café	
Grants	
Other	
Total:	

If you answered "Other", please describe:

21. Taking into account all expenditure and outgoings including overheads, what are the total costs that the community tree nursery has on an annual basis? *

- [ ] <£1,000
- [ ] £1,000 - <£5,000

- [ ] £5,000 - <£10,000
- [ ] £10,000 - <£20,000
- [ ] £20,000 - <£50,000
- [ ] >£50,000
- [ ] Not sure

22. What contributes to these annual costs? Please score the relative importance of the following options by assigning points out of 10. For example, if utilities and land/building costs are the two costs, and the majority comes from utilities with comparatively little from land and building costs, you might score utilities 9 and land/building costs 1. Your answer must add up to 10. *

Land/building costs including maintenance	
Utilities (e.g. heating, water, internet)	
Infrastructure and equipment (e.g. greenhouse, poly tunnel, tractor, fencing, irrigation system installation)	
Consumable items (e.g. compost, pots, root trainers, tree guards, irrigation replacement nozzles)	
Staff costs for employees paid annually (e.g. salaried staff)	
Staff costs for employees paid hourly	
Support for staff or volunteers not including training (e.g. expenses)	
Training for staff and volunteers	
Marketing and promotion	
Other	
Total:	

If you answered "Other", please describe:

23. Do you perceive any of the following to threaten the long-term continuation of your community tree nursery? Please select all that apply. *

- [ ] Maintaining a volunteer base
- [ ] Over-reliance on a small number of individuals
- [ ] Short term grants
- [ ] Lack of demand
- [ ] Difficulty meeting biosecurity standards (e.g. Plant Healthy Certification or Forest Reproductive Material).
- [ ] Financial instability
- [ ] Access to land for the community tree nursery
- [ ] None
- [ ] Other (please specify):

24. Do you feel any of the following would support the development and/or long-term continuation of the community tree nursery? Please select all that apply. *

- [ ] Support for peer-to-peer learning and exchange with other community tree nurseries
- [ ] Support with finding and applying for grants
- [ ] Training on community tree nursery business planning and management
- [ ] Help with record-keeping, e.g. origin of plant, plant movements, origin of materials, potting on dates etc.
- [ ] Training on community tree nursery regulations and biosecurity practices
- [ ] "How to" technical sheets for volunteers e.g., pruning, seed collection etc.
- [ ] Other (please specify):

5. Volunteers

25. Over the past 12 months, how many volunteers have contributed to the running of your community tree nursery? *

26. What are your main objectives for having volunteers? Please select all that apply. *

- [ ] Social capital and community cohesion brought about by social interaction at the community tree nursery
- [ ] Health and wellbeing benefits (e.g. through nature connection, physical exercise and through socialising)
- [ ] Learning and skills development of volunteers
- [ ] Changing community attitudes and perceptions towards trees and nature
- [ ] Volunteers contributing to the management and maintenance of the community tree nursery itself
- [ ] Seed collection
- [ ] Flexible working patterns
- [ ] Other (please specify):

27. Over the past year, to what extent have volunteers contributed to community tree nursery activities? Please provide your best approximation of the number of volunteer hours. For example, 6 volunteer sessions x 4 hours x 15 volunteers = 360 volunteer hours.

6. Biosecurity at the community tree nursery

28. Does the community tree nursery have an active biosecurity policy or plan in place? Please select one option. *

- [ ] Yes, a formal written policy/plan that all staff/volunteers are made aware of
- [ ] Yes, a formal written policy/plan that some staff/volunteers are aware of

- [ ] Yes, an informal policy/plan, e.g. some general principles commonly understood across the community tree nursery
- [ ] No
- [ ] Not sure

29. Do you have any interest in achieving Plant Healthy Certification? *

- [ ] Yes
- [ ] No
- [ ] Not sure

30. Do you perceive any of the below to be barriers to applying for Plant Healthy Certification? Please select all that apply for your community tree nursery. *

- [ ] Cost
- [ ] Motivation
- [ ] Access to advice
- [ ] Record keeping required
- [ ] Time required
- [ ] Office equipment/IT needed
- [ ] Not aware of Plant Healthy Certification
- [ ] No barriers
- [ ] Other (please specify):

31. Do you currently have, or carry out, any of the following measures? Please select an answer for each measure. *

	Yes	No	Don't know
A quarantine area	☐	☐	☐
The ability to trace trees from source to sale	☐	☐	☐
Procedures for cleaning and sterilisation	☐	☐	☐
Pest and disease checks on incoming goods	☐	☐	☐
Regular monitoring for pests and diseases	☐	☐	☐
Regular attendance of biosecurity training	☐	☐	☐

32. Do you feel further biosecurity training would support your staff/volunteers? *

- ☐ Yes
- ☐ No
- ☐ Not sure

If yes, which topics or issues would be most useful?

7. Contact details

33. If you would like to receive a free copy of the tree growers guide, please provide us with i) a contact email address and ii) a postal address. Please note that by doing so, you are giving us permission to contact you for the purpose of organising the delivery of the book. These data will be deleted once the book has been delivered. Please also note that your free copy of the tree growers guide is limited to one per community tree nursery.

Name

Email address

Postal address

Postcode

34. If you provided us with an email address in Question 33 above, would you like to receive information about Community Tree Nursery training and grants?

- [ ] Yes
- [ ] No

Alice Holt Lodge
Farnham
Surrey, GU10 4LH, UK
Tel: **0300 067 5600**

Northern Research Station
Roslin
Midlothian, EH25 9SY, UK
Tel: **0300 067 5900**

Forest Research in Wales
Environment Centre Wales
Deiniol Road, Bangor
Gwynedd, LL57 2UW, UK
Tel: **0300 067 5774**

info@forestresearch.gov.uk
www.forestresearch.gov.uk

Forest Research will consider all requests to make the content of our documents available in alternative formats.

Please send any such requests to: research.info@forestresearch.gov.uk