



Department  
for Environment  
Food & Rural Affairs

# Overcoming the Knowledge to Action Gap

## Interim Report to Future Proofing Plant Health

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# Executive summary

## Introduction

- The project is based on an identified gap between land manager knowledge on tree health issues and their actions (or lack thereof) on those issues. In particular, land managers often know *what* specific issues are (i.e. awareness of a tree pest or disease) but struggle when it comes to *how* to act on those issues.
- This project builds on findings from a pilot project on knowledge issues relating to ash dieback and *Ips typographus*, focusing on knowledge-providing organisations. The research demonstrated that knowledge is built and translated into action through complex networks of interactions and relationships.
- Focus was shifted from identifying knowledge problems, to identifying solutions in the form of targeted interventions in the knowledge system. This provides a unique opportunity to assess what factors and processes influence success in knowledge interventions.
- A decision was made to focus this study on farmers as a hard to reach audience for tree health policy. Ash dieback was chosen as a focus tree health issue, and the South East was chosen as the case study area. The project also aimed to link in with the Future Farming Tree Health Pilot where possible. A decision was made that the knowledge intervention would be a knowledge tool, supporting farmer decision-making on ash dieback.

## Methods

- This was a qualitative study. A total of 17 semi-structured interviews were conducted with knowledge intermediaries (influential farmers, farmer-focussed organisations or tree and woodland related organisations engaging with farmers). A further 28 farmers participated in focus group discussions at two in-person workshops in Hampshire and Kent, and one national, virtual workshop.
- Interview and workshop recordings were transcribed and coded in NVivo v.12. The themes were analysed against the research questions.

## Key results

- In general, farmers are: conducting informal visual inspections when out on their farms
  - few have professional surveys undertaken; felling infected trees in high risk areas, while a wait-and-see approach is often adopted where there is no risk to humans; felling the trees themselves, including some roadside trees; and leaving infected and uninfected trees in low-risk areas where this does not incur a cost.
- Farmers with woodland tend to be more exposed to forestry-related information and are therefore more likely able to access information on tree health. Those farmers require flexible guidance on how to manage their woodlands based on their objectives and circumstances. Farmers with no woodland are less exposed to forestry and tree health information and are more in need of simple, directive information on how to act.
- The main knowledge issue for farmers was assessing at which point an infected tree needs to be managed/felled. This was followed by knowledge gaps around the health and safety risks of retaining trees and of felling brittle, infected ash trees, and questions around ensuring a future for ash trees and recovery of the landscape.
- Farmers rely heavily on their peers and on personal contacts when making decisions on tree management. In order to reach hard to reach farmers it is therefore important to engage with gatekeepers such as influential farmers, or with farming-specific organisations.
- Knowledge tools on tree health issues for farmers will need to incorporate a range of media to accommodate for different learning styles. The information needs to be short and concise, specific to farmers, easy to access and properly signposted.

## Conclusions

- The results of the evidence synthesis were presented during team and steering group meeting, where a number of different ideas about the format, content and dissemination of a potential knowledge product were discussed in detail. The final decision was to produce An ADB Toolkit for farmers with modules/sections addressing knowledge gaps, and that this would be a web-based document with linked mixed, integrated media
- Reflections of the action research and ADB toolkit development process will be needed to draw out lessons from this project about how to move farmers towards action for tree health more widely.

# 1. Introduction

## 1.1. Project objectives and research questions

Research across the FPPH programme and more widely, shows that while tree health stakeholders are relatively well served with technical information about pests and diseases and disease-host interactions (i.e. 'knowing that' and 'knowing what'), supply of information and guidance about the practical actions that can be taken in response (i.e. 'knowing how') and uptake of that information amongst land managers is more problematic. This represents a significant barrier to facilitating uptake of forest management behaviours that support response and adaptation to tree health threats, and to building forest resilience more generally.

Research during a one-year FPPH scoping project (FY2020/21), focused on the provision and uptake of tree health knowledge amongst hard to reach audiences (e.g. farmers, owners of small conservation woodlands, small and micro-businesses). The research demonstrated that knowledge is built and translated into action through complex networks of interactions and relationships which include many stakeholders and social groups who influence the decision making and behaviour of target audiences in different ways. Linear models of knowledge dissemination and uptake were shown to be inappropriate, with knowledge networks and systems being a more relevant way to begin to theorise and understand the complex factors at play in the plant/tree health knowledge economy.

Scoping work focused on knowledge networks associated with three case studies, i.e. ash dieback, *Ips typographus* and small nursery businesses. The research detailed the complexity of relationships between organisations involved in producing information and knowledge, and those translating it and engaging with hard to reach land managers and small businesses. Some of the key challenges and barriers to moving land managers and small businesses to action were identified. This included possible “solution spaces”, i.e. areas for innovation or change which could facilitate behavioural change.

The potential “solution spaces” were:

- **Building perceptions of relevance and salience around tree health issues amongst key organisations and audiences.** The mission and objectives of organisations may limit their perceived role around the generation or translation of knowledge about

specific plant health issues and their engagement with particular audiences. Land managers question why they should take action, particularly where there is uncertainty about the risks and impact of those actions to their own objectives as well as environmental outcomes. Building a sense of ownership and responsibility around P&D issues would go some way to building greater resilience across treescapes.

- **Improving understanding of target audiences amongst knowledge brokers.**

Some of the organisations generating information or providing knowledge translation within knowledge networks have a poor understanding of their key audiences. Similarly, different segments of the land manager community do not necessarily perceive organisations providing information about tree health issues as being relevant to them. This limits the impact on identifying key behaviours that could be targeted, how they might be targeted, what target audiences need to know to move to action, and the development of appropriate materials and messages.

- **Developing information, guidance and other knowledge products suited to context and socio-cultural norms of HTR and non-traditional audiences.** Harder to reach land managers will not use scientific and policy information as a basis for action unless translated into guidance which is practical, feasible, and aligned with their management objectives and values. This is especially important when target audiences do not consider themselves to be foresters as these groups need clear, simple and easily located communication products tailored to their situations.

- **Involving target audiences in the generation of knowledge and the demonstration of action.** Greater involvement of end users and key audiences in the research cycle may add to the complexity of knowledge networks, but can have positive impacts on problem definition, articulating knowledge needs, undertaking applied research and the efficacy of uptake and behaviour change.

The aim of this two year action research project is to build on these scoping-phase insights and deliver specific outcomes for policy, target audiences including land managers and organisations that serve a knowledge brokerage function: The research seeks to improve understanding of the principles and practice needed to inform development of tools (e.g. learning tools for land managers, organisation/policy supported Resource Hubs), and processes that improve knowledge networks and move target audiences to acting for tree health.

The high-level research questions guiding the achievement of these outcomes are:

1. What are the key “solution spaces” for improving knowledge translation, dissemination and uptake practice that will overcome the main barriers to achieving desired actions/behaviours amongst target audiences? (i.e. where can we make changes to the knowledge system that will have impact)
2. Which are the key organisations, including knowledge network influencers intervention leaders and knowledge-focussed research organisations, likely to have the most impact leveraging these changes? (i.e. who is likely to have greatest impact in generating and promoting change within the knowledge system)
3. Can a co-design process involving stakeholders and end users in the knowledge network, help to design interventions in the “solution spaces” that are more effective in promoting desired behaviours? (i.e. what does an effective change process look like)
4. How can end-user engagement with research processes be facilitated to enhance learning and action around desired behaviours? (i.e. how can end users be included in the generation of relevant *applied* science and outputs).

## 1.2. Project focus, Year 1 actions and interim reporting

The focus of this action research project are farmers (a hard to reach audience for tree health policy), and ash dieback (ADB; a widespread and common tree health problem recognised by farmers, with significant felling costs in some high risk locations on agricultural land – e.g. roadsides). The intention is to add value to this project by linking the action research and outcomes to the Future Farming Tree Health Pilot that is engaging with farmers and ADB, and other emerging policy initiatives associated with tree health and resilient treescaping.

The overall arc of the project across the two years is as follows:

### Year 1.

- i. Initiate a Co-design action-research process with science, policy and practice communities including a farmer facing membership organisation or other key knowledge network influencer
- ii. Map the knowledge system and networks associated with ADB and farmer audiences
- iii. Identify and agree an appropriate solution space/s and practice improvements

## **Year 2.**

- iv. Produce and test the “solution/s” and practice improvements (i.e. the move to action)
- v. Evaluate practice improvements
- vi. Synthesise recommendations for other areas of tree and plant health policy and practice

This interim report provides a description of the results of actions undertaken in Year 1 of the project, and provides partial answers to the high-level research questions. These questions and the project outcomes will be achieved by the end of year 2 of the project.

## **2. Methodology**

### **2.1. Agreeing project scope and action research domains**

The previous year’s scoping study had shown that farmers with trees outside of woodlands (ToW) and small farm woodlands represent a hard to reach audience for wider plant and tree health policy (Ambrose-Oji et al. 2021). It was also shown that ADB has a relative high profile amongst farmers compared to other tree pest and disease threats so is likely to be of interest to them. The importance of engaging with organisations that connect with farming communities to enable effective communication and knowledge exchange with them was also highlighted. This was the initial focus of the project design.

The project followed the principles of co-design within the given project resources and timeline. Co-design is a participatory design process where end users and other stakeholders are given opportunities to input throughout the design process in a meaningful manner. This allows participants to contribute to finding solutions for complex public policy problems (Blomkamp, 2018), such as the need to engage hard to reach audiences in actions for tree health.

A preliminary task with project partner Exeter University, was to identify a suitable farming organisation with capacity not only to connect with farmers at a field level, but also to take part in a collaborative action research project. Potential partner organisations were identified and given a RAG ranking based on pros and cons in relation to their link with our target

audiences, their capacity to undertake research, and their previous work on similar topics. Linking Environment and Farming, or LEAF, were identified as the most suitable organisation. A number of discussions took place with LEAF to ensure that they were willing to go on the co-designed action research 'journey' with the research team.

Having engaged project partners LEAF and Exeter University, it was important to explore with them the initial assumptions around project design, and open up the development process to a more co-design collaborative process. As such, a first step was to debate the following questions to confirm the scope of the project:

- Is ADB likely to be the tree health issue of interest to the farming community?
- Within the farming community, who are the target hard to reach audiences this project should focus on?
- Which geographical area should the research focus on?

It was agreed that ADB presents a way of engaging with the farming community to explore how to engage farmers in wider tree health issues. The team also confirmed the focus on farmers in the South East was sensible, not only because of the link with the Future Farming Tree Health Pilot, but also because ADB has been present in the South East longer than other parts of the country, and therefore farmer awareness and experiences are expected to be higher in this area. A full record of decisions made during initial meetings can be seen in Appendix 1.

The range of potential action research domains were then discussed in detail among the team as outlined in Appendix 2. The development of a 'knowledge tool' for farmers that could support them and move them to active management of ADB emerged as the preferred option. The intention was for the process of developing the knowledge tool to also build capacity about tree health issues amongst project partners and other stakeholders participating in the co-design process.

## 2.2. Sampling strategy

To get the full picture of what a knowledge tool might look like, two populations were involved in the research at two different stages. These were:

*Stage 1. Collecting information about farmers current ADB behaviours and their knowledge needs.* This involved collecting evidence from:

- Influential “gateway” farmers with a knowledge of others in their community operating with different tree and woodland contexts
- Knowledge intermediaries providing advice and information to the agricultural community

The evidence collection focused on improving understanding of:

- Current farmer actions on ADB
- Knowledge challenges among farmers
- Knowledge challenges faced by knowledge intermediaries
- Identify potential solutions to those knowledge challenges

*Stage 2. Validating the evidence and ideas generated in Stage 1.* This involved collecting evidence from:

- Farmers operating with different tree and woodland contexts

The data collection focused on:

- Discussing and validating the data collected in Stage 1 particularly farmers’ key knowledge needs and gaps
- Improving understanding of what farmers need to move them from knowledge to action, including the idea of producing a farmer focused ADB toolkit

A total of 45 research participants participated in 17 interviews (see **Error! Reference source not found.**), two in-person focus groups and one virtual focus group (see Table 2). Purposive sampling was used for the knowledge intermediary interviews. A list of potential interviewees was collated collaboratively by the research team. Interviewees were selected based on their activities in the case study area, their engagement with farmers and provision of advice on tree health or ADB.

For the farmer focus groups, invitations were shared with farmers through LEAF’s members. In addition, a representative from a LEAF demonstration farm was invited to each of the focus groups and gave presentations on their experiences with ADB on their farms. A

Woodland Officer working on the Future Farming Tree Health Pilot in the case study area also participated in the workshops and provided a talk on ADB. This helped foster the link between the Knowledge to Action project and the Future Farming Tree Health Pilot.

## 2.3. Semi-structured interviews

Semi-structured interviews were undertaken with knowledge intermediaries, each lasting between 25 minutes and an hour and 10 minutes. An interview guide was used to structure the conversations around the following topics: about the interviewee and their role; general awareness of tree health and ADB; key desired farmer behaviours; information and knowledge development; and learning tools (See Appendix 3). For the key desired farmer behaviours, actions related to four specific behaviours were investigated in detail: surveying and monitoring ash trees on farmland; felling infected trees in high risk locations; retaining ash trees in low risk locations; and managing roadside ash.

A total of 17 interviews were conducted (see Table 1) with 18 participants (KtoA07 and KtoA15 participated in a joint interview). While the sample mainly consisted of intermediaries operating on a national level (n=7), or in the South East (n=7), a few key intermediaries from other regions were also included due to their expertise on the topic. The knowledge intermediaries were active in farmer organisations, advisory groups, conservation organisations, environmental consultancies, landowner groups, and farms including demonstration farms. Their specific roles within their organisations were varied, focusing on tree safety, woodland specific advice, policy, grant schemes including agri-environment schemes, environmentally-friendly farming, and facilitating farmer networks and/or learning opportunities. Further details of the sample are not provided to protect anonymity.

**Table 1. Knowledge intermediary interview sample characteristics – KTA 15 not included**

Region / area of operation	Role type			Total
	Agricultural advisor	Woodland advisor	Influential farmer (e.g. Farm cluster facilitator, demonstration farmer)	
UK National	4	2	1	7
South East	2	3	2	7
South West	1	0	0	1
Midlands and North West	1	0	1	2

<b>Total</b>	<b>8</b>	<b>5</b>	<b>4</b>	<b>17</b>
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## 2.4. Focus groups

Three workshops were planned with one each in Hampshire, Kent and Suffolk. The in person workshop lasted five hours and included a break with refreshments and lunch or dinner for the participants. A surprisingly low number of farmers signed up for the workshop, and a decision was made to move the workshop planned for Suffolk to a two-and-a-half-hour online workshop accessible to farmers from all parts of the country. The virtual workshop was successful and had a higher number of participants than the in person workshops (see Table 2). This prompted conversations about limitations in getting buy-in from farmers for the co-design process. The workshops included presentations followed by two focus group discussions. The first discussion focused on tree health in general and farmers' responses to ADB. The second discussion then focused in on knowledge needs and knowledge tools for farmers (see the slides in Appendix 4). Each focus group was facilitated by a member of the research team, and where possible, another member of the team took notes during the discussions. The discussions were also audio recorded.

The majority of participants were farmers (22 of 27) and came from a range of farm types: livestock, arable crops, fruit, salads and horticulture. One benefit of working with LEAF was the access to their membership of farmers engaged in environmental issues, who were identified in early discussions as the most feasible target audience for the research. As a result of this, a large number of focus group participants worked on estates with woodland or had woodland on their farm. These participants were able to make comments on the awareness and behaviours of their less-aware peers. A small number of woodland advisors and participants with other tree or woodland-related roles participated in the workshops which helped provide the participants with specific information and guide the conversations.

**Table 2. Focus group participant sample**

Focus Group	Role type			Total
	Farmer/farm manager	Woodland/forest manager/tree surgeon	Woodland advisor	
<b>Hampshire (in person)</b>	2	1	1	<b>4</b>
<b>Kent (in person)</b>	6		1	<b>7</b>

<b>National (virtual)</b>	<b>14</b>	<b>1</b>	<b>1</b>	<b>16</b>
<b>Total</b>	<b>22</b>	<b>2</b>	<b>3</b>	<b>27</b>

## 2.5. Analysis

Intelligent transcripts were produced from the interview and focus group recordings, and the transcripts were imported into NVivo v.12 (QSR International, 2018). Three researchers (AP, RW and BK) collaborated on the coding. An initial coding framework was developed deductively based on the research questions and the interview guide. The framework was reviewed by AP and RW who then applied them to three interview transcripts. The researchers then met and compared their coding and made adjustments to the coding framework. The remaining interview and focus group transcripts were then shared between the three researchers and coded in full. The coded material was analysed to pull out the most common or otherwise notable content from the relevant themes as they relate to the research questions.

The synthesis analysis is reported below and used the coding framework to organise the results to explore the key research questions outlined in Section 3 below.

## 3. Results

### 3.1. What are the key knowledge barriers to action and what are the potential ‘solutions’

#### 3.1.1. How are farmers currently acting for ash dieback, and what are the drivers/barriers mediating action?

Table 3 below combines interview and focus group data to summarise current actions respondents were taking or thought farmers were undertaking to manage ADB. These results are organised around the four key behaviours desired by policy. No significant patterns of difference emerged between what knowledge intermediaries thought farmers were doing, and what farmers themselves reported in the focus groups. When looking to establish differences in understanding and behaviours between farmers, awareness and actions were

seen to be influenced by farm size, whether they are managing woodlands or ToW, and how much they value trees on their holding. The type of farming undertaken on the farm (i.e. arable, livestock etc.) did not seem to be a key influence. The knowledge intermediaries thought that larger estates were more “clued up”, more strategic in their responses, spending time in/around their trees on a more frequent basis, and having management plans in place. Focus group participants agreed and thought larger woodland owners and estates were seen to be more linked up with tree health as some of them run forestry operations, and many interact with tree health professionals:

*It's probably the small farmer that maybe doesn't have woodland and therefore doesn't have conversations with foresters and arboriculturists, that are really not sure what to do - or even if they've got to do anything at all. (KtA08, woodland adviser)*

*I think if you've got that wider tree ownership it's probably a very relevant thing to you and you're onboard with the thinking. It's the more individual ownerships that for me are harder perhaps, where that information might not necessarily be there. (FG1)*

Focus group participants also pointed out that estates and larger farms potentially have more resources to deal with things like the paperwork required for grant applications etc. or are able to hire surveyors and felling contractors. However, there will also be more work required for the larger estates with lots of public access than for the smaller farms with a few woodland trees. Estates with woodlands used for recreational shooting were seen to be both more aware and more risk averse due to the nature of interaction with the woodland – the estate owners will be going into the woodlands to feed the pheasants etc. and the shooters will be going through the woodland during the shoots. One shooting estate had closed their woodland for shooting for a season in order to undertake extensive tree works.

Although acknowledged to be a broad generalisation, farmers of arable farms were perceived to have less interest in, and knowledge of trees, particularly as field trees can complicate field operations. As one focus group participant explained:

*but you do get people like I mentioned my friends up North. They're not really interested in trees at all. They have arable farm and just happen to have some trees. They're not in woodland as such, but they're hedgerow trees. They don't know anything about trees. (FG1)*

There was also seen to be a difference between farmers who own the land and tenant farmers. For tenant farmers, liability might fall on the landowner and decision-making might be restricted. In some cases, the landowner might have better tree health knowledge and

pass that on to the tenant farmers. However, tenant farmers might not necessarily place value on the trees on their rented farmland in the same way a farm owner might do.

When considering the key barriers to action Table 3 highlights these as falling in three key areas:

- **Prioritisation.** Managing ADB is not a priority for the majority of farmers, particularly if they perceive trees to have little value.
- **Time and cost implications of action.** Whether considering surveying or felling, road closure or learning more about ADB, the resource costs are too high for many farmers to accommodate.
- **Lack of awareness and knowledge** about: identification of different symptomatic stages and when a tree becomes a significant risk; what circumstances to fell or retain trees; the H&S risks of retaining trees, and of felling practice; and rules and regulations associated with felling.

**Table 3. Farmer behaviours and barriers to desired actions reported by knowledge intermediaries and farmers (n=44)**

Desired behaviour	Actions undertaken	Barriers to desired action
<b>Survey/monitor</b>	<ul style="list-style-type: none"> <li>• The importance of monitoring in order to effectively manage trees at different stages of disease is recognised.</li> <li>• Monitoring is mostly an informal process which occurs throughout the year as farmers go about their daily business. This is not a systematic process. ADB is usually noticed when the tree is symptomatic at a more advanced stage. Professionals might then be brought in if the farmer has identified a need to act.</li> <li>• Farmers who survey tend to do so every 3 years. They recognise ADB may need to increase the frequency.</li> <li>• Farmers may not be surveying because of the associated cost and time, others because they are not aware they need to.</li> <li>• Larger estates might have a more formal processes of professional surveying, because woodland management is a part of their day to day business.</li> </ul>	<ul style="list-style-type: none"> <li>• ADB is not a priority for farmers – trees are not valued</li> <li>• Significant time and cost implications of surveying</li> <li>• Lack of awareness of the need for surveying, the frequency and the best time of year to survey</li> <li>• Inability to identify different stages of the disease and know when action needs to be taken</li> </ul>
<b>Fell infected high-risk trees</b>	<ul style="list-style-type: none"> <li>• The data about what felling actions were being taken was mixed.</li> <li>• Farmers generally fell trees in high risk areas, e.g. near buildings/ footpaths/ roads.</li> <li>• Farmers are mainly felling infected trees or those which are dying or dead (including those in woodlands)</li> <li>• Some farmers are pre-emptively felling all ash trees because of H&amp;S fears.</li> <li>• Some farmers (those who have ash trees in woodlands) are keen to fell their ash early while there is a still a market for it (potentially leading to felling trees</li> </ul>	<ul style="list-style-type: none"> <li>• ADB is not a priority for farmers</li> <li>• Confusion over the guidance about when to fell or retain trees</li> <li>• Reluctance to fell until it's perceived as really necessary</li> <li>• Time and cost associated with felling</li> </ul>

Desired behaviour	Actions undertaken	Barriers to desired action
	<p>in early stages of infection, felling healthy trees among infected trees in stands, or pre-emptive felling of healthy stands)</p> <ul style="list-style-type: none"> <li>• Understanding that costs of felling are likely to increase as the disease advances, can be the motivating factor for action amongst some. For others, the perceived difficulties of felling means trees are left for longer, and they end up being even more costly and dangerous to remove. This variation in response was observed among all farmer types include those with woodlands and estate owners, and depends on management objectives and risk perceptions.</li> <li>• Felling practice is variable. Some farmers are contracting specialists. Many farmers are avoiding felling contractor costs or avoiding paperwork, and undertaking the work themselves. This felling work tends to be without specialist equipment. In some instances felling practices may be unsafe as not all farmers are aware of the H&amp;S issues associated with felling trees heavily infected with ADB. This is true for farmers with low awareness and low numbers of trees as well as farmers with woodland and estates.</li> <li>• Farmers who are aware of costs involved in felling dangerous trees, often find it more cost-effective to fell other uninfected ash trees at the same time. This is to save on long-term management and repeat visit costs.</li> </ul>	<ul style="list-style-type: none"> <li>• Perceived bureaucracy in getting felling permits and licences</li> <li>• No financial incentives/support</li> <li>• Lack of information on Health and Safety issues associated with felling risky trees</li> </ul>
<b>Retain healthy and low-risk trees</b>	<ul style="list-style-type: none"> <li>• Reasons for retention include a perception that mature trees may develop resistance combined with the prohibitive costs and time of felling / replanting, difficulty accessing trees in woodlands and a desire to provide deadwood habitats for biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>• Confusion over the guidance about when to fell or retain trees</li> <li>• Lack of information about the reasons behind this advice in a</li> </ul>

Desired behaviour	Actions undertaken	Barriers to desired action
	<ul style="list-style-type: none"> <li>• The preference for a ‘wait and see’ approach, is prominent where ash trees are in low risk areas (e.g. open grassland or woodland without public access), where trees are shelterbelts or provide biodiversity benefits</li> <li>• Some farmers have an attachment to larger, older trees and hope they will survive, so are retaining them regardless of infection</li> <li>• Some are waiting for natural processes e.g. storms, to bring trees down</li> <li>• Areas that are close to pedestrian paths and roadsides are priority for felling, even if the trees are healthy</li> <li>• Some farmers are reluctant to retain infected trees or standing deadwood even in low risk areas due to health and safety fears, and a culture of keeping a “clean and tidy” farm</li> </ul>	<p>way that relates to ToW and farmer context</p>
Roadside ash	<ul style="list-style-type: none"> <li>• There is awareness of the need to survey and fell infected roadside ash due to owner liability and to comply with insurance policy conditionalities.</li> <li>• Farmers are more likely to clear fell all ash along roadsides and other infrastructure areas because they want to minimise long-term cost and labour, business risk and liability.</li> <li>• Many farmers bypass the official road closure process, felling without going through official channels at the local authority, waiting for trees to fall naturally, or waiting until a road is closed for other reasons. On two occasions this was encouraged by the local authority due to the cost and administrative burden.</li> <li>• Small ash trees on minor roads are seen as both less urgent and easier for farmers to fell on their own.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of awareness and understanding of health and safety issues associated with the need to fell roadside ash and how to fell it safely</li> <li>• Costs, bureaucracy and time needed to get all the permits etc. for road closure and felling pose a significant barrier to farmers with roadside ash.</li> </ul>

Desired behaviour	Actions undertaken	Barriers to desired action
	<ul style="list-style-type: none"> <li>Because of the associated costs / time farmers tend to fell both healthy and infected ash</li> </ul>	<ul style="list-style-type: none"> <li>Lack of coordination between neighbouring farms/land managers</li> <li>Lack of coordination with local authorities and others who may be closing roads, and could provide farmers with an opportunity to fell</li> </ul>

### 3.1.2. How is information and knowledge currently influencing farmer decision-making for ash dieback?

As our summary of results has shown that while information does influence decisions, other factors include personal experiences (especially for those who have been dealing with ADB for a longer time), farmers' existing knowledge, risk perceptions, interests in tree health and attitudes towards trees. Costs were also a major factor in decision-making.

However, focusing on the knowledge and attitude aspect, there are two types of decisions that need to be considered when assessing influence:

- i. a decision to move from doing nothing to doing something, and
- ii. a decision on *what* to do.

The first type of decision relies on farmers' **awareness** of the issue, and motivation to act mediated by the level of **concern** about ADB.

The second type of decision relies on having the **right knowledge and skills** in place to be able to act.

Generally speaking awareness has increased over recent years, and most farmers have heard of ADB and know they may need to do *something* to manage it, even if they are not necessarily aware of the extent of the disease on their land, and *what* they need to do to manage it. However, the level of awareness of ADB among farmers varies significantly. Some farmers were perceived to be vaguely aware of ADB or deliberately 'turning a blind eye'. Knowledge intermediaries highlighted that many farmers have demonstrated a lack of knowledge and understanding of ADB. It was suggested that a 'culture of awareness' could help engage farmers in the conversation:

*Then almost you need that culture of awareness to start that conversation. Yes, I think if you get that cultural change, [...] Then people start asking (KTA17, agricultural adviser)*

Other farmers such as those that took part in the focus groups, with an interest in trees and ADB, had a significant level of awareness and understanding of ADB. Many mentioned how the prevalence of ash within the landscape, and the visibility of ADB symptoms, have facilitated a growing awareness of the disease and its impacts:

*It's fairly obvious because of just the numbers of ash trees that are out there and how, when they should be in full leaf in the middle of the summer, they look quite thin in the leaf cover. That's very visible. So that's two things being the prevalence of the tree and it being fairly obvious when it's got a tree health issue, I think has promoted the awareness. I don't think there's a great level of understanding of the disease, but I think people are more aware of it just because they can see it. (KTA05, agricultural adviser)*

One participant referred to ADB as an 'iconic disease' which has raised awareness of wider tree health issues.

Reported levels of concern were similarly variable. Many farmers are very concerned about ADB because of the prevalence of ash and the speed of the disease's advance, with language around 'fear' and 'worry' used frequently. Some are less concerned and are leaving diseased trees standing where there is no risk to people or infrastructure. For those farmers and others who are able to remember Dutch elm disease, this was an important point of reference, heightening levels of concern:

*I think it's a concern in that it's a very familiar landscape tree. It's just so everywhere, that if it... It's a bit like Dutch elm disease. If it goes completely, then it leaves just a very, very big hole in the landscape as a familiar tree. (KTA01, agricultural adviser)*

Those with experience of Dutch elm disease were especially pessimistic believing that all ash trees would disappear. However, many others also expressed optimism that trees could develop resistance.

The list of issues raising concerns included the visual impact of ash loss on the landscape, particularly for larger estates with ash-dominated woodlands; potential impact on biodiversity; the loss of commercial timber stock and the loss of woodlands for future generations. Another key area of concern is risk to health and safety.

Awareness of the disease often comes through concern for health and safety. Farmers with roadside ash are often the first to become aware of the disease, because of the specific associated health and safety regulations and liability. This tended to be the area of greatest concern to farmers, because of the dangerous nature of the felling work and the costs of contractors and insurance:

*It's a bit of firewood as far as they're concerned, and it's only when there's liability either because of footpaths, roads, or some other sort of infrastructure that there's a concern, and the concern about the cost of managing that as well. (KTA09, agricultural adviser)*

While many farmers are concerned about the risk to people and infrastructure, some of the larger estates felt that small farmers especially are less concerned than they should be. This is because awareness and concern are interlinked. Without awareness that ADB presents risk, farmers' perceptions of the risk associated may not match the reality and may not prompt action to manage ADB:

*The only time that we come into funny conversations about that - or interesting conversations - is where they perceive a risk where we wouldn't. That field tree in the middle of nowhere, that there's no public access near... They want us to take it down, just because it's dying - because either they don't like dead or dying trees on their land for aesthetic reasons, or they think it's just not a tidy farm. Or they perceive the risk for themselves or their livestock - where, really, that risk is completely out of proportion to the cost of anyone going in and removing the tree. Those are the interesting conversations we have about tree safety. (KTA11, woodland adviser)*

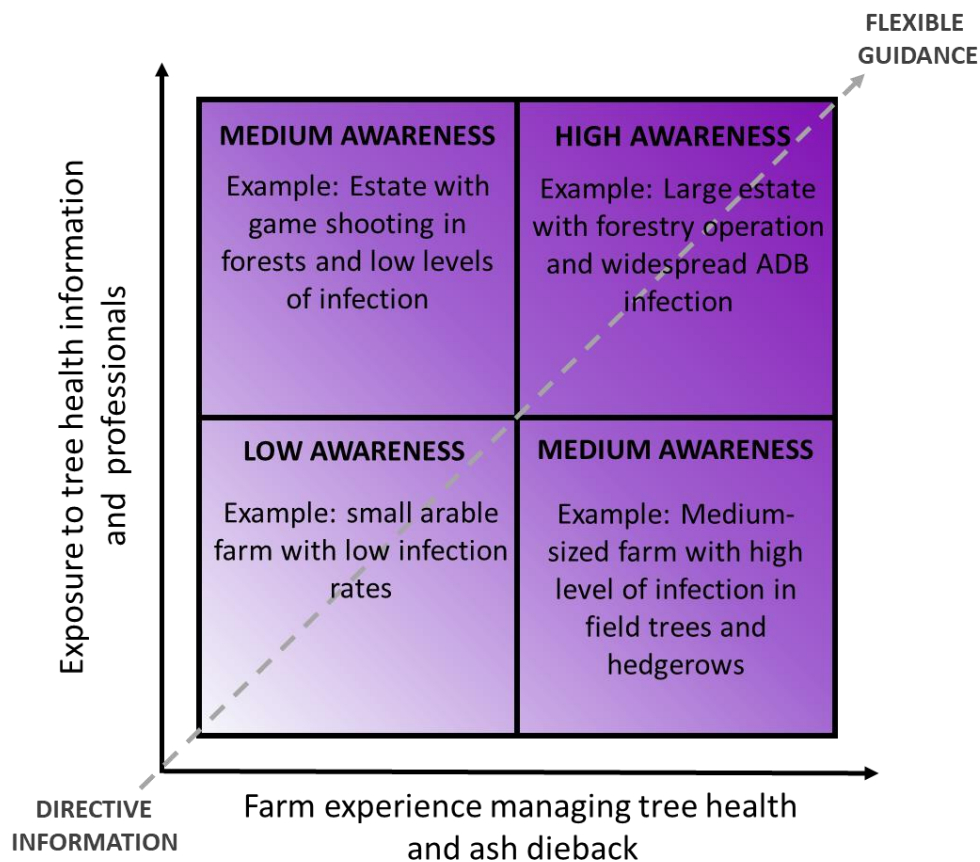
An important point raised by one interviewee was the 'journey' that farmers take from initial lack of awareness towards concern and eventual action, as they described it:

*When they started to realise: Hang on, were going to lose, potentially, 75 - 80 per cent of these field trees... They were really saddened by that. Some of them started to be quite keen to replace those field trees - just for their landscape function as much as anything - which is quite interesting, really. But they definitely had to go on a bit of a journey with it, through the conversations that I had with them. (KTA11, woodland adviser)*

Another one participant flipped this problematic around by posing that a degree of prior knowledge and experience can help farmers interpret what they're reading and understanding how it applies to themselves.

This journey towards awareness, concern and action were shown to be related with farmers' level of personal experience and where they are in the journey of dealing with ADB on their own farms. This seems to vary by their connections with arboriculture, woodland and the forest management experience and exposure to general tree health information. These two factors and how they relate to different kinds of farmers and their levels of awareness seen in the evidence are illustrated in Figure 1 below. The diagram

shows how farmers might be distributed across a range of awareness levels, from low to high, depending on their experience and exposure to information. Farmer journeys mean that the diagram is not static, and as experience and exposure to information and knowledge grows, farmers can move from one quadrant of the diagram to another. The diagram also helps to illustrate different kinds of information that farmers may need depending on where abouts they sit. Those farmers in the lower left quadrant with very low levels of awareness and concern, still do not know what it is they need to know on the topic, and for these farmers, just building a connection and raising awareness of the importance of dealing with ADB is essential, i.e. encouraging a decision to move from



**Figure 1. Levels of farmer awareness on ADB, factors influencing awareness, and suitability of directive versus flexible information**

doing nothing to doing something. These audiences seek basic, directive information on how to identify ADB and the progression of the disease as a first step. More aware farmer audiences will often be further along in the journey, seeking information on what to replant with and details around building long-term resilience among their trees, and are looking for guidance that helps them assess and decide on a range of potential next steps.

This difference in the kind of information needed is between:

- Directive information
- Flexible guidance

Directive information here is that which “serves to direct, guide, and usually impel toward an action or goal” (Merriam-Webster, 2022) rather than in the traditional sense of official instructions from an authority. This stems from a call from a number of participants for very prescriptive information on how best to act. Particularly farmers with little existing knowledge of tree management will benefit from such an approach. It requires less research on their part and reduces the risk of confusion on how to act. In some cases, further professional advice will still be needed, but the information will provide a clear path for action.

For other farmers, however, flexible guidance might be more sought after. This is particularly the case for farmers who have available expertise on tree management. These farmers are likely to have existing management aims and plans, and guidance on how to act will need to be flexible in order to fit around those plans. Those farmers might therefore seek information (facts) and guidance (professional advice) to support their tailored decisions.

Individuals’ awareness and knowledge on ADB may have gradually been accumulated from a variety of sources over the years (as indicated by the breadth of information sources cited by participants: see section 3.3), as well as from direct past experience of managing the disease, making it difficult to pinpoint specific instances of when advice/guidance has led to action. There were some examples of where decision-making was informed by information from multiple sources in combination with the land manager’s own opinion based on their experience of managing ADB and/or other tree diseases in the past. For example:

*There is certainly a lot on councils with specifically ash dieback and issues that's hitting headlines, and that's coming through. The CLA have sent the information through to us coming back, which, to be honest, has helped. It certainly helped us with our tree policy that information, but we are openminded and we do maintain an opinion as well going forward as well (KTA12, farmer)*

*We have the woodland trust next door, so we tend to, I tend to chat with them a little bit. They neighbour onto us, and yes, I've taken a bit of advice on them, but they seem to be well. They've taken a few out just where they think there's a safety risk, but the rest is like, 'Well, we'll let it do what it's going to do.' I'm pretty much of the same view (KTA17, farm advisor)*

One participant commented that, where advice is received from the Forestry Commission, land managers usually act on that advice, particularly if they have little prior experience of ADB. In their opinion, however, there has been a tendency for advice (and related felling grants) to recommend tree removal even where this may not be necessary. This farmer was managing ADB based on their own experience (as one of the earlier pieces of land to be affected by the disease) and was frustrated at the inflexibility of policies that only offered grants for tree felling.

*We started to make observations about how trees had started to decline but then recover, and some trees that were within groups that were never affected, so we were making observations through that. Then we got to the stage where we were offered money to take trees out, but from those observations and the way we could see that we could manage the problem, we declined that.... They could sort of see [our argument for retaining trees], but because the policy was to remove, there was no other option (KTA12, farmer)*

Similarly, some managers received advice from agents or contactors, sometimes deferring their decisions to those with specialist knowledge and removing trees identified as high risk in surveys. However, the level of trust in contractors as a source of information is variable (see section on dissemination).

*We probably don't necessarily know the need to, and we pay someone else to do a five yearly check and then I've done a lower-level tree inspection course, so I keep it updated, but even we'll move it onto someone else to make the real decisions. (FG1)*

One example of knowledge leading to action on ADB was provided by a knowledge intermediary who talked about how a partnership of various organisations, including the Forestry Commission, had run management sessions with Farm Clusters in their area. In their view, this had positively raised awareness among attendees about tree health generally, particularly around safety and the importance of monitoring, and this led to tree surveys being organised for the farms in the clusters.

*One of the things that always came up was the tree safety side of things - they never realised that they should be doing that. That's one thing that ash dieback is doing - it may be that they got a lot of ash on the farm, but actually, it's these other trees on the roadside that they should be more concerned with, and monitoring and looking out for fungi and things at the right time of year. It's very much been the feedback that, can they do this Level 1 tree survey themselves? For two of the clusters we did follow up tree surveys and health and safety and ash dieback events...But there is this keenness to learn and get involved with - probably more than half the members (KTA02, woodland adviser)*

Some interviewees discussed the ability of certain types of information to effectively drive action. In particular, concerns around risks to public safety from falling trees were seen to grab land managers' attention and nudge them to take action.

*Yes, it does [make them sit up and take notice]. Certainly as that starting conversation about risk and trees and target areas for falling on footpaths and roads, if they've had experience of it before, not with me, where they may have had a tree fall across the road then they are aware of it and they're a bit more on it in terms of managing that risk. When it comes to them fresh, let's say, they are quite keen to act on it (KTA04, agricultural adviser)*

Timber companies were noted to be influential in prompting land managers to clear-fell trees in order to maximise potential income from the timber whilst it still has value. According to one knowledge intermediary, the risk of public liability claims and the economic efficiencies of clear-felling have also been used by timber companies as arguments to further push for widespread felling. In this sense knowledge about ADB was used to drive action, but not necessarily in a way that would be advised by some tree health specialists, highlighting the potential implications of land managers gaining partial knowledge from certain sources with a vested interest in particular courses of action.

*There's been some big timber companies that have approached some of the bigger estates, and they've encouraged people to do quite a lot felling while there's still value in the timber. This has been happening across the Southeast. I've seen - certainly, what I consider to be - possibly unnecessary felling of trees, even on the edges of fields, which might have survived had they been left because they're not in a woodland (KTA10, agricultural adviser)*

Cost was also a major factor in decision-making. It was stated on several occasions that many farmers are unlikely to pay attention unless a financial incentive is made. Others highlighted that cost can trump other factors when making a choice.

*it's £8,000, for one, for a road closure to knock a few trees down. You cannot afford to do that. What's the answer? The answer is where I put a JCB in the middle of the road, say, 'The tree's come down, road's closed.' What choices do you have? (FG2)*

*I don't know how you get a message out unless you make it financially worth their while in the long-term. Otherwise as a farmer, I think you're just dealing with the immediate thing in front of you. (FG1)*

Some farmers seek out grants, but bureaucracy was a major barrier here with farmers citing a messy and cumbersome process as a real issue. Furthermore, grants for hedgerows are available from Natural England while other trees sit under the Forestry Commission. This was seen as disjointed and calls were made for better integration and communication of the impacts of ADB on both.

Awareness and concern (or lack thereof) may have more to do with whether farmers notice or care about their trees in general, rather than concern for ADB being linked with tree health in particular:

*They're very, very focused on the health of what they're growing, and anything that can affect it, pests and diseases and so on. I don't think they lift their eyes much to the health of trees around them in their woods, and even in their windbreaks, necessarily. (KTA01, agricultural adviser)*

While many felt the multiple pressures on farmers meant that trees and their health were not a priority or major concern, with some going as far as suggesting that some farmers are unable to identify the tree species on their land, others expressed the reverse, that farmers are *more* aware than most of the trees on their land, precisely because of their connection with the land and nature:

*Frankly, anybody who's got eyes in their heads are aware of their surroundings, but farmers more than anybody, because we're on our farms looking at the landscape, and the crops, and the trees, and the wildlife. (KTA18, farmer)*

### 3.1.3. What information and knowledge is needed to influence farmer decision-making for ash dieback?

Regardless of the type of information needed, whether directive or flexible, and regardless of the level of awareness and confidence of farmers, there were a list of comments and perspectives around information about tree health management and ADB in particular that are worth noting. The key issues that emerged as impacting on farmers decisions to act were:

- The existence of contradictory information. In some case this could be attributed to developments in science and understanding of the disease and therefore the management prescriptions advised, only slowly filtering through to farmer audiences
- Lack of confidence in acting on information if information appears contradictory
- Lack of trust or belief in the information being provided
- Information not being relevant to their working or business context, or perceived to potentially be working against or challenging their financial/business decision making
- Farmer perceptions of their own knowledge and skills being discounted by themselves as knowledge gaps, i.e. their sense of identity being farmers not foresters working against them, feeling they already knew something about ADB and what appropriate actions to take.

#### *Contradictory information*

In relation to existing information on ADB perceptions of contradictory guidance on desired actions can lead to confusion on how to act. Information released might be different over time, but being available across multiple, sometimes persistent formats, including online and printed, can lead to different messaging coming from different sources. For those farmers with greater awareness and experience, differences in information are filtered and assessed and used to develop and refine knowledge, as one person expressed it:

*it's adding those three or four areas, and you pick different things out from each paper or whatever, and it gets you a better level of knowledge that then you can critique the next one that comes in, and you can pick the pieces out. (FG3)*

While there have been many efforts to streamline advice on ADB, farmers are not first in line to receive up to date information:

*there is a communication thing there, that's not coming down to us either then. If there's a new thought, new train of thought to say let's leave some infected trees, that's not coming down to us as practitioners and advisors on the ground. (KTA02, woodland adviser)*

As a result, information might still appear contradictory to farmers who have not informed themselves after advice has changed. For example, a couple of farmers expressed a willingness to fell some trees to create a 'firebreak' for other trees on their land (which is not considered effective and is not in line with policy to retain healthy ash trees). For a few participants, it appeared important not to assume a previous level of information in order to bring them into the conversations. Other farmers were not necessarily confident about how to act, despite the fact that the farmers who participated in the workshops were generally engaged with environmental or tree health issues.

In another example in one of the focus groups there was some confusion between Defra's guidance to retain any trees you can and cited Natural England guidance which states to leave at least 5% of your trees – this gave the impression that it is appropriate to fell the remainder. Another participant representing an organisation also provided a specific example of differing advice from different organisations

*The Woodland Trust [...] are the ones that go and do the visits and then obviously sign all the bits of paper, so it's their recommendations, and we would look very rounded-ly at what's going on, on that piece of land. They may think where we would say, no, don't take it all out, but I would say all the licences I've ever issued, I've agreed with the landowner that it's more cost-effective and it's better for climate change resilience to do it and get a grant and plant. (FG2)*

Farmer confidence in their decisions was relatively low. Farmers articulated their reasons behind this and described how managing the different information they had received meant they were seeking social legitimisation of their approach to action. This highlights the importance of peer group interaction, advice and learning opportunities:

*No, you can keep on reading things and everyone says something different. You morph it all together and come up with an average. Then, you come in here and you want to check that your average is where everyone else is thinking. If you're off track, you've got to reassess it (FG2)*

On the other hand, one respondent interestingly commented that they didn't feel there was sufficient information, but then as the discussion moved on, realised that they knew quite a bit. This led them to conclude that there is plenty of information that they had accessed and absorbed, but "does it sink in? Does it register?". Another participant in the same focus group added that while there is a lot of different information out there, the most prevalent or salient points can get lost in the volume. This raises questions about what leads farmers to pay an interest in the content that is presented to them.

In other focus groups it appeared that the more information the participants were given, the more questions they had about how that applied to their farming context, and how they could integrate it with their own farming circumstances.

### *Farming identities*

There was also a perception among some estate managers with large areas of woodlands that farmers on small farms with few trees lack interest in and knowledge about trees in general, and ADB in particular, because they don't consider themselves to be tree managers:

*I know a lot of woodland isn't managed but they're likely, if they have some woodland hectareage, to be at least some way involved in managing it. It's farmers that have hedgerow ash trees probably that don't consider themselves owners of trees and woodland, who aren't particularly, not necessarily not interested, but not joined up with it. They're more likely the ones who would get a saw out and do it themselves or maybe don't know they need to think about it. (FG1)*

A farmer's practical experience may not bear out the information and advice given. Farmers spend a lot of time on their land, relating information and advice to what they're seeing themselves. This can lead to scepticism or a desire for further information:

*We were advised with mature and ancient trees, ash trees, that we shouldn't pollard them. Pollarding was likely to add more stress to the tree, but where we've had a kind of natural pollard occurring with storm damage, the tree seems to have responded very well. (FG3)*

*Yes, but my real point about this was that the people who are managing the trees - and mainly farming groups and managing the trees - have a different view to the advice that we are being given. (FG2)*

Finally, focus group participants felt that farmers should be included in the process of producing materials targeted specifically at them. It was felt that too often, they are excluded from such processes and therefore do not have a sense of ownership of such materials, or do not find them to be relevant or written in a suitable language.

#### *Information challenging business decision making and local context*

The message to retain ash trees was also challenging for some farmers, as this can have a financial impact if they then need to fell high-risk trees in several rounds. Retention advice could also contrast with advice from others to fell the timber while it is still valuable as firewood, or with advice from contractors to cut their infected trees down early to avoid the high costs associated with felling very infected trees, actions which can reduce or neutralise the net loss from felling operations. On the other hand, some farmers are hearing about the importance of trees in ELMs, with a certain anticipation that there might be support for managing their infected trees when the policy is launched.

*Clearly, as the trees die - and the difficulty at the moment is do you wait for them to die completely which has the problem then of felling them when they're dangerous, or do we fell them as soon as they're starting to look as though they're dying? Then lose the possibility of actually them getting over it. (FG3)*

*I'm thinking of one particular tree that's a massive ash tree that just is virtually giving up now, so I'm just shall I chop it down? What should I do with it? (FG3)*

*I noticed there were great areas of them that were suffering with ash dieback. I'm thinking, that's a real shame, how do we manage this? We haven't actually felled any of those trees. Fortunately, they're not near a footpath or a road, like these guys. Nevertheless, how do we manage it to the best effect? I'd hate to see them all go on this area and in the woodland as well. (FG2)*

More justification about this approach was sought. Knowledge intermediaries too also suggested that while it was generally accepted that it is good to leave some trees for resilience, they themselves found it confusing to know when and where to leave ash trees. There was also some disparity in opinions and guidance among knowledge intermediaries and their different organisations.

Farmers arrive at a decision by assessing available information in relation to their own experiences and context. Farmers therefore look beyond information on what the problem is, seeking information on what actions to take based on where their trees are and so on:

*They might realise you know; oh, we've got an issue and I need to do something about it but then it's the implications of what you need to do. So you need to apply for a felling licence, you might be eligible for a grant. You need to consider is there a TPO or is it in a conservation area and all the other things that go along with it. (FG2)*

*You're going to have a very different approach to some 30-year-old sapling ash that's established itself, than you're going to have to farm hedgerow ash that might be 300 years old. How are you going to give the right advice for each occasion? (KTA08, woodland adviser)*

Another example of scepticism is around road closures. One participant pointed out that if a tree falls over onto the road, they are able to remove the tree without traffic lights or other safety precautions. This raises questions about the need for the high administrative and financial burden of closing a road to deal with a dangerous, infected ash tree.

The policy message about retaining trees was an area of discussion here too, as it applied to specific circumstances. For example, there were diverging opinions on whether to retain healthy trees in hedgerows and along roadsides. Similarly, in larger, ash-dominated woodlands it is seen as unfeasible to survey all the trees to identify those which might show signs of resistance, and questions arose about what would happen to that woodland when the trees would die around the same time:

*..... but I was managing woodlands that were 90 per cent ash. They were just leaving the stuff that wasn't next to a public right of way or whatever. I'm just like, the scale of the decline means that within ten years you potentially have no woodland left. (FG3)*

One participant challenged the practicalities of successfully identifying and retaining healthy, potentially resistant ash trees when taking out infected ash in woodland:

*So actually, what you're saying is, you can't look at the tree and tell whether that tree is one of the five per cent or not. It was something that you can only establish over a period of time. So that is a challenge in itself. (FG2)*

### **3.1.4. Knowledge gaps and knowledge needs**

What came through from the discussions were common sets of questions and areas of greatest debate and uncertainty in terms of moving farmers to action. These areas of knowledge need were:

- When to intervene and in what way

- The health and safety implications of managing ADB
- How to ensure a future for ash trees
- How to facilitate wider landscape recovery

*When to intervene and in what way*

General awareness of ADB means many farmers were capable of identifying ADB

*I'm not under the impression that farmers don't know about ash dieback or plant health. I think they know about it and they know enough to be able to identify it without having to get a specialist in (KTA07, agricultural adviser)*

However, insecurities remained around identifying the progression of the disease, and knowing the point at which a tree becomes a risk and should be felled. Directive tools enabling this assessment emerged as an important knowledge need. The request was for visual guides and assessment scales accompanied with high-quality photos to direct individuals in this decision-process

*I don't believe you just fell every single ash tree. I think there's a way of moving forward with the problem. Obviously we've got, for me, I know they're dangerous because when they're dead they're really dangerous, so you've got to nip it in the bud before you get to that stage, but where do you draw the line on that? (FG2)*

*Health and safety implications of dealing with ADB*

It became clear that there is a gap between the health and safety practices recommended for dealing with ADB, and the *actual* practices carried out by many farmers. Farmers will often take down their own trees without professional assistance. In some circumstances this might be safe and reasonable. In others, the true risks might be underestimated due to a lack of understanding of the unpredictable nature of brittle, infected ash trees. A need emerged for awareness raising tools on the topic using accident statistics and visual materials including video of the dangers posed by the lack of structural integrity and unpredictable and dangerous responses of trees infected by ADB and secondary infections. One participant further highlighted potential opportunities to link with the UK Forestry Industry Safety Accord (FISA).

*I think in the forestry press it's been widely stated about the fact they're dangerous to fell or they can be if it's extensive. I don't think farmers really know that, which is a bit of a concern*

*because lots of farmers do their own fairly unskilled tree felling already, if you know what I mean. (KTA6, woodland adviser)*

*The fact that what five out of the six deaths have been farmers just going out with a chainsaw, that message needs to get out there to people, massively (FG2)*

### *Ensuring a future for ash trees*

There was a real sense among some of the participants that they valued their ash trees and wanted to contribute to ensuring the retention of resistant ash trees and helping build in long term resilience. This further points to opportunities to include more engaged farmer audiences in citizen science projects and other collaborative research and experimentation processes. However, the practicalities of how farmers can do their bit were often unclear. In particular, guidance was sought on how to tell whether a tree is resistant e.g. is a single healthy tree in a group of trees resistant, more resilient than its neighbours, or simply not infected yet due to chance, and how long do you need to monitor it before that becomes clear? Is this a sign that even if the tree becomes infected, it might survive if left to battle it out? If a tree is through to be resistant, participants further sought information on how they could best optimise this resource. Should they tell the authorities? Should they collect the seeds and try to propagate it?

### *Ensuring wider landscape recovery after ADB*

This was a frequent question, and several debates took place with farmers making their best guesses about how to ensure retaining tree cover and healthy ecosystems in the future. The classic dilemma of planting species resilient to future climate change while avoiding import of novel pests and diseases in stock was aired by a few participants. However, participants called for simple, directive guidance on this topic for those farmers who are unlikely to immerse themselves in this complex topic of research. One such recommendation was a list of the six best trees to replace ash. There was also an interest in ash tree prospects too and what could be done to ensure conservation of ash into the future:

*How is the ash going to respond? Is it going to come back in the landscape? Is some of the genetic stock going to survive and adapt? If so, what's the - guessing the percentage? So is this worthwhile? (KTA08, woodland adviser)*

*Talking about ash as part of the woodland and hedgerow tree network, which is critical to nature's recovery within the landscape. (KTA16, farm facilitator)*

### *Other topics of interest*

Other information and knowledge gaps were expressed by a smaller number of participants:

- Directive information about
  - legislative conditions and bureaucratic processes to consider when felling trees in certain circumstances, including felling licences, TPOs, trees in conservation areas, road closure procedures etc, along with information on available support including grants for specific trees/conditions
  - how to act at speed if roadside ash poses an immediate risk
  - the best time of year for surveying ADB, especially if wishing to fell in the winter
  - the urgency of dealing with ADB, not just because of health and safety risks, but also because of the increased cost of felling highly infected trees
- Guidance about
  - the financial implications and options of dealing with ADB, including conditions for selling infected ash for firewood, i.e. that it doesn't need to be kiln dried
  - pollarding as an option to retain infected ash trees
  - biosecurity implications of having felled, infected ash material on sites
  - using 'firebreaks' to prevent spread to other ash trees
  - leaving seed sources to ensure the persistence of ash trees in the long run

A few farmers thought it might be helpful to demonstrate what a well-balanced approach to ADB across a landscape or land holding looks like. In addition, many farmers appreciate personal advice and therefore would benefit from linking to organisations that can provide this service, ideally free of charge.

## 3.2. How can information about ash dieback best be communicated to farmers to support action?

Having identified the barriers to building farmer knowledge and supporting action, and having identified particular areas of knowledge needs, this section looks at the evidence around how best to communicate and disseminate knowledge to farmer audiences.

The concept of the learning/experiential journey needs to be kept in mind. It is not possible, nor sensible, to identify a single 'solution' that can move farmers to action for ADB. Having a population of farmers with different levels of awareness and different degrees of concern reinforces the needs for products that either target specific audiences or provides across a range of requirements. 'Solutions' will also need to repeat the same messages to different farmer audiences over time, in different ways, so that awareness is raised and messages are eventually passed on regardless of the point at which farmers begin to consider tree health

The evidence suggests that whatever the level of farmer awareness or concern, communicating information effectively relies on a number of key factors, namely:

- Trusted sources of information are important - unless information comes from trusted organisations and individuals, farmers are not moved to act on it
- Dissemination and communication methods need to be varied to reach different kinds of farmers at different points in their knowledge to action journey
- Key messages are important to raise concern and to leverage action
- The format of the information is important to reach different learning styles

### *Trusted sources of information*

Different organisational sources of information (LEAF, Woodland Trust, Farmers Weekly etc.) will be most effective in reaching farmers with different awareness levels, land management priorities and learning styles.

In terms of access, knowledge intermediaries felt that information is not well signposted for farmers. In order for communication to be successful, it needs to go through the right channels to be accessible to farmers. The same is true for activities such as events and training courses. There is currently no one single place for farmers to access such opportunities. This is a challenge for farmers as they emphasised that they do not have

the time or drive to trawl through lots of information in order to find the bits that are relevant to them, or that they feel they need:

*At the moment the government website seems to be producing reams and reams of stuff presumably to cover somebody's backside and it's not necessary. (FG3)*

### *Dissemination and communication*

The importance of personal relationships, social learning opportunities and peer to peer conversations and advice remained a strong undercurrent to those conversations. It was especially highlighted as important in exposing those to information who might not necessarily be seeking it out in the first place.

*So tenant farmers for me and the CLA are two groups that I personally have a bit to do with. Therefore if a message comes to me and makes me aware of something such as today's meeting, then that's personally where my message comes from. I'm not heavily involved in forestry so therefore I'm not looking for that information. (FG1)*

*I think there's some farms that it's very difficult to reach out to directly and reaching out to the people who advise them is quite important. (FG3)*

It was suggested that events cater to some farmers' way of learning and provide an opportunity to ask questions. Furthermore, if the content is integrated in other farm-focussed events, this can be a good way of raising awareness where interest is low:

*I don't think it is, in that it's one thing saying, 'There's information here, come and have a look of it,' that's different to promoting that and really putting it in front of people so they understand it, or getting people on a farm and walking them round, looking at this tree, that tree, and, 'Why has this tree got it? Why do we think that tree hasn't? Is this tree safe? Why would it not be safe? Can we leave that one?' That's very different, and that's the sort of thing I think the farmers will respond (KTA01, agricultural adviser)*

*They're bombarded - absolutely bombarded - with paperwork, so the only way you will get that message to them, is if it's put within a relative training session or event through a body that's very friendly to them. There's got to be an incentive to know more, and I don't how you do that, but that needs to be looked at. (KTA10, agricultural adviser)*

One-on-one information and advice was seen as important in supporting particular decisions and information was often held in high regard when delivered by personal contacts:

*Facilitator: Was the fact that it was from the Forestry Commission part of why you opened the email? Participant: Yes, it was from [redacted]. It was like, oh, right, he's emailed me. What's this about? It's someone you know.” (FG2)*

One estate manager got a phone call asking how they manage their roadside trees, and then asked whether he could share that information with his neighbours. The importance of such personal interactions highlights the opportunities for wide-scale dissemination by going through knowledge intermediaries who will be the ones interacting with a wide range of farmers, including the less aware farmers. On a similar note, one farmer pointed out that they would benefit from detailed information for themselves (as the decision-maker) as well as a separate product which they could pass onto their staff or contractors who will be carrying out the felling on the ground:

*I'm not actually going to be cutting the trees down myself. I need to be able to put the information in to my guys, so that they can identify the tree and clear it all up. I might be there, but I'm not - sometimes I'm not. (FG2)*

Professional one-on-one advice is available from environmental organisations, woodland officers, contractors and agents and from farm advisers. However, there were benefits and disbenefits to some of those sources. One focus group pointed out the value, particularly, of ongoing relationships with advisers and a Natural England adviser was used as the example in this case. Others pointed out that the Woodland Trust offers free advice, and that it can be seen as more accessible than the Forestry Commission.

Many farmers rely on their contractors for information and even decision-making although this varies. Farmers in several focus groups were sceptical of their intentions and also pointed out that their advice comes at a cost:

*I'm not a fan of a lot of agents and people telling me how it should be done. [...] They're well-informed, I'm not convinced that the advice is always right for my personal scenario. (FG1)*

*Those? They just burn money. (FG2)*

Other farmers who are not linked in with tree health organisations might look to their agricultural advisers for advice on ADB. However, it is possible that engagement with tree health issues from advisers on the agricultural side of things can be low. Again, trust can also play into these relationships:

*One of the people who got back to me was an agent. He's an independent [...] farm management consultant, I suppose, so he has farms on his books and some estates as well. He said, 'With everything else that farmers have to think about, they don't really concern themselves much with tree health, and it's not something that I talk about with them.' [...] If it's not on their radar, it's not on his! (FG3)*

*something that's on a reputable adviser's, [...] that's always the worry, sometimes, is where somebody's got a financial interest in it. You think, hang on, is this the truth or is this nearly the truth, and they're a selling a service, and so they want you to take it on. Whereas someone like the CLA and NFU, I tend to feel a little bit more honest brokers. (FG3)*

### *Key messages to leverage action*

Farmers are overloaded with messages from multiple directions about all the changes taking place in the policy landscape. Therefore, the framing of messages about ADB to capture attention and to build awareness and concern is very important. As one person put it:

*I just wanted you to understand that the policy landscape as we see it, there's quite a lot of resistance, so whatever we do the messages have got to be landing really carefully.  
(KTA10, agricultural adviser)*

Some focus group participants felt that the current focus on tree planting can detract from messages around tree health. The message framing that was suggested by research participants mirrored those areas they had identified as knowledge needs, and were around:

- Ash trees and business health
- The need for identification and ADB management
- Next steps including treescape recovery and replanting.

### Ash trees and farm business health

Knowledge intermediaries thought that trees, whether in farm woodland or as trees outside of woodland, could play a role in the long-term economic and environmental resilience of a business. A focus on tree health across the farm poses opportunities in terms of carbon sequestration, water quality and soil health and biodiversity, particularly as a part of whole farm business planning

*I'm always so pleased when the farmers in deep frustration come to me and say,*

*'I cannot think of my woods, and my biodiversity, and my farm landscape in three separate silos. Why can't we think about it as a single, joined-up network? (KTA16, farm facilitator)*

In the immediate term having adequate regard to the liabilities posed by ADB is also a key message and important hook.

### The need for ADB identification and management

Some knowledge intermediaries argued that it was important to go back to basics and ensure all farmers are able to confidently identify different signs of ADB, as well as understand what that identification means in terms of short and medium term management. It was argued that very clear instructions about what the desired behaviours are and the timelines for carrying these out with a very directive and clear message about the need for ADB management and the journey to that would be important:

*Getting a really practical route map from A to Z: close the road, take the tree down, cut the timber up, get it out, sell it, clear the site, make it look tidy, plant another tree, make sure it's properly guarded and protected. Look after that tree for five years plus, job done. (KTA16, farm facilitator)*

The balance here is between the directive information and messaging for farmers with less knowledge, experience, awareness and concern, and the message for those further along their journey. There was also a balance to be found in the way this message might be relayed, with a note of caution that communication materials with farmers often assume no prior knowledge and can come across as condescending:

*A webinar which you can access out of hours later if you want to I think would be very useful. Particularly if you don't pitch it at a level that is a bit noddy; give us actual information, and we're quite capable of understanding pests and diseases (KTA 18, farmer).*

### Next steps including treescape recovery and replanting

Focus group participants and knowledge intermediaries alike felt messaging around long-term landscape recovery was required. Important here were links to other policy initiatives and new opportunities including nature recovery networks, agroforestry and sustainable farming initiatives.

### *Formats and content*

Further discussions took place with both knowledge intermediaries and farmers themselves around what types of formats are helpful in terms of communicating messages around ADB specifically as well as tree health in general. To reiterate, it was strongly felt that a combination of formats is most appropriate as different farmers will access information in different ways. Photographs were repeatedly pointed to as important for conveying messages, especially in terms of identifying the disease and its progression. Cognitive aids such as scales depicting the rate of decline were also seen as helpful for farmers in terms of interpreting the information presented to them. Table 4 provides a summary of the pros and cons of the different formats discussed as well as any differences in the audiences they reach.

**Table 4. Comments on the suitability of different formats for engaging farmers with ADB issues, as reported in the interviews and focus groups**

Option	Format	Perceived pros and cons	Key audiences
<b>PDF</b>	Printed leaflet	Easy to distribute, able to demonstrate pictures of infected trees and provide brief summary of ADB. Downside: information can go out of date quickly. It needs to be very concise or farmers are unlikely to read them. Can go hand in hand with farm visits and help facilitate conversations with peers.	Older farmers and other farmers who prefer printed material vs. online sources.  Could also be a good tool for knowledge intermediaries to share with land managers as it can be printed off.
<b>Newsletter</b>	Article in a newsletter	Effective when article or message is placed in the correct newsletter whose targeted audience is already farmers. Useful to stay up to date on emerging pests and diseases and grants. Effective way to sign post to lots of different aspects of one issue.	Wider farming community, often already members of key farming organisations. This option was frequently mentioned as a good option for reaching a very wide, diverse audience if placed in the right newsletters. Also good for farmers who do not use the internet.
<b>Videos</b>	YouTube	Effective when used in conjunction with social media or linked to in newsletters. Farmers will often watch videos in the evening or while working and use this as a conversation starter.	Often younger farmers that are more likely to engage with material that they can watch while doing their on-farm tasks. One farmer felt they're a good option for those who feel overloaded by newsletters.
<b>Pre-recorded media</b>	Podcasts	Easy to distribute and link to through social media, newsletters and other influential organisations social media and communication tools. Effective way of hearing about a specialised topic surrounding ADB, e.g., testimonial from other farmers or a focus on health and safety concerns around roadside ash.  There is a limitation in that it is non-visual, so couldn't be used for topics that require pictures.	Likely to be found by engaged farmers and people proactively looking for information. Furthermore seen to be used more by younger, more tech-savvy farmers.  Especially good for farmers who have an opportunity to listen to podcasts throughout their working day – such as arable farmers while they're driving their tractor. Others listen to podcasts in their car.

Option	Format	Perceived pros and cons	Key audiences
<b>Social Media</b>	Twitter, Instagram, Facebook, LinkedIn	<p>Effective way of promoting peer to peer learning. If farmers see that other farmers are engaging with something through social media, they are more likely to feel comfortable engaging as well. Great way for farmers to learn about new ideas.</p> <p>There are many different options for engaging on social media: On Facebook there are options to do paid campaigns, and some farmers mentioned helpful Facebook groups. One participant mentioned the potential for local WhatsApp groups run by facilitators (NE or WT etc.) and NFU send WhatsApp texts for important information.</p>	Targets farmers who engage with technology frequently as well as farmers that prefer to engage with information that is succinct and curated for them. Note that many farmers will limit use to one or two platforms. One person said that TikTok is a growing platform in farming. Often the target farming audience is slightly younger.
<b>Seminars</b>	Webinar	<p>Effective way of engaging farmers about ADB and facilitating conversations around particular points of contention. Good when they're available online for a longer period of time so participants can watch them later while doing other things.</p> <p>Some people might feel a bit overloaded with webinars after the pandemic.</p>	Farmers are used to engaging in webinars at the moment due to COVID – this is a great way to take advantage of this cultural shift and maintain the momentum for webinars.
<b>Events</b>	Demonstration farm events, workshops, discussion groups etc.	Really appreciated by farmers who are interested as it gives them an opportunity for interrogating information and for social learning opportunities. But it was challenged whether in-person meetings are necessary to learn about ADB, and that people likely won't have the time.	Likely to attract people who are interested in ADB already

### 3.3. Which are the important stakeholders in farmer knowledge networks and what role could they play in moving farmers to action for ash dieback?

#### 3.3.1. Where do farmers get their information from?

Many different organisations were mentioned as sources of information during both the interviews and the focus groups. There was a sense that the source of information was not seen to be of major importance, as long as it was trustworthy and appropriate.

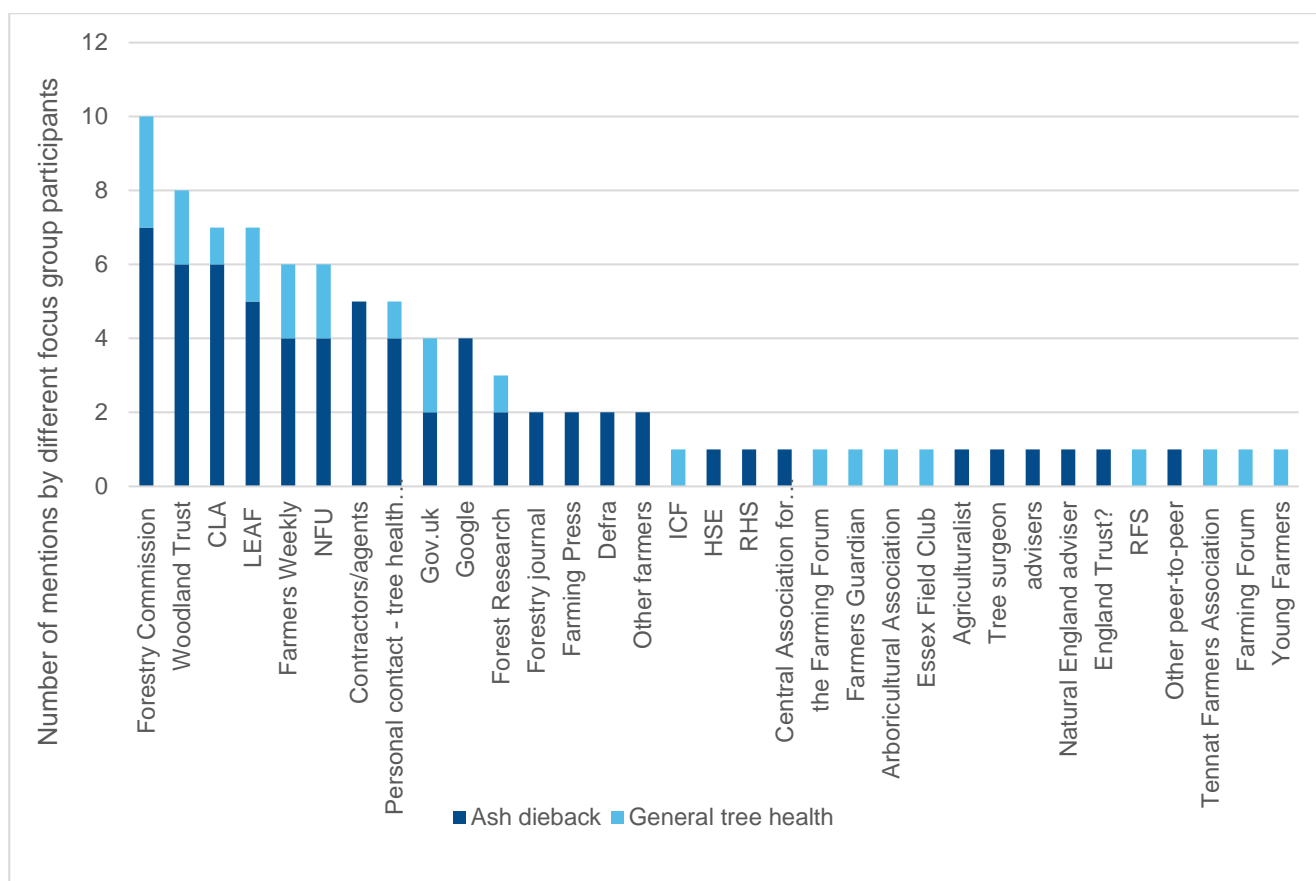
Yet, a few people pointed out that forestry and farming are not well linked up, and that farmers will not necessarily seek out forestry sources. Interestingly, while Forest Research is used as one of the main websites providing accurate information about ADB, one farmer mentioned that they are not aware of Forest Research, and did not feel this was a relevant source, highlighting how important it is to think about how sources align with how farmers identify themselves and with what they are trying to achieve:

*We're not interested - we don't want Forest Research that sends you off. We're not into research, [...] I would naturally - I'd go to the Forestry Commission. I've never heard of Forest Research (FG2)*

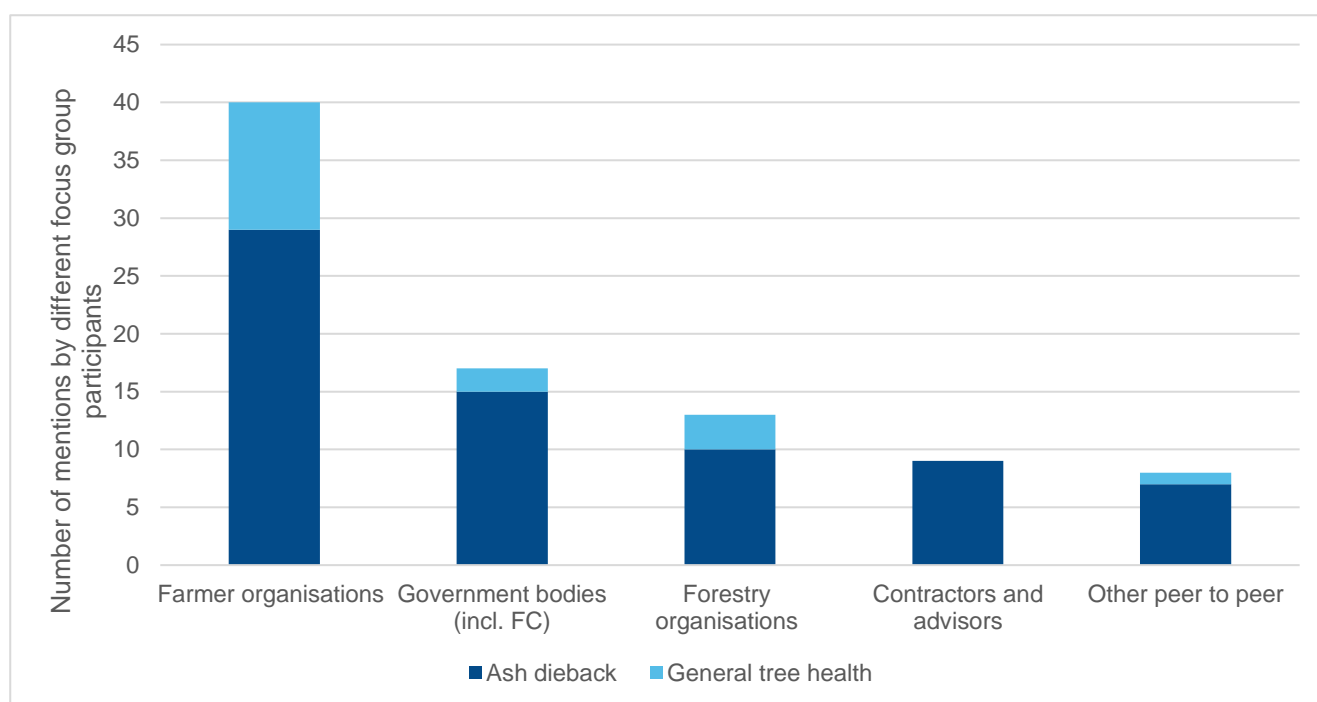
*I think a problem is that farmers don't naturally go to the Forestry Commission. (KTA03, farming advocate)*

*Then also, I think, a fear of interference. So if it's presented to them by somebody that's not farmer-friendly, and not known to them, they might shy away, or just not listen at all. (KTA10, agricultural adviser)*

For the farmers participating in the focus group discussions, the Forestry Commission, the Woodland Trust, the CLA and LEAF were mentioned as the top four sources of information on tree health and ADB (sources used currently and sources thought to be best for future communication; see Figure 2. note that some tree health professionals were present during the focus group discussions, and that recruitment through LEAF and CLA likely had an impact on the responses of farmer participants). When grouped, it is clear that farmer organisations are the main sources used by the focus group participants (Figure 3) although this covers a large range of organisations. Government organisations were the second most cited source.

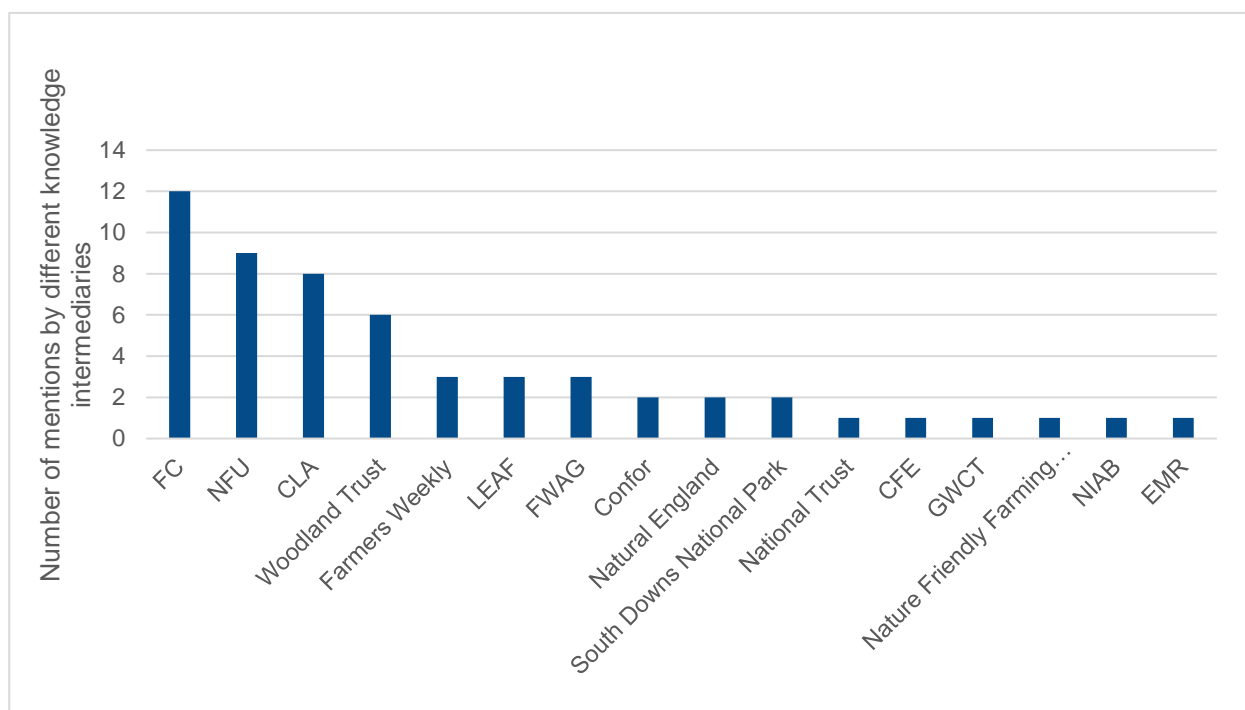


**Figure 2. Information sources on tree health in general and ADB in specific as reported by focus group participants (n=27)**



**Figure 3. Information sources on tree health and ADB as reported by focus group participants, grouped by the type of source (n=27)**

The information sources reported by knowledge intermediaries (Figure 4) were not much different from those reported in the focus groups. An emphasis remained on farmer organisations and the Forestry Commission.



**Figure 4. Information sources on tree health and ADB as reported by knowledge intermediaries (n=18)**

### **3.3.2. Which kinds of organisations are involved, and how are they connecting with farmer audiences?**

A range of different organisation types communicate tree health and ADB issues with farmer audiences. As previously mentioned, forestry and farming are not well joined together. The forestry industry therefore struggles to reach farmers, while farming organisations might not have the right information and connections to communicate effectively around tree health. The organisations included in this research can be broken into the following categories: private sector consultancies, tree/woodland organisations, agricultural stakeholder organisations, conservation organisations and influential farmers and landowners. The audiences, dissemination approaches, key topics and barriers encountered by these types of organisations are outlined in Table 5Table 5.

**Table 5. How are different knowledge intermediaries engaging with (which) farmers?**

<b>Knowledge intermediary type (organisation)</b>	<b>Audiences</b>	<b>Dissemination format/approach</b>	<b>Key topics (not exclusive)</b>	<b>Barriers / key things to consider</b>
<b>Private sector consultancies</b>	Farmers/estate managers (all farm types)  Other landowners (e.g. local councils)	Direct emails/e-newsletters  Face-to-face contact/farm visits	Env. management (incl. agri-env schemes)  Whole business advice	Need whole farm approach  Requires willingness on part of land manager  Interest in issues such as ADB usually reactive rather than proactive  Farmers not necessarily willing to pay for tree/env. advice
<b>Tree/woodland organisations</b>	Protected landscape organisations  Farmers/estate managers (all farm types)  Farm clusters  Other landowners (incl. small woodland owners)	Signposting to specific sources of advice (e.g. Forestry Commission)  Seminars at big farming events  e-newsletters, updates  Websites  Face-to-face contact/farm visits  Social media (Twitter, LinkedIn, Facebook)  Partnerships with e.g. protected landscapes organisations	Tree health  Tree planting/ woodland creation  Agroforestry  Hedgerow management  Health & safety  Biosecurity  Signposting to funding sources	Multiple information sources leading to risk of confusion (& tendency to rely on trusted peers as a result)  Effective management requires nuanced messages
<b>Agricultural stakeholder organisations</b>	Farmers/estate managers (all farm types)  Other landowners	Direct emails & e-newsletters  Print media (e.g. magazines, newsletters)	Issues-driven e.g. Agricultural Transition policy	Coordinating activities between landowners  Reaching diverse audience requires internet and paper based approaches

Knowledge intermediary type (organisation)	Audiences	Dissemination format/approach	Key topics (not exclusive)	Barriers / key things to consider
	Rural businesses Commodity boards	Events & conferences On-farm events Webinars Websites Social media (Twitter, LinkedIn, Facebook)	Env. management (incl. agri-env schemes) Support for food production	Lack of farmer time / low priority of tree health – incentives are needed Lack of farmer knowledge / understanding re: ADB Current timing an issue re: communicating ADB messages due to pressures from changing policy landscape Lack of integration between organisations (e.g. grants for hedgerows from NE, but grants for woods from FC)
<b>Environmentally-focused organisations</b>	Farmers/estate managers (all farm types) Other landowners Protected landscape organisations Agricultural colleges	Embedding messages into agronomist offerings Via farm clusters, protected landscape organisations etc. Direct emails Social media (Twitter, LinkedIn, Facebook)	Env. management (incl. agri-env schemes) Tree health Tree planting/ woodland creation	Funding (both for organisations and land managers) Need to get farmers looking at things to understand specifics (ie. farm visits) Lack of farmer knowledge re: tree health. Advice often needs to be very context-specific Lack of trust in official organisations Farmers like to develop long-term relationships (trust) with advisors Farmers often not proactive re: trees / low priority / grabbing their interest can be difficult
<b>Farms / landowners</b>	Farmers/estate managers (all farm types) Links with various farming and environmental organisations	Emails/ newsletters to tenants Tenant meetings Informal face-to-face contact Discussion groups		Lack of trust in official organisations

### **3.3.3. Influential relationships, including other important stakeholders**

For large estates or tenanted farms, landowners may not necessarily work directly with trees themselves, but are able to act as knowledge intermediaries for those 'on the ground'. Similarly, key contacts within bodies such as National Park authorities or government agencies can be influential in engaging with farmers on tree health issues, provided they are 'liked' and trusted by farmers. However, farmers can often be fearful of authority figures coming onto their farms, and this presents difficulties when considering the Forestry Commission's role in terms of creating guidance on ADB. Forestry Commission advisors are likely only to be consulted on ADB management by farmers already involved with other Forestry Commission schemes or grants, and who therefore have an existing relationship with the organisation and an interest in tree health, or by farmers making strategic use of informal connections with family members or neighbours they perceive to have specialist knowledge of ADB through employment in the forestry sector. People and organisations unrelated to government and not in a position of authority can be seen as better suited to communicating with farmers around tree health issues. This can include private contractors with specialist knowledge (such as tree surgeons), as well as tree officers within both forestry and farming NGOs. Forestry sector contacts are equally important for farmer organisations acting as knowledge intermediaries, especially those without their own tree specialists.

Farm advisors are another key knowledge intermediary because of their existing relationships with the farmers they work with. In particular, they may act as trusted 'gatekeepers' for farmers who are less engaged with tree health issues.

However, there was some concern expressed over a perceived lack of independent advisors, mistrust towards perceived financial motivations of commercial agents, and uncertainty whether they would advise on environmental issues (including tree health issues). In addition, advisors are not accessible to all farmers as their advice needs to be paid for, and there is not always a clear source of funding:

*I'm more interested in terms of land agents. They're always a harder ask, because they're much more economically driven. It'd be like, 'What's in it for the farmer? What's in it for us?' I've never quite felt, I'm never sure whether I've cracked that note of understanding, the relationship there. There is a very strong relationship; a very, very strong relationship. (KTA17, farm adviser)*

Advisory networks (such as FWAG) can also act as knowledge intermediaries not only for farmers themselves, but for other farmer organisations, acting as a bridge between the environmental or forestry sectors and the farming sector by signposting relevant meetings to attend, as well as organising their own on-farm walks and giving talks at events.

However, a key message across both interviews and focus groups was the importance of peer-to-peer learning, with farmers preferring to learn from other farmers with experience of managing ADB. These could be demonstration farmers or other local farmers within a farm cluster. This was felt to be particularly useful for farmers at the beginning of their 'journey' in understanding and managing ADB, and who have not yet developed a network of specialist contacts. The ability to frame tree health issues within the context of other relevant farming issues means that other farmers are highly influential as knowledge intermediaries.

Although not knowledgeable 'experts', other farmers are best positioned to signpost relevant information when farmers feel overloaded by an abundance of complex information sources:

*Yes, there seems to be, I think because there's so many routes for advice that farmers have lost confidence in it, it's just too confusing. Therefore, they're more likely to go to their trusted peer. (KTA03, farming advocate)*

## 4. Conclusions

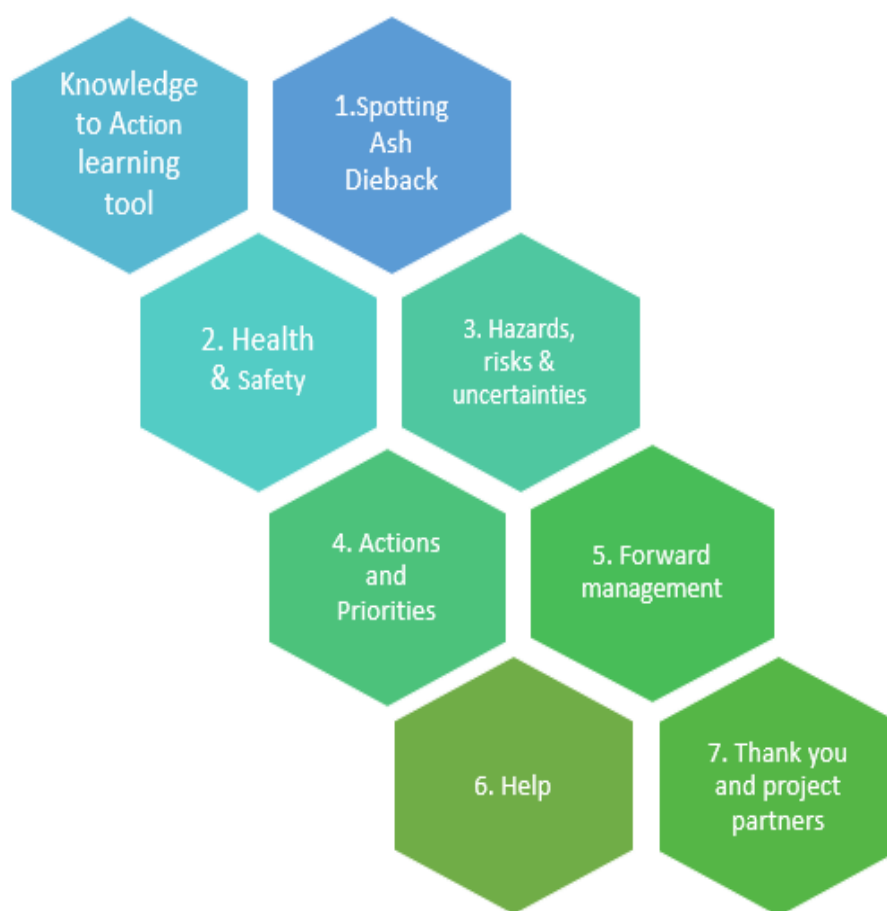
The results of the evidence synthesis were presented during a team and steering group meeting, where a number of different ideas about the format, content and dissemination of a potential knowledge product were discussed in detail. The final decision was to produce:

- An ADB Toolkit for farmers with modules/sections addressing knowledge gaps,
- This would be a web-based document with linked mixed, integrated media

### 4.1. Developing and disseminating the toolkit

The toolkit will be organised around specific sections including both directive and guidance type material, with the sections following the journey from surveying ADB to landscape restoration as shown in Figure 5. The content of the toolkit will draw on existing material already approved by Defra/FC as well as additional material that farmers have expressed an interest in knowing more about but which does not currently exist. Collaboration with other organisations including FC and Defra who are able to contribute material and review

new material is written into the toolkit development process. One of the most important features of the toolkit will be the use of images that reflect farming contexts.



**Figure 5. Schematic of farmer focused ADB Toolkit suggested sections/modules in the knowledge to action journey**

The suggested section contents are as follows:

1. Spotting ash dieback
  - a. ID photos
  - b. Severity
  - c. 0-6
  - d. Priorities
  - e. Specialists
  - f. Community engagement
2. Health & Safety
  - a. Felling & management
  - b. When to seek professional help

- c. Roadside ash trees
- 3. Hazard, Risks & uncertainties
  - a. Roadside safety
  - b. Road closures
  - c. TPO and legal requirements
- 4. Action & priorities
- 5. Forward management – build back better
  - a. Biosecurity
  - b. Nursery stock (reputable supplier)
  - c. Restocking (diversity, geographical, topological, native/relevant, purpose/use, scale)
  - d. Identifying resistant and clean stock
- 6. Help
  - a. Documents
  - b. Grants & schemes
  - c. Contacts
  - d. Specialists
- 7. Thank you and project partners

The toolkit development and dissemination process plan is as follows:

1. Straw Man, draft of toolkit - Early April 2022 – for discussion with “critical friends” drawn from the farming community
2. Expert inputs, including K2A, to develop draft. End May 2022
3. Sign posting to existing material. End May 2022
4. Engagement with farmers and knowledge Intermediaries. June 2022
5. Development of new material. May – Sept 2022
6. Final sense check and signoff with FC and Defra. October 2022
7. Final document. November 2022

Dissemination and launch campaign process plan is as follows:

1. Agree comms plan and key messages with FC and Defra. End June 2022.
2. Supplementary information. September/October 2022/ongoing.
3. Session at OFC and ORFC. Early January 2023.

4. To include paper version and ISSUU, social media, press release, organisation emails etc. Early January 2023
5. Key messages to be shared at farm walks & events, such as LEAF Demonstration Farms, AHBD monitor and strategic farms, Farming Connect etc. January 2023 – March 2023

## 4.2. Evaluating the toolkit - moving farmers to action

Plans to undertake user research as part of the review and evaluation of the toolkit will take place in the final quarter of FY2022/23 has the full launch of the toolkit will be at the end of quarter 3. The intention is to engage up to 20 farmers in an assessment of the toolkit, by either conducting interviews with them, or by running one or two evaluation workshops. The objective of the evaluation and user research will be to:

- Assess the suitability of the toolkit and areas of potential improvement or additional material
- How far the toolkit moved farmers to act for ADB where perhaps they might not have done otherwise
- The importance of the knowledge network in disseminating and communicating information about ADB, building farmer skills and confidence to act, and lessons for future working on tree health issues.

## 4.3. Project process reflections

Although this project has focused on the issue of farmers and supporting their action around ash dieback, there are higher order questions about the wider tree health policy context and how to develop engagement with particular audiences that this project also seeks to learn more about. It has been the intention of the project design to include reflective sessions, within the team, and perhaps with a wider set of stakeholders, to deliberate these issues. The specific objectives of the reflective sessions are to contribute to answering the following questions:

- i. To what degree does knowledge (particularly the type of knowledge), influence farmer motivations and behaviours for tree health?

- ii. How important is the knowledge network influencing farmer motivations and behaviours for tree health?
- iii. What organisations need to be involved to effectively move farmers towards action for tree health?
- iv. What are the implications of these insights for tree health policy development, particularly in relation to engaging hard to reach audiences?

This will be done by:

1. involving the action research team in reflective sessions together at key points in year two, i.e. after drafting the toolkit, during communication and dissemination, and post-user evaluation, to explore the co-design process addressing the following questions

- i. What have different partners' experience of the action research and co-design project been?
- ii. What are the benefits for policy/research/delivery partners in this process?
- iii. What are the key challenges for policy/research/delivery partners in the process?
- iv. Have we contributed to building farmer knowledge networks for tree health?
- v. What has been learnt in terms of connecting tree health policy development with farming communities?

2. Involve a wider stakeholder group in a reflective workshop at the point of sign-off of the toolkit and onwards communication in October 2022, to explore the project process and outcomes addressing the following questions:

- i. What have been the key challenges identifying 'solutions' to moving farmers to action for ADB?
- ii. What have been the key challenges building knowledge networks to support farmer focused organisations?
- iii. What has been learnt in terms of connecting tree health policy development with farming communities?

## 4.4. Updated project plan for year 2

There are four planned workstreams in the year ahead FY2022/23

1. Producing the ash dieback 'toolkit' for farmers including involving stakeholders in concept, content, and approval from April – October 2022
2. Disseminate the toolkit through a communications strategy and launch at events from October 2022 to January 2023
3. Evaluating the product with the intended users January and February 2023
4. Reflecting on the experiences of the project for strategic learning from May 2022 to February 2023

These have been integrated into an updated project Gantt as shown in Figure 6 below

	Y2											
	Q1			Q2			Q3			Q4		
	April	May	June	July	August	September	October	November	December	January	February	March
<b>Tasks</b>												
<b>1. Initiate Co-design research process</b>												
1.1 Co-design meetings with Defra, FC and Exeter												
1.2. Scoping and engagement of operational partner												
<b>2. Identify knowledge product</b>												
2.1 Steering group sign-off												
2.2 Co-design action plan produced												
<b>3. Evidence collection for developing the knowledge product</b>												
3.1 SSIs undertaken												
3.2 Farmer focus groups undertaken												
3.3 Analysis of SSIs and workshop evidence												
<b>4. Deliver the knowledge product</b>												
4.1 Agreement of knowledge product based on workshop evidence												
4.2 Toolkit outline and scope drafted												
4.3 Collaborative workshops with stakeholders to agree content/messaging in toolkit												
4.4 Draft toolkit circulated for comments												
4.5 Toolkit finalised and signed off by Defra/FC												
<b>5. Disseminate knowledge product</b>												
5.1. Agree dissemination and comms plan												
5.2. Disseminate/launch at various events and various channels												
5.3. assess effectiveness of comms/dissemination												
<b>6. Evaluate the knowledge product</b>												
5.1 Survey and/or 20 SSIs												
5.2 User testing workshops												
5.3 Analysis of evidence												
<b>7. Reflect on project process and outcomes</b>												
7.1. Agree reflective process methodology and questions												
7.2 Research team reflective meetings												
7.3. Wider stakeholder reflective meeting												
7.4. Lessons learned synthesised												
<b>8. Evidence synthesis and report writing</b>												

Figure 6. Updated project Gantt for FY2022/23

## References

Ambrose-Oji, B., Karlsdóttir, B. & Jones, G. 2021. *Knowledge to Action: Overcoming the gap between knowledge into action with hard to reach (HtR) audiences*. FPPH Project Report for Defra.

Blomkamp, E., 2018. The Promise of Co-Design for Public Policy. *Australian Journal of Public Administration*. 77, 729-743.

Merriam-Webster. (n.d.). Directive. In *Merriam-Webster.com dictionary*. Retrieved March 31, 2022, from <https://www.merriam-webster.com/dictionary/directive>

## Appendix 1. Key decisions made during initial inception and steering group meetings

	Decided	Discussed	Rationale
<b>Case study</b>	FFTH Pilot (advice and guidance aspect)		This presents a good opportunity to apply research to real life policy development
<b>Focus audiences</b>	Farmers engaged in agri-environmental schemes and other environmentally focussed farmers.	Farmers engaged in environmental issues. Less engaged farmers. Farmer audiences with particular challenges.	We will be more successful in engaging with farmers if we start with those who are more engaged and use them as a way to connect with their peers and neighbours (although the latter is outside the scope of this project). We do not have sufficient resources to try to engage disengaged farmers.
<b>Case study pest/disease</b>	Ash dieback	Ash dieback, Ips typographus and chestnut blight  (FFTH pilot focus pests and diseases)	Most farmers are aware of ash dieback and it is therefore an easy conversation to pick up with them. We risk losing focus if trying to cover more than one tree health issue
<b>Case study area</b>	South East England	All FFTH areas	This area works well for the areas in the tree health pilot, for areas where ash dieback is an issue to farmers, and for the connections of the research team.
<b>Operational partner</b>	LEAF – Linking Environment And Farming	A partner scoping exercise was undertaken	LEAF are engaged in the local area but cover a larger area across the South East and East. The project aligns well with what they usually do, and they have a research remit.
<b>Intervention</b>	Ash dieback learning tools for farmers	A range of options were discussed. Refer to Appendix 2.	This presents an opportunity to address many of the potential actions needed based on the pilot year findings, including building organisational capacity around tree health, identifying key messages and building consensus.

## Appendix 2. Potential solution spaces discussed during early team meetings.

Actions	Notes
<b>Build organisational understanding and capacity around tree health knowledge by embedding them in the tree health knowledge network</b>	There needs to be a buy in and the people making the changes will be the farmers in the end. For example NFU will need to balance a big challenge of tree disease with trying to grow new trees. Not just understanding and capacity.
<b>Produce characterisation/segmentation of farmers in terms of tree health issues and identify group-specific needs</b>	Might also depend – focus on ADB. Do you actually need different actions from different farmers on ADB? Could swallow the whole of the budget. Lots of segmentation already taking place in ELMS.
<b>Identify messaging for specific farmer segments (what is likely to motivate them? How can this encourage wider thinking around tree health?)</b>	It's about the call to action and making it straight forward. Decision-tree stuff. Develop messaging to counteract the perceived contradictions in felling one set of trees and planting others for CC.
<b>Develop a practical learning tool (e.g. training course, webinar, toolkit, suite of these options) aimed at a particular farmer audience and which translates scientific evidence and information into a suitable format for target farmers</b>	Would also contribute to the organisational learning. Trying to get something to stand out to get it to land effectively – could be linked to the payment schedule for farmers. Format needs to be based on learning styles. Need to be easily accessible.
<b>Build collaboration between stakeholders, researchers and target audiences to build consensus around practical actions</b>	Really difficult to get consensus – might be a challenge to decide what to tell farmers. There are huge expectation of tree health professionals but a skills shortage.
<b>Build collaboration between stakeholders, researchers and target audiences to develop a strategic plan for engaging farmers with tree health issues</b>	Might be difficult to achieve – see comment above.

<b>Develop guidelines for knowledge organisations on building knowledge and awareness around tree health issues among farmers</b>	Could be developed as part of other solution spaces. Might not be the best option in itself if we want to target farmer action.
<b>Including tree specialists in the solution space</b>	Many don't have the right language for landing on farm. Could help bridge the gap between two different knowledge sectors and help build respect of each others' view. But issue – are there enough?
And bring along your additional ideas .....	Maybe focus on risks etc. and leave out the complicated stuff on species choice given the timeline of the project.

## Appendix 3. Knowledge intermediary interview guide

### Knowledge to Action: Developing a knowledge product for farmers with ADB

#### Semi-Structured Interview guide

September 2021

**Sample:** 15-20 structured/semi-structured interviews. Mix of “gatekeeper”/influential farmers and organisations that deliver farmers with information and knowledge.

**Approach:** The interviewer will need to select the appropriate set of questions and tweak the question wording slightly depending on whether they are talking to an individual or an organisation. The interviews with individuals should focus on the person’s view of the wider agricultural community and farm businesses they are situated amongst/network with.

Questions intended for **Individuals alone** are shaded in yellow

Questions intended for **Organisations alone** are shaded in grey

**Gaining consent before and at the start of the interview:** Ensure the interviewee has been given the [link to provide consent](https://www.smartsurvey.co.uk/s/RMYWJC/): <https://www.smartsurvey.co.uk/s/RMYWJC/> – ideally this should be sent out in the interview confirmation email together with the blurb below under “rationale and introduction to the research”. On the day, make sure they remember the introduction and have understood it. Reiterate if necessary. Explain that the interview will take between 30- 60 minutes and they are free to stop at any time. They do not have to answer questions if they do not want to, and their responses will be anonymised. Confirm again that they consent to recording the interview before pressing the button.

#### Rationale and introduction to the research:

Trees are currently under stress from a variety of factors including an increase in pests and diseases. Farmers and other agricultural land managers are responsible for trees in woodland as well as trees in settings outside of woodland. However, research has shown that these land managers do not necessarily know how to recognise and manage for different tree health issues. Ash dieback is one such disease that has been given a significant amount of attention, particularly as the impacts have become more apparent across the country. Defra wish to encourage farmers and agricultural land managers to:

- conduct surveys of their ash trees to confirm presence and spread of ash dieback,
- remove infected ash trees in high-risk areas including non-urgent but declining ash trees along roads and paths,
- leave ash trees that do not pose a threat to allow resistance to build through natural processes.

The aim of the research is to understand more about farmers' and agricultural land managers' responses to ash dieback, and seeks a greater understanding of their level of awareness, risk perception, understanding and knowledge of ash dieback.

The interviews are being undertaken by Forest Research, Exeter University or Fera. The research is funded by Defra. The evidence collected will be used by Forest Research, Exeter University, LEAF, Fera, and Defra to identify information and guidance that might support farmers and agricultural land managers better deal with ash dieback.

## Questions

### About the interviewee and their role

1. What is your role?
2. Do you own or manage any ash trees? If so, how many/and in what kind of setting?  
(Prompt: are the trees in high risk areas or along roads? Do they have woodland?  
Number or trees or ha. - depends what interviewer actually knows about their own trees.)
3. Do you see yourself having a role to play in relation to tree health? If so, what is that?
4. How are you involved with farmers and the agricultural land manager community?  
(Prompt: Through informal conversations, discussion groups, farmer networks etc. Do they speak, present, produce information, put on events? )
5. What kind of farmer audiences do you engage with?

### General awareness of tree health and ash dieback

6. What do you perceive farmers' general level of awareness and understanding of tree health to be?
7. What do you perceive farmers' level of awareness and understanding of how to deal with ash dieback to be? (Prompt: Is it awareness of ash dieback in general or of specific threats and management options? Has this changed over time? What has led to these changes?)
8. How much of a concern do you feel ash dieback is to farmers you engage with?
9. Are there any other tree pests and diseases that are of concern to the farmers you engage with?

### Key behaviours

NB: We are looking for interviewees to comment about the wider farmer community. Even with the influential individual farmers, we are asking their opinions about how and why their peers do or don't act for tree health/ash dieback, not just their personal experiences with ash dieback. The research needs to develop a picture of the knowledge needs of farmers and agricultural land managers across the sector.

10. How do you think farmers tend to arrive at decisions about dealing with ash dieback?  
(NB.: Information, including source and format, but also personal experience with other pests and diseases or with tree management)

11. In your opinion, how *should* farmers be acting on ash dieback, if at all? What do you think good practice looks like?
12. What barriers, if any might be preventing farmers from deciding on the best course of action and implementing this?
13. Do you think different kinds of farmers (e.g. farm type/size/location), respond to ash dieback differently? If so why?
14. To what extent do you think farmers currently check their trees for ash dieback or other tree pests and diseases? Why/why not? What would need to change to facilitate this? *(NB. pull out the knowledge aspects of this question, not e.g. the financial aspects, and tease out any differences by farmer type)*
15. Do you feel farmers are currently felling, or likely to fell, declining trees along roads, paths and in other high-risk areas – ash or otherwise? Why, why not? What would need to change to facilitate this? *(NB. pull out the knowledge aspects of this question, not e.g. the financial aspects, and tease out any differences by farmer type)*
16. Do you think farmers are currently likely to leave infected or infested trees on their land? Why, why not? What would need to change to facilitate this? *(NB. pull out the knowledge aspects of this question, not e.g. the financial aspects, and tease out any differences by farmer type)*

### Information and knowledge development

17. Which organisations or individuals do you think are influential in building awareness and knowledge of ash dieback among farmers?
18. How do these organisations go about building awareness and knowledge among their audience? *(Probe: Do they reuse general content, or do they translate it for farmer audiences? Do they produce new content? Is the information understood and used by farmers? How do they disseminate this? Do they encourage learning on this topic? Do they deliver training? How do they get people engaged?)*
19. How has your organisation built up knowledge and understanding of ash dieback? *(Prompt: look for different types of information: written / oral / formal / informal / tailored / general etc.)*
20. How does your organisation decide what information and messages to communicate, and the ways in which these are developed and delivered? *(Prompt: Who is involved? Is this passive information dissemination or do they encourage active learning?)*
21. Do you feel that the information available about ash dieback is focused on the issues and knowledge gaps of concern to farmers?
22. Are there any (other) challenges in current communication and messaging around ash dieback which might be preventing farmers from acting to deal with ash dieback? *(Prompt: look for contradictory messaging, and if so, by whom? What drives different messages? Other issues could be the level and format of information and whether it is translated for farmers. If they discuss other limitations or support, just make sure they also address information and communication.)*

### Learning tools

- 23. What do you feel are the best ways of helping farmers learn about how to act for ash dieback (e.g. Video, podcasts, handbook, webinar, training course)? (*Prompt: Why this/these methods. What are the benefits and potential pitfalls/downsides?*)
- 24. What key messages should such a learning tool focus on communicating?
- 25. What other support do you think farmers might need to enable them to take action on ash dieback? (*Prompt: are there any other barriers they need to overcome?*)

<b>Ending</b>
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- 26. Any other comments?
- 27. Other questions?

**Thank the respondent and explain what happens next.**

## Appendix 4. Focus group slide pack

Farmer Focused Online Workshops

January 10<sup>th</sup> 2022

# Tree Health and Ash Dieback



Department  
for Environment  
Food & Rural Affairs



Forestry Commission



LINKING ENVIRONMENT AND FARMING



Forest Research



Timing	Item	Lead
16:00	Welcome and Introduction from <b>Caroline Drummond MBE, LEAF Chief Executive</b>	CD
16:10	<b>Specialist talks</b> <ul style="list-style-type: none"> <li>- An introduction to ash dieback from <b>Elliot Carpenter, Woodland Officer, The Forestry Commission</b></li> <li>- On farm experience of handling ash dieback from <b>Peter Wilderspin, Rural Surveyor at Cambridge University farms</b></li> </ul>	CD, EC, PW
16:20	Introduction to <b>Focus Group Discussions</b>	CD
16:25	<b>Focus Group Discussion 1</b> - Farmers' response to ash dieback (Breakout rooms)	CD, MB, BK, KS, AP, NJ
16:55	BREAK	
17:05	<b>Focus Group Discussion 2</b> - Knowledge tools for farmers (Breakout rooms)	CD, MB, BK, KS, AP, NJ
17:35	<b>Focus Group</b> – Feedback on both sessions	CD
17:55	Summary/conclusion	CD
18:00	END	

# Welcome and Objectives

## Bridging the knowledge to action gap for tree health

The session will focus on two areas:

- an opportunity to share your own experience and knowledge of ash die back and
- understanding the types of information and materials farmers find most useful and easiest to interact with to guide their ash dieback decision making.

Our objective is to use this research to:

- improve the information and knowledge available to farmers by designing something better suited to their needs, and
- inform Defra of the kind of support farmers need to respond to tree health issues, such as ash dieback.



# Specialist Talks

- Elliot Carpenter - Woodland Officer with the Forestry Commission
- On farm experience of handling ash dieback from **Peter Wilderspin, Rural Surveyor at Cambridge University farms**



# Breakout rooms

- **Focus Group Discussion 1** - Farmers' response to ash dieback
- BREAK
- **Focus Group Discussion 2** - Knowledge tools for farmers

**Return to main plenary at 17:35**



# Discussion 1

## What do you know about ash dieback and is it a conce

1. Prior to today's session, what was your understanding of tree health and ash dieback in particular?
2. How much of a concern is ash dieback on the land you manage?
3. Are the practises you are adopting the same or different to what is recommend?
4. Are there any barriers preventing recommended action to identify and manage ash dieback on your land?

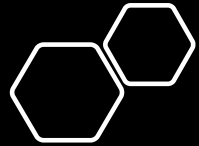


## Discussion 2

# Plugging the knowledge gaps

1. How do you normally receive, or look for, information about tree health issues including ash dieback?
2. Do you find this information and its format easy to understand and engage with?
3. What information do you feel you need to manage ash dieback in the way that's recommended?
4. What format of information will be most useful for you to bridge the knowledge to action gap?





# Wrap-up

## Thanks for taking part

- AOB / Questions?

- What next...

Ash dieback resources can be found on the following websites:

- Forestry Research- Ash dieback hymenoscyphus fraxineus
- Tree Council – Local authority ash dieback action plan toolkit
- Gov.uk– managing ash dieback in England

More information about tree pests and diseases can be found at:

- Forestry Research– Pest and disease resources



