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Farmer acceptability of increased tree cover scenarios in the UK: Identifying farmer preferences for tree planting on their land

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ABSTRACT

Tree planting on farmland will be necessary to meet 2050 UK net-zero targets, creating a conflict between land for food production or carbon sequestration. Trees on farmland can be planted separately (e.g. farm woodlands, boundary hedgerows) or integrated (e.g. grazed woodlands, alley cropping), each with the potential to deliver a range of benefits. However, despite decades of incentivising tree planting, previous planting targets have not been achieved. A key implementation factor is developing a better understanding of farmer preferences for different tree planting configurations. This study used a mixed methods approach to investigate what the future of trees on UK farms may look like and the associated farmer attitudes. An initial exploratory online survey (127 respondents) was followed by a Q-study to find shared farmer perspectives (33 participants).

Most farmers surveyed held a positive attitude towards future increases in tree cover. Results suggest that economic barriers may be less significant than previously thought. For all farming sectors, increasing biodiversity was the most important driver. The most popular action was planting more hedges. Results support the fact that a diversity of approaches tailored to different farming sectors could help ensure that the UK's tree planting targets are met. For example, the expansion of existing hedgerow networks was highly valued by livestock farmers whereas planting trees on less productive land for biodiversity was most important for arable farmers. This study has gathered new insights that will allow policy makers and advisory services to tailor recommendations to identified groups based on perceptions of trees on farm.

1. Introduction

1.1. Tree planting for climate change mitigation

Increasing tree cover is widely agreed to be necessary for the UK to meet its 2050 net-zero greenhouse gas emissions targets (Cho et al., 2025;Committee on Climate Change, 2019). The Committee on Climate Change, 2025 have recommended planting trees on 10% of farmland while maintaining its primary agricultural use and extending hedgerows by 36% by 2050. Together with these recommendations, the UK devolved administrations have set individual targets; for example, in England there is now a legally binding target to increase tree canopy cover in England from 14.5% to 16.5% by 2050 (DEFRA, 2023a). However, there has been a consistent gap between policy aspirations and the actual volume of tree planting (Priestley and Sutherland, 2016; Westaway et al., 2023) and central to these targets is the need for new suitable areas to plant. In the UK approximately 71% of land is used for some form of agricultural production (DEFRA, 2024a), and the remainder is either largely already wooded or unsuitable for afforestation. It is therefore inevitable that a large proportion of this tree planting will need to take place on land that is currently used for agricultural production, making farmers important gatekeepers for this climate change mitigation strategy (Hardaker et al., 2022). Increasing tree cover on agricultural land has been shown to have many benefits (Biffi et al., 2022; Carroll et al., 2004; Crous-Duran et al., 2020; Hernández-Morcillo et al., 2018), but in recent years, UK farmers have failed to make a substantial contribution to increasing tree cover (Felton et al., 2023). The effectiveness of government policies, grants and incentives to influence tree planting has been found to be dependent on many factors including the pre-existing interest of the farmer or landowner (Burton

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et al., 2018; Lawrence et al., 2010; Matthews et al., 2020; Westaway et al., 2023) and studies have shown that farmers may be reluctant to plant trees for a wide range of reasons.

1.2. Farmer attitudes and engagement

The basic tenet of farming practice is the prioritisation of food production. Farmers are inherently risk averse and a key determinant of regional agricultural land use in the UK is 'profit maximisation' (Rounsevell et al., 2003). Farmers tend to hold a shared culture which respects 'correct' land use and seeks peer respect based on using land for its appropriate productive purpose (Beth et al., 2026); this can impact on the uptake of tree planting (Ambrose-Oji, 2019; Lawrence et al., 2010). Policies to encourage farmers away from traditional production-focussed roles have had limited success with uptake often limited to particular types of farmer (Burton, 2004). In order to inform policy development and for research purposes, farmers are being increasingly approached for their input, views and data. It is important that farmer voices are heard, that research results are truly representative and that policy decisions are made from the bottom-up. However, farmer engagement is waning, cynicism has increased and pressure on farmers to be accountable to multiple agencies whilst also producing food at ever decreasing margins makes getting this representative voice increasingly difficult (Avemegah et al., 2021). Rois-Díaz et al. (2018) assessed factors acting for and against the adoption of agroforestry systems and found that it was very difficult to get UK farmers who were not already practicing agroforestry engaged.

1.3. Barriers and drivers to farmers planting trees

In recent years there has been considerable effort by researchers and policy makers to identify barriers to tree planting on farmland and a general consensus has been reached on the common barriers to tree planting on farmland in the UK and Europe. These can be broadly grouped into; (1) a lack of practical understanding/knowledge and; (2) financial constraints (Beth et al., 2026; Marshall et al., 2025; Tosh and Westaway, 2021). Many farmers are under significant financial pressure and are expected to deliver public goods and intensify production whilst farming sustainably. In a study of European farmer perceptions of arable agroforestry (silvoarable) systems, Graves et al. (2008) reported that 86% of interviewed farmers were willing to plant silvoarable systems, but only under particular conditions, the most important of which was confidence in their profitability. However, productive use of trees (e.g. for timber, nuts or fruit) is a long-term investment and is often perceived as uneconomic by farmers used to annual agricultural revenue (Soil Association and Woodland Trust, 2018). Business planning for tree planting also requires forward thinking and significant capital investment, with an additional cost of income foregone on land taken out of agricultural production. In addition, approximately one quarter of agricultural land in the UK is tenanted. The rights to trees and woodland on tenanted land are often vested in the landlord (Lobley et al., 2012) and farmers on short-term tenancies may not benefit from their investment (Lawrence and Dandy, 2014). As such resolving tenancy constraints is also recognised as important to enable tenant farmers to undertake long-term investment decisions such as tree planting (Committee on Climate Change, 2020). There is less consensus around what drivers might encourage farmers to plant trees. An evidence review identifying factors incentivising or disincentivising UK farmers to adopt agroforestry (Tosh and Westaway, 2021) showed a high level of farmer support for public goods monitoring; farmers were genuinely motivated by the environmental benefits of agroforestry, not just the economic ones.

1.4. Farmer preferences for tree planting scenarios

As well as developing a better understanding of common drivers and barriers, we need to recognise that there is a diversity of approaches to increasing tree cover on farms. Trees and woodland in the UK's agricultural landscape take a wide variety of spatial configurations and can be divided into distinct separate features (e.g. farm woodlands, shelterbelts and boundary hedgerows) or more integrated agroforestry systems (e.g. grazed woodlands, alley cropping and scattered trees). Each of these approaches has the potential to deliver a range of benefits, but they are unlikely to be equivalent, and farmer preferences for different tree planting configurations need to be accounted for and understood. Understanding individual perspectives and identifying areas of consensus within a complex topic requires the use of methods that can investigate subjectivity. Q-methodology systematically studies subjectivity (McKeown and Thomas, 2013), and it has been successfully used to explore the range of opinions and viewpoints for a variety of subjects (Chowdhury and Kabir, 2024; Iversen et al., 2024; Kam, 2024; Urquhart et al., 2012). It combines qualitative and quantitative methods whilst also enabling stronger farmer participation due to its bottom-up construction of the subject matter. The method allows individuals to be grouped and categorised according to the similarity in their responses to the statements presented in a Q-sort.

This study employed a two-stage approach, incorporating an exploratory online survey complimented by a more detailed study using Q-methodology to explore farmer attitudes. The aim was to understand core motivations and desires around the future of trees on participants farms by answering the research questions:

- Given that all farmers are being incentivised to plant more trees, what might the future of trees on UK farms look like?
- Do farmers from different sectors favour planting trees in certain spatial configurations more than in others, and if so, what are the implications of this for policy implementation?
- What are the barriers and drivers for increasing tree cover on farm and how are these influenced by sector?

2. Methodology

A two-stage mixed method approach was taken to identify the motivations of farmers around trees on their land (Fig. 1).

2.1. Stage one: online survey

The initial stage was a simple 'broad and shallow' online survey, collecting farmers opinions of trees on their farms. The survey aimed to collect feedback from as many farmers across the UK as possible, it was shared widely, via farmer networks and contacts, farming events and social media. To maximise participation, it was kept short with multiple choice questions and visual images used where possible, and the average completion time was 5 min (see supplementary material SP1 for the full survey and the survey distribution pathways). Results from Rois-Díaz et al. (2018) showed that the concept of agroforestry was not well understood by farmers who were not practicing agroforestry. Therefore, the term 'trees on farm' rather than 'agroforestry' was used throughout the consultation process. Responses were collected from September to November 2023. Limited demographic information was collected via a series of contextual and background questions about the surveyed farm (farm size, location, farming system). The following questions were then tailored to farm sector based on the UK government's Department for Environment, Food & Rural Affairs (DEFRA's) Robust Farm Types (DEFRA, 2023b):

- Cereals and General Cropping: Farms where combinable crops or field crops dominate the output.
- Horticulture: Farms focusing on the production of fruit, vegetables, and flowers.
- Specialist pigs and poultry: Dedicated pig or poultry production.

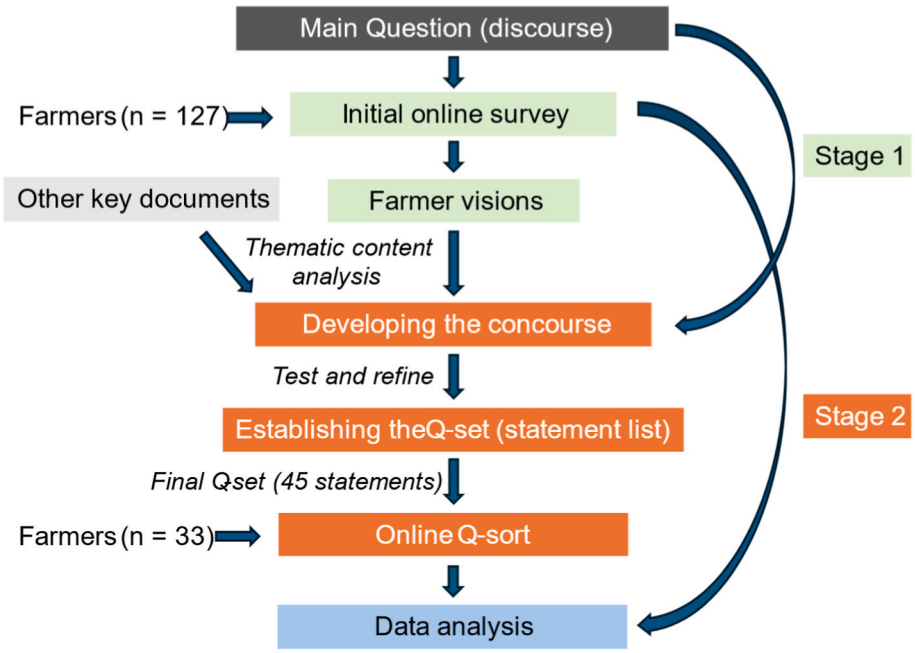

Fig. 1. Methodology flow diagram, showing the 2 stages and the different elements of the Q-methodology.

- LFA grazing livestock: Beef and sheep farms in Less Favoured Areas (LFA).
- Lowland Grazing Livestock: Cattle and sheep farms located in lowland areas.
- Dairy: Over two-thirds of farms standard output comes from dairy cattle.
- Mixed: Farms where neither crops nor livestock are more than two-thirds of the output.
- Other: Miscellaneous or unclassified farms.

The initial question was deliberately open-ended and asked about respondents' vision for tree planting on their farm by 2050. Next was a discrete choice question testing how farmer preferences vary when presented with sector-specific images showing different tree cover scenarios. The images were categorised according to the degree of integration of the trees with agricultural practices and the density of planting. Each sector's image selection always included a 'no tree' option. In some cases, there was an uneven number of images relating to each category, for example the 'integrated dense' category was only offered as an option to livestock (woodland grazing) and horticultural (forest farming) farmers. To correct for this, the total number of each image category chosen by respondents within each sector was divided by the total number of images of this category offered. The next question aimed to capture survey responses across a range of land-use futures. It asked respondents to place themselves on a spectrum according to how they see themselves in the next 50 years, firstly, in terms of the quantity of new trees planted on their farm and secondly, whether these trees are 'integrated with agricultural operations (e.g. alley cropping or in-field)' or 'separate from agricultural operations (e.g. woodlands, hedges or shelterbelts)'. The final question sought to establish the main drivers for farmers to plant trees. Respondents were asked to score different motivations for tree planting on a five-point Likert scale from low priority (1) to high priority (5).

2.2. Stage two: Q-methodology study

In the second stage, Q-methodology was used to find shared perspectives and emotions amongst farmers relating to increasing tree cover at a farm level. A Q-methodology study contains five stages: 1) Identifying a discourse, 2) Developing the concourse, 3) Establishing the Q-set, 4) Carrying out the Q-sort and, 5) Data analysis (see Fig. 1.).

2.2.1. Identifying the concourse and developing the Q-set

The discourse, set by the research questions, was 'attitudes towards increasing tree cover on farm'. The next step was to develop the concourse. This is a collection of the breadth and depth of the potential feelings and attitudes on the subject being discussed (Van Exel and De Graaf, 2005). Statements are typically selected from previous research or discussion, such as interviews, surveys, or general media (Paige and Morin, 2016). Once a concourse is developed, it is used to create the final Q-set, which is a list of 30-50 statements that can answer the research question (Watts and Stenner, 2012). The concourse was primarily developed from the farmer visions collected in the initial online survey. Narrative thematic data analysis using Nvivo software (Lumivero, 2023) was undertaken to extract key themes from the text related to visions for the future of trees on individual farms. Four additional documents and data sources were added to the thematic content analysis to complete the concourse:

1. The sixteen building blocks for effective agroforestry support from DEFRA's Agroforestry Environmental Land Management (ELM) test project (Simonson and Tosh, 2023).
2. The transcript from a Farming Forum discussion (The Farming Forum, 2020) of the biggest obstacle to farmers planting trees on their farm.
3. The evidence review from DEFRA's Agroforestry Test and Trial (Tosh and Westaway, 2021) which reviewed ten source documents, representing the principal evidence sources on UK farmer opinion to the adoption of agroforestry. The review identified 36 different factors incentivising or disincentivising UK farmers to adopt agroforestry.
4. A recent research paper examining farmers' attitudes towards, and intentions to adopt, agroforestry on farms in lowland South-East and East England (Felton et al., 2023).

Thematic analysis was performed through the process of manual inductive coding of these five key sources in several rounds. The aim was to produce a list of short statements related to farmers' decision-making around tree planting. Initial coding generated a list of statements that

could answer the question 'What are your thoughts on increasing tree cover on farmland by 10% by 2050?'. The statement list was verified by a small group of experts in a pilot run of the methodology (experts included agricultural researchers, farmers and an environmental NGO policy expert), statements were adjusted and added accordingly. The final list contained 45 statements which then became the Q-set, the foundation of the Q-sort. The 45 Q-set statements were each assigned a sentiment in relation to tree planting (positive, negative or neutral); 17 statements were positive; 16 were negative and 12 were neutral. Statements were also classified according to drivers or barriers of increasing tree cover on farms; 11 related to economic aspects, 15 to practical considerations, 5 to knowledge needs, 3 to policy considerations, 9 to public good provision and 2 to other (see supplementary material SP4 for the final statement list).

2.2.2. The Q-sort

The question to guide participants through the Q-sort was 'What are your thoughts on increasing tree cover on farmland by 10% by 2050?' The year 2050 was chosen to correspond with current net-zero goals whilst also being far enough away not to be unduly influenced by the immediate practicalities of day-to-day farming activities and current subsidy rounds, but still close enough to visualise. The Q-methodology does not require a large sample size; instead, participants are selected to cover a range and diversity of viewpoints and/or for their relevance to the study. The sample is therefore strategic and not random. Webler et al. (2009) proposed that the number of participants required for an effective Q-study is between 12 and 36. For this study 58 farmers across the UK were selected from initial survey respondents and via farmer networks and invited directly to participate, with the aim of representing the diversity of views on the subject; specifically to ensure representation across the farming community of all major farming sectors, organic and conventional farming practices, and land tenure types. The Q-sort took place between January and March 2025.

QMethod Software (Lutfallah and Buchanan, 2019) was used for the online Q-sort. During the Q-sort, participants were asked to rank the Q-set statements into three categories (1) agree strongly, (2) neutral, and (3) disagree strongly. This process enabled familiarisation with the Q-Set making the next step more manageable. Participants were then asked to place each statement in a ranked Q-sort grid. The Q-sort grid was arranged in a quasi-normal distribution, making it a 'forced choice' distribution where participants rank statements onto the grid based on a pre-determined structure (See SP5 for the grid used in this study). Each statement could only be placed once, and once a spot was taken it could not be used again; however, statements could be moved until every cell in the Q-sort grid was filled to satisfaction. Participants were then asked to review their grid and provide a brief explanation of their ranking selections. Participants were given the choice to fill in the Q-sort online independently or to arrange an online one-to-one meeting to complete the sort.

2.3. Data analysis

Answers to the contextual and background questions were used to compare the structural/demographic features of farmers from both stages with known census parameters of the wider farming population. This helped ascertain how representative the survey respondents were and enabled an evaluation of survey bias.

2.3.1. Stage one: online survey data

Pearsons r correlation analysis was carried out within the different farming sectors to examine whether, within each sector, there was a relationship between farmers who would like to plant more trees and whether they would prefer the trees to be integrated or separate. Weighted averages and Pearson's Chi-squared test were used to explore how farming sector affected farmer's drivers for tree planting, with the null hypothesis that there was no association between farming sector and drivers to plant trees. Thematic content analysis was used to draw key results from the free text of the 'farmer visions'. This was carried out as an exploratory exercise to understand more about respondent motivations around tree planting and managing existing trees and to identify common drivers and barriers. Narratives appearing from the data were then compared against demographic survey attributes.

2.3.2. Stage two: Q-methodology study

The analysis of data within Q-Methodology involves the correlation and factoring of Q-sort participants with each factor representing a different perspective. The association of each respondent with a perspective or viewpoint is indicated by their loading on that factor. Individuals with high loadings on the same factor will have a similar outlook or perspective on the issue. Each statement in the Q-sample is also scored for each factor. Analysis of the Q-sort data was carried out using QMethod software (Lutfallah and Buchanan, 2019). Once complete the Q-sorts were transformed into numerical data, and each individual Q-sort was intercorrelated with the Q-sorts of other participants using Pearsons correlation. By-participant factor analysis was carried out using Principal Component Analysis (PCA) to identify factors that represent clusters of shared viewpoints between participants (Watts and Stenner, 2012). In order to determine whether or not a factor was retained for analysis, Kaiser's criterion (Kaiser, 1960) was employed and factors with eigenvalues greater than 1.0 were retained. Factor rotation identified Q-sorts whose position and viewpoint closely approximated that of a particular factor. Varimax rotation was applied as it automatically seeks the solution which maximises the amount of variance explained by the extracted factors (McKeown and Thomas, 2013).

3. Results

3.1. Stage one: online survey

3.1.1. Structural demographics of sample farmers

A total of 185 responses were collected from farmers across the UK and of these, 127 respondents (68%) completed all of the questions (See supplementary SP2 material for map of survey respondents). There were fewer farms (10% of survey respondents) from the cereals and general cropping sector than the England average, but the average farm size was considerably larger (Table 1). This was partially due to the relatively small sample size (12 farms) and that one of these farms was exceptionally large (3000 ha). The relatively high number of horticulture farms compared to the England average and the smaller size may reflect an increased interest in agroforestry in the horticulture sector, but may also be a result of response bias. Except for horticulture and pigs and poultry, the average farm sizes of survey respondents were higher than

Table 1
Stage 1 survey responses by farming sector and average farm size of respondents from across the UK compared to 2024 England averages (DEFRA, 2024b).

Farming sector	Complete responses	Survey results (UK)		Defra 2024a,b (England)	
		Average size (ha)	Proportion of farms	Average size (ha)	Proportion of farms
Cereals and general cropping	12	457.7	10%	122.6	38%
Horticulture	20	16.4	16%	45.8	4%
LFA Grazing Livestock	23	223.7	18%	103.6	12%
Lowland Grazing Livestock	42	77.7	33%	42.2	30%
Mixed	28	306.0	22%	115.8	7%
Specialist pigs and poultry[a]	1	35.0	1%	41.4	4%

[a] Removed from analysis due to low number of responses.

England averages for each sector.

The proportion of owner occupation was higher amongst survey respondents, 70% compared to an average of 54% (Table 2). The proportion of organically certified holdings was also markedly higher amongst the survey respondents compared to the UK average. Again, this could be down to increased interest in agroforestry amongst organic farmers but is likely to have also been influenced by the reach and available distribution networks of the research team. 35% of survey respondents were already practicing some form of agroforestry; a recent report estimates that only 3.3% of the agricultural area of the UK is under agroforestry (Woodland Trust, 2022), so it is likely that the survey respondents were biased towards those already engaged in some form of agroforestry. 60% of respondents also self-identified as 'regenerative farmers' and 17% as 'new entrants'.

3.1.2. Farmer preferences for different tree planting configurations

Images showing separate dense (SD) plantings (farm woodlands and wide shelterbelts) were the preferred choice for cereal farmers (67%), LFA grazing livestock farmers (52%) and mixed farmers (64%) (Table 3). Images showing integrated low density (ILD) planting (low density infield trees and widely spaced alley cropping) were preferred by lowland grazing livestock farmers (71%). Farmers from the horticultural sector were most interested in integrated medium density (IMD) planting (55%). It should be noted that not all image choices were available for each sector, e.g. there were no integrated dense (ID) planting images (woodland grazing and forest farming) shown to cereal or mixed farmers. A no tree (NT) option was always available but was only chosen once by a lowland grazing livestock farmer.

Farmers were asked to place themselves on a slider from 0 to 100 for how they see themselves in the next 50 years, in terms of establishing more trees on their farms and whether these trees are integrated or separate. High scores (>50) indicate that farmers would like to plant more trees and would like them integrated with agricultural production. Lower scores (<50) indicate that farmers would prefer fewer or no more trees and would prefer them separate from agricultural production.

Results show that lowland grazing livestock farmers would like to plant the most trees and horticulture farmers the least, but all farming sectors averaged over 50, showing a generally positive attitude to increasing tree planting (Table 4). High standard error values for 'cereals and general cropping' indicated a large range of opinions in this sector. In terms of integration, the scores confirm the results in Table 3 that the horticulture and lowland grazing livestock sectors were most interested in integrating trees into their production systems, i.e. planting alley cropping agroforestry systems or in-field trees. Results from Pearsons r correlation analysis showed slight positive correlations between the number of trees the farmer wanted to plant and the level or integration with the farming system for all sectors, although these were significant only for LFA grazing livestock farmers ($p \leq 0.005$) and mixed farmers ($p \leq 0.05$) (Table 4). This suggests that farmer interest in planting more trees may be related to their interest in integrating trees into their farming systems.

Table 2
Survey responses by tenure type and farming systems compared with England and UK* averages.

		Survey results	England/ UK* Average	Source
Tenure	Owner occupied	70%	54%	(DEFRA, 2024b)
	Wholly tenanted	9%	14%	(DEFRA, 2024b)
	Mixed tenure	17%	31%	(DEFRA, 2024b)
	Ownership/ tenancy unspecified	4%	no data	
Farming system	Organic	35%	3% *	DEFRA (2024a)
	Regenerative	58%	no data	
	Agroforestry	35%	3.3% *	Woodland Trust (2022)
	Agri-Environment Scheme	58%	30% *	DEFRA (2024a)
	New entrant	13%	no data	

3.1.3. Drivers for tree planting

The survey also sought to understand whether farmers from different sectors have different drivers and priorities for tree planting. Weighted averages of the Likert scores for the drivers were calculated (Fig. 2). Scores greater than zero indicate a positive preference for this driver.

For all sectors, increasing biodiversity was the most important driver (Fig. 2). Grants and investment had low scores for all sectors with the only negative score for horticulture, suggesting a low priority in this sector where historically there has been lower availability of subsidies, especially for smaller holdings. In contrast, trees for food production and for health and community were ranked with higher importance for horticulture than for the other sectors. No significant differences were found between sectors for any of the drivers (Supplementary material SP6). The greatest difference between sectors was seen for the drivers 'food production', and this appeared to be driven by the horticulture sector prioritising this driver.

3.2. Stage two: Q-methodology study

3.2.1. Thematic content analysis (TCA) of farmer visions

Exploratory coding of the farmer visions from Stage One showed that the most popular action was to plant more hedges, with over 20% of respondents mentioning this (Fig. 3), followed by unspecified tree planting (e.g. 'tripling of tree cover', 'add trees into our landscape') and then planting more woodland. 13.4% of respondents did not want to plant any more trees. Some respondents mentioned managing existing trees as well as either planting more or not wanting to plant any more trees. By sector the most popular tree planting visions were: 'no more trees' for arable farmers; 'plant more general agroforestry' for the horticultural sector, 'plant more hedges' for LFA grazing livestock farmers; 'plant more woodland' for lowland grazing livestock farmers; and 'more unspecified tree planting' for mixed farmers.

3.2.2. The Q-sort

58 farmers were directly invited to participate, and of these 33 (67%) completed the Q-sort. From these completed Q-sorts, 24 were selected for inclusion in the analysis to form the most representative sample based on demographic and structural information collected in the initial questions (Table 5).

Some notable differences were observed; organic farmers and owner occupiers were overrepresented compared to national averages, there were more farmers who self-identified as having agroforestry on farm than average, and 50% of farmers also had woodland on farm. Participants were spread across the UK, with a slight bias to the South of England (See supplementary material SP2 for a map showing geographical spread of survey participants).

3.2.3. Description of the main factors

Five factors cumulatively explaining 65% of the variance in the data were extracted from the Q-sort data (Table 6); these factors represented five major perspectives on 'increasing tree cover by 10% on UK farmland by 2050'. Of the 24 Q-sorts completed, sorts by three farmers did not load significantly ($p < 0.05$) onto any one factor and are thus not represented by the following five perspectives (see SP3 for a full list of statements and factor rankings).

Factor 1: agroforestry and agroecological farmers. Trees are beneficial to farming systems. This factor (F1) explained 37% of the variance, and 11

Table 3
Percentage of farmer responses for each different type of tree cover categorised by sector – corrected for the number of images available for each category.

Farming sector	Integrated				Separate		
	Dense	Medium Density	Low Density	No Trees	Dense	Medium Density	Low Density
Lowland Grazing Livestock	45%	33%	71%	2%	32%	30%	12%
Mixed	NA	46%	16%	0%	64%	43%	11%
LFA Grazing Livestock	43%	35%	22%	0%	52%	50%	4%
Cereals & general cropping	NA	17%	29%	0%	67%	47%	8%
Horticulture	30%	55%	20%	0%	30%	15%	0%

Table 4
Average scores with standard error (SE) of the mean for different farming sectors, showing preferences for quantity of new trees, the preferred degree of integration and the results of correlation analysis of the two scores for each sector (* indicated significance <0.05 and ** <0.005).

Farming Sector	Quantity of trees score	S.E.	Degree of integration score	S.E.	Pearsons r correlation coefficient	p value
Lowland Grazing Livestock	69.0	4.7	60.6	4.4	0.119	0.4603
Mixed	64.9	5.7	59.6	5.4	0.404	0.0332*
LFA Grazing Livestock	64.7	6.3	56.9	5.9	0.569	0.0046**
Cereals and general cropping	57.3	10.8	56.5	9.6	0.327	0.2999
Horticulture	52.3	6.2	72.4	6.0	0.339	0.1432

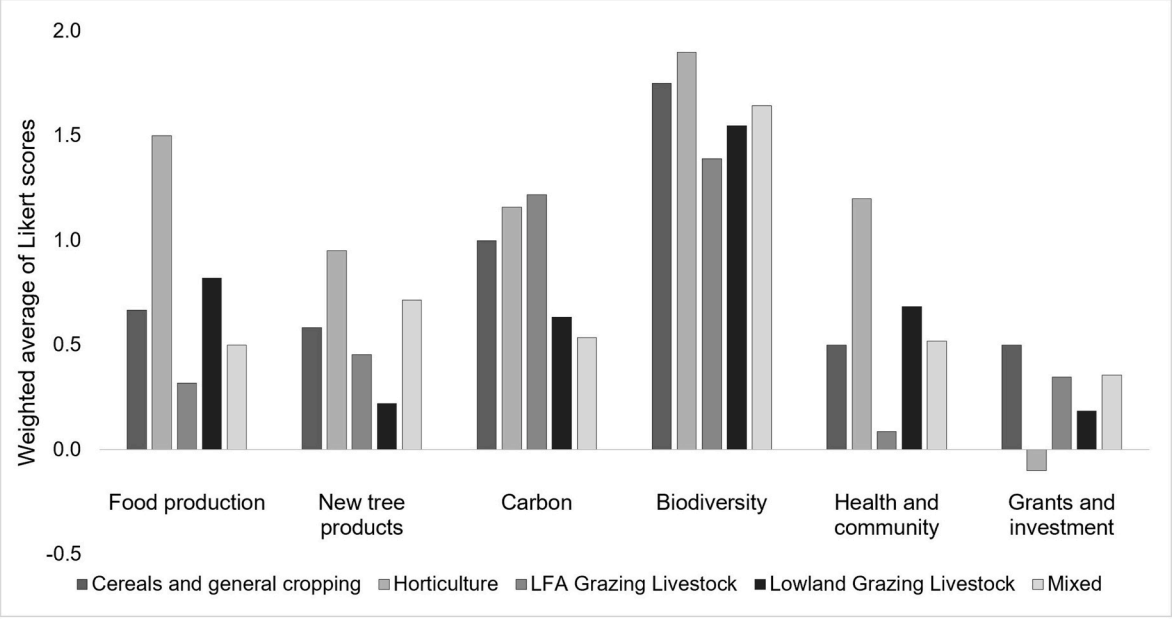

Fig. 2. Drivers for tree planting – weighted averages of Likert scores by sector.

farmers significantly contributed to this factor (Table 6), indicating that they shared a similar perspective on increasing tree cover on farmland. The feeling that we need more trees on farm is central to this perspective with one farmer grouped in this factor stating, '*I feel very strongly that we need more trees whether native or not*'. These farmers see trees as a good thing and think that there will be enough farmers planting trees to achieve the 10% increase in tree cover. They view agroforestry as playing an important role in delivering more trees on farms and ranked this statement highest (+5). They also see the wider benefits of trees to farming systems in terms of shelter provision and resilience to extreme weather events. These farmers came from all farming sectors and had a small average holding size (43 ha). Three-quarters were organic, and three-quarters stated that they were already practicing agroforestry. This suggests that as a group these farmers may already be comfortable with the complexity that additional trees might bring to a farming system, as one of the respondents stated, *'Complexity is not always a bad thing, [trees] add jobs to a farm which involve little or no fuel, does not need perfect weather and does not need the soil cultivated'*. Respondents grouped in this factor believe that every farm has areas which can be planted with almost no loss of production, but that advice and guidance will be needed to achieve this, as one respondent stated, '*Tree planting, and the planning of it, has to be very strategic*'. The statement 'Funded advice and guidance will be needed' was ranked much higher in this group than for the other factor groups (+4). The size of this group and the fact that it includes all sectors suggests that despite significant effort to make the sample representative, Q-sort participants were likely to already be more favourable to trees on farm.

Factor 2: traditional livestock farmers. Hedge lovers. Three farmers significantly contributed to this factor (F2); these were grazing livestock farmers (2 LFA, 1 lowland) with woodland or agroforestry already present on the farm. One of the LFA grazing livestock farmers was certified organic, the others farm conventionally. The average holding size was quite large (656 ha). This perspective sees the value of trees on farms and ranked the statement 'Trees, woods and hedges make farms a more pleasant place to work' highly, but they believe that efforts to

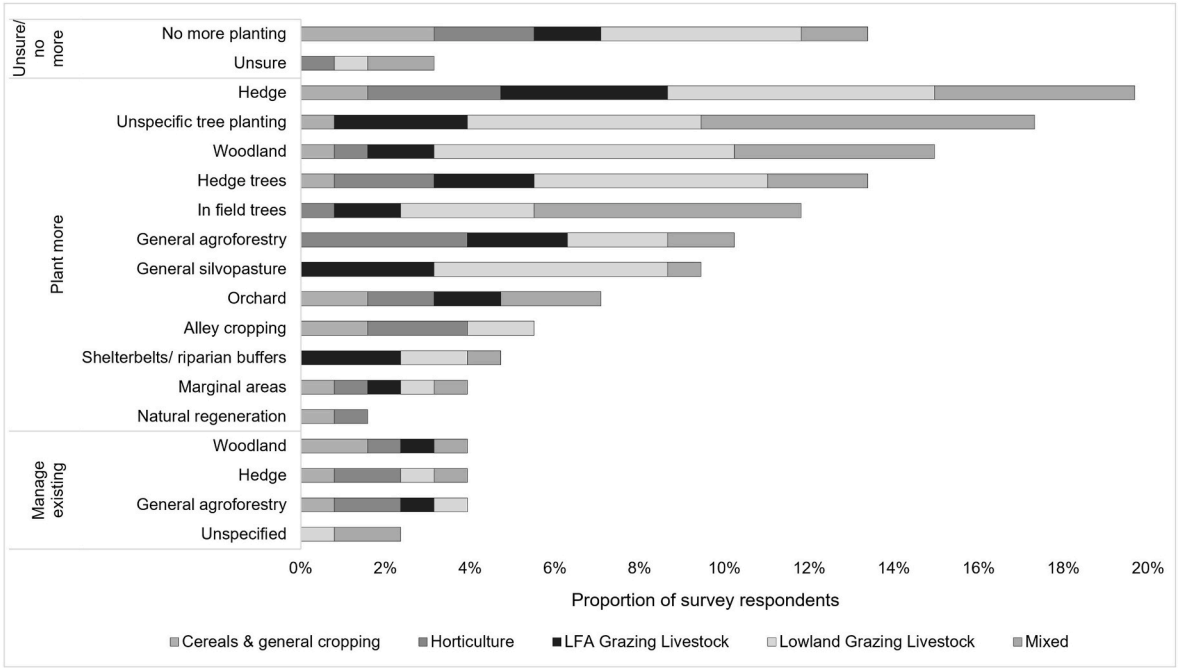

Fig. 3. Farmer visions for tree planting on their farms by 2050 extracted from online survey responses.

Table 5
Descriptive statistics of the Q-sort participants retained for analysis (number and percentage of total sample) by farming sector, farm ownership and farming system, compared to national averages.

		Participant numbers and % of total		England/UK* averages for the sample size	
Farming Sector	Cereals & general cropping	7	29%	15	38%
	Horticulture	2	8%	2	4%
	Specialist pigs & poultry	1	4%	2	4%
	Dairy	0	0%	2	5%
	Grazing livestock (LFA)	3	13%	5	12%
	Grazing livestock (lowland)	8	33%	12	30%
	Mixed	3	13%	3	7%
Ownership	Owner occupied	17	71%	22	54%
	Wholly tenanted	1	4%	6	14%
	Mixed tenure	6	25%	12	31%
System	Organic	4	17%	1*	3%
	Conventional	20	83%	39*	97%
	Practicing agroforestry	8	33%	1*	3%
	Woodland on farm	12	50%	n/a	n/a

Table 6
Number of defining variables for each factor, level of variance explained, and eigenvalues.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Eigenvalues	8.95	2.24	1.75	1.40	1.27
% Explained Variance	37%	9%	7%	6%	5%
Cumulative % Explained Varience	37%	47%	54%	60%	65%
No. of Defining Variables	11	3	2	2	3
Composite Reliability	0.98	0.92	0.89	0.89	0.92
S.E. of Factor Z-Scores	0.15	0.28	0.33	0.33	0.28

increase tree cover should focus on maintaining and restoring traditional landscapes, with natural regeneration the priority when establishing more trees on farm. They believe that increases in tree cover should be delivered through either widening existing hedgerows or by planting new hedges (+5) to connect existing habitats. This group feels strongly that permanent grassland and moorland should be protected from tree planting, with one respondent stating, '*There is a tragedy unfolding in the uplands where swathes of a non-native invasive species (sitka) are replacing heather moor land and permanent grassland leading to hugely damaging carbon loss and associated loss of biodiversity.*' Another participant highlighted the role of permanent grassland in carbon storage, '*Trees store carbon in a risky way compared to carbon stored in permanent grassland. Better to recommend a 10% increase in pasture than in trees.*' But they are also the group who feel most strongly that trees do not devalue the land and are a viable option on UK farmland.

Factor 3: production focus. Trees for biodiversity, but in the right places. Factor 3 (F3) consists of two conventional farmers from the cereal and general cropping sector, both without woodland or agroforestry. They are both from mixed tenures with large holdings (average size 1062 ha), neither farmer identifies as a regenerative farmer. This perspective is not supportive of agroforestry (−4) and ranked the statement 'some land is just not suitable for growing trees' much higher (+4) than the other factors. They believe that productive land should be kept for food production and trees should mostly be planted on lower grade and marginal agricultural land where they will benefit biodiversity. These farmers ranked the statement 'It will be good for biodiversity/nature' highest. They strongly disagree (−3) with the statement 'The additional shelter will be beneficial to farming activities' and would like more information on the economics of increasing tree cover on farms. While all other groups ranked the statement 'Many farms already have enough trees and I don't see any advantages in growing more' as very negative (−4), this factor ranked this statement as neutral.

Factor 4: knowledge seekers. Factor 4 (F4) consists of two conventional farmers, one mixed and one cereals and general cropping, both with farm woodland and part of an agri-environment scheme and both identifying as regenerative farmers. The average holding size was smaller than for F3 at 376 ha. This perspective sees benefit in increasing tree cover on farm, and they also believe that trees, woods and hedges make farms a more pleasant place to work. But despite this, they also had the lowest rank (−3) on the statement 'An additional 10% tree cover

on farms is not enough', suggesting that they are the group that believe most strongly that the 10% target is sufficient. This group were the most interested in understanding more about benefits and public goods of trees on farmland, and they were also the only group to strongly agree with the statement 'Trees will enhance existing agricultural activities and contribute positively to farm income and business resilience.' In common with F2, they believe that widening existing hedges is the best option to achieve this, with one respondent stating that '*A focus on trees along all boundaries, of fields, paths and rivers, would be most beneficial.*' They believe that, in addition to more knowledge on the public goods benefits of trees on farmland, farmers need more practical knowledge on tree and forestry establishment and management, and more demonstration farms are needed to see evidence of real working systems. This group cautiously embraces the idea of trees on farm but would like more knowledge to inform decision making.

Factor 5: small hobby livestock farmers. All three farmers that significantly contributed to this factor (F5) were conventional lowland grazing livestock farmers without woodland or agroforestry, they were all landowners, and one self-identified as regenerative. They had a small average holding size (15 ha) suggesting that farming was not likely to be their sole income source. This group are generally in favour of trees and see the benefits of trees to their farming system but want to think long term and to retain management control of their land. The group is differentiated by not believing that 'there are insufficient, uncertain or unstable markets for tree products' or that 'there won't be enough people to manage these trees.' This also indicates that these farmers may be less reliant on their farms for income. This perspective ranked the statement 'An additional 10% tree cover on farms is not enough' highest (+3) but was the only group not to positively rank the statement 'The landscape and farm will be improved aesthetically'. They also strongly disagreed with the statement 'Trees complicate and add time and cost to farm management operations' (−5).

3.2.4. Consensus statements

Consensus statements with common scoring between all factors are shown in Table 7. Other consensus statements where there was general agreement between all five groups, included the statement 'I have no interest in this topic' which was rejected strongly by all participants along with the statement 'Trees belong in woodlands - separate from farming' which was again rejected by all groups.

4. Discussion

This study addresses the lack of qualitative research on farmer and landowner attitudes to woodland creation and increased tree cover in the UK identified by Lawrence et al. (2010). The two-stage mixed method approach employed here facilitated a relatively high level of farmer engagement from across the UK and from a broad range of different farming sectors.

Table 7
Consensus statements with average scores for each factor, ranging from −5 (strongly disagree) to +5 (strongly agree), 0 is neutral.

ID	Statement	F1	F2	F3	F4	F5
10	The focus on carbon targets will be at the expense of biodiversity/nature	−1	−1	−1	0	−1
11	It needs to be carried out on a farm-by-farm basis - planting designs should suit the farm not the subsidy	1	2	3	1	1
28	The landscape and farm will be improved aesthetically	2	2	2	1	0
37	Trees, woods and hedges make farms a more pleasant place to work	3	3	2	3	1
44	Farmers do not have the time/skills/equipment to manage trees/protect them from grazing animals	−1	−2	−1	−2	−1

4.1. What might the future of trees on farms in the UK look like?

Farmers from all sectors from both stages of the study held a largely positive attitude towards future increases in tree cover. The Q-study statement 'Trees, woods and hedges make farms a more pleasant place to work' was agreed on by all groups and only 13.4% of respondents in Stage One did not want to plant any more trees. This is supported by a recent survey by Marshall et al. (2025) exploring how farmer values impact their willingness or ability to grow trees, they also found that most (63%) of participants stated that they were likely to plant trees in the future. We found some commonalities and shared views between farmers, for example there was strong cross-sectoral support for increasing the length and width of farm hedgerows and for tree planting to support biodiversity. However, all farmer groups agreed that tree planting needs to be carried out on a farm-by-farm basis and the future of trees on farms in the UK will very much depend on the sector and geography. Current woodland cover is not evenly distributed across the UK, with the highest cover in the south, particularly the south-east (Brewer et al., 2017). Tree cover outside woodland is also unevenly distributed, with the majority (91%) of small woods, groups and lone trees found in lowland areas, at an altitude of less than 200m (Brewer et al., 2017). Trees on farms can be planted separately from agricultural activities (e.g. creating woodland patches or expanding hedgerows) or via more integrated land-sharing options (e.g. in trees in fields). The Agroforestry ELM Test project found that regional environmental differences have a strong influence on what type of tree planting or agroforestry is suitable where (e.g. what works in a Somerset orchard is not the same on Yorkshire moors) (Simonson and Tosh, 2023). Our study confirms these findings, indicating that areas with larger land holdings (generally Eastern UK and the uplands) could be more likely to see an expansion of farm woodlands, whereas in lowland areas, where livestock farming predominates and holdings are generally smaller, more integrated planting and an extension of farm hedgerows might be expected.

4.2. Do farmers from different sectors favour planting trees in certain spatial configurations more than in others?

A study by Eves et al. (2015) observed that production-focussed farmers were the least likely to have any interest in trees and woodland planting, and they generally only perceived dis-benefits from trees. In contrast, the more production-focussed cereal and general cropping farmers in this study (F3) saw the benefits of trees strongly in terms of biodiversity. Marshall et al. (2025) found that LFA farmers were least likely to plant trees whereas lowland livestock farmers most likely to. Our results suggest that this difference maybe more to do with integration; LFA grazing livestock farmers preferred trees to be separate from grazing areas, whereas lowland grazing livestock farmers were more favourable to integrating trees into their fields. These findings indicate that attention to sector and farm type is important when considering how to enable and encourage tree planting. Results from Stage One indicate that, together with farming sector, the size of land holding appears to be an important factor, with more integrated agroforestry plantings preferred by farmers with smaller land holdings, in the horticulture and lowland grazing livestock sectors. This trend was also seen in the Q-analysis with farmers from smaller holdings being more favourable towards integrated agroforestry. By contrast, farmers from the cereals, LFA grazing livestock and mixed sectors had the largest average holding sizes and also showed a preference for separate farm woodlands. This is confirmed by a study by Beer and Theuvsen (2019) who found farmers with larger holdings were more willing to plant trees. Eves et al. (2015) also observed that larger and freehold farms were more likely to be interested in woodland creation, and that farmers with existing woodland were more than twice as likely to be interested in additional planting. In the Q-study, the statement 'They should mostly be planted on lower grade and marginal agricultural land' split the

cereal farmers. Farmers without woodland or agroforestry already agreed (F3), and farmers currently with woodland or agroforestry disagreed (F4), supporting the fact that the presence of trees and woodland on a farm may make farmers more favourable towards more trees. There was also a positive relationship seen between the number of trees farmers wanted to plant and the degree of integration of those trees into their farming system. A review by Ambrose-Oji (2019) suggests that generally, younger more educated owner farmers, on diversified holdings, with existing woodland or close to other woodland are most likely to establish trees on their farms. This is partially supported by our results, where agroforestry and tree planting were favoured by farmers with existing woodland and with more diverse holdings who identified as 'organic' or 'regenerative'. Our results indicated that hedges were universally popular as a way to increase tree cover on farm, whether planting new hedges or widening existing hedges. When asked what their vision was for tree planting on their farms by 2050, the most commonly cited action was to plant more hedges. Livestock and LFA farmers in particular felt that any increased tree planting would be best achieved through more hedgerows connecting and enhancing existing landscape features.

4.3. Policy implications

Our results support the fact that a diversity of approaches tailored to different farming sectors, farm sizes and farm types will be needed to ensure that the UK's tree planting targets are met. The horticulture sector was less inclined to plant more trees but were most interested in new tree planting being integrated with agricultural production. The lowland grazing livestock sector were the most interested in planting more trees and in these trees being integrated. The interest in integrated agroforestry planting in these sectors could reflect the fact that these are predominantly small holdings without much land to spare for tree planting. In terms of policy support and tree planting grants these could be good sectors to target for integrated agroforestry support. In their study Eves et al. (2015) categorise farmers into five distinct groups based on their motivations, attitudes toward woodland creation, and responses to environmental incentives. They suggest that the production focussed group 'Farmers First' represent a category that it is not efficient to direct efforts, however results here indicate that targeting woodland planting for biodiversity towards this group could be effective. Our results suggest that, for some farmers, mechanisms other than direct grants may be more effective at promoting tree planting, for example, promotion of biodiversity benefits of trees and woodlands through partnerships with conservation bodies or funding for farmer knowledge exchange networks.

4.4. What are the barriers and drivers for increasing tree cover on farm and how are these influenced by sector?

Biodiversity was an important, if not the most important, driver for farmers from all sectors to increase tree cover on their farms. This was seen in both stages of the research, and has been observed in previous studies. Felton et al. (2023) found that farmers most commonly reported reason for planting was the improvement of wildlife habitats, reported twice as many times as the next most common reason, offsetting greenhouse gas emissions. The Q-analysis results also indicate that farmers also did not perceive there to be a trade-off between carbon and biodiversity. The need for more information and advice differed between farmer groups. The statement 'Funded advice and guidance will be needed' was ranked much higher in F1 than for the other factor groups, raising the question; are farmers with greater experience and knowledge of more complex agroforestry/agroecological farming systems more able to recognise their need for additional knowledge? Many farmers are under financial pressure, whilst also being expected to farm sustainably and intensify production (Pretty et al., 2018). But, in contrast to the commonly cited barriers, results from Stage One suggest that 'grants and investment' is not an important driver for any of the sectors, being least important for the horticulture sector and most important for cereals farmers. The same result was found in the Q-sort data, with farmers in three out of five of the groups disagreeing with the statement 'It will not be possible without significant financial support', suggesting that this farming cohort did not perceive economic barriers to tree planting. This is supported by the fact that the statement 'Trees devalue land and are not an economically viable option on farmland' was generally disagreed with apart from by F3 (cereal and general cropping) farmers. This is surprising given that economic constraints are consistently cited in discussions around the barriers to farmers planting trees (Beth et al., 2026; Hernández-Morcillo et al., 2018; Lobley et al., 2012; Marshall et al., 2025; The Environment Food and Rural Affairs Committee, 2022) and financial incentives have been cited as positively affecting the level of enrolment in tree planting programmes (Kim and Langpap, 2016; Marshall et al., 2025). However, Felton et al. (2023) showed that, although farmers may welcome tree planting grants, the establishment cost was not an important barrier to adoption. Our results demonstrate that farmers are not solely driven by profit maximisation and financial incentives (Home et al., 2014) and confirm the view of Lawrence et al. (2010) that the evidence about the relationship between grant availability and decisions to plant trees is inconclusive and that further understanding is needed.

4.5. Limitations and further work

As with all surveys, there is a possibility of 'non-response bias' i.e. those that did not respond may be different in some important way from those who did, and attempting to ensure a survey is both unbiased and representative is a critical objective for quantitative rural and agricultural research (Coon et al., 2020). Coon et al. (2020) suggest demographic trends (in particular, aging populations in rural areas) and increased survey loads (particularly for farmers) can both contribute to declining response rates to farm surveys. Survey based research has become more challenging in recent years with declining response rates (Avemegah et al., 2021). To limit this, participant recruitment for Stage One focussed on distributing the survey link as widely as possible and the survey was kept deliberately short and simple. However, this meant that demographic information such as age, education and gender were not collected. This data would be useful to further contextualise the results and is a limitation of this study. Although steps were taken to ensure access, the predominantly digital nature of the study may have excluded older, less educated farmers as indicated by a study by Zahl-Thanem et al. (2021). For the Q-sort, significant effort was made to get a representative sample as well as to make sure that all viewpoints were covered in the statements. The farmer visions from Stage One were balanced by other sources including the transcript from a Farming Forum discussion where farmers were less favourable to tree planting. Nevertheless, in spite of this, survey response bias was still likely, with results skewed towards farmers and sectors where the lead researchers have the most reach (i.e. organic and horticulture and also towards farmers with a predisposition to agroforestry/trees). The low number of cereal and general cropping farmers in Stage One and difficulty recruiting sufficient farmers from this sector for Stage Two probably reflects the difficulties in engaging arable producers with trees and agroforestry, and information about the sectors and farming types that did engage with the research is interesting and useful when planning further studies. Although the sample in this study may not be fully representative of the whole of the UK farming community, results are representative of those farmers who have an interest in agroforestry, and these are the farmers who are likely to be most receptive to increasing tree planting on farm. But, it is important to acknowledge that there are large numbers of farmers likely to remain reluctant to planting trees (Ambrose-Oji, 2019). Other interested stakeholder groups (e.g. researchers, policy makers, advisory bodies) were not consulted as the subject of interest for this study is farmers. Further work could take the

farmer preferences to a wider stakeholder group (research, NGO and governmental bodies etc.).

Likert scale and scoring-type questions such as the 'driver' question can be subject to distortion for several reasons including central tendency bias i.e. avoidance of using extreme response categories, agreeing with statement by default or attempting to portray themselves in a more favourable light (Boari and Ruscone, 2015). Although efforts were made to balance the image options available for the image preferences question of the online survey, some of the images will be more appealing than others to farmers regardless of the number or configuration of the trees, due to unconscious bias and factors such as crop health, farm tidiness, livestock breed preferences etc. The forced distribution used in the Q-sort is an important component of Q-methodology to encourage participants to think more deeply and critically about each statement but it has been the subject of some debate in the research with a trade-off between methodological rigour and accurately modelling peoples beliefs and opinions (Webler et al., 2009). It was also not popular with some of the farmer participants for this study, with comments that they were forced to agree or disagree with some statements due to lack of space in the Q-sort grid.

This study provides important insights into the differences between sectors and individual farmers, however the UK's agricultural landscape is populated by a diverse range of interests from major institutional and private estates to a multitude of small owner occupiers (Lobley et al., 2012). The overriding message from a review by Rose et al. (2018) seeking to understand behavioural change approaches in the context of farmer decision-making, is that focusing on changing the behaviour of individual farmers diverts attention away from influencing wider social change, which may be a better way to influence decisions on-farm. A similar conclusion is reached by Padel et al. (2017) in a study of farmer motivations in transitioning to agroecology; the transition towards new farming methods was an active learning process with motivations and triggers varying between farmers. The study concluded that inspiration and social networks in our farming and rural communities are key to achieving real change. Those farmers who had adopted agroforestry mentioned the limited number of agroforestry practitioners to draw on for inspiration, support or advice. There is also a need for an improved understanding of the links between personal, farm-specific and external drivers of change, considering farming as a human activity system (Padel et al., 2017).

5. Conclusions

This study has gathered new insights that will allow policy makers and advisory services to tailor recommendations to identified groups based on perceptions of trees on farm. The majority of farmers surveyed held a positive attitude towards increased tree planting and the benefits that trees can bring. However, the future of trees on UK farms will depend on farming sector and geography. Common ground between farmers was seen for increasing hedgerows and planting trees and woodland for biodiversity. Farm size influenced the preferred spatial configuration. Smaller farms preferred a land sharing approach with integrated agroforestry planting and larger farms a land sparing approach with separate blocks of woodland. Results also suggest that the significance of economic barriers may have been overplayed and that, although grants will influence some farmers, in order to achieve targets, it is important to look beyond the finances, especially for the livestock and horticultural sectors. In conclusion, a diversity of approaches tailored to different farming sectors and farm types will be needed to ensure that tree planting targets are met.

CRediT authorship contribution statement

Sally Westaway: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Visualization, Writing – original draft. **Ian Grange:** Funding acquisition, Supervision, Writing – review & editing. **Jo Smith:** Funding acquisition, Supervision, Writing – review & editing. **Laurence G. Smith:** Funding acquisition, Supervision, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no conflicts of interest, including competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jrurstud.2026.104353.

Data availability

Data will be made available on request.

References

Ambrose-Oji, B., 2019. Characterising land managers to support woodland creation efforts in Scotland: research summary. https://www.forestresearch.gov.uk/research/identifying-opportunities-for-woodland-creation-in-central-scotland/#downloads.

Avemegah, E., Gu, W., Abulbasher, A., Koci, K., Ogunyiola, A., Eduful, J., Li, S., Barington, K., Wang, T., Kolady, D., Perkins, L., Leffler, A.J., Kovács, P., Clark, J.D., Clay, D.E., Ulrich-Schad, J.D., 2021. An examination of best practices for survey research with agricultural producers. Soc. Nat. Resour. 34 (4), 538–549. https://doi.org/10.1080/08941920.2020.1804651.

Beer, L., Theuvsen, L., 2019. Conventional German farmers' attitudes towards agricultural wood and their willingness to plant an alley cropping system as an ecological focus area: a cluster analysis. Biomass Bioenergy 125, 63–69. https://doi.org/10.1016/j.biombioe.2019.04.008.

Beth, C., Francisco, J.A., Kyriaki, R., Shan, J., Teh, Y.A., Rao, F., Martin, L., Lynn, J.F., 2026. English farmers' views on agroforestry and agroforestry scheme characteristics: a qualitative analysis of drivers and facilitators of engagement. Agrofor. Syst. 100 (2), 64. https://doi.org/10.1007/s10457-026-01441-7.

Biffi, S., Chapman, P.J., Grayson, R.P., Ziv, G., 2022. Soil carbon sequestration potential of planting hedgerows in agricultural landscapes. J. Environ. Manag. 307 (January), 114484. https://doi.org/10.1016/j.jenvman.2022.114484.

Boari, G., Ruscone, M., 2015. A procedure simulating Likert scale item responses. Electronic Journal of Applied Statistical Analysis 8 (3), 288–297.

Brewer, A., Ditchburn, B., Cross, D., Whitton, E., Ward, A., 2017. Tree cover outside woodland in Great Britain: statistics. Forestry Commission Statistical Report.

Burton, R., 2004. Seeing through the "good farmer's" eyes: towards developing an understanding of the social symbolic value of "productivist" behaviour. Sociol. Rural. 44 (2), 195–215. https://doi.org/10.1111/j.1467-9523.2004.00270.x.

Burton, V., Moseley, D., Brown, C., Metzger, M.J., Bellamy, P., 2018. Reviewing the evidence base for the effects of woodland expansion on biodiversity and ecosystem services in the United Kingdom. For. Ecol. Manag. 430 (April), 366–379. https://doi.org/10.1016/j.foreco.2018.08.003.

Carroll, Z.L., Carroll, Z.L., Bird, S.B., Emmett, B.A., Reynolds, B., Sinclair, F.L., 2004. Can tree shelterbelts on agricultural land reduce flood risk? Soil Use Manage. 20 (3), 357–359. https://doi.org/10.1079/sum2004266.

Cho, Frankie H.T., Agnolucci, Paolo, Bateman, Ian J., Lee, Christopher F., Lovett, Andrew, Mancini, Mattia C., Rapti, Chrysanthi, Day, Brett H., 2025. Resilient tree-planting strategies for carbon dioxide removal under compounding climate and economic uncertainties. Proceedings of the National Academy of Sciences 122 (10), e2320961122. https://doi.org/10.1073/pnas.2320961122. https://pnas.org/doi/10.1073/pnas.2320961122. (Accessed 3 March 2025).

Chowdhury, A., Kabir, K.H., 2024. How do agricultural advisory services meet the needs of farmers? Applying Q-methodology to assessing multi-stakeholders' perspectives on the pluralistic advisory system in Ontario, Canada. J. Rural Stud. 105, 103186. https://doi.org/10.1016/j.jrurstud.2023.103186.

Committee on Climate Change, 2019. Net zero: the UK's contribution to stopping global warming. In: Committe on Climate Change (Issue May).

Committee on Climate Change, 2020. December 2020 Policies for the Sixth Carbon Budget and Net Zero. December.

Committee on Climate Change, 2025. The seventh carbon budget. https://www.theccc.org.uk/publication/the-seventh-carbon-budget/.

Coon, J.J., van Riper, C.J., Morton, L.W., Miller, J.R., 2020. Evaluating nonresponse bias in survey research conducted in the rural Midwest. Soc. Nat. Resour. 33 (8), 968–986. https://doi.org/10.1080/08941920.2019.1705950.

Crous-Duran, J., Graves, A.R., de Jalón, S.G., Kay, S., Tomé, M., Burgess, P.J., Giannitsopoulos, M., Palma, J.H.N., 2020. Quantifying regulating ecosystem services with increased tree densities on European Farmland. Sustainability 12 (16), 1–20. https://doi.org/10.3390/su12166676.

DEFRA, 2023a. Environmental improvement plan 2023. https://www.gov.uk/government/publications/environmental-improvement-plan.

DEFRA, 2023b. Farm classification in the United Kingdom. https://assets.publishing.service.gov.uk/media/641073c8e90e076cd09acda9/fbs-uk-farmclassification-2014-14mar23.pdf.

DEFRA, 2024a. Agriculture in the United Kingdom 2023. https://www.gov.uk/government/statistics/agriculture-in-the-united-kingdom-2023.

DEFRA, 2024b. Farming evidence - key statistics 2024. https://www.gov.uk/government/publications/farming-evidence-pack-a-high-level-overview-of-the-uk-agricultural-industry/farming-evidence-key-statistics-accessible-version.

Eves, C., Johnson, M., Smith, S., Quick, T., Langley, E., Jenner, M., Richardson, W., Glynn, M., Anable, J., Crabtree, B., White, C., Black, J., MacDonald, C., Slee, B., 2015. Analysis of the potential effects of various influences and interventions on woodland management and creation decisions, using a segmentation model to categorise subgroups. Volume 3: Woodland management segmentation and assessment of interventions 4 (March).

Felton, M., Jones, P., Tranter, R., Clark, J., Quaife, T., Lukac, M., 2023. Farmers' attitudes towards, and intentions to adopt, agroforestry on farms in lowland South-East and East England. Land Use Policy 131, 106668. https://doi.org/10.1016/j.landusepol.2023.106668.

Graves, A.R., Burgess, P.J., Liagre, F., Pisanelli, A., Paris, P., Moreno, G., Bellido, M., Mayus, M., Postma, M., Schindler, B., Mantzanas, K., Papanastasis, V.P., Dupraz, C., 2008. Farmer perceptions of silvoarable systems in seven European countries. In: Agroforestry in Europe. Springer, Netherlands, pp. 67–86. https://doi.org/10.1007/978-1-4020-8272-6_4.

Hardaker, A., Bodner, T., Dandy, N., 2022. Tree planting for climate change: coverage in the UK farming sector press. J. Rural Stud. 94, 140–149. https://doi.org/10.1016/j.jrurstud.2022.06.001.

Hernández-Morcillo, M., Burgess, P., Mirck, J., Pantera, A., Plieninger, T., 2018. Scanning agroforestry-based solutions for climate change mitigation and adaptation in Europe. In: Environmental Science and Policy, vol. 80. Elsevier Ltd, pp. 44–52. https://doi.org/10.1016/j.envsci.2017.11.013.

Home, R., Balmer, O., Jahrl, I., Stolze, M., Pfiffner, L., 2014. Motivations for implementation of ecological compensation areas on Swiss lowland farms. J. Rural Stud. 34, 26–36. https://doi.org/10.1016/j.jrurstud.2013.12.007.

Iversen, S.V., Dalgaard, T., Graversgaard, M., 2024. Discordance between farmers and scientists - perspectives on nitrogen reduction measures in Denmark. J. Environ. Manag. 352, 119877. https://doi.org/10.1016/j.jenvman.2023.119877.

Kaiser, H.F., 1960. The application of electronic computers to factor analysis. Educ. Psychol. Meas. 20, 141–151.

Kam, H., 2024. Opportunities for achieving landscape scale conservation in England. J. Rural Stud. 110, 103380. https://doi.org/10.1016/j.jrurstud.2024.103380.

Kim, T., Langpap, C., 2016. Agricultural landowners response to incentives for afforestation. Resour. Energy Econ. 43, 93–111. https://doi.org/10.1016/j.reseneeco.2015.11.004.

Lawrence, A., Dandy, N., 2014. Private landowners' approaches to planting and managing forests in the UK: what's the evidence? Land Use Policy 36, 351–360. https://doi.org/10.1016/j.landusepol.2013.09.002.

Lawrence, A., Dandy, N., Urquhart, J., 2010. Landowners' attitudes to woodland creation and management in the UK A review of current evidence. Forestry Commission, July 1–66.

Lobley, M., Winter, H., Millard, N., Butler, A., Winter, M., 2012. *Making land available for woodland creation* (issue 35). http://forums.forestry.gov.uk/pdf/Exeterreport.pdf/$FILE/Exeterreport.pdf.

Lumivero, 2023. NVivo 15 *[computer software]*.

Lutfallah, S., Buchanan, L., 2019. Quantifying subjective data using online Q-methodology software. The Mental Lexicon 415–423.

Marshall, H., McConnachie, S., Brockett, B., Lorenzo-Arribas, A., Ambrose-Oji, B., 2025. Trees and farmers' values: findings from a survey of agricultural land managers in England. https://cdn.forestresearch.gov.uk/2025/05/Trees-and-farmers-values-Findings-from-a-survey-of-agricultural-land-managers-in-England.pdf.

Matthews, K., Wardell-Johnson, D., Miller, D., Fitton, N., Jones, E., Bathgate, S., Randle, T., Matthews, R., Smith, P., Perks, M., 2020. Not seeing the carbon for the trees? Why area-based targets for establishing new woodlands can limit or underplay their climate change mitigation benefits. Land Use Policy 97 (April), 104690. https://doi.org/10.1016/j.landusepol.2020.104690.

McKeown, B., Thomas, D., 2013. Q Methodology, vol. 66. Sage publications.

Padel, S., Rubenstein, O., Woolford, A., Egan, J., Pearce, B., 2017. Transitions to agroecological systems: farmers' viewpoints. Aspect Appl. Biol. 136 (March), 27–32.

Paige, J.B., Morin, K.H., 2016. Q-Sample construction. West. J. Nurs. Res. 38 (1), 96–110. https://doi.org/10.1177/0193945914545177.

Pretty, J., Benton, T.G., Bharucha, Z.P., Dicks, L.V., Flora, C.B., Godfray, H.C.J., Goulson, D., Hartley, S., Lampkin, N., Morris, C., Pierzynski, G., Prasad, P.V.V., Reganold, J., Rockström, J., Smith, P., Thorne, P., Wratten, S., 2018. Global assessment of agricultural system redesign for sustainable intensification. Nat. Sustain. 1 (8), 441–446. https://doi.org/10.1038/s41893-018-0114-0.

Priestley, S., Sutherland, N., 2016. Tree planting in the UK. In: Debate Pack CDP 1016/0241 (Issue December). http://researchbriefings.parliament.uk/ResearchBriefing/Summary/CDP-2016-0241.

Rois-Díaz, M., Lovric, N., Lovric, M., Ferreiro-Domínguez, N., Mosquera-Losada, M.R., den Herder, M., Graves, A., Palma, J.H.N., Paulo, J.A., Pisanelli, A., Smith, J., Moreno, G., García, S., Varga, A., Pantera, A., Mirck, J., Burgess, P., 2018. Farmers' reasoning behind the uptake of agroforestry practices: evidence from multiple case-studies across Europe. Agrofor. Syst. 92 (4), 811–828. https://doi.org/10.1007/s10457-017-0139-9.

Rose, D.C., Keating, C., Morris, C., 2018. Understand how to influence farmers' decision-making behaviour. https://projectblue.blob.core.windows.net/media/Default/ImportedPublicationDocs/FarmersDecisionMaking_2018_09_18.pdf.

Rounsevell, M.D.A., Annetts, J.E., Audsley, E., Mayr, T., Reginster, I., 2003. Modelling the spatial distribution of agricultural land use at the regional scale. Agric. Ecosyst. Environ. 95 (2–3), 465–479. https://doi.org/10.1016/S0167-8809(02)00217-7.

Simonson, W., Tosh, C.R., 2023. Final Report: Agroforestry T&T 106.

Soil Association, & Woodland Trust, 2018. Agroforestry in England.

The Environment Food and Rural Affairs Committee, 2022. Tree planting. Third report of session 2021–22. In: The Environment, Food and Rural Affairs Committee.

The Farming Forum, 2020. To farmers who are interested in practicing agroforestry on their farms - what's your biggest obstacle? https://thefarmingforum.co.uk/index.php?threads/question-to-farmers-who-are-interested-in-practicing-agroforestry-on-their-farms-whats-your-biggest-obstacle.332530/.

Tosh, C.R., Westaway, S., 2021. Agroforestry ELM Test Incentives and Disincentives to the Adoption of Agroforestry by UK Farmers: a Semi-quantitative Evidence Review.

Urquhart, J., Courtney, P., Slee, B., 2012. Private woodland owners' perspectives on multifunctionality in English woodlands. J. Rural Stud. 28 (1), 95–106. https://doi.org/10.1016/j.jrurstud.2011.08.006.

Van Exel, NJA, De Graaf, G, 2005. Q methodology: a sneak preview. https://www.jobvanexel.nl available at:

Watts, S., Stenner, P., 2012. Doing Q Methodological Research: Theory, Method and Interpretation. SAGE Publications Ltd. https://doi.org/10.4135/9781446251911.

Webler, T., Danielson, S., Tuler, S., 2009. Using Q method to reveal social perspectives in environmental research. www.seri-us.org.

Westaway, S., Grange, I., Smith, J., Smith, L.G., 2023. Meeting tree planting targets on the UK's path to net-zero: a review of lessons learnt from 100 years of land use policies. Land Use Policy 125, 106502. https://doi.org/10.1016/j.landusepol.2022.106502.

Woodland Trust, 2022. Farming for the future: how agroforestry can deliver for nature and climate. www.woodlandtrust.org.uk/publications.

Zahl-Thanem, A., Burton, R.J.F., Vik, J., 2021. Should we use email for farm surveys? A comparative study of email and postal survey response rate and non-response bias. J. Rural Stud. 87, 352–360. https://doi.org/10.1016/j.jrurstud.2021.09.029.