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RESEARCH ARTICLE

Co-designing a research agenda for UK agroforestry using a multi-actor approach

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Abstract

There is growing recognition of agroforestry's potential to help mitigate and provide resilience to the climate and biodiversity crises. Beyond its environmental benefits, agroforestry can also enhance production and profits, making it a sustainable farming solution that is scalable. Despite this, uptake within Europe is low, and many knowledge gaps remain that need to be addressed to promote adoption and optimize the management and implementation of agroforestry systems. We co-developed a research agenda for agroforestry using a multi-actor approach and a modified Delphi method in 2023. 156 UK-based stakeholders contributed to this process, including farmers, advisors, policy makers, NGOs, and researchers. An initial list of 238 research priorities (high-priority research questions) was submitted via a survey and a workshop. This was shortened during a second workshop with 48 participants. The final list included 40 research priorities across the themes "environment and production," "human livelihoods, knowledge, and perceptions," and "policy, financing, and markets." There was high agreement about which priorities to include, with questions on policy incentives, knowledge-exchange, agroforestry design (e.g., tree/crop selection), biodiversity, ecosystem functioning, well-being, markets, and food security. We identified a need for landscape-scale and longer-term research. Our agenda is a rare example of a research-prioritization process that includes farmers and other agricultural stakeholders throughout the research process. The value of this approach can be seen in the inclusion of research priorities that are grounded in the real world and relevant to different actors. Our agenda goes beyond existing evidence syntheses in scope, and should be used alongside them to identify stakeholder-relevant gaps for future primary research and evidence synthesis. By guiding researchers and funding bodies to impactful areas of enquiry, it can promote evidence-based agroforestry practice and policy. Addressing this research agenda requires better support for long-term, transdisciplinary, multi-stakeholder research, and funded demonstration sites or living labs.

Keywords Agrisilviculture · Agroecology · Agroforestry knowledge-gaps · Alley cropping · Multi-stakeholder co-production · Regenerative agriculture · Research agenda · Research prioritization · Silvoarable · Silvopasture

1 Introduction

Agricultural reform is needed to address the climate and biodiversity crises; agriculture accounts for one-third of global greenhouse gas emissions and is the primary threat to 86% of species at risk of extinction (Benton et al. 2021; Crippa et al. 2021). These crises threaten global food security in turn, as degraded and less biodiverse agricultural systems have lower resilience to intensifying climate-induced disturbances (Oliver et al. 2015). Climate-induced disturbances include an increasing frequency and severity of high temperatures, drought, heavy rainfall, and other extreme weather events (Calvin et al. 2023). For example, severe droughts in the UK are predicted to increase in frequency by 85% with 2 °C warming above pre-industrial levels, a scenario we would reach by 2051–2070 under an intermediate emissions pathway (SSP2-4.5) (Hanlon et al. 2021; Calvin et al. 2023). Such environmental extremes, which will only intensify, have already impacted crop production globally, with yield reductions of up to 30% in several cases (Lesk et al. 2022).

There is compelling evidence that agroforestry is a scalable farming method that can help mitigate and provide resilience to the climate and biodiversity crises, while also maintaining or increasing production and farm profits

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(Graves et al. 2010; Pent 2020; Kletty et al. 2023; Quandt et al. 2023; Amorim et al. 2023). Agroforestry is defined as the integration of woody vegetation (e.g., trees/shrubs) with crops and/or livestock simultaneously or sequentially on a land management unit, including productive (e.g., timber, fruit) and non-productive trees (den Herder et al. 2017). This includes the integration of trees or shrubs into fields in arable (silvoarable), livestock or grassland (silvopasture or forestry grazing), arable and livestock (agrisilvopastoral), horticultural (silvohorticulture), and poultry (silvopoultry) systems, with trees planted in rows (alley-cropping), clumps, or other regular or irregular arrangements (Figs. 1 and 2). Agroforestry also includes the integration of trees around fields in hedgerows and riparian buffers. Other common terms for agroforestry systems include shelterbelts (trees planted for shelter), windbreaks (trees planted to provide protection from the wind), and forest farming (small-scale forest areas where crops and plants are cultivated or harvested, including for medicinal and ornamental uses) (den Herder et al. 2017).

Given the diversity of systems included in the term agroforestry, it follows that the ecological and socio-economic impacts of agroforestry adoption vary (Ivezić et al. 2021; Köthke et al. 2022). However, comparative syntheses show that agroforestry adoption often provides environmental, production, financial, and social benefits at a field or farm scale (Fig. 2) (Torralba et al. 2016; Pent 2020; Jordon et al. 2020; Kletty et al. 2023; Amorim et al. 2023). At a landscape scale, agroforestry can offer greater production per area (land equivalent ratio) compared to its counterpart monocultures, which could free up agricultural land for nature recovery or other uses (Graves et al. 2010; Pent 2020; Amorim et al. 2023). By increasing habitat connectivity, diversifying food sources and farmers' income, and increasing resilience at a field scale (Fig. 2), agroforestry can create food systems that are more resilient to climate change and increasing ecological and political uncertainty (Bentrup et al. 2019; Quandt et al. 2023). Agroforestry is a hugely promising method for advancing sustainable development via sustainable intensification, which relates to several of the UN's Sustainable Development Goals (SDGs): goals 12 (responsible consumption and production), 13 (climate action), and 15 (life on land) (Pretty and Bharucha 2014; UN 2015).

These ecological and environmental benefits have sparked growing interest in agroforestry globally. Within the UK, agroforestry has featured prominently in post-Brexit agricultural reform, and the government has made a statutory commitment to increase silvoarable agroforestry area from <0.1% to 10% of arable land by 2050 to meet its net-zero target (Climate Change Committee 2020; Westaway et al. 2023). Agroforestry is being funded by new government schemes and by the private sector (e.g., construction companies) to meet new biodiversity net-gain legislation (gov.uk 2023). This UK example is closely aligned with growing interest in other temperate regions. In Canada, agroforestry has received significant funding as one of the four priority areas of the CA$ 27 m governmental Agricultural Greenhouse Gases Programme since 2016 (Government of Canada 2014). In the EU, support for agroforestry has been growing since its introduction to the Common Agricultural Policy (CAP) in 2005, but uptake has remained low (Dauby et al. 2024). In the 2023 CAP reform, the EU has further incentivized agroforestry by including it as one of its "Key Ecoschemes," which is a new mechanism for farmer payments (Dauby et al. 2024). This increasing support for temperate agroforestry could precipitate seismic changes to agricultural systems, as agroforestry is a major farming intervention in terms of its environmental and socio-economic impact (Torralba et al. 2016;

Fig. 1 Four agroforestry systems: **A** ruminant silvopasture, **B** silvoarable alley-cropping, **C** silvopoultry, and **D** silvohorticulture. See Fig. 2 for further descriptions. Photo credits: ruminant silvopasture (Anne Boisinard), silvoarable alley-cropping (Amelia Hood), silvopoultry and silvohorticulture (Agforward, flickr, licensed under CC BY-NC-SA 2.0).

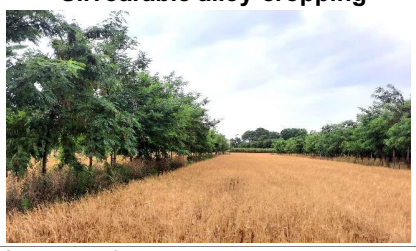
Ruminant silvopasture	Silvoarable alley-cropping	Silvopoultry
		
Ruminant silvopasture is an ancient, common, and well-studied form of agroforestry (den Herder et al. 2017; Castle et al. 2022). Compared to pasture, it can promote biodiversity, carbon sequestration, soil health, forage production, herd performance, and profitability (Bobryk et al. 2016; Jose and Dollinger 2019; Amorim et al. 2023). It can help to mitigate climate change through carbon sequestration and reducing cows' enteric methane emissions (e.g., grazing on willow can lower methane production by 22% (Thompson et al. 2023). It also provides climate resilience through microclimatic buffering and by diversifying livestock food sources during climate-induced disturbances such as drought (Jose and Dollinger 2019). These benefits can increase profits, with recorded gains of 17% (Dávila-Solarte et al. 2019). However, high establishment costs (e.g., tree guards to prevent grazing) can prohibit adoption (Tranchina et al. 2024).	Silvoarable farming involves the integration of tree rows or shrubs through arable fields, often undersown with flower or grass strips. Compared to arable farming, silvoarable farming has greater structural complexity and higher plant biodiversity, which can promote invertebrates, carbon sequestration, soil health, food production, and profits (Staton et al. 2022; Kletty et al. 2023). For example, a three-year UK study found that bee abundance, diversity, and seed set was respectively 2.4, 10, and 4.5 times greater in silvoarable sites versus arable ones (Varah et al. 2020). The ecological benefits provided by silvoarable farming can also promote resilience to climate change via microclimatic buffering, improved soil health, and the ecological redundancy provided by increased biodiversity (Blanchet et al. 2021). However, it also increases mental load as farmers must plan over longer timescales, and constrains management by fixing alley widths that may restrict future machinery options.	Silvopoultry is the production of egg or chicken meat with trees or shrubs. This can promote biodiversity, carbon sequestration, soil and water quality, and animal welfare (Castle et al. 2022). These welfare benefits stem from direct benefits from the trees, such as shade, and indirect benefits, such as aerial predator deterrence and behavior change (Jones et al. 2007; Bright and Joret 2012). This translates to a decrease in mortality and increase in egg quality, which corresponds to an increase in profits. For example, a study of 66 flocks found 20% fewer egg seconds (lower quality eggs) and 22% lower mortality rates in silvopoultry (Bright and Joret 2012). However, with 46% of EU farmland tenanted, tree planting can be hindered if profitability takes longer to accrue than tenancy durations (Eurostat 2024; Tranchina et al. 2024). Management can also be expensive and difficult to organize when it requires extra workers or machinery.

Fig. 2 Adapted from Hood et al. (2025) with permission. A summary of three forms of temperate agroforestry and their field/farm-scale impacts compared to their non-agroforestry counterparts. Photo credits: ruminant silvopasture (Anne Boisinard), silvoarable (Amelia Hood), silvopoultry (Agforward, flickr, licensed under CC BY-NC-SA 2.0). Citations included in the figure: Blanchet et al. 2021; Bobryk et al. 2016; Bright & Joret 2012; Dávila-Solarte et al. 2019; Hurley et al. 2020; Jones et al. 2007; Jose & Dollinger 2019; Thompson et al. 2023; Varah et al. 2020

Pent 2020; Kletty et al. 2023; Amorim et al. 2023), and the opportunities for expansion are vast because adoption rates are currently low (e.g., common agroforestry systems account for 7.5% of agricultural area in the EU (Rubio-Delgado et al. 2024).

While these ambitious environmental targets and policies are laudable, such large-scale agricultural transitions must be evidence-based to maximize long-term environmental, production, and socio-economic benefits and avoid unintended negative impacts, such as increased agricultural land use or reduced food security (Lewison et al. 2019). There are outstanding issues and knowledge gaps with regard to agroforestry implementation and management that need to be resolved to achieve this. For example, agroforestry can complicate farm management and increase the mental workload of farmers. The impacts of this should not be underestimated given the current mental health crisis in many farming communities, which is partly driven by high workloads of over 48 h per week (Donohoe et al. 2024). A lack of available time is also a primary barrier to learning about agroforestry, and limited knowledge about agroforestry hinders adoption in the UK and globally (Hood et al. 2025, Tranchina et al. 2024). In addition, agroforestry can cause undesirable ecological or financial outcomes under some scenarios, such as increased pest abundance or reductions in profits or land value (Staton et al. 2019, 2022). Agroforestry can also take several years to become profitable (Staton et al. 2022), and in regions where tenanted or contracted land is common (estimated 46% of agricultural land in the EU), this hinders agroforestry adoption as tenancies are often shorter than the time taken for agroforestry trees to mature (Clark et al. 2022; Eurostat 2024). There are also major knowledge gaps regarding different management approaches, including agroforestry design and the long-term impacts of different management strategies (Fagerholm et al. 2016; Jordon et al. 2020; Köthke et al. 2022; Kletty et al. 2023). For example, a recent systematic map of 632 articles on agroforestry systems in high-income countries found significant knowledge gaps by region (e.g., Northern Europe), system (e.g., alley-cropping), interventions (e.g., policy incentives), and outcomes (e.g., food security and nutrition) (Castle et al. 2022).

Evidence syntheses on agroforestry, such as the systematic map mentioned above, can help us to identify knowledge gaps (Castle et al. 2022; Köthke et al. 2022; Kletty et al. 2023). However, this does not create a research agenda that prioritizes

which gaps to address first, something which is particularly important in temperate agroforestry where there are many outstanding research needs (Castle et al. 2022). Furthermore, there is increasing recognition of the value of including stakeholders in setting research agendas and research more broadly, as producing more information alone is not effective at changing decision-making (Grill 2021; Maas et al. 2019). This has led to the development and expansion of participatory research approaches, such as co-production, social-ecology, or translational ecology, which recognize the importance of integrating stakeholders into research to develop and implement practical, scalable solutions (Enquist et al. 2017; Gaba and Bretagnolle 2020; Busse et al. 2023). Multi-stakeholder priority setting is important for research users (including policy makers and practitioners) as it develops a science agenda that meets their needs, and it is important for research producers (including funders and researchers) to direct them to relevant and impactful areas of enquiry (Sutherland et al. 2011). Research prioritization exercises can encourage more timely practice or policy-relevant research, and there are clear examples of such exercises informing UK policy (Sutherland et al. 2011).

Here, we use a multi-actor approach with agroforestry stakeholders to co-produce a research agenda for UK agroforestry. Silvopasture is the most common agroforestry system in the UK, covering 5.4 million ha (den Herder et al. 2017). This reflects the wider prevalence of pastoral systems, which account for 71% of the UK's utilized agricultural area (UAA), or 12.5 million ha (DEFRA 2024). In contrast, silvoarable systems are extremely rare—covering just 2000 ha—despite arable farming making up 26% of the UAA, or 4.6 million ha (den Herder et al. 2017; DEFRA 2024). Overall, 3.3% of the UK's UAA is under in-field agroforestry, with an additional 34% under linear-feature agroforestry such as hedgerows (den Herder et al. 2017; Rubio-Delgado et al. 2024). Support for agroforestry from policy makers is growing, including the development of new financial incentives (Westaway et al. 2023), but wider adoption is primarily hindered by a continued lack of financial support and perceived knowledge gaps amongst farmers about how to implement and manage agroforestry (Tosh and Westaway 2021, Hood et al. 2025). Disseminating existing evidence is essential to address these perceived knowledge gaps, but so is generating or synthesizing new evidence to fill evidence gaps. Our research agenda aims to address this by identifying the highest-priority research gaps perceived by a diverse, multi-actor group of agroforestry stakeholders in the UK.

2 Materials and methods

We created a research agenda using a modified Delphi method. The Delphi method elicits expert guidance to forecast outcomes or create shared priorities and insights. It consists of an initial data-gathering phase (e.g., a questionnaire) followed by iterative rounds of anonymous voting or feedback until consensus is reached (Beiderbeck et al. 2021). Anonymity is maintained throughout the process to avoid dominant individuals, social pressure, or prejudice biasing results (Mukherjee et al. 2015). Here, we used a modified Delphi method which included some anonymous data gathering and voting rounds and some non-anonymous group work across three stages (Fig. 3). We favored this participatory approach as group discussions facilitate knowledge and perspective exchange, which can help to reach consensus when you have stakeholders with different perspectives, needs, and norms (Sutherland et al. 2011). In-person participation can also promote trust and understanding, create a sense of ownership of the outputs, and foster collaborations that may lead to research gaps being addressed or to adoption into policy and practice (Sutherland et al. 2011). Other commonly used approaches in group decision-making include methods without discussion (e.g., online questionnaires) or methods with limited or no anonymity (e.g., focus groups or the nominal group technique); we chose a modified Delphi method to balance the (dis)benefits of discussion and anonymity (Mukherjee et al. 2015). Delphi methods and their modifications are widely used in decision-making and strategic planning across fields—including in medicine, education, and business—and are established methods for research prioritization (Mukherjee et al. 2015; Padfield et al. 2019; Luke et al. 2023).

Our target participants were agroforestry stakeholders in the UK, including (but not limited to) farmers, foresters, environmental organizations, agri-businesses, researchers, policy makers, and end users. This included stakeholders who were currently working in agroforestry and those in related areas (e.g., timber engineers who are not currently using agroforestry timber), who may have different perspectives and ideas than people who are actively involved in agroforestry. Farmers are rarely included in environmental or agricultural research prioritization processes despite their central role in managing our landscapes (Grill 2021). In terms of the study system, we limited the scope to in-field agroforestry, which we defined as having single or multiple trees, shrubs, or woody perennials in arable, pastoral, poultry, or mixed systems. We clarified that this includes productive (e.g., timber or food) and non-productive trees and regular (e.g., alley-cropping) and irregular (e.g., shelterbelts) planting arrangements. We excluded linear boundary features (hedgerows and riparian strips that do not have crops/livestock in them) as the evidence base supporting them is substantially larger than in-field agroforestry (Castle et al. 2022). Henceforth, we use "agroforestry" to refer to this definition of in-field agroforestry.

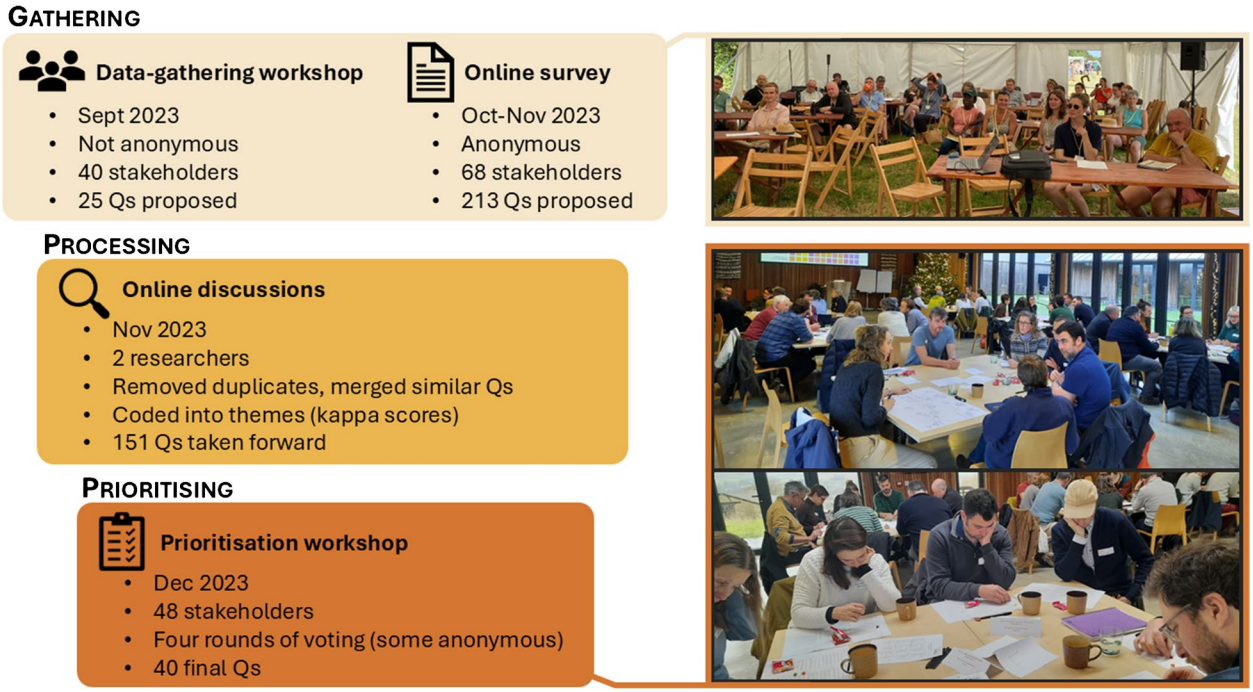


Fig. 3 A scheme summarizing the data gathering, processing, and prioritization processes, with further details provided in the methods and results sections. The photographs show the data-gathering workshop (top), the prioritization workshop (middle), and a round of individual voting with sweets as voting tokens (bottom). Qs, research priorities

2.1 Gathering research priorities

Research priorities were gathered via an in-person workshop and an online survey. The data-gathering workshop was conducted in September 2023 at an agroforestry conference for farmers and other stakeholders: The Agroforestry Show in Wiltshire, UK (The Agroforestry Show 2023). Recruitment was open to all conference attendees (over 1000 people) who were invited via the main conference programme, and 40 participants attended the workshop. Participants self-assigned to four focus groups where they discussed "what's missing" and "what's needed" for research to better support agroforestry in the UK. After 40 min, one participant per table shared their research priorities (high-priority research questions) with the wider group. We collected 25 research priorities at this workshop (Fig. 3).

The online survey was distributed via personal networks, mailing lists, and social media in October and November 2023. It was open to anyone working in industries relevant to agroforestry, and respondents were invited to submit 1–4 research priorities each (SI.1). We advised respondents that research priorities could come from any area (e.g., environment, policy, human livelihoods, knowledge exchange, markets) and to consider their impact, feasibility, and novelty. We encouraged respondents to provide questions with a similar level of scope to enable comparability and suggested this be a short (e.g., 5-year) research project led by a small team (e.g., one–three people), with full instructions in SI.1. We also included demographic questions on respondents' gender, age, current and previous roles, and experience of working in, studying, establishing, or managing different agroforestry systems. We collected 213 research priorities via this survey (Fig. 3).

2.2 Question processing

Once the survey closed, two researchers (ASCH and RS) divided the 238 research priorities collected at the data-gathering workshop and survey into four themes. We set these themes before looking at the research priorities and created them by revising themes used in a previous research-prioritization process (Padfield et al. 2019):

(1) Environment and production: e.g., biodiversity, carbon, climate resilience, conservation, ecology, fertilizing, food production, harvesting, land use, microbes, livestock welfare, organic farming, precision farming, preparing land for planting, soil health, timber, water pollution, weeds
(2) Human livelihoods, knowledge, and perceptions: e.g., barriers and opportunities to uptake, communication, community events, farmer and public perception, farmer well-being, food nutrition, gender equality, knowledge exchange, labor, land ownership, public health, social media, training

(3) Policy, financing, and markets: e.g., gross or net margins, carbon and biodiversity markets, certification, government schemes, local markets for agroforestry products (food, timber, by-products), tax, land ownership
(4) Cross theme: any questions that span more than one theme above

We randomly selected 100 research priorities, and both researchers independently assigned them to the above themes. Each question was assigned to one theme only. We calculated Fleiss Kappa scores to measure our inter-rater reliability (level of agreement) in categorizing these 100 priorities, where the kappa score $(K) = (Po - Pe)/(1 - Pe)$, where Po, observed agreement, and Pe, expected agreement under random judgement (Fleiss 1971). We used 0.7 as a threshold to indicate high agreement (Landis and Koch 1977). As we reached the threshold for agreement with the first 100 priorities (we scored 0.77), we divided the remaining priorities equally between the two researchers and categorized them independently. Then we worked together to remove duplicates and merge similar priorities, thereby streamlining the prioritization process and avoiding repetition. This reduced the list of 213 research priorities down to 151, which entered the prioritization workshop.

2.3 Research prioritization

We recruited 48 agroforestry stakeholders to a prioritization workshop at FarmEd, a farmer education center in Oxford, UK. The first day (04/12/23) was an agroforestry training day for 16 farmers and 4 farm advisors (see Hood et al. 2025 for further detail). For the second day, we purposively recruited the remaining 28 stakeholders to ensure a balance of roles, experience, and expertise. We prioritized farmers, who are at the frontlines of agroforestry adoption, and researchers, whose familiarity with the literature and knowledge gaps could inform the discussions. The final group included 20 farmers, twelve researchers, four farm advisors, three policy makers, two representatives from government advisory bodies, two agroforestry consultants, two environmental NGO employees, one farmer-education center employee, one farmer association representative, and one local council member.

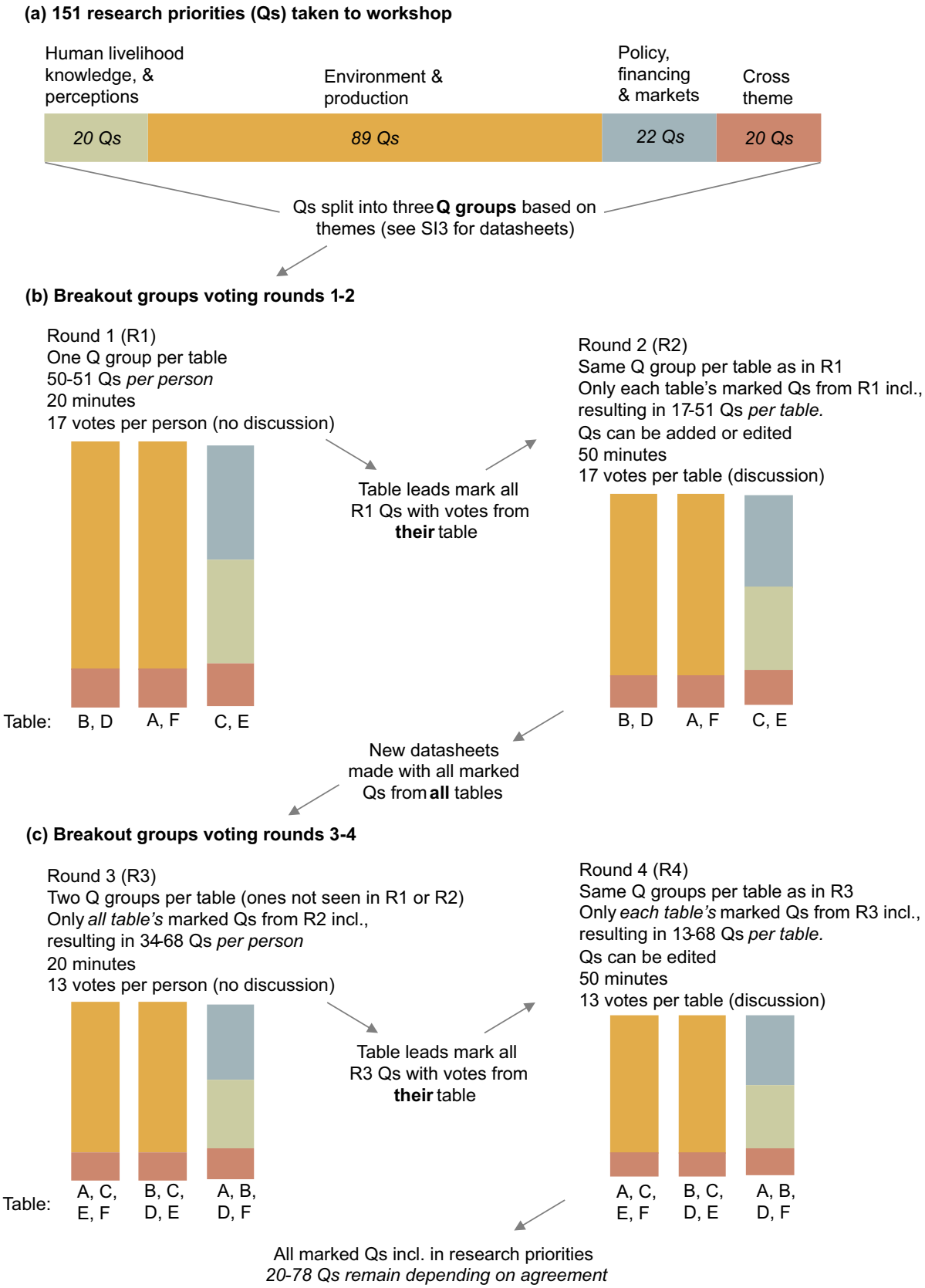
We assigned these 48 participants to one of six focus groups (tables A–F). Each table had 3–4 farmers, two researchers, one policy maker or policy advisor, and 1–2 of the remaining participants. The prioritization process was conducted over four rounds of voting in total, with two rounds of individual voting without discussion and two rounds of group voting with discussion. In the first round, each participant was given an A3 sheet (SI.2) with 50–51 research priorities (i.e., one-third of the total research priorities) and 17 tokens to vote for their top 17 research priorities (Fig. 4). To appraise the priorities, participants were asked: *what are the most important research questions that need to be addressed to facilitate the expansion of in-field agroforestry systems in the UK, in your opinion?* Then, any priorities that individuals voted for were shared with their focus group and taken to the next round of voting, with 17 tokens to vote per table. This round of group voting included discussion, and participants were allowed to make minor edits to existing priorities or add new ones. We repeated this for another set of individual and group voting rounds, but participants were given a subset of previously unseen priorities from the remaining two-thirds that were taken to the workshop. Only priorities that had passed the first and second rounds were included, and participants were given 13 tokens to vote in the third round (Fig. 4). We chose 17 and 13 tokens as we were aiming for a final list with 30–50 research priorities, as this would be comprehensive enough to cover key topics while remaining concise and manageable for addressing research gaps. Using 17 and 13 tokens could have resulted in 20–78 priorities at the end, depending on the level of agreement (Fig. 4).

Fig. 4 A scheme of the research prioritization process at the workshop showing (**a**) the research priorities taken to the workshop (**b**) the first two rounds of voting and (**c**) the final two rounds of voting. Participants were assigned to the same breakout groups (tables A–F) throughout. The colors show the themes the questions belonged to (coded in (a)).

3 Results and discussion

3.1 Creating the research agenda

We included 25 research priorities from the data-gathering workshop with 40 stakeholders and 213 research priorities from 68 responses to the online survey. This yielded 238 research priorities in total, with 142 in "Environment and production," 32 in "Human livelihoods, knowledge, and perceptions," 30 in "Policy, financing, and markets," and 34 in "Cross theme" (SI.3). These research priorities came from stakeholders with different genders, ages, roles, and experience working in agroforestry (see SI.4). We met our aim of including stakeholders with direct experience of agroforestry and people in related areas who may offer different perspectives. We found many submitted research priorities were duplicated among respondents, which indicated some existing consensus about research priorities among respondents. Removing duplicates and merging similar research priorities shortened the list from 238 priorities to 151 (SI.2), with 89


(a) 151 research priorities (Qs) taken to workshop
Human livelihood knowledge, & perceptions
Environment & production
Policy, financing & markets
Cross theme
20 Qs
89 Qs
22 Qs
20 Qs
Qs split into three Q groups based on themes (see SI3 for datasheets)
(b) Breakout groups voting rounds 1-2
Round 1 (R1)
One Q group per table
50-51 Qs per person
20 minutes
17 votes per person (no discussion)
Table leads mark all R1 Qs with votes from their table
Round 2 (R2)
Same Q group per table as in R1
Only each table's marked Qs from R1 incl., resulting in 17-51 Qs per table.
Qs can be added or edited
50 minutes
17 votes per table (discussion)
Table: B, D A, F C, E
B, D A, F C, E
New datasheets made with all marked Qs from all tables
(c) Breakout groups voting rounds 3-4
Round 3 (R3)
Two Q groups per table (ones not seen in R1 or R2)
Only all table's marked Qs from R2 incl., resulting in 34-68 Qs per person
20 minutes
13 votes per person (no discussion)
Table leads mark all R3 Qs with votes from their table
Round 4 (R4)
Same Q groups per table as in R3
Only each table's marked Qs from R3 incl., resulting in 13-68 Qs per table.
Qs can be edited
50 minutes
13 votes per table (discussion)
Table: A, C, E, F B, C, D, E A, B, D, F
A, C, E, F B, C, D, E A, B, D, F
All marked Qs incl. in research priorities
20-78 Qs remain depending on agreement

in "Environment and production," 20 in "Human livelihoods, knowledge, and perceptions," 22 in "Policy, financing, and markets," and 20 in "Cross theme."

3.2 Introducing the top 40 research priorities for agroforestry in the UK

At the end of the research prioritization process, the final list included 40 research priorities (Fig. 5). The theme "Environment and production" was again the most represented, with 20 research priorities, followed by eleven in "Cross theme," six in "Policy, financing, and markets," and three in "Human livelihoods, knowledge, and perceptions." The final list could have had as few as 20 research priorities if we had complete agreement among participants, or as many as 78 with complete disagreement (Fig. 4). Therefore, having a final list of 40 research priorities indicates broad consensus among participants, despite the diversity of stakeholders present, each with their own experiences and agendas.

Our research agenda spans subjects and scales (field to global) showing that agroforestry stakeholders in the UK have a broad understanding of the potential impacts of agroforestry adoption and expansion. The value of using a multi-actor approach can be seen by the inclusion of research priorities that are relevant to different stakeholders across the supply chain, from policy makers to farmers to end users (Fig. 6). This strengthens the evidence that multi-actor workshops are effective for co-producing research agendas that reflect diverse needs (Padfield et al. 2019; Luke et al. 2023).

The following sections discuss these top 40 research priorities in more detail, separated into questions that relate to (a) the socio-economic and policy context for agroforestry adoption (e.g., incentive schemes or education), (b) the impacts of agroforestry adoption vs non-adoption (e.g., comparing silvoarable with arable), and (c) the impacts of different agroforestry management (e.g., looking at different planting arrangements or inputs). We originally planned to structure the discussion according to our four themes, but we did not because nearly one-third of the priorities were coded into "Cross-theme," and having a large miscellaneous group hindered the narrative of the results. This research agenda was created for in-field agroforestry in the UK, but many of the research priorities have international relevance and are not context-specific.

This research agenda should be revised and updated as both the evidence base supporting agroforestry and the interests and needs of stakeholders evolve. Research-agenda setting complements evidence syntheses, which often identify many gaps in the literature, by prioritizing which gaps to address first (Sutherland et al. 2011). Furthermore, research agendas tend to go beyond the scope of existing syntheses, and this is the case for our agenda. Firstly, many syntheses focus on specific agroforestry systems or topics, such as biodiversity (Kletty et al. 2023), soil health (Beule et al. 2022; Amorim et al. 2023), pest control (Staton et al. 2019), pollination (Bentrup et al. 2019; Staton et al. 2019), or production (Pent 2020; Amorim et al. 2023). In contrast, our agenda spans all research topics. This led to the inclusion of many transdisciplinary research priorities, ranging from specific (e.g., developing an online education tool) to global questions (e.g., investigating international land-use change) (see Fig. 5 (cross-theme)). Secondly, there are notable gaps in the topics covered in existing agroforestry syntheses (e.g., social outcomes (Köthke et al. 2022)), and our research agenda can be used to identify priority areas for primary research or new syntheses within these gaps (e.g., impacts on well-being, human health, or land tenancy; Fig. 5). Finally, while some existing syntheses span multiple topics, they have focused on adoption only (agroforestry vs non-agroforestry) (Torralba et al. 2016; Jordon et al. 2020; Castle et al. 2022; Köthke et al. 2022). In contrast, our agenda spans adoption and management (agroforestry vs other agroforestry). This is important, as optimizing management is essential for scaling up agroforestry effectively and minimizing unintended negative outcomes, such as reduced food production, high rates of tree mortality, or the displacement of environmental impacts elsewhere (Lewison et al. 2019).

3.2.1 Research priorities on the socio-economic and policy context of agroforestry adoption

There is a clear appetite for agroforestry adoption in the UK and internationally (Westaway et al. 2023; Berven et al. 2023; Dauby et al. 2024), but our research priorities highlight significant knowledge gaps that need to be addressed to achieve this effectively. This includes broad questions on incentives and policy, such as "What are the major gaps between current agroforestry-related policy and implementation practices in the UK?" and on agroforestry education, such as "Is the agroforestry advice being given to farmers by different knowledge intermediaries (e.g., governments, NGOs) fit for purpose?..." This need for evidence about the impacts of policy interventions to promote agroforestry has also been identified in recent systematic reviews on agroforestry (Castle et al. 2022; Tranchina et al. 2024), and the need for better knowledge transfer on agroforestry has been identified by the European Commission, who created a

Fig. 5 The final list of 40 research priorities, separated by theme and subtopic. Key words from each question are bolded.

Human livelihoods, knowledge, & perceptions: 3 Qs

Socio-economic and policy context for adoption

1. What are the main barriers and opportunities to implementing agroforestry on **tenanted land**? How can landlords be convinced to plant more trees and what characteristics affect this?

Impacts of agroforestry adoption vs non-adoption

2. How does agroforestry impact **human wellbeing** (including farmer work/mental load and local communities) compared to non-agroforestry farming?

3. Does the milk and meat from ruminant animals fed on tree fodder have different **nutritional quality, flavor and taste**?

Environment & Production: 20 Qs

Socio-economic and policy context for adoption

4. How can farmers **self-assess** agroforestry impacts including production, soil health, carbon, biodiversity and inputs?

Impacts of agroforestry adoption vs non-adoption

5. How does agroforestry affect **soil microbial** community, and how far does this affect move away from the trees into productive land?

6. How does agroforestry farming impact **soil health** compared to non-agroforestry farming (e.g., arable/pastoral)?

7. How do agroforestry trees affect the soil and crop **microclimate** (e.g., temperatures), and what are the ecological implications of this?

8. Can silvoarable farming help to **decrease inputs** (especially pesticides) without compromising yield?

9. What impact, if any, does agroforestry have on **nutrient loss and water quality**?

10. How does the quantity and quality of **timber** produced through in-field agroforestry compare to traditional forestry?

11. How does agroforestry impact **animal welfare, health, yield, and performance**?

12. How can fresh tree fodder in agroforestry systems contribute to grazing **ruminants' diets** (including nutrition and toxicity)?

13. What are the impacts of silvoarable farming on **crop health and yields** currently, and how will this be affected by climate change?

14. Does agroforestry provide **resilience to climate change** (including extremes, drought, rain) compared to non-agroforestry farming?

15. How can the above-ground biomass of agroforestry contribute to long-term **carbon stocks** compared to arable or pasture farming?

16. Can agroforestry increase **habitat connectivity** to create wildlife corridors? How would this impact food production?

17. To maximize carbon capture, biodiversity and food production, is agroforestry better than a mix of dedicated **land-uses**?

Agroforestry management

18. How can **tree establishment** be optimized in agroforestry systems, esp. in drought years?

19. What are the **optimal patterns** of agroforestry tree planting in relation to animal welfare, health, and performance?

20. What is the impact of different **tree species** (incl. mixtures) on **biodiversity**? Do some species kick-start biodiversity more than others?

21. How do different **tree species** boost levels of key **ecosystem services**, such as pollination, decomposition, soil processing, etc.?

22. What are the best **understory or companion trees/shrubs** to promote tree establishment, biodiversity, and production?

23. Which **crops** benefit most from being integrated into a silvoarable system, and does it depend on the **tree species**?

provision for this in the 2014–2020 Common Agricultural Policy (Mosquera-Losada 2018). Addressing these research

Fig. 5 (continued)

Policy, financing & markets: 6 Qs

Socio-economic and policy context for adoption

24. Which **financial models and policy incentives** would drive the widespread adoption of agroforestry systems in the UK?

25. What are the major gaps between current agroforestry-related **policy and implementation** practices in the UK?

26. Is the agroforestry **advice** being given to farmers by different knowledge intermediaries (e.g., governments, NGOs) fit for purpose? If not, how can we address shortcomings?

27. What are the current & future **market gaps** for agroforestry products & how can they be filled?

Impacts of agroforestry adoption vs non-adoption

28. Can agroforestry provide a greater **economic return** than non-agroforestry farming in the short, medium, and long term?

Agroforestry management

29. How can agroforestry systems best be designed and managed (e.g., tree species selection) to improve farm **income**?

Cross theme: 11 Qs

Socio-economic and policy context for adoption

30. How can we best bring together and **showcase existing case studies** (10+ year trials) of what works and what doesn't?

31. How can we set up **long-term research sites** with detailed monitoring and multi-actor involvement (e.g., sentinel landscapes)?

32. Can we develop the **Ecological Site Classification tool** (www.forestresearch.gov.uk) to include agroforestry and tree crops (e.g., nuts and stone fruit)?

Impacts of agroforestry adoption vs non-adoption

33. What are the **quick wins** (within 1-2 years) in agroforestry?

34. How can we **'retrofit' woodlands** to agroforestry systems (policy and practice)?

35. How can agroforestry contribute to **energy production** on farm and a **circular economy**?

36. How large a contribution can agroforestry make to **net-zero** targets in the UK?

37. How will large scale conversion to agroforestry in the UK impact **society and land use change elsewhere** (e.g., changing food/timber production causing changes in imports, and therefore land use internationally)?

Agroforestry management

38. Can **nitrogen-fixing trees** contribute worthwhile fertility to adjacent crops, and increase their yield and gross margin?

39. Which **tree species** produce the highest yield and gross margin 5, 10, 20 and 30 years from planting?

40. What is the implication for **national-scale food production** of various scenarios of agroforestry planting in the UK?

priorities is essential to promoting agroforestry uptake in the UK and internationally (Hood et al. 2025, Tranchina et al. 2024).

More specifically, there are research priorities on land ownership: "What are the main barriers and opportunities to implementing agroforestry on tenanted land?..." Tenanted and contracted land is common, with 46% of agricultural land in the EU under tenancy and 33% in England (Clark et al. 2022; Eurostat 2024). Tenancy agreement lengths vary, but they are often shorter than the time taken for agroforestry trees to mature. For example, the average length in England is 3 years, but many timber agroforestry trees take 20–60 years to mature (Clark et al. 2022; Staton et al. 2024). This means that tenants may not reap most of the benefits of planting trees, and this in combination with the potential legal implications of planting trees (e.g., changing how the land is classed) complicates agroforestry adoption for tenanted farmers in particular. Further research is needed to identify opportunities to remedy this.

Uncertainty around the long-term implications of agroforestry adoption is also reflected in a question on markets: "Where are the current and future market gaps for agroforestry products and how can they be filled?" with a second question on the value of within-farm markets: "How can agroforestry contribute to energy production on farm and a circular economy?" The need to identify markets for

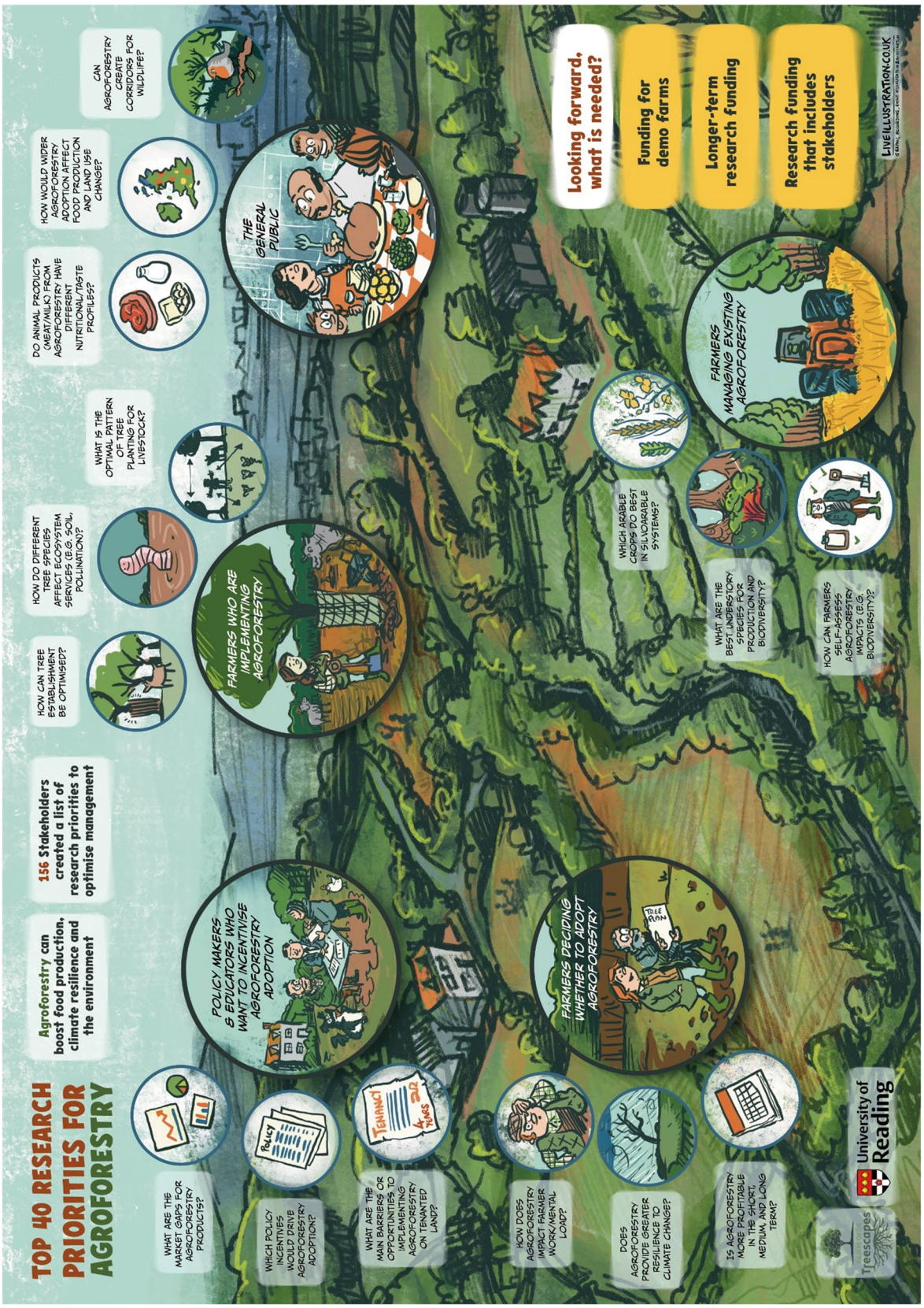


Fig. 6 An artist's illustration summarizing our findings from the imagined perspectives of five key stakeholders, shown in the large circles. Individual research priorities that relate to these stakeholders are shown in the white boxes, but these are examples and many priorities will be relevant to multiple stakeholders. This illustration shows a subset of the final list of research priorities, and some of the priorities have been abbreviated to simplify the figure (see Fig. 5 for the full list). Image credit: Chris Shipton, Live Illustration.

agroforestry products must be addressed as a perceived lack of knowledge about this has been identified as one of the five primary barriers to agroforestry adoption globally (Tranchina et al. 2024). Long-term projections should account for the effects of climate change on production and market dynamics (Lesk et al. 2022) and the anticipated changes in agroforestry product availability driven by increased adoption (Westaway et al. 2023; Dauby et al. 2024).

This need to improve predictions must be paired with improving the existing evidence and the collation of this evidence: "How can we best bring together and showcase existing case studies … of what works …?" This is an urgent research need, as a lack of availability, quality, and perceived trustworthiness in existing evidence on agroforestry management is one of the primary barriers to agroforestry adoption in the UK and globally (Hood et al. 2025, Tosh and Westaway 2021; Tranchina et al. 2024). There is a call for a multi-actor approach to generating new evidence: "How can we set up long-term research sites with detailed monitoring and multi-actor involvement …?" This reflects growing interest in using a multi-actor approach amongst researchers and funders (Lemos et al. 2018; Kurle et al. 2022), including the United Nations, the US Global Change Research Programme, and the European Commission's Horizon research fund (Weaver et al. 2014; FAO 2018; European Commission 2020). This is due to compelling evidence of the benefits of using multi-actor approaches such as co-production or co-design to promote trust, mutual learning, inclusivity, creativity, behavior change, and the application of research to practice (Fujitani et al. 2017; Norström et al. 2020; Busse et al. 2023). However, systemic changes are needed to implement this effectively; agricultural schemes (e.g., agri-environmental schemes) need to incorporate flexibility for land managers to participate in science, and funders must increase the length of research grants to facilitate long-term collaborations, which are essential for building trust between actors and effective co-production (Gaba and Bretagnolle 2020). Having dedicated long-term funding for facilitators to coordinate efforts, promote engagement, and manage collaborations is also key to successful multi-actor projects (Schüler et al. 2025).

In addition to this call for multi-actor collaboration, participants identified the need for farmers to have independence in monitoring their systems: "How can farmers self-assess agroforestry impacts including production, soil health, carbon, biodiversity, and inputs?" Aside from farmers, the main actors involved in monitoring farmland are national and international government agencies, environmental NGOs, private companies, researchers, and citizen scientists (Ruck et al. 2024; Burchfield et al. 2024). Self-assessment can be cheaper and logistically easier for farmers due to the reduced burden of co-ordination and financial cost if done privately, and it enables farmers to make timely decisions with real-time data. This research priority shows the value of developing standardized self-assessment protocols for farmers to monitor agroforestry.

3.2.2 Research priorities on the impacts of agroforestry vs non-agroforestry adoption

Twenty-one of the research priorities were on the impacts of in-field agroforestry adoption vs non-adoption (Fig. 5). Many of these priorities related to the environment and production at local (field to farm) scales, with questions on biodiversity, soil health, the crop microclimate, climate resilience, carbon storage, inputs and nutrient loss, water quality, crop health and yield, timber quality and yield, animal welfare and yield, and farm profits. Some priorities again state the need to understand these impacts over the "short, medium, and long term," which is important as many farmers will need short-term gains to offset establishment costs (Clark et al. 2022; Staton et al. 2024). The quantity and quality of evidence supporting the impact of agroforestry adoption on these outcomes is mixed, and it depends on the agroforestry system in question (see Amorim et al. 2023; Fagerholm et al. 2016; Graves et al. 2010; Jordon et al. 2020; Pent 2020; Torralba et al. 2016). For example, a systematic review of 45 studies on biodiversity in temperate silvoarable systems found limited research on aboveground biodiversity, with the exception of natural enemies and pests (Kletty et al. 2023). More broadly, a recent systematic map of 632 articles on agroforestry in primarily temperate regions found that ecosystem services and agricultural productivity are well studied overall, but there was less evidence on profitability, which is a barrier to agroforestry adoption (Castle et al. 2022). However, while there are specific knowledge gaps that need to be addressed to strengthen the case for agroforestry adoption and promote evidence-based practice, there is compelling evidence that at a local scale agroforestry adoption often provides environmental and production benefits (Fig. 2).

Human livelihoods emerge here, with research priorities on well-being "How does agroforestry impact human well-being (including farmer work/mental load and local communities) compared to non-agroforestry farming?" and diets "Does the milk and meat from ruminant animals fed on tree fodder have different nutritional quality, flavor, and taste?" The impacts of agroforestry adoption on human well-being must be addressed, as there is minimal evidence assessing this (Castle et al. 2022). In particular, we must assess the impact of agroforestry adoption on farmers' mental health and workload as many farmers are currently overworked, which is a primary contributor to the ongoing mental health crisis in many farming communities (Donohoe et al. 2024). In terms of the impact on human diets, there is compelling

evidence that feeding ruminants on tree fodder does affect the nutritional quality, flavor, and taste of animal-derived products, but the evidence base supporting the impacts of different agroforestry fodder species is lacking and needs to be developed (Henchion et al. 2017; Falowo et al. 2018; Salem et al. 2020; Torres et al. 2022). The value of enhanced nutrition from animal-derived products should not be underestimated, as unhealthy diets are incurring massive economic costs globally; in the UK, this has been estimated to be £268 Bn annually (Jackson 2024).

At larger scales, there was a question about the impact of agroforestry adoption on habitat connectivity and food production. Habitat connectivity is a key tool for combating habitat fragmentation and promoting wildlife and functional diversity across landscapes (Davies and Pullin 2006). There is strong evidence that woody linear boundary features, such as hedgerows, can support wildlife corridors, functional biodiversity and food production when they are well managed (i.e., structurally complex and diverse) (Davies and Pullin 2006; Garratt et al. 2017; Bentrup et al. 2019). However, the evidence base supporting the impact of in-field agroforestry on habitat connectivity in temperate regions is lacking (Bentrup et al. 2019; Castle et al. 2022). There was also a question about how widespread adoption in one place can have impacts elsewhere: "How will large scale conversion to agroforestry in the UK impact society and land use change elsewhere …?" This shows that UK stakeholders are thinking across local to global scales, which is fundamental for promoting sustainable management; landscape-scale and global thinking are needed to mitigate any unintended negative impacts of agroforestry adoption, such as the displacement of environmental impacts elsewhere (Lewison et al. 2019). Landscape-scale studies of agroforestry research are currently lacking (Castle et al. 2022).

3.2.3 Research priorities on agroforestry management

Seven of the ten research priorities on agroforestry management mentioned tree species selection, planting arrangement, and/or establishment (Fig. 5). Many of these relate to the same outcomes mentioned in Section 3.2.2, with questions on biodiversity, ecosystem services (pollination, decomposition, soil health), animal welfare and performance, crop yield, tree establishment, and profits. The need to understand the impact of agroforestry across timescales is also emphasized here. There are many knowledge gaps around tree species selection, planting arrangement, and establishment due to a lack of evidence; for example, a recent review of research on alley-cropping agroforestry systems found that 55% of studies in temperate regions were dominated by two genera: *Juglans* (walnut) and *Populus* (poplar) (Wolz and DeLucia 2018), but there are tens of species that can be used in these systems, and the evidence base supporting many of their impacts is lacking (Staton et al. 2024). Further research looking at species mixtures is particularly needed, as research has prioritized single-species systems (Wolz and DeLucia 2018), but species impacts can differ when planted in mixtures vs alone (Millett et al. 2012). More specifically, there was a question on nitrogen-fixing trees, and whether they can "contribute worthwhile fertility to adjacent crops, and increase their yield and gross margin." Nitrogen-fixing trees can provide these benefits in tropical agroforestry (Rosenstock et al. 2014), but in temperate regions, their impacts are less known (Wolz and DeLucia 2018). Researchers must disseminate evidence on tree management in addition to generating it, and, in the UK, innovative tools, guides, and knowledge-exchange platforms are emerging with this aim as agroforestry increases in popularity (e.g., The Agroforestry Show 2023; Land App Team 2024; Staton et al. 2024).

Beyond agroforestry trees, there are research priorities on the impact of wider management of agroforestry systems, including the understory: "What is the best understory or companion trees/shrubs to promote tree establishment, biodiversity, and production?" In alley-cropping systems, tree row understories commonly use 6–25% of the field area, depending on planting arrangement (Verdonckt et al. 2019). They are often under natural regeneration or flower planting, which can promote pest control and pollination, or arable weeds if poorly managed (Wartelle et al. 2017; Staton et al. 2021). It is likely that further environmental and production benefits could be achieved with more research, and some emerging findings have shown the potential benefit of planting additional crops in the understory, such as cut flowers or rhubarb, to offset establishment costs (Smith et al. 2017). There was also a question on adjacent crops: "Which crops benefit most from being integrated into a silvoarable system …?" Further research is also needed to address this (Ivezić et al. 2021).

3.3 Recommendations for implementing this research agenda

We identified many research priorities that urgently need to be addressed to facilitate and optimize the expansion of in-field agroforestry in the UK and internationally. At the most direct level, implementing this research agenda requires key stakeholders to be aware of it. We have promoted it widely at academic and industry events, and our agenda was used to set key themes and select speakers at the Agroforestry Show 2025, which is an industry conference for over a thousand agroforestry stakeholders in the UK (The Agroforestry Show 2023). However, implementing this research agenda effectively also requires systemic changes to the institutional, political, and economic systems governing research and agriculture.

This research agenda points to many research gaps which have been identified as global issues hindering agroforestry adoption, such as identifying markets, effective policy incentives, or the availability of trustworthy knowledge and advice (Hood et al. 2025, Tranchina et al. 2024). Addressing these issues requires a multi-actor approach that is integrated across the supply chain and includes land managers, researchers, research funders, policy makers, agri-businesses, farm advisors, and end users. This multi-actor approach is called for in the research agenda repeatedly, and it mirrors growing interest in this approach amongst researchers and funders due to compelling evidence of its benefits (FAO 2018; European Commission 2020; Norström et al. 2020; Busse et al. 2023). However, multi-actor research and co-production are currently hindered by a lack of flexibility for land managers wishing to conduct research on their farms, as they are often participating in schemes (e.g., agri-environmental schemes) with strict criteria that do not offer flexibility for research. While the UK government is improving support for farmers to participate in research (e.g., via the 2025 ADOPT grant in England), these opportunities are limited to farmer-led research and do not support farmers to participate in research more broadly. Policy makers and agri-businesses supporting UK farmers must improve funding opportunities for research and the flexibility of schemes to promote research participation and help to address this research agenda.

Agroforestry researchers will need to form transdisciplinary research teams to address this research agenda as many of these research priorities span disciplines. Agroforestry researchers in other countries can use this list to spark discussions with their local agroforestry stakeholders and identify research priorities most pertinent to them, or even repeat the process to create their own regionally relevant lists. Research funders must improve funding schemes to better support agroforestry research, and we strongly urge funders to heed the repeated calls for longer-term studies within this agenda. Agroforestry trees can take decades to mature, and long-term projects are needed to study them across their lifecycle. Long-term research contributes disproportionately to ecology and policy, but investment in long-term studies is declining (Hughes et al. 2017). Increasing the length of research grants fosters long-term collaborations, which strengthens trust between actors and enhances the effectiveness of multi-actor research approaches (e.g., co-production) and the application of research to practice (Fujitani et al. 2017; Gaba and Bretagnolle 2020; Busse et al. 2023). Creating a network of demonstration sites or living labs could be a particularly effective way to implement this research agenda as several research priorities could be addressed in parallel, which could reduce costs (Berberi et al. 2023). These sites could act as communities of practice where interventions could be tested in real-world environments and knowledge-sharing activities could promote the adoption of new innovations (Berberi et al. 2023). This approach would therefore link to environmental or production research priorities and those around implementation and knowledge. The success of living labs depends on support for their longevity (long-term funding) and on having a dedicated person (a facilitator) to manage collaborations, strengthen engagement and help with co-ordination (Berberi et al. 2023; Schüler et al. 2025). Research funding schemes aimed at supporting this type of initiative specifically could help to address this research agenda effectively.

There were also repeated calls to make evidence more available in addition to generating new research. In particular, the evidence base supporting different approaches to managing agroforestry is less established than the evidence base supporting agroforestry adoption (Fagerholm et al. 2016; Jordon et al. 2020; Köthke et al. 2022; Kletty et al. 2023). This is partly because it is harder to collate or synthesize evidence on management due to there being a greater number of possible comparators (i.e., for adoption, agroforestry is compared to a limited number of non-agroforestry land uses, whereas for management, there are many options in terms of species selection, planting arrangement, establishment methods, etc.). Flexible syntheses, such as dynamic meta-analysis or living reviews, address this issue with interactive online interfaces and hierarchical classification systems that allow users to filter and weight evidence for their needs (Shackelford et al. 2021; Hood et al. 2023). We recommend using this emerging approach to conduct a living subject-wide synthesis for temperate agroforestry to address and collate evidence on these research priorities and wider agroforestry management. Flexible, subject-wide syntheses are a highly effective way of getting relevant and up-to-date information to practitioners and policy makers (Martin et al. 2023).

Research-agenda setting is best conducted alongside evidence syntheses, which identify gaps in the literature. Often—and as is the case for temperate agroforestry—evidence syntheses identify many outstanding research needs, and creating a research agenda can help to prioritize which gaps to address first (Sutherland et al. 2011). Furthermore, research agendas are often broader in scope than syntheses, creating a more comprehensive overview of knowledge gaps (Staton et al. 2019; Pent 2020; Köthke et al. 2022; Kletty et al. 2023; Amorim et al. 2023). The process of creating a research agenda with multi-stakeholder groups has its own benefits too; it engages stakeholders in research and shares ownership with them, something which is needed to change decision-making effectively (Grill 2021). In our case, several collaborations were built at the second workshop, and multi-stakeholder research grant applications have been written by attendees with the aim of addressing several of the research priorities. Our research agenda, and updated versions, can

direct funders and researchers to relevant and impactful projects, thereby creating research that meets the needs of practitioners and policy makers (Sutherland et al. 2011). This research agenda should be revised as the agroforestry literature and the interests of agroforestry stakeholders develop.

4 Conclusions

We used a multi-actor approach to co-produce a research agenda for agroforestry with UK stakeholders. We found broad agreement about which research priorities to include, with a final list of 40 research priorities that spanned agroforestry systems, themes, topics, and temporal and spatial scales. Our agenda is a rare example of a research-prioritization process that includes farmers and agricultural stakeholders from across the supply chain throughout the research process. The value of this approach can be seen in the inclusion of priorities that were relevant to different actors and grounded in real-world opportunities and problems. We found that agroforestry stakeholders in the UK have a broad understanding of the potential impacts of agroforestry adoption and expansion, and the risks of unintended negative impacts under land-use change.

There is compelling evidence that agroforestry can promote production and profits at the farm scale, while helping to address the biodiversity and climate crises. However, there is limited evidence on the impacts of agroforestry adoption on human well-being or at the landscape scale. Furthermore, significant knowledge gaps remain regarding the effective implementation and expansion of agroforestry systems, and we identified research priorities for policy incentives, knowledge exchange, agroforestry design (e.g., tree/crop selection and arrangement), monitoring, and market development for agroforestry products. Our research agenda goes beyond agroforestry evidence syntheses in its scope and should be used alongside such syntheses to direct agroforestry funders and researchers to primary research and evidence synthesis gaps that are a high priority for stakeholders. By identifying impactful areas of enquiry for policy makers and practitioners, this agenda can facilitate evidence-based policy and the practice of agroforestry during its anticipated expansion. However, systemic changes are also needed alongside further research, including better support for longer-term research and living labs, and greater flexibility in agricultural schemes.

This research agenda is a call to action for agroforestry stakeholders across the UK. Addressing these research priorities will facilitate the expansion and optimization of agroforestry systems, thereby promoting the sustainable intensification and resilience of our agricultural landscapes.

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Data availability The data are available from the University of Reading Research Data Archive (Hood 2025).

Code availability There is no code associated with this manuscript.

Declarations

Ethics approval This research was approved by the University of Reading's ethics committee (reference number 2261D).

Consent to participate Informed consent to participate was obtained from all participants.

Consent for publication Informed consent to publish was obtained from all participants.

Conflict of interest HC, EPC, JR, and CT work for organizations that provide agroforestry advice to farmers, HC and EPC organize the Agroforestry Show, and ELS and AR are practicing farmers. However, by using a multi-actor approach that included the views of over 150 stakeholders, we aimed to minimize any potential bias in the results. The authors declare no additional financial or personal conflicts of interest.

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