



AGRIIH Workshop Summary

Exploring the potential of Multicropping in the UK

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Executive Summary

Multicropping is attracting growing interest as a means of **improving agricultural resilience, supporting biodiversity recovery and reducing dependence on external inputs**. Yet despite increasing international interest, adoption in the UK remains limited. To explore why, the Agricultural Resilience Impact and Innovation Hub (AGRIIH) at University of Oxford convened a workshop bringing together **researchers, farmers and practitioners** to identify the research needed to support the responsible development of multicropping in the UK.

Discussions highlighted that multicropping should be viewed through a **whole-system lens**, rather than simply as an agronomic innovation. Participants consistently recognised that **ecological processes**, including soil health, biodiversity and ecosystem functioning, provide the foundation for resilient farming systems, **supporting yield stability, risk management and profitability**, which in turn contribute to **wider outcomes such as healthy diets, food security and farmer wellbeing**.

Rather than seeking immediate recommendations, we encouraged participants to explore and complete the following statement:

"We cannot responsibly recommend multicropping widely in the UK until we understand..."

This led to the identification of a broad research agenda spanning ecology, agronomy, economics and food systems. Four broad priorities emerged:

- **Building a stronger UK evidence base** through coordinated experiments, monitoring and long-term assessment of ecological, agronomic and social outcomes.
- **Designing multicropping systems for UK conditions**, including crop combinations, breeding, mechanisation and climate resilience.
- **Developing viable pathways for adoption**, including business models, farmer decision-making, routes to market and practical support during transition.
- **Addressing wider food-system challenges**, including governance, value chains, food affordability, consumer engagement and the distribution of risk.

The prioritisation exercise distinguished between research questions that are both highly important and tractable within a medium-term research programme, longer-term systemic challenges requiring interdisciplinary collaboration, and practical enabling questions that may currently receive insufficient attention.

Collectively, the workshop demonstrates that making multicropping work in the UK is not solely a question of crop design or farm management. It requires **coordinated advances across ecology, agronomy, economics and food systems, together with closer collaboration between researchers, farmers, businesses and policymakers**.

The research priorities presented in this report provide a shared foundation for **future collaboration, funding opportunities and interdisciplinary research**.

1. Workshop Overview

The AGRIIH Multicropping workshop was designed as a research agenda-setting exercise, moving progressively from desired outcomes, to evidence gaps and, ultimately, research priorities.



Figure 1 Workshop Design

The following sections summarise the key outcomes and research priorities emerging from these discussions.

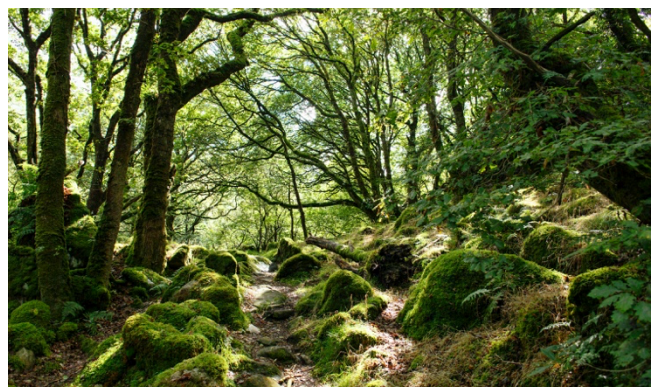
2. What outcomes should multicropping deliver?

The workshop discussions began by considering a fundamental question:

What problems in UK agriculture could multicropping help address?

To support a structured discussion, participants explored this question through four complementary outcome domains:

- Ecological outcomes;
- Yield and agronomic outcomes;
- Economic and livelihood outcomes; and
- Food system and social outcomes.



Within each domain, participants considered which outcomes mattered most, where trade-offs might arise, and where multicropping could create mutually reinforcing benefits. Although the discussions began from different perspectives, they repeatedly highlighted the strong interdependence between ecological, productive, economic and societal outcomes.

Ecological outcomes

The ecological discussion focused on the role of **biodiversity, soil health and ecosystem functioning** in supporting more resilient agricultural systems. Participants highlighted **pollination, nutrient cycling, natural pest regulation and climate resilience** as important processes through which multicropping may generate wider benefits.

The group also emphasised that ecological outcomes should not be viewed in isolation. Improvements in biodiversity and soil health were seen as contributing to reduced input use, greater resource-use efficiency, more stable production and, ultimately, healthier food systems. Healthy diets were discussed as an overarching objective, with soil health acting as an important underpinning condition.



The scale of the desired food-system outcome was also debated. Participants questioned whether multicropping should primarily support local food systems and local food security, or whether it could also make a meaningful contribution to national food security.

Yield and agronomic outcomes



The yield and agronomic discussion prioritised **profitability, yield and healthy diets** as important ultimate outcomes, supported by soil health and biodiversity.

Participants highlighted the importance of **time horizons** when assessing multicropping. Some benefits may take time to emerge, while short-term costs, reduced

efficiency or management complexity may discourage adoption. Priorities may therefore look different depending on whether systems are evaluated over the short or longer term.

This discussion reinforced the idea that agronomic performance cannot be separated from ecological conditions. Soil health and biodiversity were viewed not as secondary environmental benefits, but as factors that may underpin productive and economically viable farming systems.

Economic and livelihood outcomes

The economic discussion centred on **yield stability**, **risk management** and **wellbeing**.

Yield stability was viewed as closely connected to ecological processes including soil health, biodiversity, pollination, nutrient cycling, pest regulation and climate resilience. Together, these processes could reduce production risk and support more stable farm businesses.



Risk management was understood broadly, encompassing climatic, ecological and economic uncertainty. Participants also linked farm performance to wider outcomes including farmer wellbeing, rural livelihoods, healthy diets and food security.

The discussion highlighted that economic outcomes are highly context-dependent. Farm size, location, soil conditions, production systems and routes to market may all affect which outcomes are realistic and how multicropping should be evaluated.

Food system and social outcomes

The food system and social discussion prioritised **risk management**, **market opportunities**, **One Health** and the **rebalancing of power** within value chains.

Participants discussed the **uncertainty** farmers may face when transitioning to more diverse systems and the **potential role of transition finance** in sharing or reducing this risk. Diversification was seen as creating potential market opportunities, but also considerable practical complexity, including additional labour, time management, logistics, processing and marketing requirements.



One Health was used as an overarching concept connecting soil health, nutrient cycling, farmer wellbeing, healthy diets and wider human and environmental health.

The group also stressed that the success of multicropping depends on changes beyond the farm gate. Market access, consumer demand, food affordability, routes to market and the distribution of power and value across supply chains were all identified as

important. Storytelling and cultural change were discussed as ways of increasing appreciation for diverse farming systems and the products they generate.

Common themes across the four domains

Despite beginning from four different perspectives, participants repeatedly arrived at several shared observations.

A systems lens on multicropping outcomes

Workshop participants described multicropping outcomes as interconnected and nested, from foundational ecological processes to farm-level resilience and wider societal benefits.

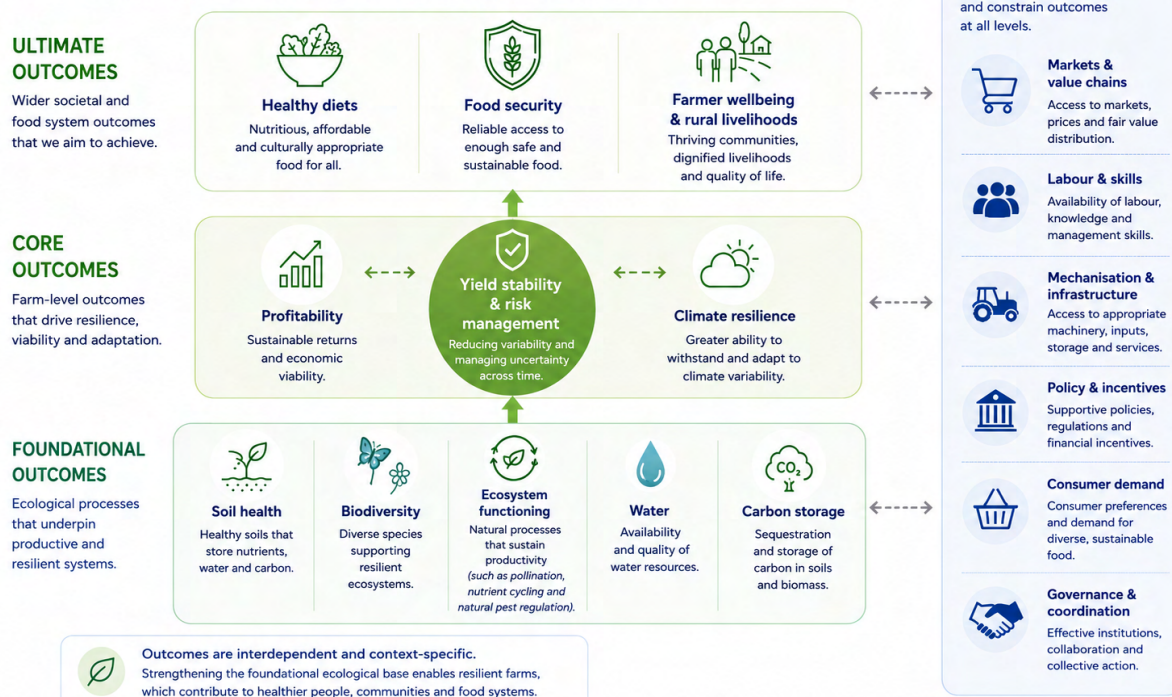


Figure 2 illustrates this conceptual framework emerging from the workshop.

Rather than viewing biodiversity, productivity, profitability and healthy diets as independent objectives, participants described them as **connected outcomes within a wider agricultural system**. Ecological processes were consistently seen as underpinning resilient and productive farming systems, which in turn support wider economic, social and food system outcomes.

Several additional themes also emerged consistently across the discussions:

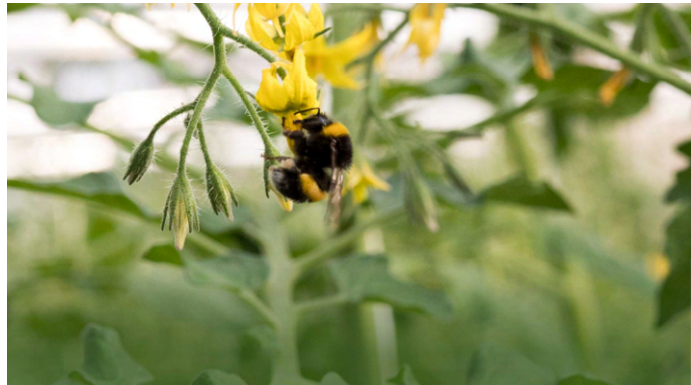
- Important **trade-offs between short-term efficiency and longer-term resilience**.
- The importance of **scale and context** when evaluating multicropping systems.
- Recognition that successful adoption depends on **changes beyond the field**, including markets, infrastructure, consumer demand and governance.

3. What do we still need to understand?

"We cannot responsibly recommend multicropping widely in the UK until we understand..."

Building on the discussions around desired outcomes, participants then turned their attention to the evidence needed before multicropping can be more widely adopted in the UK.

Participants were invited to join one of the four outcome domains according to their own expertise and interests. This allowed researchers, farmers and practitioners with shared interests to work together in identifying the key evidence gaps and research questions within each domain.



Working within these thematic groups, participants considered the assumptions currently being made about multicropping, distinguished these from areas where evidence already exists, and discussed the knowledge gaps that remain. Rather than developing recommendations or solutions, the focus was on identifying the research questions that need to be answered in order to support responsible decision-making.

The discussions generated a large number of research questions, which were subsequently refined and prioritised through a gallery walk and collaborative voting exercise.

Ecological outcomes

Discussions within the ecological group focused on the evidence needed to demonstrate the environmental benefits of multicropping in UK farming systems.

Key research questions included:

- **UK-based evidence** for the ecological and wider societal benefits of multicropping systems.
- How can **biodiversity outcomes be measured** meaningfully and quantitatively?
- What are the most **feasible, efficient and inexpensive ways to monitor** biodiversity and ecological outcomes?
- How can **local ecological knowledge** complement high-tech monitoring approaches?



- What are the **characteristics** of multicropping systems that provide the greatest benefits for both biodiversity and farm profitability?
- What **motivates farmers** to adopt nature-friendly farming practices?
- Can multicropping create **additional income opportunities** through biodiversity or carbon markets?

Yield & agronomic outcomes

The yield and agronomic discussions focused on improving understanding of how multicropping performs under UK conditions.

Key research questions included:

- Which **crop combinations** work best under different UK conditions?
- **Crop breeding requirements** for multicropping systems and crop complementarity.
- How can multicropping systems enhance **climate resilience**?
- What are the **benefits and trade-offs** of different crop combinations?
- What **labour and resource requirements** do multicropping systems have and what innovations are needed?
- How do **input requirements** change under multicropping?
- How can successful **small-scale systems** be translated to larger commercial farms?
- What role could **heritage or under-utilised crops** play in future multicropping systems?
- How can **mechanisation** support complex multicropping systems?

Economic outcomes

The economic discussions centred on the long-term viability of multicropping systems and the practical challenges associated with scaling them.

Key research questions included:

- What **business models** are most appropriate for different farming contexts?

- What is the **optimal scale** for multicropping systems?
- How can multicropping systems successfully **scale up**?
- How **self-sustaining** can multicropping systems become?
- What **risks** do farmers face when transitioning to multicropping?

Food systems and social outcomes

The food systems discussions focused on the wider changes needed beyond the farm to enable successful adoption of multicropping.

Key research questions included:

- Can **consumer benefits**—including nutrition, wellbeing and customer experience—be demonstrated and enhanced?
- What **financial, policy and knowledge support** is needed during transition?
- How can **power be rebalanced** across food value chains?
- What **routes to market and supporting infrastructure** are needed?
- How can multicropped food remain **affordable** rather than becoming a premium product?
- What **actions are needed** from other actors across the value chain?
- How can multicropping be **celebrated culturally and communicated more effectively**?
- How can **local communities** become more engaged?
- What role can multicropping systems play in increasing **food sovereignty**?



4. From evidence gaps to research priorities

Participants reviewed the questions generated across the four outcome domains and voted against two criteria:

- **Importance:** Which questions are most important for enabling the responsible development of multicropping in the UK?
- **Tractability:** Which questions could realistically be progressed within a research programme of approximately five years?

Several closely related questions appeared in more than one outcome domain—for example, questions concerning scale, transition, markets and evidence. This may have distributed votes across differently worded statements. For the purposes of this synthesis, overlapping questions have therefore been combined, and the voting is interpreted as an indication of broad patterns rather than a definitive numerical ranking.

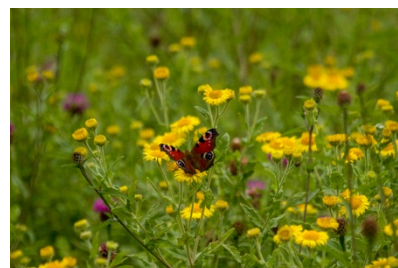
Important and tractable priorities

These themes scored highly both in terms of the importance of the question for advancing multicropping in the UK, and where substantive progress could be made towards answering the question within a medium-term interdisciplinary research programme.

Building a UK evidence base and practical monitoring framework

Questions concerning evidence and measurement appeared across the ecological and agronomic discussions. Taken together, they point to a need to:

- Generate **robust UK evidence** on the ecological, agronomic and social outcomes of multicropping across different farming systems and environmental contexts.
- Develop **integrated evidence approaches**, combining field experiments, modelling and long-term monitoring to understand system performance over time.
- Improve **biodiversity and ecosystem monitoring**, including indicators that are scientifically robust, practical for farmers and capable of integrating quantitative methods with local ecological knowledge.
- Assess **benefits and trade-offs** across multiple outcomes and timescales, rather than focusing on single performance metrics. This was viewed as both important and relatively tractable, particularly where research builds on existing farms, experiments and monitoring approaches.



Designing crops and crop combinations for multicropping

Questions about crop combinations, breeding and system performance were closely connected and received strong support.



Priorities included:

- Identifying which **crops and varieties perform well together** under different UK conditions.
- Breeding **crops specifically for complementarity** within multicropping systems.
- Understanding interactions in **nutrient use, growth periods, plant architecture and competition**.
- Assessing the **yield, resource-use and ecological implications** of different combinations.
- Designing crops and agricultural systems that are **compatible with lower-input or reduced-tillage approaches**.

Participants noted that crops are generally bred and evaluated for conventional monoculture systems. Developing breeding objectives and performance measures appropriate to multicropping was therefore seen as a significant research opportunity.

Developing viable models for different farming contexts

Business models, farm scale, customer benefits and routes to market were raised in several groups and are best considered together.

Research priorities included:

- Identifying **business models** suited to different farm types, locations and production systems.
- Understanding how **commercial viability** changes across scales.
- Comparing **direct sales, local processing, wholesale routes and supermarket supply chains**.
- Assessing the **nutritional, health, wellbeing and experiential benefits** for consumers.
- Understanding the **infrastructure** needed for storage, processing, distribution and marketing.
- Exploring the potential role of **heritage and under-used crops** in resilient and attractive product portfolios.

The discussion did not suggest that there would be one optimal model. Instead, different combinations of farm scale, market route and consumer relationship are likely to work in different contexts.

Understanding farmer motivations, decisions and learning

Questions about farmer motivation appeared in both ecological and transition discussions.

Combined, they include:

- Why **farmers choose—or decide not—to** adopt multicropping.
- How perceptions of **profitability, risk, labour and complexity** influence decisions.
- How farmers value biodiversity, nature and personal wellbeing.
- What role **peer learning, demonstration farms and practical examples** play.
- How **farmer experience and local knowledge** can inform research design.
- Which forms of evidence are most persuasive at different stages of adoption.



This was viewed as a tractable area that could also inform the design of wider technical, financial and policy interventions.

Highly important, but more difficult to address

These themes attracted particularly strong importance votes but fewer tractability votes. They represent central challenges that may require longer-term research, institutional change and collaboration beyond conventional research projects.

Managing and sharing the risks of transition

Statements concerning transition risk and transition support appeared in several forms and received strong support when considered together.

Participants highlighted the need to understand:

- Short-term **yield and income uncertainty**.
- The **learning curve** associated with new crops, equipment and management practices.
- **Capital costs and investment** in machinery or infrastructure.
- **Uncertainty** around buyers, markets and product demand.
- The **support needed** in the short, medium and longer term.

- How **risk should be distributed** between farmers, government, researchers, funders and supply-chain actors.
- The role of **transition finance, insurance, policy and knowledge exchange**.

Although comprehensive quantification may be difficult while the UK evidence base remains limited, participants suggested that research could begin by documenting perceived and experienced risks among farmers already considering or practising multicropping.

Establishing climate-resilient multicropping systems



Climate resilience was consistently identified as one of the most important long-term objectives of multicropping. Participants recognised, however, that answering this question requires evidence that extends beyond individual sites or short-term experiments.

Key research challenges include:

- Evaluating performance under **uncertain future climatic conditions**.
- Capturing the **huge variety of differences** between locations, soils and crop combinations.
- Assessing **system resilience** over sufficiently long timescales to distinguish short-term responses from long-term system adaptation.
- Understanding the **complex interactions** between biodiversity, inputs, management and climate stress.
- Determining whether resilience benefits can be demonstrated **consistently** across farming systems.

Participants recognised that progress can certainly be made over the next five years, but also noted that answering these questions with confidence is likely to require longer-term experiments, coordinated monitoring across multiple sites, and continued learning as climatic conditions change.

Transforming markets, value chains and access to food

Questions concerning power, affordability, food sovereignty, routes to market and wider value-chain action were strongly interconnected.

Together, they raise questions about:

- How **value and risk are distributed** across farmers, processors, retailers and consumers.
- Whether **existing supply chains** can accommodate greater crop and product diversity.
- How **buyer requirements** for volume, uniformity, appearance and price affect adoption.
- Whether decentralised or alternative **markets** could enable producers to retain more value.
- How multicropped food can remain **affordable** rather than becoming a premium niche.
- The role of **public procurement** and institutional purchasing.
- What **policy and governance** changes are required from actors beyond the farm.



These were regarded as highly important, but difficult to address through research alone because they involve institutional power, commercial practices and wider food-system transformation.

Tractable but potentially under-recognised priorities

Some questions attracted more support for tractability than for importance. The plenary discussion suggested that these may be practical enabling conditions whose significance is easily overlooked.

Mechanisation, labour and practical system design

Mechanisation was the clearest example. Initially, it received strong tractability votes but few importance votes. The subsequent discussion highlighted its potential significance.

Priorities included:

- Designing or **adapting equipment** for complex crop arrangements.
- Understanding how **machinery** affects feasible crop combinations and spatial layouts.
- Assessing **labour requirements** and the limits of manual management.
- Developing **solutions suitable for different farm sizes**.

- Exploring opportunities for **shared machinery, open-source designs** or collaborative innovation.



- **Avoiding the romanticisation of labour-intensive farming** where it creates barriers to adoption.

Participants highlighted that mechanisation should not be treated as an isolated engineering issue. It may determine whether promising agro-ecological systems can operate at a viable scale.

Demonstration, replication and different pathways to scale

Questions about scale appeared in the agronomic, economic and food-system groups and should be treated as one cross-cutting theme.

The discussion distinguished between:

- **Scaling up:** increasing the size or output of an individual enterprise.
- **Scaling out:** replicating a larger number of smaller, locally adapted systems.
- **Scaling through networks:** sharing machinery, processing, knowledge or market infrastructure.
- **Adaptation rather than replication:** retaining core principles while responding to local conditions.

Demonstration farms, practical role models and farmer-to-farmer learning were seen as feasible ways to test these different pathways and reduce perceived risk.

Overall interpretation of the prioritisation

The exercise did not produce a single ranked list. Instead, it revealed three complementary components of a future research programme:

- **Important questions where meaningful progress appears possible within approximately five years**, including UK-based evidence of impacts and benefits for biodiversity and ecological integrity, climate resilience, yield stability and risk management; effective monitoring; crop and agricultural system design; context-specific business models; and understanding farmer decision-making.
- **Systemic questions that are highly important but less tractable**, including transition risk, questions around addressing the long term nature of climate resilience, high variation among different contexts, complexity of interactions

with ecological and social systems, and the unpredictability of future climate scenarios food affordability and the distribution of power and value.

- **Practical enabling questions that may be comparatively tractable but under-recognised**, particularly mechanisation, labour, demonstration and alternative pathways to scale.

This distinction is important. Focusing only on the most tractable questions could neglect the structural conditions that ultimately determine adoption.

Conversely, focusing only on the largest systemic challenges could overlook practical research that is achievable now and capable of removing immediate barriers. A future programme should therefore

connect near-term technical and empirical work with longer-term ecological, economic, social and institutional research.



5. Next steps

The workshop marks an important step in the development of a research agenda for multicropping in the UK. The discussions highlighted both immediate research opportunities and longer-term systemic challenges, while also identifying a strong appetite for continued collaboration across disciplines and sectors.

AGRIIH will build on the outcomes of the workshop by:

- Refining the emerging research agenda and identifying opportunities for future funding.
- Strengthening collaborations between researchers, farmers, practitioners and other stakeholders.
- Exploring opportunities to develop a network of farmer-led field sites and demonstration farms to support future research and knowledge exchange.
- Developing interdisciplinary research proposals that address the priority themes identified through the workshop.

The workshop report is intended as a starting point rather than an endpoint, providing a shared foundation for future collaboration, research and innovation around multicropping in the UK.

To learn more about AGRIIH, get involved, or explore partnerships



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