Agroforestry and nature in the UK

> **Key Points**
> - Agroforestry has the potential to provide a range of **nature, climate and on-farm benefits** but careful consideration is needed to avoid unintended adverse outcomes
> - Supportive schemes which include **in-person advice**, **flexibility in planting design** to accommodate site-specific factors, appropriate **monitoring and evaluation** and **long-term commitments** as well as support of **peer-to-peer knowledge exchange** will be central to economic viability and widespread uptake
> - Linear agroforestry practices, such as **hedgerows, riparian buffers,** and **shelterbelts**, can be prioritised as more **immediate strategies for increasing farmland tree cover while also providing public and private goods**
> - **Further research on silvopastoral and silvoarable systems** in the UK is needed to better understand **impacts on biodiversity** and opportunities and challenges for implementation, management, and financial viability

Introduction

Agroforestry refers to a set of land use practices where woody perennials (i.e. trees and shrubs) are combined with livestock and/or crops within the same land management system. Agroforestry is commonly divided into silvopastoral (trees with livestock) and silvoarable systems (trees with crops), but also includes linear and boundary plantings on farms such as hedgerows, shelterbelts and riparian buffer strips.

Agroforestry and climate

Planting densities of 50–100 trees/ha have the potential to sequester between 1.0 - 4.0 tonnes of carbon per ha per year. However, net carbon benefits will be influenced by tree species and specific site conditions, such as soil type, as well as product end use. Robust site assessments and accounting are needed to inform appropriate planting options and ensure positive carbon and nature outcomes. Agroforestry can support increases in soil health and reduce wind speeds and soil erosion. 70% of UK freshwater comes from upland catchments and agroforestry can potentially play a role in flood reduction risk and water filtration while still supporting farmer livelihoods. Riparian buffers in particular help intercept nitrogen, phosphorous and pesticide runoff while providing bank stabilisation and preventing erosion.

Agroforestry and nature

Agroforestry can enhance biodiversity through increasing plant diversity, structural complexity, connectivity and provision of habitat. Effects on biodiversity will be largely dependent on species choice, management practices and location of planting. Native planting stock support a wider range of native species, contributing to biodiversity conservation aims and possibly supporting greater biodiversity-dependent benefits (e.g. greater diversity and resilience of pollination and pest-regulation communities). For climate adaptation it is important that species selected now will still be able to thrive in the future predicted climate.

Linear Agroforestry

- Shelterbelts and riparian buffers support greater farm biodiversity through provision of shelter, breeding and feeding habitat in addition to increasing soil biodiversity.
- Biodiversity benefits of hedgerows are well established, as highlighted in the RSPB's recent Mind the gap report.
- Riparian areas support communities of highly specialised fungi and insects, along with high conservation priority bird species such as the willow and marsh tit.
- Wildlife value will likely be greatly increased where livestock are excluded to allow patches of dense scrub to establish, and where placement enhances connectivity between existing woodland and creates wildlife corridors.

> **Agroforestry at RSPB Hope Farm**
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> *We are currently implementing a long-term research project looking at arable alley cropping. Our trial consists of just over 1000 trees, native to the local area, planted into an 11ha field in eight 6m alleys, 24m meters apart. Our long-term monitoring scheme will measure C capture both above and below ground, implications for biodiversity and yield implications and field economics. This trial aims to improve knowledge about alley cropping in a UK context to better inform our advisory and advocacy work.*

Silvopastoral and Silvoarable Agroforestry

- Silvoarable systems result in increases in biodiversity in relation to cropland, as well as a greater biodiversity of birds and arthropods across agroforestry systems.
- Pollination service, bee species abundance and diversity are higher across a range of agroforestry systems when compared to monocultures.
- Planting should be designed to enhance or expand habitats, and avoid displacing existing valuable habitat, particularly for priority species like curlew.

Agroforestry and on-farm benefits

Agroforestry can provide livestock shade, shelter and health benefits as well as the production of tree crops, fodder, or fuel. Reduced wind exposure and temperature stress of livestock can lead to higher weight gain efficiency and reduced mortality rates. Many woody species used for fodder production contain condensed tannins, which are connected to a range of livestock health benefits, such as reduced parasitism. While production of commercial timber products may be limited due to high management needs and challenges at scale, there is opportunity to produce a range of fruit and nut crops, or biomass for household use[1].

Supporting agroforestry in the UK

Access to advice, training and support of peer-to-peer knowledge exchange to promote appropriate planting will be essential, as well as supportive schemes across the four nations to make agroforestry economically viable. Partnerships should be supported between scientists and landowners to encourage ongoing monitoring of on-farm climate and nature impacts of agroforestry adoption, feeding back into the evidence base for appropriate planting strategies. Efforts to support local supply chains and strengthen markets for products produced can help reduce the perceived and real risk of diversifying farm income through uptake of tree crops.

> **For further information contact:**
> Ro Osborne, ro.osborne@rspb.org.uk

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[1] Provided that the system is drawing down more carbon than emitted through burning over short timescales