Initial Stakeholder Meeting Report
Silvoarable Agroforestry in the UK

Work-package group 4: Agroforestry for arable farmers
Specific group: Silvoarable agroforestry in the UK
Date of meeting: 18 November 2014
Date of report: 21 November 2014
Location: Wakelyns Agroforestry, Fressingfield, Suffolk, UK, IP21 5SD
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1. Context

The AGFORWARD research project (January 2014-December 2017), funded by the European Commission, is promoting agroforestry practices in Europe that will advance sustainable rural development. The project has four objectives:

1) to understand the context and extent of agroforestry in Europe,
2) to identify, develop and field-test innovations (through participatory research) to improve the benefits and viability of agroforestry systems in Europe,
3) to evaluate innovative agroforestry designs and practices at a field-, farm- and landscape scale, and
4) to promote the wider adoption of appropriate agroforestry systems in Europe through policy development and dissemination.

This report describes one of about 40 initial stakeholder workshops to address objective 2. Further details of the project can be found on the AGFORWARD website: www.agforward.eu

2. The system

Silvoarable systems are currently rare in the UK. The few systems that exist are usually based on an alley cropping design with arable crops in the alleys. The tree component consists either of top fruit trees (apples, pears and plums), timber trees, or coppice trees for woodfuel. The first stakeholder workshop of the silvorable AGFORWARD group in the UK was held at Wakelyns Agroforestry in Suffolk. This is an organic silvoarable research site that was established in 1994 on 22.5 ha on the Suffolk/Norfolk border in eastern England (52.4°N, 1.4°E). It incorporates hazel and willow coppice, and a mixed timber and fruit tree system, with cereals, potatoes, field vegetables and fertility-building leys in rotation within the alleys (Figure 1). Within the 2 ha mixed timber and fruit tree system, a diverse mix of 21 varieties of apple trees are interspersed with seven timber species, in north/south rows with 12 m-wide crop alleys between adjacent rows. The short rotation coppice systems consists of twin rows of either a mix of five varieties of willow (*Salix viminalis*) or hazel (*Corylus avellana*) with 10-12 m wide crop alleys between (Figure 2).

Figure 1. Wakelyns Agroforestry: timber and apple system (left); hazel short rotation coppice system (top right)

Figure 2. The willow short rotation coppice system at Wakelyns.

3. Description of participants and system visited

The initial meeting was attended by nine stakeholders (Figure 3). Seven people were either arable farmers with existing silvoarable systems or those interested in establishing silvoarable systems on their farms; there were also two participants from the Woodland Trust, a UK-based charity that supports woodland establishment and management. The meeting was also attended by three staff from Wakelyns Agroforestry and four staff from the Organic Research Centre (ORC). The meeting started at 10.30 and lasted until 15.00 (Table 1).

Figure 3. The stakeholder meeting was attended by nine stakeholders, four staff from the Organic Research Centre, and three staff from Wakelyns Agroforestry.

During the introduction to the day, participants were asked to complete a questionnaire. A number of participants were then asked to feed back to the group the main benefits and challenges of integrating trees and arable crops which included the benefit to biodiversity, increased profit, market risks, and management costs.

Table 1. Schedule for the meeting

10.30	Arrival and coffee
11.00	Introduction and aims of the day (Jo Smith, ORC)
11.20	Introduction to Wakelyns Agroforestry (Martin Wolfe, ORC)
11.30	Farm tour of hazel short rotation coppice and mixed timber silvoarable systems. Discussion of benefits and challenges of managing these systems.
13.00	Lunch
13.45	Whitehall Farm Agroforestry: drivers, benefits, challenges (Stephen and Lynn Briggs)
14.15	Workshop: identifying opportunities and innovations (all)
14.50	Next steps: network and research (Jo Smith)
15.00	Workshop close

4. Issues raised on the tour

Following the introductory presentations, the group went out for a tour of the agroforestry systems at Wakelyns led by Martin Wolfe. The main points and topics discussed during the tour of the hazel system were:

- Management of hazel and willow tree roots to stop encroachment into the alley ways through root pruning via ploughing.
- The productivity of different species for biomass and their rotation lengths – average annual production for willow and hazel are more or less the same despite different cutting regimes.
- Issues with compaction in the alleys due to management and harvesting of the tree components – this was said to vary with soil type and ground conditions.
- How to manage the edge and understory and whether it acts as a reservoir for arable weeds – different flower mixes and methods of management were discussed.
- Alley width was discussed regarding minimizing shade while maintaining positive interactions between the tree and crop components.
- The mechanical challenges of managing the system.

Within the mixed fruit and timber silvoarable system the following topic were discussed:

- Can agroforestry systems produce quality timber in low planting densities?
- The rapid growth and regeneration of tree species in the system.
- Benefit to biodiversity.
- Carbon sequestration potential of the system.
- Reduction of scab on apples due to increased wind flow between the alleys and tree diversity.
- Use of pollarding to reduce shading.
- On-farm value addition.
- Issues with pollination of the apples and pests such as squirrels.

An example of a silvopoultry system in rotation with arable crops was also visited. The following topics were discussed:

- The time taken for the chickens to move around the whole system – whether this would cause patchiness in soil fertility.
- Increased foraging habitat.
- Whether there was an increase in predators such as buzzards and foxes due to the agroforestry system.
- Need to research which trees are most beneficial to the birds, for example in terms of food and seasonal shelter.
- The importance in managing the tree component in silvopoultry systems.

A presentation was then given by Steven Briggs on his silvoarable apple orchard system. The main points discussed were:

- The need to establish wild flower mix strips well before planting the trees (+1 year) .
- Issues with poor quality tree supports which now require constant repair.
- Pollination issues with apple trees due to low density.
- New guards were needed due to tree damage by hares.
- Issues with pigeons causing branch breakages.
- Myplex which suppressed weeds well during establishment now causes issues when mowing.
- Issues with security (apples have been stolen).
- Disease has been low in the system.
- Yield expectations are difficult to compare to a conventional system.
- Although trees only require pruning in addition to harvesting, this is labour intensive.
- Issues with short term tenancy and the planting of timber trees.
- Care must be taken if using woodchip as an alternative to Myplex due to disease
- Biodiversity has increased although key farmland bird species such as lapwing have relocated to other fields with no trees.
- Biodegradable covering for weed control is thought not to last long enough for tree establishment.

5. Issues and challenges raised

Following the farm tour, Dr Jo Smith led a workshop with the participants to identify the main benefits and challenges of silvoarable systems and to identify some ideas as to what innovations could be trialled to address these challenges. Participants were asked to write on post-it notes the key benefits of silvoarable systems and the main challenges (Table 2), and suggest innovations or solutions to addressing these challenges (Table 3), and allocate these to three categories: the tree component; the arable component; the whole system.

Table 2. Key benefits and challenges of silvoarable agroforestry as identified by the participants

	Arable component	**Tree component**	**Whole system**
Benefits	Reduce wind and soil erosion Reduced evapotranspiration Lower disease/pest pressure Easier to spray	A marketable product e.g. fuel and fruit Carbon storage Pest and disease resilience Biophysical interactions: microclimate, nutrient recycling, erosion	Increased biodiversity over whole farm Multi-crop approach reduces risk Jobs CSA potential More sustainable Higher overall productivity (LER) Human health: mental and physical Education: ecosystem services Opportunity for new farmers Create one's own habitat Community involvement Diversify income
Challenges	Quantifying reductions in soil loss Weed migration from edges Lower crop yield Encouraging breeders top develop adapted varieties Labour extra time regarding diversification Conversion from intensive high input	Peer pressure – tradition Predicting economics- tree productivity Coordinating harvesting and marketing Tree form in an open system Lack of accessible evidence/information Tree stake quality Number of tree species V diversity of product Renewing old agroforestry systems Managing trees – How? Farm managers not used to working with trees Squirrels, rabbits, deer Quality of produce Mechanical challenges during harvest Single farm payments, regulations Tree growth quicker under agroforestry Managing tree pests – birds Trees shading crops	CAP reform – SFP & NELMS Changing farming attitudes Knowledge transfer Land tenure Over-diversification – unable to manage all components to a high standard Complexity and time for management Government/EU policy Climate change – crops and trees Planning – time constraints

Table 3. Solutions and innovations identified by the participants

Arable Component	Gaining extra crop from understory of cut flowers, herbs, berry bushes Which crops interact best with which tree species/system? Research soil protection issues Reduction in pesticides Using cereal populations to adapt to agroforestry environment
Tree component	Test a wide range of different trees Maximizing biodiversity Methods of renewing systems at end of life Finding an end market before planting – which trees have proved best in the past? Wild flower sowing after planting Different guards and tree supports Pollarding to reduce shade Weed control – woodchip vs myplex Nitrogen fixing trees Carbon sequestration potential over whole life span of system Marketing and branding e.g. woodland eggs Diversity of ages of trees? Disease resilience? Wider species choice – robina, hazelnut, paulownia, olives
Whole system	Innovative tenancy/ share farm models, and flexible land tenure arrangements Interactions between crop/tree and soil biota Visits to other sites – as many as possible More R&D on crops , tree species and climate change Knowledge transfer Go into new markets – carve a new niche for the business Sharing experiences of these systems Identify effective combinations – focus on LER but factor in market value and labour Investigate social/health benefits Government/EU policy Potential for carbon rewards

6. Potential innovations

Participants were then asked to read through all the suggested innovations and choose the two that were most important to them. These were then ranked according to number of votes:

Solutions and innovations	**Votes**
Reductions in pesticides?	4
Wider species choice – *Robinia*, hazelnut, *Paulownia*, olives	3
Potential for carbon rewards	3
Flexible land tenure arrangements	3
Government/EU policy	3
Gaining extra crop from understory of cut flowers, herbs, berry bushes	2
Using cereal populations to adapt to agroforestry environment	2
Carbon sequestration potential over whole life span of system	2
Marketing and branding e.g. woodland eggs	2
Methods of renewing systems at end of life	2
Maximizing biodiversity	2
Investigate social/health benefits	1
Effective combinations of components – LER but also market value and labour	1
Sharing experiences of these systems	1
Nitrogen fixing trees	1

Topics further discussed following this exercise included:

- Diversity in the age of trees to increase resilience to disease
- Whether there were difficulties in finding contractors willing to work in such systems
- The use of volunteers and community groups for planting
- Prefereable alley widths – 24 m was thought to work for most machinery
- The importance of learning from mistakes and sharing these experiences

Potential innovations looking forward

Potential innovations that could be further investigated in on-farm trials are

- Reductions in pesticides – compare pesticide use and pest damage in agroforestry and monocultures
- Wider species choice – *Robinia*, hazelnut, *Paulownia*, olives – establishment trials
- Potential for carbon rewards – modeling of carbon and potential for carbon rewards
- Flexible land tenure arrangements – development of different business models
- Government/EU policy
- Gaining extra crop from understory of cut flowers, herbs, berry bushes – trials of different understory management
- Using cereal populations to adapt to agroforestry environment
- Marketing and branding e.g. woodland cereals?

Identifying those producers willing to participate in the research

Several of the farmers expressed an interest in collaborating in future on-farm research. These included those with (recently) established systems (1-5 years) and those who are planting new systems this autumn.

7. Acknowledgements

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