



## Initial Stakeholder Meeting Report Grazed orchards in Northern Ireland, UK

**Work-package 3:** Agroforestry with high value trees

**Specific group:** Grazed orchards in Northern Ireland, UK

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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](http://www.agforward.eu)

## 2. Description of system

Apples are the main fruit produced in Northern Ireland, with 99% being of the “Bramley” apple variety. The other 1% is made up of cider and dessert varieties. In March 2012, the Armagh Bramley Apple gained Protected Geographical Indication (PGI) Status. Currently 96% of production is in County Armagh which is also known as “The Orchard County”. The annual rainfall is up to 2000 mm and the mean temperature is 3°C in winter and 18°C in summer. The soils in the area are highly fertile, silt-loam or clay-loam, high in calcium and essential nutrients with a pure and abundant supply of water.

The apple industry in Northern Ireland has 223 Independent growers farming 1506 ha of orchards, with a typical field size of 1.5 to 4 ha. The tree spacing varies with the rootstock used: the M9 dwarfing rootstocks are widely used with a typical spacing of 4 m between rows and 1.5 m between trees. The field boundaries are planted with windbreaks or hedgerows of mixed woody species. The area below the windbreaks is generally left unmown, producing a dense understorey. Grass strips between trees mowed regularly. Pruning is carried out manually in the summer and winter. To aid pollination, honey bees are brought into the orchards during the flowering period.

Across Northern Ireland, approximately 35 tonnes of pesticides are applied each year (2012 figure) primarily as fungicides to prevent the main disease Apple Scab (*Venturia inaequalis*). A typical spray regime involves fungicide applications every 10-14 days from May (flowering) to end of July. There will also typically be one application of an insecticide each year and two herbicide applications per year.

The industry employs directly about 300 full time workers and 450 casual staff. Other industries such as handling, packing, juicing and cider making also generate further employment. The apple industry in Northern Ireland produces an average 30-45,000 t/year. Of this about 12-15% is sold fresh with a market value of £6.3 million, 60-70% to an added value market worth £7-8 million, and 25-30% to juice. It is estimated that 35% of fresh apples are exported to Republic of Ireland and the rest of the UK. It is estimated that the total annual value of the apple industry in Northern Ireland is £13.3-14.3 million.

The other component of the grazed orchard system is sheep management. There are about 1.9 million sheep in Northern Ireland. These are managed by about 20,000 beef and sheep farmers (no distinction is made) and the average farm size is 35.5 ha. More work is needed to find which of these might be suitable for silvopastoral systems, but there is a large potential. While this workshop was for apple growers, most attending were also sheep producers and so this lays the basis for a ruminant workshop (WP5) which is planned for early 2015.



Figure 1. Photo of a grazed orchard at AFBI Loughgall

### 3. Participants

The meeting was attended by nine stakeholders; four apple growers, one industry representative (Secretary, Northern Ireland Fruit Growers Association), one AGFORWARD researcher from Cranfield University and three AFBI staff. Each of the four stakeholders who completed a questionnaire were involved in orchard management. The area of the orchards ranged from 2 to 26 hectares. Three of the four respondents stated that they did not currently manage an agroforestry system however in discussions all four grazed their orchards with sheep. Three respondents were between 35 and 50 while the fourth was over 65. The gender mix of attendees was two women and seven men. Eight of the stakeholders were from the Co. Armagh area in Northern Ireland and one from Cranfield University in England.

### 4. Introduction session

The meeting was hosted by the Agri-Food and Biosciences Institute, (AFBI) Loughgall. The meeting started at 14.00 and lasted until 16.45.

Professor Jim Mc Adam welcomed attendees to the meeting and gave an overview of the AGFORWARD project (2014-2017). He described how the project was to use participatory research (between grower and researcher) and the aim was to set up a stakeholder group in Northern Ireland (NI) focused on orchard grazing and sheep production systems. While this group mainly concentrated on grazing in orchards, the workshop also covered agroforestry for ruminants (sheep) and a wider ruminant group would be set up in due course.

The aims of the meeting were to

- provide an overview of the European AGFORWARD project,
- provide literature relating to agroforestry with high value trees
- setup an AGFORWARD stakeholder group for Northern Ireland to promote knowledge of agroforestry with high value trees and ruminant systems
- get stakeholders' ideas and opinions on the feasibility of grazing in conventional orchards and modern (high density) orchards
- encourage producer involvement in future trials

The discussions were held on the attendee's views of grazing orchards. An information booklet was issued to each attendee, references included are listed in point 9 below.



Figure 2. Group discussions on the opportunities and challenges of grazed orchards

The workshop leader presented results of a pilot grazing trial carried out by AFBI, when six sheep were placed in an orchard for four days in early August 2014 (Table 1 and Table 2). The main observations were that the sheep grazed the leaves up as far as they could reach. However they DID NOT strip the bark on any of the trees. (In previous trials, the sheep had debarked ash trees). In general terms, the apple yield was considered to be relatively unaffected. The plan was now to graze post-leaf drop and assess fungal carry-over, and to graze a mature orchard which already has a higher canopy height

Table 1. Effect of sheep grazing for four days in August 2014 on the mean height to the leaf canopy and on grass height.

	Mean height of leaf canopy (cm)	Mean height of grass (cm)
Before grazing	76	26.3
After grazing	109	8.7

Table 2. Effect of sheep grazing on apple yields in an unreplicated trial.

	Net weight of picked apples (kg)	Net weight of dropped apples (kg)	Net total weight of apples per plot (kg)	Mean apple yield per tree (kg)	Apple yield ( $t\ ha^{-1}$ )
No grazing	352.0	41.3	393.3	21.85	19.66
Sheep grazing	364.2	35.4	399.6	19.98	17.98

## **5. Oral comments during the meeting**

A wide range of oral comments were made during the meeting which are described below.

### **Timing of grazing**

One participant grazes sheep in his orchards from the start of March when the grass is young and sweet. If the orchard has young trees the sheep only stayed for a few weeks. Another applied the sheep from March to November removing them only around April when fresh buds formed on the trees and to allow the grass to grow so that he could harvest a cut of hay. A participant with a flock of pedigree Shropshires kept them on the orchard over the whole year.

### **Age of trees**

The Shropshire sheep breed had successfully been grazed in 2-year-old trees all year round with no damage. Other participants with mixed breeds were wary of the trees being so young.

### **Stocking rate and damage to trees**

It was suggested that as the apples weigh branches down, sheep ate the leaves on these branches, but did not touch the apples nor did they chew the end of the branches. It was noted that if the stocking densities were too high and there was not enough grass the sheep would eat the leaves and bark and a lot of damage can occur in just one day. The importance of attention to management detail was noted. One participant suggested that sheep would not affect the trees above the browsing line of 1.2 m, this was especially true of Shropshires. A participant with 19 ewes and 1 ram grazed 1 acre of orchard and 5 acres of other pasture. Lambs all sold for breeding as soon as they are weaned. Others in the group considered this an intensive system but good going!

### **Advantages of sheep grazing in orchards**

The participants found that grazing sheep reduced the need to mow and improved soil aeration. Grazing reduced the need to strip spray the orchard resulting in cost saving and less need for chemical applications. Grazing was also perceived to reduce the transmission of dirt to the apples via up-splash during rainfall, and during harvesting activities which results in the fruit lasting longer in the storage facilities. Sheep will eat the leaves as soon as they drop - not brown leaves, but green leaves that have fallen.

### **Grass species**

It was suggested that annual meadow grass was not good for grazing.

### **Loss of crop**

Although the sheep do eat windfall apples off the orchard floor it was suggested that if the sheep were managed correctly there would be no noticeable reduction in yield (which generally matches the AFBI trial results). However it was important to learn to manage the sheep to create 'the right balance'. However, there is no researched evidence to clarify if there is a loss in yield.

### **Chemical applications and sheep grazing**

One participant, although grazing sheep in the orchard, still uses a typical spray regime for apple scab. He removes the sheep from the orchard prior to spraying and restocks after spray has dried.

Insecticides would harm the sheep, but fungicides are not considered to be harmful. Another in the group does not take the sheep off at all even during spraying.

### **Shropshire sheep**

The Shropshire breeder gave an overview of his business. He sells to Prince Charles who has a flock at Hillsborough (Princes Trust). The approximate cost is £80/£90 per lamb. Shropshires are no longer on the Rare-Breeds survival list. To get true pedigree Shropshire is still challenging in NI. £250 for good pedigree ewe and £1000 for pedigree Shropshire ram. Breeding for meat is not so important. The ARARR genotype is Scrapie free. The Shropshire Society in England sets the annual price for lambs. Shropshire breeders must register all lambs with the Society each year for which there is a fee. He noted that Shropshires have short legs, they do not stand as tall on hind legs and they do not damage trees. It was suggested that if the sheep used were not pure breed Shropshires they would damage the trees.

### **Other breeds**

One attendee suggested that the breed "Ossant" a dwarf sheep which had the characteristics of a goat could be used to graze orchards. Another agreed but stated Ossants would eat the bark if not protected by a tree guard and the breed was a 'nightmare' to lamb. It was also noted that ewes in lamb do not eat the bark

### **Other suggested livestock for grazing orchards**

The small breed of cattle – Dexters were suggested as alternative to sheep. They are small and were thought to not damage the trees by eating the bark or rubbing.

### **Sheep and harvest interval and product contamination**

A 56 days harvest interval (ref Bulmers) from grazing sheep to harvest was discussed and the potential of fruit contamination by faeces getting from soil onto boxes/bins to the apples.

*Direct contamination of the apple by the faeces:* it was suggested if the sheep were in the orchard they would eat the windfalls so there would be no contamination directly to the apples.

*Indirect contamination:* take out sheep two or three weeks before harvest would probably remove this problem.

### **Fencing the orchard for sheep**

The Shropshire breeder suggested that Shropshires were are not hard to fence; he said he doesn't need any fencing but others used Tapered electric fencing to allow sheep to get into the base of the tree, but not damage the trees, One person runs electric fencing along the tree row hooked onto the planting stakes. It was noted that non-Shropshire sheep needed to be fenced for the whole time.

### **Fertilising the orchard**

One grower sprays seaweed as a foliar spray on trees and grazing areas, once or twice a month with no other fertilizer being applied. Another uses an NPK mix. It was suggested that the sheep droppings fertilise the land and by not using artificial fertilizers he felt there was more oxygen in the soil. Further, the sheep droppings had the advantage in that artificial NPK lowers the soil pH.

### **Apple diseases**

As there was no experimental research evidence it was unclear if grazing in orchards lowered the amount of apple scab inoculum carried over from one year to the next. It was noted that sheep only eat green leaves and ignore those which have turned brown. To reduce scab inoculum on the orchard floor the sheep would need to graze the orchard throughout the leaf fall period.

### **Sheep pests and disease**

By strip grazing the growers allowed the grass to freshen up between grazings, this helped to reduce the worms and fluke load. However one grower doses the sheep 3-4 times per year as this he said was cheap compared to the price of a sheep, while another doses every 6 weeks.

### **Grants and subsidies**

It was reported that mixing trees and animals was supported in European Union Common Agricultural Policy. It was reported that the Department of Agriculture in Northern Ireland would implement an agroforestry option in the 2014-2020 Rural Development programme. Such land would be eligible for forage area and Single Farm Payment.

## **6. Field visit**

The participants then made a field visit to the AGFORWARD orchard site at AFBI Loughgall where a replicated autumn experiment had just begun with and without sheep grazing plots after harvest. The orchard planted in 1998; the orchard consists of two apple varieties

- 1) Dessert – Jonagold, tree spacing 4 m between rows and 1.5 m between trees, 1485 trees/ha, rootstock M9.
- 2) Cider – Coet-de-linge tree spacing 5 m between rows and 2 m between trees, 1485 trees/ha, Rootstock MM106.



Figure 3. Participants to the workshop view the orchard grazing trial

## 7. Ranking of positive and negative aspects of grazed orchards

The participants were asked to complete a brief questionnaire which sought to highlight the key positive and negative aspects of grazed orchard systems. Of the four participants who completed the forms, one person did not indicate choices for the aspects table, one ticked all positives and numbered them all, while the other two filled in their choices for positive and negative aspects and gave ratings of 1 to 6 (Table 3). As general feedback, participants found this questionnaire difficult to understand.

Table 3. Positive and negative aspects of a grazed orchard system as ranked by two respondents

Positive issues	Ranking by 2 respondents		ii) Negative issues	Ranking by 2 respondents	
Animal health and welfare	1		Complexity of work	1	2
Profit		1	Cost of fencing boundary	6	1
Crop or pasture production	2		Inspection of animals	2	
Subsidy and grant eligibility		2	Administrative burden	3	3
Timber/wood/fruit/nut quality	3		Regulation		3
Reduce chemical usage		3	Labour	4	5
Management costs	4		Loss of predation		4
Income diversity		4	Farmer Image	5	
Landscape aesthetics	5		Market Risk		6
Business opportunities		5			
Biodiversity and wildlife habitat	6				
Farmer image		6			

Of the four respondents, three gave a written answer to the question: “what constraints and challenges could be addressed by changes to an existing agroforestry system or establishing a new agroforestry system”. The answers were:

- Grazing management guidelines: one respondent noted the need to learn how to manage sheep.
- Sheep breed: one respondent noted the need for a breed of sheep that will not damage trees.
- Environmental benefits: one respondent considered that grazed orchards would reduce the reliance on and the cost of herbicides.
- One felt that soil condition would improve due to reduced chemical use.

## 8. Potential innovations

One respondent gave written responses to what were potential solutions or research themes.

1. The use of Shropshire sheep to graze orchards to reduce the use of chemicals.
2. To improve income through diversification with sheep as an additional produce
3. Grazing of leaf litter to reduce apple scab infections.

One respondent gave written responses to further comments:

- Grant Aid: the respondent required information on how to access grant aid to implement grazing systems in orchards.

All four people completing the questionnaire indicated that they would be interested in supporting research related to orchard grazing on their holdings.

## 9. References

The following references were provided to each participant or quoted in the meeting

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## 10. Acknowledgements

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