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Whitehall Farm: An Innovative silvoarable orchard system in the UK

Source: Ian Knight (ABACUS)

Throughout the world the practice of growing crops in between trees has been carried out for centuries. Since the industrial revolution, farm mechanisation has led to decline in this practice as largescale agriculture, monocultures and commodity production has driven farming towards the economies of scale. In the UK deforestation has significantly reduced the numbers of trees within the farmed landscape. Planting trees on farms is now being reconsidered as part of the long-term solution for sustainable agriculture.

Picture 1: Wheat and walnut tree agroforestry, Les Eduts, France (Jollet, C)

As part of this recognition in the value of tree in agriculture there has been a growing interest in agroforestry research and the delivery of practical advice to encourage farmers to adopt this age-old practice. Research has shown the multiple benefits agroforestry brings to farming systems with the capability of increasing land productivity, diversifying farm income, enhancing biodiversity whilst protecting soils and the environment. We also see a recent growing emergence of interest amongst farmers in multi-cropping arable and horticultural crops and trees as a system known as silvoarable agroforestry. This allows short term income from crops to be maintained whilst rows of trees mature and start producing an additional longer-term income.

At Whitehall Farm near Peterborough, Cambridgeshire tenant farmers Stephen and Lynn Briggs have become modern agroforestry pioneers in silvoarable production. Whitehall Farm is a 100 hectare stockless organic arable farm located on fenland peat soil growing field scale vegetables, cereals alongside fertility building grass clover leys.

Since moving to Whitehall Farm Stephen and Lynn's main aim has always been to take advantage of the soil type (highly fertile) whilst developing an organic farming system that would balance productivity and environmental protection. As tenant farmers, Whitehall Farm has also had to be commercially viable and produce a strong financial return to be able to cover high fixed costs.

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The area surrounding Whitehall Farm suffers significant wind erosion when the light fen peat is cultivated and dry, infamously know as 'The Fen Blow'. As soil scientists and organic farmers both Stephen and Lynn were all too aware of the implications of soil loss which could pose a threat to long-term sustainability of their farm business.

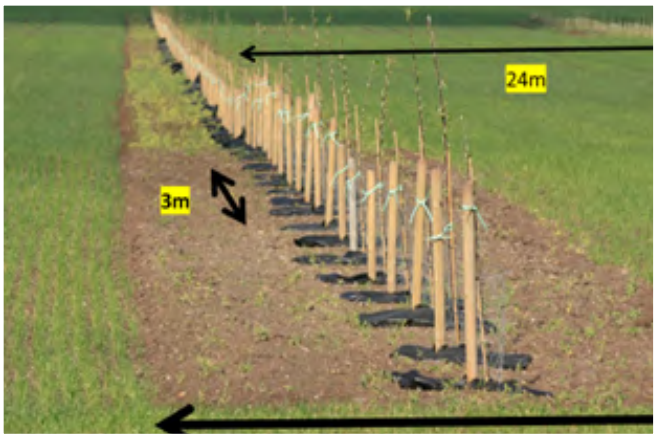
Picture 2: Wind erosion of peats soils near Whitehall Farm aka 'The Fen Blow', (Briggs, S)

Agroforestry was a light bulb moment for Stephen who embarked on an International Nuffield Scholarship to learn how agroforestry practices were carried out throughout the world to bring these lessons back for his own farm business and to encourage UK farmers to adopt similar more sustainable methods of farming.

As tenant farmers long term land tenure was a significant obstacle when approaching the establishment of the new agroforestry enterprise. Fortunately, Stephen and Lynn were able to negotiate a renewal of their farm tenancy over a period of fifteen years which provided a long enough cropping cycle for the apple trees to create a viable economic return from the capital investment required to plant trees. In the UK land tenure is most often very short term on 3 – 5 year which creates a significant barrier for other farmers to consider adopting agroforestry.

After careful research apple trees were shown to deliver significant multifunctional benefits to the farming system. Apple fruit and juice would generate sufficient economic return over the fifteen year farm tenancy whilst diversifying cropping, creating a strong mix of enterprises with climate resilience, utilising annual cereal and perennial trees together reducing pest, disease risks and protecting soils.

The Whitehall Farm silvoarable orchard system was planted across 52 ha of arable land in 2009. A mixture of thirteen fruiting and juicing apple varieties on semi-dwarf rootstocks were planted in the autumn. Key characteristics of varietal choice were taste, storage, disease resistance and late ripening, with the latter utilised to extend the harvesting window on the farm. Late ripening provides an opportunity to harvest cereal crops in the late summer before hand picking apples in early autumn.



Picture 3: Apple tree planting layout at Whitehall Farm, 100 trees per hectare, (Briggs, S)

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At Whitehall Farm where 4,500 trees were planted across 52 hectares of arable land, with apple trees only occupying 4 ha (8%) leaving 48 ha (92%) for arable cropping between the tree rows. In the UK orchard planting 1,000 trees per hectare is common, compared to 100 trees per hectare within the silovarable orchard system at Whitehall Farm. This low density reduces establishment and fixed costs without investments in specialist orchard machinery, allowing for the continuation of a productive arable system with very little trade-offs in yield from tree shading. Trees were planted in a north to south row orientation to remove the impact tree shading has on growing arable crops within the rows. This orientation helped reduce wind erosion by interrupting the predominantly south-westerly wind which blows across the flat fenland region. Tree pruning is restricted to a tree height of 3 to 4 metres which reduced shading whilst effectively interrupting the wind flows across the farm.

Picture 4: Ally crop establishment of spring cereals, (Briggs, L)

The agroforestry design comprised individual tree spacings of 3 metres within the row with 27 metre allies in between the tree rows, leaving a 24 metre wide access which suits large arable farm machinery. A 3 metre understorey was planted with a nectar flower seed mixture of clovers, vetch and perennial wildflowers. These would suppress the ingress of weeds underneath the apple trees and also provide an important habitat for pollinators and beneficial insect predators which are crucial for the fruits trees and for the organic farming system which does not use pesticides.

The capital investment was significant with 52 hectares of silvoarable system costing £65,000 to establish. The trees matured and started yielding at full production in the fifth year and will continue with a peak yield expected in 15 years' time. Gross margins per hectare are similar to the surrounding organic cereal crop at £1,000/ha.

A core theme to the business plan at Whitehall farm is to add value and control the supply chain for produce from the farm. Adding value to cereals is difficult so organic premiums and gluten free markets are utilised to achieve improved crop returns. The scope to increase returns from apples through juicing and direct sales has shown potential and to maximise on the farms location Stephen and Lynn have recently opened a farm shop (www.harvestbarn.co.uk) in order to develop a new more valuable retail sales market for apple products, juices and now much more local produce from farms in the surrounding area.

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When speaking to Stephen Briggs he explains "Agroforestry has brought many benefits to our farm and business and has delivered everything we wanted. It makes us more profitable and delivers the soil protection we were aiming for with the added benefit for farm wildlife and biodiversity."

Stephen would like Governments to take a lead role to encourage the adoption of multi-functional land use; "Nature doesn't do monoculture. If you do nothing with your land for 40 years nature will revert it to trees and bushes - this should guide you that it's what nature wants to do."

Picture 5: Stephen Briggs, organic farmer pioneering agroforestry innovation at Whitehall Farm (Briggs, L)

Agroforestry has enhanced this principle and silvoarable production at Whitehall Farm has enabled Stephen and Lynn to develop a productive farm business whilst protecting soils and increasing the biodiversity on the farm.

More info here:

https://www.agricology.co.uk/field/farmer-profiles/stephen-briggs

https://youtu.be/63VYutmrRvY