

AGROFORESTRY ON ELM FARM, THE ORGANIC RESEARCH CENTRE



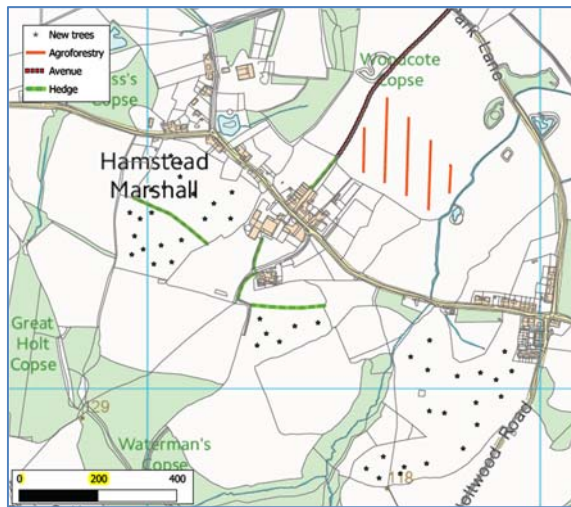
The Organic Research Centre headquarters has been based on Elm Farm, an 85 hectare organic livestock farm in Berkshire since 1980. It is currently managed by a local tenant farmer who uses it primarily as a base for raising beef cattle (British white x Jersey, a small frame cow). The farm has an average annual rainfall of 71cm and the soil type is mainly Wickham Series clay, poorly drained clay loams susceptible to structural damage.

Over the last few years we have been developing the woody resources on the farm using an agroforestry approach. There have been three main activities that we will visit:

- New tree and hedge-planting scheme
- Silvopastoral trial integrating SRC and livestock
- Managing hedgerows for woodfuel

NEW TREE AND HEDGE PLANTING AT ELM FARM

Funded by the Woodland Trust in partnership with PUR Project and AccorHotels



Tree Avenue (planted March 2014)

Aim: to create a new landscape feature including fruit trees for organic cider production

Species (100 trees):

sweet chestnut (10), oak (10), field maple (10), rowan (10), hornbeam (20), cider apples (26), pear (5), dessert apples (9)

Spacing: 5m

Protection: 1.2m guards (half with Tubex (50), half with Ezee guards). Mulch mats

Bioenergy Hedgerows (planted March 2014)

Aim: To establish hedgerows of fast growing species, straight growth form, no thorns, suitable for bioenergy production.

Species:

hazel, sycamore, sweet chestnut, willow. Planting as mixture of 2 hazel: 1 sycamore: 1 sweet chestnut: 1 willow Trees at every 20 m (oak, hornbeam, walnut) (ratio 1.5:2:1)

Spacing: 4 plants per metre

Protection: Ezee guards and spiral guards, wood chip as weed suppressant

In-field Trees (planted March 2015)

Aim: To establish the next generation of parkland trees, some pollarded for livestock fodder

Species (50 trees): oak, small leaved lime, walnut, hornbeam

Protection: spiral guards and tree stockades, woodchip and mulch mats



SILVOPASTORAL TRIAL

Aim: to assess establishment, economics and environmental impacts of a combined bioenergy and pastoral organic agroforestry system.

A new silvopastoral system integrating short rotation coppice (SRC) and pasture was planted at Elm Farm in 2011. Two tree species have been planted: willow (*Salix viminalis*) and alder (*Alnus glutinosa*). Willow was chosen as it is the most common species used for SRC; it has also been traditionally used as a fodder and bedding for livestock. Alder was chosen as it is known to coppice well and it fixes nitrogen through association with the Actinobacteria *Frankia alni* which forms nodules on the root systems.

Main Plot Treatments: species

- pasture only (control)
- willow agroforestry, double rows of willow (mix of varieties Tora, Sven, Torhild, Tordis, Olof) with 24m between tree rows. As the willow grows the tree strips will be 3m wide so there will be 21m of pasture alley between
- alder agroforestry, as for willow
- willow/alder mix agroforestry, as for willow

Three replicate blocks with coppice rows running north/south. In total the experimental plots occupies just under 3.5ha. Planting densities are 0.7m between twin rows and 1.0m within rows (833 trees/ha of agroforestry or 6670 trees/ha within tree row).

Management

Establishment rates were initially low due to dry springs in 2011 and 2012 and there was a high level of replanting. Trees were coppiced after one year to encourage multiple branching. Fabric mulches and woodchip were used for weed control and electric fencing was installed around the field boundary. A silage cut was taken once or twice a year for the first four years, and cattle were introduced in August 2015. A controlled browsing trial showed that cattle preferred eating willow to alder initially but started also eating the alder after a week. The alleys were ploughed and seeded with oats for whole-crop silage in 2017; this will be followed by re-seeding with a diverse pasture seed mix in late summer 2017.

Parameters assessed:

- Economics of establishment and management
- Productivity – growth rates and biomass of SRC and pasture
- Microclimate effects (soil moisture, air temp, humidity, wind speed)
- Biodiversity (vegetation, soil inverts, epigeic inverts)



PRODUCTIVE HEDGEROWS

Aim: to investigate the feasibility of short chain bioenergy production using existing landscape features such as traditional hedgerows



Despite increasing interest in managing hedges for woodfuel and the potential benefits, there is limited data and knowledge regarding the productivity, logistics and potential impacts of such systems. Research at Elm Farm aims to address this. Single species trial plots were coppiced in 2013 (3 x 15m). Harvesting machinery trials were carried out in 2014 (180m).

Assessments included cost and time taken to coppice or chip a length of hedge, chip quality (M.C., ash, C.V., particle size), biomass productivity, coppice regrowth rates and stool survival and impacts on biodiversity, microclimatic and soil carbon.

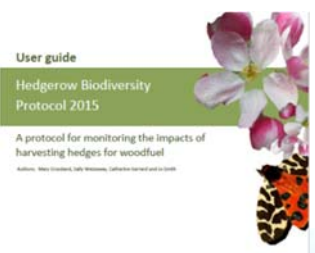


Key results

- Elm Farm has a total of length of **9.5 km** of predominantly unmanaged hedgerow. With c.5km suitable for coppice management, on a 15 year coppice cycle this equates to **300-400m/ year**
- Average yield was **8.2 tonnes per 100m** (range 4 to 13t) at 30% moisture
- This equates **c.30t /year**, enough to heat a typical farmhouse boiler (30-40kW) which uses 30-40t seasoned chip/ year

Woodfuel quality: All the hedgerow woodchip samples passed the BS EN standards and ÖNORM G30 standards for particle size distribution and as such were saleable on the open market.

Biodiversity: Coppice management for woodfuel is likely to have both positive and negative impacts on the wildlife of individual hedges and on biodiversity at a landscape scale. To address this, alongside the trials a protocol has been developed to assess the likely impacts on biodiversity.



For more information and publications see <http://tinyurl.com/TWECOM>

