Field Visit Report 2011

In the afternoon the delegates visited **Whitehall Farm**, Ramsay Road, Farcet, Peterborough PE7 3DR, by kind invitation of Stephen and Lynn Briggs. Stephen and Lynn have recently taken over the farm on a fifteen-year tenancy, and have converted it to organic production. It occupies 51 ha of fenland soil (high organic content and high water table) just outside of Peterborough. The farms surrounding Whitehall Farm are characteristically carrying out conventional practices for cereal and vegetable production.

After conversion to organic production, Stephen and Lynn planted an organic agroforestry system with apple. Trees of 13 varieties of apple (9 commercial and 4 traditional) were planted 3 m apart in rows orientated north east/south west in October 2009. The rows are 3 m wide and 27 m apart, giving alleys of 24 m that can be sown with organic crops. Within the tree rows, the density of trees is 1111 trees ha^{-1}, giving a higher density than in conventional orchards, although across the fields as a whole the density is only 247 trees ha^{-1}.

Before planting saplings, the tree rows were sown with a wild flower seed mix, with legume species included. The species were ox-eye daisy, knapweed, red campion, medic, red clover and white clover (and sainfoin in one of the fields). At the time of our visit the ox-eye daisies had come to dominate these tree rows. The saplings were then planted into predrilled and staked holes, with each row comprising only one apple variety. A wire mesh tree guard was put round each sapling and a plastic mulch map was inserted round the base of the stem. The apple varieties had been selected to be late maturing, so that harvesting of the crops in the alleys can occur before picking of the apples commences. At the time of our visit it could be seen that some of the varieties were producing their first fruit, although mostly harvesting of apples is not expected until 2012. Prior to this time a suitable building on the farm will need to be converted for apple storage. However, a market has already been identified for the apples, which will go into a box scheme for organic vegetables and fruit in Peterborough. The saplings have not yet grown to full height, and already the wire tree guards have had to be heightened. The saplings have been damaged by pigeons sitting on them, so 3 m canes have been put by each tree, to encourage the pigeons to sit there instead. It is intended that the trees will not be allowed to grow higher than this, and will be pruned to go sideways along the rows. Wind speeds are high in the area, which is flat and exposed, so this should minimise wind damage, although still giving shelter to the arable alleys (wind

speed is reduced up to 10 times the distance from a barrier of its height).

At the time of our visit, most of the fields were down to spring barley, which is going to be sold for seed. One of the fields was in the fertility-building stage of the rotation, and there was a ryegrass/white clover/alsike clover mix growing in the alleys. This will be offered to a local organic livestock producer for hay, as Whitehall Farm does not have any livestock, although if it cannot be sold it will be cut, chopped and left on the soil surface as a mulch. Legumes are much used for restoring soil fertility in organic farming, and we were shown a legume trial where a mixture of red clover, white clover, Lucerne, medic, sainfoin, trefoil, and four grasses had been sown. Lucerne had come to dominate, although in identical trials on other farms different species had been the most competitive.

Apple tree saplings in a spring barley crop at Whitehall Farm, showing the ox-eye daisies, knapweed and other species in the tree row. (Photograph: Paul Burgess)

Stephen Briggs demonstrating the legume trial mixture, with lucerne predominating. (Photograph: Paul Burgess)

Weeds can also be a problem on organic farms; here, fat hen was the main problem. Initial weeding of crops is carried out by harrow, followed by hand-weeding. The grass/legume ley stage of the rotation also removes many of the arable weeds that build up during the cereal stages.

The wildflower cover in the tree rows gives a good range of nectar-bearing flowers across an extended flowering season, and this has been beneficial for insects on the farm. Their distribution is currently being studied by a PhD student. The farm has also become a site for many birds, including some red-listed species. Two pairs of barn owls nest on the farm, and there have been recent sightings of a marsh harrier, although not on the day that we were present. However, during our visit a corn bunting could be heard calling.

In the afternoon the delegates were shown round **Wakelyns** (Organic Research Centre, Wakelyns Agroforestry, Fressingfield, Eye, Suffolk IP21 5SD) by Martin Wolfe.

The site, on 22.5 ha near the Suffolk/Norfolk border, was established by Martin and Anne Wolfe in 1994. The delegates were shown the experiments and trials being carried out there.

The first trial that we looked at was a trial of agroforestry with hazel, as Martin phrased it 'a large underground engine sequestering carbon'. Here there were double rows of hazel running north/south, and each complete row (or in some cases individual rows within the pairs of rows) were coppiced at different times to assess the effect of the coppicing on the relationship between trees and crops in the alleys. The hazel is used primarily for fuelling the wood chip boiler that heats the farmhouse but also in thatching, as spars and staples to hold the thatch on a roof. The material cut in the first harvest cycle is not much use, but after this it is suitable for this purpose, and with up to 4000 staples on a cottage roof it represents a worthwhile market. There are also nuts that can be harvested from the trees, and in the rows cut 4½ years ago the crop looked as if it was likely to be abundant this year.

The crops in the alleys are in rotation, and at the time of our visit comprised a legume ley (white clover, vetch, medic with some chicory) that will be cut and then composted as a means of taking soil nutrients to areas where nutrient-hungry crops such as potatoes will be grown. This approximates to making hay for livestock on a mixed farm.

Hazel intercropped with a legume ley at Wakelyns. (Photograph: Paul Burgess)

The effects of cutting the hazel on the performance of the alley crops was illustrated by the case of the potato crop in 2008. Spores of potato blight arrived in the location on 20th July, but for three weeks infection was only seen in the two western-most alleys (presumably as the other alleys were more sheltered from the prevailing wind). This effect had been expected, and the most susceptible varieties of potato had been put in the most easterly alleys (with the early varieties having already been harvested). As infection spread across the trial site, it could be seen that within each alley there was more disease on the west side than on the east side. It seemed likely that the east side of the alleys, which were exposed to the hot afternoon sun, dried out more, whereas the west sides of the alleys would have retained a higher relative humidity, so increasing susceptibility to blight. It also seemed to be the case that the trees on the westerly of the two tree rows in each pair (i.e. the tree row butting up to the east side of the alley) produced the most nuts, a sign of possible stress in the trees.

Louisa Winkler introduced the delegates to her experiment on ley/vegetable intercropping. Here a ley of crimson clover, lucerne and trefoil, had been sown with 20 cm gap rows, and a vegetable (this year beetroot) was sown into the gaps. The ley species had specifically been chosen as the crimson clover dies off quicker than white clover, and species that would not creep into the vegetable rows are required. The experiment was being carried out in an arable alley normally used for vegetable production.

Louise Winkler discussing her ley/vegetable intercrop experiment. (Photograph: Jo Smith)

In an adjacent site a local vegetable grower was growing vegetables in the northern end of the alleys, and the southern ends were down to a ley as a weed control measure. This is mowed frequently, with

the first cut going to the compost heap. The tree species in these areas of vegetable growing included apple, pear, cherry, quince, sea buckthorn, apricot, peach, hazel, rowanberry and walnut.

In an area planted early on in the establishment of the trials the delegates were shown hardwood species that had been planted in pairs within 3 m strips separated by 12 m alleys. These included apple, ash, wild cherry, hornbeam, small-leaved lime, sycamore, oak and Italian alder. The species were planted in pairs to aid pollination of the apples, but because the species were otherwise mixed within the rows there was a lower risk of disease in the apples due to their dispersed occurrence across the site. The trees are never sprayed, but only seem to suffer from occasional incidence of canker (treated by pruning). The other tree species are high pruned, to allow the light to get to the apple trees and arable crops early and late in the day. It was thought when the trial was planned that the tree row understorey would be a reservoir for arable weeds that would spread into the alleys, but a woodland edge flora with tall tussocky grasses such as oat grass and cocksfoot has developed, and replaced the arable weeds (which are mostly pioneer species). This is a good habitat for small mammals, which in turn are a food source for the barn owls on the farm. The rodent holes make nest sites for bumblebees and solitary bees. Indeed, bees are abundant on the farm due to the presence of legume leys.

Mixed hardwood tree species with legume ley in the alley. (Photograph: Paul Burgess)

In a nearby field varieties of walnut and plum were planted with 18 m alleys, and potatoes were growing in the alleys this year. The site is not ideal for walnut, as it is windy, and they could benefit from a higher planting density than had been carried out, but the plums are currently performing well. The Pentland Javelin potatoes (a first early variety) were being harvested. For the first time ever the potatoes had been irrigated this year, due to the dry spring.

The delegates were shown a trial assessing potential resistance of wheat to environmental stress brought about by increased genetic diversity. In a 50 ha wheat field planted with 250 plants m^{-2} under conventional agriculture there would be 0.125 billion identical wheat plants, posing an enormous risk for spread of disease or susceptibility to unexpected physical stress. Some of the experimental plots were planted with seeds arising from the crossing of six modern, high-yielding wheat varieties, then raising to the F3 stage before planting in the field (by which time there are billions of possible genotypes). There was also a population of progeny of the crosses of high-yield and high-quality parents that have been grown on the farm since 2002. A further sample of wheat arose from a 60-parent population of French wheats from INRA, which were being grown on the farm for the first time this year, and a Hungarian population that was growing in England for

the first time. The INRA wheat progeny seemed to be doing well this year, although the Hungarian wheats were not growing well.

Martin Wolfe demonstrating a plot planted with progeny from diallel crosses of 6 high-performing modern wheat varieties. (Photograph: Paul Burgess)

We also saw a trial of both naked and husked oats varieties in a LINK project. Oats is a valuable crop in organic agriculture as it is a vigorous competitor and suppresses weeds.

The tour finished at the plots of short rotation coppice willow set out similarly to the hazel that featured at the start of the tour. Five species and varieties of willow (including the industry standard Bowles Hybrid) were grown in 3 m rows with 12 m alleys. Some of the rows are harvested in January, and the harvested material is left on the field margins to dry until the following September/October. It is then taken for chipping, as required, to run the heating on the farm. There is a control area where the five willows are grown separately, and it has become apparent that the layout of the main trial is good for minimising incidence of willow rust (to which one of the give genotypes is susceptible). The other pest on site is golden willow beetle, although this is not a major problem.

The farm as a whole was converted to organic agriculture in the late 1990s, since when there have been no inputs except some seed. Martin Wolfe reported that wheat yields were about 6 t ha^{-1}

immediately after certification, then dropped to 3.5-4 t ha^{-1}, but are currently on average 8.5 t ha^{-1}. Last year the first 10 t ha^{-1} yields were obtained on some plots.

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