

Farming Connect Management Exchange

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Finland and France

No-Till Crop Production and Regenerative Agriculture

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1 Background

Based in Pembrokeshire, I have been using no tillage techniques for over 15 years on my farm. It has evolved to draw in more influences from the Regenerative Agriculture as well (such as identifying environmental 'leaks' in the production system, soil building, increased resilience to weather and prices etc). I'm constantly wondering how to improve it; how to get more with less.

I establish annual and perennial crops using no tillage for both environmental, economic and social reasons. I wanted to learn more about how the best European techniques can take us beyond 'sustainable' methods, and how we can look at more regenerative techniques. After all, what is the point of looking to sustain agricultural techniques that may not be good enough for the future? The next step is to make our farm more regenerative rather than just trying to keep what we have. I wanted to develop techniques and knowledge that will enable me to become more competitive and efficient (but not at the expense of the environment) and to see how to further develop combinable crop and annual cropping techniques and make it better i.e. to produce more food, more wildlife, absorb more carbon, and build soils that are better able to absorb water etc.

Some techniques pertaining to no tillage etc can be hard to research. The internet has been wonderful, but because it is often about saving money, and often people have nothing to sell per se, you get the best information from a farmer to farmer exchange. Therefore, standing in a field digging holes, you get to see what the farmer sees on his farm rather than just reading about it. Getting the context on things is vital. For example, I understood a lot more

about the strengths and weaknesses of cover cropping by doing a compare and contrast of the two countries I visited.

I chose to visit Finland and France.

Finland because it has, relatively speaking, a marginal arable agriculture, so in a sense they have the need to innovate when things are tougher. Also, the farms are family-sized and it has the highest percentage of no-till in Europe at around 10-12% of all land. They also had a long-running no tillage trial site which had been running for over 20 years, and this was vital information for me.

I chose France because of the focus on intensive cover cropping to build soils. Climatically, it is somewhat more similar to Wales than Finland because of the fewer hard frosts, but on the flipside, they have a shorter growing season and extreme heat to contend with.

I felt the two countries had enough differences between them to make a good project, not least because I was just as interested in learning how the farmers developed their thought process and management techniques and adapted to change as I was interested in knowing their exact soil type, weather, prices, state support levels etc.

I was looking for both inspiration and education to further my practical and technical knowledge.

2 Itinerary

Before the tour, I was getting a little concerned that I appeared not to have planned as much as I wanted for the week, and fears about wrestling with an unfamiliar language did get me wondering how much time I'd be spending alone in a sauna rather than undertaking the purpose of the exercise which was to find out about Finnish no tillage and regenerative agriculture.

Flying into Helsinki on a summer's day gives you an interesting airborne view of what much of the country is like. It's a country pockmarked with lakes and dominated by forest. It is almost as if the ice age has only recently reluctantly retreated and has left behind thousands of teardrop-like lakes as the dense and extensive conifers cloak the rest of the country. To an outsider, it almost feels like a private land and to visit is 'by invitation only'.

Indeed, the Finns have, historically, been a very reserved nation; they are still, in many ways, identifying themselves as having previously been part of Sweden and Russia, and memories of the civil war where families were divided whilst no longer fresh, certainly scars its modern history. The age-old modest dream of the Finns was said to be just to own a house by the lake and keep oneself to oneself and enjoy the nature, silence and clean air and probably a bit of woodchopping! However, a combination of perhaps the Lutheran religion, their linguistic isolation and the Finns' attitude to education, welfare and rationalism has created a society and economy which is still stoic and traditional but also outgoing, co-operative and respectful and keen to connect and look West to Europe for its political future rather than East to Russia.

My main contact for the week was Mr Jussi Knaapi, a more hospitable gentleman I could not have hoped to meet. With kindness, wit and no end of knowledge, Jussi showed me as much as he could of what I wanted to see and what he thought I needed to see. Given the vast distances involved (small population but still a vast and empty country) we also spent a lot of time in the car chatting, and my knowledge of not just Finnish agriculture increased, but Jussi was a mine of information about other things: The history of Valmet tractors, The Finnish Civil War, the sale by the state of Kemira Fertilisers, Scandinavia's famed Welfare state, the staple drink of Finland - gin and grapefruit juice, to name just a few! We spent five days travelling in the South West of Finland, visiting farms, research stations and businesses.

Jussi Knaapi is a part time farmer and a journalist for the Finnish magazine "Koneviesti", a hugely popular farming magazine. But Jussi also has a curious mind, an ear for a good story and does a lot of travelling and engagement with the wider farming world.

The Tour

Finland isn't renowned for its arable crop production, but for me as a farmer who has been growing crops using zero tillage for the past 15 years, it was a more interesting country to visit than a broadacre farming business cultivating thousands of hectares on some alluvial plain in eastern Europe. Primarily, things are still human or family scale. Farms are not big; they are still, generally, family run, and most farmers have diversified or do off-farm work. This is particularly relevant for Wales as we look towards a future where, politically, we appear to want to maintain our family sized farm units for appropriate cultural reasons as well as the fact that pretty much all commodities are produced at production cost - just above or below. The Finn's have even higher cost economy than the UK, and so the need to compete is just as pertinent. How are we going to do it?

Finnish arable cropping is predominantly spring cropping, owing to the cold winters. It can also be drought-prone in the Summer and the growing season, and whilst short by the calendar, it does have the advantage of long light days; in July at 10.30pm it felt like late afternoon. All those crop plants are enjoying that extra light.

The traditional method of Finnish cropping would be the same as much of the European tradition - plough it and plough it deep, leave it to weather, and then sow the seed in April when it warms up. For most farms, this is still the norm, but in the 1970's, a certain Mr Esa Eela (described as the father of no-till in Finland) imported a Massey Ferguson 30 drill and started experimenting with reducing the intensity of tillage. The reasons were ones of cost and to better soil condition. He got a few followers, and there was a bit of interaction between UK farmers and him in the 70's who had also experimented with the technique. As a result of the straw-burning ban, no tillage to direct drilling (as it was then called) declined in popularity in the UK - not least because of the preponderance of winter cropping and large yields of straw, but in Finland it still proved a popular, if not niche, technique. As a result, Finland has the highest percentage of 'No-Tilled' land in Europe, at about 10% - some 200,000 ha. So, given the collective experience of the farmers, I wanted to find out where the future lies and how to improve the technique.

The Finns get a subsidy for soil cover retention in the winter of between EU18-56 ha. Whilst this is a handy payment, it's not considered significant. However, the advantages of winter soil cover are good for the land. They do not, however, get a payment specifically for no-till.



Left to right: Jussi Knaapi, myself and Timo Parsinen (an early adopter of no-till)



Drying is a vital part of Finnish crop growing and often very expensive. This is a home-invented woodchip dryer.



Ari Kautonen (above) is the current leader of the Finnish No-Till Association (FICA). This is an organisation dedicated to promoting zero tillage and regenerative agriculture techniques and is part of the umbrella group of Conservation Agriculture in Europe known as ECAF; basically, for promulgating no tillage and allowing networking for farmers. Ari also used to manufacture the most popular no-till drill in Finland - the Viskean Metalli (VM) and has since sold it on to another company. The drill was very popular and sold over 1,000 units in 10 years. Tellingly, most farmers I visited had a VM drill, and most of them had their original ones. An important lesson for no-tillers is that good quality machinery doesn't wear out; you can use it again and again and keep rebuilding it (although not so good for manufacturers). Dometal now make a version of the VM drill.

Loimaa Site



Jussi Knaapi explaining to a Finnish TV audience about no tillage and carbon sequestration

The site at Loimaa is a no-till trial site that has been running for over 15 years. This, for me, was a hugely important resource, and every year this site is doing various yield comparisons of no-till versus tillage but is moving more towards not comparing to tillage because it consistently yields better; in Finland, being drought-prone despite the relatively high-water table means moisture is retained better. The manager at the Loimaa site, Thomas, undertakes the yield monitoring, talks about building soil carbon to improve the soil; they claim to be accumulating 58% more organic matter (OM) in the no-till areas. This is carbon that you can take out of atmospheric CO₂ and put into the soil as organic matter and living material; contrast this with a measured carbon loss of 200kg/ha during tillage.

The armor on the soil (the decomposing straw and trash) is vital in levelling out the extremes of moisture and temperature, so it's more habitable for the soil biology. They also use the Solvita test at the Loimaa site which is important to measure the soil biology chemistry and physics all together; very often, we are used to just analysing the soil chemistry alone.



Solvita Test

At the Loimaa site, Jussi demonstrated a new innovation which has potential for measuring how much CO₂ soils can emit, and this sort of experimentation could have implications for the place of zero tillage in the climate change debate. We observed how cultivated soils actively emitted more CO₂ throughout the day than a no-tilled soil; this is all going into the atmosphere. It's early days for this sort of experiment, but we all agreed it has potential. We measured various farms' soils for data throughout the week.



Jussi and Ari demonstrating the CO₂ emissions measurement

Because of its continuity and quality of research, the Loimaa site could well be considered one of the most important reference sites for zero tillage in Europe.

I picked up the following information from discussions with farmers:

- Much of Finnish arable agriculture is spring cropped. Wheat, barley and oats dominate, as does oilseed rape. Oats are considered a break
- The amount of forest actually makes a good barrier to keep a lot of cereal diseases at bay, as well as aphids. Being quite a dry climate and cold winters mean fungicide use isn't high
- They frequently use DAP (Diammonium Phosphate) as a 'starter' fertiliser when sowing early
- Farms save seed a lot. Typically, they will keep seed for four generations
- Yields are about 5-6 t/ha for cereals and 2.5-3t/ha for spring oilseeds
- Combining grain dry can be a challenge. Frequently, grain is harvested over 25%, and this is very expensive to dry

France

In France, frustratingly my car broke down and as a result I had to cancel 1.5 days of planned visits to some pioneering farmers such as Frederic Remy, Sarah Singla and Cristophe de Carville. There was some mitigation in that I was able to visit Frederic Thomas who runs a no-till magazine and club in France (called BASE) and has vast experience of cover cropping and soil building using plants. Frederic also showed me some no-dig vegetable market gardening, some sheep farmers mob grazing and some other innovative crop establishment techniques such as no-till maize. I did feel that I had such an informative day with Frederic it did ameliorate the other non-visits.

Frederic is renowned throughout Europe for his very intensive use of cover crops, and so I had wanted to visit him. However, what I didn't realise was how poor his soils were and how difficult his climate was. This reiterated to me how you really have to see something through the farmer's eyes on his own place before making too much judgement; he needs to cover crop as intensively as he does to build his soils.

Much of Wales and the UK is blessed with more fertility than what I saw, so the cover cropping wouldn't need to be quite so turbo-charged.

Key Outcomes:

- Making the best of what you have. For example, the climate you have is the climate you have. You cannot translate all you see abroad to your own landscape, necessarily. For example, the guaranteed frost in Finland became a key weed control tool, and the guaranteed early harvest in France allows you to grow better cover crops but you also get lower yields.

- No-till farmers all have neighbours who say “it won’t work here”. A familiar theme! The trip further iterated the need for good quality management; we look at our successes and we take credit for them, but when things don’t work out, we need to accept that it is our management systems are a large part of this rather than just chance.
- The opportunity for carbon sequestration and promoting agriculture’s role in improving ecosystems is under threat to single issue pressure groups in both countries as in Wales. Farmers seem too busy concentrating on production and land stewardship; we are not doing a great job of articulating what we do, the new things we are trying and how successful we are in the circumstances.
- Soils can be improved by good quality agricultural production. The ideas of rewilding haven’t gained so much ground here (after all, Finland is 90% forest!) but there is a disconnect between the farmer’s view and the urbanite’s perception about agriculture.
- No-till is a win-win for combinable cropping. You need to educate yourself on the technique, but it has many benefits for the soil, the environment and the economy. However, the management techniques are different.
- We are all under the spectre of losing key tools such as glyphosate. There are more ideas on how to reduce our usage, such as with intensive cover cropping, but not to eliminate it. Loss of glyphosate would make no tillage very difficult, and going back to tillage could be more damaging.
- We need to understand much more about the potential of soil biology for our fertility needs. The more we disturb our soils, the harder it will be for the biology to function.

3 Next Steps

In the middle of the study tour I was already able to promote some of my new knowledge having been invited to speak at the Groundswell event in Hertfordshire, which is a premier Regenerative Agriculture event. As a result of that, I also received some requests to speak to farmer clubs.

Part of the study tour galvanised me into realising that, fundamentally, it’s worth continuing the path I’m going down with zero tillage. From the European Knowledge Exchange, I met a range of farmers and realised it’s not about machinery, land quality or climate, but it’s mainly about the top two inches i.e. the brain!

I realised some of the weaknesses currently in my system are as follows:

- Not using cover crops intensively enough; keeping something growing in the ground will absorb more carbon and block out weeds. But also, don’t go overboard with cover crops either - accept their limitations. Cover crops are the solar panels for the soil when not cash cropping.
- I need to think more about optimising my crop rotation and adding more variety. This may help me reduce my chemical and fertiliser inputs. I can see a bit more potential for reducing some herbicides in my rotation with a bit of strategic thinking.

- I already do some promotion of what I do on my farm, but I think I need to do more and make an effort to join the public debate about what we want from agriculture in Wales. Issues such as rewilding, veganism, soil erosion, carbon sequestration, glyphosate, and meta production are things I feel I am well informed about, and I think I'm at the stage in the business that I should be aiming to provide some leadership on these issues to balance out the arguments. I'm thinking of setting up a website about this.

4 Key Messages to the industry

1. No Tillage remains a win-win low technology concept that can help protect our soils against erosion. It may not be as pertinent in Wales with our smaller cropped area; however, the concept is still applicable.
2. Farmers probably don't really need grant support or even subsidised support to no-till, however, if we are supplying a public good then this should be recognised somehow.
3. Glyphosate is under severe threat for ideological rather than scientific reasons in the EU. It is being unfairly singled out and its loss would ruin the no-till technique at the moment. We all accept a need to use less because we are relying on "one" tool but there needs to be support to develop alternatives.
4. The best cover crop for Wales is grass! But we still need to grow grain for winter feed, straw, human consumption etc, so it is right that we try to do this as environmentally responsible as ever.
5. We can achieve quite a few of our conservation aims with regard to farmland bird winter foraging areas with no-till. It can sequester carbon, reduce or eliminate erosion and it is low cost and low investment. It needs support.