No doubts about no-till

A Lincolnshire-based farmer with a wide variation in soil types from sand to heavy clay as well as fenland peat is in no doubts about the benefits he has gained through adopting a zero-till crop establishment regime 10 years ago. **David Williams** visited the farm.

Tony Reynolds says his move to zero- or conservation-tillage 10 years ago has benefitted his land, the environment and his farms' profitability.

Despite the evidence provided by his success, Tony Reynolds, of Thurlby Grange Farms in Lincolnshire as well as Burton Lazars Farms and Wheathill Farms in Leicestershire, is told frequently by other farmers that the zero-tillage technique he relies on doesn't work. "The biggest problem is getting your head around the fact that the land doesn't turn brown during the year," says Tony. "We have become so accustomed to a traditional regime of turning the land over and mixing it up, that it is hard to accept that after a few years of leaving fields untilled, conditions for crop establishment become excellent. Drainage and water retention improve, less fertiliser is needed and weeds are easily dealt with."

Tony farms approximately 1,250ha (3,090 acres) and grows wheat, oilseed rape, peas, beans and oats. The 250ha (617 acre) home farm in Lincolnshire, which includes a 16,000-bird free-range chicken enterprise, is farmed by Tony's son-in-law Clive, grandson Sam and one employee, and in Leicestershire, Tony and three staff look after 150 beef cattle on 100ha (247 acres) of grassland, as well as the arable land. Before becoming something of a UK pioneer in zero-tillage farming Tony, like most other farmers in the area, used a plough followed by cultivators or a power harrow to create his seedbeds.

"Previously I wasn't happy that we were farming our land as well as we could," says Tony. "We were entering an era in which modern machinery allows growers to beat soil into submission and buy a result as long as they can afford to do it. Zero- or 'conservation'-tillage was becoming widely accepted abroad, particularly in areas where there were problems with soil erosion or lack of water, and more information regarding the technique was appearing on-line. It appeared to have benefits for us, although our conditions were quite different, and we started doing just a little at first. Ten years ago we took the plunge and, to make sure we were fully committed to the change, we had a machinery sale and disposed of all our conventional tillage equipment.

"With some of the sale proceeds we purchased a dedicated zero-tillage drill," he explains. "Some look at minimum-tillage as being a halfway step, but it isn't. It just means that only the soil around the seed is mixed up, whereas zero-tillage means the seed is placed in the ground with none of the soil tilled. Now, on 250ha (617 acres) in Lincolnshire, our machinery fleet comprises a spreader, a sprayer, a drill and a combine harvester, a telescopic handler and four medium-sized tractors, which replaced our larger tractors."

> ***"I felt guilty, initially, hearing all the other farmers in the area drilling late into the night while we were relaxing, but the feeling didn't last long!***

The fleet for the Leicestershire farms is similar; a combine, a spreader, two drills and a sprayer, two telescopic handlers and five medium-sized tractors.

Tony says the main problem was identifying a drill which would operate well in all the farms' soils; "Most zero-till drills are made to work in very dry conditions, whereas usually our problem is wet soils. Also, we tend to have a lot of mulch on the surface and there needs to be space for that to flow through. Closing the slot after the seed is placed is essential and on some of our leathery ground it is easy to carve open but hard to push back together, and there is a case for having two drills offering advantages in different operating conditions."

The Great Plains 6m Spartan drill was purchased in 2011.

The first drill purchased by Tony performed ok, but struggled in the wet and he then came across the very simple disc design of the Great Plains disc drill which was being imported, at that time, by KRM. "It had a brilliant coulter system," he comments, "and was lightweight, with all the work done by the front discs. A rubber wheel behind closed the slot while metering was controlled by a rubber wheel running against the land wheel. It was only 3m but a superb design and when we had the very wet autumn in 2011, we worked day and night establishing 360ha (900 acres) of crops with no problems at all."

Inspired by the performance of the Great Plains system, Tony says he was delighted when Lincolnshire-based Simba UK was bought by Great Plains, which would make getting hold of the American company's products easier and would ensure efficient back-up, both through the UK headquarters as well as through the supplying dealer. "Because we got on so well with the 3m Great Plains drill, we were keen to get hold of something similar but with capacity for greater output so we ordered a 6m Great Plains Spartan drill through Sharmans, our local dealer. Apart from its size, the coulter design is identical to that of the drill which had impressed so much before, with plenty of space for trash, and nothing to clog up anywhere. We usually drill at 8.5–9.0-inch row spacings, adjustable on the 3m, with the 6m at 19cm (7.5 inches) although 15cm (6 inches) was an option, whereas the larger 9m version is available on 15, 19 and 25cm spacing."

Tony estimates that he requires just half the horsepower needed previously on the farm, using 150hp on the 6m drill on the hilly Leicestershire land, whereas in Lincolnshire a 140hp tractor is used. "We don't subsoil at all now, as the oilseed rape is spread using an Autocast distributor behind the combine header, or planted using the zero-till drill, and we don't suffer with deep tramlines or compaction," he says. "We are no longer a part of the trend of constantly increasing tractor size and because we do so few working hours now, we change them less often than most farms too. Fuel and wearing metal savings are substantial as we buy half the volume of fuel we used to; (42 litres/ha compared with 90–96 litres/ha per season previously) and hardly any metalwork. We have far less money tied up in expensive machinery than we did before and we see very little of the local dealers!"

A Shelbourne Reynolds stripper-header is used on the combine to harvest all the cereals grown on the Lincolnshire farm which, Tony says, has proved beneficial for establishment of a following rape crop. "The pigeons won't land within the long stalks so we hardly suffer any pigeon damage at all, and when we are drilling, the straw remains held by its roots so there is no loose trash to block the drill."

Tony says one common misconception regarding zero-tillage farming is that it is simpler. "It is actually more complex," he says, "and having got used to it over the first few seasons, one has to keep learning as soil conditions change and affect timings of operations. For example,

we suffer more from problems such as mice in the fields as their habitats aren't disturbed as they would be in a conventional system, and for no-till farmers the fox becomes quite an ally, helping keep mouse numbers down. Also, if a crop fails to establish then for most farmers there is the option to pull it up and re-drill, but we can't do that."

> ***"Modern machinery allows growers to beat soils into submission and buy a result, if they can afford to do it.***

Disposing of the previous cultivations equipment was a useful exercise says Tony, especially during seasons two and three when the yields fell slightly. "Year one was great," he explains. "We enjoyed the same yields as before but achieved them with an 80 per cent reduction in production costs which was very encouraging. I felt guilty too, initially, hearing all the other farmers in the area drilling late into the night while we were relaxing, but the feeling didn't last long!

"In year two, the yields dropped but we had the cost savings so were still enjoying extra profits. Year three was more difficult as yields fell further and we did wonder what we were doing wrong but, by year four, the yields were recovering well, and in years five and six we enjoyed similar yields to those we had achieved with traditional cultivations but with reduced costs and now, as far as we can tell, yields are slightly higher than we would have if we were ploughing the land, during similar growing seasons.

"After the first few years everything begins to work together; organic nitrogen, worm activity has increased, there is plenty of organic matter and conditions for root establishment are ideal as the soil structure improves," he explains, "but for those moving to zero-till now, there are guidelines for using extra seed and fertiliser to negate the effect of the yield reductions in years three and four."

Tony's farms have been studied extensively by various organisations and teaching establishments to quantify benefits to nutrition and soil structure. One soil permeability test carried out involved pushing a rigid plastic tube vertically into the ground, pouring water in the top and then recording the time taken for the water to soak down into the soil. A test was carried out in one of Tony's fields and, just a few yards away, a similar test was conducted in a neighbour's field on which traditional cultivation methods are used. In the next-door field the water took several minutes to soak down whereas on Tony's land the tube proved impossible to fill as the water soaked in too quickly. "It was a real eye-opener," says Tony. "When we are having a dry season our land is a dream as roots penetrate down easily to find water while all the organic matter acts as a wick bringing moisture up to where it is required. It drains well allowing us to get on the fields quickly when needed but when it is fully waterlogged, then it is just like any other land, and we keep off."

After continued rain when the ditches are running high Tony says benefits of his soil structure and composition are evident; "When one sees field drains and ditches running brown then what is being lost from the soil are some of the most important constituents needed for crop growth, and they have taken many years to form and will take a long time to replace. Even after heavy rain our ditches run quite clear as the soil drains naturally, and its composites remain in place," he says.

Less fertiliser is needed now on the farm and Tony explains that no P and K has been added for eight years, although some is needed for the coming season due to the exceptionally wet conditions last year. No lime has been added for eight years either, but soil pH is currently 6.5–7.0, just where it needs to be, comments Tony. The soil organic carbon, which he says affects workability of the soil, was initially 2.1 per cent but has risen to 6.2 per cent in 10 years. Nitrogen use is much less than before, the requirement reducing annually, but Tony points out it is not yet down to 50 per cent, the eventual target.

Worms are often cited as a key indicator of the success of a reduced cultivations establishment regime and, on Tony's land in 2013, an average 47 worms were found in samples taken from four locations compared to just one found between four similar samples on his neighbour's land. "What many of us believe as children, that when we chop a worm in half we then have two worms is definitely not true," laughs Tony. "Worms don't like being cut in half by ploughs and are definitely not

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Initially there was concern as to how the zero-till drill would deal with the previous season's tramlines but Tony says there was no problem. Here, the tramlines were crossed at a slight angle and plant establishment is unaffected.

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friends of the power harrow," he adds.

Weed control is carried out using trailed sprayers and a conventional spray regime and, as for many farmers in the eastern counties, black-grass is an issue. "We don't yet have resistant black-grass and are very keen to remove it as a problem before resistance develops," says Tony. "No-till gives us that opportunity as we know where it is and tackle it accordingly. Because we don't move the ground the only worry we have is seeds on the surface and we use our spring crops, which are 20 per cent of the total, as an opportunity to spray off the winter-germinated black-grass with Roundup. The spring-germinated black-grass is easily tackled with selectives."

Cover crops are used when it is felt the soil will benefit, including mustard, vetches and crimson clover as well as phacelia, usually grown on 200ha (500 acres), which produces a large rootball which Tony explains is great for maintaining soil condition.

Variety choice is more important to the success of establishment now he says. "As soon as we finish harvesting we drill first wheats, having selected varieties which get away fast," he explains. "There is a strong tendency for crops to establish quickly, then stop growing from the start of winter to mid-February, and then they take off again, so early growth is needed to make sure the crops will survive the winter well. We used to wait to drill the 2nd wheats but now drill them immediately after the first wheat is in the ground, and if they germinate immediately then that is great, but if it is cold and wet then we can risk having to re-drill.

"Spring crops are grown on a specific area as over-wintered stubbles as part of ELS and HLS schemes, or we will put in cover crops, in which case the land doesn't qualify for the schemes, but it allows us to produce good ground cover after which we either mow it to produce an even mulch or spray it off and drill straight into the crop one to two days after," he says.

> ***"Worms don't like being cut in half by ploughs and they are definitely not friends of the power harrow***

Great Plains UK sales director David Holmes says the company is seeing increased interest in zero-tillage crop establishment systems. "After two wet autumns many farmers are keen to make sure they have options available and want machinery which provides flexibility, and while we are seeing increased interest in zero-tillage products, those that can be used also in conventional or minimum-tillage regimes such as the recently launched Centurion, remain most popular."

Tony comments that the reaction from other farmers to his farming technique is always interesting. "I have no regrets at all about having moved to conservation-tillage," he says. "We save machinery costs, fuel, fertiliser and time and what we are doing is very beneficial for the environment. Between our three farms we have many types of soils from 80–90 per cent clay to 80–90 per cent organic matter so we have found out how best to establish and look after crops in a wide range of situations, although we continue to learn, both from our own experience as well as from others. Often farmers will comment to me that the technique wouldn't work on their farms but there is a lot of information around now which can help those considering moving to the technique, and when one works out the reduction in costs, then the perceived risk quickly diminishes. And, if it is later decided that it was the wrong decision, there is no law that prevents buying another plough!" ■