Improving Soil Health

Understanding the Kelly Tillage System

Kelly Tillage System Case Study
Farmer: Bernd Richter, Eastern Germany
Farm size: approx. 150ha, sand to loam soils
Crops grown: peas, canola, wheat, barley, rye
Kelly model: 6m with CL1 disc chain

Rolling Hills, Fertile Soil

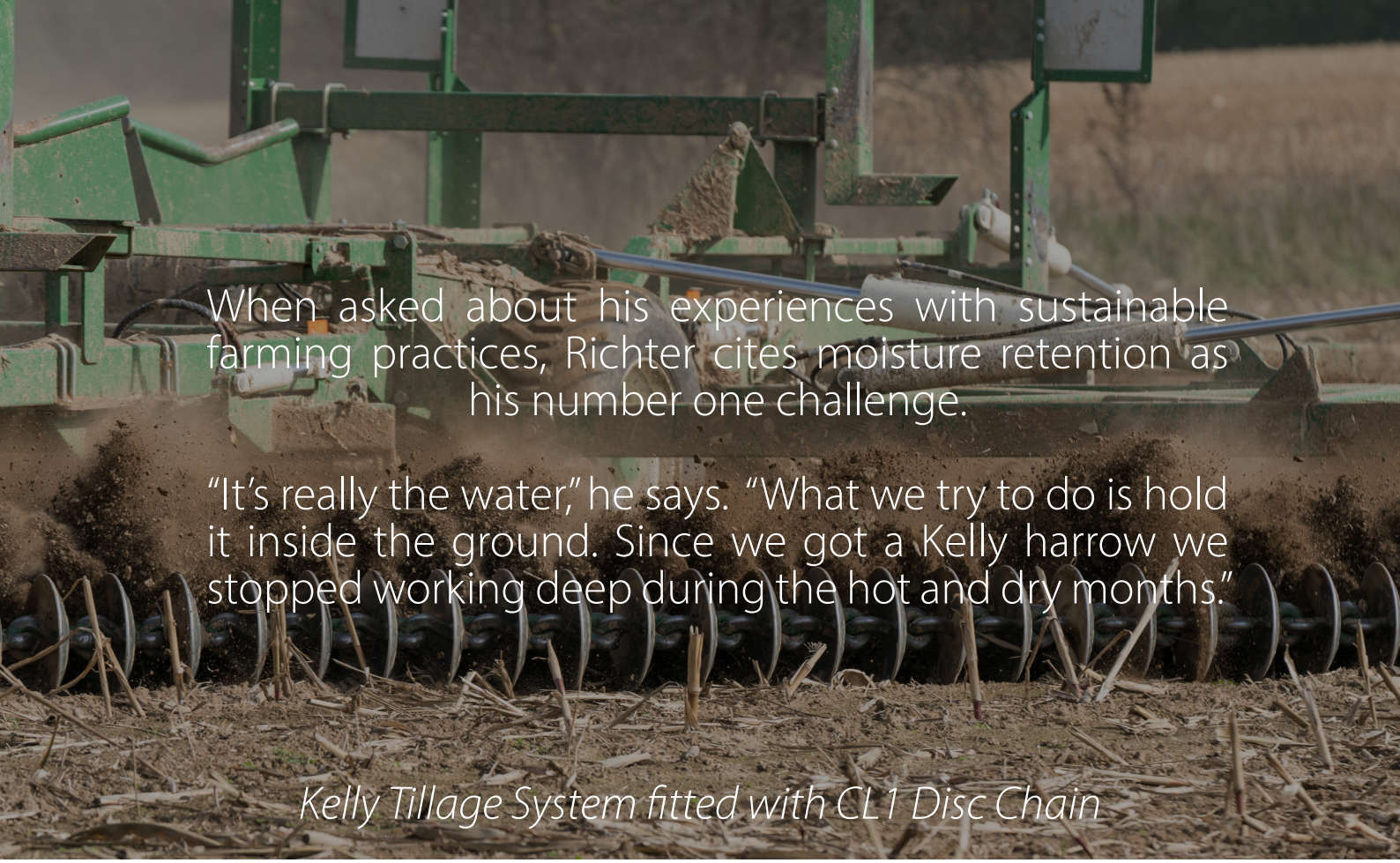
The Kelly Tillage System

'Sustainable agriculture' may feel like an overused buzzword, but improving soil health now and for future generations is something that's at the forefront of every farmer's mind. Combating herbicide resistance and soil erosion, increasing moisture retention and reducing leaching of nitrates/fertilisers are all challenges that need to be overcome. With this in mind, we talked to German farmer Bernd Richter about the role that sustainability plays on his farm.

Mr. Richter works around 150 ha of land in Upper Lusatia, an area characterised by rolling hills and fertile soil. His farm grows peas and canola at 3 to 4t/ha, with winter crops including wheat, barley and rye grown at 5 to 8t/ha. Soils range from sand to loam and are sometimes stony, with the land having a German ground point range that varies between 25 - 60. Ground points, or bodenpunkte, are a numerical value between 1-100 that is used to indicate the quality of arable land: soil with 100 ground points is considered optimal for planting, while soil with below 20 points is unsuitable for crop production and won't turn a profit.

> *"The more you try [using the Kelly harrow], the more possibilities open up."*

A range of monocot and dicot weeds grow on the farm, including burdock, cornflower, poppy, knotweed and field pansy, with couch grass and thistle causing occasional problems. Though herbicides are used for weed control, Richter makes an effort to minimise chemical applications as much as possible; glyphosate is used sparingly for select patches of couch grass and thistle. More and more, Richter is turning to mechanical weed control as an alternative to herbicide use. Both ploughing and non-ploughing tillage are practiced on the Richter farm, depending on the crop.



When asked about his experiences with sustainable farming practices, Richter cites moisture retention as his number one challenge.

"It's really the water," he says. "What we try to do is hold it inside the ground. Since we got a Kelly harrow we stopped working deep during the hot and dry months."

Kelly Tillage System fitted with CL1 Disc Chain

Choosing Kelly

Richter purchased a 6m Kelly Tillage System fitted with CL1 Disc Chain in 2015, aiming to use it for fast and easy stubble cultivation and activating weed seeds post-harvest without burying them. "We are a relatively young farm," he says. "Before [owning the Kelly harrow] I borrowed different machines and tried 2-, 3- and 4-row cultivators and several conventional disc harrows. Almost nobody in my area knew the Kelly system. Then I saw a Kelly while working at my friend's farm and decided to buy a 6m model for our farm."

The Kelly harrow is now used for a wide range of purposes on the Richter farm, including controlling weeds and cover crops, preparing a seedbed in tougher conditions and managing stubble (especially canola stubble). Richter feels that the CL1 Disc Chain is best suited to dry and normal conditions in soil that isn't too heavy. He has also been trialing rear-fitted Spiked Disc Chain in combination with the front CL1, and feels that the Spiked Discs are ideal for better aeration of the soil and for creating a seedbed that isn't too fine.

"We trialed a lot for ourselves, learning by doing," says Richter. "That was a good experience for us to see and learn what it [the Kelly harrow] is good for and what it's not good for. A few weeks ago we gave it a try on grassland. Wild boars did a lot of damage there. It was a success: the holes got levelled better than with other machines and the land was ready to be re-cultivated."

"The more you try, the more possibilities open up. But to be honest, you have to know what kind of job it's not made for," admits Richter. "Especially if you expect a clean field without any residue on the surface after one pass." Richter uses a 140 HP John Deere 6830 tractor to pull his 6m Kelly harrow. In favourable conditions his neighbour was able to pull the machine with a smaller 125 HP tractor.

The Richter Family

Fuel, Labour and Maintenance

The Kelly Tillage System has increased overall productivity on the Richter farm.

Richter's Kelly harrow uses around 3 litres of fuel per hectare, half as much as the cultivator that he used previously. With a 12-14km/h working speed, the Kelly covers 6-8 hectares every hour. As a direct result of the higher working speed and lower fuel and labour expenses, Richter is now able to make two passes across the field where he previously made one, at the same cost.

Spiked Disc Chain

"There's less wear and tear than on a usual disc harrow or a cultivator."

Richter's maintenance costs are also dramatically lower with the Kelly harrow than they were for the cultivator.

"Not much maintenance is needed," he admits. "Once a day greasing and looking over the machine, and that's it. There's less wear and tear than on a usual disc harrow or a cultivator."

Richter uses the Kelly harrow for mechanical weed control. He notes that weed pressure on his farm has reduced significantly since he purchased the Kelly, and he is now beginning to reduce his herbicide use accordingly.

"I try to place the Kelly as the centre of the mechanical weed control part of our farm," says Richter.

Surprising Results

Bernd Richter's Kelly Tillage System has had two unexpected, additional benefits.

By working only the top few centimetres of the field it causes surface-level soil to warm and dry faster, allowing for earlier planting. "For three years we've used it on an autumn ploughed field one or two days before seeding peas in spring," describes Richter. "Soil isn't processed too deep. Only the capillary is broken, so there's no evaporation. The top layer of soil is drying and warming faster, but the deeper water is kept there." The resultant conditions have been perfect for planting peas, which require a lot of water to germinate.

> *"Soil isn't processed too deep. Only the capillary is broken, so there's no evaporation."*

The second surprise benefit that Richter mentions is a result of the level seedbed that the Kelly harrow creates for planting. Having flat and even fields has allowed planters and drills to work at higher speeds, increasing productivity and reducing planting losses. "The driver of the harvester praised our flat, bump-free surface," says Richter. Having a smoother seedbed also led to improvements in crop establishment, causing Richter's pea crop to grow more evenly.

Overall, Bernd Richter feels that the Kelly Tillage System is a vital part of his sustainable agriculture practices, and strongly recommends the tool for other farmers. "It [the Kelly harrow] is an inherent part of our farm," says Richter. "Seriously, I think it's a one of a kind machine."

Bernd Richter on Sustainable Agriculture

"We try to move towards sustainability more and more. We think it is necessary! We see and feel the impact of a changing climate every year a bit more. Not every farmer is ready to reflect on his actions and what happens to his environment depending on how he does his work.

"Water is the limiting factor. We have to face that and focus our actions on saving water, and not only by stopping needless evaporation. We have to take care of the water quality too, especially with regards to high organic fertilisation (nitrates, phosphates).

"We reduce the usage of pesticides and fertilisers, do more conservation tillage, focus on shading the soil (no blank ground), do less deep work because of the deep drying in and after summer, and try to move towards a circular economy. We take only self produced food for our animals, and give the manure back to the place where we took the straw away."

Farming for the Future

Sustainable farming methods on the Richter farm are beginning to bear fruit:

- A concerted effort has been made to minimise field traffic, significantly reducing soil compaction and operating costs.
- Cutting back on chemical application and making heavy use of ground cover have made the soil more resilient. "A healthy soil can buffer a difficult situation better,' says Richter.
- Alongside the obvious agronomic and economic advantages, Richter finds that sustainable farming measures have the unique added benefit of "a good conscience while working."
- When asked about the biggest challenge he faces with sustainable farming, Richter cites moisture retention. "It's really the water," he says. "What we try to do is hold it inside the ground. Since we got a Kelly harrow we stopped working deep during the hot and dry months."
- Richter suggests a varied approach to tillage, noting that every practice has its pros and cons. "Good conservation tillage and cultivation is not always the cheapest variant," he warns. "Sometimes special machines are needed."

Richter's 6m Kelly Tillage System

Contact Kelly Engineering for more information about the Kelly Tillage System

Australia/New Zealand/South Africa
web: www.kellyengineering.com.au
email: sales@kellyengineering.com.au
tel: +61 8 8667 2253

Europe
web: www.kellytillage.eu
email: sales@kellytillage.eu
tel: +61 8 8667 2253

North America
web: www.kellyharrows.com
email: sales@kellyharrows.com
tel: 417-865-2100

Argentina
email: ventas@giorgi.com.ar
tel: + 54 3464 493512

Data for this case study was provided by Bernd Richter and collated by Kelly Engineering