

“ We noticed lifting was trickier the deeper we’d cultivated. ”

# Fitting in with new ways

**Alternative approaches to sugar beet**

**Can sugar beet growers successfully use reduced cultivations to reap the cost saving benefits and improve sustainability credentials? CPM learns about a trial comparing different approaches.**

**By Mike Abram**

**In most crops, reducing cultivations results in lower establishment costs through minimising labour and machinery requirements, plus reduced fuel use. This is in addition to the added benefit of helping to preserve the soil’s natural structure by reducing the impact of heavy field equipment.**

But economic benefits can be wiped out if yields are pulled down, which can be the concern with sugar beet where tillage is used to produce a fine, uniform seedbed in a crop that’s particularly sensitive to poor soil structure and compaction.

However, with increased emphasis on sustainability in agriculture and rising interest in regenerative practices, BBRO has been keen to investigate how sugar beet can fit into that approach, explains applied crop scientist Dr Georgina Barratt.

The obvious starting point was testing different tillage approaches, which led to a trial with Holkham Farming Company in Norfolk, which has been aiming to reduce cultivations across its 3500ha business which includes both sugar beet and potatoes.

“We used to use a Lemken System-Kompaktor as part of our sugar beet cultivation,” notes Connor Tindall-Read, assistant farm manager at Holkham. “It provided the perfect seedbed everywhere but was probably overkill on a lot of our land.”

## Cover cropping

“Now we cover crop and use a Köckerling Allrounder as the farm standard cultivation ahead of beet, which does a perfect job on about 90% of our land. If we require a little bit more, we have a Vaderstad Carrier to run a set of discs through,” he says.

The chance to quantify those practices and obtain data on the carbon footprint, as well as sugar beet yield, led to Holkham’s interest in hosting the BBRO trial, adds Connor.

Four cultivation practices — ploughing, deep tillage with a Vaderstad Cultus tine cultivator, the farm standard Allrounder, and shallow disc cultivation with the Carrier, were compared in a field-scale strip trial.

Cultivation depths ranged from 5cm with the Carrier to 30cm with the plough and Cultus, with the Cultus also set up at a 20cm depth, and the Allrounder at three depths — 10, 15 and 20cm. Each strip was 18m

wide and replicated twice with all cultivations taking place on 28 April with drilling 24 hours later.

Connor says fuel use was obviously higher the deeper the cultivation, with the Carrier using 4 l/ha and the Allrounder 7 l/ha, compared with 14-16 l/ha for the Cultus and plough. Work rates were also slower.

“Using a Cultus — or our big 7m Opus at full depth — would have completely hampered the drilling operation as we wouldn’t be able to cover a lot of ground very quickly,” he notes. ▶



*The trial gives some confidence, albeit with caveats around soil type and a relatively kind season, that you can reduce tillage and be successful growing sugar beet, says Georgina Barratt.*



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► Whereas Georgina explains that on a relatively kind-to-work loamy sand soil type and amenable weather following drilling, differences in establishment were relatively minor.

"The Carrier plot was a little behind as you might expect at the start of the season, with digs on 26 June showing lower root biomass than the other treatments. But by the second biomass dig these were no longer apparent and all seven approaches had beet of a similar biomass. I was a little sceptical that it would catch up as it wasn't just numbers, it was visibly behind."

The main difference in the trial was surprisingly in the plough plot. "We haven't ploughed before sugar beet in the eight years I've been on the farm," says Connor. "But, it brought up a lot of weed beet. We haven't grown sugar beet in that field in the past 10 years, so we weren't aware of weed beet pressure."

The weed beet showed to a line, adds Georgina. "It resulted in around a 20% yield loss, which is what we'd expect as previous research shows one weed beet per m<sup>2</sup> equates to about 20% yield loss."

Other than that, there were little differences in yield between any of the plots — measured by replicated hand harvesting in January which went through a British Sugar tare house.

"It was interesting the Carrier plot did catch up, but we wonder if in a more challenging year with a drier spring and establishment period whether that would have happened," reflects Georgina.

In common with most later lifted crops this season, conditions when the beet harvester lifted the remaining beet were less than ideal, adds Connor. "We did notice lifting was trickier the deeper we'd cultivated."

"It wasn't to the extent that we were completely bogged down in the ploughed work and were

## Kit improvements

Many sugar beet drills have been designed to drill into fine seedbeds with good tilth, but with increasing interest in minimum or even strip tillage approaches where seedbed quality might not be as favourable, drills that can cope with a variety of conditions could be required.

That's why Stanhay has been trialling adaptations to its X7 sugar beet drill which will help it to drill where growers are using minimum tillage or strip-till techniques, says Chris Fletcher, the firm's managing director, after also being asked for similar modifications for its range of vegetable drills.

"We started looking at whether we can do some cultivation on the drill, particularly moving trash and clods out of the way of the coulter and drilling into more marginal cloddy seedbeds, where you need an element of cutting to make a slot for the seed," he explains.

That led to initially developing a pre-cutting disc in front of the coulter, which in the new version has been taken a step further by adding a set of

trash clearing V-wheels at the front, which move any residue out of the coulter's path.

"They also provide a little pre-cultivation that just nibbles the top of the soil surface to make a slightly finer seedbed for the sugar beet," he says.

The design has been tested in trials on a farm near Peterborough in different conditions, including direct drilling into stubble or following the leg of a subsoiler, as well in a single pass operation behind a power harrow drill planting a companion crop of oats into stubble.

"It moved enough soil to direct drill into stubble," he reports. "But if the stubble field is very hard, the jury's out on whether the beet will actually grow and penetrate the hard pan of soil."

"Following the subsoiler leg left a very uneven finish, so pulling a coulter through meant seed could fall down cracks or sit on the side making it difficult to get uniform



travelling fine in the Carrier area, but you could see as you went across the treatment area, the harvester and trailers started to struggle more and left deeper wheelings."

### Soil type dependent

The results give some confidence, albeit with caveats around soil type and a relatively kind season, that you can reduce tillage and be successful growing sugar beet, suggests Georgina. "Because it could depend on soil type we're interested in working with a grower on heavier soil to conduct similar work."

Ploughing has its place too, she stresses. "It can be very beneficial for weed and pest control, as well as reliable establishment, although the trial has also shown that ploughing isn't always the best solution and can dig up problems with weed beet."

A second year of trials is planned at Holkham with a streamlined treatment list to

allow for three replicates. "We've swapped out the plough treatment for a strip-till treatment. Strip-till is a great alternative for sugar beet because you till where you require it. But we know while it works for some people, others have tried it and been less successful," says Georgina.

The other three comparisons will be the Carrier at 5cm depth, the farm standard Allrounder at 20cm and the Cultus at 30cm.

Greenhouse gas emissions data will also be collected. Last year's GHG data, which was collected between cultivation and drilling, albeit with a 24 hour wait following the equipment's set up, didn't show any massive differences, reports Georgina.

"I think that was partly down to methodology, so this year we'll cultivate and drill on the same day, install the equipment and then measure early the next day. Hopefully that will be a better approach," she concludes. ■

depth," adds Chris.

However, the result was much more positive drilling into power harrowed soil. "These were conditions a normal sugar beet drill would struggle in with the straw residue."

As a result, the farm has drilled beet earlier than otherwise would have been possible, says Chris, which has been helped by the drill having scrapers on all soil-engaging components. "It's running in wetter conditions."

Assuming successful beet establishment follows, the modified drill will be available in a six-row version next season, he says.

"We're trying to make as versatile machine as possible. With most manufacturers moving to larger width drills, we offer something unique in selling a six-row drill that doesn't require such a big outlay but has the ability to get your sugar beet in the ground in a range of conditions," concludes Chris.



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