

Doing less brings more



“The amount of fuel you burn on the tractor often correlates with the amount of soil damage you do.”

DR MARK STALHAM

Shallower working that shifts less soil can bring significant benefits in terms of soil health, yet doesn't necessarily have to compromise production. CPM talks to a leading potato consultant for the lowdown.

By Mike Saul

While the somewhat ‘smash and grab’ approach to potato production may be counterintuitive to efforts applied to improve soil health in other crops in the rotation, there's plenty that can be done to minimise the impact without compromising yield, suggests potato consultant, Dr Mark Stalham.

Yes getting the crop into a well-formed ridge requires plenty of soil movement, but when it comes to cultivations, it's a case of doing so in the least intensive manner, he adds. This should include operating to a minimal depth, leaving as much of the soil untouched as possible and working the ground under

conditions and in a way that creates as much stability as possible.

Mark points out that trials using lower intensity destoning with shallower, faster, wider-pitch webs or stars, suggest it's possible to cut cultivation costs and speed the planting operation without compromising yield.

“All it takes is closer attention to detail, a willingness to try, and a change in mindset,” he raises. “And don't underestimate the role of the potato crop in the rotation where it's possible to correct structural issues created by reduced-tillage cereals.”

So, what's the ideal ridge for potato production? Quite simply, it's one with sufficient soil volume

to grow and contain the crop tubers with minimal greening, says Mark.

“With only 3-4% of ridge volume occupied by the tubers for typical yields, growers should ask themselves why they're shifting such large volumes of soil?”

Adequately sized ridges – with a 1100-1200cm² cross-section – can be formed from as little as 25cm of soil, even in moderately stony scenarios. Equally, potato seedbeds should be compaction-free, especially 25-30cm below the ridge apex, and be porous and free-draining.

HARVESTER PERFORMANCE

Ideally, there should be 5-6cm of loose soil below the seed tuber, then a layer of firmer but not compacted soil, to allow the harvester to work to a consistent depth without slicing tubers. At the same time, the ridge should be stable and not prone to wind or water erosion, water-induced slumping or gravitational settling.

Mark argues that since World War II, when the UK recognised the demand for self-sufficiency, growers have been farming too hard and destroying the productivity in soils. “As a result, we’ve been growing too many crops such as potatoes, carrots and onions on productive, irrigated, sandy soils in a 7-8-year rotation, which all require intense seedbed cultivation. The damage has been done and soils and production are barely sustainable.

“Now we’re starting to reverse the decline using regenerative techniques, and there’s plenty more we can do to build improvement into our soils and potato crop production methods.

“This is particularly important on our lightest, sandy soils. Here, it’s very easy to put the pedal to the metal and move earth deeply just because we can, but this de-stabilises soil and reduces its resilience to recover from damage.

“We must recognise that it takes time to build organic matter in these sandy soils even to low levels of just 2.5-3%, and in some rotations, if it wasn’t for the combined approach of organic matter amendment and use of cover crops, they’d hardly

be viable anymore,” he stresses.

Mark points out that cover crop roots aerate, allow water to drain over the winter and reduce nutrient leaching. However, the wrong choice before potatoes can be painful, he warns. “Growers will have to spend more time experimenting with and managing different cover crop regimes to ensure they work.

“Farmer attitudes have changed and if push came to shove, most would carry on with regenerative measures including a cover crop, even if commercial support and SFI payments weren’t available,” he believes.

Mark adds that that cover crops keep soils living for longer during the wet winter period and by maintaining the cover crop root channels for as long as possible, soils are better drained to greater depth. “The contribution of roots to the below-ground active carbon pool is often underestimated compared with the above-ground biomass.

“Best practice is to establish cover crops early by drilling in August or early September, and the aim is to maximise below ground biomass using



Questioning the standard

With only 3-4% of ridge volume occupied by tubers for typical yields, growers should ask why they’re shifting such large volumes of soil, suggests Mark Stalham.

a mix that provides shallow rooting, well-branched roots and plenty of thicker, vertically-orientated roots, over the relatively short growing period.

“Mixes cut risk, but utilising complex multi-species blends can be over the top and difficult to manage; you’re never quite certain what’s going to grow and what will fail. It’s also important to avoid species such as stubble turnips or chicory that leave residues that cause soil flow issues

BETTER STORAGE STARTS WITH DORMANCY

DormFresh helps safeguard your stored potatoes, delivering field-fresh quality by prolonging dormancy with 1,4SIGHT®.

Have confidence in your storage all season long!

+44 1738 633 859 www.dormfresh.co.uk



ROOTS Potatoes

- ▶ on destoners. Bamboo-cane like kale stalks can also create issues for the destoner or bed-tiller,” says Mark.

Cover crops should be terminated well ahead of primary cultivation; ideally in January or early February to allow the dying roots to detach from soil aggregates and create voids in the soil, he advises. “The aim is to make the most of this added porosity and improved drainage that cover crops deliver to allow us to cultivate soil to the required depth when it’s in a state that minimises the risk of damage.”

Then, the ideal moisture content to form beds is when the soil state is just below field capacity and in the friable range. The more air added into soil, the lower the plastic limit – the minimum moisture content at which the soil becomes likely to smear or compact. Cover crops can effectively allow working to around 2-3cm deeper, without creating damage, he highlights. “They help tremendously: it’s difficult to dry soil to 25cm depth through natural evaporation alone from the soil surface.”

According to Mark, cultivation following cover crops is key and



Compare and contrast

Destoned clay loam soil (L) versus the same soil bedtilled and destoned (R) with an overly-fine tilth. Photo: Mark Stalham

growers should start shallow – at 5-8 cm – then work deeper to create sufficient tilth to form ridges and allow flow through the destoner. Cover crops can also reduce bed-tilling ahead of destoning in heavier soils, he points out.

UTILISING SKILLS

Most contractors employ operators that are more than capable of adjusting cultivation, destoning and ridging kit

to accurately work within a 2-4cm range of depth, and these skills should be used accordingly, advises Mark.

“In a cereal crop system, you’d look at every operation and try to find ways of getting rid of at least one-pass or more with the cultivator. If you reduce the destoning depth by 3-4cm in the potato crop, that’s the equivalent of removing an operation from the establishment process of many other crops.

profi IN THE NEXT ISSUE....

BIG COMBINE GUIDE



What's on the market & new tech explained

DRIVING IMPRESSION



Sentinel fire suppression system

USED MACHINERY



Claas Lexion 7000 & 8000 series combine harvesters

❖ **Enjoy thirteen issues of profi magazine every year** ❖ **SAVE up to £50***

❖ Free access to our entire 30-year in-depth test archive, including the unique DLG Powermix tractor tests

❖ **PLUS**, complimentary access to the digital editions of Agricultural Trader & Farm Machinery every month

EASY WAYS TO SUBSCRIBE

1. GO TO SHOP.KELSEY.CO.UK/PFIXAD 2. CALL US 01959 543747 QUOTE PFIXAD

LINES OPEN MONDAY-FRIDAY, 8:30AM-5:30PM. CALLS CHARGED AT YOUR STANDARD NETWORK RATE. £50 SAVING APPLIES TO UK ANNUAL DIRECT DEBIT OFFER.



**SCAN TO
SUBSCRIBE**



Team skills

Most operators can accurately work within a 2-4cm range of depth, so these skills should be used accordingly.

“Remember that the amount of fuel you burn on the tractor often correlates with the amount of soil damage you do. Putting energy into moving soil is damaging and if you plough, rotovate and then bed-till very deeply using a 400hp tractor, you’ll significantly damage soil health in the long-term.

“The less we do and the coarser the seedbed, the more resistant the ridge to slumping when water comes along. While many think that creating smaller ridges will exacerbate greening, we’ve found the opposite because the ridges are more stable so collapse less.”

A RETHINK

Typical destoned ridges can contain 1200cm² of soil, but there’s no reason why 80-90t/ha crops can’t be grown with minimal greening in just 900-1000cm², suggests Mark. Often as much as 3000cm² of soil is moved, frequently more than twice, to create such a ridge – that’s three times the amount of soil in the ridge itself.

“Our target should be to only till half the soil we currently move. By operating to 30cm depth – that’s a big profile –

we almost produce so much soil we don’t know what to do with it,” he notes.

Based on research, Mark’s view is that soil shouldn’t be cultivated deeper than is necessary to produce destoned beds, and that producing a good ridge based on a 27-28cm depth of worked soil is achievable.

“We’ve found that destoning deeper than 35cm on sandy soils and deeper than 28cm on heavy soils will result in reduced yields. In addition, producing beds as shallow as 25cm won’t affect planting depth or time from planting to emergence; it also allows for soils to be cultivated closer to their optimum moisture content.”

Critically, most destoners lose 10-20% of the soil entering the front of the machine. Much of this falls out of the sides, either ahead of the intake share or out of the intake stars or shares. The key to avoiding this is matching bed profile and height to the required

destoning depth, explains Mark.

Shallower destoning requires shallower, flatter-topped beds. Once destoned beds have been formed, further soil loss occurs on the planter. Equally, deep destoning results in very loose soil which requires high pressures on planter hoods to stabilise

the soil in ridges.

This extra pressure often results in soil capping, delayed emergence and soil cracking leading to increased greening.

Shallower destoning – with wider-pitch webs and/or wider star

gaps and avoiding bed-tilling – leaves soil with larger aggregates which require less compression to stabilise ridges. This in turn leads to less erosion and slumping of ridges and fewer green tubers, says Mark.

“In our trials, shallower cultivation has no negative effect on yields, and in heavier soils, some very significant improvements in yield,”

The less we do and the coarser the seedbed, the more resistant the ridge to slumping when water comes along.

► he highlights. “In addition, seedbeds can be made appreciably coarser and shallower than current practice before any significantly increased risk of common scab or greening.”

Destoning shallower is a faster operation and there’s a wider weather window to operate in; in addition, labour and fuel costs are lower. It reduces the wear on machinery and results in lower repair and depreciation costs and decreases the chance of breakdown during the planting season, notes Mark. “We’ve also found that cultivation depth has little effect on nitrogen mineralisation, crop uptake, fertiliser requirement or input costs.

“By gradually increasing the depth of destoning on heavier soils, operators should be able to observe

the sudden change in soil being placed in the furrow, indicating where they’re close to the critical depth.”

When it comes to harvesting, providing the kit is adjusted to take into account the shallower ridge depth, bruising is generally unaffected, except on very stony soils where destoning deeper may have to be accepted.

SPOT TREATMENT

Highly stony areas of fields – for example, greater than 30% stones – are usually identifiable from stone content on the surface and can be ‘spot’ treated accordingly to reduce mechanical damage to both tubers and harvesters. There’s no reason not to destone at shallower depths in less

stony areas though, suggests Mark.

Large savings in labour costs can be made through 20-40% faster work rates and there are also significant savings in fuel of around 20-30% by cultivating and destoning beds shallower than is currently being practiced.

“In trials we’ve also seen that there’s a value of 3-5t/ha from the majority of the cropped area being planted in a more ideal weather window which can result from destoning when soil conditions are optimal.

“Where there are concerns and more soil may have to be moved, then growers should consider zonally tilling – equally if they can leave the soil alone, why not just loosen under the tuber?” concludes Mark. ●

Enhanced potato nutrition insights

New rapid petiole analysis reads crop nutrition as the plant grows allowing for rapid action

While most crop analysis tells you what’s already happened, petiole testing informs what’s happening now, in time to do something about it, highlights Mark Law of Cambridge Natural Solutions.

Having recently opened a new equipment and a biotech centre at March in Cambridgeshire, the firm offers the testing with just 48 hours, which is why it’s so valuable, he adds.

“Petiole analysis measures the mineral content of the leaf stalk – whereby the petiole connects each leaf to the stem – after free water has been removed. Because it targets nitrate rather than total nitrogen, it reveals what the plant is drawing on right now, giving growers a lever on canopy development and crop timing,” explains Mark.

In comparison with sap analysis which involves squeezing the entire liquid fraction from a leaf, petiole analysis is a more repeatable process, he suggests. “Sap analysis is somewhat skewed by however much water the plant happens to be holding that day. Removing free water first standardises the sample, so results can be compared reliably from one week to the next, giving consistent, reproducible figures against validated reference ranges.

“By contrast, conventional tissue

and total-nitrogen analysis measure stable compounds laid down over weeks of growth. That’s a sound picture of the crop’s overall reserves, but not of the day-to-day flows that show how it’s growing today. In medical terms, it’s the difference between a blood test and a biopsy – the blood reads current health, the tissue reads accumulated history,” says Mark.

This matters most where the margin for error is smallest – in progressive potato cultivation, regular petiole testing across the season lets growers top up routine blight sprays with the right foliar feed, nudging the crop back on track, believes Mark.

For Sootywells Farm, which grows more than 160ha of potatoes for premium markets, tuber number rather than total yield sets the price. Here, petiole testing is used to apply the minimum nitrogen for the crop’s requirements – an operation that deliberately holds back the lush top growth that comes with over-feeding, explains Mark.

“This favours tuber set instead – ‘toppy’, over-fed crops put their energy into haulm and set fewer. The petiole readings guide that balance, keeping the main crop just above the levels that’d otherwise slip into deficiency.”

The same discipline answers a



Leaf stalk mineral content

Petiole analysis measures the mineral content of the leaf stalk after free water has been removed, says Mark Law.

growing commercial and regulatory pressure, he highlights. “Applying only the nitrogen a crop can actually use and no more cuts input waste, reduces the nitrate left to leach into water, and sits squarely with the direction of travel on farm nutrient rules. In-season testing turns ‘use less nitrogen’ from a compliance headache into a precision decision that can lift quality at the same time.

“And because timing is everything, the response can be blended the same day by sister company, Law Fertilisers, which makes tailored multi-nutrient foliar feeds.”