Syngenta ROOT MATTERS

> "This is a year to watch for lazy rooters."

When roots show their strength

Innovation
Root matters

With dry, hot conditions taking over from the cold, wet start to spring, thoughts are turning to the ability of roots to sustain crops currently racing through their growth stages. *CPM* gets an update on field trials set to shed light on sub-surface interactions.

By Tom Allen-Stevens

As soils dry up and wheats come under stress, differences are beginning to show in crops across the country. A wet March and April and late start to the spring has left a legacy of crops that in some situations have failed to put their roots where they need to be, according to Leics grower Phil Jarvis.

"Where the rooting zone has compacted and slumped, it's clear the 175mm of rain we had in March and April just sat there and inhibited rooting. In a normal year it would be fine, but there's no such thing as a normal year," he says.

"This is a year to watch for lazy rooters," says Chris Leslie, farm manager on the Whittingehame Estate in East Lothian. "Second wheats in particular may benefit from some rain and foliar feeds of soluble phosphate."

Struggling crop

Spring barley drilled into some heavy clay cap is struggling, according to Hants grower David Miller. "Our heavier ground now needs some rain — I really didn't think I'd be saying that this year."

The growers are among a core group who established trials on their own farms last autumn in a bid to unearth some of the secrets of how roots develop. It's part of Root Matters, an initiative from *CPM* and Syngenta (see panel on p87), that aims to bring to the surface expert advice and relevant research that'll help improve crop growth, and explore how this is put into practice.

Syngenta's Jon Ronksley has been monitoring root growth in field trials across the UK and agrees the late spring has been very testing for wheat crops. "It's very different to last year's hot and dry spring, but actually the performance across the trials has been broadly similar." ▸

For Phil Jarvis, it's soil type that dictates where the rooting differences lie.

Rooting scrutiny revealed at open days

Field trials to investigate the interaction between establishment regimes, sowing dates and seed dressings will be the focus at a number of Syngenta Innovation Centre open days this summer.

At the blackgrass Innovation Centre at Barton, Cambs, for example, the effect of later drilling into heavy land is under investigation, reports Syngenta field technical manager James Southgate. "The site was drilled at the end of Oct, and the operator said at the time it's the worst soil he's had to work with. When we took the site on in Oct 2016 the blackgrass population was 656 heads/m^2, so this has really put establishment practice to the test."

The field-scale trials have put three regimes side-by-side: ploughing, non-inversion tillage using a Horsch Terrano, working to 12-13cm depth, and direct drilling. All three were drilled using a Weaving GD drill on 27 Oct at a seed rate of 400 seeds/m^2. The seed across half of each plot was treated with Vibrance Duo and the other half with Redigo Pro (prothioconazole+ tebuconazole).

"The drilling conditions were difficult and the plant numbers established were pretty poor across the site, but there were distinct differences between the plots when we assessed them in March," reports James (see chart right).

The ploughed plots treated with Redigo Pro hadn't started tillering, but this was well underway where Vibrance Duo had been used. "There was a significant advantage in root weight in both the ploughed and direct-drilled plots where Vibrance Duo had been used."

Blackgrass head counts hadn't been assessed by the end of May, but James reckons the differences will be clearly visible to those who come to the open day. "It's quite clear we'll get a yield advantage from the plots where establishment was thicker. Where crops have tillered well, this has also had an effect on the blackgrass."

At the Rougham Innovation Centre, very much the same trials are underway, again to test the interaction of different seed dressings and cultivation regimes. Here the drilling date was 12 Oct, but on the lighter land with little blackgrass, the results are looking very different.

"In the early stages, the crop seemed much more vigorous where cultivation preceded drilling," reports James. "But as the season has progressed, the crop in the direct-drilled plots appears better. It could be that the land didn't sit as heavy in all the wet weather, with resulting improvements in rooting."

In other trials, spring barley has been established following different cover crops. Rye and vetch are up against oil radish and black oats, with cover destroyed at different times and then drilled with a John Deere 750A direct drill. The seed has been treated with and without a new coded product, currently going through registration.

James Southgate has been exploring the interaction between method of establishment and seed dressing.

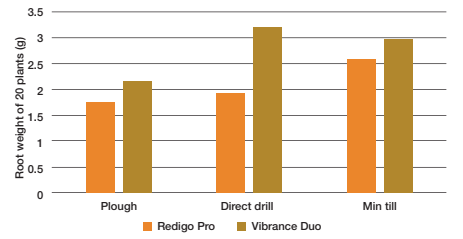
"There are some quite big differences between the plots," says James. "With the potential loss of active ingredients available at establishment, the method of establishment and interaction of the seed dressing used will become ever more important."

Other areas of cultural blackgrass control are also under investigation at Barton, as well as the effect of crop residues on herbicides. At Rougham, there's a whole range of variety plots and work underway with foliar nutrition. The effect of adapting fungicide management to the season has also been under scrutiny.

Cereals 2018

Visitors to the Syngenta stand at Cereals will be able to see what takes place beneath the soil surface. Plants have been grown in rhizotrons — thin slabs of rooting medium with clear plastic on one side so you can see the roots. The effect of sedaxane on wheat, and also of new coded products on barley and oilseed rape, will be on display. Syngenta experts will be on hand to discuss some of the findings of the company's latest research work into rooting.

Effect of establishment on crop root weight



Increase in root weight - Vibrance Duo over Redigo Pro	23%	16%	67%
Plants tillering - Redigo Pro	0%	3%	3%
Plants tillering - Vibrance Duo	34%	3%	15%

Source: Syngenta Blackgrass Innovation Centre, Barton, Cambs; Second winter wheat (cv Shabras) drilled 27 Oct 2017 and assessed 26 March 2018

Innovation Centre and Platform Site open days

Date and time	Event and location	Date and time	Event and location
4 June 17:00 to 19:00	West Midlands blackgrass open evening Brewood, Staffs, ST19 9BQ	2 July 18:00 to 21:00	Warwick Platform Site open evening Leamington Spa, Warwicks, CV33 9JY
7 and 21 June 08:45 to 12:00	Barton Blackgrass Innovation Centre open day Barton, Cambs, CB23 7AR	3 July 11:00 to 16:00	Newark Innovation Centre open day Newark, Lincs, NG32 2AX
19 June 11:00 to 15:00	Berwick Platform Site open day Berwick-Upon-Tweed, Northumberland, TD15 2LP	3 July 15:00 to 17:00	Stamford Platform Site open day Peterborough, Cambs, PE8 6NP
21 June 11:00 to 15:00	Holderness Platform Site open day Hull, East Yorks, HU11 4RB	3 July 16:00 to 21:00	Oxford Innovation Centre open evening Kidlington, Oxon, OX5 3DR
26 June 11:00 to 15:00	York Innovation Centre open day Crockey Hill, York, YO19 4SL	4 July 15:00 to 18:00	Luton Platform Site open day Hitchin, Herts, SG4 8HD
27 June 16:45 to 19:00	Hampshire malting barley field evening Chilbolton, Stockbridge, Hants, SO20 6BU	5 July 09:30 to 12:30	Rougham Innovation Centre open day Bury St Edmunds, Suffolk, IP30 9LP
28 June 11:00 to 15:00	Glamis Platform Site open day Glamis, Angus, DD8 1UB	10 July 11:00 to 15:00	Market Stainton Platform Site open day Market Rasen, Lincs, LN8 6JR

Refreshments will be served at all events; BASIS and NRoSO points will be available; details www.syngenta.co.uk/events

Chris Leslie reports his first wheats look better than they should be for how wet it's been.

► In split-field trails where cereal seed treatment Vibrance Duo (fludioxonil+ sedaxane) has been put against competitor products, it's brought crops into their spring growth with, on average, a 13% increase in tillering, 17% increase in root weight and 24% increase in foliar weight, he reports.

"Crops in general were set back by the cold, wet start to spring, but it seems those treated with Vibrance Duo survived it better — it'll be interesting to see if this transfers through to more ears/m^2 and ultimately a higher yield."

The differences are consistent across sites and soil types, he continues. "Although generally where the site or field conditions at establishment have given the crop a greater challenge, the differences have been more marked."

Soil type

For Phil, the differences in his on-farm trials he saw soon after establishment have now evened up. But elsewhere on the farm, it's soil type that dictates where the differences lie. "Our Hanslope and Denchworth clays felt the harsh wet conditions, and crops on these are noticeably behind. But on the Banbury series, red soil over ironstone, the wheats are looking really healthy."

The differences are most marked in his establishment trials. "The direct-drilled area looks worst, which highlights the importance of drainage and a good soil structure if you're going down that route. The ploughed plot probably has only 200mm of free-draining soil before it hits a pan. But that's maybe all the crop needed over the winter."

Chris is worried some of his crops may burn up if they don't get the rain, "but the first wheats look fantastic — better than they should be for how wet it's been."

This may be down to the digestate he

In split-field trails Vibrance Duo has brought crops into their spring growth with increased tillering, root weight and foliar weight.

Neonic ban puts focus on crop establishment

The vote by the EU extending the ban on the use of neonicotinoid seed dressings to non-flowering crops could have serious implications for crop establishment, warns Syngenta head of technical Dave King.

"We don't yet know how that will affect crops planted this autumn," he says. "But it's worth reviewing practices that rely on neonics and introducing alternative measures to ensure crops get the best possible start."

The decision to extend the ban on neonics will bring to an end the use of the cereal seed dressing Deter (clothianidin). "It's up to member states how and when this is implemented — there may be a use-up period or there could be an immediate ban on its use. It's worth noting the UK was among member states that supported the ban, so it may be unwise to assume an extended use-up period will be granted for the whole of the time winter cereals are usually sown."

In cereal crops, clothianidin serves two purposes, he explains — it deters slugs from grazing on the seed and emerging seedlings and provides early protection from aphids. "Slugs can hollow out up to 50 seeds in a week. Early sown crops are particularly vulnerable to aphids, and the smaller the plant is when it's infected with barley yellow dwarf virus (BYDV), the more damage the virus will do."

Where slugs are the main concern, it's even more important to ensure a well consolidated, friable seedbed and that seeds are well covered, he advises. "Emergence is a numbers game, and it's crucial that the crop gets up and away quickly, particularly where sowing later. That's where Vibrance Duo can help as it's been shown to speed up emergence and help the onset of tillering. That will ensure the plant can grow away from any damage."

Aphids will be a priority in early sown crops, he advises. "Grain aphid (*Sitobion avenae*) and bird cherry-oat aphid (*Rhopalosiphum padi*) are the two vectors. Pyrethroids, such as Hallmark (lambda-cyhalothrin), are still relatively effective, providing robust rates are used they're applied well.

"But an early sown crop without a Deter dressing may require as many as three sprays to keep it protected. This will put the chemistry under pressure and encourage resistance in the aphid population, so growers should look to other measures to limit the damage from BYDV."

Crops sown later are less at risk because aphid flights become less frequent as conditions get colder. "But again, it's important to get crops up and away fast, particularly later sowings, which is where Vibrance Duo can help. Also, the larger the plant when it's initially infected, the less damage BYDV will do. So the more you can do to encourage the young crop to put down roots and put on biomass, the better," Concludes Dave.

With slugs, it's crucial that the crop gets up and away quickly, particularly where sowing later.

fed to 120ha of first wheats and OSR. "It's stopped them having to forage. The wheats are really motoring through their growth stages now. You can still see the difference in the Vibrance Duo trial, though — it's looking better than the crop treated with Redigo Pro, without a doubt."

While the wheats may be looking healthy, he's concerned his spring barley's taking up N in fits and starts. "It'll need some careful growth regulation to prevent brackling being a worry," he says.

For David, who's moved over to direct drilling with a Cross Slot drill, crops on his lighter flinty soils over chalk are looking good. "Everything points to the fact that you get better rooting with direct drilling, and this year will be a good indication of that," he says.

"The chalk acts as a sponge where the roots get down to it, and what we're aiming to do is help that happen. If it stays dry, the heavier land will be more prone to drought, but hopefully the better structure will keep crops greener for longer." ■

David Miller believes there's every indication that you get better rooting with direct drilling.

Root Matters

Root Matters is an initiative from *CPM* and Syngenta that aims to unearth some of the secrets of how a crop develops beneath the soil surface.

Together with a core group of growers, we're looking at how to conduct simple assessments of crop and soil health. We're exploring the implications of agronomy decisions on root mass and plant stress management, and the interaction of this with variety choice. It combines 'citizen science' from the group, with practical field trials at Syngenta's Innovation Centres, through to high level technical R&D.

The aim of this interactive initiative is to develop practical solutions and information to help farmers get more from their wheat crops. We hope to deliver a better knowledge and understanding of crop rooting systems, and work together to develop practical solutions to help farmers get more from their wheat crops.

For more, go to www.syngenta.co.uk/root-matters or follow progress on Twitter - #RootMatters.

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