COVERING SOILS EVENT

FEATURE

We ran the first in a series of Direct Driller days around cover crops, SFI options, agronomy decisions and compaction on the 21st September at TWB Farms in Staffordshire.

It was a great day, with great local food provided by Untamed Grill. We plan to continue these series of days, some based on the trials we planted on this day, others based on different topics in different parts of the country.

For all those who weren't able to attend this first event, we have included write ups of each of the sessions and you can also watch all the videos from the day

Watch Videos from the Event

Covering Soils Day - Highlights

Covering Soils Event - UK-Anglo American talk Fertiliser

Covering Soils Day - RAGT talk Cover Crops

Covering Soils Day - SFI Options and Soil Health

Grange Machinery at Covering Soils 2023

Horsch Machinery at Covering Soils 2023

HOW UNDERSTANDING MORE ABOUT **ORGANIC MATTER AND SOIL CARBON** CAN BOOST PRODUCTIVITY AND PAYMENTS

Understanding more about organic matter and soil carbon can help growers improve soil health, get more from crop nutrition inputs and build greater overall resilience into their crop production, believes Agrii agronomist Will Francis.

"So many aspects of profitable crop production are affected by the condition of your soil that it's worth spending a bit of time getting to know the type of soil you have, what its organic content is and what management you can focus on to get it working to its full potential," he says.

"Organic matter is basically plant and animal residues at various stages of decomposition with three known pools in the soil depending how far this process has proceeded.

"The first is 'active' organic matter which is made up of recent organic matter inputs and soil organisms such as those from previous crop residues and is not very decomposed such that you can still tell what it is made of.

"Next is 'slow' organic matter which refers to organic compounds derived from the active pool which are slightly more decomposed and identifying the origin of these inputs/organisms is more difficult.

"Finally, 'stable' means fully decomposed organic matter where you can no longer identify the origin inputs and organisms as is the case with humus."

Soils with higher levels of organic matter are generally seen as healthier and more resilient with several benefits resulting from this, he says.

"High organic matter soils tend to store nutrients better and act like a sponge when it comes to water retention as well providing the essential energy for soil biology which is responsible for the decomposition process converting carbon from 'active' to 'stable' organic matter.

"During this process, the soil biology secretes the sticky substance Glomalin which binds soil particles together, aggregation, and this also improves overall soil structure which, in turn, facilitates greater aeration and water infiltration through the soil profile."

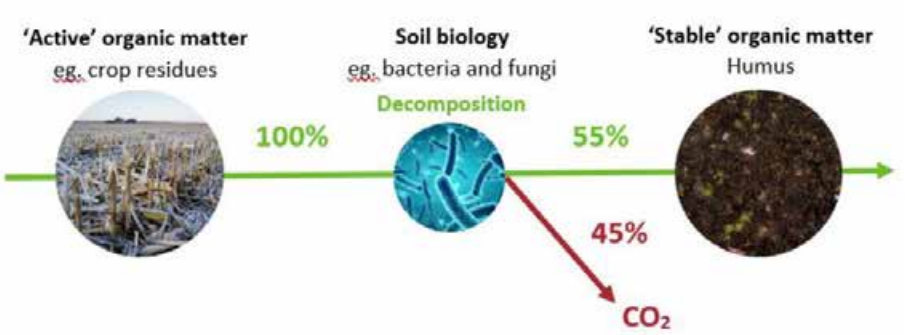
Improving carbon use efficiency and C:N ratio

The soil microflora also feeds on the carbon from the residues/organisms as the organic matter decomposes and the efficiency of this dictates what the overall carbon use efficiency (CUE) of the soil is, Will Francis explains.

"Soils with a higher proportion of larger, more recalcitrant molecules, such as those found in straw for example, have a lower CUE with fungi tending to favour these types of molecules in the decomposition process.

"Simpler molecules with a lower carbon to nitrogen ratio have a correspondingly higher CUE with bacteria more active on these easier to digest molecules. In addition, some microbes are more efficient at decomposing than others and therefore contribute to a higher CUE.

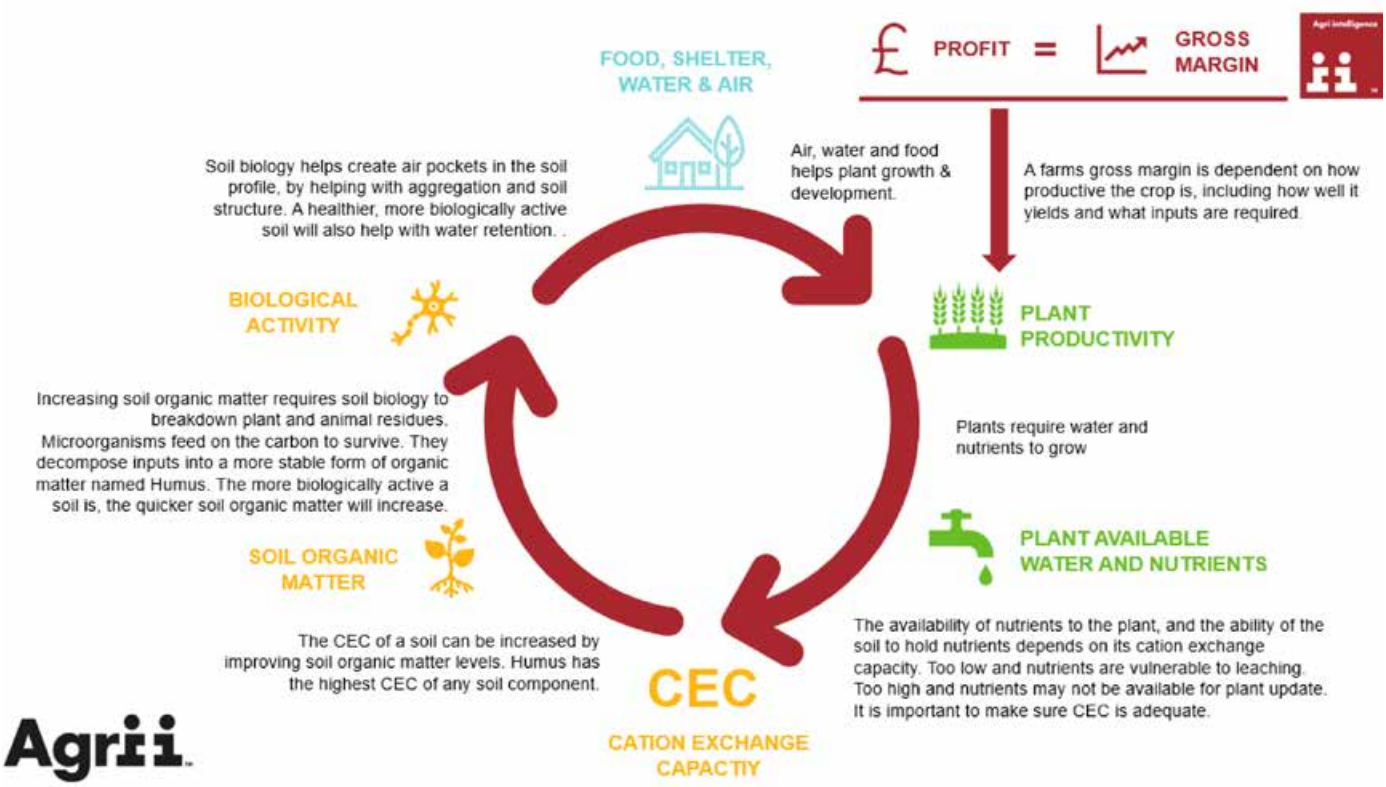
"By considering carbon use efficiency and the carbon to nitrogen ratio (C:N) of crop inputs and their effect on organic matter, growers can also influence the microbial makeup of the soil, particularly the fungi:bacteria ratio and this can have a significant impact on the profitability of crops.



"CUE is the percentage of carbon consumed that is used to make biomass. The higher the number, the more carbon has gone into the soil and the less into the air as CO_2.

"It is an important factor when building soil organic matter and soil health and like nitrogen use efficiency (NUE), high CUE can lead to lower emissions and a faster increase in soil organic matter.

"The C:N ratio is also important for managing NUE, which is a key factor in economic productivity and crop performance and a key consideration when checking soil sample results and deciding on the most appropriate inputs for nutrient management, such as cover



crop species, organic amendments and fertilisers.

"The ideal C:N ratio from a soil test is around 12:1, but this differs from the ideal C:N ratio for inputs, as not all the carbon will remain in the soil."

Measuring soil carbon for revenue generation

In the current production climate, there are other benefits to understanding more about soil organic matter and carbon content, he says.

"Soil organic carbon is different from organic matter and it is this which carbon markets tend to look when evaluating payments.

"Organic carbon is a measurable component of organic matter and it usually assumed to be 50-58% of total organic matter with the other 42-50% deemed to consist of other organic compounds such as hydrogen, oxygen and nitrogen.

"Carbon markets tend to look at the amount of organic carbon in soils in tonnes per hectare (t/ha) to a defined soil depth, usually 0-30cm, 30-60cm and 60cm depths, so it is important to check guidelines with a recognised market before undertaking samples.

Soil carbon tends to be analysed most commonly using the Dumas method which is favoured by laboratories due to its improved accuracy, he adds.

"The sampling strategy and number of samples taken needs to align with the carbon scheme being joined and this will depend on factors such as soil type, management practices and the potential for change. Samples will usually need to be geo-referenced.

"Fine dry bulk density measurements also need to be taken using a corer. This cannot be taken using a standard soil auger or trowel in the field and remember, only certain labs offer bulk density tests."

Agri intelligence

Farming for a SUSTAINABLE future

Like it or not, farming has to change.

We can help future-proof your farm by growing a diverse range of crops together with comprehensive advice on environmental and sustainable business opportunities.

We've captured our wealth of experience and know-how in our Green Horizons Insight Reports. Simply ask your Agrii agronomist for copies or follow the link below to order copies directly.

Whatever your sustainable farming, nature recovery or regenerative farming goals are, Agrii can guide you to a profitable and successful future.

FIND OUT MORE AT WWW.AGRII.CO.UK/ SUSTAINABILITY

Agrii

REGEN INTELLIGENCE

COVERING SOILS DAY
AN INTRODUCTION TO SOIL HEALTH MANAGEMENT

Anglo American exhibited their natural mineral polyhalite fertiliser 'POLY4' and Soil Scientist, Kathryn Bartlett gave a talk on how long-term soil management plans can improve soil fertility.

You will have heard it many times already how fundamental soils are to the wellbeing of our planet. Intrinsically knowing the value of good soil-based understanding, is the foundation of any growing system (excluding of course aquaponics!). Agriculture is recognised more and more as one of the drivers of possible mitigation of climate change, and as an industry with vast hectares of land on which significant gains could be achieved. Farmers are ever more increasingly expected to provide services in keeping with enhancing soil productivity and health. The job remit is massive: produce more and better-quality crops, with limited good quality soil and do that in an environmentally responsible manner. No small ask.

One of the major challenges we face in addressing soil productivity and health is the inherent variability of soils. The UK alone has hundreds of different soils and the landscape variation within field can be significant, affecting the management needs of this land. Therefore, 'one size fits all' solutions will not work, and we must rely on more detailed understanding at an appropriate scale to the management need, this is further hampered by soil data often being held by several institutions and not always readily available depending on your location.

The story is further complicated when we seek clarity on what is 'soil health' and what measurements can conclude this. The Food and Agriculture Organisation of the United Nations Intergovernmental Technical Panel on soils defines it as: 'The ability of the soil to sustain the productivity, diversity, and environmental services of terrestrial systems' which of course means that it is a dynamic concept changing with the anthropogenic drivers on that land.

Soils need to be considered in three dimensions – look beyond the surface at a complex world and intersection between physics, chemistry, and biology. Soil structure and texture regulate pore spaces, aeration, and drainage. Whilst clay particles in your soil regulate the nutrient availability along with soil organic matter which plays many other important roles such as gas exchange and affecting water movement in soils. Not forgetting that soils are one of the most biodiverse terrestrial systems – they are the recycling centre of the earth driving much of the resource we need to provide good quality food. However, with a third of global soils classified as degraded we are at greater risk of reduced production, not only in terms of volume, but in nutritional quality. Fertile productive soils form the basis to achieving this. Therefore, practices that reduce erosion, minimise soil organic carbon loss, correct nutrient imbalances, combat soil acidification, halt and remediate contamination and prevent soil compaction are some of the practical measures we can put in place to combat this.

To add one last complication to the thinking, we need to also consider soil management as a medium to long-term view when we are framing it within the lens of agrifood systems. Soil processes and changes happen over a scale of years and better to watch the long view to truly gain insight as to the management impacts on any given piece of land.

Whilst there is no single solution to addressing soil fertility problems, we now have many tools on hand to help. Focusing on providing the best physical, chemical, and biological conditions is the key to maintaining a more balanced and resilient soil system in the long term to provide increased functionality.

Things to keep in mind:

- Keeping the soil covered as much as possible to help prevent erosion losses.
- Selecting cover crop mixes with differing plant rooting structures to aid water infiltration and compaction zones.
- Keep soil trafficking to a minimum to avoid soil compaction.
- Where possible try to increase soil organic matter inputs.
- Provide balanced nutrition to ensure no harmful effects on soil pH and chloride levels.
- Regularly monitor your soils (visually and chemically) and keep a record to monitor long term trends.

Kathryn Bartlett is a soil scientist who is working on unpicking the interactions between polyhalite and soils. Building up this understanding of interactions will unlock new and innovative crop nutrient solutions as part of a global need to improve soil health/ performance that enhances crop nutrient use efficiency and land management practices. Kathryn holds a PhD in Soil Microbial Ecology of arable agricultural systems from the National Soils Resources Institute at Silsoe, Cranfield University. She has worked on projects ranging from nutrient cycling in northern peatlands through to helping inform UK soils policy. She is an honorary member of the British Society of Soil Science.

POLY4

An Anglo American Product

Supporting our soil ecosystems

POLY4 is a multi-nutrient, low-chloride fertiliser created from the natural mineral polyhalite.

- Season-long crop nutrition helps increase yield
- Improves nutrient use efficiency
- Helps preserve soil health and structure
- No chemical processing during manufacturing
- Low CO_2 footprint*
- Suitable for organic farming

*compared to conventional synthetic fertilisers

GRANGE MACHINERY

Strip-Till Preparator

The Preparator has been designed from carefully listening to farmers over the past few seasons who are wanting to perfect their establishment of maize. The layout of our three independent rows of cultivation discs that can be hydraulically adjusted whilst working in harmony with our low disturbance tine and point allows us to create a perfectly cultivated row that is ready for a seed to be planted into. This system is then finished with a zonal Guttler prism roller ring that is the final part of the cultivation pass to breakdown any clods that have flowed through the system as well as consolidating the row in readiness for a planter when the time suits to sew.

One of the unique features that the Preparator offers is the option of applying either granular or liquid fertiliser behind the loosening tine in preparation for seed to be placed into the row.

Low Disturbance Loosener

The LDL has been designed with the need of farming practises moving towards direct drilling or min-till and the requirements that the latest direct drills have to sew into a level and perfectly finished surface. Compaction is commonly found at depths of 6"- 10, the Low Disturbance Loosener will be used to lift at full width and at depths of up to 12". It is used primarily to loosen the soil structure straight after combining and removing the compaction pan. We have witnessed farms start to experience poor crop establishment and growth due to the compaction generated from machinery traffic, rain fall etc. We offer the central folding machine in 4m along with the wider working widths of 5m & 6m.

6m Low Disturbance Toolbar

Options.....

The 6m LDT offers the ability to lift and lower the cultivating legs and discs within the frame/chassis whilst not interrupting the height of the trailed implement on the rear hitch. This feature allows the machine to be mounted on the tractor and to only be used when required. The operator has complete control on having the loosening legs in or out of work whilst on the move, this allows the leg and disc depth to be altered if required without leaving the cab. One of the key attributes of the machine is that it provides options for the farmer.

'Tight Turn' - Automatic Headland Turning Feature...

The 6m LDT offers a unique system that allows the machine to be converted from 6m working width down to 3m during headland turns. This feature eliminates the need for an extended headland, the wings on the machine automatically lift to a 90 degree position whilst the operator concentrates on performing the turn, this is achieved using one tractor auxiliary service. The wings will then unfold and become a 6m beam again ready for the next pass, a very easy but versatile feature that transforms field operations.

Choose your system...

The 6m LDT has proven to be a very popular machine that is used with a range of trailed implements. Having the ability to lift and lower the cultivating legs when in combination with other implements without affecting the trailed setup makes the machine very versatile and to be frequently used. The LDT adds a loosening system to machines that are already on farm allowing farmers to enhance their current cultivation and drilling system. We offer three widths of Low Disturbance Toolbar in 3m, 4m & 6m

Heavy Duty Track Eradicator

This machine is very popular for farmers that are currently practising or looking to move into CTF however it is aimed at eradicating wheelings in all farming practises. A strong and robust frame that is built with 8m - 12m trailing implements in mind. The versatility and ability in having the loosesning legs in/out of work is a key feature of the machine. The front cutting discs are on the same service which means the machine is very easy to operate and can be set up in the headland management screen. The machine replicates the tractor drawbar height, allowing you to lift and lower the wheel eradicator legs whilst on the move, without affecting trailing implement setup.

Set your trailing implement to the optimum working depth and let the Track Eradicator take care of your wheelings.

Strip-Till Preparator

"Look out for the Grange flags on Stand 520 at Lamma 2024"

- Available in: 3m, 4m and 6m
- Leg spacing - 0.45, 0.5m, 0.6m, 0.75m & 0.8m spacings
- X2 Hydraulic catching discs (per row) that can be adjusted to enhance/decrease soil flow into the row for the rear offset discs to cultivate dependent on type and thickness of surface residue
- X2 Rear mounted offset wavy discs (per row) that are hydraulically adjustable up/down to determine the finish of the soil condition in the row to enable a good seedbed for planting.
- Option of either Shear Bolt or Hydraulic Reset Protection & Fertiliser application
- 4m & 6m machines are central hydraulic folding frame with a transport width of under 3m

Prepare the perfect row for your crops.....

GRANGE MACHINERY

- CAT 3 & 4 Linkage Headstock
- X12 Hydraulic adjustable front cutting discs for trash management and to provide minimal disturbance
- X12 Low disturbance loosening legs at 0.5m spacing with a range of 300mm working depth all fitted with Tungsten protected points
- Automatic Headland Turning Feature – hydraulic system that folds the wings from 6m to 3m for the headland turn
- Hydraulic services for trailing secondary implements

Add complete versatility to your drilling and cultivation processes ....

GRANGE

DIRECT AND MIN-TILL DRILLING VERSATILITY

The HORSCH Avatar and Sprinter drill ranges offer direct and min-till drilling with a focus on versatility and productivity.

The Avatar is the direct drilling expert that is flexible, robust and precise. It can be used universally from direct drilling to cultivated soils with up to three individual metered components. The high coulter pressure of up to 350 kg per individual row and maintenance-free bearings ensure a reliable and effective performance. Depth control at the individual coulter and adjustable closing wheels result in precision drilling in a wide range of conditions.

The Sprinter tine drill combines soil preparation, seeding and fertilisation in one pass. The robust design has clear advantages in min-till conditions, with most of the straw residue remaining on the soil surface. Its strong frame design, low draft coulters and large seed hoppers allow high performance and productivity.

Avatar SD with smaller working widths and updates

The Avatar SD is available in 8m, 9m and 10m working widths with the choice of 6300 litre double hopper or 6400 litre triple tank, and the ability to mount a 400 litre MiniDrill too. It is possible to equip the machines with trash wheels to cope smoothly with high amounts of straw.

In 2024, the Avatar 12.25 SD and 12.40 SD can be optioned with a selective hosing. This allows for alternately supplying the seed coulters with two different crops. Thanks to the individual depth control, fine seeds can be placed shallow and coarse seeds can be placed deep. In addition, double row spacing can be achieved so that, for example, cereals can be sown with a spacing of 25cm and soybeans with 50cm. The Avatar 12.50 SD offers a row spacing of 50cm as an option for the 12m version.

The AutoForce system, well-known from the HORSCH Maestro, was shown on an Avatar 10.25 SD at the Agritechnica 2023 show. Using hydraulic rams, AutoForce is the only system available to continuously adapt coulter pressure while drilling to prevent compaction on light land or reduced sowing depth on heavy land. This produces an even seed placement which helps crop growth. Row cleaners are now available on the 8m to 12m Avatar models with 25cm row spacing.

Avatar SL – all-new mounted model

The all-new Avatar SL is the smallest and most manoeuvrable Avatar seed drill with a mounted 3-point configuration designed for precise sowing in mulch seed conditions. The depth control roller of the SingleDisc coulter ensures a regular depth placement even in uneven conditions. Row spacings of 25cm or 30cm pave the way for mechanical weed control.

The Avatar SL is used in combination with the HORSCH Partner front tank. As an option, there will also be a solo version with an 800 litre seed tank in the rear. Hydraulic weight transfer achieves a coulter pressure of up to 240kg per coulter, with the weight of the tractor transferred to the seed coulters. This is useful especially in harder conditions and considerably extends the range of use of the machine.

Sprinter 6.25 SL and 12.25 SC tine seed drills

Two new models join the popular Sprinter tine seed drill range; Sprinter 6.25 SL and 12.25 SC. Changing climate conditions are bringing about longer dry periods and cultivation methods need to change to the meet the challenge of keeping water in the soil.

The new Sprinter models reduce tillage to a minimum yet work well in high amounts of straw residue, as well as in harder soils. To ensure a perfect seed-soil contact between the grain and seed furrow, the new Sprinters are equipped with a tine seed coulter that creates a residue-free seed furrow. Three different tine coulters (110mm WideEdge, 21mm ThinEdge and 12mm UltraThinEdge) enable the farmer to additionally react to various conditions.

The new 6m SL mounted model works in combination with a Partner FT front tank, while the 12m trailed SC model is equipped with a 6300 litre double hopper and is available with a triple tank and additional MiniDrill options. Both feature tines with a 25cm spacing and a 180kg release force.

HORSCH

VERSATILE DRILLING - **AVATAR & SPRINTER**

The Avatar and Sprinter drill ranges offer direct and min-till drilling with a focus on versatility and productivity. The Avatar is the direct drilling expert that is flexible, robust and precise. The Sprinter combines soil preparation, seeding and fertilisation in one pass. Both can be specified with multiple metered components for uncompromised versatility. **HORSCH.COM**

AVATAR SD

- SingleDisc seed coulter that is maintenance-free with a long service life
- 25cm row spacing available on 8, 9, 10 & 12m
- 6400 litre double tank system with third and fourth components optional

SPRINTER SC

- 6300 litre double hopper
- 110mm WideEdge, 21mm ThinEdge and 12mm UltraThinEdge tine coulters
- Available with a triple tank and additional MiniDrill options

TOGETHER FOR A HEALTHY AGRICULTURE

RAGT – PUTTING SCIENCE BEHIND COVER CROP VARIETIES

When it comes to growing cash crops, most farmers will spend plenty of time choosing the right varieties with traits that suit a farm's physical and management characteristics.

However, many growers are sold cover crops by species, with little or no additional information to demonstrate their suitability for different enterprises, soils or rotations.

As one of a handful of global cover crop and soil health plant breeders, RAGT believes this needs to adapt and change to help growers get the most from their investment and better meet the needs of agricultural policy, while optimising opportunities within environmental schemes.

RAGT has been deeply involved in the cover crop/soil health sector for many years. "There are not many other plant breeders in the world with such an extensive portfolio," says David Ramdhian, RAGT UK's head of forage and soil health crops.

"We are currently involved with lots of partners within and beyond the RAGT group, offering more than 47 species in the UK last year.

"But, while the concept is more accepted than a few years ago, there is still an element of muck and mystery about soil health plants.

David Ramdhian

think **SUSTAINABILITY** think **RAGT**

- Offering a wide range of cover crops, facilitating carbon storage
- Contributes to reduced nematodes pressure
- Provides higher rates of N fertility in the soil

think **COVER CROPS** think **RAGT**

Call us on **01799 533700**,
or visit us at **ragt.uk**

R·A·G·T

think
SOLUTIONS
think **RAGT**

N-Fix blend

"Our breeding programme is putting much-needed science into the sector, so we can target the right varieties at specific problems in the field to deliver the best results."

RAGT has established partnerships with ADAS, Harper Adams University and the University of Wageningen in Holland to delve further into the science and has also embarked on a major European joint venture with Bayer looking at carbon capture.

The company also runs demonstration trials at Ickleton in Cambridgeshire. Taking part in AgriWeb Media's Covering Soils event was an obvious next step.

"We are delighted to be working alongside host farmer Clive Bailye, who is a real cover crop enthusiast," says David. "The event was a great opportunity to provide new growers with technical information on various cover crop blends and straights from RAGT's breeding programme."

At the event Peter-Jan Jongenelen, RAGT's international cover crop product manager, showed visitors some key products from RAGT's breeding programme, which includes brassica cover crops, such as mustards, radishes and rocket lettuce, as well as phacelia, legumes and black oats.

"Some of our soil health varieties are used to improve soil structure and to produce a healthier community of soil microorganisms to help provide the ideal growing medium for cash crops," Peter-Jan said.

"There is also an increasing focus to manage and suppress soil-borne crop diseases caused by nematodes and soil-borne fungi across a range of rotations. We are also looking to control pests like wireworm and leatherjackets.

"Whatever the aim, we are all the time choosing varieties to ensure we don't introduce a potential new weed species or disease into the rotation."

Many cover crops play additional roles in capturing residual nitrogen and other nutrients, eventually making them available to the following cash crop.

Several straight plant stands and a range of mixtures, all sown immediately after oilseed rape, were demonstrated at the event.

RGT N Fix Blend

This nutrient-capturing soil improver includes a late-flowering Ethiopian mustard to prevent seed set, potentially important where other brassicas feature in the rotation.

- Added berseem clover fixes and captures nitrogen and P and K
- Very deep rooting, good restructuring capabilities
- Frost susceptible so suits no-till systems.

RGT Fungi Redux (nematicide radish, berseem clover, phacelia)

Fungi Redux was created to reduce sclerotinia. In trials with Warwick Crop Centre, this mix has had a good reducing effect on sclerotinia in carrot rotations.

- Also very effective at capturing P and K.

RGT Factotum (phacelia), RGT Dracula (oilseed radish) and berseem clover

Contains phacelia, radish and berseem clover, featuring a range of rooting depths to condition and loosen soils as well as fixing nutrients.

- Frost susceptible, so facilitates destruction.

RGT NemaRedux

- Suppresses potato cyst nematodes and beet cyst nematodes as well as free-living nematodes that affect many cash crops, including wheat. Growing roots attract nematodes out of soil and block their life cycle.
- Clubroot-resistant oilseed radish plus rocket lettuce
- Eliminates need for biofumigation.

RGT Biofum Autumn

Ethiopian mustard, oilseed radish and forage rape mix, drilled in September and incorporated ahead of the cash crop in March for biofumigation.

- All inclusions are winter hardy
- Apply small amount of fertiliser if permitted to boost glucosinolate levels.

Amelia and RGT Brons

A very late-flowering brown mustard for longevity to optimise fumigation potential, plus vetch to provide nitrogen to aid establishment and early growth.

RGT Cebelica

Later flowering, high-biomass buckwheat which is under test for repellent effects against leatherjackets and wireworm.

COVERING SOILS DAY

The Tyre & Compaction presentation hosted by Philip Wright & Stephen Lamb was an engaging and well-attended station during the event.

From a tyre perspective, the focus was very much on the Interface – the contact area between soil and tyre, and how by doing some homework, soil compaction could be dramatically reduced. Identifying the most suitable size of tyre for the application, with the aim of selecting the lowest operating pressure tyre within that size, which normally would be VF specification tyre, with many of the guests already benefiting from that fitment.

A demonstration was given to show, how in some cases, it can be more beneficial to go longer in the footprint, rather than just going wider, this is where VF technology can really play its part, by having a longer footprint, within the already committed trackway, as opposed to just going wider.

This followed nicely into an area, which is commonly over-looked, regarding tyre width vs implement width – which controls the – Tyre to Field Percentage Contact. Example a 3m drill with 710's tractor tyres fitted has a Contact Percentage of 47%, that is nearly half your field in Contact with your tyre, and with whatever pressure you are operating at ! Whereas say a 6m Drill with 710's would only have a 24% Contact in your field.

Three main aim areas were illustrated, if not already achieved :-

A – Aim to reduce your axle loads, where possible, to 5 Tonne.

B – Aim to reduce your operating pressure to sub – 12psi.

C – Aim to reduce your Field Contact Percentage – 20%

By being aware of these aims/goals, soil compaction would be greatly reduced.

One additional area covered at the Station, was with all the hard data we have about the cost of establishment, inputs data, crop data, etc, etc. do we actually have a value as to what level of compaction we generate with each application within the field, especially during drilling - the last tyre before the seed goes to work, the answer coming back was very little hard factual data was known.

Yet we all know that compaction is a major player in poor soil health, yield loss and the business's bottom line – yet we seemingly have no really reference point to it, in this data driven world - this got the guests thinking !

The station was however able to offer one value, which could be easily calculated, while not compaction itself, it is the element which develops compaction at the interface, subject to

soil type, density, moisture, etc. that being the Load Applied.

From this calculation, Load Applied values could be mapped from each application within the field, and then with the whole farm on an annual basis. From this captured data, informed decisions can be made, on how to reduce the Load Applied values. Is it possible to achieve - by reduced applications, doubling up applications, Increasing the working width of an implement &/or reduce the width of tyre, looking for a lower operating pressure, specification of tyre, would all help to mitigate the effects of soil compaction to your business.

Load Applied Field Mapping could possibly be used as part of the Farm's Management Soil Action Plan within SFI.

Load Applied data will be a value offered by OEMs within their field solutions - data capture - in the near future.

Load Applied - Field Mapping - Full Year Cycle

	Tyre Width	W/Width	Distance	Pressure
Combine	800	10.6	X	32
Tractor / Trailer	650	3	X	20
Mucksprеading	650	12	X	20
Subsoiler	710	3	X	18
Cultivator	710	3	X	18
Powerharrow	710	6	X	16
Drill	710	6	X	12
Rollers	800	10.3	X	10
S/P Sprayer	650	36	X	12
Fertiliser	650	36	X	12
S/P Sprayer	650	36	X	12
S/P Sprayer	650	36	X	12
Applied Load for Full Year				3250

PHILIP WRIGHT

Reduced or minimum tillage requires soils to be in good condition for an efficient and effective transition from more conventionally tilled situations. Promoting healthy, biologically active and aerobic soil conditions is key to all forms of successful farming, and especially important where such activity, allied to vigorous crop root development and growth, can result in improved levels of soil resilience. Such resilience is becoming ever more important as our weather conditions become more extreme in both the wet and dry sense.

Important factors to consider when transitioning to reduced, or zero tillage:

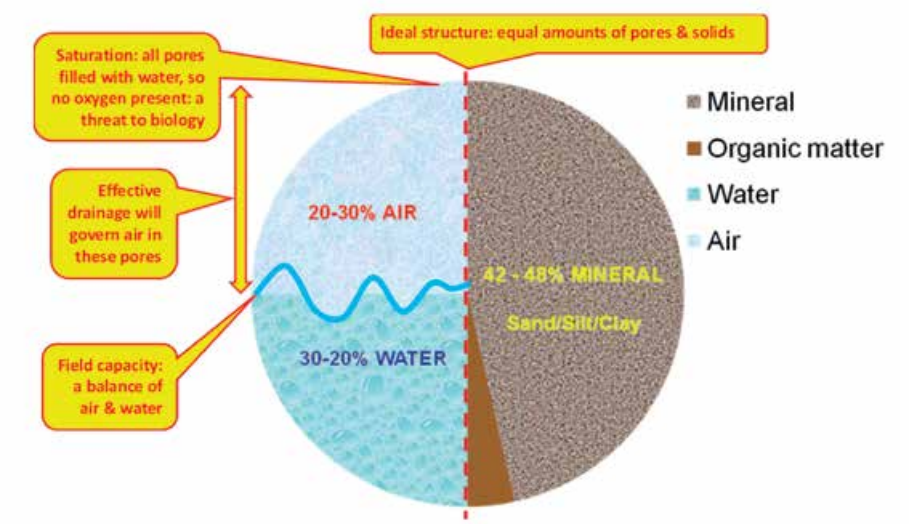
Soil type is important, along with the status of the soil itself. Biological activity, for example, will have been influenced by past and current cropping and cultivations. Naturally free-draining and self-structuring (calcareous) soils are likely to make a transition faster, and more efficiently than slowly permeable soils with a slumping-prone nature (silt is a key fraction here, especially in clay soils), or those where previous cultivations have been very intensive. Low soil organic matter levels (as a result, or where straw is removed, or no FYM or biosolids have been returned) also imply the need for care when looking to make such a transition. Other factors of critical importance include the following.

Drainage: Having aerobic soil biology is critical. A rapid return back from saturation to field capacity after high levels of rainfall will help. The capability to pass water through the soil profile efficiently – having a good level of vertically connected pores in a stable, well aggregated structure - is key to unrestricted water passage. Porosity levels also should be roughly 50% of the total soil mass. These pores can then hold onto water and air in balanced amounts, and provide pathways for such, along with plant roots and a home for the soil biology.

A fast return from saturation (all pores full) to 50% full of water at field capacity is driven by stable, resilient soil structure and effective drainage where this is needed for water to leave the field. On heavier soils needing drainage, yield improvements of circa 1 tonne/Ha of cereals crops is common, once the scheme has bedded in, and soil has begun to repair itself. New schemes are costly, so it is vital to ensure current schemes are functioning to their best before considering further investment:

- Ensure ditches are free of obstructions, and outfalls are clear, and above the bottom of the ditch. This also includes allowing water off the farm holding, onto the next by such means.
- Following heavy rain when soils are already damp, drains should start to run quickly, and slow down equally fast once surplus water has been removed by drainage.
- Mole drainage on appropriate subsoils (at appropriate moisture levels – the soil must be plastic at depth and drier nearer the surface for traction) should supplement under-drainage if indicated on drainage maps. This fissuring action above the mole can also help maintain subsurface structure when it is at appropriate moisture levels.

Other considerations for effective mole drainage include proper mole channel formation –these need time to "cure" so avoid moling immediately before forecast heavy rainfall where soils at depth are near field capacity. Back-fill gravel above drainage pipes also ensures mole channels can vent efficiently and minimises risk of



premature collapse.

Attempting to direct drill poorly drained and poorly structured soils is a recipe for disaster.

Soil Structure: This also determines free root, water, and air passage. Barriers, if found, should be removed so effective rooting (and yield) can result. Soil structure resilience improves with biological and root activity, so significant compromises to yield (and crop rooting) will prolong the transition process, and have negative effects on the business bottom line. The spade is essential here to determine the degree of damage, if present, and actions then needed.

Soil loosening by low disturbance "soil profile stretching" should be considered if this improves rooting, and shallow drainage.

- In many cases, such structuring can be done by a tine based drill – for example when establishing a cover crop. Having the capability to drill seed slightly shallower than loosening depth can be good – as the BTT opener examples seen on Clive's Sprinter drill.
- An option to use a loosener ahead of the drill can also be effective, where needed.
- Such loosening can often be timed ahead of a break crop such as WOSR or beans, allowing its effect to benefit the following first wheat also.

Deeper structure issues are often confined to known areas (turning headlands, & on less stable soils) where a controlled "stretching" of the profile will usually then allow effective root development and drainage. This process is NOT subsoiling, and can be done by a "sward lifting" approach in conjunction with growing roots through the profile.

Where this loosening action is needed, ensuring structured "columns" remain between the loosened zones will further stabilise the structure and help maintain the biology present. The benefit to yield in the example previously outlined was just over 1 tonne per hectare of spring barley where the compacted headland was restructured.

Cropping: Growing crops with effective root systems normally drives further, higher yielding crops to then follow. Such crops and roots support positive soil biology, soil resilience, and also sequester Carbon most effectively. Avoid leaving land fallow and without some form of a growing crop whenever possible will maximise the building of soil resilience.

Prevention before cure: Prevention, or mitigation of trafficking damage helps to minimise unnecessary cultivations, accelerating the transition.

- Controlling and managing traffic limits areas of damage – Controlled Traffic Farming principles apply.
- Minimising axle loads, and ground pressures resulting, is a key factor to consider when transitioning. Many disc based direct drills do not use eradicators, and in any event, keeping ground pressures to levels of 0.7b or below will minimise adverse yield effects in these trafficked zones. Yield effects from ground pressure vary, and can lead to yield reductions of 40% or more, compared to where not trafficked, when drilling direct.