

“ Farmers hold the key to improving human and planetary health. ”

Healthy life starts with the soil

Machinery Groundswell 2018

Groundswell, that took place in Herts at the end of June, has now become a key event for growers looking to understand how to bring the benefits of conservation agriculture into their arable system.

CPM was there.

By Tom Allen-Stevens and James Hacker

Health. This was the running theme for the Cherry family's third annual Groundswell Show. From twelve direct drill demonstrations, to keynote speaker Dan Kittredge's opening presentation covering nutrient level in food supply: what is meant by health is more than simply maintaining soil structure.

"Farmers hold the key to improving human and planetary health, starting with the soil," say the event organisers, and over 1200 farmers and scientists attending the two-day event was evidence in itself

of a commitment to investment in sharing information regarding conservational practices.

Drill demonstrations

If the future of soil health lies in innovation, then some of the features on the drills that lined up during this year's demonstrations will surely ensure a healthy foundation for farming. Twelve of the leading names in drilling presented their very best equipment designed to meet the individual needs of customers. All drills were demonstrated on ground with standing cover crops.

SlyAgri demonstrated its Boss drill, with its emphasis on control. The drill applies pressure though hydro-pneumatics. The coulter is angled so that it is pulled into the ground, lessening the amount of weight needed from the drill itself. With its connection to a sensor on the gauge wheel, the hydraulic down pressure gives precision control of the coulter pressure. This allows for close monitoring and control of furrow depth. When combined with the V double disc which allows for a range of soil conditions, this drill offers a better early life for the seed, says the manufacturer.

Hutchinsons and Cousins' collaboration

formed the basis of their demonstration. This featured a new crimper roller which, Hutchinsons' Dick Neale says, fully crimps cover crops as opposed to simply bruising them. The roller is fitted with helical blades, rolling over and crimping the crop ahead. The fallen crop forms a very dense cover on the soil surface which effectively earns several weeks extra benefit from the crop through protecting soil and suppressing weeds.

John Deere demonstrated its 750A, and these proven drills continue to impress. Although not much has changed, the 750A shows off several features which David ▶



The Cousins crimper roller is fitted with helical blades, rolling over and snapping the crop ahead.



Twelve of the leading names in drilling demonstrated equipment on ground with standing cover crops.

► Purdy of John Deere claims make this drill truly versatile. Its 7° angle single disc allows for precise seed placement in all conditions with very low soil disturbance. It has exact depth control, ensuring levelled crop emergence even when drilled directly into stubble. With low fuel costs, this drill operates at minimal power requirements rendering it a truly versatile machine, David adds.

This year, Sky demonstrated the Easydrill which matches this level of versatility by offering a certain level of customisability, says Sky's Joe Redman. The drill is fitted with a 3.5° angle single-disc opener, making it a truly minimal disturbance drill, says Joe. Seed depth is controlled by the "Tandem" — a rubber depth wheel and two rear press wheels ensure depth variation is limited to only 1cm. Dual depth outlets allow for a

variety of cover crop species to be metered and placed at once. The drill can seed three products at two depths simultaneously, allowing for a number of time-saving combinations: grain, fertiliser and companion crop or slug pellets, for example. As the name suggests, ease of use is the top priority here, and the number of adjustments does not hinder this, says Joe. The 4m and 6m models are foldable.

Horsch presented a drill specifically designed for no-till application, although arguably rendering it less versatile. In dryer soil (such as the ground conditions we saw the drill demonstrated on), Horsch's Avatar SD line does an admirable job, according to those attending the demo. There's very little soil disturbance thanks to the SingleDisc coulters, arranged in two bars, which are exclusive to the Avatar. The drill is available in 3, 4, 6, 8 and 12m widths, with a weight that puts a maximum of 310kg pressure down to each coulter, ensuring good penetration into hard soils.

Groundswell provided the first true no-till demonstration of Weaving's new GD8000T. The company launched the 8m drill at Cereals last month, intended to offer all the technology larger farms need to protect their soil structure and meeting customer demands for a wider drill, says the company. The drill has 48 coulters with 6 coulters per m across two rows, and folds to less than 3m for transport. The

principle behind the GD coulter design is its double-disc arrangement, angled at 25° degrees to the vertical, pivoted around a central kingpin. The larger leading disc cuts an opening, with the soil wedge lifted by the second disc, and the seed placed into the angled slot. The soil drops back into place, firmed by the press wheel, causing less sidewall compression and more effective and consistent slot closing, says Weaving

These drill manufacturers and distributors tout the versatile application and adjustability of their drills — the newest developments in ensuring each drill meets the exact needs of the user, and then some. If healthy soil is the first step in improving planetary and human health, then there's plenty of choice with where to begin.



The GD coulter is a double-disc arrangement, angled at 25° degrees to the vertical, pivoted around a central kingpin.

Sixty-minute worms

The advantages of earthworm population to soil health are no secret, improving soil structure and moisture content.

In an effort to measure (and hopefully improve) their numbers, Jackie Stroud — a NERC soil fellow based in Rothamsted — developed a traffic-light rating system to be used by farmers across the UK. The result she shared at Groundswell reveal the benefits of no-till practices on soil health.

The test works as follows. Ten topsoil pits (roughly the size of a spade) must be dug. Farmers then identify the three types of earthworms found (Epigeic, Endogeic, and Anecic). The test has informed Jackie's traffic-light system, which functions as an easy way to identify soil health, based on the population and diversity of earthworm species. For example, a higher distribution and variety of worms indicates a healthier soil structure.

"A farmer's decisions on how they treat their

soil can have a significant effect on earthworm population beneath the ground," points out Jackie. "No-till fields proved to have the highest chance of a good distribution across the field, while ploughed had the lowest." No-till fields were also likeliest to have higher numbers of earthworms with a 46% probability, with ploughed or pastured land offering a very low likelihood at only 11% each.

"Even when the individual earthworm types are assessed, the diversity of the population is highest in fields which employ no-till practices. The benefits of no-till practices to earthworm population, and soil health as a result, are clear," Jackie says.

Reflecting on her results, Jackie notes a lack of awareness of the role of earthworms. "43% of participating farmers requested better support in realising soil health practices, and better opportunities to share these practices with others."

She intends to publish a leaflet to be



Jackie Stroud has developed a traffic-light rating system for worms to be used by farmers across the UK.

downloaded online, explaining her findings from this first round of research. She has also produced an online test for participants to practice their earthworm knowledge.

The next earthworm sampling will take place between 25 Sept 30 Oct this year, with the aim that the results will benefit from this shared knowledge.

www.wormscience.org/earthworm-id-quiz.html



Groundswell provided the first true no-till demonstration of Weaving's new GD8000T.

Feed the soil gut flora

Maintain a healthy soil and you'll grow healthy, quality food. Keynote speaker at Groundswell and farmer from Massachusetts, USA, Dan Kittredge believes there's a direct correlation between how food is grown and how it tastes.

"Plants have a gut flora, just as we do," he says. "It's a symbiotic relationship with the microbes in the soil, such as bacteria and mycorrhizal fungi. It's the microbes in the soil that enable plants to flourish."

Dan founded the Bionutrient Food Association (BFA) in 2010, that aims to improve food quality through biological management and regenerative agricultural methods. The priority he says is to build soil vitality for better crop nutritional quality, vigour, flavour and yields.

"There are components of food that translate into flavour. But the average nutrient levels of food have been reducing. Meanwhile food-related disease is going up — we are degenerating and it's because most of what we're producing is relative junk," he says.

He believes there are secondary metabolites that are only built into a plant once the essential primary ones have been laid down. "It's these secondary metabolites that give a food its flavour."

So what are the conditions that allow this to flourish? Dan claims he's been into organic farming since he was five years old, but criticises the sector for producing food in a way he feels is very similar to conventional agriculture. On his own farm, he struggled with organics, but reached a turning point around 12 years ago. "We got to a point where the pest pressure diminished. Yields were going up. It became a functional farm. Viability was getting better."

The principles of biological management, he says, lie in understanding that plants are

feeding the soil with sugars. This feeds the soil microbes which in turn are feeding the plant with the complex array of nutrients and metabolites they need not only to thrive, but to produce healthy, flavoursome and nutritious crops.

Dan has five key principles about the soil that allow this process to take place:

1. It must be aerobic

Without air in the soil, there'll be systemic issues you'll have year after year, he says, and if it's too tight, the microbes will die. A good root mass is essential to maintain this. "As a rule of thumb, if you allow grass to grow to just 6in high above ground, there'll be only 6in of roots below ground — you need to let swards grow before cutting them. Cover crops will open up the soil."

2. Manage the water

Dan believes that tidal forces are in operation on land, just as they are at sea. "If you have water in your soil, the influence of the moon will move this through the profile — it's a beautiful, healthy process that happens twice a day. But if you damage your soil through tillage, this process is broken, and it's not available to you."

In general, farmers don't manage soils for sufficient hydration and should focus on proactively establishing "an infrastructure" that allows it to manage both too much water and not enough, he says.

3. Feed the soil

Soil needs food, he says, and this relies on carbon compounds. "There must be a stockpile of food in the ground for microbes to eat. If not, they'll die, and you'll end up with nothing more than lifeless dirt." This is where over-wintered cover crops come in, and he likes to have around 60cm of top growth by Oct. This ensures there's plenty of "food" in the soil by spring to make it biologically active for the established crop.

"The ability of plants to sequester carbon is really an amazing story," he says. "You can influence excess CO₂ in the atmosphere by increasing soil organic matter. You can increase SOM by 0.5% per year, and if everyone did that it would take just eight years to bring CO₂ levels down to where they were in 1750."

But one of the ways to be "part of the problem" of climate change, he says, is to apply fertiliser. "To take an analogy, we eat food, we don't take nutrients intravenously. If we did, our gut microflora would die. That what we do to our soils if we apply fertiliser." ►



The coulters of the Boss drill from SlyAgri is angled so that it is pulled into the ground.



Seed depth on the Sky Easydrill is controlled by the "Tandem" — a rubber depth wheel and two rear press wheels.



There's up to 310kg of pressure on the SingleDisc coulters, exclusive to Horsch's Avatar, to good soil penetration with very little soil disturbance.



The 7° disc angle on the John Deere 750A allows for precise seed placement in all conditions with very low soil disturbance.



Dan Kittredge believes there's a direct correlation between how food is grown and how it tastes.

► 4. Stimulate the life of the soil itself

This is critical to the soil's gut flora, says Dan. "Inoculate your seed to make sure there's a full spectrum of microbes at birth. This is like colostrum and you should ensure at least one or two dozen family

of bacteria on the seed."

But he believes that using fungicides counteracts the beneficial fungi you're aiming to encourage. "If you use fungicides you won't encourage a biological system," he says.

5. Maintain the mineral balance

These are the enzymes a soil need to process, he says — the tools of biochemistry. As well as the macro and micronutrients farmers are familiar with, there are others he believes are also important for a healthy soil. "80% of soil species are dependent on vitamin B12 – if you don't have it the microbes cannot exist. This requires a trace level of cobalt."

The BFA is now engaged in a project through which it aims to put quantitative values on the flavour and nutritional quality of food. Dan says they're currently developing a tool, based on a spectrometer, that you'll be able to point at

a carrot, for example, and it'll tell you how flavoursome it is. "We don't know yet what specific elements we're looking to detect in food — this is a collaborative effort and the answers will come as the project evolves." ■

Groundswell visitors gather at the Soil Tent to hear about the principles of biological management.



Direct drill comparison – 6m models

	Row spacing (cm)	Hopper capacity (litres)	Seed/fertiliser	Weight (kg)	Coulter configuration	Starting price (£)
Dale drills Eco M	12.5-25	2800	both	6250	up to 48 over 6 rows	61,500
Duncan AG Renovator AS6100	12.5-15	2000	both	5600	up to 48 over 2 rows	82,600
Horsch Avatar 6 SD	16.7	3500	both	9300	36 over 2 rows	94,430
John Deere 750A	16.6	2300	seed	6300	36 over 2 rows	100,862
Rytec Ma/Ag SS P 60 T	18.2	2500	both	6250	33 alternate fore and aft	69,495
Simtech T-Sem 600AC	18.75	4100	both	5550	32 over 3 rows	70,000
Sky EasyDrill	16.6	4100	both	7100	36 in pairs on tandem	100,304
SlyAgri Boss	16.7/18.75/20/25	2000	both	6000	up to 36 over 2 rows	61,800
Triton SP 600M-ET	16.7	extra	seed	3400	36 over 4 rows	29,000
Weaving GD6000T	16.75	3500	both	9000	36 over 2 rows	64,400

HEAVY DUTY

Everything about the GF600 is heavy duty. We added strength where it counts in the main frame and bearings plus a 500HP gearbox so good that we gave it a 2-year warranty.

It's versatile too with a choice of 12mm speed blades or hook line rotor. Add our BF or Shapeforma bodies, a vegetable hood or crumbler roller and you'll find it leaves a great finish too.

Judging by advance orders it's a perfect combination.

Your Choice...



12mm Speed Blades, or



Hook Lines



For more information talk to your GRIMME dealer or visit www.grimme.co.uk

