

ISSUE 2 | JUNE 2018

# DIRECT DRILLER

MAGAZINE

THE FUTURE OF YOUR SOILS

## Leaving the COMFORT ZONE

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Species **Page 30**

Grazing Crop  
Residues **Page 46**



**PROCAM**

"AGRONOMY THAT DELIVERS"

Supporting Knowledge  
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IS  
GLYPHOSATE  
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OF CONSERVATION  
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Using Peas as an Agronomic  
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# DIRECT DRILLER

MAGAZINE

Issue 2  
June 2018

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# INTRODUCTIONS

## MIKE DONOVAN

**Many thanks to all those farmers who made contact with favourable comments about Direct Driller Issue 1. The challenge of creating a new magazine that farmers want to read cover to cover is one which is very close to my heart. It is a vital topic of major importance to everyone.**

You'll find a lot of hands-on practical advice in these pages which will help you achieve success. Success in anything involves knowledge, experience

and application, and here you have a valuable source of the first two of these.

The strap line reads "The Future of Your Soils" and it is becoming clear that soil condition will very much be the future of many farms, both in the UK and abroad. With the majority of the content about improving your soils.

The first issue of Direct Driller included informative articles on systems of reduced tillage, and this second issue is larger and leads on well from the first. I am confident you will not only find it a cover-to-cover read, but also something you'll keep.

Finally, we want to hear from our readers: feel free to contact us with your direct drilling experiences and knowledge. Thank you for your support!



## DID YOU KNOW ONE OF THE AHDB MONITOR FARMS IS A DIRECT DRILLER?

Rick Davies is one of the latest to join the AHDB Monitor Farm programme, where farmers meet at a host business to share ideas and expertise and learn from experts.

He said: "There is a lot to be learned from other farmers. It will be good to get a group together to talk openly.

"I want to dig deeper into our business, to focus more on my costs."

During the three years of the Monitor Farm programme Rick hopes to increase his business resilience, reduce fixed and variable costs while maintaining crop quality, and improve soil health for a healthier crop.

Rick is holding his first event on 4th July – you can find out more details

on how to attend here - <https://cereals.ahdb.org.uk/northampton>

### About the farm

Rick Davies farms 404ha at MTH Davies, between Northampton, Bedford and Milton Keynes. He grows milling wheat, malting spring barley and HOLL oilseed rape, all for premium markets. The soil is a mixture of sandy loam, corn brash, silt and heavy clay loam. Crops are currently established with a Claydon-based direct drill and Rick would like to look at other systems of establishment. As a family-based

business, MTH Davies has a number of diversification activities to spread risk, including boxed beef, office and industrial units and residential lets.







IT'S TIME TO  
**REGAIN  
CONTROL**  
OF GRASSWEEDS

## CLEANING-UP WITH OSR HARVEST MANAGEMENT

Pre-harvest glyphosate can make a valuable contribution to grassweed control as well as the timeliness and efficiency of oilseed rape combining. Undertaken correctly, it will deal with perennial and late-maturing annual weeds while improving stubble management by giving more time for out-of-crop weed control and reducing trash burdens.

### Appreciate Infestation Levels

Substantial grassweed populations can easily escape notice in heavy oilseed rape crops. Although they may remain well below the canopy annuals will set seed and perennials develop strongly below ground.

### Target Key Weed Species

Pre-harvest treatment will be too late to deal with most black-grass and brome problems. Later-maturing annuals and perennial grasses and broad-leaved weeds, however, will be at the right stage for control.

### Avoid Spraying Too Early

There is no advantage in spraying before rapeseed moisture levels drop below 30%, either for weed control or harvest management. Treating too early will slow down drying and restrict both yield and oil content.

### Use the Most Effective Treatment

Heavily-waxed, senescing canopies and weather uncertainty make it vital to use glyphosates with proven dry weather activity and rainfastness. Formulations that minimise drift are of obvious value.

### Employ the Best Spraying Practice

Medium-coarse sprays are advisable, together with water volumes, pressures and settings giving thorough canopy coverage and penetration. In hot weather, spraying early in the day will be useful.

For fully comprehensive advice on pre-harvest OSR treatment and other elements of cultural grassweed control go to [www.monsanto-ag.co.uk/grassweed-action](http://www.monsanto-ag.co.uk/grassweed-action)

### OSR Harvest Management Timing Guide

- Select areas of the field representative of the crop.
- In each area pick 20 pods from the part of the canopy carrying the lion's share of the yield.
- If at least two thirds of the seeds have changed from green to brown in at least 15 pods the earliest stage for spraying has been reached.
- Only start combining once stems as well as pods are fully fit which may be up to 3 weeks after spraying under some conditions.

### STEWARDSHIP

**Seed crops should never be treated. The statutory 14-day minimum interval between glyphosate treatment and combining must be observed. Stubble cultivation and glyphosate treatment should be integrated to particular grassweed and volunteer burdens.**



For more details visit [www.monsanto-ag.co.uk](http://www.monsanto-ag.co.uk) or phone (01954) 717575 or e-mail [technical.help@monsanto.com](mailto:technical.help@monsanto.com)  
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# ARBUSCULAR MYCORRHIZAL FUNGI AND MODERN WHEAT VARIETIES

Written By Lottie Alves

Procam have been working with a number of no-till farmers to look at ways of maximising crop yields whilst reducing inputs. One of the key areas which Procam have been looking at is the use of growth promoting bacteria and fungi to help stimulate root development and increase nutrient and water uptake by the crop. One such trial now in its second year, has been looking at the potential of modern varieties of wheat to be colonised by arbuscular mycorrhizal fungi and the benefits of this association.

Approximately 74% of flowering plants form associations with arbuscular mycorrhizal fungi (AMF), which require a plant host to survive, and the colonisation of plant roots by AMF has been shown to have a number of plant benefits, including; increasing plant uptake of nutrients and water, increasing a plants' tolerance to both biotic (pathogen infection) and abiotic (drought) stresses and improving soil structure through the release of the protein glomalin. However, many current farming practices have depleted the natural levels of AMF

in the soil, through the use of some pesticides and fertilisers to which they are sensitive, growing crop species such as oilseed rape, or sugar beet which are non-mycorrhizal and through cultivation practices where their hyphal network is damaged. No-till farming practices are a good environment for the re-development of natural mycorrhizal populations, and we have seen this on our trial farm down in Essex, which has very high background levels of AM fungi.

The trial I conducted on behalf of

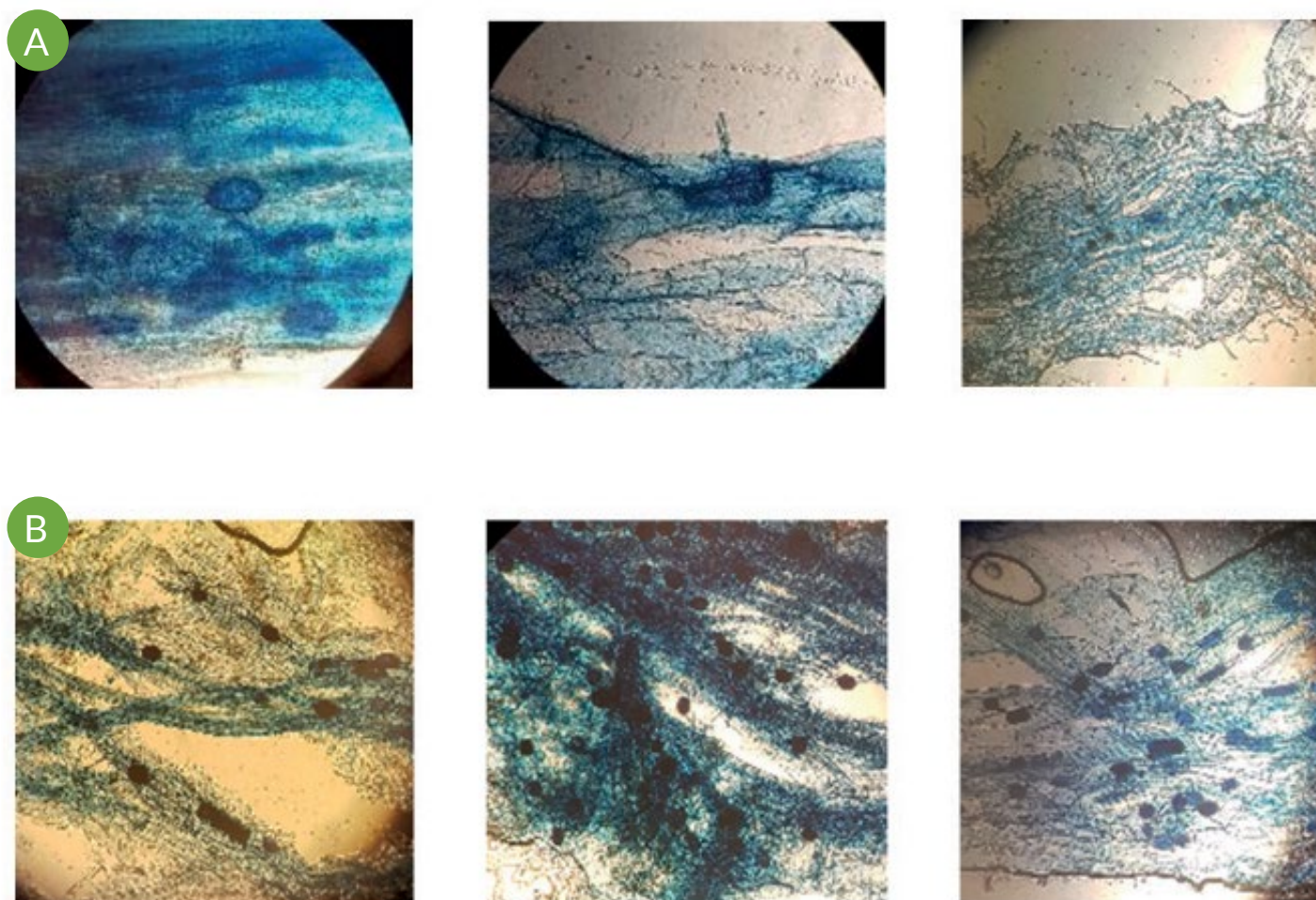


Figure 1: Mycorrhizal colonization levels in wheat root samples taken in March (A) and July (B)



## Mycorrhizal colonisation levels in each variety in March and July

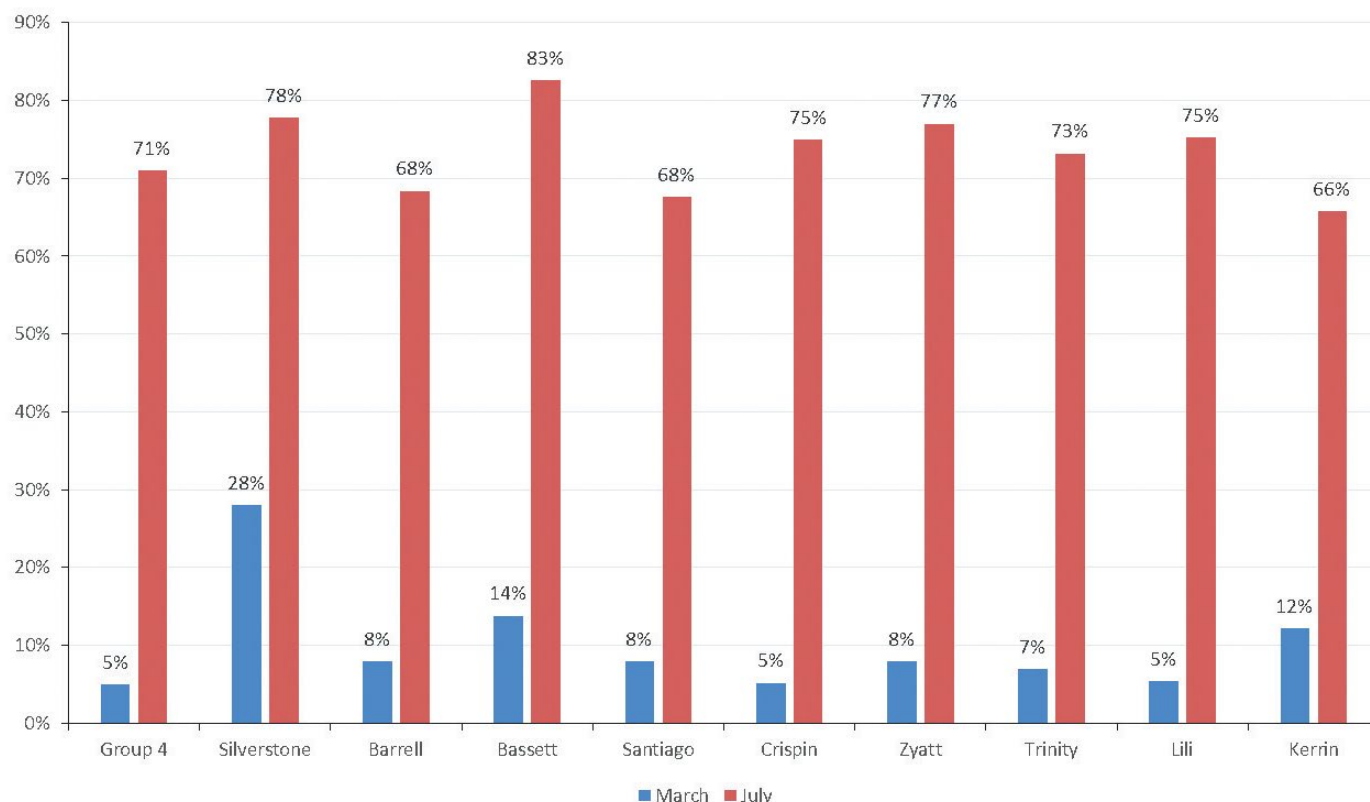


Figure 2: The Proportion of analysed root segments found with signs of mycorrhizal root colonisation, split by each variety. For root samples taken in March and July.

Procam, wanted to assess not only the ability of modern wheat varieties to be colonised by AM fungi, but also to assess any potential differences in varietal colonisation levels which might help us to be able to identify varieties best suited to the no-till growing system.

The trial took place on a farm down in Essex which has been practicing no-till for over 10 years and with soils which had been tested and found to have high background levels of mycorrhizae present within the field. A total of nine different varieties of wheat, plus the farmers' own group 4 wheat variety blend were drilled in the autumn of 2016, following lucerne. The wheat was taken through to harvest with assessments made in March, when the plants were tillering and in July just before the crop was harvested, on the level of AMF colonisation seen. Colonisation levels were assessed by staining the wheat roots with a dye which binds to the AMF structures within the root cells, allowing me to visually assess the proportion of the

root samples which were colonised. The images in figure.1 are examples, taken using a microscope showing some AM fungi structures found in stained wheat roots at the assessment timings in March (A) and July (B). AMF structures have been stained dark blue, whilst plant cells remain white/light blue.

The results from the first year of the trial showed us that all the varieties of wheat tested were capable of AMF colonisation, although the levels of colonisation varied between varieties (figure.2). There was an overall increase in the level of AMF colonisation within the wheat roots from March to July and this is likely due to AM fungi becoming more active as temperatures increase and could also explain the lower variability in colonisation levels between varieties in the samples taken in July, as those less mycorrhizal varieties had a chance to 'catch-up'. Of all the varieties trialled KWS Bassett and KWS Silverstone appeared to be the most mycorrhizal, with KWS Silverstone having double to five times

the proportion of root area colonised, compared to the other varieties at the March sample timing. This gap had reduced by the July sample timing and it was KWS Bassett that had the highest level of colonisation at this timing, although KWS Silverstone still had the second highest level of colonisation, suggesting that these two varieties are potentially the best to grow in no-till systems.

A second year of the trial is currently on-going, with most of the same varieties being tested, to try and see if the results of last year's trial are replicable. Procam will be at Groundswell this year on 27th-28th June, at stand E5 in the pasture field, where I or my colleagues will be able to give more information out about our work on AMF, including some preliminary results from the second year of the wheat trial and our work with other biologicals, and our other no-till trials.



# TRACTOR 3-PT COMPOST TURNER USES A TRUCK AXLE

In future years compost will become mainstream in farming, and compost heaps will become a regular sight on farms. This homemade turner which was first published five years ago has been a popular workshop project due to low cost and simplicity. It makes a great introduction for composters who are looking for a machine which creates an even, uniform turn to the heap. Something that's not so easy to achieve with a loader and fork.

Having turned more than 5,000 cu yards of compost with no problems, Paul Bernier is happy to say that his home designed and built compost turning machine is up to the job. It works on the Californian vineyard which he manages alongside his brother. They grow 45 acres of grapes without irrigation, which means they need to conserve moisture in the soil, and composting is an important means of doing this. This year they didn't get the spring rains which they rely on, so they are turning and mulching the ground with compost to hold in what moisture they have.

The Bernier's use the compost turner to convert all the waste from their wine operation into plant food for next year's crops, and it is so successful that compost is their nutrient source for the grapes and also a 5 acre field of row crops.

## Five ft rotor gets into the pile

A heavy built rectangular frame mounts on the 3-pt and the tractor PTO connects with the back axle, and differential, off a substantial truck. The PTO drives one of the wheels and the output turner is axle's drive shaft. The axle can be rotated on

the frame so it can be lifted up about 45 degrees. The PTO is connected to the left hand (curb side in the UK) wheel. The right hand half shaft and hub are retained and the hub is locked so the drive goes to the original drive shaft alone.

The drive shaft from the truck has a 5ft long pipe fitted over it and a series of tines bolted to tine holders that are positioned in a spiral. The tines are short lengths of steel plate which are turned in a shallow angle so they catch the compost but don't spade it up.

The axle is held in place by two solid hoops with fitted grease nipples, the front one fitting round the housing for the half shaft, and the rear around the axle in front of the wheel hub. Welded to the axle is a heavy support strut across the gap from half shaft housing to the drive shaft end, and this has a bracket on which a hydraulic ram (red) is fitted. There's a bracket with a hole in it welded to the diff casing and when the machine is lifted this fits into a clevis on the frame, allowing the machine to be locked upright for transport.

There's a robust angled blade mounted between the rotor and the drive, and this

goes to the ground when the machine is used in its lowest position. The blade has an angled part at the front which pushes the outside of the swath up, and there's a further pusher mounted in front of the rear wheel that does the same. This means the machine can be used tight to the compost row.

## Strength built in to work at any angle

The way the machine lifts allows it to work at an angle as well as horizontal to the ground, so it can be used to turn the top of a swath of heavy compost before going back and lowering the turner for a second go through. The diff is rated at 20,000lbs and the turning loads are far less than this, so the gearing has plenty in reserve.

## Fast worker

Paul says "This machine is pretty efficient, I turned this windrow, approx. 250 cu. yds. in 15 minutes. I have been making around 2500 yards a year with this thing for 4 years, with no problems. I was worried that the hub bearing wouldn't take the load, but it doesn't even get hot after hard use."



Above left and centre: The guard shield allows close working in the windrow - Paul hopped off to take the pictures. Above right: Lifted in the transport position



Far left: Compact, simple machine is built around a big truck axle

Left: The tyre tread is a guard to stop compost flying over the machine

Article first published in Practical Farm Ideas Vol 22-2.



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# FEATURED FARMER

## ALEX SHUTES



It's now been well over a year since I wrote my first Farmer Focus piece and I have continued to learn as I go on with our strip-tillage system having had some good and not so good results on the way.

As with a lot of farming much can depend on the weather, and despite the strip-till systems ability to conserve moisture the summer of 2016 was so dry here that we lost 40 of our 70 acres of OSR to lack of moisture and slugs that refused to come above ground to eat the Sluxx pellets I had kindly provided them, preferring instead to feast on my chitting OSR seed. Cover crops went a similar way with so little moisture to get them growing it was about an 80% failure overall.

With that in mind our OSR drilling had a slight change in mindset where we planned to only drill with rain almost certainly on the forecast rather than aiming more for a specific date, switching back to higher seed rates of conventional seed, to put liquid N+ P down with the seed to give it a boost, double roll at different angles if necessary and putting Ferric Phosphate slug pellets down with the seed. This was implemented in the summer of 2017 with good results in terms of crop establishment, only harvest this year will tell us how we have really got on.

Our move to Volume Hybrid barley for the first time last harvest gave us our best ever yield of winter barley on the farm, the crop looked great all year and did 9.4t/ha,



*Above: Claire 1st wheat after spring beans, stubble raked, sprayed off and drilled @200kg/ha on 10/10/17*

it seemed to be about the only crop that didn't suffer to much in the dry spring! For harvest this year I have changed variety to Bazooka to hopefully push that even more but the wet winter and early spring, plus combine and trailer wheelings from a wetish harvest doesn't look to have done it many favours, however, I may yet be surprised.

Our Claire 1st wheats did ok again for us last harvest though I'm still waiting on final lorry loads to calculate total tonnage. JB Diego 2nd wheats were disappointing, they were badly affected by the long dry spell in the late spring where they were

on lighter land which pulled the average down to only just over 7.5t/ha. This year I have switched away from Diego and gone for the higher yielding KWS Kerrin as a 2nd wheat which looks good so far and the weather this spring is proving better for maintaining potential yield so far with some good rain events and nice spells of sunshine!

Propino spring barley also had its last year here for harvest 2017, the difficult growing season last spring (and perhaps a lack of PGR in hindsight) caused the crop to brackle over badly so I estimated we lost possibly 1t/ha on the floor from the combine chopping heads off underneath the knife. Speaking to other farmers we weren't the only ones to have this issue and still managed 5.5t/ha. Another variety switch has been made this time to KWS Irena for this year for its improved lodging and straw stiffness scores as well as greater yield potential. It looks great so far despite not being drilled till the 3rd week of April. We also used our liquid fert system, that was installed on the drill for using on the OSR, to place 200l/ha of 14-7-7 to see what difference it would make. In terms of yield, we won't know till harvest, but establishment had a very visible difference with the few test areas I turned the fertiliser off were considerably behind in growth once the roots took



*Above: New liquid fert nozzles (red cap) and stainless steel holders putting liquid fert down mixed in with the seed before being covered up.*



Filling up with liquid fert whilst drilling spring barley.

up the placed fertiliser. 5 weeks after drilling and there is still a noticeable height difference between the two areas although they are now all the same dark green colour whereas the non-liquid fert areas had been a much paler green for a few weeks. I'm very interested to see what this brings at harvest.

Spring beans managed 3.8t/ha and didn't all make human consumption quality, another victim of last spring's drought. We have them in the ground



again this spring though I am looking at alternatives as Blackgrass control is not good in them, though the 1st wheats after look very good this year!

Other developments include a new combine, with a wider header, so fewer wheelings, and a chaff spreader so even more improved trash distribution. I'm looking forward to getting it stuck into this year's crops!

*Below: KWS Irena spring barley receiving some Manganese. Drilled @220kg/ha on the 24/4/18, versatility of the DTS showing as this land was ploughed as a reset due to ruts at harvest and building work. Had been ploughed the previous year as well so this field has yet to be fully converted into strip-till. Flexibility is key at times.*



BASE-UK was established in 2012 and is independent of all businesses or organisations. We provide a forum for members to share information, experience and ideas on minimum tillage, direct drilling, cover cropping, integration of livestock and other techniques offering more sustainable agriculture by working in harmony with soils and the wider environment as well as inviting industry experts to speak to members.

The Association aims to champion all practical approaches, techniques and opportunities offering to improve the social, economic and environmental sustainability and resilience of UK farming, particularly through tillage and cropping systems generally associated with soil conservation and conservation agriculture.

More information and membership details are on our website: [www.base-uk.co.uk](http://www.base-uk.co.uk)

## BASE-UK UP-COMING EVENTS FOR 2018

For more information on any of these events please contact [rebecca@base-uk.co.uk](mailto:rebecca@base-uk.co.uk)

**27<sup>th</sup> and 28<sup>th</sup> June** – Groundswell No-Till Show - Our stand is in The Black Barn.

**5<sup>th</sup> July** – BASE Member Farm Walk – Richard Watts, Gloucestershire.

**3<sup>rd</sup> and 5<sup>th</sup> December** – BASE-UK hosts Professor Jonathan Lundgren, Bluedasher Farm.



# INFLUENCE OF CUTTING HEIGHT ON STUBBLE MANAGEMENT

Written by Frederic Thomas, TCS Magazine n°95. November/December 2017

The experiments and measurements that follow were carried out by Étienne Mignot (engineering student) on the farm of David Guy in Loire-Atlantique (sky France).

In order to observe the quality of emergence and the development of machinery, a variety of plants were sown with a (EasyDrill) disk drill as soon as the harvest was completed (July 10, 2017) with 3 modes of management of crop residues: high stubble (cutting at 40 cm), short straw rolled (8 cm) and rolled short straw followed by shallow stubble cultivation (5 cm deep). The crops observed are mustard, peas and buckwheat, which serve as indicators; the other plants, according to their typology, had quite similar reactions and developments. These 3 species were used for these reasons - Mustard is often the most

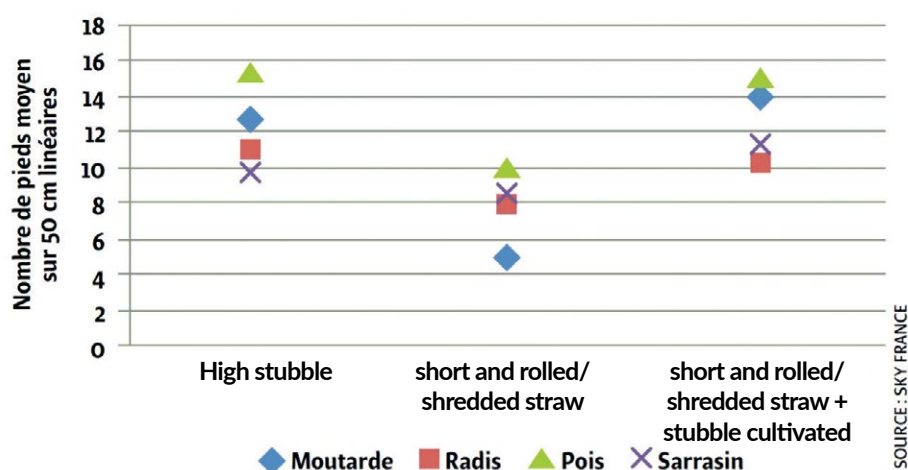


Figure 1: Observation of the dynamics of emergence for each modality and the four cover crops

common "minimum cover" because

it is cheap with the guarantee of good establishment; Feed pea is a legume which fixes nitrogen and it is logically a cover that must, in fact, be less sensitive to possible problems in summer after harvest. (NB In France of course !) Buckwheat was chosen as a cover that emerges quickly in summer but also as it is a commonly used species in catch cropping.

In addition in 2017, spring and summer were extremely dry in the Loire Atlantique: 9 mm between sowing and first emergence, only 8 mm in the first half of August and 21 mm at the end of the month.

## The dynamics of emergence

These particular conditions, which correspond more to what the majority of farmers may normally encounter in the area, have certainly amplified the differences and have highlighted the pitfalls in terms of summer cover establishment.

Not surprisingly (see Figure 1), it is in the 'rolled straw' that the emergence is lowest, all species combined, while the 'high stubble' is similar. This observation confirms the difficulty of cutting through a "mattress" of dry crop residue just after harvest. The 'hairpinning' of the



Above: this experiment was conducted on a plot in Zero till and min-till for nearly 15 years with a goal of sowing at 3 cm. Seeding was carried out offset from the previous sowing to improve the quality and a band was left without cover to study the dynamics of emergence of regrowth and the soil.



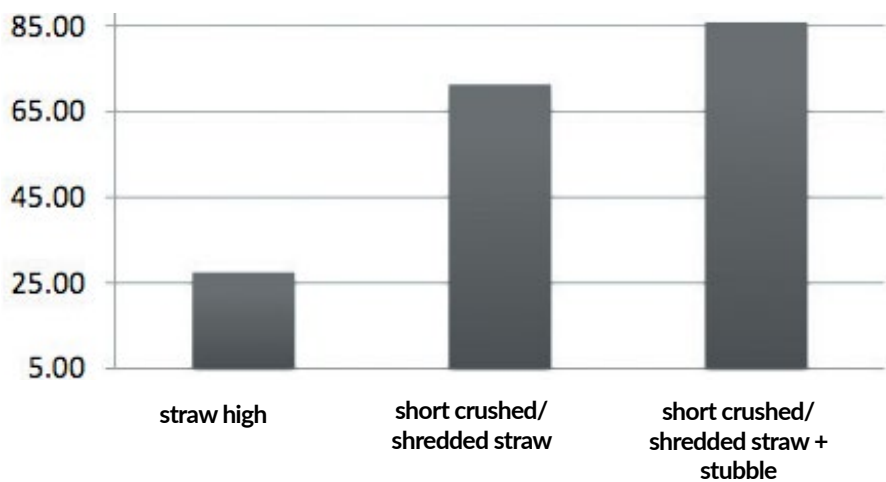


Figure 2: Impact of flea beetles in the mustard canopy depending on the management of the straw

straw in the furrow is not a fable but a reality. Stubble rolled is shown to

be the worst option. On the other hand, conservation stubble cut high

shows an interesting solution to protect seedlings at this time and in these conditions. As the flea beetles attacked very early in cruciferous crops this summer, the straw height seems to have disturbed them (Figure 2). Indeed, only 25% mustard seedlings were affected in the high stubble while 68% were attacked with rolled stubble and 85% in the cultivated version. This is a comforting observation on the effect of companion plants in rapeseed: from the moment they cover and even hide the seedling, some pests are avoided. It also confirms that healthy rape seedlings that grow quickly are a lot less affected.



Above Left: **Mustard August 28th** : except for height differences that remain important (36 cm high stubble, 28 cm in short stubble and 31 cm in the cultivated area), this observation shows up a strong difference in growth stage. The 'high stubble' has a bigger leaf surface area and a much larger biomass than the other two and has very few flowers. This difference in appearance confirms that in the 'high stubble' the plant has developed well in better conditions and with less stress, particularly related to nitrogen, as opposed to the others.

Above centre and right: **Peas and Buckwheat on August 28th**: As shown in this picture taken on August 28, even peas, (legumes) are affected by the stubble height. in the 'high stubble', they have about 86 leaves on average with a lot of tendrils against 54 for the shorter stubble and 48 for peas in the cultivated area. It's as if the difference achieved at sowing and emergence had continued to grow. The vegetation gap is equally impressive with the buckwheat that has reached the flowering stage.



	Long stubble	Crushed straw	Straw in place	SOURCE : SKY FRANCE
t / ha of ms	0,6	0,7	1,1	
kg / ha N trapped	23	29	35	
kg / ha N restituted	12	15	17	
kg / ha p 2 o 5 returned	3	4	6	
kg / ha K 2 o restored	19	24	37	

Table 1 Biomass from the mustard to August 28, 2017

	Long stubble	Crushed straw	Straw in place	SOURCE : SKY FRANCE
t / ha of ms	0,7	0,9	1,7	
kg / ha N trapped	31	40	71	
kg / ha N restituted	16	20	36	
kg / ha p 2 o 5 returned	4	5	9	
kg / ha K 2 o restored	17	22	42	

Table 2 Biomass of the Cover Crop from the 28th of August 2017

	Long stubble	Crushed straw	Straw in place	SOURCE : SKY FRANCE
t / ha of ms	0,9	1,3	2,6	
kg / ha N trapped	25	32	57	
kg / ha N restituted	12	13	22	
kg / ha p 2 o 5 returned	5	8	16	
kg / ha K 2 o restored	22	33	65	

Table 3 Biomass from the Buckwheat on August 28, 2017

## Early developments

A first observation, 3 weeks after sowing, the differences in techniques are already apparent. The establishment is generally better in the high cut stubble, then that seedlings are much weaker in straws rolled with or without stubble cultivation. The difference is more obvious with the peas. The 'High stubble' already shows thirty or so shoots with the appearance of the first tendrils, while in the shorter stubble the number of leaves goes down to 24 and even fall to 20 in the rolled straw. A beautiful demonstration which confirms that the peas enjoy the companion crop, giving protection but also supports on which they can grab early. The difference in height of the cover also makes a big difference for buckwheat in favour of stubble cut at 40 cm. Measurements made 2 weeks later in the middle of August reinforce these first observations with big differences especially for peas and buckwheat. These differences will continue to



Above: this photo which compares all the cover in the dethatched part (the worst part) and cover in tall straw (Top row) shows that the trend presented above for only 3 types of plant is general. The residue management at harvest therefore has a very strong influence on the success of covers.

grow during the observation at the end of August where mustard was very short and had almost set seed.

## Weighing analysis and trapped Nitrogen estimates

For this step, it was weighing of the aerial parts at the end of August that was used as a combined method to give an evaluation of response. So logically, we are witnessing an important difference between the techniques, which verifies the field observations.

For mustard If the biomass is almost similar between the 'cultivated' part and "rolled stubble"

it doubles for the 'High stubble' as the picture shows, which is confirmed by weighing. This difference is logically in trapped nitrogen with rather large gaps despite levels of weak plants. This shows, like the behaviour of the plants from earlier, that post-harvest nitrogen residues were very low in this plot, a low level certainly maintained throughout the dry summer.

## For peas

For this legume, the initial difference is maintained and even amplified in time with the 'high stubble' area which stands out as having double the biomass in late summer. This experiment once again demonstrates that legumes appreciate a little free nitrogen or fertility at sowing and during their emergence. So that once in place, they can start to compensate by symbiotic fixation. So if we compare nitrogen contained in the mustard and in the peas, the arithmetic is almost right. The bacterial symbiosis allowed them to double what has been taken from the ground but no more. However, this is where the peas are the most vigorous at establishment, and certainly better fed early, and that the total amount fixed is the most important (about 35 kg in the 'high stubble' against 15 kg in cultivated stubble).

So for legumes, the quality of the establishment does not only influence the biomass but also their capacity to return free nitrogen into the system. Also differences are to be expected for the buckwheat. However this can achieve, in the 'high stubble' situation", the highest biomass with 2.6 t of MS in slightly more than 45 days. This level of production confirms its speed of growth in summer and even in dry conditions, which makes it a very competitive plant against a lot of summer dicots. It also confirms here its aptitude as a second harvest option. The amount of trapped nitrogen is pretty intriguing then, as this plant is not a legume that can fix nitrogen, nor a cruciferous plant considered very nitrogen hungry. Buckwheat demonstrates however here it can be very powerful and that it is capable of scavenging or even draining the soil of its fertility more than other classic cover crops. It is certainly, and partly for this reason, that buckwheat has the reputation of keeping fields clean. As its common name of "Black wheat" could lead one to think, it is simply nitrogen hungry and it is this which allows it to dominate. It is logically for that reason that the grains that follow it need a small fertilizer application, especially in direct seeding.

## Points to remember and explanation hypotheses

This experiment and especially the weather conditions following sowing showed very clearly all the issues and differences involved in the sowing and establishment of covers in summer:

- The higher the stubble is left, the less they disturb the seedling quality, especially with a disc seeder. This potentially gives rise to the use of the Shelbourne stripper header in zero-till situations.
- High stubble is shading and especially limits the velocity of the wind at ground level which is one the biggest factors causing moisture loss by evaporation. In

summer, warmth of the surface is certainly less important than moisture retention under a layer of rolled straw.

- A high stubble benefited more from light rain as was the case this summer (8 mm). A good mulch limits evaporation, but it is necessary to count at least a good ten mm of rain to cross this barrier which works like a blotter for a really wet soil. When the humidity is low, as often in summer in covers, it is necessary to limit all sources of waste and these are ultimately all these little amounts of water that end up making a big difference in establishment and growth.

Finally, it is impossible to forget in this debate the influence of early fertility and nitrogen. The presence of straw on the ground, even in the form of mulch, will take a part of the fertility available in the first inch, the area where the seedlings need to settle in and germinate. The situation is even worse in the mulched area: even if the low tillage triggered a slight quicker germination it was slowed down by the dry conditions, and the volume of straw incorporated has constantly demanded the available nitrogen to the detriment of the covers. This is an only too classic phenomenon.

For more information on Nitrogen management in intercropping read also: "How much nitrogen may be required for the decomposition of straws?"

For successful covers, it is not enough just to have the right drill and concoct the best mixtures; it is necessary to learn everything about managing the straw during the harvest according to the operating conditions. It is also necessary to remember that poor fertility at the time of sowing is always detrimental even for covers that suffer more often from a lack of nitrogen before lack of water, while many think the opposite to be true.

*Written by Fredric Thomas*



# FEATURED FARMER

## STEVE LEAR



### Taking a leap of faith into Direct Drilling

My name is Steve Lear and my family and I run 1000 ha of farmland in Buckinghamshire. We run a mixed farm of beef and arable. We have a suckler herd of 400 pedigree Limousin which are either sold as breeding stock or fattened on the farm. So, with 1000 head of cattle on the farm we have a lot of farm yard manure to spread come the summer. On our arable side we grow milling wheats, hybrid barleys and spring oats in a three-year rotation. Previously we have grown OSR and spring beans but find that the beans don't really pay very well and the flea beetle pressure in the area is too high to carry on with OSR. Our soils are a mix of clay loams, silty clay loams and heavy clay. Being a mixed farm, we have the benefit of being able to rotate grass around in our rotation which helps to control our blackgrass to a degree.

The first time I saw a direct drill was at an agricultural show a number of years back. I remember turning to my dad and brother and having a laugh about how it would never catch on over here.... And now here I am, eagerly awaiting the delivery of our farms first no-till drill.

In this section I am hoping to document our journey into direct drilling as it happens. Ill give you an honest opinion of the pitfalls and successes that we find along the way. I look forward to your feedback and discussion on The Farming Forum – [www.thefarmingforum.co.uk](http://www.thefarmingforum.co.uk)

So how was I converted from a sceptic to someone who finds themselves writing in Direct Driller Magazine?

For a number of years, I felt that our clay soils were becoming harder and harder to knock down to a seed bed. We had been using a Simba Solo or plough as our primary cultivation followed by either power harrows or discs to knock the soil

down before our Vaderstad Rapid drill. The fuel bill wasn't getting any smaller and the cost of wearing metal was creeping in the wrong direction. The system always produced a decent crop and was fairly resilient but I always felt that were doing battle with mother nature.

It was at this point that I started to see a bit more in the farming press about direct drills. I started to take more interest in the subject and soon I was hooked. I attended a couple of seminars set up by our agronomists Pro-Cam and listened to the likes of Clive Bailye, Joel Williams and Jamie Stotzka talk on the subject of direct drilling and how our soils work with the plants we are growing.

We could see the benefits of No-till and when the implications of Brexit started to unfold it became obvious that we would have to become lower cost producers to compete on the global grain markets. As farmers we don't have a huge amount of influence on the variable cost that go into

producing a crop, although I think that this is starting to change now. I could see that our fixed costs could be dramatically reduced.

We began trying out a few drills in the autumn of 2017 as a bit of a trial. The conditions were not great for direct drilling. The soils were very wet and the crop was being drilled at the beginning of November. But it was a good way of testing them under harsh conditions. At the time I thought that there wasn't a cat's chance in hell of getting a crop off the field. Some drills hadn't closed the slot properly, some had disturbed too much soil and some hadn't been able to penetrate the soil. The crop looked very poor coming out of a very wet winter and I thought that I would be ripping it out and putting a spring crop on the field. However, the wheat seemed to come good and the low plant population soon tillered out to fill the gaps. Although it won't be a record yield for us it certainly won't be written



Direct drill trial in winter wheat



Wheat drilled into heavily compacted ground suffered



off. It was obvious from the trial that we carried out, that we would not just be purchasing a drill and that our whole system would have to change. For a start with direct drilling there is no scope to take out compaction, so the idea is to not cause it in the first place. This isn't going to be easy on a mixed farm as we have a lot of FYM to get out in the summer. We will be controlling traffic as much as we can without spending huge amounts on GPS systems, but simply we will be driving on tram lines were ever practically possible. It will also mean that we will have to be more patient when the ground is wet. As well as compaction, we noted that coulter travel was going to be important to us, with no field levelling possible the coulter would have to drop into any wheeling whilst maintaining seed depth. The strip till style drills were able to establish a crop well but there was too much soil movement and this was going to be an issue with our blackgrass.

We decided that the Primewest Drill was going to be the best drill for our farm. It has a large coulter pressure which may be needed if our heavy clay dries out at the end of summer. It also has a variable down pressure system integrated into the drill which will help with maintaining seed depth on the fields with more variable soil types. We are having the drill built with a liquid fertilizer kit on it to enable us to put fertilizer down at drilling when needed. The other reason that we liked

the Primewest Drill was the Crossslot technology that they use on the opener. The seed is placed to the side of the disc, which means the slot does not need closing up like other drills. It should also eliminate hair pinning from crop residue.

It then came to finding the capital to pay for the drill. I have spoken to some farmers who have sold all their cultivation kit and old drills to finance the purchase of a no-till drill. We are not done just yet as we want to prove it can work before ditching the plough. We applied for a Leader Grant through our local Leader Programme. The process was fairly straightforward and the local Leader team were very helpful and supportive of our application. Our local leader team could see the environmental benefits as well as the economical benefits from direct drilling. In early 2018 we were told that our grant application was successful and we have now gone ahead and ordered our drill. Our drill will be arriving on farm just in time to plant some cover crops in the summer, in the meantime Primewest have drilled 100ha of spring oats for us. They have also established 15ha of linseed and 22Ha of forage maize.

After a wet winter we had to be a bit patient before we could let Primewest travel on the ground. The oats all went in well and they were up and out of the ground very fast. I can see a few crops in the area already struggling with a lack of moisture. Since we haven't disturbed the

ground our crop will be fairly resilient to the long periods of dry.

I don't think that direct drilling is going to be easy on our heavy clay soils, and I'm reminded of this on a weekly basis by friends and neighbours who assure me that it won't work. This is great at making me more determined to get it right.

Our first task is to get our soils restructuring. We will be drilling a broad species cover crop between winter barley and spring oats. We will be spraying this off in November to allow the ground to dry out ahead of spring drilling. On top of this we will also be using our FYM on all our arable land to help feed the soil. I am hoping that our populations of beneficial organisms will increase rapidly with all the organic matter that we will be putting back into the soil.

Looking to the future I hope that we will no longer need our cultivation equipment. I hope to one day not have any need for insecticides and that our reliance on inorganic fertilizers will be reduced. It's an exciting time to be in agriculture and we have a lot more to learn about how the plants that we grow are interacting with the soils and the beneficial organisms within it. For too long agriculture has been perceived by the public to be the destroyer of ecosystems and the polluters of rivers. I hope that conservation agricultural practices can go some way to change that perception.



Spring oats planted into barley volunteers



Fast growth on spring oats at two weeks after sowing



Spring oats after one month





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# UK DRILL MANUFACTURERS IN FOCUS...

## SIMTECH

Simtech T-Sem tine drills are probably the most versatile of all the direct drills on offer today. Their heritage is from the inverted T-slot coulter, initially developed in New Zealand for establishing new seed into living grass, which is probably one of the most difficult direct drilling challenges. From Simtech importing these drills, the European T-Sem was born and has progressed from a simple 3m machine to the range of drills we see today.

The unique T-Slot coulter creates the perfect environment for seed to germinate and develop. At only 10mm wide at its leading edge it is designed to cause as little surface disturbance as possible. Preceded by a vertical cutting disc, that creates a path through surface trash, the inverted T-slot coulter ensures that the seed is always placed on a firm base, with the vibrating tine creating the tilth to cover it. In soil held together with a large amount of root material the T-slot coulter creates a void in the soil, which is like a mini greenhouse, generating humidity to enhance the speed of germination, but at the same time allowing sunlight to penetrate through the partially open slot. This scientifically



proven feature allows small seeds to be placed deeper than would normally be viable into an environment which is much less likely to result in poor germination or seedlings drying out.

The T-Sem is the ideal drill for a farmer in the early stages of converting to direct drilling. Versatile enough to cope with all the other drilling tasks such as min-till or ploughed surfaces, but none the less a dedicated and powerful direct drill, able to handle large amounts of surface trash and hard or wet ground conditions. The heavy duty 30mm square double coil tines are strong enough to direct drill crops such as Beans to a depth of up to 10cm (4") in most soils, once again ensuring that the seed is always placed in the correct environment for its development, not at a depth limited by the drills capability.

The T-Sem is also uniquely placed for the establishment of cover crops, which is enabled by its ability to work in high levels of crop residue and at a time of year when the soil can be quite hard to penetrate. The subsequent drilling of the cash crop into the cover crop is also a job that requires the T-Sem's ability to work in large amounts living vegetation, once again placing the seed in the best environment for its rapid development.

The base model T-Sem 3m is available with pneumatic or gravity metering systems with the later shortly to be available with second "micro" hopper which can be used for slug pellets or micro fertiliser. In addition it can be used for inter sowing a companion crop in between the rows of Oil Seed Rape making the whole package a very affordable and versatile drill for the smaller farmer.

All pneumatic models can be specified with the ability to meter up to 2 additional products into the main airstream or 1 product into individual rows.

T-Sem drills are now available for all situations. There is a new range of 4 Vineyard models from 1.1m to 1.8m and 2 pasture rejuvenating models of 2.4m and 3m. T-Sem Arable drills start with 3, 3.5 & 4m fixed frame models, 4.8m & 6m mounted folding models and trailed drills starting at 6m. All drills are available with liquid and granular fertiliser options.





## SEEDBED MANAGEMENT KEY FOR YIELD AND PEST CONTROL

Good seed bed management and crop establishment alongside controlling blackgrass and reducing the slug risk is farm manager Simon Hill's main priority on the 687 hectare Strattons Farms LLP in Hampshire.

The land is roughly split into two types, approximately half is chalk land with a clay cap and the other half is a silty clay loam. The vast majority of the land is down to a cereal rotation apart from 109 hectares of grassland which supports a beef suckler herd.



Simon Hill

"We try where possible to keep an open six year rotation using winter wheat, winter oats, winter barley oilseed rape and spring barley," says Mr Hill. "In recent years we have grown less and less soft milling wheat and now we are growing almost exclusively hard feed wheat.



"There is no second wheat and the further the oilseed rape crops are kept apart the better. By growing the rape once in every six years rather than once in every three means that we get far better yields as there is a lot less chance of damage by pests, especially now there are no neonicotinoids available to control flea beetles."

In order to get the best seedbed available and good crop establishment Mr Hill has adopted a non-inversion tillage programme, although a small amount of ploughing is carried out when needed to help weed control, especially blackgrass.

It is a relatively simple system, he says, with around 70% of the straw produced being baled, but this presents a problem with chaff and straw because a 30ft combine has difficulty spreading it evenly across the full working width.

Consequently he has replaced an old Vaderstad Carrier with a new Carrier 525XL, pulled by a John Deere 6190R, which has a straw rake on the front and 61cm discs.

"We travel at a 250–300 angle across the tramlines as soon as possible after harvest," says Mr Hill. "We set the discs to go to a depth of between 7.5cm and 10cm, which is essential to do as soon as possible after harvest to ensure trash and soils are well mixed. This will allow the micro-organisms in the soil to start to break down the chaff and trash which helps in the control of slugs without the need for any chemical control."

Two of the three farms on the estate have open water ditches and so are under the control of Catchment Sensitive Areas. The other farm has no surface water as such but water from the aquifer below is used for drinking water and so is bound by regulations regarding slug pellets.

The land is then left to green up before being sprayed off with glyphosate. This is followed by a pass with a Vaderstad TopDown to a depth of 175mm pulled by a John Deere 8345R. The land is then left to green up again before being sprayed off with a second application of glyphosate.

"We have done this since we started getting some signs of blackgrass resistance to Atlantis and so far it appears to be working well and keeping things under control. Only following the second dose of glyphosate do we consider drilling. This is done with a 4m Vaderstad Rapid drill pulled by a Fendt 820 Vario.

"By using this system we feel we are getting the best seed bed possible with good high quality kit that holds its value. Good establishment is essential for good yields and also we are able to adopt good cultural practices for weed and pest control."





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# LEAVING THE COMFORT ZONE FOR A GREENER NO-TILL FUTURE

Written by John Dobberstein in No-Till Farmer USA, first published on December 17, 2016 in the Cover Crops, Equipment and Water Management Section

Allen Below's 7,000-acre farm in southeastern Missouri is undergoing a rapid transformation with the help of no-till practices, aggressive cover crop adoption and elimination of tillage.

For the last few years, Allen Below has been working on a learning curve, but he's moving toward a day where he's reduced or eliminated irrigation, restored his farm's soils and is enjoying a better balance sheet.

Below and his partner brothers, Justin and Austin Littleton, began no-tilling their 7,000 acres of corn, cotton, rice, popcorn and non-GMO soybeans in 2014 near Parma in the Missouri Bootheel. They also began seeding cover crops the same year.

Below had been using a conventional/modified ridge-till system with a minimum of three trips across the field, and as many as six if fields were in poor condition, to get the beds ready.

So far, Below estimates he's saved as much as \$102 per acre by switching to no-till, which is helping to pay for his



*GOING BIG. Allen Below is rapidly converting his 7,000-acre farm in southeastern Missouri from conventional tillage to no-till, seeding a majority of them to cover crops and planting corn, soybeans and cotton into them in spring.*

cover crop seed. It cost him up to \$17 per acre alone for each tillage trip. He wants covers to do the tillage for him.

"Even though it's pretty flat here we do get some soil loss," he says. "When it rains a lot you see muddy water running down the ditches. We want to improve

soil health, improve water infiltration and water-holding capacity, and grow our own nitrogen (N). The only way to make cover crops work well was to go to no-till."

## Jumping In

Below and his partners wanted to see if cover crops would also help them on their heavier clay soils. In fall 2014 they planted 1,500 acres of cover crops with three different mixes that included oats, hairy vetch, daikon radishes, turnips, Austrian winter peas and buckwheat.

The covers went in after popcorn harvest and also into standing soybeans. The fields were planted in 2015 to either popcorn, cotton, milo or soybeans.

Below had so much success planting cash crops into killed covers that spring that he seeded 6,000 acres of covers



*CLOSING UP. Two John Deere planters, both with Schaffert Mfg.'s Zipper closing wheel system, were used this spring as Allen Below no-tilled cotton, corn and soybeans into cover-crop mixes. These cover-crop mixes included annual ryegrass or cereal rye, radish and vetch, and Dwarf Essex Rape.*



in fall 2015, believing the whole-hog approach would be easier than managing two tillage systems.

That year he seeded annual ryegrass or cereal rye, radish and vetch on all acres, and added dwarf Essex rape on some soybean acres where nematodes had caused problems. While some of the cover germinated well, the radishes were seeded late and didn't germinate properly before winterkilling, and hairy vetch seemed to die out in flooded fields.

Below says he's been using annual ryegrass even though local universities have advised farmers to avoid it. He's had some minor difficulties killing annual ryegrass himself, but that isn't discouraging him from possibly expanding its use due to the biomass it provides.

There is a lack of knowledge of using the grass in certain areas, he says, because there are so many varieties and not everything is suited for every climate. Below has worked with retired University of Illinois Extension agronomist Mike Plumer to get his cover-crop program started.



**LESS IS MORE.** This former Orthman Mfg. toolbar has been repurposed as a "Furrow Runner" implement that cuts V-shaped grooves in the soil to allow irrigation water to flow to crops, reducing soil and residue disturbance on Allen Below's no-till corn, cotton, rice, popcorn and soybean farm near Parma, Mo.

"Knowing what to plant and where you are in the country is critical," he says.

This fall, Below seeded mostly cereal rye, oats, hairy vetch and radish, but in some fields mixed in annual ryegrass and clover in place of cereal rye and oats to get the carbon-to-N ratios in the desired range and facilitate biomass breakdown.

"There were several fields that had a big biomass of cereal rye and annual ryegrass, and by the time we were harvesting we still had a mat on the ground," he says.

### The Right Method

Below has had cover crops seeded with a spinner spreader, airplane and drill and is

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still working to devise the best long-term application plan. He says aerial application works best to get radishes seeded into standing corn, or a layer-harvested crop like cotton.

Spreading annual ryegrass seed via airplane has proved to be difficult, he notes, because of the lightweight seed. He's found using a drill to seed covers is more precise, uses less seed and produces better stands.

"With an airplane, rainfall plays such a big part," Below says. "We've had covers that we flew into cotton where the seed laid there for 45 days before it rained and then came up. With a drill we're able to get the seeds into moisture."

Going Green. As if no-tilling and seeding cover crops in the same year isn't enough of a challenge, Below also decided last spring to start planting corn, soybeans and cotton into terminated green cover crops.

"You take a guy who's used to planting in ground that looks like lettuce bed vs. walking out on plants that are waist high on me — that's a big leap," he says.

Below terminates covers along with his regular spring burndown application, saving another pass over his fields, applying glyphosate and either 2,4-D or dicamba, and sometimes adding a shot of Gramoxone right at planting to kill any straggling plants.

While planting into living covers went well overall this spring for corn and soybeans, Below says a lot of his cotton was lost due to unseasonably cool and wet weather in May that turned terminated cover crops into a "wet carpet" at planting.

Variation in ground cover was another issue, Below notes. Spots where covers were shoulder high caused seeding to be shallower, and areas where cover was only about knee high produced less ground cover and allowed seeds to go deeper.

His replanted cotton emerged, and even as the weather turned warm and dry, Below says he was able to go longer between irrigating, and no-till is the likely reason.

### Planter Questions

Below is also identifying which planter setups work best for no-tilling corn, popcorn and cotton into covers. Cotton has been especially challenging, he says,

because it isn't seeded 1½-2 inches deep like corn.

He hopes using cover crops will help alleviate crusting issues in his soils and allow him to no-till cotton a little deeper to improve seed-to-soil contact. Closing the seed trench has been a major challenge with the new no-till system.

This spring he used two John Deere planters with Zipper closing wheels from Schaffert Mfg., along with Schaffert's G2 system for 2-by-2-inch fertilizer application near the furrow.

Below says the Zippers were a "huge, huge help" in getting the seed trench closed in tough conditions this spring, especially with cotton. "It took out one of the big questions marks in my mind on how do we plant into this stuff."

He isn't planning to use row cleaners on the units, believing disc openers will be sufficient to slice through cover-crop residue during planting. But if he goes to killing covers earlier and 'planting brown,' he may add row cleaners.

"I don't want to disturb the soil," he says. "I would like to be able to set them in there, just brush that cover crop residue on top out of the way for cotton, and go in and plant before we've exposed where seed is at. It would help."

### Cutting a Strip

Below is also revamping his irrigation program to reduce dependence on the practice and keep cover crops in the rotation.

He uses a "Furrow Runner" implement to cut V-shaped grooves in the soil that

allow irrigation water to flow to crops. Fashioned from an Orthman toolbar, the machine includes coulters out front that push and rake cover crop residue out of the way.

Below usually runs the Furrow Runner in corn in mid-May, soybeans near the end of May into July and cotton in late May or early June. His plan is to let the unit help get water into the fields and let cover crops work the soil, with the only disturbance to plant row crops.

Below believes he is seeing some benefits with no-till on his irrigated ground in terms of water absorption and improved utilization of precipitation. He estimates irrigation use has been cut by 10-20% so far with both no-till and the new irrigation method.

"I think we will see headway there, and we've also got to learn not to irrigate just because our neighbor is," he says. "Our replanted cotton wasn't showing any sign of being stressed this year while others were very drought stressed."

## OSR - Flea Beetle?

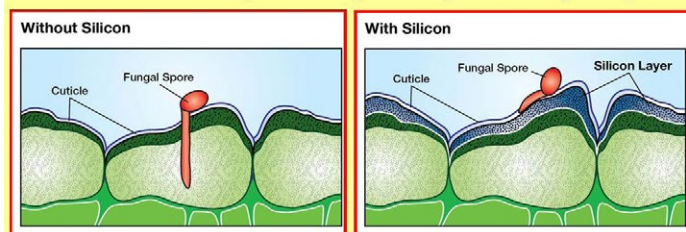
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# ROBOTS DOING DIRECT DRILLING

Many think we are on the verge of the next farming shift. Like when tractors took over from horses, will autonomous implements take over from tractors? Farming is arguably one of the last analogue industries. But many farmers are ready to go digital and already embracing a number of new technologies. Robotics, artificial intelligence, drones, satellites, autonomous vehicles and blockchain: these are all elements of the ecosystem which will make up the Digital Farm in the future.

And sooner than you may expect, it can all start with direct drilling. The Small Robot Company's direct drilling robot Harry is currently in development, funded with an Innovation award from the Institute of Engineering and Technology (IET) and the High Value Manufacturing Catapult (HVMC) to develop the prototype technology. Commercial trials will start on select UK farms in October.

Harry will accurately place seed individually in the ground at a uniform depth to within 2cm accuracy. This creates a plant level digital map showing the location of each seed. And in doing so, Harry digitises the field.



This is a radical development. And one of many going on at the moment. Robotic technology is coming; but at the Small Robot Company, they believe it must be by farmers, for farmers. Their technology was designed following extensive consultation with more than 100 farmers. This has led to a different design than you may have expected.

And so Harry has an 'arachnid' design, with a three metre boom, enabling him to fold up compactly for transport by transit van. Or you could move multiple Harrys on the back of a trailer. There is no news yet on hopper sizes and speeds it can travel, so we don't yet know all the details on

how much land Harry can cover in a day. But, the way the Small Robot Company have approached the solution, it may not matter to the farmer. Because they are not selling technology: instead, they are providing a service to create a healthy crop. You won't buy Harry. Farmers will pay a per hectare subscription fee for a robotic hardware service which digitises the farm and delivers crop care at per-plant precision.

If you would like to see and learn more, check the events section at the back of the magazine for the next event the Small Robot company are running.





# DIRECT DRILLER GOES INTERNATIONAL

One thing we didn't expect when starting Direct Driller Magazine was the interest we would have from abroad. The magazine was something we wanted to be able to provide free to farmers, both online and in print. We felt there should be no barrier to the flow of valuable information for any farmer who wanted to learn more or share experiences.

What we didn't expect was to have so many international readers, with 15 from Norway signing up on just one day. We would love to know why that was, if any of our Norwegian readers can shed light on this. Were we mentioned at a conference in Norway?

However, the cost of shipping abroad has become quite a burden. On top of printing the magazine for free, it costs 4 times as much to post abroad than it does in the UK. We have absorbed this cost again for Issue 2, but we will be asking all our international readers who want a printed magazine from Issue 3 onwards to contribute to the postage costs in the future. We are still happy to cover the cost of printing.

We will contact you all individually and give you the option to receive the magazine digitally, which will always remain free or to make a small payment for the year to also have a printed copy sent to you. We could also make the PDF available, so you could print yourself, but it doesn't quite compare to having your own professionally printed copy on quality paper. The international popularity of the magazine

was unexpected, it's great to see such a wide and diverse readership already. However, we apologise to our international readers for not quite being able to make it free for them. We hope you understand and find the content of these pages of great enough value to be worthy of the cost of postage to your country and help to make quality publications possible and sustainable in the future.



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# WOULD YOU LIKE TO WRITE FOR DIRECT DRILLER MAGAZINE?

You will notice we are aiming to include as much content about what farmers are doing as we can. It's the nice thing about farming, you can learn from other farmers and The Farming Forum has whole sections dedicated to farmers learning from each other. You will see some of those journeys documented in Direct Driller and for many of us, these are the most interesting things to read. We also aim to include information about many of the no-till events that happen in both the UK and abroad. Again, the best way to hear about these events is from farmers who attended them.

You will also know from listening to speakers at shows and conferences that hearing about the experiences of farmers in different countries is fascinating. Which is probably why Direct Driller Magazine already has so many readers in Norway, Denmark and Australia!

We would like to hear from you! If you are about to start direct drilling on your land and have goals that you want to achieve or if you are already direct drilling and are hitting (or not hitting) the expectations you had to start with.

Please get in contact with us so you can be one of our featured farmers.

The most important thing to realise about improving your soils is finding out there is no quick fix and almost everybody faces slightly different problems. Which means in turn, that every farmer and farm needs a slightly different solution. There is no blueprint for success – one list of machinery, rotation and varieties to grow. You must learn what the right path and what works for your farm and we all know the best way to learn is to listen.

If you would like to write about your farm or even an event you have been to, please do let us know. We ask for around 300 words upwards and 2-3 pictures. In return (apart from the fame) we aim to give back to all our writers in some way, whether that be tickets for shows and events, invites to dinners and awards, speaking positions or the most valuable of all, a lifetime subscription to Direct Driller Magazine.

Please contact **info@directdriller.com** on how you can be involved.

## DO YOU THINK WHEAT YIELDS CAN BE INCREASED BY 50% IN THE NEXT 20 YEARS?

While it seems impossible to imagine – this is the stated aim of the International Wheat Yield Partnership. The research initiative is focusing on 2 priority areas: targeting the use of new technologies to enable breakthroughs for cereal breeding and seeking breakthrough discoveries that lead to significantly greater grain size, set and grain filling duration following embryo formation, in diverse environments, without compromising grain protein concentration.

Over the first five years, the growing list of partners aims to invest up to US\$100 million

The IWYP is an independent research Initiative. IWYP represents a long-term global endeavour that utilizes a collaborative approach to bring together funding from public and private research organisations from a large number of countries. Currently, this includes the Biotechnology and Biological Sciences Research Council

of the United Kingdom (BBSRC), Grains Research and Development Corporation of Australia (GRDC), United States Agency for International Development (USAID), United States Department of Agriculture's (USDA) Agricultural Research Service (ARS) and National Institute of Food and Agriculture (NIFA), Department of Biotechnology of India (DBT), International Maize and Wheat Improvement Center, in Spanish,

Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT), Agriculture and Agri-Food Canada (AAFC), Institut National de la Recherche Agronomique of France (INRA), Syngenta Foundation for Sustainable Agriculture (SFSA) and Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food of Mexico (SAGARPA).

You can read more about it here: <http://iwyp.org/>



# COVER CROPS

## SOME SPECIES OBSERVED, TESTED AND MIXED

by Frédéric Thomas and Matthieu Archambeaud from “ TCS magazine ”, France

Species	Seeding rate (kg/ha)	Comment
<b>BASICS</b>		During the period between cash crops, seeding any cover-crop is a big step forward in restoring water quality, maintaining and developing soil fertility and in the long term saving fertiliser inputs and reducing the need for tillage. There is no such thing as a bad species and neither are there any specifically good ones. Each plant has its own attributes that fit specific or diverse situations. So it is very important to have a good knowledge of each one of these important “agronomical tools” in order to use them properly and gain the maximum benefits.
<b>Common (white) mustard</b>	8 to 10 single, (3 to 4 into a mix)	The most widely used cover crop, easy to establish, quickly covers the soil surface but very sensitive to stress (lack of water, lack of nitrogen or very high temperature) and can run to seed very quickly. As it's biomass rapidly becomes fibrous, is slow to break down and during decomposition nitrogen losses can be high. The normal seed rate is about 10 kg/ha however due to its root structure: at this density there is a competition between plants and poor soil exploration: in a mixture a rate of 3 to 4 kg/ha would be used (to be divided by the number of species in the mix).
<b>Phacelia</b>	6 to 10	Requires better establishment, has small roots which are very beneficial in improving the surface soil structure, especially in clay soils. It is very popular with bees. Phacelia improves the density in mixtures and can easily be destroyed by a knife roller; its black coloured residues help to warm up the soil (just like the field bean residues). If nitrogen is available (manure or legumes), it produces a lot of biomass; it's also a good potash scavenger. Because it has an indeterminate flowering habit it produces a lot of seed.
<b>Oat (spring or winter variety)</b>	70 to 90	Not expensive and easy to establish, oats are better suited as autumn and winter cover-crops. When drilled too early they produce low levels of biomass and are susceptible to rust and aphids. Generally the crop is not killed by frosts and will re-grow in the spring
<b>Fodder radish</b>	6 to 8	A versatile plant suited to almost all soil types and conditions. A big biomass is produced and it leaves a good soil structure. It resists drought and is not attractive to slugs. Can produce some seeds. It's a good basis for a lot of mixes.
<b>Rye</b>	70 to 100	Very aggressive plant with a good soil restructuring root system. It will not develop a lot of biomass after autumn seeding but will become very productive at the following spring. Very sensitive to slugs when young, it is a very useful plant for farmers looking for thick mulch to direct drill legumes, maize or vegetable crops into. The C/N ratio of the residue is high, so there is a risk of early nitrogen deficiency, mixing with vetches or peas is advisable
<b>Triticale</b>	80 to 120	The same properties than the rye but a little bit less aggressive and is more susceptible to pests and diseases. Triticale should be sown as an over-wintered cover crop
<b>Barley (spring or winter variety)</b>		Useful and cheap cover-crop that can supply some biomass in autumn (spring varieties). Never the less barley is sensitive to stress and diseases. Not advisable in rotation with winter cereals.
<b>Ray-grass</b>	17 to 22	Early growth is slow but once established can become very aggressive. It is better suited to cover crops which will be over-wintered. It can supply a useful source of forage and is a nitrogen scavenger. It is one of the few species that can be grown under maize, but can be very difficult to manage either mechanically or chemically.



Species	Seeding rate (kg/ha)	Comment
<b>Oil seed rape</b>	8 to 12	Very inexpensive cover-crop, the plant is aggressive with good soil structuring attributes. To get the best from OSR as a cover crop there needs to be sufficient N available. It could be used in any rotation where OSR is not a part. OSR can and will encourage slugs so this should be taken into account when considering it.
<b>Fodder rape</b>	8 to 12	Very similar to OSR but with more foliage (better cover) and it can be grazed.
<b>NEW SPECIES</b>	20 to 25	These species have been introduced recently as potential cover-crops with some useful attributes. It is not a complete list; new species are screened every year by min-till and no-tillage organisations and also by seed suppliers. There are many other species which might be suited as cover-crops but it is a case of finding them and trialling them on a local basis.
<b>Sunflower</b>	20 to 25	This species is best suited to hot and dry conditions and can supply good levels of biomass if planted early in the summer. It is a very good option for summer cover-crops in the rotations where it is not planted as a cash crop; it is killed by frost. In Biomax type mixtures it forms a basis which absorbs nitrogen, phosphate and potash: It doesn't provide much soil cover but does absorb a lot of nutrients which can help suppress weeds
<b>Rough oat or Brazilian oat (avena strigosa)</b>	35 to 45	Will grow under all conditions. This type of oat, close to forage oat, is quite aggressive and produces a heavy biomass that can be converted into quality forage (could be fibrous). As a cover-crop, the straw remaining on soil can be difficult to break down and may require some extra nitrogen: therefore there is risk of nitrogen deficiency in the next crop (just like mustard)this can be reduced by including a legume.
<b>Flax</b>	20 to 30	A plant easy to establish even under dry conditions. Although it has a low surface biomass it produces a good level root development and competes well with weeds. The remaining surface residue can block tillage tools and seeders.
<b>Buckwheat</b>	45 to 55	This plant is quite easy to establish in stubble during the summer and competes well with broadleaved weeds (allathrophic effect).Initially it is a cash crop that is quite easy to use as "double" crop or catch crop. Never the less seeds remaining on the soil surface after harvest or in the cover-crops biomass will germinate next spring when the temperature reaches (12 °C). Buckwheat is so not recommended as cover-crop or in a mix before maize, sugar beet, sunflower.... It encourages bees and wild life. It's a good phosphorus scavenger.
<b>Camelina</b>	8 to 12	An oil seed plant that must be seeded very shallow (very small seed) but emerges and grows quickly competing well with weeds. As the growing cycle can be completed in 90 to 100 days there is a high risk of it producing viable seeds. However this species can be used as double crop, and as companion crop especially in association with legumes (lentil, soyabean, lupin for example) still showing all its attributes as a cover-crop.
<b>Asian Raddish</b>	5 to 8	It is a species that is quite easy to establish and absorbs a lot of Nitrogen. Unlike the fodder radish this cover-crop doesn't grow a stem (if sown late summer and autumn) but develops rapidly and produces a long tap root. If there is sufficient soil fertility its root can become very big and weight several kgs. It is usually killed by winter frosts (-7 or -8 °C) or by rolling or shallow tillage. Although it is a crucifer, this crop returns the fertility stored in its root as it has a low C/N ratio.
<b>Turnip</b>	6 to 10	Another cruciferous species mopping up a lot of residual Nitrogen. Like OSR, this specie doesn't grow to stem in autumn and the foliage is good for grazing. It will not be killed during winter and will continue to absorb nitrogen during spring growth initially depleting the nitrogen available for the following crop. This nitrogen will be only available later to the cash-crop.

Species	Seeding rate (kg/ha)	Comment
<b>Moha millet</b>	25 to 30	Summer grasses need high temperatures, water and nitrogen. It is an excellent source of forage and a useful catch crop when grown in conjunction with legume like Alexandra clover. Like all summer grasses, moha is sensitive to sunlight and must be seed early,(before mid-July) as the long day length stimulates its growth.
<b>Sorghum</b>	15 to 25	Very aggressive tropical grass producing a heavy biomass and roots, when planted early. This plant is supposed to be drought resistant when well established (it needs a good seeded). Never the less sorghum benefits from high temperatures, moisture and nitrogen. Several types are available (grain, sugar, paper) that can produce different volumes and qualities of vegetation. Sorghum is a good source of forage.
<b>Black mustard</b>	2 to 3	With a very low thousand grain weight and strong emergence (vegetal development a little bit like OSR but will produce a stem in the autumn), black mustard can be seeded at very low seed rate. Its growth cycle is longer than the white mustard so the chance of producing seed is lower, so it is less competitive with weeds. Some people say that it could be employed as a "bio-fumigant" on nematodes.
<b>Nyger</b>	8 to 12	Nyger is closely related to sunflowers, and is best suited to hot moist conditions. If drilled early it can produce high levels of biomass and will smother volunteers and weeds. The first light frost will kill it and it is attractive to slugs. If planted early it is a versatile cover-crop.  Planted alone or in a mixture it gives good results.  Nyger should be considered as a companion crop with autumn sown oilseed rape because it attracts slugs and is killed off with the first frost so will not compete with the crop.
<b>LEGUME COVERCROPS</b>		In Europe few are included in our crop rotations, so they should be included in cover-crops mixes. This is probably at odds with the concept of the nitrogen holding cover crops aimed at reducing nitrate level in drainage water. They bring more diversity, promote a higher biomass production and, none the less, fix some nitrogen which can reduce the dependence on artificial fertilizer. Finally, legumes have a low C/N ratio so do not tie up soil nitrogen. As an essential natural plant species they should be included wherever possible.
<b>Common vetch (spring or winter cultivars)</b>	40 to 50	Slow to establish, but as a climber will smother other species in the autumn (or spring if seeded late). It is a very good nitrogen fixer that combines quite well with cover-crops and forage mixes. Vetch is easily controlled with a knife roller or any other means of mechanical destruction. It has a tendency to re-grow and can block up tine based tillage machinery. Its shallow root system aids biologic activity.
<b>Hairy vetch</b>	35 to 45	Initially slower than the common vetch to establish once growing can become quite aggressive. It can dominate any species or mixture and will smother weeds on volunteers by its very high levels of vegetation. As a species it has a trait of having 3-5% of its seeds reaming dormant and these may well germinate in the following cash crop. The risk of contamination is limited by conservation tillage and direct drilling but could be a problem for organic growers.
<b>Bengal vetch</b>	40 to 50	The same traits than the common vetch but with faster growth: depending on conditions between 25% to 40% more biomass in 3 months of summer and autumn. It a quite good choice where sown between to winter cereal crops supplying nitrogen to the following crop.
<b>Cerdagne vetch</b>	30 to 40	Mountain vetch is well suited to dry and harsh conditions. Like the bitter vetch, the various species are not yet catalogued so cannot be differentiated between.



Species	Seeding rate (kg/ha)	Comment
<b>Alexandra clover</b> (Bersim clover)	8 to 12	Annual or biannual clover which develops rapidly during the summer and autumn if conditions are favourable. Never the less it prefers deeper soils with a good natural fertility and sufficient moisture. It is significantly less competitive under dry conditions. Under good conditions it can produce high levels of biomass (3 to 4 t of DM/ha are possible after a barley or wheat crop) as well as fixing significant amounts of nitrogen. It is a very good source of forage alone or in mixes but also a very good cover-crop between two straw crops. It does not necessarily need to be destroyed before planting the next straw crop as it can be dealt by herbicides during the autumn and winter.
<b>Persian clover</b>	8 to 12	Like the Alexandra clover it provides biomass during the summer but will grow better in poorer soils and harder conditions: it's more resistant to frost and harder to destroy.
<b>Crimson clover</b>	12 to 15	Biannual clover, quite slow to establish in autumn but as opposed to the Bersim clover it performs better under more difficult climatic conditions and lighter soils. It is quite winter hardy and will regrow again in spring very fast (the main production period). It is a good source of forage and a useful plant to complement a cover-crop mix for early spring biomass production. Despite its qualities, it is not a big nitrogen fixer: In field trials it is often bottom of the list. It's a good cover crop to use on wet soils before maize so long as it is killed off before uses up all the soil moisture.
<b>Field bean</b>	150 to 200	Despite the large seed size, and heavy seed rates, field beans are a very useful and versatile plant as cover-crops (volunteers are a good indication). They can produce a descent amount of biomass and the taproot is good for soil re-structuring. Field beans are also one of the legumes able to quickly fix the high amounts of nitrogen (from 80 to 200 kg of N/ha in 3 to 4 months). It is not an ideal forage crop but can be made in silage or haylage. It can be included in many summer, autumn or winter mixes. Usually it is killed by winter frost but if sown late (after corn harvest), it will go through the winter easily and start to grow again in spring. Good companion crop (OSR, sunflower, corn, cereals) it is not a very competitive against weeds. The spring variety "Diana" with a lot smaller grain size (300 to 400 g/1000 Grains) that has been tested by conservation agriculture networks seems to bring equal results at half the seed rate.
<b>Forage pea</b>	60 to 80	Very versatile legume well suited to cover-cropping. A lot more hardy, producing a bigger biomass and is more disease resistant than the varieties used for grain production, it is a good supplement of any cover mix. As its name indicates, it also produces good quality forage useful in forage and grain mixes.
<b>Latyrus</b>	35 to 45	This legume is better suited to calcareous soil where it can produce good levels of biomass. In these conditions it is also a good nitrogen fixer. Because it grain is toxic it can't be use as forage but is useful as a companion plant especially for OSR (short growing cycle and easily killed by frost).
<b>Lentil</b>	25 to 35	This legume generally prefers calcareous and non-acidic soils. Although it does not produce high levels of biomass it is still quite competitive with weeds (when drilled at high seed rates). It is rarely used as a cover-crop and especially not in mixtures. However lentils are very useful as companion crop for OSR, the GFL mix (Gesse (Latyrus)/ fenugreek/lentil). Its bigger sister, the black fodder lentil, produces more biomass and is more aggressive but seed is in short supply.

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## NEXT GENERATION COMBINATION SEED DRILL

The 4-metre VENTA 4030 + HR 4040 is KUHNS all-new, next generation combination seed drill.

The power harrow element – HR 4040 – uses straight blades and a Duplex gearbox, enabling rotor speed to be adjusted according to soil conditions.

The VENTA seed drill features a 1,800 litre seed hopper and uses a fluted metering unit with large splines for larger seeds (wheat, barley, peas, beans, etc.) and small splines for smaller seeds such as rape and alfalfa. Seeding rates can be set from the tractor cab at between 1 and 430 kg/ha. A remote calibration “start button”, located close to the VENTA’s metering unit, makes calibrating the machine easy to achieve without the need to go back into the tractor cab to access the drill’s main control panel.



A speed sensing radar ensures precise seeding at up to 15 kph and it is possible to shut-off every second row for special applications. KUHNS precision coulter bar, the SEEDFLEX system, takes care of seed placement, with widely offset double discs mounted on a parallelogram to enable fast and accurate seeding. These maintenance free coulters perform well in all soil conditions, from ploughed to min-tilled land. Following press wheels control seeding depth and ensure good soil to seed contact for

consistent germination.

Tillage and seeding are carried out independently thanks to a roller frame design which effectively separates the two functions. This patented design allows for a more compact unit and enables the two units to be uncoupled in less than 10 minutes.

The VENTA 4030 + HR 4040 is suitable for use with tractors with a maximum power output of 320hp.

A 3-metre version, the VENTA 3030 + HR 3040 is also available: this is suitable for use with tractors with a maximum power output of 300hp.

### Starting prices for these machines are:

VENTA 3030 + HR 3040: £28,403 + £19,533 = £47,936

VENTA 4030 + HR 4040: £30,490 + £25,662 = £56,152

## NEW COMBINATION MIN-TILL TRAILED DRILL

KUHN Farm Machinery has added two new versions of its popular min-till seed drill to its expanding range of ESPRO trailed machines: the new 6-metre ESPRO 6000 RC and 4-metre ESPRO 4000RC are foldable machines which, unlike previous versions, now offer seed placement and fertiliser application in one pass.

The ESPRO RC machines join KUHNS existing line-up of trailed min-till drills which includes the 3-metre rigid ESPRO 3000 and the 4 and 6-metre foldable ESPRO 4000 R and ESPRO 6000 R.

Originally launched in 2015, the ESPRO range has become a firm



favourite with medium to large-scale arable farmers and contractors thanks to the low power requirement and high output capacity of the various models: the CROSSFLEX coulter bar, which is the key to the ESPRO range’s high working speeds, ensures seed is accurately placed at up to 17kph: each coulter is mounted on polyurethane blocks which allow the individual coulters to closely follow terrain contours. This ensures a consistent seeding depth across the machine’s full working width and enables accurate seeding to be carried out at high forward speeds.

In common with other models in the range, the ESPRO RC machines use two rows of cultivating discs followed by a single row of large diameter (900mm) press wheels which are offset and fitted with specially designed deep tread tyres to create an ideal seed bed.

An additional row of single disc coulters behind the working discs delivers fertiliser or a second seed variety directly in front of the press wheels and equidistant from each of the two main rows of seed: placing fertiliser to this level of precision

ensures the seed receives the necessary nutrients during the early stages of growth whilst also minimising the risk of the young plants being scorched by coming into direct contact with the fertiliser.

The ESPRO RC is fitted with a 5,500 litre, twin-compartment hopper which is divided on a 60:40 (fertiliser:seed) basis. Two separate metering and distribution systems provide several potential modes of operation including the ability to sow: one seed variety from both compartments; seed and fertiliser from the separate compartments; two main crop varieties; or a mixture of two seed varieties with each sown to a different depth.

An optional set of front press wheels with in-cab pressure adjustment can also be added to provide a level soil surface ahead of the working discs and to prevent the machine from sinking into lighter or wet soils.

### Starting prices for these machines are:

ESPRO 4000 RC: £97,124

ESPRO 6000 RC: £136,805



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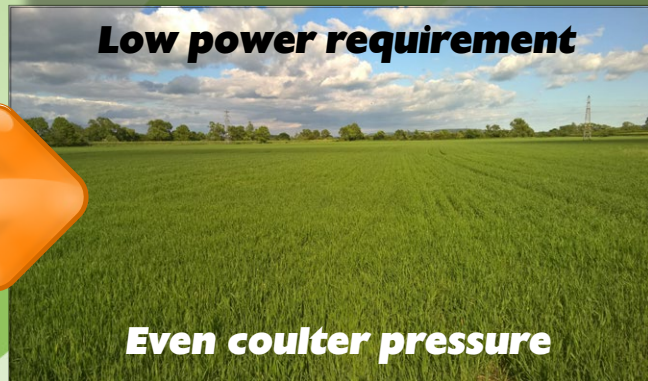
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# MICHEL MERCIER: PEAS AS AN AGRONOMIC WEEDING TOOL

Written by Frédéric Thomas, TCS Magazine No. 46 - January / February 2008

Like many farmers, Michel Mercier first got into direct drilling based on the economic savings it offered. He first worked with an SE Horsch then onto an AT Köckerling, then onto a SD Kuhn, only to find that the drill is only an ingredient, only part of a solution, purely the way to do something. He soon realised that the key to success lies in the soil, it's quality and its structure. On his soils with low potential (gravelly to stony silts with a good proportion of flint) in the North-East of Chartres (Eure-et-Loir), he re-taught himself to respect the soil by means of TMCE (Mineral Technology Culture and Breeding – [www.tmce.fr](http://www.tmce.fr)) placing a much greater importance on building organic matter whilst developing a more balanced approach to crop nutrition.

Now with 12 years of knowledge,

he has been able to reduce his average Nitrogen rates (only 100 kg of product in two applications: 50 kg in the spring and 50 kg in the autumn), he observed straws decomposes more rapidly and the biological activity seems much more efficient. The crops are doing well or better than they did under his previous farming system. This has especially been visible in areas where cereals would not previously grow, with these areas gradually disappearing over time.

"Finally, the organic matter levels that initially fell to around 1.5% have risen to about 2.7% and with little plant cover," says Michel.

The proof is evident in February, when the levels of residual N were generally

quite low in this region, the farm's cereal plots show high levels (between 79 and 80 kg N) with total input calculations reduced to only 65 kg N / ha for a target of yield of 7.5t/ha

## Emergence of grassweeds

However, after 7 years in a wheat / rapeseed rotation grassweeds have gradually invaded the fields. A return to tillage was naturally the first solution considered. However, the idea of destroying the improved soil structure that took so much time and patience to progress to its current state alongside fears of bringing up dormant weed seed to the surface soon put Michel off that possible solution to the grass weed issue he faced.

Rather than simply give up on his zero-



Pea, used as a weeding tool, besides its effectiveness, progressively shows all its agronomic advantages in a rotation



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till journey Michel sought alternatives through agronomic rather than mechanical change, growing peas between wheat and OSR creating a double break in his rotation. The first results are very encouraging and for the past five years, this practice has been systematically used on fields where the level of grassweeds had become difficult to manage.

Growing Peas after the wheat crop allows enough time for a cover crop to be established further helping increase Michel's soil organic matter levels and biological diversity. Inter row weeding of the pea crop is possible via mechanical hoe further helping to reduce the grass weed issue. The following OSR crop is seeded between the rows of the pea crop.

### Pea Rapeseed: A Faultless Combination

With very few slugs and straw residues, a good structure and a lot of nitrogen in the profile, the planting of rapeseed becomes easier and establishment without need for placed seed bed N more consistent and reliable. Even if pea regrowth develops it is not a problem in the OSR crop, on the contrary, and in any case, they will be destroyed by frost. The program of weed control of the rapeseed remains traditional with an autumn propyzamide application to finish the work of cleaning grassweeds and leave a clean start for the following wheat crop.

The following cereals are generally clean and it is in these plots that Mr. Mercier now chooses to grow his seed for the following season. Finally, because of this sequence, he also finds a higher nitrogen availability which to some extent compensates for the lower margin of the peas in this more diverse rotation meaning that the overall rotation margin is little changed financially.

However, the pea crop, profitability is lower than the OSR break so remains for the moment only an agronomic weeding tool, as pointed out by Michel, who tends to remain in rapeseed for as long as possible on his land that suffers no grassweed problems, which offers the superior gross margin.

### Observation:

Hybrid rye: an opening interesting for small lands

For four years now, Mr. Mercier has been growing, hybrid rye as an alternative to wheat with yield potential on his farm about 10% higher than that of a soft wheat especially in a dry season

It's a much more aggressive, more robust and better able to access soils residual nutrition with average nitrogen application usually 60 kg / ha against 130 for his wheat.

Another advantage is that establishment is earlier, which helps spread autumn workload, typical seed rates of 30 to 35 kg / ha for 100 to 120 p / m<sup>2</sup> also aid logistics.

In hope of further reducing costs and increasing efficiency this year Mr. Mercier set a trial with only 16 kg / ha of seed for a density reduced to 50 p / m<sup>2</sup>. His hope is that the lower seed rate crop may reduce disease and therefore fungicide use, as in spite of the plants robust agronomic nature, it is necessary to remain vigilant on rust and a good growth regulator programme is very important to keep thicker crops standing. Satisfied with this new system, the rotation is slowly moving towards: pea / canola / wheat / canola / rye



# A FARMING 'STEP-CHANGE' THAT SPELLS 'SUSTAINABLE'

This article was published in Practical Farm Ideas Summer 2015, Vol 24 issue 2. It describes the conversion from conventional to zero-till made by a traditionally managed farming estate on the Berkshire-Hampshire border. It's a major change in method which has continued to work well. Manager Stuart Cath reports that the farm is hitting budgets of 9 tonne crops and the soil conditions seems to be improving. Grass area and sheep numbers have been increased somewhat. They continue with the machinery they had on my visit four years ago - the John Deere 750A and the Simtech seed drills.

The annual savings in tractor hours continue to accumulate. The conversion to direct drilling has been followed closely by the estate owners.

The ownership of the estate goes back many generations and continues to be farmed with their own staff and equipment, contrasting with many others. The estate has a fine house and gardens, and host events for a number of local and national charities. Farm appearance is therefore important.

Farmers of all shapes and sizes are considering a change to no-till methods, and there is a lot to think about for each one. When the farm is a traditional gentleman's estate there's a further dimension to take into account. Moving from farming systems which have kept the estate both in the black and also a stretch of land which is pleasing to the visitor's eyes to something which involves less land working and consequently the possibility of a less managed farm. The use of cover crops mixtures with their variety of plants can also create a farm which is poorly managed, even though, as no-tillers know, the opposite is actually the case.

Farm manager Stuart Cath had knowledge of zero-till for some ten years before it actually happened on the land he managed, and that time was spent finding out the wrinkles as well as the benefits. This research and knowledge has made Harry Henderson, the senior partner of the family trust, fully enthusiastic about the new farming system. This has led to the farm being nominated, and winning, the Land and Soil Management Award, in 2014 from the European Landowners' Organisation. This prestigious award is competed for by farmers across the EU.

Soils in Britain have lost a great deal of their organic matter, and with it many of the natural soil creators such as worms,

fungi, bacteria and other living organisms. The result is they have become harder to work. So bigger cultivators with larger, heavier tractors are needed to break soil. Big machines don't help compaction. The loss of organic content means that soil needs increasing inputs to maintain yields which overall have remained stubbornly static.

Here's a farmer who uses worms as his subsoiler, slashing fuel and HP requirements. You can recognise his land. It is never bare, the aim is to be growing a crop 12 months a year. We find out how the dramatic change was made.

## West Woodhay estate wins European Soil Award

A programme to arrest the decline of soil condition and rebuild fertility gained top marks in a pan-European competition

Located on the Hampshire/Berkshire border, West Woodhay is a traditional 'gentleman's estate' associated with aristocracy. The large house dating from 1635 is surrounded by 2,000 acres, 1,300 of which are arable. The impressive surroundings can disguise the need for farming efficiency, but the reality is that the farming criteria is no different to other farms. Owned by the Henderson Family Trust, the farming has been kept in hand with most of the operational work carried out with their own equipment. This hands-on approach has meant the senior trustee, Harry Henderson, keeps a real interest in cropping and latterly, in soil management.

"It's a collaborative enterprise," says farm manager Stuart Cath who clearly enjoys the challenge of changing from conventional to zero-tilling. Up to 2009 the arable land was traditionally ploughed and min-tilled with a full winter rotation of w wheat, w-osr and winter beans. Inputs were high. The land carries flints which used to go through a set of tyres on the main tractor

in 12 months. The work load and diesel use was average for land managed this way. Stuart is an unusual manager as he is also a qualified agronomist, doing the study with the Cherwell Group. "The course was really very demanding and went way beyond college or university, but it has been a real benefit for me to do the agronomy on the land we farm, where decisions can be taken independent of product."

Harry first came across Lincs zero-tiller Tony Reynolds nearly 10 years ago and the seed was sown for a change in policy. Looking at the farm through Tony's eyes it was clear the soil was deteriorating, the stones more prevalent, the erosion off the steeper ground a regular event in heavy rain with increasing soil compaction raising the cost of cultivating. This view showed Harry that it was the long term road to nowhere.

At the same time they had a 120ha block of marginal land under Countryside Stewardship that started in the mid-90s and over 14 years the soil there had improved out of all recognition. With the



Challenging land with soil that is easily washed. This next season there will be no tramlines, but driving lines opened in tall crops with the sprayer

Stewardship at an end it was decided to bring the ground back into the arable rotation, but rather than plough and start the degradation process again, they used a contractor with a Cross Slot direct-drill

to put wheat into the sprayed sward, and harvested a good crop. So much so the decision to work the total arable area the same way was taken in 2008 and the farm has been direct-drilled since 2009.



*Drilling direct into a mustard fallow*

## Winner of the EU Land and Soil Management Award 2015

The estate farm has a long standing involvement with farming competitions and always enters and supports events run by the Newbury & District Agricultural Society. With the achievement of a real improvement in soil fertility and structure over the past five years, together with the relevance of a competition titled Land and Soil Management Award, they decided to put in an entry, even though the competition extended across the whole of Europe. The Newbury experience was useful. The Award is run by the European Landowners' Organisation in association with the University of Vienna and Syngenta as well as the Centre of Soil and Environmental Studies at Ljubljana University. The aim is to encourage new concepts of progressive soil management with a prize of €5,000 and the presentation of the award at a gala dinner in Brussels following the 8th Forum of the Future of Agriculture. Winning this single award is a huge accolade not only for West Woodhay but also the farmers and others who have provided ideas, advice and information.

In the report for the award Stuart wrote:

'The first year of total zero-tillage on the 400ha was reasonably successful since we had inherited a legacy of previous cultivations. In years two and three, any residual soil structure through cultivations had gone and earthworm populations were still low. This resulted in two difficult years. To help overcome some of these issues, mustard was planted in the fallow as a green manure crop and using its root system as a form of organic cultivation. The mustard was then sprayed off and the net crop of wheat drilled straight into the dead mustard. From year three through to the present day there has been quite a remarkable change in soil-life. The most apparent has been the worm activity with areas of large quantities of worm casts and middens. As time goes by, we have found all the residue from the previous crop is being almost totally consumed and turned into friable organic matter.'

Before and after tests have shown an increase in soil organic levels.



*Competition in the local ag society provides an annual challenge with other keen and accomplished farmers*

## The challenges of change

Major changes in direction always involve risk. They're a leap into the unknown, and information and research is needed and Stuart and Harry searched for people and facts which could help. Getting the facts in the world of zero-till can often be only done by on-farm experimentation, and it was interesting to see just how many of these were currently in progress at the time of my visit in July 2015. There was a field of winter beans with a section of spring sown

beans in the centre. Which is going to work the best? There was fallow carrying crops of oats and barley; oil radish, oil seed rape and stubble turnips over-sown in June into a standing crop of winter wheat.

The results of such trials are of real value to other farmers. This is an area of farm knowhow where the farmers themselves are very much ahead of the academics and institutions. We need to publish them more in Practical Farm Ideas. (Hint to readers - tell PFI what you're doing!)

Making the change permanent: The determination to make the change to zero-till permanent was made when four high HP tractors, two big ploughs and cultivators, a seed drill and a baler were sold. This fleet was replaced by 2 x 170HP John Deere 7530 (which weigh just 7 tonnes) a 4 metre John Deere 750A disc drill and a Simtech Aitkinson tine drill. The new tractors are fitted with the basic John Deere Parallel Tracking system on the free SF1 signal, upgraded to the steering kit and StarFire receiver. This has proved entirely satisfactory on all the land, despite slopes and surrounding woodland.

The farm uses liquid fertiliser and the John Deere 840i trailed sprayer therefore does all the fertilising as well as crop protection.

John Deere has been the preferred equipment. Local dealers Farols carry a wide range of spares and expertise; the equipment has proved to be reliable; residual values are good as used Deere kit is always in demand; there's some compatibility both in parts and the way their kit works.

Slug control is done using ferric phosphate instead of the more popular metaldehyde. Thames Water has been offering a £1/kg incentive for farmers to make the change - enough to level the cost.



*The machinery shed with the principal players*





The John Deere 750A drill is four years old, does 100 acres in a 12 hour day with a 175HP JD 7530 in front. The 4m drill has 24 units and the steering is set for 3.95m to prevent gaps. These drills plant more seed globally than any other make of seed drill.



The seeder discs need regular changing, and the job takes 10 minutes per unit



Simtech has the original 20 tines reduced to 9 which have been re-spaced to 32cm spacings. The drill has the new Simtech points which are hardwearing - these have done 64ha and are still not worn. Replacements are £26

## Re-building soil through cropping at West Woodhay

While acknowledging crop rotations as being key to profitability, Stuart confesses they have no set rotation plan. They cannot say what they will be growing in each field over the next three seasons or more. Flexibility allows cropping to be dictated by market prices as well as what the land needs. Cover crops are used, but seed costs dictate what cover are planted.

Stewart thinks they will be growing more grass as a break crop and will be looking into a Natural England scheme\* for two year legume mixes which provide a useful financial incentive, and would be excellent for blackgrass control. With the option of mowing and baling, grazing with their 400 Welsh Mountain ewes, or topping, the crop prepares the soil well for subsequent wheat, is inexpensive to establish and maintain, and generates an income. The other departure from the norm is using cover cropped fallow, and here he finds mustard a good performer.

At present they have a useful supply from a local seed company of out of date dressed seed, both wheat and oats, in part-filled sacks that is free on collection. The plan is to drill this discarded seed at high rates, 200 kg/ha, to provide over-winter covers. The oats will be saved for the sloping more marginal land due to its great root structure and the wheat and barley used on the flatter ground. The thought is that while this cereal seed may not be the ideal cover, the savings in seed cost more than make up for the benefits.

There's no rape to be seen, the crop being substituted by both spring and winter beans. Rape is difficult to grow well, suffers slug damage, and the price has dropped while beans are having a good trade, fix N with their nodules, are easier to get right and not so costly. And Stuart likes growing beans!



Root, worm and bio-logical action make a friable soil, this after a cover of oats



Dessicated oats provide good soil cover, hold in moisture, encourage life soil activity, planted the end of August (2014) dessicated early May....



...while the adjacent barley treated the same provides less mass and root



Simtech at work with game cover maize being sown at 5 inches. Tough no-nonsense machine which has been adapted to 32in spacing for beans and maize



Spring beans drilled with 750A at 18 plants/sq m. Bean contract is £30/t over the spot price of wheat. Straw provides useful organic matter and the beans add N.



Game cover maize has been continuous on this land for 5 years, with pre-em Crystal on a special licence as not approved. Sown early June.





Winter beans with an experimental spring crop in the centre. The yield monitor will say which works the best - this season at any rate



Beans in mid-July have a good size on them - a promising crop



Stuart shows the kind of plants he's getting. Direct drilled at 5ins into wheat stubble with Simtech and with no fert or FYM; 2 x pre-em; 2 x fungicide; 1 x insecticide. The crop took some time to come through, which would have provided time for a second RoundUp application.



Field named 'The Clays' after 5 years of zero-tillage showing how the surface is breaking - a worm also made itself known.



A super stand of Clare, drilled early into empty fallow, and given 210 kg N with Sulphur in three splits all in the spring. Seed was drilled with no fertiliser and all the fert applied by T1. "We're looking at a 10 ton crop" says Stuart.

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This year's experiment - over-sowing into wheat with a standard spinner going down the tramlines. This tramline had oil radish and was sown 2 weeks before this pic was taken. The crop could be combined or used as a cover for spring sown cereals.



Oil seed rape seedling, sown on the same day. The crop could be grown for the combine, or used as a cover. If the experiment works well the idea is to get a 24m pneumatic spreader to spread small seeds evenly.



Stubble turnips under the same regime in the same field - each had a single adjacent tramline just to see what happened. Some ferric phosphate slug pellets were mixed with the seed. The turnips could be fed to the sheep or used for soil regeneration.

\* See: [www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/397037/CAPLF004\\_FINAL\\_WEB\\_2015.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/397037/CAPLF004_FINAL_WEB_2015.pdf)

Excerpt: The Wild Pollinator and Farm Wildlife Package is made up of the management options shown below.

Evidence from Environmental Stewardship suggests that applying a combination of these options over 3 to 5% of eligible land will bring meaningful changes and benefits.

Pollen/nectar resources for pollinators and chick-food for birds – options:

- Management of hedgerows (one/both sides of the hedge)
- Flower-rich margins and plots
- Autumn sown Bumblebird mix (food source for birds and bees)
- Two-year sown legume fallow (flowering crops on fallow land)
- Legume and herb-rich swards
- Nectar flower mix

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Best regards John Gilgunn - sent April 6, 2017

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Best wishes to all readers of Direct Driller *Mike Donovan*



**Mike Donovan,  
Editor**

# FARMER FOCUS

## TOM SEWELL

Sewell Farms Kent



To say this spring has been a challenge is an understatement to many of us in farming. The huge variations in temperature combined with some very heavy rainfall at times and very few "good spray days" have hampered our progress in many ways. We are however blessed and fortunate here in that we managed to get our whole farm planted in the autumn. Our current cropping comprises Oilseed Rape, Winter Oats and Milling Wheat. All of our crops for the past 5 years have been established using a no-till drill and generally we are very happy with the outcome.



Our Oilseed Rape established very well but where we did struggle was when I persevered drilling in the drizzle one day to get a field finished. The field in question had yielded 10t/ha of milling wheat and we had chopped all of the straw. We started drilling the field with the headland first but the further we got across the field with straw getting wetter and wetter the worse the crop established. A very valuable lesson was learnt. When conditions deteriorate it's best to stop and put the kettle on! When conditions are good, crack on!

We had a similar situation planting wheat into oat stubbles which again had been chopped. The land was very heavy Weald clay (yellow plasticine when wet and as hard as iron when dry!) with a wet end to harvest we decided that the wheat needed planting in September before



conditions deteriorated further. The soil conditions were really too wet when we drilled but rather than wait we went with conventional wisdom and planted. Had the weather improved we may have got away with it but 2 days later we had half an inch of rain! This combined with wheat sitting in a slimy wet slot covered in chopped oat straw made for pretty poor and slow emergence. Again we learnt an important lesson. If the soil's not ready, wait!

Farmers are generally not patient and cultivation has allowed "progress" to be made at the expense of soil health. For me learning patience is one of the keys to successful no-till farming.

This spring has seen the drill busy

planting for other farmers locally. We have planted beans into green cover crops of oats and vetch then sprayed off after drilling. We have put beans into grass, peas into oats that had been grazed by sheep, forage maize into grass and cover crops, and not to forget the 18 acres of bird cover in ten separate parcels!!

At home we are bringing in raspberry compost (mulched raspberry plants) and making some of our own compost using horse muck and woodchip. I'm convinced it's the right thing to do to improve soil health on the farm but how long will it take to make properly?

As much as I'd like to invest in a shiny new muck spreader with spinning discs to spread this lovely compost I'll have to try and hire one from a friendly local farmer when he's not using it in the tight window between harvest and planting next years crops.

The worms will appreciate the food and over time will hopefully repay the favour! It's those underground livestock on my farm that do so much good aerating the ground, incorporating residues and dealing with drainage without sending a bill!

I hope the coming harvest brings you good yields with quality, all cut at 14.5% moisture!







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# GRAZING CROP RESIDUES AND COVER CROPS

No-Till Farmer USA, first published on May 29, 2018 in the Cover Crops Section

Source: Penn State University

Modern agricultural systems focus on specialization and simplification, but we are now experiencing unintended consequences, says Sjoerd Willem Duiker. Rural areas are depopulating as the number of farmers continues to decrease; water quality is under threat as soluble nutrients are leaking to ground and surface waters; soil organic matter has decreased, input costs have escalated and profit margins are small.

It is clear there is a need for new strategies for rural revitalization and environmental improvement. Re-introducing grazing animals on our cropland can be one of these strategies, says the Professor from Penn State University. It will involve some modest investment in infrastructure such as fencing and water supply, but it can add a new income stream to the farm while potentially improving soil health.

Grazing has been shown to be a very cost-effective method to feed animals. Additionally, new grazing strategies involve frequent movement of animals and this can be an opportunity for new

exceeding 10 tons can compact the subsoil. This is important because biological and physical forces are most active near the surface of the soil to increase the resistance of soil to compaction as well as remediate it after it has been caused.

Root density is highest near the surface of the soil – and roots act as a geotextile making soil resist compaction, while growing roots restore pore spaces in the soil. Soil organisms such as earthworms, bacteria and fungi are equally more active near the soil surface. Some classes of dung beetles, living under dung patties, make tunnels near the surface.

Freeze-thaw cycles and wetting-and-drying cycles, more frequent near the soil surface, have been shown to create new pore spaces. In continuous no-tillage, the surface soil becomes more resistant to compaction because of high organic matter content and surface crop residues.

In a study in Ga., cover crops of rye or pearl millet were grazed in fall or summer in rotation with grain crops under no-till management. Compaction effects were only measured in the top 3" of the soil. The researchers measured slight but inconsequential increases in bulk density. Infiltration rate decreased only after grazing of pearl millet but not after rye. Penetration resistance increased somewhat in the top 4 inches due to grazing. However, the effects of grazing were small and dissipated after a rest period, leading the authors to conclude that grazing the high-quality cover crop did not cause substantial damage to the soil.

Similarly, corn residue was grazed in fall or spring in a corn-soybean rotation

in Nebraska. Cattle grazing did not affect bulk density, soil aggregate stability, particulate organic matter, soil organic carbon and nutrients except calcium and sulfur. Although spring grazing, at a higher stocking rate than fall grazing, increased penetration resistance, it never reached yield threatening levels. There were indications that microbial biomass was positively affected by grazing. Crop yields were not affected by grazing in this 16-year study.

Finally, in a study in northern Florida, rain-fed cotton yields increased 17% with grazing. The rotation was two years of bahia-grass, one year of peanut and one year of cotton. Cattle grazed cover crops of oats/rye in the winter. Bulk density was reduced due to grazing in the top 2 inches only, while microbial biomass carbon more than doubled in grazed rainfed plots compared with non-grazed plots. Significantly higher levels of extractable phosphorus, exchangeable potassium and acid and alkaline phosphatases were observed in the grazed compared with the non-grazed plots.

The authors found evidence that root length and surface area increased due to grazing. Over the past three years we have followed three farms in Pennsylvania (two beef, and one dairy) who successfully integrated grazing with no-till crop production. We observed high grazed yields of annual forages. High biological activity in the soils appeared to remediate the effects of compaction caused by the grazing animals. These studies show that with careful monitoring of soil and vegetation conditions grazing can be successfully integrated with annual crop production, especially in no-till systems.



Hairy vetch, rye, annual ryegrass, and clover cover crop being grazed. Photo Credit: Sjoerd Duiker, Penn State University

employment in rural regions.

One of the concerns with grazing cropland is the compaction caused by the animals but several studies have shown that this concern is overrated. That is not to say that grazing animals do not cause compaction. Their hoofs can exert as much or more pressure on the soil surface as heavy pieces of farm machinery.

Nonetheless, there are important differences. First, grazing animals rarely cause compaction below 3-4 inches, while farm machinery with axle loads



# IS RAPE READY FOR A REVIVAL?

Sentry farming director John Barrett and Essex grower Dan Wormell explain the benefits of Clearfield varieties of oilseed rape and how they manage them in the field.

The UK oil seed rape cropping area has fluctuated from a high of 755,000ha before the neonocotinoid ban to a low of 564,000 ha in 2017. This year the crop area has increased 10 per cent to over 600,000 ha - farmers are seeing the value once more.

"People have confidence in the crop again and that's not just farmers," explains Sarah Hawthorne of European seed breeders DSV. "The wider industry sees a future for the crop and that is encouraging businesses to invest in its development once more.

"A lot of growers have realised that it's very difficult to find a better break crop that fits in with existing management and equipment and certainly not one that makes as much money as oilseed rape."

There's a lot going for OSR at the moment. Advances in genetics in recent years have already made the crop much more reliable, she says, and developments such as 'triple-layered' yield protected varieties will make the crop even easier to grow with fewer agronomic inputs in the future. Clearfield

technology has become popular very quickly, with 1% of the UK area just three years ago to around 10% in 2017.

"The plants are resistant to Imazamox-based herbicides, so you can control difficult weeds such as charlock, runch and hedge mustard whilst the crop is actually growing.

"As charlock inclusion contributes to erucic acid levels, many growers have found they end up with higher quality crops too."

The downside is that Clearfield varieties deliver lower yields compared to the best performers on the Recommended List but all that is about to change with a new wave of second generation Clearfield varieties, Sarah Hawthorne says.

"We've learned a lot about drilling date, seedbed preparation and establishment techniques to help us mitigate against the loss of neonicotinoids, and new higher output and lower care Clearfield varieties could really make this pay off.

"Our new varieties such as Phoenix CL and Plurax CL combine high levels

of early vigour with good disease protection packages and are ideally suited to minimum tillage and direct drilling techniques."



John Barrett, farming director of Sentry

John Barrett, farming director of Sentry, thinks these varieties will close the yield gap between Clearfield and conventional oilseed rapes. He has responsibility for Sentry's Hill House Farm near Bungay in Norfolk with 1400ha of arable production. All his Clearfield acreage is now down to Phoenix CL with Plurax CL and Veritas CL is being trialled.

"We've stuck with oilseed rape despite the problems many people have faced recently and currently have 282ha in the ground as part of a rotation that includes 640ha of winter wheat, 92ha of peas, 127ha of sugar beet, 107ha of winter barley, 69ha of spring barley and 110ha of winter beans.

"We've deliberately kept the rotations wide and that has definitely helped kept flea beetle at bay but choosing the best



Sarah Hawthorne of DSV

variety for individual applications is an essential element of getting the most out of the crop."

A key part of this is choosing the right variety for the time of year, he says.

"For example, if we're aiming to get oilseed rape in after barley, then we can usually drill around 7 – 10 August so we don't want something that 's going to establish too quickly."

"In contrast, if we're going in later after winter wheat, for example, then high vigour is essential so crops get away quickly and cleanly without being attacked by pests."

John Barrett says that when there is a problem with broad-leaved or difficult to control weeds the Clearfield crop will outshine the others.

"We do have problems with Charlock in particular and we've historically tried controlling it in the early winter but it's obvious the crop has been knocked back by competition from the weed up to that point."

"With Clearfield you can go in mid to late September with either Clerando or Cleravo and take the weed out before it has chance to grow so you don't get the yield loss."

It also means that difficult pre-emergence herbicides are avoided which can cut into time at a very busy time of the year.

John adds "I am sure a pre-emergence application can also hold the crop back which can leave it more susceptible to pest threats, so it's not something we like doing if we can avoid."

A 6.0m Vaderstad Rapid drill with a Rapid-Lift tool bar direct drills all the oilseed rape crop. Seedbeds are rolled within 24 hours of drilling. Organic manures such as turkey litter and biosolids are used to aid establishment where the opportunity allows.

John is taking part in DSV's RDT (Rapid Development Trials) to identify varieties for the future and he says Plurax CL looks particularly encouraging. Phoenix CL is the only commercial variety grown this year.

"Plurax CL was the stand out variety earlier in the year being by far the earliest to flower and consequently the

first to finish flowering and is looking really good in the field in the run up to Summer.

"I'm also aware of the growing threat of verticillium wilt to UK crops and I'm told trials in Europe, where this is a bigger problem, have shown Plurax CL to have exceptional tolerance to this so it's a variety we'll be very keen to look at commercially in the future."

### Essex grower goes for Imazamox resistant varieties



Dan Wormell

With around 600ha in arable production, Dan Wormell from Colchester has 80% of all oilseed rape down to Imazamox resistant varieties this year.

"Oilseed rape has always been a key part of our operations, and like many others we probably had too tight a rotation a few years back."

Extending rotations so oilseed rape is grown only once every five years compared to cropping as frequently as one in two previously.

"A typical rotation for us is now winter wheat followed by the oilseed rape and then another winter wheat followed by a spring wheat and then either beans or linseed before starting over again."

The 100ha of oilseed rape grown

on the farm's mostly heavy soils is all direct drilled using a Dale Drills Eco-drill following light cultivation using a stubble rake. DAP is applied down the spout to help the crop get off to the best start possible.

"Oilseed rape is a front-loaded crop but you really do have to invest in it to get the most out of it, says Dan Wormell "and that is where the Clearfield varieties come in."

They use Clerando in mid September to take out the more difficult weeds and have found it works better than Cleravo on their farm.

"We sprayed on 27 September this year - six weeks after sowing - which was probably a little late. That's all part of the learning process."

Dan says he is always looking at new things, and Veritas CL is one of these. Its horizontal growth habit particularly intrigued him and he can see this being of real benefit in inhibiting weed growth.

"It definitely grew out rather than up and will help to achieve good ground cover in situations where establishment has been poor."

"The fact that it has pod shatter resistance is also important to us as is its Rlm7 resistance to phoma and 7 for light leaf spot."

Plurax CL has also impressed in his RDT trials with the highest vigour of all varieties tested and was the first to flower. The variety has been 2 weeks ahead through the season, and having a combination of early and late flowering varieties helps to hedge our risk against poor weather conditions post flowering. It also has good tolerance to Verticillium wilt.

### Conclusion

Breeding developments in the valuable oil seed rape crop are of major benefit to farmers and make long term sense when these are in accordance with the direction of pesticide and genetic regulations. Tackling crop protection in the non-neonicide era is challenge itself, let alone weed and fungal attacks. Farming has numerous challenges and the help of seed breeders can only be appreciated by growers.

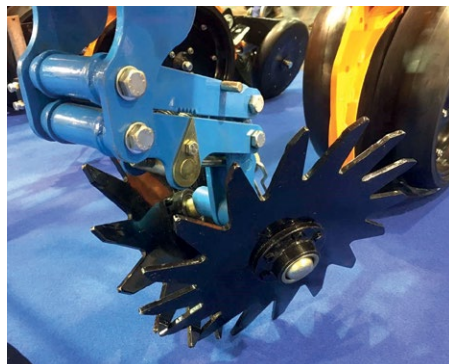


# UK DRILL MANUFACTURERS IN FOCUS...



What is required from the modern direct drill? Everyone has their own idea, based on personal preference, experience, land type and many other criteria. One machine may well find it difficult to address all of these, after all there is the big debate between discs and tines before any other consideration.

At Ma/Ag, the SSP drill is a disc drill, so if tines are your chosen type, we can't help. Tines are usually a cheaper option, as the drill is a more simple design along the lines of a cultivator with spring tines mounted to a fixed frame. Depending on width and ground undulations this system can struggle with uniform sowing depth and in wet conditions on heavy soils the tine can create a smeared channel which the seed sits in, this can hold water in wet conditions and gives slugs a underground highway to travel along with regular food stops ! The tine advantage against discs in trash is usually to avoid hair pinning, at Ma/Ag the disc drill has been designed with a serrated main disc, which operated in a straight line and in combination with a smaller plain disc at an angle to open the ground for the seed, the serrated opening disc operates below the sowing depth of the seed, so the extra penetration shears any straw pushed into the ground, and



Star wheel straw cleaner

the self-sharpening plain disc gives extra cutting action, a simple star wheel can also be specified which clears the path of the coulter from lying straw like a miniature (and stronger version) of the old acrobat hay turners!

Probably the biggest argument in favour of discs is that they (usually) offer less disturbance than a tine, and if your prime objective is weed control (did someone say blackgrass?) then a low disturbance disc is really the only choice, depending on the coulter design. With the Ma/Ag drill we offer independent floating coulters with an adjustable press wheel to control sowing depth, this allows each row to sow at a constant depth irrespective of field undulations, the parallel floating arm design with adjustable spring pressure helps achieve this even sowing depth, simply for even germination.

The Ma/Ag can exert a minimum of 240kg per coulter which means penetration even in the hardest ground should be no problem, what always tests a direct drill is closing the seed in the ground. The press wheel on the Ma/Ag controls the sowing depth and therefore once the disc has settled at its working depth, the coulter pressure is now transferred to the press wheel, a wide rubber wheel with hard sides and a soft centre tread give a needling effect at either side of the seed, which firms from the outsides to the centre of the wheel giving excellent seed to soil contact for quick germination and discouraging soil pest from finding and damaging the seed.

That's the basics of the Ma/Ag solution to low disturbance direct drilling, but because of the wide rubber press wheels, the drill also works well in min till and conventional operations, ideal for working on sterile seedbeds without germinating unwanted weed seeds.



Ma / Ag

The fact that the coulters are mounted on two toolbars, one up front and one at the rear of the drill mean clearance between the coulters is double the row spacing (176mm or 7"), ideal in cover crops, and the centrally mounted hopper means even distribution of the drills weight onto all coulters. The transport wheels are mounted centrally between the front and rear toolbars, and this in combination with the tractor linkage mounted towbar give excellent manoeuvrability in tight corners and minimises wheeling's on headland turns. Standard accord metering gives accurate and easily set rate control with an optional fertiliser system which uses a completely separate delivery system with fertiliser placement below the seed and a novel air drier to stop fertiliser pipes clogging in damp conditions. You can then choose from the mechanical land wheel driven meter system, or touch screen electronic metering with variable rate control and push button calibration.

For more information, contact Ryetec on 01944 728186 or email [info@ryetec.co.uk](mailto:info@ryetec.co.uk)



## Weaving Machinery's new 8m no-till drill to demo at Groundswell 2018

The GD8000T "leads the charge" for combining soil health with yield and productivity.

Weaving Machinery will demo its new 8m version of the no-till Weaving GD Drill at Groundswell 2018, giving visitors the chance to see the drill in action in Roadshott Field.

The GD8000T is targeted at farms that take soil health seriously – and the yield benefits that re-sult – but have thus far not found a drill large enough to match their system.

"This year marks Weaving Machinery's 20th Anniversary as suppliers of no-till drills," adds Mr Weaving. "Groundswell's theme of "soil health" is, understandably, close to our heart. The GD8000T is our grand statement in support of no-till systems – why not have improved soil quality while boosting profitability? Weaving Machinery are proud to be leading the charge for im-proved soil health."

No-till farming has seen increased

interest following Environment Secretary Michael Gove's re-cent indications of possible incentives for zero tillage farms following Brexit. The future of no-till – and how to best implement soil health as a priority in existing systems – is the subject of extended debate. Weaving Machinery are keen to engage with farmers and will be at the Soil Tent for the Manufacturer's Drill Discussion on both days at 3pm to share their vision for no-till farm-ing in the years to come.

"Weaving Machinery wants soil health to be accessible for every farmer," says Simon Weaving, Sales Manager at Weaving Machinery. "This new drill has the power and scale needed for larger farms, making it easier than ever to create healthy soil for healthy crops."

### Specifications

- Designed and built in the UK
- 8 metre working width
- 3 metre transport width
- Proven Weaving GD Coulter design
- Row spacing of 16.7cm

- Row clearance of 130cm
- 4-ton hopper
- Linkage mounted drawbar
- Tank sieve
- 800/45 R26.5 Mitras Agritererra 02 low ground pressure flotation tyres
- 3 section unique compact folding toolbar
- Hydraulic fan
- Oil cooler
- Double metering units & distribution head
- iSOCAN controls
- Full tramlining kit
- Work & road lights
- HP requirement of 250HP+

Weaving Machinery will be at Groundswell 2018 on stand D10 between 27th and 28th June. The new 8m no-till drill will demo on Wednesday 27th June at 1pm in Roadshott Field.

Weaving Machinery will also take part in the Manufacturer's Drill Discussion in the Soil Tent at 3pm on both days.



# WHAT COULD BE THE IDEAL NO-TILL DRILL ?

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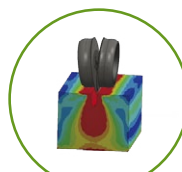
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Looking for a minimal disturbance disc drill for reducing grass weed emergence?  
Consider the Boss!  
With over 1 million hectares sown in Arid+Wet conditions in Australia we have an extremely durable solution.

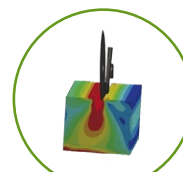


Two gauges possible, with the side wheel or the gauge wheel. Adjustable without tools

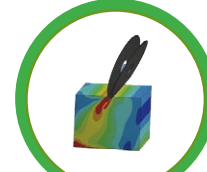
The boss opener has almost zero seed furrow compaction



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# FARMER FOCUS

## ANDREW HOWARD

It's been a year of arrivals so far. Our third child William arrived safely in January, then our new drill arrived a couple of weeks later. Unfortunately, spring decided not to arrive until the middle of April. When it finally did "Monsoon Monday" was chasing it away again! We had finally finished drilling (so we thought) on the 26th of April, then on the 29th we had 51mm of rain. In total we had 70mm of rain in the six days following drilling. The picture below shows a field of linseed under water, it was under water for 6 days and didn't make it. Our friends a few miles upstream had 90mm in that one day, all their water came through our farm making the flooding worse. A spring to forget.



Our new drill is a second-hand 3m New Zealand made Cross Slot (CS). I was lucky to get a LEADER grant to help pay for it (soften the blow). I decided on a Cross Slot as I wanted the flexibility of 3 hoppers and being able to plant 2 types of seeds at different depths simultaneously, ideal for our intercropping. The coulter design of the CS will hopefully mean hair-pinning is no longer the issue that it was with the JD750a.

This spring we have planted oats with clover, beans with rape (see picture), linseed, linseed with lentils, SOSR and barley. The barley has really suffered from the flooding damage, but the other crops look reasonable. All we need now is warmth, sunshine, it to rain regularly and they will perform well, surely we are owed some decent weather?

Some of our Bean/Rape intercrop is part of the Diversify project. This project is investigating intercropping on farms all over Europe. We have intercrop and monocrop plots, so we can compare. I will keep you updated on the results as the season progresses. Fingers crossed for a kinder summer!





The logo for The Farming Forum (TFF) consists of the letters 'TFF' in a bold, white, sans-serif font. The letters are slightly shadowed and are set against a dark blue background that is part of a larger graphic element resembling a speech bubble or a rounded square.

# Content from our Direct Drilling Forum on The Farming Forum:

<https://thefarmingforum.co.uk/index.php?category/direct-drilling-forums.36/>

Regenerative Agriculture - nowhere near as big here as in the US, but a lot of interest  
<https://thefarmingforum.co.uk/index.php?threads/186234/>

Large scale No Till - we often say no till needs more management and is hard to get right on bigger units. Do people think it's possible on big units like 3000ha+ in the U.K?  
<https://thefarmingforum.co.uk/index.php?threads/216914/>

Moving the ground post harvest - New to no-till and trying to get my head round what people do post harvest. <https://thefarmingforum.co.uk/index.php?threads/212596/>

Perm pasture into arable with a DD - Need to establish some arable thinking it will be spring triticle and lupin being drilled into perm pasture. More than likely this ground wouldn't have seen a plough in 30 years. <https://thefarmingforum.co.uk/index.php?threads/209538/>

Triton drill - Anyone tried/seen one? <https://thefarmingforum.co.uk/index.php?threads/215192/>

750A variable seed rate - Is any body doing variable seed rate with their 750A, other than with a john deer tractor? <https://thefarmingforum.co.uk/index.php?threads/213148/>

Pig Slurry - Has anybody used 3000 gls/ac pig slurry before zero tilling spring barley a few days later  
<https://thefarmingforum.co.uk/index.php?threads/217062/>

Spring barley variety? - Does anyone have any theories about which Spring Barley variety likes no-till the best? We've grown Tipple and Propino before and neither of them had much go in them, the roots never really got going and the yield was always disappointing -  
<https://thefarmingforum.co.uk/index.php?threads/214704/>

Cover crop quandary - For spring barley 2019 we will be pressing reset on the fields and ploughing them properly and deep to bury grass weeds. This will be done in good conditions in the autumn as ploughing this land in the spring has never been a good option historically -  
<https://thefarmingforum.co.uk/index.php?threads/213518/>

Best cover crop for sheep grazing - my rotation is 30% WW, 30% WOSR and then 30% SBarley. What would be a good over-winter cover crop for me to establish behind the combine to graze sheep over before destruction\* in front of Spring Barley? -  
<https://thefarmingforum.co.uk/index.php?threads/40130/>



# GROUNDSWELL 2018

Written by John Cherry

Two years ago, we hosted the first Groundswell No-Till Show and Conference. The idea for doing it came from a visit we made to the No-Till on the Plains Conference in Salina, Kansas some years ago. It's a marvellous three-day event that takes place every January and, although conditions in the Great Plains are quite different to what we're used to here, I can't recommend it highly enough for anyone with an interest in Conservation Agriculture.

Anyway, we couldn't help thinking that somebody ought to put such a thing on in the UK and as no-one else was getting on with it, we created Groundswell, setting it up as a mix of a No-till version of Cereals, with the only machines being Direct Drills working in cover-crops and a Conference, with speakers from around the world talking about all aspects of no-till farming and soil health.

We called it Groundswell as all the



John Cherry

momentum for change is coming from farmers, as they have most to gain. Like the best revolutions, it's coming from the bottom up. And we're trying to make the ground well.

Two years on and it's grown a bit. We've incorporated even more focus on soil health, including the idea of getting

animals back into the arable rotation. As I said, no-till in the UK is very much a farmer led revolution, so this is a show for farmers by farmers. We've booked a lot of farmers to speak about their successes and failures, including Clive Bailye, David Walston, John Pawsey, Andrew Bott and Jake Freestone. There is nothing so useful as hearing other farmers talk frankly about their experiences.

Growing crops successfully under a continuous no-till system isn't just about abandoning all cultivations and hoping for the best...you need to really look after your soil and it may well take a year or two for it to recover from being bashed about over the years in conventional seed-bed creation. So, we've lined up lots of experts to talk about what goes on underground and how we can use this knowledge to make our soils better, like the wonderful Joel Williams, who will be speaking on both days.

There is a lot of talk about cover crops nowadays, but for many people the jury is still out in terms of what benefits they bring. So, we've got Ademir Calegari from Brazil, who probably knows more about the subject than anyone else on the planet and he'll fill us with

enthusiasm with all sorts of possibilities. We've also got some demo plots from our partners, Kings and there will be more talks from Mike Harrington, and Ian Wilkinson will be discussing herbal leys and the definite benefits they can bring.

To make the best use of herbal leys, you'll be wanting to mob-graze them, so we've got Greg Judy from the USA who'll be talking about building healthy soil with mob-grazing. He is perfecting the art of grazing animals on his farm and tells an inspiring story which will get the most hard-nosed arable farmers itching to get beasts back on their land. There will also be forums with the Pasture Fed Livestock Association with ideas and inspiration from the UK.

Once you've got all that stuff sorted out in your head, the next step is to see which drill will work best on your





farm. Across the road in Roadshott field there will be twelve drills a-drilling into standing cover crops. In addition to the John Deere, Sly, Ryetec, Horsch, Weaving, John Dale and Sim-Tech T-Sem we've got first time appearances from Sky, Duncan, Triton, Cousins of Emneth and Jordans Engineering.

So, there will be something for everybody, from big to small, for start-ups to experts.

We'll also have some machinery based talks in the Soil Tent in Roadshott, with David Purdy giving advice on setting up tractors and weight distribution, Graham Edwards challenging tractor makers to make machines suitable for this way of farming, the Small Robot Company describing their vision for the future and discussion forums where you can quiz the drill-makers.

We've found that there is increasing interest from outside mainstream farming for no-till and what DEFRA calls the 'public good' it can bring. We have



a few forums on such diverse subjects as the politics of food and the Brexit



implications. Healthy soil has immense ramifications for the whole nation, if only the nation knew it.

The general theme of this year's show is health, which chimes nicely with what Michael Gove has been promoting. Health is a much-abused word and its modern meaning is all about disease control, which normally means buying products from pharmaceutical companies, whether it be antibiotics for people or animals, fungicides for crops or any number of other expensive sprays and potions.

Health is actually a positive condition and when you have it, you don't get ill. When your soil has it, your crops don't get disease, your animals don't either and the food you produce will be the best that anyone can buy. Which brings us to Dan Kittredge, an organic farmer from the USA, who will be giving a couple of keynote speeches on this very subject, which I'm particularly excited about. He's also developing a gizmo which I suspect will change the food market forever. I won't say more about it now, you'll just have to hear what he has to say...

From health to wealth...there is no point changing your farming system if you are going to be worse off financially, so we're delighted that the renowned agricultural accountant Gary Markham, who has been analysing various no-till farm financial results, will be presenting his findings to the Conference on day two. This, too, may be something of a game-changer.

There's more, much more. Luckily, it's on for two days so you can spread yourselves about a bit. One of the main attractions is having several hundred ardent no-tillers in one place, just talking to strangers or old friends can teach you as much as anything. We've also got



parties coming from Africa and China amongst other places, some of them will be speaking about what they are up to and what they've learnt in their countries. We've got four lecture rooms this year so there's going to be lots of hard decisions about who to listen to.

We look forward to welcoming you to Lannock Manor Farm on 27th/28th June

# THE GROUNDSWELL SHOW 2018

**What:** The first UK conference wholly focused on no-till techniques, soil regeneration and the value of livestock in arable and mixed farming situations. Featuring speakers, workshops and seminars; exhibitions from a wide range of innovative farming companies and field scale direct drill demonstrations.

**No-Till Benchmarking Group:** Hear the results from the first ever No-Till Benchmarking Group showing how the figures stack up from UK no-till farms of different shape and sizes.

**When:** 27/28th June 2018

**Where:** Lannock Manor Farm, Weston, Hitchin, Hertfordshire SG4 7EE

**Drill Demonstrations from:** John Deere, Sly, Ryetec, Horsch, Weaving, John Dale, Sim-Tech

T-Sem, Unidrill, Sky, Duncan, Hutchinsons, Triton and Jordans.

42 Speakers across four conference and seminar areas

30+ different exhibiting companies

Over 500 farmers, both conventional and organic, at all stages of no-till conversion

AHDB Interactive Soil Pit, No-Till Potatoes, Kings Cover Crop trial plots, Mob Grazing demonstrations, Electric Fencing Demo's, Bokashi Heap, Agricolology Breakout Sessions, Innovative Farmers and much more.

**Tickets:** £55 (+VAT) for one day or £85 (+VAT) for both days. Tickets are available from:

**[www.groundswellag.com](http://www.groundswellag.com)**



# UK DRILL MANUFACTURERS IN FOCUS...

## HORSCH

### Avatar SD direct seed drill with single disc Coulter

The Avatar SD is a compact seed drill that is ideal for direct seeding or catch crop populations. In cases of black grass resistance, the Avatar's low disturbance of the seedbed when sowing with the single disc coulters helps prevent the black grass from germinating.

The Avatar SD is available in 3, 4, 6, 8 and 12m working widths and due to its high tare weight, the new single disc coulters are ideal for direct seeding. The Avatar SD in 4m working width weighs 5,800kg, 9,300kg at 6m and 19,160 kg at 12m working widths. Despite the high weight necessary for a direct seed drill, the horsepower requirement of the Avatar SD is low as the SingleDisc coulters are arranged in two bars.

Avatar SD uses the well-proven hopper and metering components of the Pronto DC seed drills. Depth control of the coulters is carried out via the well-proven rubber suspension



of the Pronto in a larger and stronger version which is required due to the high coulters pressure.

The coulters pressure of up to 310kg

guarantees penetration into the soil. The strong coulters frame eliminates sideways movement, which ensures that the coulters keeps to the set sowing depth even on uneven soils. A press



wheel then closes the seed furrow and consolidates the seed row.

A 2,800-litre hopper can be replaced with a double hopper version (3,800 litres) for grain and fertiliser and a 200-litre micro-granular unit is available with either hopper version. The machine is controlled and monitored by a standard ISOBUS terminal.



Dale Drills have been helping farmers to drive down the cost of crop establishment for over 20 years. Founded by Lincolnshire farmer, John 'Edward' Dale, the company has been a long term advocate of low impact cultivation – recognizing the importance it has for improving soil structure and the associated benefits of improved fertility and increased yields.

Now run by Edward's two sons, Tom and James, who grow 3500 acres of combinable crops (utilising No-Till and CTF techniques) in North Lincolnshire, the company pride themselves on their technical expertise and practical understanding.

The companies Eco-Drill assembly combines technology with a versatile but simple design to ensure accurate, effective and low cost establishment. Fitted with two 12mm wide, low disturbance tines, the Eco-Drill assembly can be quickly adjusted to provide 5"(12.5cm) or 10"(25cm) row spacings. Attached to the drills main chassis via a parallel linkage, and followed by a depth setting press wheel, the drilling assemblies are able to independently contour follow ensuring very accurate seeding depth even at the company's widest working width offering of 13.5m. Each assembly is pressurised into work via a hydraulic ram which is supplied with an adjustable hydraulic pressure, allowing operators to set the drill to the conditions.

Dale Drills have always maintained its



tine opener offers greater versatility as well as number of other benefits over disc openers. The additional weight disc openers require in order to gain penetration is avoided when utilising the Eco drilling assembly, reducing the amount of compaction caused by the drill. This is amplified by the fact that a lower HP and therefore lighter tractor can be used to pull the drill or alternatively a wider drill can be used reducing the amount of ground trafficked. The simplicity of a tine opener removes the need for expensive bearings as well as reducing downtime for repairs. The Eco opener will avoid 'hair pinning' of residues ensuring positive seed-soil contact for rapid germination. The narrow, forward facing point of the Eco opener will preserve moisture in a dry period whilst also avoiding smearing in wetter soils.

With increasing interest from overseas,

Dale Drills recent developments have focused on wider machines with a new Eco-XL being tested this spring to great success. The machine features a new layout with an 8500Litre (6t) Hopper followed by a toolbar fitted with the companies proven Eco Drilling assemblies.

Low ground pressure, 710mm wide land wheels are located towards the front of the toolbar, followed by two rows of drilling assemblies which remove any surface compaction. Wider models are fitted with wing stabilising wheels, located on the same axis as the main land wheels to avoid the need for expensive and complicated caster wheels.

The Eco-XL is available in widths from 9 – 13.5m, all of which hydraulically fold down to less than 3m wide and 4m high for road transport.





# DIRECT DRILLING BACK IN 1970S

While many farmers in the UK have only been considering systems with reduced tillage for the past 5-10 years, worldwide research has been going on much longer. No-Till Farmer Magazine in the USA has been published for over 20 years and John Deere have been selling direct drills in North and South America for the same period.

While looking for information on water run-off we found an article published in the Soil Science Society of America Journal in 1976 which was based on research between 1970-1975 (Lal, R. 1976. No-tillage Effects on Soil Properties under Different Crops in Western Nigeria<sup>1</sup>. Soil Sci. Soc. Am. J. 40:762-768. doi:10.2136/sssaj1976.03615995004000050039x). That's nearly 50 years ago when proof of the benefits of systems of reduced tillage started to be documented. So when you are considering taking the leap, remember it's really not that new!

The paper compared soils that were no-tilled for 5 years versus soils that were ploughed for 5 years in Western Nigeria. It found the no-till regime had significantly affected the physical structure of the soils and also its chemical make up.

You can read the abstract here: <https://dl.sciencesocieties.org/publications/sssaj/abstracts/40/5/SS0400050762#>

## In summary they found:

- no-tilled plots had higher organic matter content
- no-tilled plots had higher concentrations of nitrate-nitrogen, available phosphorus, and ammonium acetate extractable cations such as Ca<sup>2+</sup>, Mg<sup>2+</sup>, and K<sup>+</sup>
- Water infiltration rates in the reduced cultivation plots were higher than those of the ploughed plots
- Rain water runoff and the effects of soil erosion were lessened in the no-tilled plots
- maximum soil temperatures were higher in the ploughed plots

- no-tilled plots had higher soil moisture content
- no-tilled plots produced yields equal to those from the ploughed plots
- reduced tillage led to Greater earthworm activity
- no-tilled plots had reduced compaction and crust formation

## Does this all sound a bit familiar?

If you want to read the whole article you will need to buy a subscription to the Science Society of America Journal, however there are lots of articles on there that you would find interesting, so it maybe worth the investment for more in-depth reading - <https://dl.sciencesocieties.org>



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3m – 6.25m

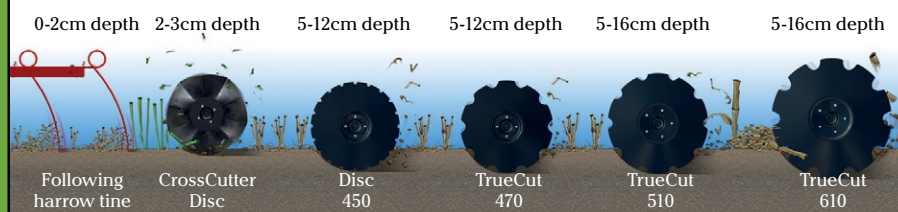


**Carrier**  
3m – 12.25m



**Carrier L/XL**  
3m – 6.25m

Carrier is a disc cultivator used for high speed primary tillage and seedbed preparation. The wide range of front tools, discs and packers enables Carrier to handle the versatile challenges of modern farming – from ultra-shallow cultivation to a deeper incorporation. The versatility it brings to the farm saves passes, decreases machine cost per hectare and provides the best start possible for the coming crop.



Learn more at [vaderstad.com](http://vaderstad.com)







# ARE WE MINING THE SOIL?

By Samantha Mullender a Sustainability Researcher with the Organic Research Centre.

Article originally published on the Agricollogy website in October 2017

## Farmers and researchers explore the potential for improving nitrogen (N) efficiency in organic rotations.

Organic principles and standards emphasise the importance of practices that can encourage the long-term health and fertility of agricultural soils. Effective crop rotation, cultivation regimes and organic fertiliser application are therefore important elements of the organic approach. Whilst such practices can undoubtedly increase the soil's health, their true impact is still uncertain, particularly with regard to soil nutrient and organic matter contents.

### Introducing NDICEA

As part of the OK-Net Arable project, a group of organic farmers wanted to improve their understanding in this complex area. This was done by using a computer-based nutrient budgeting model called NDICEA.<sup>1</sup> A researcher

from the Organic Research Centre visited each farm for a couple of hours to assess individual field rotations using the model. The farmers provided data on climate, soil properties and management practices (e.g. seed rates, fertiliser application, cultivation regimes etc.) for one of their fields. Using this data, NDICEA is able to work out where nutrient surpluses and deficiencies occur over the seasons and rotation cycle. This information is used to provide information on environmental impacts like N leaching and identify if rotations are balanced, helping to build soil fertility or mining nutrients and organic matter.

NDICEA outputs include graphs of nitrogen uptake vs. availability (A), leaching (B), organic matter in the top soil (C), supply and decay of organic matter (D) and a table showing mineral balances (E)

### Farmer experiences

Seven organic farms took the opportunity to look at one or more of their fields. They entered their crop rotation and

management practices to see where, if anywhere, problems arose. The results caused some surprise for both farmers and researchers...

In all cases except one, organic matter was found to decline over the course of the rotation, even where leys with a high clover content formed a substantial part of the cropping sequence. Declines in organic matter were even seen on a farm with six years of grass/clover ley. Similarly, only one farm maintained a positive balance of phosphate and potassium. The only way it achieved this was through annual applications of either compost (35 tonnes per hectare (t ha<sup>-1</sup>) or chicken manure (10-17 t ha<sup>-1</sup>) for six (out of eight) years of the rotation.

An additional discovery was that a lot of the nutrients added to the field through fertilisers (including compost or manure) or grass/clover leys were being lost through leaching or harvest. Even with grazing and no cutting, leys high in clover only retained the soil N and did not increase it, whilst

## Walking with farmers



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gains in organic matter across the ley were only seen with reduced tillage AND when the last cut of forage was left on the field/ploughed in. Meanwhile, breaking the ley in the autumn led to most of the nutrients added being lost before the growing season of the next crop began, due to leaching and denitrification losses over winter.

The model also allowed the farmers to adjust their rotations to see what might happen if they changed their rotation or management practices. The seven farms experimented in a number of ways, e.g. exploring the effect of changing fertilisers, cover crops, ley duration and tillage practices. This exercise illustrated just how difficult it was to maintain positive nutrient and organic matter balances over their crop rotations.

### Outcomes revealed

1. **The biggest improvements were seen by changing tillage practices.** The difference between conventional and reduced till, and reduced till and no till, were substantial for all the modelled rotations. In many cases this was enough to give positive nutrient balances. In some cases it built organic matter too. This is shown in the graphs above.
2. **Leaving the straw behind has very little effect on nutrient balances.** It does, however, increase organic matter.
3. **Breaking the ley in the spring doesn't improve overall nutrient or organic matter balances.** What it does do is make the nutrients from the ley available for the following crop, by reducing the amount of nutrients lost over the winter months. This is true even when the crop following the ley is planted in the autumn.
4. **Using digestate from anaerobic digestion could present an alternative to rock phosphate.** In addition to supplying phosphate, digestate can add nitrates, potassium and organic matter to the soil.
5. **Increasing the yield of a grass/clover ley can lead to substantial benefits,** improving organic matter balances and soil nutrient retention.

It must be remembered that no model is 100% accurate and that the outputs given by NDICEA are indications rather than definite outcomes. Despite this, the seven farms all reported just how useful the experience had been. Overall, the work has revealed some real problems to be addressed within organic arable farming. As farmer John Pawsey (pictured above) said: "No matter which way you look at it we are all mining the soil, unless we are bringing in nutrients to balance exports of meat, straw, forage and grain." Certainly a challenge for the future.

A video on the work described above can be found on YouTube at <https://www.youtube.com/watch?v=lv2bX7-XSO8&feature=youtu.be>. There is a factsheet on the finer details of the tool available on the Farm Knowledge Platform, while the NDICEA tool itself is available to download for free from here. Detailed instructions on how to use the tool are available from the same link

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# IS GLYPHOSATE THE 4TH PILLAR OF CONSERVATION AGRICULTURE?

Written by Matthieu Archambeaud - TCS n ° 62; March/April/May 2011-

Conservation agriculture is commonly presented as the combination of reduced tillage, maintaining permanent coverage of the soil and the setting up of suitable rotations. It is often forgotten, that this is often only possible with the help of total herbicides that allow the farmer to get rid of weeds without the help of ploughing and weeding. It was the appearance of molecules such as paraquat, 2-4 D, then glyphosate, that simplified the work of tillage and direct seeding. At this time when the active and its most common trade name Roundup and its counterparts are being put on the spot, a recent review by TCS Magazine wished to make some very important observations on the subject.

## Remove weeds without tilling

Since the beginning of agriculture, cultivation has been used primarily to fertilize crops by oxygenation of the organic matter. It also lets you control the weeds by burial of vegetation (ploughing) or a simple removal (weeding) of above ground material. In recent decades, the depth and the speed of ploughing strongly increased, with the massive development of industrial style mechanization.

Mineral fertilization, is itself, is very effective along with the selection of suitable crop varieties that were developed at the same time. The result was a huge leap in productivity. In this system, the concept of nurturing the ground gradually faded in favor of intensive cultivation, and artificial fertilization of crops. This system has given very good results so far, allowing France, weakened and hungry in the late 1940s, to become one of the



world's major agricultural exporters. The context changed however with the emergence of environmental problems induced by inappropriate treatment of agricultural soils, reflecting their

degradation: erosion, reduction of organic matter content, nutrient losses, reduction in biological activity, etc. Becoming less and less, alive and fertile, agricultural soils are no longer able to tolerate mechanical damage, fertilization organic or mineral, or even irrigation.

## Too effective a weed killer

Glyphosate can effectively remove unwanted vegetation without touching the ground, in a way that is fast, easy to apply, very economic and with extremely low energy consumption. It also has a significant agronomic asset in that it is destroying weeds while leaving the soil undisturbed without fresh weed germination, unlike mechanical destruction. This explains no doubt its popularity and its use as well by (conventional, conservation agriculture and direct seeding) farmers, gardeners, alongside roadways, and





even by the military. Of course, this product 'miracle' raises complex problems. The first question is the popularity of glyphosate which makes it the best-selling and most widely used herbicide molecule in the world, far beyond the circle of conservation agriculture.

It follows that the product is used by all, not always in good conditions, at any dose, not always for the right reasons, and therefore one finds it or its degradation products (including AMPA) in analysis of water quality.

The second phenomenon is a consequence of the first and becomes more worrying at the agricultural level: nature works more easily around an obstacle if it is repeated and widespread. The systematic use of glyphosate inevitably results in resistance phenomena. These resistances are not related to glyphosate itself but its mode and intensity of use. For example, there is in France more resistance from populations of ryegrass and fescues. The first French case of glyphosate resistance was in a population of vetch in vineyards where this product is used extensively alone. These phenomena of resistance also appear much more quickly when the product is used alone, since the use of several active ingredients to eliminate cross-resistant

individuals (a plant resistant to the active substance) with glyphosate is unlikely to be more resistant to a different active. The Australians did so to reintroduce paraquat in combination with glyphosate, to achieve what they call a "double knock". The same phenomenon is observed in North and South America where genetically modified soy and corn RR (Roundup Ready) are widely used and require a number of passes pre-emergence and post emergence.

The third and final point is the designation of glyphosate as a symbol of an intensive, destruction of the environment and that it may affect human health.

### **This challenge is of three orders:**

- the massive international use of the product
- its obvious link with GMOs grown today
- the involvement of Monsanto in military operations with the Government of the United States of America, whether it's Agent Orange in the Vietnam war or concentrated spray of glyphosate on plantations of coca in Latin America.

## **Impacts on the soil and living organisms**

The purpose of glyphosate is to suppress plant organisms: the molecule is an amino acid analogue onto which a different chemical group is grafted: glycine-phosphonate whose contraction gives its name to the molecule. This compound disrupts the synthesis of some essential amino acids and plant compounds, resulting in the death of the plant that absorbed the herbicide.

Since glyphosate is poorly absorbed in its pure state, additives intended to facilitate its absorption (surfactant, surfactants,) are attached to it. Glyphosate acting specifically in a plant biochemical pathway has long been considered harmless to animals and the environment. However, because of its popularity and its strong link with the GMO problem, a multitude of scientific studies have been carried out around the world relating to the safety of the active substance.

In the first place glyphosate, being relatively immobile, would tend to concentrate in soils that receive applications regularly. This concentration would disrupt the absorption of some mineral elements by crops, such as for example manganese, iron, calcium or magnesium. This lack of absorption could be caused by several mechanisms according to D. Huber of Purdue University: it would physically block a part of trace elements available in the root environment by the phenomenon of chelation. Second, it would hurt populations of rhizosphere microorganisms that facilitate the absorption of minerals. Finally, these phenomena are amplified on a RR crop that radiates into the ground by its roots glyphosate that the plant absorbed and cannot metabolize (Digest). This researcher goes further and considers that it is not the glyphosate which is responsible for the death of the plants, it is the molecule that would that suppress the immune system the plant would then be the victim of fungi and pathogenic bacteria. Direct seeding, focusing the organic material on the surface, could amplify the phenomenon by focusing the glyphosate near the rhizosphere.





This type of result was also confirmed by Professor Römheld of the University of Stuttgart, who showed the negative impact of glyphosate on root growth of RR crops in the presence of glyphosate even at a low dose compared to other herbicides.

Other studies have also shown the harmfulness of glyphosate, admixtures and their products of degradation, on the flora and fauna, and even on human health. As such, there is little doubt that molecules that are intended to remove organisms may have negative effects on animal and human health.

It reinforces the idea that users must imperatively protect themselves, take the necessary measures to avoid the derivatives in the atmosphere and in water, and finally that it is essential to implement technical and agronomic solutions that maximally reduce the use of pesticides.

### **Direct seeding with conservation agriculture**

With the “dust bowl” American 1930s, and serious erosion problems in Brazil in the 1970s, farmers and scientists are finding that the reduction of cultivation can reduce or even remove the problems of land degradation. In

pursuing this non-cultivation on an ongoing basis, they realize that soils are a framework comparable to that of a meadow, which allows it to produce as in a conventional system or even more, with a very low of cost of production in mechanization and labour. It is enough to weed a soil, sow a crop, protect and fertilize it to make good returns: American farmers are past mechanical tillage moving on to “chemical ploughing.” With the introduction of resistance to glyphosate in crops, the system becomes even more simple and profitable, if not sustainable over time.

From the 1992 CAP reform, reduction of cultivation has also been sought by French farmers to reduce production workloads. However, unlike the systems pioneers of South America, Europe and Eastern Australia, European agriculture has evolved in a social, regulatory and environmental framework, forcing growers to go further than their direct seeding “GM and glyphosate” and leading them to increase exchanges with organic farmers themselves, in pursuit of agronomic and technical solutions. Conservation agriculture systems (or even agroecological, on living soils, environmentally intensive, etc.), in which we redefine principles as farmers

who rely on the natural organization of the soil (no-till and always covered), looking to produce a maximum plant biomass on a permanent basis in order to increase the physical, chemical and biological fertility of the soil. In this context, glyphosate, or other existing or future active materials allows a control of this biomass without damaging the soil. Based on the principle that control of the soil is related to control of the plants in the system (choking, competition, allelopathy, mulching, local fertilizing, rotation...), herbicides are a way to push the systems further without excessive risk taking.

Finally, it must be recognized that it is thanks to glyphosate that pioneer farmers and technicians are developing efficient, effective and innovative agroecological systems based on living soils. And the more we develop and validate alternatives, the less it will become necessary.

To continue the development of conservation agriculture, without undue risk, the strategy is to find new methods of action, even if we restrict the uses of the product without the need to remove its approval. Glyphosate was the mainstay of direct drilling, it has become the safety net of conservation agriculture.



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# ROLLING COVER CROPS

## A RICH TECHNIQUE OF OPPORTUNITIES WITH MUCH STILL TO MASTER

Written by Matthieu ARCHAMBEAUD, TCS Magazine No 64 September/October 2011

The research institute Agroscope of Changins in Switzerland (Canton of Vaud) has been conducting a trial since 1969 with four different types of tillage and since 1976 also comparing various forms of fertilization and plant cover. The results that have been learned so far are proving to be a very valuable insight for all farming systems whether conventional, conservation agriculture based systems or organic.

An Idea pioneered in South America, the physical destruction of a cover crop by rolling has developed all around the world and in France. The technique is so promising that we can now see it on all continents, in both in organic and now conservation agriculture systems as well as more conventional agriculture. Unlike the destruction by mulching, a crimper roller doesn't touch the ground and therefore kills the plant material without disturbing soil, in some situations with or without additional chemistry, and especially without the risk of reviving a fresh germination of weeds.

Conservation of soil cover after rolling keeps the ground protection against heavy rain, erosion, and evaporation losses and extremes in temperature. Finally, keeping the terminated biomass on top of the soil decreases the risk of

nitrogen hunger for the next crop, which is often not the case when mulching to destroy the living vegetation.

In a high biomass cover the purpose of the crimper roller is to injure the plants in extreme weather conditions of heat or cold so they will not regrow. The South Americans use the technique in dry and hot conditions, in Europe, it's the cold, even the frost, which improves efficiency. The technique interests naturally the organic farmers and farmers practicing conservation agriculture. However we are seeing interest now with more trials in conventional agriculture. Indeed, successful termination using a crimper roller on high biomass material can replace mowing or mulching: the rolling becomes a solution which is both economic and relatively simple means of control for most farming systems.

However several conditions must to be brought together to ensure effective destruction of the cover.

Firstly, the rolling is generally only effective on a high and developed vegetation. For mechanical termination of either weeds or cover crops a well-developed plant will be effectively killed. There are several versions of crimpers which have been imported from South America soon after direct sowing was introduced and both the technique and method of crimping has been researched by technicians of the INRA farm from Mirecourt, Vosges, Eastern France. The INRA have been looking at multiple effects from cold, heat, pathogens or pests. Secondly, we know that after flowering, the plants are a lot more susceptible to this physical mode of destruction because the plant reserves are then redirected towards reproduction rather than vegetative growth. This sensitivity is necessary for both crimping and rolling in the frost and equally sometimes to mowing or traditional mulching. Of course, for the plant to reach this critical stage, the cover must be given every opportunity to achieve maximum biomass in good time in order for it to fulfill its role as a cover. Depending on the date of destruction, it is therefore essential to establish the cover crop in good time to allow the crimper to work effectively. For overwintered cover crops with long growing periods, relatively late sowing dates are conceivable. On the other hand, for short term covers preceding a cereal, a very early sowing date is essential.





The frost is an extremely valuable tool in assisting a crimper to work effectively but not essential. It is usually recommended to roll or crimp during a frost for plant species that can survive a normal winter, this will see their tissues sufficiently damaged by the roll, resulting in certain death. Freezing temperatures are much more necessary when the tool being used is not specialized (for example a flat or cambridge roller, which can be too light and not as reliable.) or that the cover is still immature due to a late date of sowing, resistant species and / or a lack of soil fertility. We find also that the crimping must take place on frozen ground to avoid physical damage to the soil structure and machine. In general, a well-covered soil will not freeze over hard as the high biomass cover itself will serve as a buffer. However the weight of tractors that are used during this period should be both as light as possible and the power requirement will be minimal for this type of operation.

When considering a specific crimper roller there are a number of factors which should be considered for success. A simple flat roller will not be as effective as a purpose made cross kill or bar type crimper. A flat roller has the potential to work efficiently on a white frost when compared to blade crimper. However, in order to achieve an effective kill in a wider range of weather conditions and the stage and type of vegetation, the more specialized

the roller will have to be. A large diameter roller allows the operation to act at a higher forward speed with less revolutions but more of blades around the circumference meaning the tool will jump less maintaining stability and an even pressure on the biomass which is very important. A wide diameter of the rolls also leaves the ability to add a ballast of water or sand according to the weather and the toughness of the canopy (otherwise tractor weights or dual ballasted wheels do just as well). The inclination of the knives compared to the diameter plays an important role. Depending on the angle of attack, the

tool will be more or less aggressive: in most cases, a reducing angle will be sufficient to damage the stems but by increasing the angle this will increase the effectiveness of the knives of the crimper on woody stems. However if the tool is too aggressive in relation to the volume of vegetation this may produce varying results as will an excessive forward speed.

The distribution of the blades around the diameter also comes into play when using a "straight" mounted pattern (perpendicular to the direction of travel) promotes vibration and therefore reduces stability; the pinch pressure is





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more unevenly spread over the entire rolling width. A helical assembly of blades, or more simply a mounting of offset fin blades will bypass this problem.

### Choosing suitable species and susceptible varieties.

The last point to be addressed concerns the sensitivity of species and even individual varieties. The question is even more important when the cover sometimes has to be destroyed outside periods of cold, before an autumn sowing or in late spring for example. The tall vertical species like rye will therefore be more easily destroyed than those that remain at ground level; a tillage radish will be easily killed, unlike a turnip or rapeseed, where the underground architecture is protected from cold and rolling. The physiology of the plant and stage of development also play a role, delicate hollow stems being more easily destroyed than those who are full or already lignified.

A green mustard is destroyed easily, which is more the case than a mustard which has finished flowering and whose stem has hardened. The same idea applies to a crimson clover or a bean which are destroyed easily by rolling, as opposed to a red clover or an alfalfa plant that are perennial plants. In the case of cereal plants it is even more interesting; rolling (using a conventional or cambridge roller) of a cereal grass can enhance tillering and therefore the vigor of the plants, while it can be destroyed by a simple pass of a roller (blade crimper roller) at the flowering stage. Aiming to bruise the cereals stem and not chop it up, the plant is then exhausted and dies trying to feed damaged tillers. If the stem is cut it will try to produce new secondary tillers, as would happen if the plant is cut for silage or grazed. Choosing varieties that have been selected for this role is essential.

The importance of variety choice within plant species has been briefly mentioned previously, it is necessary to choose covers who will reach the appropriate stage at the date of destruction required while being neither too advanced (with a risk of running to seed) or neither too immature (making it difficult to destroy by rolling). In the end, if we want to increase the chances of success, that is, total destruction of



the cover without the use of cultivation or a contact herbicide and in addition to not being able to rely on a frost such as in frost-free areas of the west of France. Then choice of species and a dedicated type of crimper roller is paramount. If conditions are not met with the first pass of a crimper, a second pass can be used or even the use complementary reduced doses of herbicide applied at the same time or as a stand-alone operation.

Mechanical destruction of cover crops is an unexploited technique with many opportunities to reduce the need for chemical herbicides. However it does have limits, rolling can also become a powerful tool for plant species management without the need for total destruction of the canopy. A roll passage in the autumn or spring can help suppress vegetation considered too forward and to postpone destruction, mechanical or chemical, until a later time in a season and allow an adaptive approach to mechanical destruction.

For example differences in sensitivity to crimping which is often seen as an inconvenience, can be considered from another angle making the roller a selective weed killer which will eliminate non target plants sensitive to being rolled while retaining the resistant plants. We could consider the destruction of tall

plants (such as a mature cereal) in favor of smaller plants lurking in the bottom of a canopy (rapeseed, clover or alfalfa for example), the weakening of flowering perennials in a fallow or in a meadow without mowing and so without the stem re growing (thistles and dock). Why not also replace the coulters of the weeder with a crimper roller to ensure localized weeding on or in between the row without touching the ground and maintaining the cover crop as a mulch? Finally the only limit as to the potential uses of plant species are in the mind; many cash crop plants can provide an excellent cover such as; cereal stubble, forage maize/grain maize, sunflower and rapeseed.

### Conclusion

Rolling of cover crops seems simple at first, in fact it is not and it's a complicated set of parameters that determines its success. However, rolling will undoubtedly go from a simple tool of terminating cover crops to a versatile tool capable to reducing certain species and selecting others; selective weeding by mechanical means alone or combining it with a herbicide. There is a huge amount of complexity in this technique still to be explored. However, before rushing to purchase a purpose built machine its worth exploring what is already in your yard.



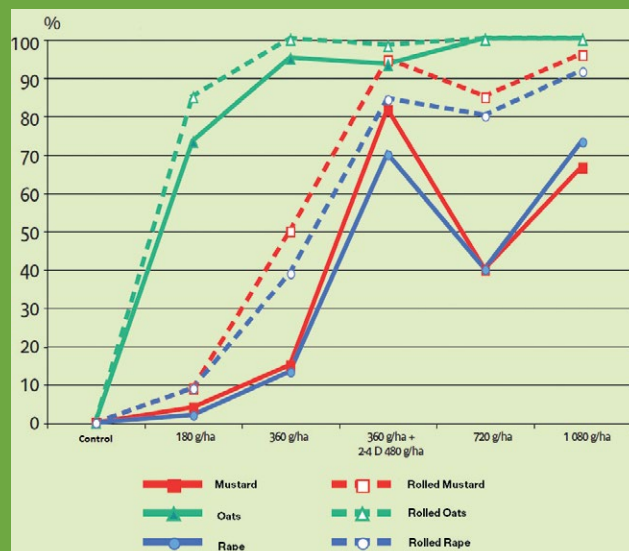
## Combined rolling and chemical weeding

JJérôme Labreuche and his team worked on the synergy between rolling and the application of herbicides (glyphosate with or without 2-4 D) to destroy cover crops. The first trials (2009-2010) focused on the effects on the weeds controlled by rolling on and the subsequent weed populations. However the plots of mustard-faba bean cover developed poorly, they had been killed by the frost and overtaken by volunteer oats and corn. So a second trial (2010-2011) focused on the effectiveness of a combination of rolling and glyphosate on cover species usually difficult to destroy by simple rolling (mustard, undeveloped oats, etc.). The rolling was carried out during a period of frost with a range of rolls used across the three experimental sites, using cambridge, packer or cross-kill rolls, with different doses of herbicides and a spray application between two hours and several days after rolling. Several interesting points stand out of these tests; the effectiveness of rolling before an herbicide application depends on the sensitivity of the species to glyphosate. The technique is most reliable on sensitive weeds (cereals, oats and lentils) and the results are more consistent. However, with species usually more resistant (established broadleaf weeds, mustard, rapeseed and radish) the results vary.

On volunteer rapeseed rolling followed by 360 g / ha of glyphosate is as effective as 720 g / ha without rolling, ie 1 l / ha of glyphosate saved. In the end, the effectiveness of destruction has been improved by 40% for the broadleaf weeds, from 70 to 99% for cruciferous plants and 95% for crimson clover. Note that for a dose of 360 g / ha of glyphosate (efficiency of 10% on rapeseed), the addition of 480 g / ha of 2-4D is more efficient (70%) than rolling (40%). The time between rolling and spraying is another key element since the

*Effectiveness of destruction of various plant species*

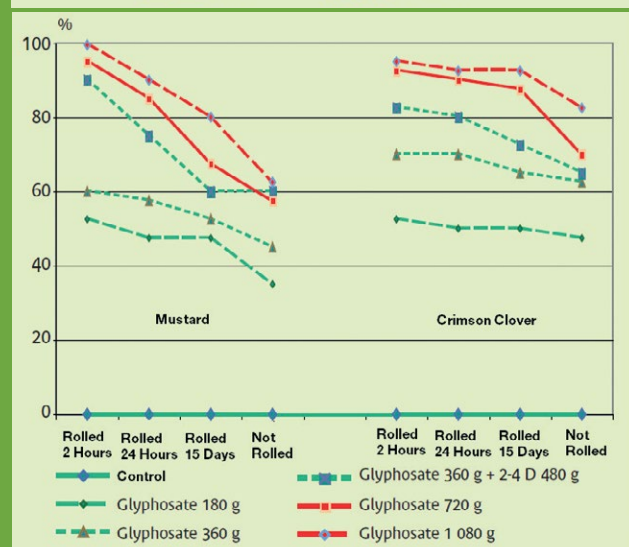
*Based on different treatments (Labreuche, Arvalis-2011)*



*Effectiveness of destruction of various plant species*

*According to the delay between rolling and application*

*Of glyphosate (Labreuche, Arvalis-2011)*



sprays carried out within two hours of rolling is the most effective. If the spraying is postponed twenty-four hours the level of destruction is reduced by 10 to 15%; if the period is fifteen days, the impact is almost nil. The hypothesis formed for the moment by the Arvalis team is that the injuries inflicted by the rolling improve penetration of the product, by bruising the leaves and the exposure of their lower face. Leaving too long a gap between rolling allows the plant to heal, or if rolling has not been effective, the activity of the he glyphosate is reduced.

Last but not least, Arvalis has calculated the cost of rolling at €12 euros ha, 3litres ha of fuel and 20 minutes ha for a 6 meter Cambridge roller. This cost is not insignificant, nor is it exorbitant and reduces or even eliminates the need for

further herbicide applications.

To conclude, these tests give very interesting results which will undoubtedly be confirmed and reinforced by the use of more specific rollers on more developed cover crops. The amount of glyphosate used to destroy the cover crop can be reduced while reducing the effect of shading by large leaves when treating a diverse cover mix than would otherwise have to be used. Also rolling improves the overall destruction of all plants meaning a reduced dose can be used on species which would otherwise require a larger rate of herbicide. The growing period for covers can be extended even until sowing time particularly when sowing in the autumn, allowing the technique of roll-sow-apply total herbicide to be used.

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## Direct Seeding Experience

With 16 years' pioneering successful direct seeding in over 30 different countries with the patented Claydon technique, we are now seeing the return of old technology systems that were first seen in the 70s.

Interestingly this old technology lost favour then due to inconsistency of results and has a track record feared by many who are considering entering into direct seeding technology. With the right soil and weather, and combined with a high level of patience and discipline, it can work quite well. Many farmers consider this too risky, however, even over older plough technology. But the savings can be



Jeff and Ivan look at 500ha field of Claydon drilled Wheat after Maize

considerable, to the point of turning a loss situation into a profit. With Brexit and uncertainty, it is important to be efficient enough to be able to survive without subsidy payments. Many have turned to min till to save costs, but have suffered from shallow compaction



Ivan's Maize

pans, caused by sedimentation, wheelings and lack of air, resulting in massive loss of worms, in many, many cases.

This results in slow drainage, sour land and poor yields; we saw it in the 70s & 80s, each year requiring heavier, min till spring-tine cultivators. This led to the introduction of subsoilers to air/ break and lift the soil to improve drainage, etc. With the introduction of the stubble burning ban in the 80s, many tried to go to the plough, but the ground had become so solid, the plough simply could and would not enter the ground on heavier land!

In late May, I visited Bulgaria, where the farms are very large - anything from 2000 to 120,000 ha.

The weather was over 27-35°C and the wheats are now at the milky ripe stage. Our host farm has over 6000ha and they run two Claydon T8 machines. Their cropping comprises wheat, maize and oilseed rape. They have been using Claydon drills for the past four years to establish the wheat and oilseed rape. For maize, they use

the Claydon straw harrow to prepare in front of the Vaderstad Tempo drilling maize direct. The farm has been breaking all previous yield records since the introduction of the Claydon Drills and straw harrows, the only other kit being the Tempo and a Spiral roll.

Why is the farm such a success? On our visit Ivan took us to see some other maize and wheat established with min till. Both crops looked more stressed than those on his farm. The wheat was in poor health with a considerable amount of fusarium, and the maize had variable growth stages, small and large plants. These crops were quite normal for the area, but well below Ivan's standard.

We then went on to see a no-till



Spencer in Ivan's 500ha Maize

farm of several 1000ha. The fields we visited were vast, 100s/ha. Sadly I don't think they will be contributing much to the world maize stocks; you had to look very carefully to spot the rows!

Why were we seeing such a variation in the crops? Why should Ivan's be so much better?

The soils were all very similar but





No till maize showing radish

when we got the spade out it revealed some amazing surprises. The min-till was tight, especially at the depth of tillage, and under that level there was very little activity: poor rooting, dead appearance, no air, no worms and a poor scent. The maize crop also showed wheelings, and it was easy to see it was not happy. The wheat was a similar story, weaker plants and more fusarium.

On the no-till farm the soil was quite tight, but there was a lot more activity. We could not find the cultivator level of compaction and, on the positive side,



No till maize



Mintill maize



Ivan's Claydon osr

we found a number of worms; the soil was in better health, a cover crop of oil radish had been planted in the autumn to improve soil structure, but most of the radish had grown out of the top and only penetrated 50/70mm. Even with this the crop was very poor. There was a distinct lack of tilth on the surface, and the soil was baking out with cracks appearing in the high temperatures.



Abi min till wheat

The soil appeared hard and dry and difficult to dig into.

Returning to Ivan's farm was a real experience. His only cultivation was the straw harrow in the spring, with the optimum tillage produced from the drill's front tine. When we dug into the ground after four years of Claydon what were we going to find? The spade entered more easily, the texture was great, it smelled and looked beautiful, there was good worm

activity, with plenty of humidity/soil moisture. But most importantly the crops roots were much better/stronger and more uniform in the soil. The maize was incredibly healthy following an oil radish cover crop established with the Claydon which had rooted well and even into the ground. The wheats



Mintill wheat with Fusarium and wild Oats

had very little fusarium after following maize and were filling the ears well. The oilseed rape was beyond compare. The value of the front tine, with its optimum tillage, was clear to see: better soil health, better rooting, and higher yielding crops!

Farming is about getting good results. Surviving as a farmer requires us to treat the soil kindly, improving its capability to produce better yields, opening up its true capabilities, in whichever climate we are farming in, and working with mother nature, rather than trying to dictate with "I've got the Power"!



# FARMERS GET TO SEE SKY DRILL IN ACTION AT COLLEGE FARM OPEN DAY

At the recent 4th Sky Roadshow on 22nd May, farmers got to see the Sky's EasyDrill (imported from France by Opico since 2015) in action on a trial site at College Farm, Nr Huntingdon, Cambridgeshire. College Farm combines 100ha of arable with 20ha of grass grazed by the farm's pedigree Suffolk sheep. The trials here are currently into their second year.

Various cropping sequences and cover crops are being trialled and the plan is to emulate the success of the Sky farm, Ferme de la Conillais in Brittany and to show and take potential customers on a journey through actual farming years and growing seasons.

Stephen Briggs, Head of Soil & Water at Innovation for Agriculture, soil specialist, practical farmer and consultant shared his extensive knowledge and experience. Stephen gave much for the farmers attending to think about - from the importance of tracking organic matter to the impact of fungicide and seed dressings on the hugely beneficial mycorrhizae population.

Stephen was followed by FACTS qualified, Joe Redman, OPICO's Sky Drills Product Specialist who shared his knowledge on the benefits of fertilizer placement and how the SKY drill achieves this through large capacity hoppers, 2 separate air circuits and versatility of seed /



fertiliser placement.

Ian Gould, from Oakbank Seeds shared his extensive cover crop experiments and experiences across College Farm. As always there was plenty of interest in the micro clover/ OSR crop, a combination that Ian

had picked up from the Sky trials in France. Both Ian and Steve were able to discuss the impact of cover



crops on soil health ie What happens above the ground determines the soil environment under the ground. A lively, open and honest exchange followed – warts and all!

The next Sky roadshow will be on 18th October 2018. Keep an eye on <http://www.sky-agriculture.co.uk/roadshow> for details. The Sky EasyDrill will also be at Groundswell Agriculture this month.





## UPCOMING EVENTS

26th June 2018	NIAB Cambridge Open Day - Cambridgeshire <a href="http://www.niab.com/shop/civcrm/event/info?reset=1&amp;id=2754">www.niab.com/shop/civcrm/event/info?reset=1&amp;id=2754</a>
27th and 28th June 2018	Groundswell 2018 - Weston, SG4 7AL <a href="http://www.groundswellag.com">www.groundswellag.com</a>
28th June 2018	NIAB TAG Croft Open Day - County Durham <a href="http://www.niab.com/shop/civcrm/event/info?reset=1&amp;id=2762">www.niab.com/shop/civcrm/event/info?reset=1&amp;id=2762</a>
4th July 2018	AHDB Monitor Farm Event - Newton Lodge Farm <a href="https://cereals.ahdb.org.uk/northampton">https://cereals.ahdb.org.uk/northampton</a>
5th July 2018	BASE Member Farm Walk - Richard Watts, Gloucestershire.
6th July 2018	STAR Open Day - Suffolk (Arable rotations, cultivations and soil) <a href="http://www.niab.com/shop/civcrm/event/info?reset=1&amp;id=2824">www.niab.com/shop/civcrm/event/info?reset=1&amp;id=2824</a>
28th August 2018	"Organic conservation agriculture" day - Senarclens VD, Switzerland <a href="http://www.bioactualites.ch/actualites/agenda/calendrier/journee-abc-2018.html">www.bioactualites.ch/actualites/agenda/calendrier/journee-abc-2018.html</a>
4-6th September 2018	Innov Agri - Outarville, France - <a href="http://www.innovagri.com">www.innovagri.com</a>
11th September 2018	SYMPOSIUM "Preserving The Fertility of Agricultural Soils" - Villequier Aumont, France - <a href="http://www.weezevent.com/colloque-de-restitution-sol-d-phy">www.weezevent.com/colloque-de-restitution-sol-d-phy</a>
26th September 2018	Tillage Live - Dunbar - <a href="http://tillage-live.uk.com/">http://tillage-live.uk.com/</a>
18th October 2018	Sky Roadshow at College Farm - <a href="http://www.sky-agriculture.co.uk/roadshows">www.sky-agriculture.co.uk/roadshows</a>
November/December 2018	Future of Farm Thinking Conference - Small Robot Company
5th November 2018	Agri-Tech Week 2018 - save the date
27th November 2018	AHDB Monitor Farm Event - Newton Lodge Farm <a href="https://cereals.ahdb.org.uk/northampton">https://cereals.ahdb.org.uk/northampton</a>
28th/29th November 2018	Croptec 2018 - <a href="http://www.croptecshow.com">www.croptecshow.com</a>
3rd/5th December	BASE-UK hosts Professor Jonathan Lundgren, Bluedasher Farm.
4th/5th December 2018	AHDB Agronomists' Conference - <a href="https://cereals.ahdb.org.uk/events.aspx">https://cereals.ahdb.org.uk/events.aspx</a>
18th December 2018	AHDB Monitor Farm Event - Newton Lodge Farm <a href="https://cereals.ahdb.org.uk/northampton">https://cereals.ahdb.org.uk/northampton</a>
8th to 11th January 2019	2019 National No-Tillage Conference - Indianapolis USA <a href="http://www.no-tillfarmer.com/events/185-2019-national-no-tillage-conference">www.no-tillfarmer.com/events/185-2019-national-no-tillage-conference</a>
22nd January 2019	AHDB Monitor Farm Event - Newton Lodge Farm <a href="https://cereals.ahdb.org.uk/northampton">https://cereals.ahdb.org.uk/northampton</a>
8th and 9th January 2019	Lamma 2019 - NEC - <a href="http://www.lammashow.com/">http://www.lammashow.com/</a>

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# CLASSIFIEDS



£9750 +vat

## HORSCH CO8

Horsch CO8 year 2003 in good condition go straight to work, radar metering, with new seed drive motor recently fitted, full set of blockage sensors, hydraulic markers plus pre em, full set of cleated tyres on packer in good condition. £9750+vnt call 07792049734.



£30,000 +vat

## 6M CLAYDON HYBRID DRILL

Claydon hybrid 6 meter + Font fertilizer tank great condition. Comes with paddle boards and following tines. Bout markers tram line shut off. The drill has been used mainly for drilling OSR for the last four years. lots of spare parts including bean shares and boots a few A shares spreader boots and band boots and some worn leading tines shear bolts etc. Please contact via the Farming Forum - Machinery ID 17969



£22,000 +vat

## CLAYDON HYBRID

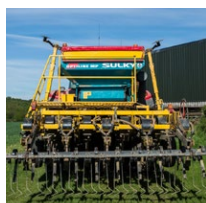
Claydon Hybrid 3m due to change in farming policy (entered countryside stewardship which will involve drilling 80hc+ a year of grass reseed). Had a lot of success with this drill over the last 3 years but sadly difficult to justify when having to pay contractor to drill grass in. In great

condition, owned since new and only done approximately 300 hectares. Auto reset legs so stones are no problem (and we have ALOT of them!) It is a 2014 production, but very late 2014 and only did one demonstration elsewhere before we took ownership and started using spring 2015. Drilled cereals, beans and rape/turnip all with success. 7inch Points/ Coulter's still plenty of life left in them 70% plus, legs probably 50% so still plenty left in them and batter boards probably 50% also. Harrows new last year so plenty left in them.

As shown in photos had a crack in frame after a run in with a huge rut and going to fast but saw it early and welded and braced before any issues and absolutely fine now.

£22000+VAT. Payment must be made before any collection and viewing preferred.

Contact via The Farming Forum - Machinery ID 17671



£11,500 +vat

## CLAYDON 3M SR DRILL 2007

Excellent condition. Carefully looked after by owner /driver since 2010. Stored undercover. This drill was the start of fascinating journey into soil health which has got us to where we are today. Also included is a comprehensive range of spare parts including bean kit , 3 inch spoons , 5 & 7 inch shares ,covering tines. This drill has been used mainly on kind land and has had an easy life . Act quick to be sure of getting extra Brownie points from Mr Gove ! Viewing welcome, sensible offers considered. Price plus VAT Please contact via the Farming Forum - Machinery ID 17815



£28,000 +vat

## WEAVING DRILL GD400M

Weaving GD direct drill 4m folding, 2016, rds Artemis control box, hyd markers, only done 721 ha

Contact via The Farming Forum - Machinery ID 17587



£30,000 +vat

## VADERSTAD RAPID

Vaderstad rapid 400s . All new metal and bearings 750 acres ago, interactive depth control, central tyre packer, great condition. Year 2011, 2500 ha worked .

Call 07712 824850



£68,950 +vat

## DALE DRILLS - 6M DRILL

Year of Manufacture: 2015  
Selling on behalf of customer 6m working width • Grain & fertiliser • Very little use •  
Genuine reason for sale  
Located at our Cirencester Branch  
Available to View Now  
Contact: Mark Horlick - 07810 886573



£7,000 +vat

## DALE SIMBA CONVERSION TINES

Direct drill unfinished project - mounted 3m Accord Metering with Dale heavy duty spring tine Coulters. Spent about £7000 on it and needs a little tinkering to finish off. Heavy Duty bit of kit and cheap entry to direct drilling. Open to offers as just taking up space. Coulters alone cost £3500 for 24.

Contact via The Farming Forum - Machinery ID 16653



£POA

## VADERSTAD - RAPID A 600S DRILL

Year of Manufacture: 2017  
Premium Machine • 2017 Demonstration Machine • IDC • Reinforced tyres • Bout marker • Pre emergence markers • GATEWAY & Isobus • System disc aggressive • E-control HTS • Tramlane kit • Work lights • 3rd row coulters kit • Spare wheel • Available Now  
Stock Number: 10075480  
Location: Wallingford, Oxfordshire  
Contact: Jim Bullen - 07717 681795

**Browse machinery related to Direct Drilling on The Farming Forum's Classifieds**  
**www.thefarmingforum.co.uk**



£POA

#### Mzuri Pro-Til 3T (2017)

Model: Pro-Til 3T  
2017 model, only selling due to upgrading to a Pro-Til 4T  
3 metre trailed format • Dual Tank • Front Pivoting Discs • Slug Pelleter not included • Year of Manufacture: 2017  
Contact Will Davies at Mzuri on 01905 841123  
Hectares drilled to-date: 300 hectares  
For more information, contact Will Davies, Sales Manager at Mzuri, on 07972 704367



£POA

#### Mzuri Pro-Til 3T Drill (2014)

A very tidy owner-operator drill, available due to the customer upgrading to the latest 2018 Pro-Til model.  
3 metre trailed format • Single Tank – Seed Only • Dickey John Seed Monitors • RDS Drill Controls (Variable Rate Unlocked) • Road & Work Lights • Hydraulic Pressure Harrow • GPS Forward Speed • Fixed Front Discs • Tramliner Kit • Pre Emergence Kit • Wide & Narrow Seed Coulters • Wide Press Wheels • Camera Kit • Year of Manufacture: 2014 • Hectares drilled to-date: 364 hectares  
For more information, contact Will Davies, Sales Manager at Mzuri, on 07972 704367



£65,250 +vat

#### DALE 6m Eco L, Ex-Demo, S/N 6335

2017 model • Area Drilled 550ha • Specification • Seed & Fertiliser Capable • Adjustable row spacing - 5"(125mm), 10"(250mm) • Choice of Following Harrow • 3 Ton (wheat) 4200 Litre Hopper • Bout Markers • Electro-Hydraulic Module to Control Bout Markers • RDS Artemis Isocan Control System. • ISOBUS and variable rate ready • Tramliners • Motor Driven, Radar Controlled Accord Metering Units • 6m Working Width (Option to extend) • 1 Seasons Warranty • Complete Spares Kit  
Contact Dale Drills on 01652 653326



£19,800

#### Vaderstad 4 Metre Rapid

Vaderstad 4 Metre Rapid • Year 2008 • Full system disc • 2 Rows of seeding coulters (new discs to be fitted) • Cleated staggered wheels • Rear following harrow • Double pre-em markers • Radar control • Hydraulic fan • Clean & tidy • Well looked after  
Contact Weaving Machinery on 01386 49155



£48,000 +vat

#### Dale 8 Metre Eco Drill

Dale 8 Metre Eco Drill • 2014 • 64 Coulters • Steel press wheels • Hydraulic markers • 4 ton hopper Aprox. • Twin accord metering • RDS Artemis GPS controls • Tramlining • 1/2 Drill shut off • Low HP requirement • Hydraulic fan • Lights • Toolbox • Very little use  
Contact Weaving Machinery on 01386 49155



£50,000 + VAT

#### VADERSTAD RDA600S

Year of Manufacture: 2016  
Contact Mason Kings - Newton Abott - 01626 852140



£36,000 +VAT

#### VADERSTAD RDA400

Year of Manufacture: 2011  
Contact P Tuckwell - Great Dunmow - 01371 875751



£36,000 +VAT

#### VADERSTAD RDA600S

Year of Manufacture: 2009  
Contact Doubleday Group - Spalding - 01406 540261



£21,000 +VAT

#### Sumo DTS 3M Mounted Drill

Year of Manufacture: 2015, 3 meter working width, 9 legs c/w single bean coulters and duet coulters  
Contact JR Firby - York - 01653 628614

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