The Guide To Good Black Grass Stale Seedbeds

An essential checklist to maximise the agronomic benefits
The soil on your farm is your most important asset, providing the foundation for yield and profit. Yield losses attributable to compaction range from 15% to 50% or greater. These losses can be the difference between profit and loss for many crops, so avoiding and correcting compaction is key.

Maintaining good soil structure is vital; key indicators of good soil structure include:

- **Porosity** - to allow easy passage of roots, plus for good air and water storage or movement;

- **Stable aggregates** - to cope with heavy rain, and to resist breakdown or loss by erosion;

- **Good biology** - having adequate levels of organic matter, aerobic conditions and ‘soil life’ including good earthworm numbers;
Drainability - capable of a fast return from saturation to field capacity after high rainfall;

Good crops - high yielding crops develop large root systems which maintain good structure.
Compaction is best spotted when soils are moist to wet. Digging holes will show layers resisting moisture movement, and checking root growth through the profile will show if remediation is needed.

Long term, building roots and organic matter levels through the profile will give a sustainable structure. Removing barriers to water and root movement will allow nature to work most efficiently to provide this.

Having identified a ‘problem layer’ this should be removed by setting a tine just beneath it. Ensure it breaks the layer upwards and apart, leaving fissured columns for roots to grow through and water to pass.
This action maintains the various layers of soil intact, avoiding any risk of bringing up coarser soil (together with buried weed seeds) to the surface. The columns of fissured soil provide support for future traffic, together with root access and drainage channels.

Low rake angle tines with adequate lift height for the depth are best, worked when soils are dry enough to fissure and break apart at the problem depth.

Pre-working to a shallower depth helps to maintain the layers and optimise performance of any deeper loosening tines. A stale seedbed approach can do this effectively as part of the overall cultivations and weed control strategy for the field.
Cultural weed control methods

There are two main ways to control weeds via cultivations. They must be encouraged to grow, then destroyed pre-drilling; or be buried to a depth at which they will not germinate and grow in the crop at all.

1) Min-till / stale seedbed

Keep the weed seeds as close to the surface as possible, and provide them with the correct environment to germinate, emerge, and be killed with glyphosate before the crop is drilled.

2) Plough

Bury all weed seeds to a depth at which they will not germinate.

The ongoing Agrii/Lemken cultivation trials are showing a combination of both to be the most effective measure in combatting black grass.
A correctly set plough will bury high levels of organic matter and all of the weed seeds.

A successful stale seedbed needs the weeds to emerge before spraying with glyphosate.
INTRODUCTION

Where are the weed seeds?

There will always be a stock (bank) of seeds in the soil waiting to germinate and emerge. It is important to understand how cultivations affect that weed seed bank.

- ‘Good’ ploughing scrapes weed seeds from the surface and buries them to a depth at which they will not germinate.

- ‘Shallow’ tillage keeps the weed seeds close to the surface and provides the best environment for rapid germination and emergence before spraying with glyphosate.

- ‘Deeper’ tillage mixes the seeds throughout the soil profile. Some emerge quickly; some are buried too deep to emerge; others germinate but emerge slowly after the glyphosate has been applied.
Distribution of Black Grass Seed

Small black grass plants being ploughed in.

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INTRODUCTION

Is your stale seedbed satisfactory?

Maximise the amount of weed seeds that germinate

Arable fields have a bank of seeds sitting in the soil waiting to geminate. As weeds become increasingly resistant to herbicides, it is important to avoid them emerging in the crop.

A good stale seedbed will provide the perfect environment for the weeds to germinate and emerge, so that they can be sprayed off with glyphosate before the crop is planted.

Care should be taken when applying glyphosate to maximise the control of black grass, such as nozzle selection, forward speed, water volume and dry leaves.

Page 11 shows test strips taken from a block placed on the soil surface to represent a clod of soil, showing the spray pattern and distribution. Top strip is front side of the clod; middle strip is top side of clod; bottom strip is rear side of clod. Agrii are conducting further experiments on this very important area at Stow Longa 2014/15.
Nozzle choice can radically affect glyphosate performance.

1. Low drift, however the droplets are too big, potentially missing the target area.

2. Good droplet range, giving the maximum chance of hitting the target with even coverage of fine leaves.

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What does black grass seed need to grow?

Black grass seeds are like any other grass seed - they need a fine, firm, moist soil to germinate. Therefore, a successful stale seedbed will be prepared just like the seedbed for a grass ley:

- **Fine tilth** - for good soil-to-seed contact.
- **Firm** - to retain the moisture needed for germination.
This is easy to achieve on sandy soils.

It can be more difficult on clay soils. 1 Work shallow. 2 A disc will produce a smaller clod size than a tine. 3 Ensure the surface is level and firm.
Stubble - the chimney which vents moisture into the atmosphere

Nature has developed a highly efficient system to locate and gather moisture from the soil and deliver it to plants growing above the surface. It does so using a large root structure and delivery tube (otherwise know as the ‘stem’ of the plant).

Once the crop has been harvested, the roots and stem continue to work, gathering moisture and ‘venting’ it into the atmosphere.

It is important to break the capillaries as soon as possible, to avoid further loss of moisture from the soil.
Work as close to the combine as possible

Weed seeds will need moisture to germinate. Therefore, moisture must be conserved in the soil.

A shallow cultivation with a disc harrow, immediately after harvest, will break the capillaries (root and stem structure) to prevent further moisture loss from the soil.
Small seeds germinate from a shallow depth. That is why we plant grass seeds as close as possible to the surface of the soil. It is important to keep weed seeds close to the surface as well.

Seeds deeper in the germination zone (up to 7cms) will clearly take longer to germinate and can easily emerge in the following crop which could remain uncontrolled. The objective must be to work shallow, conserve moisture, and achieve a high percentage of weed emergence and destruction with glyphosate before drilling the crop.
A tine disc combination can create surface tilth and remove compaction in one pass. BUT, it will move weed seeds to a depth at which they won’t emerge in time to get glyphosate on them. Such operations should be avoided in high risk fields.

In some conditions, harrowing or straw raking can be enough to encourage a high percentage of weed seeds to germinate. Chopped straw can act as a mulch to provide moisture. Sometimes, greater soil movement will be needed to provide the soil-to-seed contact needed for efficient germination.

Stubble Rake vs Disc Cultivator 2013 and 2014
September/October Black Grass Plants / m²

The soil surface was very dry after harvest at Stow Longa in 2013 and so the light discs and press giving good soil-to-seed contact increased the germination significantly over just a stubble rake. However in 2014 when there was much more moisture just after harvest, the straw rake was adequate.
Roller choice is critical

Growers would always roll a field once drilled with grass seed. The roll crushes surface clods and consolidates the soil around the seeds. Soil-to-seed contact is improved, moisture is drawn to the surface by capillary action, and the seeds are more likely to receive the moisture they need to germinate.

The same principles apply to germinating grass weed seeds.
Press angle changes to achieve more black grass emergence (Stow Longa first flush, Autumn 2014). 72% increase in germination . . .

29 black grass plants per m²

50 black grass plants per m²

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Sharp rings are chosen by many growers as they leave soil ridges which dry out quickly. This helps the subsequent operation, but is no good for producing a stale seedbed. Weed seeds emerge from the troughs but not from the ridges. Viable seeds are left in the ridges and will emerge once the field is properly consolidated after drilling.
A flatter profile roller will provide uniform consolidation and avoid moisture loss from the surface. Weed seeds will emerge across the entire working width. There will be less viable seeds left near the surface to emerge in the growing crop.
In our 2014 stale seedbed trials, all cultivations were done on the 21st of August. Soil moisture at the time of cultivation was low, however some rainfall did occur shortly afterwards (30mm on the 25th). There was very limited rainfall in the successive weeks.
Above :
Weed emergence after 3 weeks (08-09-2014).

Below :
Weed emergence after 6 weeks (01-10-2014).

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Later drilling will help

Black grass is predominately an Autumn germinating weed. A high proportion of seeds will not germinate until early October. In high risk fields, delaying drilling until at least the second half of October has made a huge difference to the overall black grass levels.

The Stow Longa five year cultivation strategy experiment started in 2010 and has stimulated a lot of discussion between agronomists and growers, such as where in the soil profile is the black grass seed distributed, and should the worst fields be ploughed then subsequently min tilled / direct drilled for the next 4 years?
One really important part of the cultural control strategy which has made a huge difference to black grass numbers is the drilling date. This is arguably the largest contributing factor in the battle against black grass.

An example is shown below from the experiment in 2012. Both sides of the cane have had the same cultivation, both drilled with Solstice @350 seeds/m². Both unsprayed with pre-em herbicides because of the very wet conditions, but these strips did have an application of Atlantis + Bipower in March 2103.
Stale seedbed top tips

The Agrii/LEMKEN trials have shown that there are significant differences in effectiveness of stale seedbed according to method and timing. For a good stale seedbed keep these top tips in mind.

1. Prior to harvest identify the high risk fields and prioritise cultivation practices.

2. Avoid uneven consolidation of the soil surface when creating stale seedbeds.

3. Remove flushes of black grass as they emerge rather than one high rate of glyphosate just before drilling - you increase the overall germination of black grass this way, so the seedbank is reduced.

4. Correct application of glyphosate, e.g. nozzles, forward speed, water volume, boom height . . .

5. Be patient! Emergence will occur even in a drier season - it just takes longer.

6. Don’t drill until adequate numbers of black grass have germinated in the worst fields - this could easily be into a mid-October drilling slot.
Use a cultivation strategy that enables you to drill the worst fields last - this of course can be on the wettest ground, so soil structure needs to be good to depth.

If the worst fields have not had high enough germinations of black grass in the Autumn and the seedbed conditions are poor, the Agrii work at Stow Longa has demonstrated that these fields should not then be mauled into cold and wet seedbeds. It is much better to drill in the Spring with the relevant choice of cropping, which at Stow Longa was Spring Wheat.
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