



Widening the window for weed control

Sustainable weed control

Results from the second year of trials using a novel technology to control weeds at harvest has proven to reduce grassweed levels by up to 70%. *CPM* finds out more.

By Charlotte Cunningham

Following success in 2022, a farmer-led project has once again proven the value of controlling yield-robbing weeds at harvest.

The Harvest Weed Seed Control (HWSC) project, led by the British On Farm Innovation Network (BOFIN) in collaboration with NIAB, is based around the Redekop Seed Control Unit (SCU) which can be retrofitted to combines and is claimed to destroy 98% of the weed seed that passes through.

BOFIN founder and Oxfordshire farmer, Tom Allen-Stevens, talked through the latest results in a recent webinar. "We've been looking at harvest weed control in three specific weeds — meadow brome, Italian ryegrass and blackgrass. We know that 98% of the seed that passes through the SCU is controlled — but what we don't know is how much seed is going in at the front of the combine."

Tom says that's all down to how much seed shed there is before harvest, and so the second year of research has specifically looked to capture data on this, as well as continuing to explore the level of weed control that's possible on commercial farms.

To recap on the first year of research,

headline results included 54% retention of blackgrass seed at Adam Driver's farm in Sussex, as well as 60% reduction in Italian ryegrass in winter barley and 44% reduction in spring barley at Ted Holmes' farm in Warwickshire. Results were inconclusive at Jake Freestone's Worcestershire farm.

The second year of research has included the original three farmers and the combine at NIAB's Hinxton site but has been strengthened by bringing in Lincolnshire farm manager Keith Challen who's fitted the SCU to his Fendt Ideal 10.

Clear potential

Building on work that Will Smith carried out in the previous year, John Cussans has headed up NIAB's analysis for the most recent year of trials. He says the potential to fit the SCU to a wide range of combines is clear and the key observation was of a positive, trouble-free user experience.

This positive experience is despite farmers reporting increased fuel usage and engine load when the seed mill was engaged — something which was measured directly on the combine at the NIAB site. "We came up with a figure which was very reproducible and by using the telemetry from our combine we calculated the average increased fuel usage to be around 10%," explains John.

While he says that this is something which should be taken into account, John believes this isn't a significant enough figure to 'colour your opinion' on the value of the technology as a whole and will vary depending on the individual combine.

Turning focus to the research itself, John explains the work has not been focused on proving the efficacy of the SCU, but has

“It's a completely different paradigm for weed control.”

instead looked at the level of control that's possible within the harvest window. "We work on the safe assumption that the seed mill itself is incredibly effective. Almost all weed seeds that go into the mill — we're talking more than 90% — are destroyed.

"We're not repeating work that's already ▶



Data captured by the farmer-led 'Seed Scout' network has proven that meadow brome has the highest seed retention in the ear at harvest, explains Tom Allen-Stevens.



The Redekop SCU is claimed to destroy 98% of the weed seed that passes through it.

► been done in terms of the efficacy of the machine and there's no reason to think UK weed seeds are any different to Australia or America, where the technology has already been proven.

"Essentially, what we've done is go onto farms where the SCU was fitted to commercial combines and set up some static tramline strips where the seed mill was engaged and disengaged. This enabled repeatability and replication on a large field scale."

The research team carried out assessments on density of weeds/m² prior to the SCU being used in the fields in the summer of 2022 to provide a baseline figure, followed by further assessment post-harvest in 2022 and 2023, explains John. "The results showed an immediate improvement when the SCU was engaged, which resulted in statistically significant differences in weed seedling levels in the following crop."

That said, John says it's important to put this into context with the fact that even if the SCU enabled 100% control of seedlings, growers would still have some weed seedlings in the following crop due to seed-bank populations. "The proportion of seedlings in a crop from freshly shed seed compared with a long-term seed-bank really depends on the system — how much mixing of the soil is done by cultivations,



The second year of research showed estimated reductions in weed seedling density of an average of 5% for blackgrass, 40% for Italian ryegrass and up 70% for brome.

rotational sequence etc.

"As the balance of fresh seeds compared with those in the seed-banks changed, we saw two things. Firstly, that where weed populations were high in a crop, a higher effectiveness of the seed mill was observed.

"Secondly, on fields where there was much less cultivation — and therefore less mixing of the seed-bank to bring up older seeds — again, this resulted better effectiveness of the SCU."

Practical translation

In terms of the figures and what this means practically on farm, John explains that seed mill effectiveness was estimated by averaging across all fields and all years where the weed species was observed at sufficient density. "This direct evaluation of effectiveness resulted in estimated reductions in weed seedling density of an average of 5% for blackgrass, 40% for Italian ryegrass and up 70% for brome — which included a mixture of meadow and sterile species.

"These values are performance over the whole system as measured by reduction in following crops — not seed mill efficacy — and are minimum values because they don't account for the seed-bank reservoir."

While further work and incorporating botanical expertise is likely to be required to better understand seed retention and maturity at harvest, John stresses that the results to date highlight the importance of controlling weeds at harvest, alongside existing practices. "This isn't a pseudo-herbicide. Harvest weed seed control — with a seed mill in this case — means capturing seeds which have survived



John Cussans says the SCU technology could contribute significantly to making sustainable grassweed management a reality.

a previous attempt to be controlled. It's a completely different paradigm for weed control.

"If we take another cultural control like delaying drilling for a month, figures show an average of a 40% reduction in blackgrass or Italian ryegrass seed heads. So with the seed mill, we're talking about an equivalent level of control to a practice which has been the mainstay for weed control.

"This in theory means that growers who are already delaying drilling could potentially bolster control by adding an SCU in. But it also opens up the door to growers to challenge how they approach growing crops as a result of weed seed pressure.

"It could be the case in the future that they could change this — which in turn may benefit establishment or yield, for example — by incorporating a harvest weed seed control mechanism instead. As it stands, this technology could contribute significantly to making sustainable grassweed management a reality." ■

Seed Scout results

Having secured funding from Defra delivered through Innovate UK, the most recent year of research also enabled the team to recruit 'Seed Scouts' to collect data on how much weed seed is shed between full ear emergence and when the combine goes in. The reasoning for this was to use the results to hopefully strengthen the use of harvest weed seed control measures, such as the SCU, explains Tom.

A total of 12 farmers from across the country sent in 26 samples for analysis of the grassweed seed count, per head, at harvest. Looking at the averages, in terms of percentage of seed retention in the ear at harvest, the results were:

- Blackgrass – 20-25%
- Italian ryegrass – 40-50%

- Meadow brome – 50%
- Sterile brome – 40%
- Wild oats – 5%

(Sterile brome and wild oats based on small samples)

"Something important to note about this is that there was a large range in the number of seeds per head, with more than 200 seeds of blackgrass in some cases. But it seems that meadow brome is the 'best' at retaining its place."

While the data collected so far provides a useful starting point and is the biggest collection in the UK to date, Tom points out that more is required to be able to draw meaningful conclusions about seed retention at harvest.