

“Bumps make booms wobble.”

How application affects efficacy

Innovation Research Briefing

Every spray droplet counts when it comes to blackgrass control. CPM investigates the effect of application on post-emergence herbicide performance.

By Lucy de la Pasture

Growers with blackgrass need no reminder that it's a costly problem to battle with. No one measure will stop it advancing but efforts on many fronts each make incremental gains. With that in mind, making the most of blackgrass herbicides means squeezing every drop of activity out of them.

It's not just herbicide efficacy that matters, application is just as important, explains Life Scientific UK technical manager, Ruth Stanley. The Dublin-based company brings products to market rapidly when they become off-patent because of its ability to reverse-engineer, a process which pulls apart the formulation of reference products and recreates an identical version.

“Although our aim is to bring off-patent products to the market as quickly as possible, we also want to help growers get the most out of them in the field,” she says.

“Blackgrass control is known to be application sensitive and we felt that not enough application work had been carried out for the Cintac and Niantic (mesosulfuron+ iodosulfuron-methyl) reference products (Pacifica and Atlantis), so we were keen to fund some work to develop better application recommendations,” she comments.

The person charged with the trials work to establish these is well-known specialist Tom Robinson. He believes elements of the work are long overdue.

“I've been asked by growers for Atlantis application advice since it was first launched but there was little proprietary data we could draw on,” he says.

Tom has looked at the spring application of Cintac in field-scale trials at Thurlow Estates and further replicated trials at a site near Peterborough, using both self-propelled and hand-held equipment.

Blackgrass challenge

“The first trial got underway late in the season during March 2018, so it was a challenge to find blackgrass in what had been a good autumn for grassweed control. Having found a site at Thurlow, there wasn't enough blackgrass present to conduct a trial looking at control levels, but we were able to carry out a field trial to investigate spray coverage from four different nozzle types and the effect of different boom heights — 40cm, 50cm and 100cm.”

The nozzles chosen for the trial were the air-induction Guardian Air-05 nozzle, representing a commonly used low drift option; the traditional 110° flat fan-05 to deliver a medium spray quality; a narrower 80° flat fan-05 to deliver higher energy and consequently more penetration of the canopy; and the Defy 3D-05 angled nozzle, placed on the boom to deliver spray on a forward and backward trajectory.

Water-sensitive paper was placed as targets within the crop at GS30 in order to assess spray coverage in both the vertical and horizontal planes and this was measured using the SnapCard app, a digital tool that's freely available for smart

phones, explains Tom.

“We're looking at where the spray is going, and coverage gives a useful insight into this. But it's important to differentiate spray coverage from the actual deposition of the herbicide, which is influenced by factors such as run-off and droplets bouncing off the target,” he explains.

The trials found that boom height had a big influence on the amount of spray getting down to the target, with the two lower boom heights delivering the most, comments Tom.

“The work showed that coverage on the vertical targets doubled at 40cm and 50cm compared with 100cm boom height for all nozzles. But it was the Defy 3D that achieved the best coverage of both front and back vertical surfaces, with two times more coverage than any other nozzle tested.

“Even on the best sprayers it's difficult to keep the boom at a consistent height. Bumps make booms wobble, so it's vital to use a nozzle which operates reliably over the widest range of possible boom heights,



Ruth Stanley says this is the first application work carried out using mesosulfuron+ iodosulfuron-methyl products.

particularly ones that produce a consistent spray pattern at the lower range.

So what does this mean in practice? Quite simply, if there isn't good control of the boom when it's running at 50cm, then you won't get the performance Cintac is capable of, he explains.

Tom also looked at the effect of boom height on spray pattern for each of the four nozzles using a Hypro patterner, using the internationally recognised Julius Kühn Institute (JKI) standard to appraise each nozzle's consistency in performance at different boom heights.

This test really sorted out the differences in the nozzles, he explains. "Using the JKI as a reference, a nozzle needs a coefficient of variation of less than 7% at 50cm, plus 10cm below and above this height to perform reliably in the field.

"The results showed that the Guardian Air and Defy 3D nozzles were the best patterners and were the only two nozzles that met the JKI standard at all the heights tested — 40-100cm," explains Tom.

"The 80° flat fan only produces a good spray pattern at 80cm. It's a bit like a pressure washer — its narrow angle produces a spray with high energy that penetrates well but it doesn't produce a good pattern over the range of boom heights," he comments.

"The 110° flat fan is a bit like a camera lens, it drifts in and out of focus but only delivers the JKI standard over a narrow range of boom heights, most reliably at 50cm," he adds.

The trial using water-sensitive paper was repeated in 2019 using Cintac applied at 0.5kg/ha plus 1.0 l/ha (adjuvant) in 200 l/ha water, using all four nozzle types at a forward speed of 12km/h and a boom height of 50cm. This time blackgrass headcounts were taken to assess the level of blackgrass control, with yield predicted from the results.

"The second trial gave slightly different coverage results with the water-sensitive paper but again the Defy 3D gave the most consistent coverage on the front and back of vertical surfaces," explains Tom.

New application recommendations for Cintac

- Water Volume 200 l/ha
- Nozzle Height: Maximum 50cm above crop
- Forward Speed: 12 km/h (maximum)
- Nozzle Type: Defy 3D (preferred: top performance, least drift, best patterning) 110° fan jet also recommended.

Blackgrass head counts were made in May and showed that all the treatments had provided effective levels of control compared with the untreated control, which had 232 heads/m². There was variation between the levels of blackgrass in the different nozzle treatments with the Guardian Air nozzle having the highest mean count (180/m²) and the Defy 3D the lowest (108/m²).

Financial cost

"Using yield loss and head count data from Dr Stephen Moss we were able to predict yield loss and determine the financial cost of using the different nozzle types to apply Cintac," explains Tom.

While all the treatments had a commercial benefit when predicted yield figures were analysed, using the Defy 3D nozzle gave the highest predicted yield benefit of 1.3t/ha over the control, worth an extra £175.50/ha (with wheat at £135/t).

The 110° flat fan nozzle was marginally lower, giving a yield benefit of 1.2t/ha over the control (worth £162). The 80° flat fan was predicted to give a yield benefit of 1.0t/ha (worth £135) and the Guardian



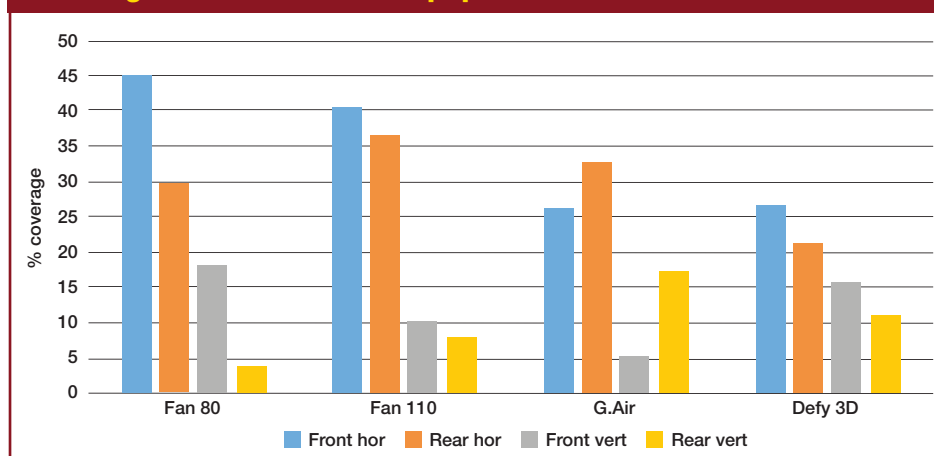
The trials carried out by Tom Robinson show the Defy 3D nozzles will give the best chance of blackgrass control under the widest range of conditions.

Air was predicted to yield worst of all, producing an extra 0.5t/ha (worth £67.50).

"The 110° flat fan and Defy 3D nozzle gave very similar results but the 3D would be my choice," says Tom. "Knowing how good the 3D is at patterning will give more reliable control under a range of different conditions, whereas the 110° will perform well only as long as you can control all the variables."

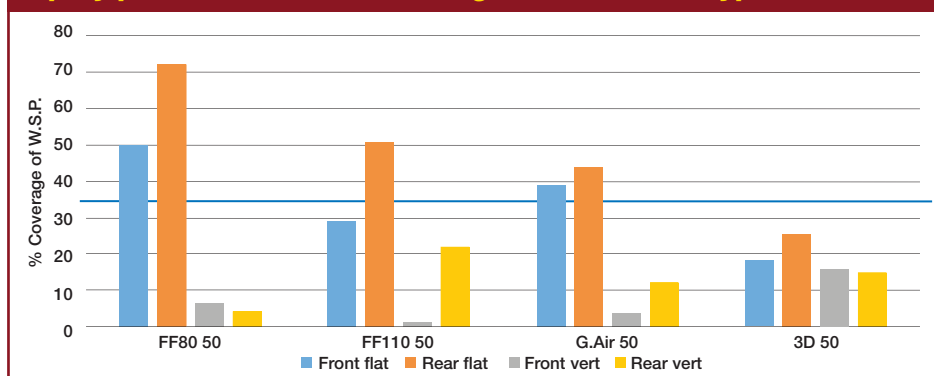
Tom puts that into context saying, "If you ▶

Coverage on water sensitive paper



Source: Life Scientific, 2019

Spray pattern at 50cm boom height for all nozzle types



The solid black line indicates the JKI standard.

Source: Life Scientific, 2019



The pattern produced by each nozzle was assessed at different boom heights using a Hypro Patternator to see how consistent their performance was.

► were a Formula One driver at the beginning of the season then you'd want to drive a Mercedes because you'd have more chance of winning races. The Defy 3D is the Mercedes of the nozzles tested. It won't win all of the time, but it will win more often than the others."

The new trials work may have come at an opportune time given the awkward autumn, which has seen repeated bursts of wet weather forcing Oct-planned drilling to become much later than intended, believes Ruth.

"Even where crop is in the ground, the temptation is to put on a hefty stack of

Research Briefing

To help growers get the best out of technology used in the field, manufacturers continue to invest in R&D at every level, from the lab to extensive field trials. CPM Research Briefings provide not only the findings of recent research, but also an insight into the technology, to ensure a full understanding of how to optimise its use.

CPM would like to thank Life Scientific for sponsoring this Research Briefing and for providing privileged access to staff and material used to help bring it together.

Life Scientific specialises in bringing high quality off-patent crop protection products to

market with the goal of providing customers with better options to meet their plant protection needs.

The company's R&D focus is forward looking as it aims to provide growers and agronomists with innovative formulations and novel combinations of products. At the same time, Life Scientific works hard to support established products through trials, application advice and the most up to date technical data.

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chemistry. But it's so wet in places and under these conditions there's a large potential for crop damage, especially as days get shorter and crop growth slows down.

"While getting pre-emergence herbicides is still a priority, it's a season to be mindful of how much active to put on and post-em's could become of more importance than they've been for the past few seasons. These trials will give confidence that Cintac makes financial sense." ■



Water-sensitive paper was placed in the crop to assess both horizontal and vertical coverage using different nozzle types.

Zero-tolerance approach to blackgrass

Jonathan Drury is manager of the 5000ha Thurlow Estate Farms on the Cambs/Suffolk/Essex border and hosted the Life Scientific trials in 2018. He adopts a zero-tolerance approach to blackgrass but stresses there's no one-hit solution to managing the grassweed, it demands a whole farm strategy employing a range of cultural strategies to support herbicide use.

The cultural foundation to the estate's blackgrass control strategy is a seven-year rotation which must include spring cropping, he explains. Winter wheat precedes winter barley, which is followed by oilseed rape before returning to winter wheat. Next in the rotation is a spring crop which may be peas, linseed or spring barley before returning to winter wheat again, then finally spring beans.

"We use a traffic light system to highlight the level of blackgrass in each field and this dictates our management strategy. For instance we'll drill a hybrid barley in red and amber fields because it's more competitive than conventional varieties and allows us to drill later," he explains.

Drilling date is also dictated by the traffic light system, with red fields the latest to go in. Like growers across the country, wheat drilling has been frustratingly delayed by the wet weather in Oct, but the farm is well equipped to make rapid

progress when conditions are right.

"We make sure no cereal crop is sown without the field receiving glyphosate in the preceding 36 hours. We have two 40m self-propelled sprayers, one runs in front of the three 8m drills and the other follows with a pre-em herbicide," he explains.

The sprayers are fitted with the latest boom technology and have individual nozzle control to minimise any overlaps. Jonathan prefers forward and backward facing Defy 3D nozzles for blackgrass control, using an O6 for pre-em application. Autumn herbicides are applied in water rates from 100-150 l/ha, but he says this will increase to 200 l/ha in the worst areas for blackgrass.

"We're stacking chemistry so would follow Liberator (flufenacet+ DFF) with Crystal (flufenacet+ pendimethalin) in a dry season, targeting the worst blackgrass areas with Avadex (triallate) using maps we've created in Gatekeeper," he explains.

The wet conditions this autumn mean a more careful approach, comments Jonathan. "We need to avoid herbicide damage and part of this is to be consistent with drilling depth. The rain is making things more challenging and we're having to time applications to reduce the likelihood of pre-em's



Jonathan Drury doesn't plan to use post-em herbicides, but he accepts that sometimes the season dictates one may be necessary.

being washed into the rooting zone."

Jonathan doesn't plan to use post-em herbicides which are often less effective and therefore expensive, but he accepts that sometimes the season dictates one may be necessary. Where blackgrass has got away his preferred policy is to burn off the crop and although a drastic measure, he's been impressed with how effective the strategy is, with following crops much cleaner.

"Last year we burned off 5-6ha where blackgrass control had failed. In these fields follow with a spring crop before returning to winter wheat again," he adds.