

Reducing Propyzamide losses to water



What is the problem?

Water destined for drinking water must adhere to the **drinking water standards**; an individual pesticide must not **exceed 0.1µg/l (0.1ppb)**. This is an extremely small amount and can be equated to 1 stem of hay in 111,000 bales or equivalent to a drop of water in ten Olympic size swimming pool.

Herbicides such as **propyzamide** used to control black-grass in oilseed rape are **often detected above the drinking water standard** and some of those herbicides are **difficult to treat by conventional** treatment processes.

Project objective:

Many farmers use clethodim (plus water conditioner) in sequence with propyzamide for black-grass control in oilseed rape.

This project was designed to determine the potential for **reducing propyzamide/carbetamide use by maximising control from clethodim so that potentially lower rates of propyzamide can be used, at least on high leaching risk fields.**

The trial consisted of three main elements:

- 1) Black-grass resistance testing
- 2) Three field trials with Affinity Water
- 3) Black-grass survey of agronomists

Part 1 – Resistance testing

Resistance testing of twenty-seven black-grass seed samples for resistance to **clethodim, pendimethalin and cycloxydim** was carried out. This consisted of 23 samples from fields and four reference samples.

Resistance testing was carried out because clethodim is from a class of herbicides (ACCase inhibitors) very prone to resistance. However, it is much less affected by resistance than similar herbicides (e.g. cycloxydim). So we wanted to see if we could detect resistance and how much it varied between fields, especially in those used for field trials.

Resistance testing results

The results confirmed that **resistance has much less effect on clethodim than on cycloxydim efficacy.**

In addition, there was a lot of variation in resistance test results **between samples from different farms, and fields on the same farm, showing any resistance tests need to be done at the individual field level.**

Interestingly, one field trial sample showed relatively high resistance in the resistance test but efficacy in the field trial was still good – a very positive result.

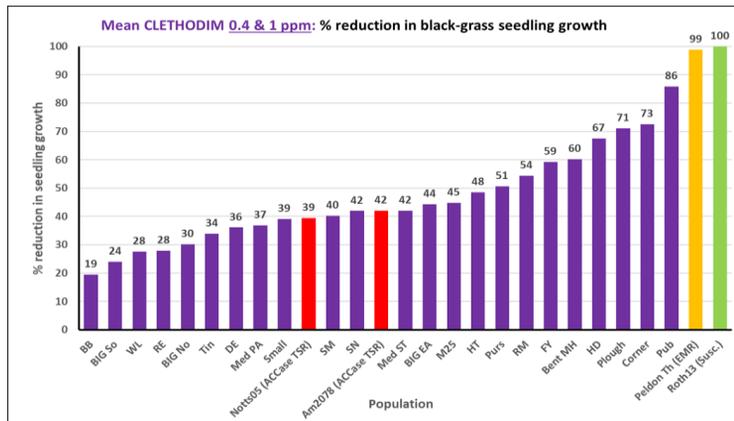


Figure 1- Clethodim 0.4 & 1 ppm combined: accessions in order from most resistant (at left) to most susceptible (at right). Reference accessions in red, orange and green.

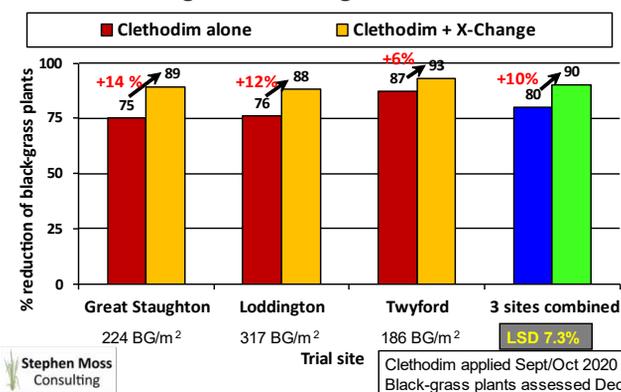
Part 2- Field trials

Three oilseed rape field trials were carried out to test **14 different herbicide treatments** for black-grass control. Individual plots were 3 m wide and 12m (Loddington & Great Staughton, 24 m tramlines) or 9 m (Twyford, 36 m tramlines) long. There were four replicates of 14 treatments in randomised blocks.

What did the field trials show?

- Use of a water conditioner increased the efficacy of clethodim by an average of **10% across all sites**.
- **Clethodim alone** gave good control (**75 – 87%**) of black-grass at all sites, despite relatively high black-grass populations.
- Similarly, **propyzamide applied alone** also substantially reduced black-grass populations at both sites and, as expected, increasing dose resulted in lower weed populations.

Effect of water conditioner (X-Change) on efficacy of clethodim against black-grass in OSR



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What about the herbicide sequences?

- Although propyzamide and clethodim used alone gave good control of black-grass, the **sequences were even better, giving very good control at both sites.**
- There was **no evidence that the higher dose of propyzamide gave more benefit in the sequence with clethodim; 500 g/ha gave similarly good control as 850 g/ha at both sites.**

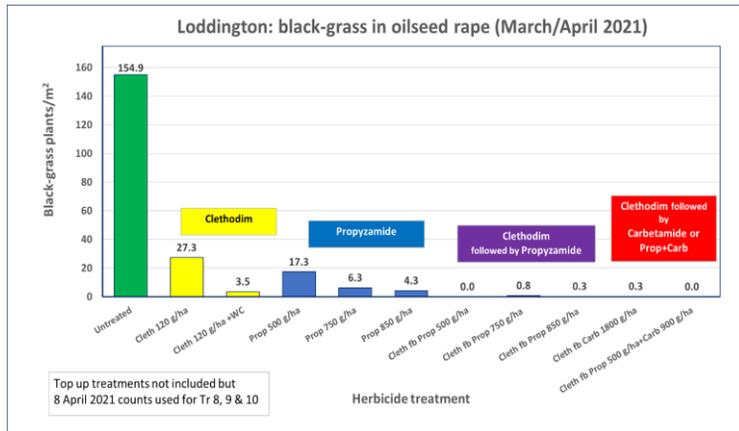


Figure 2. Loddington: black-grass populations March 2021 (SE ± = 5.76, LSD (P<0.05) = 16.51)

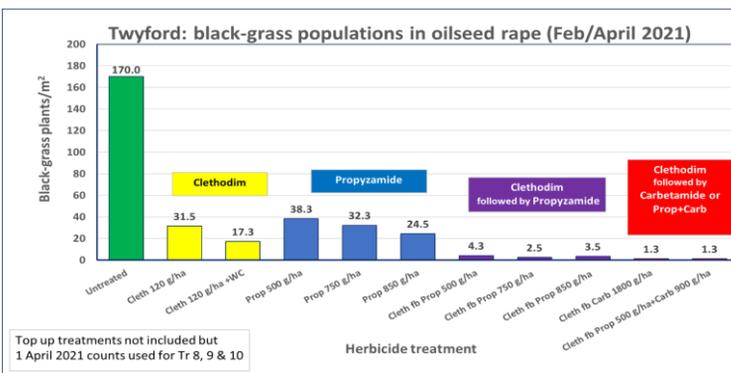


Figure 3. Twyford: black-grass populations Feb/April 2021 (SE ± = 5.06, LSD (P<0.05) = 14.49)

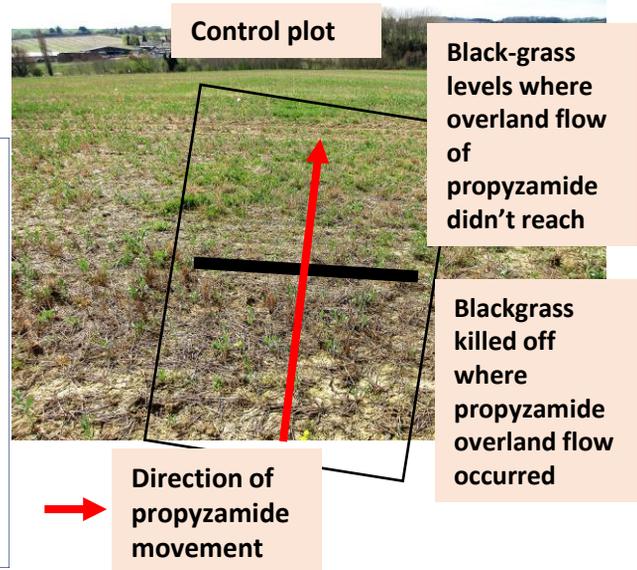
Farmer comments:

Phil Jarvis, Farm Manager at Loddington and Head of Voluntary Initiative said:

'We've seen Propyzamide is highly mobile and we need to make sure we keep it in the field, controlling weeds. As farmers we have to start with an IPM approach around rotations, cultivation strategies and field specific management. The timing, sequences and prevailing weather conditions, mean our oilseed rape herbicide strategies have to take into account their environmental impacts as well as effective weed control.'

Unexpected finding- overland flow of propyzamide

Some trial plots showed **substantial lateral movement of propyzamide**, either surface or sub-surface, due to the slightly sloping site. **One trial was 'lost' because of this movement.**



Key takeaway findings from the trial

1. Both **clethodim and propyzamide** alone give good black-grass control, although it is not recommended to us clethodim on its own from a resistance management perspective and they **work better when used in sequence, as is commonly done.**
2. Using a **water conditioner with clethodim, regardless of water hardness** can improve its efficacy by an **average of 10%.**
3. **Lower rates of propyzamide, used in sequence with clethodim** can give very good black-grass control, **comparable to higher rates of propyzamide**
4. **Propyzamide can be lost from the field by overland flow** so measures to reduce overland flow such as putting buffer strips in place next to watercourses, disrupting tramlines to slow the flow can help to reduce this risk.

Farmer comments:

Nick Philp who farms land close to the Twyford Brook said, *"I think the positives we took from the trial are that you can get the required 90 to 100% blackgrass control with a sequence of 1t/ha Clethodim and reduced rate 1t of propyzamide. The negative results we found that you still need to use propyzamide for effective blackgrass control, and cannot rely on Clethodim alone"*.



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