

“The reality is, if we’re not careful with products, we’ll break them.”

Emerging from the shadows

Technical Research Briefing

Though it’s spent many years in the shadows, the loss of chlorothalonil has arguably thrust folpet into the spotlight as an alternative solution and new research shows it may be more effective than previously given credit for. *CPM* finds out more.

By Charlotte Cunningham

As resistance to single-site fungicides continues to wreak havoc with curative strategies and diminish the protectant activity of existing chemistry, formulating a crop protection programme that encompasses a diverse range of active ingredients has become a fundamental part of ensuring disease control programmes offer effective, long-term protectant activity on septoria.

One of the main elements in such programmes are multi-site fungicides, and as the UK begins to emerge from its period of mourning following the loss of chlorothalonil (CTL), it’s time for many to seek a new tool to help battle key cereal diseases.

Though folpet has been available to growers for a number of years, CTL had traditionally dominated the market, meaning it’s likely that many will have never experienced the benefits of products such as Adama’s folpet-based product Arizona.

Key drivers

And it’s this notion which has been one of the key drivers behind some new ADAS research into the efficacy and usage of the multi-site fungicide. “Folpet has perhaps been unfairly dismissed in recent years, largely because it was a little more expensive and a little less effective than CTL,” explains ADAS’ Jonathan Blake, who has headed up some of the most recent trial work. “CTL provided growers with a six to eight-fold return on investment, so it was an easy choice. Now it’s gone, the comparison is null and void, and actually folpet can be a very cost-effective addition to a programme — in trials last year, it provided around a two-fold return on investment, despite 2020 being a low pressure season.”

But before delving into the detail and results from the trials, it’s essential to understand the current outlook that UK growers face, points out Andy Bailey, technical specialist at Adama. “In wheat, the continued reduction in the efficacy of triazoles against septoria is further complicated by the decreasing sensitivity of an increasing number of septoria strains to azoles and SDHIs: only BASF’s new isopropanol-azole fungicide, Revysol

(mefentrifluconazole), offers effective curative action against septoria.

“However, as this is a single site active, it too is at potential risk of resistance and therefore needs to be protected to ensure its long-term efficacy. AHDB fungicide performance trials have shown that between 2001-2019, there’s been a continued reduction in triazole efficacy and Rothamsted Research studies have also showed a decreasing population sensitivity to azole and SDHI fungicides (for septoria control) — so it’s a real challenge.”

In barley, the position is slightly more favourable although the erosion in efficacy of azoles, along with SDHI sensitivity shifts and



CTL was a multi-site that provided good efficacy, but Andy Bailey is confident that folpet can provide similarly good control.



some resistance to strobilurin chemistry, means diseases such as ramularia and net blotch are becoming increasingly difficult to control, he adds.

As 2021 will be the first full year cereal growers have had to protect their crops without the protectant benefit of CTL, it's important to build a robust programme on a field-by-field and variety-by-variety basis, Andy continues. "In my opinion, there are three main elements of future-proofing control. These are an integrated approach to disease management, keeping ahead of disease, and maximising the use of multi-site chemistry."

And to prove just how beneficial these multi-sites can be, in 2019 ADAS conducted a series of trials which looked at modelling the value of folpet in

resistance management.

Previous modelling studies carried out by Rothamsted looked at the time taken for septoria to build resistance to high-risk fungicide, epoxiconazole. This showed that folpet doubled the life expectancy of the azole (from eight to 16 years), so the new research looked specifically at prothioconazole and fluxapyroxad.

"The objective was to track the number of seasons a fungicide gives effective control," explains Jonathan. "The effective control threshold was set as 'no more than 5% loss of a healthy green leaf area duration of the upper leaf canopy'."

The studies looked at the relative impact on effective life and assumed that full rate fluxapyroxad alone remained ▶

Hope for ramularia-stricken barley growers

It's not just on wheat and for septoria control where multi-sites can make a difference — they also play a huge role in controlling ramularia in barley. "CTL was the most effective option for barley growers, and so we now have a huge gap to fill — which makes things somewhat more difficult for growers," explains Andy. "I appreciate that products such as Revysol have activity, but ramularia is an extremely aggressive disease and has a habit of breaking chemistry almost quicker than septoria."

That said, control and efficacy from wherever growers can get it will be essential this year, he adds. "Folpet certainly has an effect and we've been able to prove that adding folpet partner products at T2 can provide ramularia protection. We've also seen an improvement in control from a programmed approach — adding folpet to partner at a dose rate of 0.75 l/ha at T1, and at least 1 l/ha at T2."

Going forward, Andy says the team are keen to explore the disease further. "I think even leading experts would say we don't



fully understand ramularia and its interactions with both the crop and climatic conditions, and the effects on disease expression, but I think it's really interesting to see that a programmed approach really does boost efficacy.

"Of course, we don't yet fully understand why the earlier application is helping — perhaps it's stopping earlier breakouts — but this is something we'll definitely be doing more work on.

"If we don't do something now, and we aren't careful with products, the reality is that we'll break them. While there's much to be uncovered, what we can be certain of now is that extending chemistry mixes as part of resistance management is going to help prevent this for as long as possible."



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Folpet has perhaps been unfairly dismissed in recent years, believes Jonathan Blake.

► effective for an average of seven years, however, mixing with a full rate of folpet doubled that effective life, he adds. “The duration of that effective life is related directly to the rate of folpet.

“In general, the higher the folpet dose, the greater the extension to effective life and the delay in resistance development.”

As well as investigating what to use folpet with, recent work has also looked at how best to use it in programmes, explains Andy. “Looking at the basics, folpet can only be used at a maximum of 3 l/ha per crop — and at a maximum single dose rate of 1.5 l/ha.

“We know from historical work that folpet also works best at T1, however, we wanted to see if there was a difference in protection when wheat crops were covered at all key timings — T0, T1 and T2.



One of the trials compared the effects of leading products Ascra and Revystar XE alone, and when used with Arizona.

“So we did some research, looking at whether it would be more effective to split applications between T1/T2 — which is the traditional recommendation — or would it be better to go at a lower dose for each timing?”

The trials focused specifically on high-risk situations – applying 1 l/ha at all three timings – and compared it with application at just T1/T2. “The results were really encouraging, and we found a great response with highly susceptible varieties — which subsequently performed the best after three equal applications,” says Andy.

“I think this really all comes down to getting in earlier with that control element, so these results could be a good justification for going in with a T0 — though there are other factors to consider such as variety, drilling date, location, disease levels, the weather and which partner product it’s used with.

“Obviously, we know the T1 application is most effective, but this could give some flexibility and additional protection for those in high-risk settings.”

Counter arguments

According to Jonathan, one of the main counter arguments he sees is increasing the rate of an SDHI, rather than including a more expensive multi-site, however, the trials showed just how much difference products like Arizona can make. “One of the trials was carried out in a low disease season on a crop of KWS Kerrin in Hereford, and looked at dose responses using leading products Ascra (bixafen+ fluopyram+ prothioconazole) or Revystar XE (fluxapyroxad+ mefentrifluconazole) alone, compared with the same products used in combination with 1.5 l/ha of Arizona.

“Even though the conditions weren’t particularly conducive for septoria, we still saw that it was more cost effective to include the Arizona rather than just increase the rate of SDHI/azole. In a nutshell, we were able to reach a level of control above what an SDHI could achieve on its own.”

In a three-spray programme, the inclusion of Arizona also proved to deliver the best yield on high-risk varieties. “This was proven in a trial using LG Skyscraper, alongside a programme comprising Proline (prothioconazole), Elatus Era (benzovindiflupyr + prothioconazole) /Aviator (bixafen + prothioconazole) and Revystar/Ascra — with the highest MOFC coming in at £60 where 3x 1 l/ha of Arizona was applied,” explains Andy.

When CTL was on the scene, the use of Arizona was only really recommended at 1.5 l/ha at T1 and T2, so what’s changed?



In a three-spray programme, the inclusion of Arizona also proved to deliver the best yield on high-risk varieties.

“It’s important to remember that CTL was a very good product and it largely dominated the multi-site market, so we had to compete with its efficacy and were able to do so by recommending higher rates,” adds Andy.

“But chlorothalonil is gone, and we have to move on from that and realise there’s still a very high level of control that can be realised with folpet and products like Arizona. This is why we’ve invested in the research to show that actually there is some flexibility in usage, and we wanted to provide some clear guidance on how it can compete and still give growers the good level of control that they’d become accustomed to.”

Jonathan says that the trials have shown there are clear economic and risk management benefits of using folpet. “From an economic point of view, there appears to be a clear return on investment, but for me it’s the risk and resistance management that is the real advantage. While we don’t know how much protection SDHIs and azoles will continue to give in the future, we do know that folpet is unlikely to change, so it adds an extra element of security to what we do.

“And from a resistance management point of view, the basic principle is that if you apply a multi-site, you’ll extend the life of effective, newer chemistry — but there has to be an economic case for their usage. However, I believe folpet ticks all the boxes.”

So as growers feel their way into control without CTL — and in light of the new evidence that’s emerged regarding folpet — what’s the advice for the season ahead? “In my view, the most important thing this year is ensuring you keep a multi-site within your

programme,” says Andy. “CTL was a multi-site that provided good efficacy, but we can be confident that folpet can provide similarly good control.

“It’s also important to remember that it’s not a curative product and has to be applied before disease is present, so timing is key.”

When formulating programmes, Andy says it’s also crucial to keep resistance management in mind. “One of the main things that concerns me is that while there are new products coming onto the market, almost all of them are single site modes of action. While there’s no doubt they’re going to be highly effective, the issue is that as soon as you start using them, the resistance clock starts ticking.

“While diversity in any programme is essential, multi-site products are much lower risk, and including them can help prolong the life span of other chemistry.

“The key bonus of multi-sites is that their efficacy won’t erode over time — unlike many of the single site products — and while resistance is a difficult thing to sell, if you’re achieving efficacy, you’re also helping to promote better product protection which can only be a good thing for the industry as a whole.

“Multi-sites have to deliver efficacy

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and a return, but I think we’ve been able to show in these trials that Arizona/folpet can do just that.”

Food for thought

While this new research will no doubt give growers some food for thought, what can we expect to see next from folpet? “On the wheat front, we’re certainly planning on doing more work looking at varietal interaction — specifically using folpet in partner programmes and observing varietal interactions on the same site.

“We’ve seen some really positive results so far, particularly on the more susceptible varieties, which indicates that folpet really can contribute to that increased control.

“When it comes to preventing against disease on farm, varietal resistance is clearly part of the solution, but it isn’t a silver bullet,



The studies predict that full rate fluxapyroxad alone remains effective for an average of seven years, however, mixing with a full rate of folpet can double that effective life.

so I think it’s really important that we explore the role that chemistry — and cultural controls — can play when it comes to supporting the end goal of reduced disease levels.” ■



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