

How ferric phosphate became a biocontrol success



Slugs

As wet conditions push slug pressure into the red, many will unknowingly be reaching for a biological control to protect their broadacre crops. *CPM* explores the evolution of ferric phosphate into the reliable crop protection product it is today.

By Rob Jones

A revised national action plan for pesticides is due from DEFRA imminently and will set out how plant protection products (PPPs) will be used over the next five years.

While details are yet to be revealed, it's not expected to include arbitrary targets on overall use reductions, but instead centre around increasing the uptake of IPM. This means growers will have to increasingly justify their use of PPPs and seek to exhaust all non-chemical controls before reaching for a can of a conventional chemically-synthesised product.

For some, the very word biocontrol — which can be defined as biologically-derived substances that have a low impact on the environment — brings with it an immediate sense of apathy. Whereas this has been justified in some cases as biologicals haven't always done 'what

it says on the tin', there are some shining examples of them becoming like-for-like replacements.

One is ferric phosphate molluscicides, which for a long time were seen as much less effective than conventional baits based on active substances metaldehyde and methiocarb.

Ferric phosphate

A collaboration between German ferric phosphate pellet pioneer Neudorff and UK marketing company Certis Belchim, brought ferric phosphate molluscicides to the UK in 2005 and changed perceptions through clever product development and grower education.

Certis Belchim's Morley Benson has been supporting UK growers in their use of ferric phosphate pellets from the start and says it's been a long journey to today when all growers are content with performance.

"The Metaldehyde Stewardship Group was set up in 2008 to promote slug pellet best practice across the supply chain, with the ultimate aim of reducing the drinking water limit exceedances that eventually led to its demise in March 2022.

"Over those 14 years, we had to engage with growers, agronomists and wider stakeholders, and show them a completely new concept in slug control with a different mode of action to anything they'd used before," he explains.

This successful introduction relied on there being an effective product in the first place, and Neudorff's development agronomist Peter Baumjohann says ferric phosphate was originally designed

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for hobby gardeners.

The demand was for a pet-safe molluscicide, and with ferric phosphate commonly found in food products, it fitted the bill perfectly with the first registration ▶



Peter Baumjohann says ferric phosphate is suitable for use at a range of temperatures, from early-sown OSR, to late-sown November wheat.

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Successor product SluXX HP was introduced in 2015, having changed colour from pale green to a more visible blue.

► in Germany for a 1% ferric phosphate bait in 1997.

Certis Belchim brought this same formulation to the horticultural market in 2005, but Peter says because of its high use rates of 12-25kg/ha, it wasn't economically viable for broadacre crops.

"That was why we developed the first 3% pasta-based ferric phosphate formulation SluXX, which is applied at 5-7kg/ha and much more competitive on price," he says.

With the UK the biggest market for molluscicides in Europe, and use in cereals and oilseed rape a sizeable chunk of that, it opened up an opportunity for growth, but growers still had to be convinced that it worked.

Peter says the firm carried out almost 200 efficacy trials across Europe, which always compared their ferric phosphate baits with metaldehyde pellets, with the data showing comparable control of all species of slug.

Ferric phosphate even outperformed metaldehyde at low temperatures, making it equally suited for use in early-sown OSR drilled in temperatures of 25-30°C, and late-sown wheat in November with lows of 5°C.

However, the key barrier to adoption has been the difference in modes of action between ferric phosphate and metaldehyde. Having consumed metaldehyde, slugs die quickly and will often produce excess slime on the soil surface, showing it's done

its intended job across the treated area.

"With ferric phosphate, the trick is to get enough active substance into the cells in two key parts of the slug — first the crop and second the hepatopancreas, or digestive organ," explains Peter.

Slug mortality

"When the active substance gets into the crop, there's an immediate feeding stop but it then takes some time to reach the hepatopancreas and kill it. This is just long enough for them to retreat into the soil before dying."

Peter adds that an investigation at Harper Adams University, where researchers placed radio transmitters into slugs treated with ferric phosphate, proved the mortality scenario with visible tracking data.

"It was great to have the evidence to say that once the slugs disappear after ingesting ferric phosphate, they're unable to feed or lay eggs any longer and do eventually die. The whole lifecycle is disrupted."

Development of ferric phosphate pellets didn't stop with the pasta-based formulation of SluXX. New improved successor SluXX HP (high performance) was introduced in 2015 with a number of upgrades, including a change of colour from pale green to a more visible blue.

The production process was tweaked so the pellets were air dried over a long period of time to leave fewer micropores, making water ingress a much slower process. Along with the addition of a food-grade anti-moulding agent, this significantly increased the durability of the bait, while the use of an EDDS chelating agent, instead of the more common EDTA, keeps SluXX HP pellets efficacious for longer in the wet. These features have made it a key snail control product in the rice paddies of Japan.

Peter says the company has

tested many potential attractants to draw slugs to the pellet, but haven't found scientific evidence of a benefit, so opted out of including one in the formulation. "Attractants are a good marketing story, but as we know, slugs can smell only from a very limited distance so our philosophy has been to focus on producing a very palatable bait made from durum wheat flour.

"The product also has to provide a high number of baiting points/m² to increase the chances of the slugs finding a pellet, with SluXX HP providing about 60/m² at the 7kg/ha rate," explains Peter.

More recently, Certis Belchim introduced Menorex, which is the only mini ferric phosphate product on the market. It provides significantly more baiting points than SluXX HP at 94/m² and is ideal for use early in the OSR season.

Same formulation

The company's arable portfolio manager Kate Downes says the formulation is identical to its standard sized sibling and is a good example of how the collaboration between Certis Belchim and Neudorff has built confidence in ferric phosphate.

"We've listened to what growers wanted and developed both the formulation and product offering to ensure slug control is as effective and flexible as it was with methiocarb and metaldehyde," she adds.

Morley says the long process of metaldehyde stewardship leading up to its eventual withdrawal provided the perfect vehicle to drive people to try ferric phosphate while the comfort blanket of metaldehyde pellets remained.

Along with incentives from water companies in high-risk catchments, early adopters used SluXX HP side-by-side with metaldehyde and could see the crop was protected adequately under both treatments.

Other tools to educate growers on ferric phosphate use and improve uptake of the biorational product included speaking at IPM conferences, offering slug masterclasses in conjunction with BASIS, and even demonstrating caged arena trials at the Cereals Event.

"The very wet year of 2012 was also a turning point, as many growers ran out of legal applications of other products and were forced to use ferric phosphate, sourcing more product on to farm," says Morley.

With no buffer zone for watercourses and no harvest interval, there are no human or environmental concerns associated with its use. However, as well as ensuring PPPs are kept within the target area, good application

is vital for efficacy and control slips where applicators are incorrectly set up or calibrated.

Kate says the Certis Belchim Calibration Wizard, which was developed in conjunction with application experts SCS, is a recent addition to the company's slug control toolbox which helps operators to fine tune applicator settings.

The web app can be accessed on a computer or smartphone, and users select the pellet type, model of applicator, spreading width and target application rate they require. It then shows applicator aperture settings for different forward speeds, as well as showing the number of baiting points that will be on the ground.

"Growers have completed a significant mindset shift in adopting the product's mode of action and we've encouraged



According to Kate Downes, Menorex provides more baiting points than SluXX HP and is ideal for use early in the OSR season.

a continuation of the importance of best practice application started under metaldehyde stewardship," Kate concludes. ■

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