



techtalk

Effective desiccation

Certis Belchim combines the strengths of two well-established businesses focused on investing in potatoes throughout the crop lifecycle, with the aim of achieving and protecting greater yields and quality through innovative and sustainable crop protection products with high-end technical support.



Patience always pays

Over the past couple of seasons it's been a steep learning curve as the industry gets to grips with desiccation in the post-diquat era. *CPM* gets the gen on how to use PPOs to best effect.

By Lucy de la Pasture

Desiccation is one of the most important processes in potato production. Get it wrong and the price is paid in loss of marketable yield and potential problems during harvesting and storage.

With the PPOs now the only chemical option remaining, planning desiccation strategies has never been more necessary. To plan effectively it's important to know how the chemistry is working so that it can be used to achieve the best results. And that means also understanding the factors that may make the job more difficult.

James Cheesman of Certis Bechim has been working with

the PPOs for a long time, both as an agronomist and latterly in his technical role at the company. He talks through the essentials to ensure desiccation success at the business end of the season.

What makes a good desiccant?

One of the main purposes of desiccation is to 'stop' the crop so that marketable yield is maximised by preventing a fraction of tubers from becoming oversize. But although tuber size is a major consideration, desiccation also aids stolon detachment from the tubers — essential for ease of harvesting — and enhances skin set, which

is of particular importance for tubers going into store.

Speed of kill is an important quality of a good desiccant, something that both sulphuric acid and diquat were renowned for. Rapid haulm removal is the most effective way of stopping tubers from bulking and reducing the threat from late blight. However, the PPOs work in a different way and their efficacy on leaves is lower than with previous options, resulting in a slower speed of kill. This means it's important to monitor crops and plan desiccation programmes, working backwards from the ideal date of lifting to allow for the extra time that's required using all PPO or flail and spray strategies.

How do PPOs work?

PPOs inhibit an enzyme called protoporphyrinogen oxidase in the chloroplasts within the leaf of the potato plant. The role of this enzyme is to facilitate the conversion of protoporphyrinogen IX to protoporphyrin, which is a precursor for production of chlorophyll. So one of the actions of PPOs is to interrupt photosynthesis, but there are additional indirect effects that are destructive to plant tissues.

The application of PPO

“ Planning and patience are the key to effective desiccation using PPOs. ”

inhibitors also results in the production of damaging free radicals which disrupt cell membranes and cause leakage of cell fluids, leading to desiccation.

Visually the symptoms seen in



James Cheesman warns not to 'chase crops' at lifting time as patience pays dividends.



in older leaves. However, the hormone cascade has already been triggered which causes the plant to start to shut down.

Blocking the PPO enzyme pathway causes a build-up of ethylene in the plant, triggering senescence — seen as yellowing of the leaf tissues which is followed by browning, sometimes surrounded by a reddish ring.

PPOs also cause an upregulation of abscisic acid which causes leaves to drop and stolons to detach from the tubers, aiding harvesting.

What factors influence this?

One of the big influences on the efficacy of PPOs is the weather. Because one of the effects of the PPO inhibitors is to cause leakage of the cell contents, warm weather enhances their effect as the plant is actively growing. Application on overcast or cool days slows down the desiccation process.

leaves after PPO application also differ from the rapid effects seen with now obsolete desiccants, such as diquat. These are much slower to appear, particularly



Nitrogen should be tailored so that crops start to senesce just before the desired desiccation timing.

As well as temperature, high light intensity helps get the best out of this group of chemistry. While a bright sunny day is ideal, the time of application is also influential — with Belchim trials in Belgium indicating the best window is between 10am and mid-afternoon, when the sun is at its most powerful during the day.

Because PPOs don't move in the plant, good coverage is the key to good activity. That means nozzle selection should be

considered to give the best deposition of spray on the leaf and a minimum water volume of 300 l/ha is necessary, with higher volumes giving the best results.

There are also a lot of agronomic factors which influence the effectiveness of PPO applications. These include variety — whether a determinate or indeterminate growth habit, whether the crop is senescing, physiological age of the seed, nitrogen management and soil ▶

Meeting the challenge

There's been no shortage of challenges since the loss of diquat, according to Richard Tressider of Agrovista. He looks after potatoes in the south of Cornwall, with varieties including Casablanca, Wilja, Sagitta, Eurostar, Markies and Caberet.

"Diquat was really the answer to desiccation in a can. It was very effective at opening up the canopy and to be honest, I miss it."

Richard is far from alone with that sentiment and, like the rest of the industry, has been finding the best way to tackle desiccation for his growers. With very few employing a flail in his region, that means PPOs have now become his mainstay.

"The number of applications needed really depends on the vigour of the crop but a full dose of one of the PPOs gets the ball rolling, with a follow up application 7-10 days later. If the crop is starting to senesce at the first application, then two sprays are usually enough to do the job," he says.

PPOs have been around for a long time and typically were used to desiccate the stems once diquat had

opened up the canopy, says Richard. "But you don't get the leaf 'blow off' effect with PPOs so their action isn't as visible as diquat. We also have to rely much more on the weather to get the best results so we try and apply on warm, bright days if we can.

"Maintaining blight control during the desiccation process is also important, right up to the point of death," he adds.

The biggest difference has been in mindset, in particular understanding why it's necessary to start the desiccation process earlier and why including a blight fungicide has become even more important, says Richard. He also believes close communication between grower and agronomist is crucial.

"I do a lot of sizing and yield monitoring with my growers so that we're talking about the market requirements and where the crop is at. That means we're well prepared to start desiccation earlier than we were used to because PPOs aren't as quick to act, and we can't afford to let tubers get oversize."

Tailoring nitrogen to the crop

requirements is something Richard works closely with growers on. "This year, more than ever, there's a keen interest in not overapplying nitrogen. We want to be sure we don't starve the crop but don't want to overfeed so that we're dealing with oversize tubers and a crop that stays green until Christmas.

"Nitrogen manipulation is paramount so that the nutrient package is put together to allow for natural senescence," he adds.

When the crop is vigorous at the time of first application, Richard says it can be a bit of a cringe moment. "This is when weather conditions can really help but I still find myself praying the second application will help the process."

Richard recommends PPOs are applied in a minimum of 300 l/ha and says many of his growers also have vegetable crops so are proactive at maintaining high water volumes. "Good coverage is key and water volumes of 100 l/ha won't cut the mustard for desiccation."

In his previous role Richard was a spray operator so he's acutely aware of



Paying close attention to application is the recipe for success for Richard Tressider and he cites weather conditions, water volume and nozzle selection as important considerations.

the difference good application can make. "I'm a fan of Guardian Air nozzles and with copious water volumes these really do give good spray distribution. We all know that flat fans probably give the best coverage but spray days when these can be used are very limited in Cornwall."

He summarises by emphasising that planning is the key when it comes to desiccation. "You have to be on the ball and discuss where the crops are at because timing is of the essence when using PPOs."

Effective desiccation: top tips

- **Plan ahead** – start to consider desiccation before the crop is even planted so that the strategy is matched to the variety and nutrition is tailored accordingly
- **Be canny with application** – take into account weather, with warm and bright conditions giving the best results. Good coverage is crucial
- **Patience pays** – whether it's finding the best spray window or allowing time for PPOs to work in time for lifting

► type. Region and weather conditions following application can also be influential, particularly if rain follows application after a dry growing season.



Salad crops can be hard to stop and because tuber size is crucial, close monitoring and pre-planning is required.



Because the PPOs take longer to burn off the foliage in an all-chemical regime, the first spray should be applied 'earlier' so that tubers don't go oversize.

How can flailing help?

Flailing has become a popular option to rapidly remove the haulm and, for many growers, it has replaced diquat where it was used to 'open up' the crop to gain access to the stems for subsequent spray application, which was often a PPO. It's particularly useful in 'hard to stop' crops, such as those grown for seed or salad potatoes which have to be burnt off before they start to senesce naturally.

Done well, flailing provides immediate removal of the foliage but, if the haulm is deposited on the stems rather than in between the ridges, the debris can hinder subsequent spray application. For this reason it's crucial to avoid this. It's also important that flailing doesn't overly stress the crop because this can result in vascular browning.

The past two autumns have provided good conditions for the flail but there are times when ground conditions don't allow entry or soil type prohibits its use. In these situations it may become necessary to use a chemical only approach, which may require multiple applications to achieve complete desiccation of leaves and stems, so flexibility is key. If delayed with the flail because of the weather, it may be useful to apply a dose of PPO to stop tubers from going oversize to buy some time for ground conditions to dry out enough to go in with the flail.

So how do I get the best results?

Planning and patience are the key to effective desiccation using PPOs. You can't chase the field to get in with the harvester where PPOs are concerned. Because they work in a different way to diquat, kicking off the desiccation process has to be brought forward a little to allow sufficient time for the anticipated number of applications and slower defoliation.



When a crop is flailed well, the debris should be deposited between ridges so that the stems are accessible when a desiccant is applied 48 hours later.

Even if the plan is to flail, it's important to understand both sides of the coin so that, should the weather force you down the chemistry route, the crop will be stopped at the right time.

Management decisions made before the crop is even planted may make the difference between successful desiccation and a crop that's difficult to stop. In particular, nitrogen applications should be tailored to the variety and optimum lifting date so there's just enough to keep the crop growing and bulk the tubers but not an excess, which would delay senescence and make the crop more difficult to desiccate at the right time.

In a flail and spray regime, a full dose of PPO — Gozai (pyraflufen-ethyl) plus methylated seed oil (MSO) should be applied 24-48 hours after flailing together with Ranman Top (cyazofamid) to protect against late blight. A top up dose may be required seven days later, depending on factors such as variety, weather conditions and maturity of the crop.

In an all-chemistry programme then 2-4 applications of PPO will be required at seven-day intervals, requiring use of both Gozai and Spotlight Plus (carfentrazone ethyl). The important thing to remember is that good

coverage and bright conditions at application will help ensure good results.

Are there any restrictions?

Gozai has a LERAP B restriction and a 14-day harvest interval, which is slightly longer than Spotlight at seven days. In practice, this isn't a negative for Gozai because of the slower activity of the PPOs and instead removes the temptation to lift before the crop is fit.

The maximum dose per annum for Gozai is 1.6 l/ha, so if it was applied as a herbicide on the ridge at 0.4 l/ha then only 1.2 l/ha is permitted for use at the desiccation timing. ■

Sponsor message

Over the years, Certis Belchim has continued to develop effective solutions for desiccation of potatoes, previously with diquat and more recently with pyraflufen-ethyl (Gozai). Extensive trials work and in-house expertise has led to practical and reliable treatment programmes for farmers and agronomists in both flailed and non-flailed crops.



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