



Innovation Insight

The tonic to the gin

Although it's been a while since the loss of desmedipham, finding a similar level of annual broadleaf weed control in sugar beet has proven quite the head-scratcher. However, the answer could lie in a specific type of adjuvant. CPM reveals more.

By Janine Adamson

Done well, sugar beet provides much value within a rotation, breaking the cycle of many weeds, pests and diseases while helping to build soil organic matter. However, the crop isn't immune to its own challenges, particularly when it comes to annual broadleaf weed control.

As with most UK crops, sugar beet's plant protection product toolbox is diminishing, with one of the most significant losses being desmedipham in 2020. Since then, focus has been on finding alternative methods to achieve a similar level of control to what 'des' offered.

British Sugar's Pam Chambers says this has meant more attention to detail when it comes to all aspects of herbicide application. "With only 11 active ingredients registered for annual broadleaf weed control in

sugar beet, of which nine are for use on conventional varieties, we have no choice but to get the best from those limited options to optimise performance.

"There's also a high risk regarding the future of triflurosulfuron-methyl, as within Europe 2024 it's the final year of use for this active, although a decision still has to be made within Great Britain," she explains.

Adjuvants

For Pam, central to improving performance is refining understanding of a sometimes neglected piece of the tank mix puzzle — the adjuvant. "Adjuvants are so important for sugar beet — in every mix for annual broadleaf weed control, an adjuvant will be used.

"My colleague Andy Wing once said that using products such as Debut/Shiro (triflurosulfuron-methyl) without an adjuvant, is like a gin without the tonic. However, the importance of adjuvants does vary depending on weed species and size, active being used, and climatic conditions."

In some years, for species such as cleavers, correct use of an adjuvant can lead to a 50% uplift in weed control efficacy, she says. Equally, 'hairy' weeds such as small nettle and poppies, respond particularly well to the inclusion of an adjuvant.

Hutchinsons' Darryl Shailes concurs that adjuvants perform a variety of tasks and should be considered a vital component in most herbicide programmes. "A correctly selected adjuvant can help the adhesion and penetration of herbicide actives to target

“This will be the most economically-savvy way to achieve control.”

weeds and importantly boost herbicide activity on larger weeds, especially in cool dry conditions," he says.

But when faced with a year like 2023 where sugar beet was drilled a month late



The importance of adjuvants varies depending on weed species and size, active being used, and climatic conditions, says Pam Chambers.

with mixed conditions, significant crop damage was reported across the board. "It's likely this was due to applying too strong a tank mix without the correct adjuvant at the correct rate, which stresses the importance of paying close attention," explains Pam.

Rhodri Morris, commercial director for De Sangosse, agrees that using mineral oil-based adjuvants in sub-optimal conditions can induce phytotoxic effects on the crop, particularly if used when atmospheric temperatures are high or plant vigour is compromised.

"This is the case for a product such as Newman Cropspray 11E (mineral/paraffinic oil), although very effective, its use in temperatures above 21°C can increase the risk of crop phytotoxicity," he explains.

"However, adjuvants based on methylated seed oil (MSO) such as Phase-II are much safer to apply in high temperatures. This is because MSOs increase the interface area between the spray droplet and the target surface, reducing concentration levels at the site of adhesion.

"In comparison, droplets containing mineral oil contract, increasing the concentration and consequently the risk of crop phyto. Another benefit of MSO-based adjuvants such as Phase II is they're normally used at lower rates than mineral oils," says Rhodri.

MSO adjuvants were first introduced to the UK market around 30 years ago and according to Rhodri, De Sangosse's Phase-II adjuvant is the most widely used MSO in the UK. Despite this, like Pam, he believes more can be done to improve understanding of their benefits.

"Progress continues to take place in MSO product development, for example, around 10 years ago De Sangosse released Drill — an activated MSO co-formulated with a non-ionic surfactant. This co-formulation can be particularly beneficial for weeds with cuticles of poor wettability such as cleavers," he explains.

Spray drift

"It also contains tall oil [paper mill by-product] which can help to mitigate drift. From an environmental perspective, it's essential that spray practices reduce the risk of pesticides reaching non-target organisms, and adjuvants can play an important role in reducing spray drift."

Work carried out in 2021 by Silsoe Spray Applications Unit (SSAU) for De Sangosse and UPL demonstrated the benefits of including Drill with phenmedipham (Betasana SC) when controlling Chenopodium species (for example, fat hen and fig-leaved goosefoot).

The inclusion of Drill at 0.5 l/ha with



Rhodri Morris says adjuvants based on methylated seed oil (MSO) are much safer to apply in high temperatures.

Betasana SC at 3.0 l/ha when applied with flat fan nozzles or Teejet AIXR nozzles at 100 and 200 l/ha of water, resulted in a significant improvement on plant surface area covered (see graph 1).

Furthermore, Rhodri says growers should also consider that any pesticide not reaching its target is a wasted investment. And of course, from an agronomic point of view, the more active on the target, the better it should perform, he explains.

"Without desmedipham there's a glaring gap in terms of product performance but we believe that adjuvants such as Drill can help to plug that gap." ▶

Formulation considerations

According to British Sugar's Pam Chambers, the majority of beet herbicides used for annual broadleaf weed control are suspension concentrate (SC) formulations which are much kinder to the crop and weed than what was formerly available.

"Historically, we used to have emulsifiable concentrate (EC) formulations which were much harsher and didn't rely on adjuvant use so much; we had to be much more cautious when using adjuvants with ECs," she says. "Now, all liquids apart from clopyralid which is a soluble liquid (SL), are SCs."

Hutchinsons' sugar beet crop protection specialist Darryl Shailles agrees that the loss of ECs and oily flowable formulations means adjuvants are essential to make current herbicides work more effectively. "With the older formulations the use of an adjuvant wasn't always required as the products were already well supplied with adjuvants and worked very effectively on their own in most conditions.

"While being a little more aggressive on the sugar beet, ECs had more impact on the weeds

because the adjuvant and solvents within the products broke down the leaf wax and enabled the herbicide to work more effectively.

"We only really had to add something extra when the weeds were larger and the weather conditions were dry and the plants had become very waxy and hard to kill. With the formulations we have available now, adjuvants are required with nearly every herbicide application," Darryl explains.

Equally, greater attention should be given to whether an adjuvant is based on methylated seed oil (MSO) or mineral oil.

When comparing the two, the following points should be considered:

- Protracted crops can be prone to more damage from harsher penetrants, adjuvant choice is key to mitigating this risk
- If plant vigour is slow, trials have shown MSO adjuvants are preferred in this situation



With the formulations we have available now, adjuvants are required with nearly every herbicide application, says Darryl Shailles.

- Monitor temperatures – BBRO guidance should be followed in terms of rates; avoid mineral oils in extreme temperature scenarios (high or low)

Ambient temperature	Rate of Newman Cropspray adjuvant
Up to 18°C	0.75 l/ha
18-21°C	0.5 l/ha (normal rate)
Above 21°C	Not recommended, switch to MSO-based adjuvant



Antonia Walker says straights are the building blocks of sugar beet weed control because not only are they tried and tested, but they're a cost effective way to achieve results.

► Darryl agrees that adjuvants don't just enhance the efficacy of herbicides, they also increase spray coverage and help with rainfastness. "Spray drift can be an issue too — identifying spring spray days when targeting sugar beet weeds can be difficult, so something that reduces drift while targeting more of the product where it's required really helps.

"And it's not just with herbicides that adjuvants are useful, they can also help with many fungicides, insecticides and trace elements," he explains.

To demonstrate the value of adjuvants further, work has been taking place in conjunction with UPL to help growers to maximise the effectiveness of herbicide straights. Antonia Walker stresses that actives such as phenmedipham have become more critical in recent years, especially when margins are tight.

"This season in particular is challenging

and growers will be carefully considering their spend across both sugar beet and the rotation as a whole in hope of avoiding wastage.

"Straights are the building blocks of sugar beet weed control because not only are they tried and tested but they're a cost effective way to achieve results," she says. "Although newer co-formulated products are available, straights have never been as important as they are now."

Tailored approach

According to Antonia, another benefit of using straight active ingredients is the ability to tailor mixes and rates according to the specific broadleaf weed pressure. "As well as applying at the optimum timing, this is enhanced further through the use of the correct adjuvant at the correct rate. This will be the most economically-savvy way to achieve control."

Her advice to growers and agronomists is to know exactly which weeds are in abundance and to target difficult species such as fat hen early doors. And although she acknowledges the benefits of the Conviso Smart system (Smart hybrid varieties in combination with Conviso One (thiencazabone-methyl+ foramsulfuron)), Antonia believes growers may be some way off fully buying into the concept.

Equally, Pam says conventional chemistry is increasingly being used in sequence with the Conviso system. "Conviso One chemistry is very effective against weed beet but the single spray option often means that annual broadleaf weeds have to be controlled or sensitised before the optimum timing for Conviso One.

"Using straights such as ethofumesate, metamitron and phenmedipham at the early

post-emergence timings in conjunction with an adjuvant oil will help to ensure the best results are obtained from Conviso One, especially where fat hen and other Chenopodium are present," she explains.

According to Pam, adjuvants are also regularly used with Conviso One chemistry on the continent and she believes inclusion within GB programmes should be evaluated more closely.

But overall, Rhodri believes adjuvants suffer from simply not being interesting enough. "Adjuvants just aren't overly 'sexy' when it comes to crop production so we have to convince agronomists and then farmers of their importance. They can be a secondary thought, so the technical messages and benefits should be made clear.

"Whether that's balancing input costs or preserving active ingredients, adjuvants, in particular MSOs, have a clear place within the sugar beet portfolio," he says.

And the collaboration between De Sangosse and UPL continues, this time with the development of a new emulsified adjuvant where one use is with post-emergence graminicide, clethodim. Current stewardship guidance in the UK outlines that the clethodim shouldn't be tank mixed with an adjuvant, although inclusion of a water conditioner is recommended.

The new product is currently approved in France and branded as In-Tech Exsentia. According to Rhodri Morris, this development shows a continued commitment to adjuvant R&D. ■

Innovation Insight

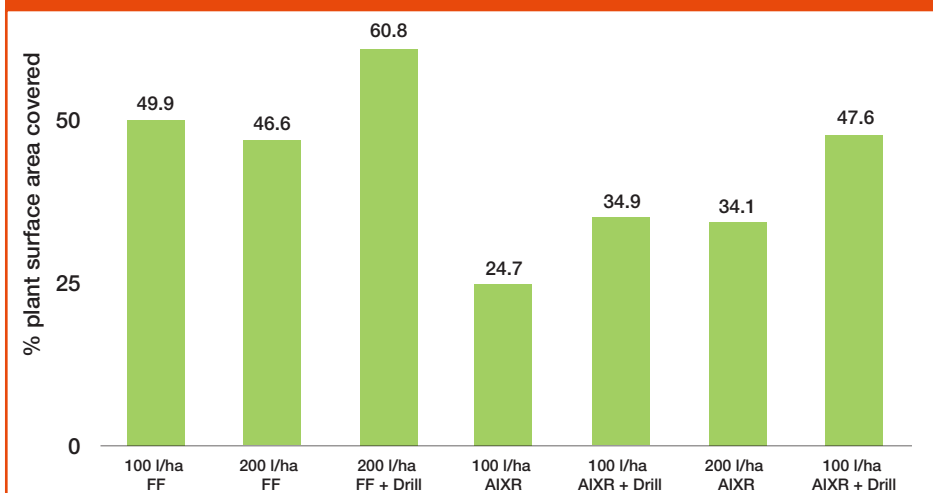
De Sangosse is a European leader in complementary chemistry and molluscicides providing growers with innovative new approaches to protecting crops against disease, pests and the effects of adverse weather from seed to harvest.

Based in Suffolk, with headquarters in France, De Sangosse has been providing research-backed solutions for more than 30 years across seed treatments, molluscicides, nutrition, spray enhancers and pod sealers.

CPM would like to thank De Sangosse for kindly sponsoring this feature, and for its assistance in providing access to the relevant experts and contacts required to produce it.



Effect of application techniques on phenmedipham



Silsoe Spray Applications Unit, 2021