Weed Control

Introduction

Supporting crops to establish faster growing canopies is the cornerstone to increasing sugar beet yield. Removing the competition from weeds for light, nutrients and moisture not only drives rapid canopy development of young sugar beet plants, but also helps to create healthy active plants that are more tolerant to pests and diseases. Remember, the crop is in a race to reach the 12-leaf stage of maturity, when plants start to become more resistant against virus.

Identification of weed species

It is not always easy to correctly identify weeds, especially at the cotyledon stage. The result of mis-identification can result in unsatisfactory weed control. Examples of this are provided in the table below.

Photo 1. Fat-hen

Photo 2. Orache

Photo 3. Cleaver

Photo 4. Ivy-leaved speedwell

Key Points

- Correct weed identification is key to achieving satisfactory weed control
- Use of a residual pre-emergence spray will lengthen the time available to apply post-emergence treatments and help to sensitise the weeds to these treatments
- Post-emergence herbicides should be applied to small (cotyledon – 1 true leaf) actively growing weeds for optimum control
- Herbicide programmes should be built around the active ingredients, ethofumesate, metamitron and phenmedipham
- Adjuvants can improve weed control especially when weeds are large or waxy

Weed species	Distinguishing features	Comments
Fat-hen confused with orache	Fat-hen has broader cotyledons than orache, undersides are often bright purple (Photo 1). The undersides of orache cotyledons are generally brighter green than fat-hen (Photo 2).	Orache is considered more difficult to control than fat-hen. Higher rates of contact chemistry eg phenmedipham and ethofumesate may be required plus an adjuvant.
Ivy-leaved speedwell confused with cleavers	Cleavers have large cotyledons that end in a 'cleavage' whereas ivy-leaved speedwell cotyledons end with a 'knob' (Photos 3 and 4).	Cleavers are more responsive to herbicides once at 1st whorl stage. Use triflusulfuron-methyl for cleavers and quinmerac and phenmedipham for ivy-leaved speedwell.

Timing of first spray

There is a saying “it is not what you spray but when” and to some extent that is true, as timing spray applications to when the weeds are at the cotyledon/1st true leaf stage is an important factor in post-emergence sprays. If weeds get beyond this, it then becomes increasingly difficult, if not impossible with some weed species to obtain adequate control.

Weather conditions before and after spraying

When plants are growing rapidly, they have less wax on the leaf surface so herbicides can enter more easily. However, with prolonged wind, cold and dry conditions wax layers will build up and weed control can become more difficult. Higher than average temperatures tend to result in easier weed control with lower rates of actives, but could also lead to the crop showing signs of stress if the rates selected are too high.

Rates of product, choice and rates of adjuvants all need to be adjusted according to weather conditions at and after spraying.

Incorrect use of phenmedipham

Since the loss of desmedipham there is more reliance on phenmedipham use. However, remember that 1g of phenmedipham is not equal to 1g of desmedipham. Trials have indicated that at least double the amount of phenmedipham will be required, but weather conditions and weed species present will all play a part. In adverse conditions, even higher rates of phenmedipham will be required.

Phenmedipham is purely a contact material and activity does not depend on absorption into the leaves, but on timing of application. If temperatures exceed 21°C and there is high light intensity, then crop selectivity is reduced. Where very light rain <1.0 mm/hour occurs then activity on speedwells for instance can be improved; this is due to phenmedipham penetrating into the leaf axils. However, avoid heavier rain as this can lead to wash off and reduced efficacy. Generally, phenmedipham is partnered with other actives or at least an adjuvant.

Interval between spray applications

Be aware of the impact of delayed herbicide use, particularly if you are trying to link in with other spray programmes. Fat-hen can emerge and get to 4 true leaves within 10 to 14 days, so it is imperative that fields are checked regularly, and recommendations adjusted when sprays are delayed.

Should a pre-emergence herbicide be used?

The use of a pre-emergence residual herbicide generally lengthens the time available to apply post-emergence sprays. Pre-emergence sprays will also sensitise weeds. Where black-grass is expected then a pre-emergence spray containing ethofumesate should always be considered. There are some weeds such as mayweeds, knotgrass and fat-hen where a pre-emergence spray containing metamitron is useful, as it helps to build up the residual levels within the overall spray programme. If there is any doubt in the ability to apply a timely first post-emergence spray, then consider using a pre-emergence spray straight after drilling when the soil is moist.

When to consider a pre-emergence application

- When the soil is moist
- To provide flexibility in timing of post-emergence treatments
- Where large populations of difficult to control weeds are expected

Adopt a post-emergence programme matched to spray capacity, management input and weed species present.

Active ingredients available for broad-leaved weed control

The basic 'building block' actives of annual broad-leaved weed control in sugar beet crops are phenmedipham, ethofumesate and metamitron, and one or more of these actives are generally used at each spray timing. These are available as 'straights' and also as formulated products that consist of a combination of these and other actives. The use of formulated products means less cans are used however using straights can give more flexibility in tailoring rates according to specific situations. Whether a product can be applied pre or post emergence may also be an important consideration.

Adjuvant Oils

Adjuvant oils can improve weed control but can also reduce selectivity of herbicide products. They are of most benefit when weeds are large or 'waxy' (most likely to occur after periods of hot, dry weather). Adjuvants should always be used as per recommendations on the product label.

Adjuvant oils can increase the risk of crop damage when the sugar beet crop is under stress (eg after wind blow, frost, pest or previous herbicide damage). As temperatures increase, so does the risk of damage. The table below can be used as a guide to rate of oil based on temperature.

Rate of oil according to temperature

Temperature on day of spraying (°C)	Dose of Adjuvant oil (l/ha)
Up to 14	1.0
14-18	0.75
18-21	0.5
Above 21	Not recommended

Black-grass control in sugar beet

Sugar beet provides an excellent rotational opportunity to target control of black-grass. Aim for an integrated approach combining cultural and herbicidal methods. After cereal harvest allow black-grass seeds to chit and remove seedlings before winter ploughing. Apply glyphosate pre-drilling to remove any emerged black-grass prior to seedbed preparation.

After drilling, consider use of pre-emergence treatments of ethofumesate and metamitron. Post-emergence treatments containing triflusulfuron-methyl and ethofumesate appear to show useful increased control of black-grass (based on limited data). The overall herbicide programme should aim to include at least 2-4 modes of action. Target post-emergence black-grass treatments to small plants (1-3 leaf stage). Control is dramatically reduced when black-grass plants have begun to tiller.

ACCase resistant black-grass

ACCase inhibitor graminicides such as clethodim, may still offer some control of resistant black-grass, depending on degree of resistance, and when used as part of a programme.

When using a pre-emergence treatment apply a minimum dose of ethofumesate of 500g ai/ha + metamitron at 1400g ai/ ha. Keep some ethofumesate in 'reserve' for post-emergence applications. Use a post-emergence programme that includes ethofumesate in sequence with clethodim. Remember that a maximum permitted total does of 1000g/ha of ethofumesate over a three year period on the same field applies. Check ethofumesate and clethodim product labels for permitted maximum individual doses as these vary. The table below summarises sugar beet herbicides with activity against resistant black-grass.

For more information on resistant black-grass visit the Weed Resistance Action Group (WRAG) website:

The Weed Resistance Action Group (WRAG) | AHDB

Mugwort (left) and Barnyard grass (right)

CONVISO® Smart System

The CONVISO® Smart herbicide tolerant technology system provides effective control of weed beet. The system involves ALS herbicide tolerant varieties (Smart varieties) used in conjunction with CONVISO® One (foramsulfuron + thiencarbazone-methyl), a dedicated ALS inhibitor herbicide. Understanding the target weed species and getting the correct timing is key to successful use of the technology. For more information on the CONVISO® Smart System and weed beet control see the Weed Beet and CONVISO® Smart Fact File.

Emerging weeds

While certain spring germinating weeds are common in sugar beet (eg fat-hen, knotgrass, black-bindweed), new emerging weed species are providing new challenges. These include species such as mugwort (*Artemisia vulgaris*) and barnyard grass (*Echinochloa crus-galli*) which can be very competitive and difficult to control in sugar beet.

The emergence of 'new' weeds is being observed across the rotation. Some species appear to be associated with game cover and cover crop mixes, which are not regulated for seed contamination. It is therefore prudent to retain samples of any seed brought onto the farm so that potential impurities can be tested if required.

More information on emerging weed species is available in the Emerging Weeds Fact File.

Sugar beet herbicides with activity against ACCase black-grass

HRAC Group	Mode of Action	Chemical Family	Active Ingredient
2	Inhibition of acetolactate synthase (ALS)	sulfonylureas	triflusulfuron-methyl
5	Inhibition of photosynthesis at photosystem II	triazinones	metamitron
15	Inhibition of lipid synthesis	benzofurans	ethofumesate
1	Inhibition of acetyl CoA carboxylase	cyclohexandiones	clethodim