

Sugar Beet Technical Update

March 2014

Black-grass (*Alopecurus myosuroides*) control in Sugar Beet – not straight forward!

With adequate moisture 80% of black-grass germination and emergence will occur within the autumn months from September to November, consequently spring cropping especially when it is a non-cereal crop, is considered to be one of the 'ten key factors' to consider when planning control measures for this difficult weed. The planting of a non-cereal crop can also allow the use of alternative herbicides with different modes of action to those approved of for use in cereals. A critical factor is minimising the number of viable black-grass seeds that are produced in the spring and understanding the practices, cultural and chemical that can be used to achieve this goal. It should be emphasised that non chemical methods of controlling black-grass are extremely important but this bulletin concentrates on herbicide factors to consider when growing Sugar Beet. A leaflet produced by Dr Stephen Moss 'Black-grass (*Alopecurus myosuroides*) Everything you really wanted to know about black-grass but didn't know who to ask' revised in 2013 is recommended reading.

Post-emergence graminicides

There is now a very high incidence of both ACCase target site and enhanced metabolism resistance in black-grass populations in the UK. Table 1 provides information on ACCase inhibitors (fops and dims) which have approval for post-emergence use in Sugar Beet, varying degrees of black-grass control can be expected from these products.

Table 1. ACCase inhibitors (fops and dims) which have approval for use in Sugar Beet

Group	MOA	Chemical family	Active	Example product
A	Inhibition of acetyl CoA carboxylase (ACCase)	aryloxyphenoxy propionates (fops)	e.g. fluazifop-P-butyl	Fusilade Max
		cyclohexanediones (dims)	e.g. cycloxydim tepraloxym clethodim	Laser Aramo Centurion Max

Centurion Max (clethodim) which has recently gained approval for use in Sugar Beet is unusual in that it is currently less affected by target site resistance than other ACCase inhibiting herbicides, but using clethodim in sequences with other relevant herbicides with differing modes of grass-weed activity will be an important requirement in prolonging its effectiveness.

Tank-mixing graminicides with annual broad-leaved weed herbicides

Frequently the question is raised about tank-mixing graminicides with annual broad-leaved weed herbicides within Sugar Beet weed control programmes. Tank-mixing has huge benefits as it minimises spraying time as well as reducing fuel and labour costs, it can also be a 'struggle' to slot graminicides into a herbicide programme at the optimum timing. So, high is the temptation to tank mix even though the advice from manufacturers has generally been no – but should you be tempted?

During 2013 United Phosphorus Ltd (UPL) looked at black-grass control in Sugar Beet at two different sites in Lincolnshire and Norfolk, one of the objectives was to look at tank-mixing the graminicide Aramo (tepraloxym) with Oblix MT (metamitron + ethofumesate) applied at the T3 timing to evaluate efficacy. Plant and head counts were carried out on July 3rd 2013 and the results are shown on p2 (Fig 1). At both sites using a tank-mix resulted in much higher plant and head counts which could potentially lead to high seed return, an estimate of seed return is given for each treatment.

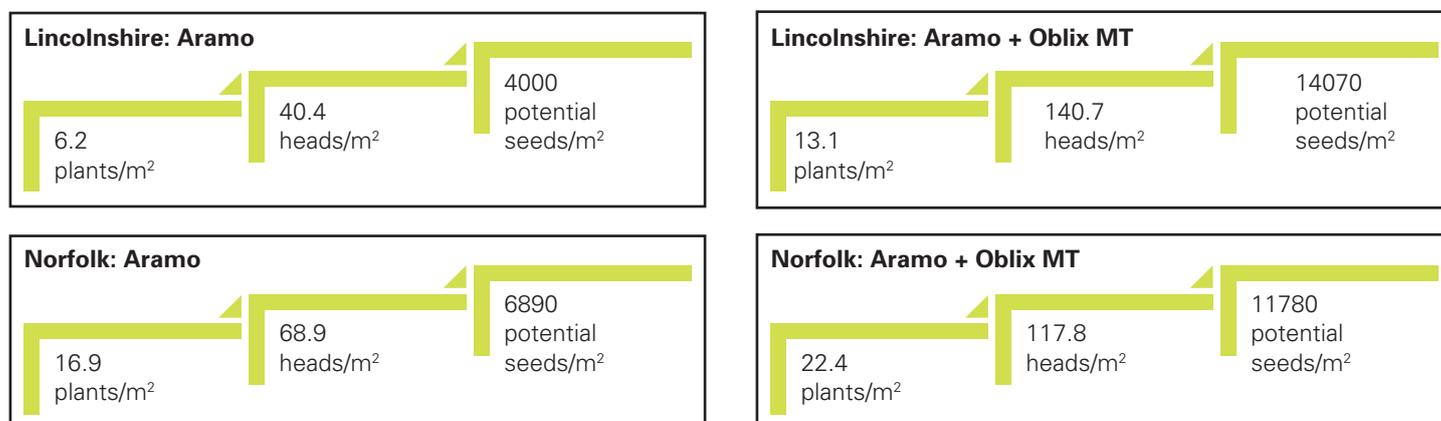


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Fig. 1. Results from black-grass trial sites looking at tank-mixing efficacy. (July 3rd 2013)



Pre and post-emergent annual broad-leaved weed herbicides with activity on black-grass

A few annual broad-leaved weed herbicides approved for use in Sugar Beet will have some effect on resistant 'ACCase' black-grass populations; a summary of these are given in Table 2. Currently only triallate has a recommendation for use in cereals.

Table 2. Sugar Beet herbicides with activity against resistant 'ACCase' black-grass

Group	MOA	Chemical family	Active	Example products
B	Inhibition of acetolactate synthase ALS	sulfonylureas	triflurosulfuron-methyl	Debut
C₁	Inhibition of photosynthesis at photosystem II	triazinones	metamitron	Bettix Flo Defiant SC Goltix Flowable
N	Inhibition of lipid synthesis	thiocarbamates	triallate	Avadex Excel 15G
		benzofurans	ethofumesate	Ethofol 500SC Ethosat 500

In using the information provided in Tables 1 and 2 it is possible to choose herbicides with different modes of action to produce a black-grass control programme for the Sugar Beet crop. In using herbicide sequences and mixes compiled of actives from different mode of action groups, over-all control of black-grass will be improved but it will not prevent resistance developing.

Triallate e.g. Avadex Excel 15G – pre-emergence activity on black-grass

Avadex 15G (triallate) was included in the UPL 2013 and BBRO 2012 black-grass herbicide trials with inconclusive results. The use of Avadex 15G within a Sugar Beet black-grass control programme should continue to be investigated.

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Ethofumesate e.g. Ethofol 500SC - pre and post-emergence activity on black-grass

A 'container screen' looking at the efficacy of Ethofol 500SC (ethofumesate) applied to a selection of black-grass populations was carried out for UPL by AgHerba Consultants (Dr C R Riches, Weed Scientist) in 2013. As a pre-emergence treatment ethofumesate applied at 250 g ai/ha rate provided excellent control of black-grass populations with a range of herbicide resistance mechanisms. These include resistance due to both ACCase enhanced metabolism and target site resistance (Notts 05, Peldon 07 and ISL PITCH) and a population combining moderate ACCase enhanced metabolism, ACCase target site and ALS target site resistance (Long C 11). See Photo 1.

There are strong indications that pre-emergence applications of Ethofol 500SC (ethofumesate) will give better results than post-emergence timings. It should however be stressed that results from pre-emergence container screens will show much higher efficacy than field results and control will vary according to field conditions. A restriction on ethofumesate is that only 1000 kg of ai/ha can be used per field in any three year period. This restriction should be taken into account when planning Sugar Beet herbicide programmes as ethofumesate is included in many formulated products which have an important part to play in post-emergence timings e.g. as in Betasana Trio (phenmedipham + desmedipham + ethofumesate), Oblix MT (ethofumesate + metamitron) and Betanal maxxPro (ethofumesate, lenacil, phenmedipham and desmedipham).

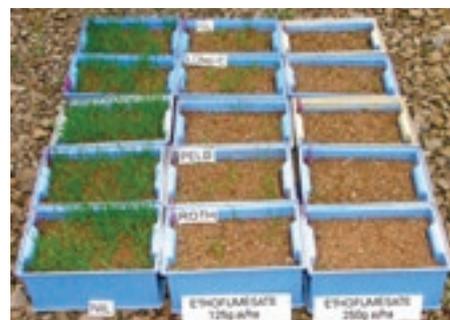


Photo 1: Response of five UK black-grass populations to 250g and 125g ai ha⁻¹ ethofumesate on 13 February 2013. Populations from front: Rothamsted, Peldon 07, Notts 05, Long C 11 and ISL-PTCH08.

Metamitron e.g. Bettix Flo – pre and post-emergence activity on black-grass

In UPL 2013 trials and BBRO 2012 trials metamitron was included in black-grass control programmes at both the pre and post-emergence timings and a combination of both. Results from all of the trial sites were inconclusive, there is however evidence that metamitron shows activity against black-grass. As such it is advisable to continue to use metamitron e.g. Bettix Flo, within a Sugar Beet herbicide programme where black-grass is the target. A suggested rate is 700 g ai/ha i.e. Bettix Flo at 1.0 l/ha.

Triflusalufuron methyl e.g Debut - post emergence activity on black-grass

Debut (triflusalufuron-methyl) is a sulfonylurea herbicide and agronomists and farmers have often commented that this product shows some activity on black-grass. In trials carried out by BBRO in 2012 and UPL in 2013 there is some evidence to substantiate this claim. Although not statistically different, at the UPL Norfolk trial site there were strong indications that the inclusion of Debut (triflusalufuron-methyl) in combination with Betasana Trio (phenmedipham + desmedipham + ethofumesate) resulted in a reduction in the final number of black-grass heads/m² see Graph 1 and Photos 2 and 3. The resistance status of the black-grass population within a field is likely to impact on the efficacy of triflusalufuron-methyl.

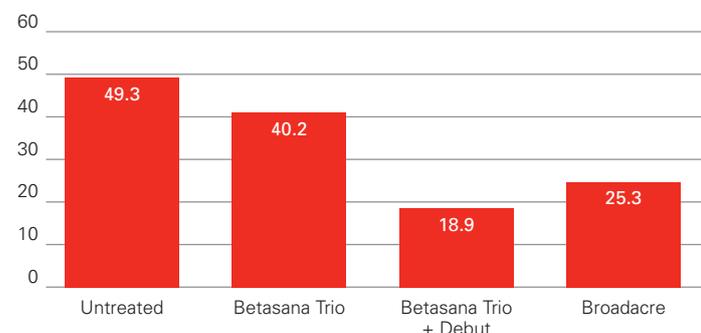


Photo 2: Betasana Trio programme

Photo 3: Betasana Trio + Debut programme

Graph 1. Norfolk trials site – Debut (triflusalufuron-methyl)

Black-grass heads/m² 3 July 2013



Note: Broadacre is the UPL version of the Dupont Broadacre programme which contains Beetup Compact SC, Ethofol 500SC, Debut, Bettix Flo, Venzar + oil.

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Resistance testing

If black-grass resistance is suspected then it is advisable to carry out a test on black-grass plants or seeds, results will help with planning control options.

2014 recommendations for black-grass control in Sugar Beet

As mentioned in the introduction a combination of weed control measures is required when targeting black-grass, to quote Dr Stephen Moss, 'herbicides or non-chemical methods alone will not offer sustainable long-term control'. There are a number of herbicide products that can be used to formulate a black-grass control programme, the important thing to remember is to include key actives, one suggestion is given in Table 3. Adjustments should be made according to a) crop growth stage, b) other weed species present, c) weather conditions.

Table 3. 2014 option for black-grass control in Sugar Beet

Timing of crop	Actives in programme	Example product	Rate/ha	Comments
Pre-em	metamitron	Bettix Flo	1 to 2.0 l/ha	Do not use more than 1.0 kg of ethofumesate per ha in any three year period.
	ethofumesate	Ethofol 500SC	0.8 l/ha	
T1	desmedipham	Beetup Compact SC	1.5 l/ha	Apply at 2 to 3 leaves of the black-grass. Adjust rates according to crop size. Include oil if conditions and crop size allow. The use of a pre-em should permit a delayed T1 timing.
	phenmedipham	Ethofol 500SC	0.4 l/ha	
	ethofumesate	Debut	20 g/ha	
	triflurosulfuron methyl	Bettix Flo	0.5 l/ha	
	metamitron			
	clethodim	Centurion Max	1.0 l/ha	Consult label for optimum timings, do not tank mix with any other herbicides. Do not apply products containing an ACCase inhibitor herbicide more than twice to any crop. Centurion Max can only be applied once before row closure.
T2	desmedipham	Betasana Trio	2 to 2.5 l/ha	Apply according to growth stage, emergence of fresh black-grass and other weed species present. Adjust rate of oil according to weather conditions.
	phenmedipham			
	ethofumesate	Bettix Flo	1.0 l/ha	
	metamitron	Debut	20 g/ha	
	triflurosulfuron methyl	Oil	0.5 to 1.0 l/ha	



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