

Black-grass Control

in Sugar Beet

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Made in Britain



Introduction

Chemical control of *Alopecurus myosuroides* (black-grass) in sugar beet

The main emergence period of *Alopecurus myosuroides* (black-grass) in England tends to occur in the autumn period from September to November so the inclusion of spring cropping within an arable rotation is considered to be a useful means of helping to control this weed.

In recent years the level of black-grass seen in sugar beet crops has raised concerns and improved levels of cultural and chemical control are sought. There are herbicides that are approved for use in the sugar beet crop that are known to have activity against black-grass that are not currently used elsewhere in a conventional arable rotation e.g. ethofumesate, metamitron and triflusaluron-methyl.

This booklet provides a summary of recent trials work carried out by UPL on black-grass control in sugar beet and provides suggestions for herbicide programmes that can be applied.

Cultural control is not covered in this booklet but it is recognised that this forms a key component of any black-grass control strategy.



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Herbicides with activity on black-grass that are approved for use in sugar beet.

The Herbicide Resistance Action Committee (HRAC) classification of herbicides according to site of action is in itself NOT a recommendation of which herbicide to use.

The system is not based on resistance risk assessment but on the chemical site of action.

The information is designed to be used as a tool to select herbicides from different site of action groups so that appropriate mixtures or rotations can be planned within an integrated weed management system.

Table 1. Provides information on herbicide actives approved for use in sugar beet that are known to have activity on black-grass..

Table 1: Properties of actives available for black-grass control in sugar beet

HRAC group	Mode of action	Chemical family	Active	Example product
A	Inhibition of acetyl CoA carboxylase (ACCase)	aryloxyphenoxy propionates (fops)	fluazifop-P-butyl	Fusilade Max
		cyclohexanediones (dims)	cycloxydim tepraloxydim clethodim	Laser Aramo Centurion Max
B	Inhibition of acetolactate synthase (ALS)	sulfonylureas	triflusalufuron-methyl	Debut
C ₁	Inhibition of photosynthesis at photosystem II	triazinones	metamitron	Bettix Flo Goltix Flowable
N	Inhibition of lipid synthesis	thiocarbamates	triallate	Avadex
		benzofurans	ethofumesate	Ethofol 500SC Ethosat 500

Also available are a number of products that contain mixtures of the actives mentioned above for example **Obliv MT/Volcano** (ethofumesate and metamitron). The Chemicals Regulation Directorate (CRD) website provides a comprehensive list of approved products and actives for use on sugar beet www.pesticides.gov.uk.

Information on UPL sugar beet products can be obtained from www.uplsugarbeet.co.uk.

Properties of ethofumesate in sugar beet

Ethofumesate is a contact and long lasting residual herbicide for pre and post-emergence use to control annual grasses and broadleaved weeds in sugar beet and fodder beet, it also has activity on black-grass.

Ethofol 500SC and Oblix 500SC

UPL currently market two straight brands of ethofumesate, both are 500g a.i./l and are suspension concentrate formulations. A summary of these two products is given in Table 2, 'Useful information'.

Table 2: Useful information

Product	MAPP number	Final use date	LERAP	Max ind. dose (l/h)	Max no. apps	HI (Latest app. date)*	Max dose at 80 litres of water
 ETHOFOL [®] 500SC	15179	31/01/19	—	0.8	—	90 days	0.8
 OBLIX [®] 500SC	16671	31/01/19	—	2.0 pre-em 0.6 post-em	—	BBCH39	2.0 0.6

* HI applies for sugar beet, check label for other crops.

Timing of application

Results from container trials carried out for UPL by AgHerba Consultants and ADAS Boxworth have demonstrated that ethofumesate applied pre-emergence provided good control of all black-grass populations. The level of control achieved from post-emergence applications of ethofumesate was considerably reduced compared to pre-emergence applications, see Photos 1, 2 and 3.

Source: ADAS Boxworth January 2015



Photo 1: Untreated black-grass



Photo 2: Pre-emergence ethofumesate 400 g ai/ha



Photo 3: Post-emergence ethofumesate 400 g ai/ha

Container trials carried out by AgHerba Consultants also demonstrated the timing of post-emergence applications were important, with the level of control of black-grass reducing as the number of leaves increased. (Table 3)

Table 3: Mean % reduction in number of surviving plants +/- SE compared to untreated when treated with 250g ai./ha of ethofumesate.

Population	Pre-emergence	One leaf	2-3 leaves
Rothamsted 10	79.5 +/- 2.2	69.5 +/- 4.5	33.4 +/- 7.1
Suffolk	67.5 +/- 0.3	55.7 +/- 7.2	31.6 +/- 9.2
Norfolk	74.7 +/- 3.3	50.9 +/- 1.9	21.3 +/- 12.4

Source:- Aspects of Applied Biology 127. 2014

Resistance to ethofumesate

There is currently no known black-grass resistance to ethofumesate. The only recorded instance of resistance is to poa annua which was in the United States (Oregon) in 1994. Further information on resistance can be found at www.hracglobal.com and www.weedscience.com.

Ethofumesate specific restrictions

To protect groundwater the maximum total dose must not exceed 1 kg ethofumesate per hectare in any three year period.

Ethofumesate labels

It is important to check individual ethofumesate labels as they vary with respect to maximum individual dose and crop approvals.

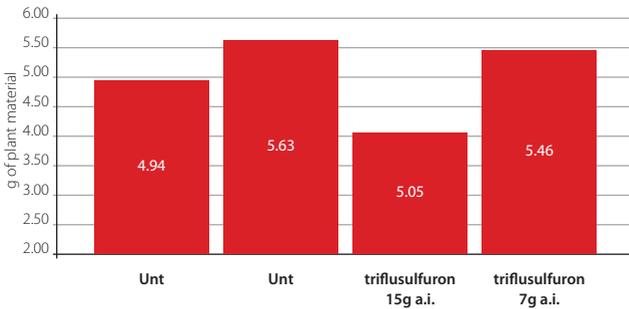
Key advice for black-grass control in sugar beet

- Apply ethofumesate pre-emergence adjusting rate according to soil conditions, use a minimum of 400g a.i./ha.
- Use in tank mix with metamiltron to minimise resistance.

Properties of triflusaluron-methyl in sugar beet

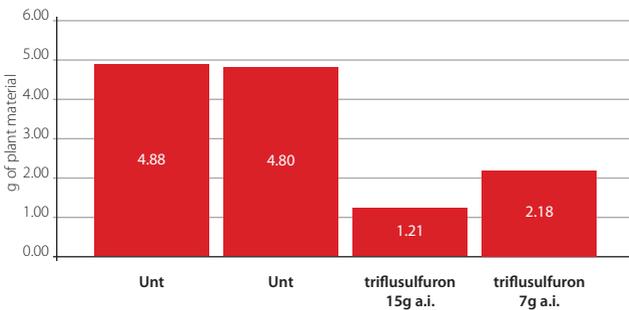
In trials, triflusaluron-methyl e.g. Debut, has offered some useful benefits in controlling black-grass but it belongs to the sulfonylurea family. The efficacy of triflusaluron-methyl will vary according to a field's history with respect to black-grass control and how effective similar actives are. Results from a glasshouse pot test are shown in Graphs 1 and 2 illustrating how the Rothamsted strain is still susceptible to ALS chemistry compared to the Peldon strain which demonstrates resistance. Field resistance testing can be carried out to help support decisions on which actives to use to control black-grass.

Graph 1: Sensitivity of the Peldon strain of black-grass to triflusaluron-methyl



Source: ADAS Boxworth/J Lowe 2014

Graph 2: Sensitivity of the Rothamsted strain of black-grass to triflusaluron-methyl



Source: ADAS Boxworth/J Lowe 2014

Key advice for black-grass control in sugar beet.

Products containing triflusaluron-methyl e.g. Debut and Safari Lite WSB should not be relied upon to offer black-grass control due to resistance to ALS chemistry. In some situations they may provide a 'useful effect', they are useful tank-mix partners for other sugar beet herbicide products.

Properties of metamitron in sugar beet

Metamitron is a contact and residual acting selective herbicide for the control of annual weeds and some grass weeds in sugar beet, red beet, fodder beet and mangels. It shows some activity against black-grass. Metamitron does not show as much activity against black-grass as ethofumesate but it is a useful tank-mix partner and forms part of a resistance management strategy.

Table 4: Useful information

Product	MAPP no.	Final use date	LERAP	Max ind. dose (l/h)	Max total. dose (l/h)	Max no. apps	HI (Latest app. date)*	Max dose at 80 litres of water
 BETTIX [®] FLO	16559	28/02/22	—	3.0	5.0	—	—	3.0

Properties of tri-allate in sugar beet

In UPL trials conclusive results from using tri-allate to control black-grass have not been obtained, however it is an active that should be given serious consideration for pre-emergence use. It can be applied pre-drilling and in sequence with other pre-emergence herbicides, performance is best on soils where organic matter (OM) is less than 10%.

Properties of chloridazon in sugar beet

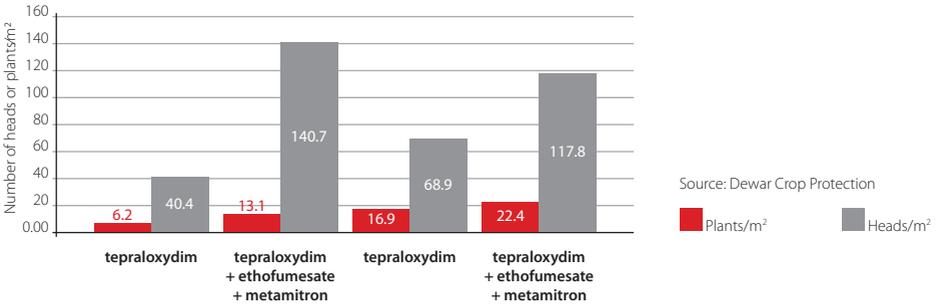
In 2013 chloridazon (Parador) was included in two UPL black-grass trials, one in Norfolk and the other in Lincolnshire, it was applied pre-emergence at 2580g a.i./ha in tank mix with 500g a.i./ha of ethofumesate. This rate of chloridazon was much higher than the average rate that is typically used. Results showed no benefit of including the chloridazon compared to straight ethofumesate. It would be useful to repeat this work as some growers/agronomists have reported benefits from using chloridazon in black-grass control programmes.

Graminicides for black-grass control in sugar beet

Tank mixing

In 2013 UPL carried out two trials, one in Lincolnshire and the other in Norfolk looking at using tepraloxymid (e.g. Aramo) applied alone and in tank mix with other sugar beet herbicides. Applications were made to tillering black-grass, applications made at earlier growth stages were not looked at. Where a graminicide is being applied to tillering black-grass results would suggest that a graminicide is best applied on it's own, see Graph 3. Similar effects were seen in 2014 trials with clethodim (e.g. Centurion MAX). When applied on it's own a graminicide can potentially be applied at higher water volumes and the use of water conditioners should be considered.

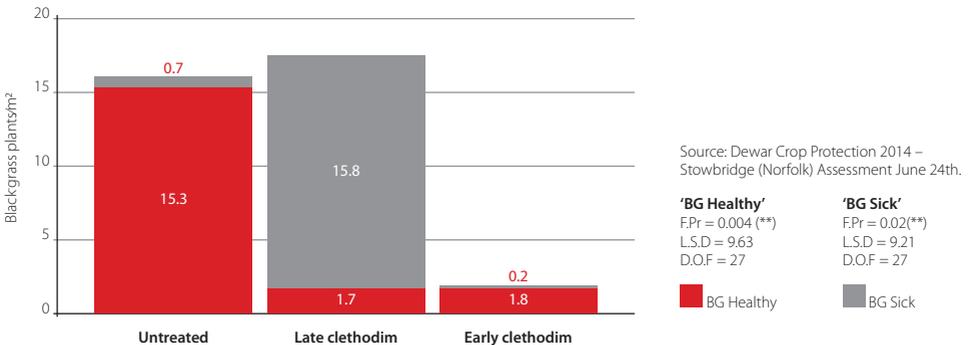
Graph 3: results from two trials sites using tepraloxymid (e.g. Aramo) alone and in tank mix



Efficacy of clethodim (e.g. Centurion MAX)

In a 2014 UPL trial the timing of clethodim applications was investigated in relation to size of black-grass. Early applications of clethodim, pre-tillering of the black-grass gave much better control than latter ones. Where clethodim was applied to tillering black-grass at the end of a broad-leaved herbicide programme partial control of black-grass was observed – these are presented in the Graph 4 as 'sick' plants.

Graph 4: Timing of clethodim (e.g. Centurion Max)



Black-grass control programmes for 2015

Ensure that cultural control is used in combination with herbicides, there are a number of publications that provide advice on this, see Further information on page 11.

A 'clean seedbed' is essential, there are various approved tank-mixes for glyphosate in combination with liquid nitrogen, **Oblix MT**, **Ethofol 500SC/Oblix 500SC** and **Bettix Flo** which can be used pre-emergence. Further information can be found at www.upsugarbeet.co.uk.

Suggestions for two herbicide programmes are given below, but post-em broadleaved herbicide choice and rate will be influenced by weeds present/expected and climatic conditions.

Option 1

Pre-emergence	Ethofol 500SC 0.8 l/ha + Bettix Flo 1.0 to 1.5 l/ha
T1	Centurion MAX 1.0 l/ha or alternative graminicide*
T2	Betasana Trio 2.0 + Bettix Flo 0.75 + Debut 20g + Oil
T3	Betasana Trio 2.0 + Bettix Flo 0.75 + Debut 20g + Oil

Option 2

Pre-emergence	Oblix MT/Volcano 2.0 + Ethofol 500SC 0.4 l/ha
T1	Centurion MAX 1.0 l/ha or alternative graminicide*
T2	Betasana Trio 2.0 + Bettix Flo 0.75 + Debut 20g + Oil
T3	Betasana Trio 2.0 + Bettix Flo 0.75 + Debut 20g + Oil

Centurion MAX can be applied at 1.0L/ha from when the crop has fully expanded cotyledons or first leaves visible until before row closure. *Where graminicides other than clethodim are known to still be effective then these should be used in preference to Centurion MAX. Spray intervals between herbicides should be based on crop health and climatic conditions, widening the interval if crops are stressed or if frosts are forecast.

A summary of black-grass control in sugar beet

- Use ethofumesate pre-emergence either as a straight or in a formulated product such as ethofumesate + metamitron (e.g. **Oblix MT/Volcano**).
- The rate of ethofumesate applied pre-emergence should be at least 400 g a.i./ha, remember to check labels for maximum individual dose of product.
- Include metamitron in the pre-emergence mix as this will have some activity on black-grass and may help with resistance management.
- Do not exceed 1 kg ethofumesate per hectare in any three year period.
- Allow for the use of some ethofumesate post-emergence to help with broad-leaved weed control.
- Apply graminicides early in the herbicide programme, either as the first or second post-emergent herbicide application when the black-grass is at the 1 to 2 leaf stage and actively growing.
- Trials suggest that graminicides should not be mixed with other herbicide products.
- Consider using higher water volumes and water conditioners with graminicides.
- Triflurosulfuron (e.g. Debut) should not be relied upon for black-grass control, but in some cases it may have a useful effect depending on the sensitivity of black-grass

Further information

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