

Resistance Warnings and Restrictions on Labels of Professional Herbicide Products

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Introduction

Following a paper in 1999, the Advisory Committee on Pesticides (ACP) approved a standardised resistance warning for all products with recommendations for grass weed control. There are also additional resistance warnings and restrictions on use approved either prior to, or after, 1999 for specific active substances and modes of action.

In November 2005, PSD (now CRD) asked the ACP for advice on the strategy for the future use of high resistance risk herbicides used for the control of grass weeds. These were presented to the ACP and a disclosed version of the paper is available at (<http://webarchive.nationalarchives.gov.uk/20151023155227/http://www.pesticides.gov.uk/guidance/industries/pesticides/advisory-groups/Resistance-Action-Groups> archive version only available). The ACP advised that PSD (now CRD) should adopt a more restrictive regulatory approach to resistance management and apply restrictions to the use of existing grass weed herbicides where there is a high resistance risk (ALS inhibitor and ACCase inhibitor herbicides). These restrictions are aimed at prohibiting the use of sequences or mixtures of grass weed herbicides that are considered to pose a very high-risk of resistance. (See also [Efficacy Guideline 611](#) 'Guidance on the Restriction of Use of High Resistance Risk Herbicides' and Regulatory Update 16/2006)

All current resistance phases are summarised in this guideline. Applicants should also be aware, however, of the resistance warning specified in Annex V labelling directive of 91/414/EEC. Further guidance on the appropriate use of this phrase is provided in [Efficacy Guideline 606](#): Resistance risk analysis and use of resistance management strategies. No other phrases are allowed without further approval from CRD.

These phrases and restrictions also apply to relevant 'off-label' uses, where they appear as part of the approval notice and advisory information. This is in recognition of the need to ensure a consistent approach to resistance management across all potential uses. It is important to note that the restrictions also refer to potential future extensions of use.

Label phrases and restrictions

The following situations require restrictions on use and/or specific label phrases:

- i) All products with recommendations for annual grass weed control.
- ii) All products containing ACCase inhibitors
- iii) All products containing ALS inhibitors with selection pressure on high resistance risk grass weeds
- iv) Products containing paraquat or diquat
- v) Broad-leaved weed herbicides containing phenoxy-carboxylic acids e.g. products containing 2,4-D, mecoprop-p, 2,4-DB, MCPA

All products with recommendations for annual grass weed control

During the early 1990s black-grass resistance became widespread. In 1992 the ACP approved a request from CRD (then PSD) for the following label amendments:

"Strains of black-grass have developed resistance to many black-grass herbicides, this may lead to poor control."

CRD agreed that the following phrase could be included **after** the above warning,:

"The Weed Resistance Action Group has produced Guidelines on avoiding and coping with resistant black-grass. Copies of the guidelines may be obtained from your distributor, crop adviser or product manufacturer."

In January 1999 a PSD (now CRD) paper to the ACP put forward a proposal to change the resistance warning of products with label claims for control of black-grass to one that incorporated both the warning and new WRAG guidelines. In addition the opportunity was taken to widen the scope to include wild-oats and Italian rye-grass. It stated that:

Strains of some annual grasses, e.g. black-grass, wild-oats, and Italian rye-grass, have developed resistance to herbicides which may lead to poor control. A strategy for preventing and managing such resistance should be adopted. Guidelines have been produced by the Weed Resistance Action Group and copies are available from the HGCA, CPA, your distributor, crop adviser or product manufacturer.'

All herbicides with a claim for annual grass weeds must incorporate the 1999 revised label phrase.

- ***All products containing ACCase inhibitors***

The Statutory Conditions of Use must include:

- A restriction on the maximum number of applications of any one active substance which is an ACCase inhibitor to one per crop (or one per year for perennial crops).
- The 'Other Specific Restriction' 'To avoid the build up of resistance do not apply products containing an ACCase inhibitor herbicide more than twice to any crop. In addition, do not use this product in mixture or sequence with any other product

containing [*active substance*]. Where there is more than one ACCase inhibiting active substance in a product both active substances must be named in the 'Other Specific Restriction'.

Label recommendations must include the following sentences:

'This product contains [*active substance*] which is an ACCase inhibitor, also classified by the Herbicide Resistance Action Committee as 'Group A'.

'Use only as part of a resistance management strategy that includes cultural methods of control and does not use ACCase inhibitors as the sole chemical method of grass-weed control.'

'Applying a second product containing an ACCase inhibitor to a crop will increase the risk of resistance development; only use a second ACCase inhibitor to control different weeds at a different timing.'

- **All products containing ALS inhibitors with selection pressure on high resistance risk grass weeds**

All products containing an ALS inhibitor will be subject to restriction unless applied at a dose shown not to exert a selection pressure on high resistance risk grass weeds (see [Efficacy Guideline 611](#) for more information)

The Statutory Conditions of Use must include:

- The 'Other Specific Restriction' 'To avoid the build up of resistance do not apply this or any other product containing an ALS inhibitor herbicide with claims for control of grass-weeds more than once to any crop'.

Label recommendations must include the following sentences:

- 'This product contains [*active substance*] which is an ALS inhibitor, also classified by the Herbicide Resistance Action Committee as 'Group B'.
- 'Use only as part of a resistance management strategy that includes cultural methods of control and does not use ALS inhibitors as the sole chemical method of grass-weed control'.

- **Products containing bipyridylum herbicides**

Paraquat and diquat belong to the bipyridylum -class of herbicides (HRAC group D).

There are a number of reports of resistance to this group worldwide. To date in Europe resistance to paraquat has been detected in three species. These are *Conyza canadensis* (Canadian fleabane) in Belgium, *Epilobium adenocaulon* (American willowherb) in hops in the UK and *Poa annua* (Annual meadow-grass) in hops in the UK and Belgium (www.weedscience.org). As a rule, paraquat-resistant biotypes have been reported in locations where the substance has been used over a period of several years and in some cases several times per year.

The resistance mechanism has yet to be clearly explained, but it is speculated that in resistant biotypes smaller quantities of the active substance may reach the Photosystem I site of action than in sensitive biotypes. Nothing is known about the differences in fitness between the biotypes. Because of the common mode of action, there is cross-resistance

between diquat and paraquat. Cross resistance to other modes of action has not been observed. There are biotypes of Canadian fleabane and annual meadow-grass that have multiple resistance to the Photosystem II inhibitors and the bipyridyls after more than 25 years of selection by simazine and paraquat.

All paraquat containing products should have the following standard warning phrase:

‘Strains of Annual Meadow-grass and American Willowherb resistant to paraquat have been found in some hop yards/gardens and also top and soft fruit orchards. Where resistant strains are present [*product name*] may not give full control of these weeds’.

On this basis the following warning must be added to the label;

‘Paraquat (and diquat) belong to the class of herbicides known as bipyridyls. Strains of Annual Meadow-grass, Canadian fleabane and American Willowherb resistant to paraquat have been found in some hop yards/gardens and also top and soft fruit orchards. Where paraquat resistant strains are present [*product name*] may not give full control of these weeds’

Since products generally also have claims for control of black-grass, wild-oats and ryegrasses the standard annual grass weed resistance warning must also be included on the label.

- ***Broad-leaved weed herbicides containing phenoxy-carboxylic acids e.g. products containing 2,4-D, mecoprop-p, 2,4-DB***

These active substances belong to HRAC Group O. In Europe resistance has been identified in the following species:

Creeping thistle;	Sweden; MCPA & 2, 4-D Hungary; MCPA
Scentless chamomile;	UK and France; 2, 4-D
Common poppy;	Spain; 2, 4-D
Common chickweed;	UK; mecoprop

All products containing phenoxy-carboxylic acids alone must include a standard warning phrase such as:

“When herbicides with the same mode of action are used repeatedly over several years in the same field, selection of resistant biotypes can take place. These can propagate and may become dominating. A weed species is considered to be resistant to a herbicide if it survives a correctly-applied treatment at the recommended dose. A strategy for preventing and managing such resistance should be adopted. This should include integrating herbicides with a programme of cultural control measures. Guidelines have been produced by the Weed Resistance Action Group and copies are available from the HGCA, CPA, your distributor, crop adviser or product manufacturer”.