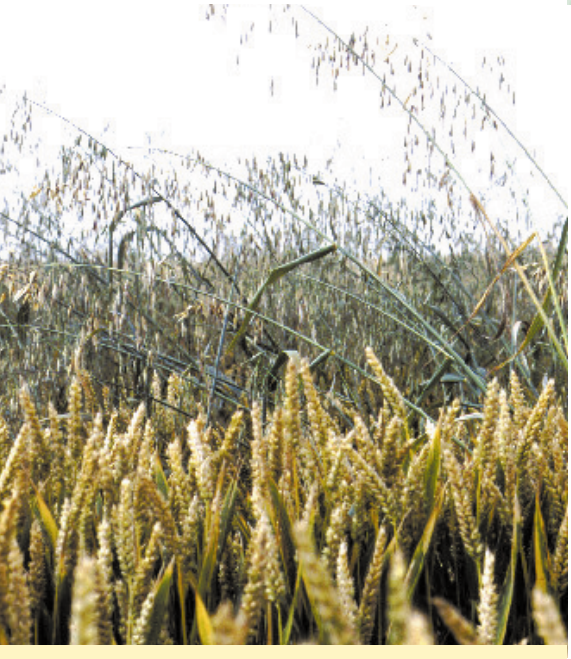
HGCA

Topic Sheet No. 46

Spring 2001

Dealing with herbicide-resistant wild-oats



Action:

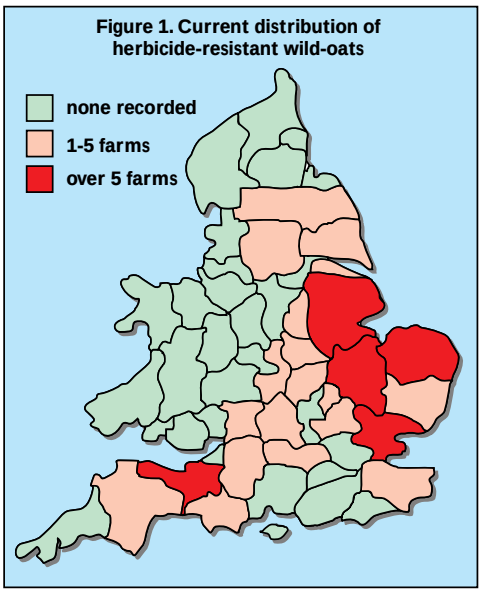
- **Maintain good field records in order to plan herbicide use.**
- **Map patches of wild-oats. Do not assume they are 'spray misses'. Use intensive hand-roguing, spray off with non-selective herbicides and minimise weed seed movement. Take action early.**
- **Monitor herbicide performance and identify causes of poor activity. If you suspect resistance, have seeds tested for resistance.**
- **Do not use 'fops' and 'dims' as the only means of grass weed control in consecutive crops. Consider herbicides with alternative modes of action.**
- **If resistance is suspected or confirmed, apply post-emergence herbicides when weeds are small (1-3 leaves) to maximise control of partially resistant wild-oats.**
- **Use cultural control wherever practical, including crop rotation, to reduce herbicide usage and extend the range of active ingredients available.**

Occurrence of resistance

Herbicide-resistant wild-oats, first identified in 1993, are now found on 68 farms in 21 counties in England (Figure 1).

Most cases have arisen separately on individual farms. Wild-oats self-pollinate, so any spread occurs by seed movement between neighbouring farms, not through pollen.

Figure 1. Current distribution of herbicide-resistant wild-oats



Characteristics of resistance

Resistance occurs in both species of wild-oats – *Avena fatua* (common wild-oats) and *Avena sterilis* ssp. *ludoviciana* (winter wild-oats). Most populations show partial, rather than absolute, resistance, which often develops in patches and may be mistaken for spray misses. Patches may be less than 100 m^2 initially, but often lengthen in the direction of combining.

Some wild oat populations are only resistant to 'fops' but not to 'dims' or any other herbicides (Table 1). Other 'fop'-resistant populations show cross-resistance to the 'dim' tralkoxydim, and to other herbicides, eg imazamethabenz-methyl (Dagger), flamprop-M-isopropyl (Commando).

No resistance has been found in the UK to tri-allate (Avadex), isoproturon (IPU), difenzoquat (Avenge) or cycloxydim (Laser).

Table 1. Commonly used 'fop' and 'dim' herbicides

'fops'		'dims'	
clodinafop-propargyl diclofop-methyl fenoxaprop-P-ethyl fluazifop-P-butyl propaquizafop quizalofop-P-ethyl	Topik in Tigress Ultra Cheetah Fusilade Falcon Pilot D	cycloxydim sethoxydim tepraloxydim tralkoxydim	Laser Checkmate Aramo Grasp

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Resistance mechanisms

Herbicide strategy should be tailored to the resistance mechanism(s) present on your farm. Tests on seed samples can indicate the mechanism(s) present.

- **Enhanced metabolism** resistance is more common and results in herbicide detoxification. Resistance is partial but plants may be cross-resistant to several different herbicide groups. Resistance does not necessarily increase rapidly, but does not decline if herbicide use is reduced.
- **Target site resistance** blocks the site of herbicide activity. In UK populations studied so far, it only affects 'fop' herbicides (and not 'dims' as is the case with target site resistant black-grass). Resistance tends to be absolute and may develop faster than enhanced metabolism.

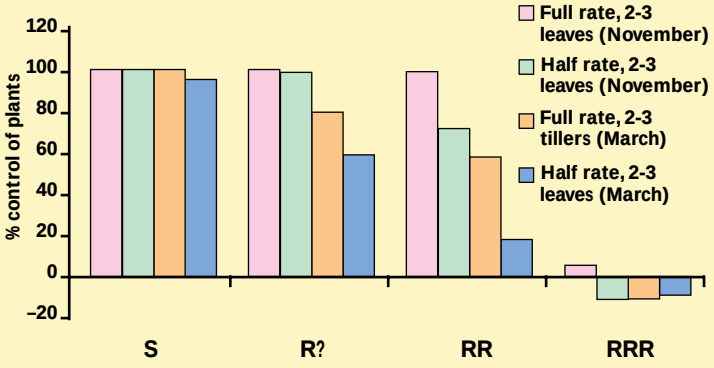
Herbicide timing

Correct timing is critical to maximise control of partially resistant wild-oats. Full rates applied early (2-3 leaves) can give good control. Later applications may give poor control, especially if reduced rates are used (Figure 2). As dose is reduced and timing delayed, the risk of inadequate control increases, especially if resistance is present.

Susceptible populations should be well controlled regardless of timing or dose. Herbicides will not control highly-resistant populations at any timing.

Figure 2. Effects of growth stage and resistance on control of wild-oats by fenoxaprop-P-ethyl

S = susceptible population
R?, RR, RRR = 3 populations with increasing levels of resistance



Summary

Collaborative research by IACR-Rothamsted and ADAS Boxworth has improved our understanding of herbicide resistance in wild-oats. The work was funded by MAFF, HGCA, Aventis, Cyanamid (now BASF), Monsanto and Novartis/Zeneca (now Syngenta).

Improved prevention and management hinges on correctly identifying the resistance mechanism(s), cultural control and judicious herbicide use.

Further information:

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Ongoing project 1467

Revised guidelines for preventing and managing herbicide-resistant grass weeds, produced by WRAG and published by HGCA.

Topic sheets are free

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