

Weed Management in Winter Oilseed Rape Crops

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Technical Note

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SUMMARY

This technical note considers weed management in winter oilseed rape crops. An integrated approach to management is given where possible.

- **Oilseed rape is grown as an autumn sown crop (winter oilseed rape) and a spring sown crop (spring oilseed rape).**
- **However, it is the time of sowing rather than variety type that has the biggest impact on weed species and growth.**
- **The time of sowing also has an effect on both cultural and herbicidal tools available for weed management.**

The Weeds

Table 1 present the results of the last published surveys of weeds in oilseed rape crops, confined to winter crops. Common chickweed was clearly the most common weed, and that is probably still the case. However, since those surveys were done it is suspected that cleavers are an increasing problem in Scotland, along with fumitory species, bromes and

volunteer oilseed rape, especially where the spring crop has been grown in the rotation. Charlock and runch may be surviving more often as autumn/winters appear to getting warmer. These can be a serious problem because there are few options for herbicide control. More locally, sow-thistles, poppy and crane's-bills may be increasing.

TABLE 1. Incidence of Weeds in Winter Oilseed Rape in Great Britain (in autumn)

Weed Species	% Occurrence	
	Whitehead & Wright (1989a)	Whytock & Carnegie (1990)
Common chickweed	98	100
Mayweeds	81	75
Common field-speedwell	71	25
Red dead-nettle	53	26
Cleavers	46	-
Shepherds purse	39	55
Field pansy	38	75
Charlock	34	16
Ivy-leaved speedwell	25	-
Common poppy	23	7
Common hemp-nettle	10	59
Volunteer cereals	88	77
Annual meadow-grass	80	98
Black-grass	40	-
Wild-oats	40	5

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Volunteer Oilseed Rape

Spring oilseed rape sub-species/ varieties appear to be 'weedier' than winter types. That is, they appear to be more frequently seen as weeds. Volunteer rape appears to be less of a problem in spring sown crops than in winter sown crops because spring and winter rape volunteers can emerge in the autumn and then be killed before sowing spring rape. However, it may be that spring rape plants are simply noticed more in winter rape because spring rape volunteers will flower with the spring sown crop. In winter rape they may even flower in the autumn, and certainly will look larger in winter/early spring than the sown winter crop. Winter rape volunteers are almost impossible to see amongst sown winter types, unless they are varieties with a very different growth habit. Whether winter or spring varieties, serious infestations may be a problem where the crop it is being grown to a specific quality.

Weed Competition

Volunteer cereals and grass weeds

In a review of weed competition trials, Lutman (1991) calculated that there is a clear linear relationship of increasing yield loss with increasing volunteer barley plant numbers, exaggerated by any delay in sowing (Figure 1). Essentially the later the drilling date the less barley plants it takes to affect yield, with a particularly dramatic effect once drilling enters September, due to reduced competitiveness from the crop. A 5% yield loss figure is given as an economic threshold above which a treatment is worthwhile. Lutman's (1991) analysis suggests that a 5% yield loss will occur in an average crop from about 100 barley plant/m² if the crop is sown on 26 August and from about 10 plants/m² when sown on 9 September. Other work in Germany and France suggests a threshold of about 20 barley plants/m², averaging effects of density and drilling dates. This confirms some British work, and may be a useful figure to consider.

The competitive effects of wild-oats, black-grass and barren-brome are thought to be similar or greater than of cereals. The individual black-grass plant tend to be less competitive, but this is compensated by population densities of this weed tending to be high. Annual meadow-grass can also be present at very high populations, but is less competitive than black-grass, and numbers of a thousand heads per square metre are probably needed to effect yield on earlier sown crops. Nevertheless, such populations can occur in some regions in mild, moist autumns.

Broad-leaved weeds

In general, it is assumed that broad-leaved weeds are less competitive than grass weeds in winter oilseed rape. Work undertaken at SAC and ADAS shows a poor relationship between total broad-leaved weed density and yield loss (Lutman, 1991). In 45% of herbicide treatments, yields were the same or less than the untreated yield. This tends to confirm results from other areas. For example in Germany, a detailed analysis of 249 herbicide trials indicated an average yield benefit of 0.3t/ha, equivalent to a 10.2% yield increase (Warmhoff, 1990). Scottish data (SAC trials) indicates a stronger relationship between weed ground cover in early spring with yield, with an approximate 1% decrease in yield for every 5% increase in weed ground cover.

There have been a few more detailed analyses of individual weed competitive effects and Table 2 shows the relative competitive indices of some weeds (from Lutman, 1991), but this information in part comes from wheat studies. It does confirm, however, the importance of cleavers. Cleavers appear to be particularly damaging once they have grown through the crop canopy. Chickweed and mayweeds are probably the most competitive of the other species. Overall, however, Lutman (1991) concludes from his review of SAC, ADAS and other trials that, excluding cleavers and other tall growing weeds, even populations of 200 plants/m² of low growing species have little effect on the yield of winter oilseed rape.

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TABLE 2. List of relative competitive indices (% crop loss/weed plant/ sq metre) of some weeds in rape and wheat

		Gerowitt & Heitefuss (wheat)	Wilson % Wright (wheat)
	Kust (rape)		
Cleavers	1.0	0.16	1.24
Common chickweed	0.3	0.08	0.16
Mayweeds	0.05	0.03	1.31
Red deadnettle	0.03	0.06	0.09
Field pansy	0.03	0.03	0.02
Forget-me-not	0.03	0.02	-
Shepherd's purse	0.03	0.02	-
Annual meadow-grass	0.03	0.02	-
Black-grass	-	-	0.25
	Denmark	N Germany	UK

Other Effects of Weeds

Harvesting

- SAC trials in cereals show more matter other than grain passing through the combine in weedy crops, increasing separation losses. This is probably also the case for oilseed rape.
- Tall, stemmy and scrambling weeds such as cleavers have the greatest effect on harvest efficiency.

Contamination

- Contamination of grain with weed seed is potentially expensive to clean (> £15/tonne), or in the case of some weeds' seed such as cleavers and brassicas, impossible to clean out, potentially leading to rejection. Other contaminants include seed heads of many species such as mayweeds.
- Contamination with weed seed effects quality of oils and other outputs; of particular concern are volunteer rape with different specifications, charlock and related brassica species, which can not be cleaned out from grain.
- In the case of seed crops, the failure to produce weed seed free lots will mean rejection.

Effects on pests and diseases

- Weeds can host a range of pests and diseases of rape, and can also effect the micro-climate within the crop so improving conditions for diseases such as botrytis. SEERAD- funded studies at SAC showed a correlation between weediness in spring and botrytis on rape pods.
- Of particular concern are cruciferous/ brassica weeds. These may be implicated with phoma leaf spot/ canker, alternaria, light leaf spot, downy mildew, powdery mildew and white-leaf spot.
- Some authors report sclerotinia of stem rot in a number of weed species associated with rape, but these are probably of less consequence than sclerotia in volunteer rape plants.
- In SEERAD-funded studies at SAC, there was evidence of an association between slug damage and the presence of weeds, particularly charlock. Other weed - pest associations may have included charlock, field pansy and fumitory with flea-beetle, true potato seedlings with aphids and leaf miners and fumitory and fieldpansy with slug damage.
- These pests and diseases were also associated with crop oil content and glucosinolate content changes. So the presence of weeds could indirectly effect the final quality of the grain.

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Weed Control

Weed Control through Rotation

Winter oilseed rape is a good break crop for the management of grass weeds such as black-grass, rye-grass and wild-oat because of the wide range of selective herbicides available that allow use of active ingredients to which there is no significant or known grass weed resistance: trifluralin, metazachlor, carbetamide and propyzamide.

Autumn sowing, however, tends to encourage populations of winter tolerant broad-leaved weeds that flower early, enhancing their weed seed bank, although the dense spring crop canopy does suppress spring emerging weeds.

Husbandry and Weed Management

Stale seedbed

The stale seedbed approach allows weeds to emerge in the stubble in direct drill situations or in a rough seedbed, to be killed by harrowing or a contact herbicide before sowing the next crop. The earliness of sowing of winter rape usually excludes the option of a stale seedbed approach to reduce weeds emerging with the crop. However, the approach can be of benefit where rape is following a fallow and weeds such as charlock and volunteer rape are a potential problem.

Tillage

Ploughing before sowing winter rape is an option where there have been severe combine losses or high grass weed populations in the previous cereal crop, so burying the weeds before they emerge in the rape. Leaving the heavily contaminated seed bank buried for at least two years will greatly reduce the viability of cereal grain and most grass weeds. Wild-oats are an exception. It should be noted, however, that volunteer cereals and most grass weeds are readily controlled in winter rape.

Ploughing does, however, tend to encourage broad-leaved weeds which can persist in deep seed banks and emerge when brought to the surface. Reduced tillage tends to reduce broad-leaved weed problems. There are exceptions such as cleavers.

Stubble burning

Stubble burning is still legal in Scotland and can be used after cereal harvest to reduce cereal grain and grass weed seed viability before sowing rape in reduced tillage systems and before weed seed is buried for future management in ploughed systems. However, it is important not to leave a layer of burnt ash on the soil surface as this can reduce the activity of residual herbicides used in rape crops.

Do not plough immediately after growing rape, but allow shed rape seed to germinate (which it will readily do with moisture available, allowing about 10 days after rain has fallen) and be killed. Otherwise dormancy will be increased in the rape seed which will then survive as a weed in the soil for at least up to 9 years, so affecting future rape crops and other crops in the rotation.

Controlling Weeds in the Crop

Physical Weed Control

Winter oilseed rape will stand early inter-row hoe cultivations and this is done in organic crops in some countries. However, this technique is damaging once the crop starts to cover the row, and fails to control weeds in the row. Volunteer cereals and grass weeds are a particular problem early in the season in the winter rape crop and it may be preferable to plough where reliant on hoeing for weed management to reduce these problems.

Weed control in broadcast crops has to be with a stale seed bed approach or other pre-sowing cultivation as hoes cannot be used and harrowing causes too much crop damage.

Herbicides

Volunteer cereals and grass weeds

- Pre-mergence residual herbicides, notably trifluralin, will reduce grass weed infestations, but a follow-up treatment is generally needed.
- From just after crop emergence, a range of foliar acting herbicides are available. Their dose depends on the growth stage of the weed. These are termed '-fops and -dims'. There can be some resistance to these herbicides in black-grass, rye-grass and rarely wild-oats.

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- Once the crop has 3-4 leaves in October, carbetamide and propyzamide are available and have a mix of residual and foliar activity. These are slower acting, and prefer less growthy conditions. There is no grass weed resistance to these herbicides.
- For very high populations of grass weeds and cereals a foliar acting herbicide may be needed early and then again in a split-dose or alternative product sequence where grass weeds come up over an extended period, or in sequence with carbetamide or propyzamide.

- Where black-grass, rye-grass or wild-oats are present, use carbetamide or propyzamide as part of the control programme to help reduce the rate of development of resistance to the other herbicides. There has been some promotion of use of 'fop' and 'dim' herbicides to improve control, but resistance development may be encouraged by such an approach.

1. Herbicides available for volunteer cereal and grass weed control in oilseed rape crops

Foliar acting herbicides (fast acting)	Residual + post-emergence activity (slow action)
Cycloxydim*	Carbetamide
Fluazifop-P-butyl *	Propyzamide
Propanil*	
Quizalofop-P-ethyl*	
Tepraloxym	
<i>From around cotyledon stage of crop and from 2 leaves of cereals/ grasses</i>	<i>From 3 leaf stage of crop, early –mid October, any stage of grass weeds</i>

* Not effective or not very effective on annual meadow-grass

2. Herbicides for general and broad-leaved weed control in oilseed rape crops

Pre-sowing	Pre-emergence	General post-em	BLW post-em
Trifluralin	Metazachlor	Metazachlor	Clopyralid
Napropamide	Metazachlor + quinmerac	Metazachlor + quinmerac	Clopyralid+ picloram
	Clomazone	Carbetamide	Cyanazine
	Propachlor	Propyzamide	Pyridate (SOLA)

General Weed Control

A range of products have some activity on major grass weeds, annual meadow-grass and some broad-leaved weeds.

- *Trifluralin* can be used pre sowing incorporated to control or reduce grass weeds whilst giving chickweed and speedwell control. It also has the advantage of having some activity on common fumitory. *Napropamide* also has approval for this timing in winter rape only, and to mix with *trifluralin* to broaden the spectrum of control. However,

it is seldom used because of cost and it is a very persistent residual which can effect the following cereal crop in dry seasons. Avoid sandy, gravelly soils with these herbicides.

- Trials at SAC have shown that trifluralin can give 70-80% of normal levels of activity in winter rape when applied pre-emergence (not incorporated) to a moist seed bed. It could be considered as a cheap option if little else except meadow-grass and speedwells are expected.

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- *Metazachlor* applied pre-emergence or once the crop has fully expanded cotyledons is a standard treatment for winter rape. It is most active pre-emergence of weeds, but will control a number of weeds at seedling stages in winter rape where moisture is less limiting. For cleavers, poppy and shepherd's purse, pre-emergence treatment is essential. Other weeds controlled include chickweed, crane's-bills, dead-nettles, corn marigold, mayweeds and speedwells; there is annual meadow-grass and some black-grass and brome activity.
- In broadcast crops, and on sandy or gravelly soils, metazachlor should be used at the post-emergence timing. Its relative flexibility means that metazachlor is often used in mixtures post-emergence.
- *Metazachlor* + *quinmerac* is available in two mixtures for winter rape. The higher quinmerac treatment (Katamaran) adds extra pre- and post- emergence cleaver and poppy control in particular to metazachlor, whilst the lower quinmerac content (Novell) adds better speedwell, pansy, red dead-nettle and cleaver control. Otherwise restrictions are as for metazachlor alone.
- *Clomazone* can also be added to metazachlor to improve cleaver, shepherd's purse and dead-nettle control and add some activity to a wide range of broad-leaved weeds, such as speedwells plus annual meadow-grass. However, it can only be used pre-emergence of the crop; it can cause a temporary whitening of the crop as it emerges under wet conditions. Do not use on broadcast crops.
- *Propachlor* can be used pre-emergence of winter rape (or after 3 leaves have developed) for control of a similar range of weeds to metazachlor but is seldom used because it has no post-emergence weed activity, cost and the high doses needed. It may, however, be more active than metazachlor on organic soils (but not fens). Do not use on broadcast crops.
- Once winter oilseed rape crop has three leaves, *propyzamide* can be used from 1 October and *carbetamide* from mid-October. These products are active on a wide range of grass weeds pre-and post-emergence, but also have activity on some broad-leaved weeds. *Propyzamide* is active on established chickweed, with some activity on seedling

speedwells and cleavers. Although propyzamide can be used until 31 January, it is best used in the autumn because it has persistent residual activity and can affect following cereal crops in a dry season. It readily mixes with a range of products.

- *Carbetamide* is active on seedling chickweed and speedwells as well as having pre-emergence activity on a range of other weeds, but by the time of use most weeds will have emerged. It is, however, less persistent than *propyzamide* and there is no residual carry over to following crops. It readily mixes with a range of products. Where it is uncertain that a rape crop will survive the winter, care should be taken as to which if any of these residual materials should be used, and *carbetamide* is preferred.

Broad-leaved Weed Control

There are no options for broad-spectrum broad-leaved weed control in oilseed rape.

- *Clopyralid* controls mayweeds, corn marigold, groundsel, sow-thistles and other thistles, from the crop three leaf stage to before flowerbuds are visible.
- A *clopyralid* + *picloram* product can be used at a similar timing to clopyralid alone, and importantly adds some cleaver control.
- *Cyanazine* can be used in winter rape only until 2007, once the crop has 5 winter-hardened leaves until end of January. *Cyanazine* can scorch the crop if it is not hardened, but it recovers. It has an important use for the control/ suppression of brassica weeds such as charlock and shepherd's purse but has an effect on other weeds such as dead-nettles and speedwells. In practice it also appears to kill or check volunteer spring rape, possibly by reducing their winter hardiness.
- There is an off-label approval (SOLA 011663 until 2008) for the use of *pyridate*, but only when the crop has 6-8 hardened leaves and not under any stress and up to 15 cm spring growth. There are specific weather conditions outlined on the label. This greatly limits its use, which is strictly at the grower's own risk, although it has useful activity on unusual weeds such as borage species, charlock and other brassicas and crane's-bills, as well as cleavers, speedwells and dead-nettles.

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Herbicide programmes

Clearly from the limitations of individual products outlined above, mixtures and sequences of herbicides may have to be considered. An early treatment based on metazachlor followed by a volunteer cereal/ grass herbicide is a common approach, but there are a series of options based on whether other weeds are a problem, such as cleavers or charlock. Some products cannot be mixed and need a gap; check the label before using any product in oilseed rape.

Resowing After Crop Failure

As long as the growing points on the main stem are not badly damaged, winter oilseed rape can tolerate severe damage to foliage and grow away well from axillary buds. However, if an oilseed rape crop has to be ploughed in then considerable care must be exercised in the choice of crop for

re-sowing if residual herbicides have been used in the autumn. If oilseed rape is being grown in a less favoured situation, e.g. late-sown, exposed sites, isolated crop in a pigeon infested area, etc, then it is preferable that the more persistent products are avoided. If a herbicide treated crop is to be replaced, check the herbicide label as to what cultivations must be undertaken and which crops can follow.

Precautions

Under the Food and Environment Protection Act, 1985, it is an offence to use non-approved products or to use approved products in a manner which does not comply with the conditions of approval on the label. Detailed guidance on how to comply with the regulations is given in MAFF/HSE publication: Code of practice for the safe use of pesticides on farms and holdings 1990; available from HMSO.

3. Impact of soil type, sowing procedure and conditions on herbicides

- Residual herbicides are very reliant on moisture for good activity, as well as having a good, even seedbed. Cloddy soils reduce activity.
- Heavy rain can take herbicides down to crop root levels and cause damage; this is particularly the case in sandy and stony/gravelly soils.
- Residual herbicide activity reduces when soils have a high organic matter content.
- In broadcast crops and direct drilled crops not well covered with soil, wait until the crop has established before using herbicides. Ensure that the crop roots are not exposed.

4. Reducing herbicide doses

- Trials at SAC show that there is potential for herbicide dose reduction, but this is likely to be influenced by soil conditions, weather pattern and crop vigour. Figure 2 shows the impact of a vigorous crop on chickweed control with metazachlor.
- Early residual herbicides tend to be more active in lighter soils, so potentially allowing some dose reduction.
- Post-emergence herbicides are very reliant on good crop vigour to assist control; good crop establishment can allow some reduction, but the weeds must also be small.

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Figure 1: Influence of drilling date on number of volunteer barley plants/square metre to cause a 5% loss in rape yield

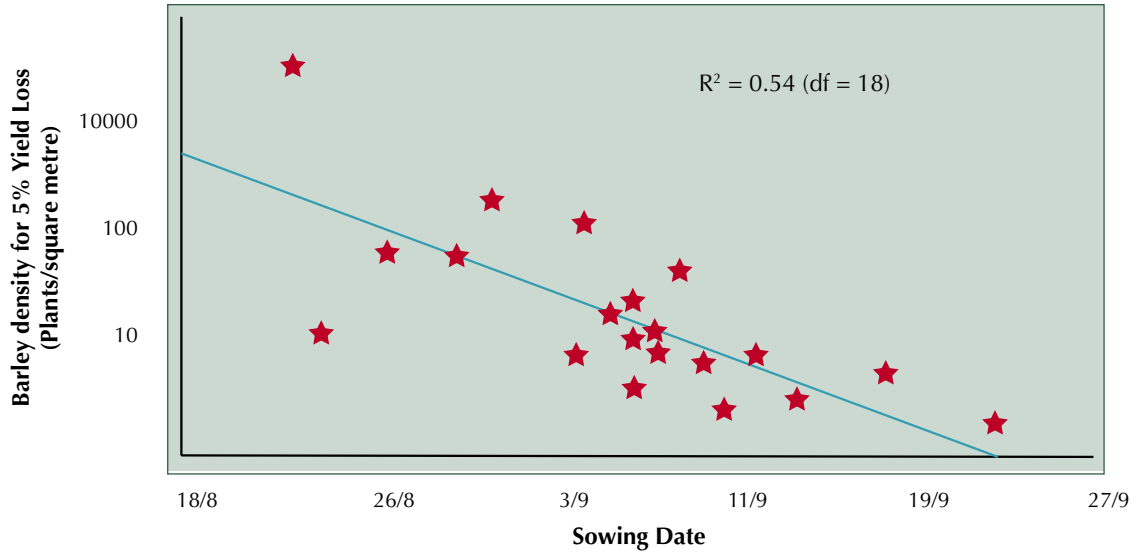
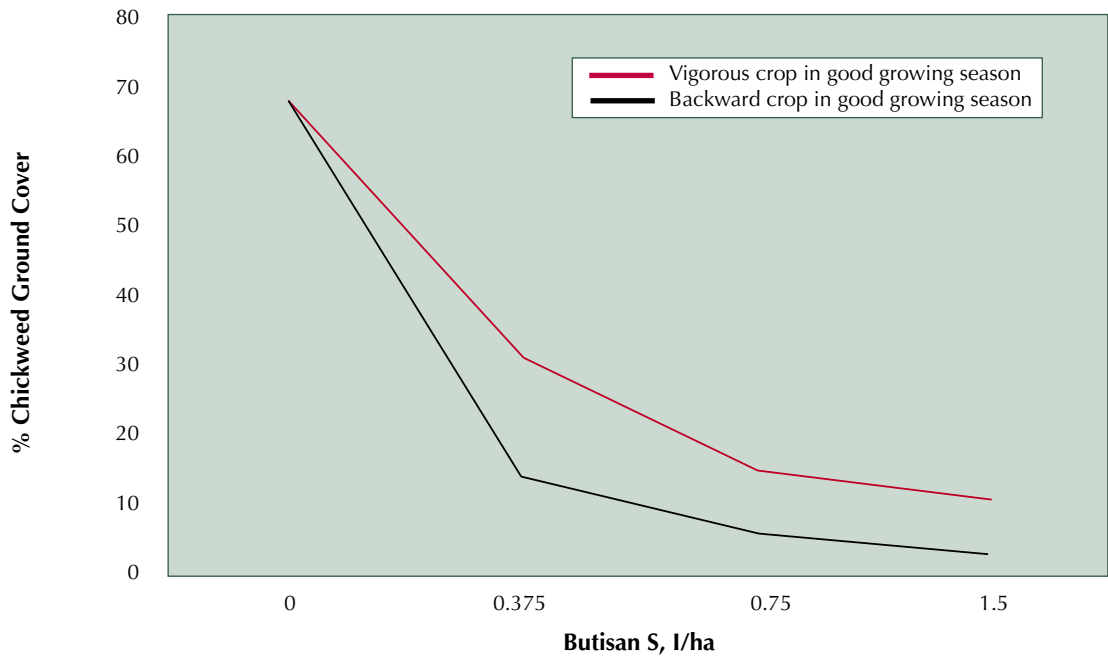


Figure 2: Effects of growing conditions on the activity of metazachlor (Butisan S) on Common Chickweed (SAC Trials)



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TABLE 3. Volunteer cereal and grass weed control in winter oilseed rape

	Metazachlor+	Trifluralin++	Carbetamide	Cycloxydim	Fluazifop-p-butyl	Propaquizafop	Propyzamide*	Quizalofop-p-ethyl	Tepraloxymdim
Weed species									
Barley volunteers	-	-	S	S	S	S	S	S	S
Oat volunteers	-	-	S	S	S	-	S	S	S
Wheat volunteers	-	-	S	S	S	S	S	S	S
Annual meadow-grass	S	S	S	-	-	m	S	-	S
Rough meadow-grass	-	(m)	-	-	-	-	(m)	M/S	-
Barren brome	M	-	S	S	S	-	S	S	S
Black-grass+	S	M	S	S	S	S	S	S	S
Wild-oat	-	M	S	S	S	S	S	S	S
Common couch-grass	-	-	M/S	-	M/S	M/S	-	M/S	M/S
Italian rye-grass	-	(m)	-	S	S	M/S	S	S	-
Perennial rye-grass	-	(m)	-	S	S	M/S	S	M/S	M/S
Black-bent	-	-	S	S	M/S	-	-	M/S	-
Creeping bent	-	-	S	M/S	M/S	-	-	M/S	-
Canary-grass	-	-	S	S	-	-	-	-	-
Loose silky-bent	-	-	-	S	-	-	-	-	-
Onion couch	-	-	-	M/S	-	-	-	M/S	-
Yorkshire-fog	-	-	-	-	-	-	S	-	-
Weed Growth Stage	Pre-em > seedlings	Pre-em	Pre-em > post-em	2 leaf > 1st node	2 leaf > 1st node	2 leaf > 1st node	Pre-em > post-em	2 leaf > 1st node	2 leaf > 5 tillers
Crop Growth Stage	Pre-em or cots	Pre-sow	3 leaf – 28 Feb	Cots – Crop canopy covers weeds	1 leaf – Crop canopy covers weeds	Cots – Crop canopy covers weeds	3 leaf – 31 Jan	Cots – 11 weeks before harvest	Cots-end November or 9 leaves

- M = moderately susceptible, m = seedlings suppressed, M/S = suppression of rhizomes, control of seedlings, (m) effects seen in trials (may be on label)* To reduce the potential for black-grass resistance to herbicides build-up, use combinations of herbicides in different chemical groups (include –fops and –dms as one group).
- Pre-em = pre-emergence, Pre-sow = pre-sowing incorporated, Cots = cotyledons, Crop canopy = when canopy stops spray penetration, Feb = February, Jan = January.

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TABLE 4. Susceptibility of common broad-leaved weeds to winter oilseed rape herbicides

Herbicides	Weeds													
	Clomazone	Metazachlor	Metazachlor + quinmerac	Propachlor	Trifluralin	Trifluralin / napropamide	Clopyralid	Clopyralid + picloram	Cyanazine	Metazachlor	Metazachlor + quinmerac	Carbetamide	Propyzamide	Pyridate (SOLA)
Weeds		Pre-em	Pre-em							Post-em	Post-em			
Bugloss	-	-	-	-	-	-	-	-	-	-	-	-	-	S
Charlock	MR	-	-	-	-	-	-	-	S	-	-	-	-	M
Chickweed, common	S	S	S	S	S	S	-	-	S	S	M	M	S	M
Cleavers	S	M	S	S	-	-	-	M	-	-	S	M	M	S
Cranes-bills	-	S	-	-	-	-	-	-	-	M	-	-	-	S
Deadnettle, red	M	S	S	S	M	S	-	-	S	S	M	-	-	S
Forget-me-not, field	MR	S	S	-	-	-	-	-	S	S	-	-	S	S
Fumitory	MR	-	-	-	M	M	-	-	-	-	-	S	-	-
Gromwell, field	-	-	-	-	-	-	-	-	-	-	-	-	-	S
Groundsel	M	-	S	-	-	-	S	S	-	S	-	-	-	-
Hemp-nettle /Day-nettle-	MR	-	-	S	S	M	-	-	-	-	-	-	-	S
Marigold, corn	-	S	-	S	-	-	S	-	-	S	-	-	-	S
Mayweeds	MR	S	S	S	-	S	S	S	-	S	S	-	-	M
Mustard species	-	-	-	-	-	-	-	-	S	-	-	-	-	-
Nettle, small	M	M	-	S	M	M	-	-	S	-	-	S	S	M
Nipplewort	-	-	-	-	-	-	-	-	-	-	-	-	-	S
Pansy, field	MR	-	M	-	-	-	-	-	-	-	-	-	-	-
Parsley-piert	-	S	S	-	-	-	-	-	-	-	-	-	-	-
Parsley species	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poppy	MR	S	S	-	M	M	-	-	-	-	S	-	-	-
Runch	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shepherd's purse	-	S	S	S	-	-	-	-	S	-	-	-	-	M
Speedwells	M	S	S	S	S	S	-	-	S	S	-	S	M	S
Spurrey, corn	-	M	-	S	M	S	-	-	-	-	-	-	S	-
Sow-thistles	M	-	-	-	-	-	-	S	-	-	-	-	-	-
Thistle, creeping	-	-	-	-	-	-	S	M	-	-	-	-	-	-
Weed growth stage	Pre	Pre	Pre	Pre	Pre	Pre	Post	Post	Pre-seedl	Pre-seedl	Pre-post	Pre-post	Pre-post	Post
Crop growth stage	Pre	Pre or cots	Pre or cots	Pre	Pre	Pre	3 lf- pre-flower	3 lf- pre-flower	5 lf- 31st Jan	Cots on	Cots on	3 lf-(mid Oct)-28 Feb	3 lf-(1 Oct)-31 Jan	6 lf- 150mm in sprng

- S = susceptible, M = moderately susceptible, MR = control of seedlings
- Pre: pre-emergence of weeds; Post: post-emergence at most growth stages; Pre-seedl: pre-emergence to seedling stages; Pre-post: pre-emergence to post-emergence, depending on weed, but check individual products for Pre and Post activity.

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TABLE 5 . Herbicide Product Information for Winter Oilseed Rape (No LERAP assessment requirement unless indicated)

Active Ingredient and Timing	Products	Manufacturer	Information
Pre-emergence of weeds			
Clomazone	Centium/ (Cirrus) 360g/l c£90/l @ 0.33l/ha	FMC	Pre-emergence, tank mix with trifluralin or metazachlor to add cleavers and broaden spectrum. Can be transitory whitening of crop as emerges in moist conditions. Not on light soils or sands.
Napropamide	Devrinol 450g/l 2.1l/ha mix with trifluralin	United Phosphorus	Pre-sowing incorporated with trifluralin up to 14 days before sowing.
Propachlor	Various (eg Ramrod) 480-500g/l c£35/l @ 9-13l/ha	Various	Pre-emergence or after 3 leaves of crop, but pre-emergence of weeds. Not on broadcast crops. May be most active residual on organic soils.
Trifluralin	Various (eg Treflan) 480g/l c£2.50/l @ 2.3l/ha	Various	Pre-sowing incorporated up to 14 days before sowing. Reduce doses in sandy soils. In trials and field use has been used pre-emergence of crop and weeds, but with reduced activity.
<i>Pre-or early post emergence of weeds</i>			
Metazachlor	Various (eg Butisan S) 500g/l c£20/l usually up to 1.5l/ha, can use 2.5l/ha	Various	Pre-emergence (within 48 hours of sowing) or from fully expanded cotyledons of crop. Pre-emergence of weeds, or seedling weeds depending on species. Do not use on broadcast crops or stony or very sandy soil.
Metazachlor + quinmerac	Katamaran 375+125g/l c£20/l @2l/ha LERAP (B) assessment required.	BASF	Pre-emergence (within 48 hours of sowing) or from fully expanded cotyledons of crop. Pre-emergence of weeds, or seedling weeds depending on species. Cleavers to two whorls. Do not use on broadcast crops or stony or very sandy soil.
Metazachlor + quinmerac	Novell 400+100g/l c£17/l @ 1.5-2.5l/ha LERAP (B) assessment required.	BASF	Pre-emergence (within 48 hours of sowing) or from fully expanded cotyledons of crop. Pre-emergence of weeds, or seedling weeds depending on species. Cleavers to two whorls. Do not use on broadcast crops or stony or very sandy soil.
<i>Post-emergence of crop and weeds</i>			
Carbetamide	Carbetamex/ Crawler 70% / 60% w/w 3kg/ 3.5kg/ha c£11/ £9.5kg	Makhteshim Agan	From 15 Oct, crop from 3 leaves, until end Feb. Some residual activity on weeds up to all stages of grasses, seedlings of some other weeds.
Clopyralid	Dow Shield 200g/l c£55/l @ 0.5-2l/ha	Dow	From 2 leaves of crop to flowerbuds visible. Up to 4-6 leaves of weeds. Sequences possible. Sequence of 0.5 then 1l/ha for creeping thistle possible.

Weed Management in Winter Oilseed Rape Crops

TABLE 5 *continued*

Clopyralid + picloram	Galera 267+67g/l c£77/l @ 0.35l/ha	Dow	From 2 leaves of crop to flowerbuds visible. Up to 4-6 leaves of weeds. Cleavers to 15 cm.
Cyanazine	Fortrol 500g/l c£11/l @ 1l/ha	Makhteshim Agan	From 5 winter hardened crop leaves until 31 Jan. 2-6 leaves of weeds, up to 10cm of some.
Cycloxydim*	Various (eg Laser)* plus adjuvant 200g/l c£30/l @ up to 1.5l/ha	Various	From expanded cotyledons to crop canopy closing, weeds from 2 leaves. Note label for adjuvant requirements.
Fluazifop-P-butyl*	Fusilade Max 125g/l c£25/l @ up to 1.5l/ha	Syngenta	From 1 leaf to before flowerbuds on crop. Weeds from 2 leaves. Note label for adjuvant requirements.
Propaquizafop*	Various (eg Falcon)* 100g/l c£30/l @ up to 1.2l/ha Some products (excluding Falcon) require LERAP B assessment.	Various	From expanded cotyledons to before flowerbuds appear. Weeds from 2 leaves.
Propyzamide	Various (eg Kerb) 400g/l or 50-80% w/w granules 50% granule: £30/kg @ 1-1.4kg/ha	Various	From 1 Oct, 3 leaves on crop, to 31 Jan. Some residual activity. Grass weeds all stages, some small broad-leaved weeds.
Pyridate*	Lentagran* 45% w/w c£10/l @ 2kg/ha LERAP B assessment required. (OLA 011663 to Dec 2008)	Syngenta	From 6-9 leaves on crop to mid-Dec, then from start of spring growth to 15cm stem extension. Weeds 4-6 leaves.
Quizalofop-p-ethyl	Sceptre plus adjuvant 200g/l Up to 0.25l/ha @ £30 CoPilot plus adjuvant 100g/l Up to 0.625l/ha @ £30	Bayer	From expanded cotyledon to before crop canopy closes. Weeds from 2 leaves. Note label for adjuvant requirement.
Tepraloxydim*	Aramo* 50g/l c£16/l @ up to 1.0l/ha	BASF	From expanded cotyledon to end-Nov or 9 crop leaves, whichever occurs first. Emerged small weeds.

..... Weed Management in Winter Oilseed Rape Crops

TABLE 6. Residual Effect of Herbicides for Winter Oilseed Rape

Active Ingredient	Recommended minimum Interval before drilling Cereal/grasses	Less susceptible Crops for spring
Trifluralin	12 months then mouldboard plough	Brassicas, field beans
Napropamide	12 months then mouldboard plough	Brassicas, potatoes
Propyzamide +/- clopyralid	30 weeks then mouldboard plough	Field beans, peas, brassicas
Propachlor	8 weeks	Should be no problems if mouldboard ploughed
Metazachlor +/- quinmerac	6 weeks?	Winter wheat or barley in same autumn if adequately ploughed. In spring: cereals, brassicas, beans, peas, potatoes, linseed
Carbetamide	16 weeks	Brassicas, field beans, peas, runner beans
Clopyralid	4 weeks	Cereals
Clopyralid + picloram	Next spring after autumn treatment	Spring oilseed rape, cereals, maize, rye-grass
Cyanazine	8 weeks then plough	Cereals, peas, potatoes, field beans

Check label for recommended cultivation before sowing next crop.

..... Weed Management in Winter Oilseed Rape Crops

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