

# Weed Management in Spring Oilseed Rape Crops

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Technical Note

TN579

ISSN 0142 7695

ISBN 1 85482 836 3

May 2005

## SUMMARY

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

### The Weeds

Spring oilseed rape is sown in April and May and this coincides with the peak of spring weed germination. At this time of year, broad-leaved weeds dominate, but annual meadow-grass will emerge in moister areas and locally wild-oats can be a problem. Occasionally other grass weeds are a problem, but except for common couch-grass, are much less of a problem than in autumn sown crops.

There has not been a specific survey of weeds in spring sown crops, but knot-grass, redshank, black-bindweed, fat-hen, hemp-nettles/day-nettles, mayweeds and chickweed are very common and locally charlock, wild radish/runch, corn-marigold, poppy, sow-thistles and creeping thistle are a problem. Charlock, runch and other brassica weeds can be a very serious problem because of the lack of suitable herbicide treatments.

#### Volunteer Oilseed Rape

Spring oilseed rape varieties appear to be 'weedier' than winter types. That is, appear to be more frequently seen as volunteers in other crops. However, 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, if spring varieties do emerge it is difficult to tell as they would tend to flower with the sown crop. Very different varieties may be distinguishable from differences in growth habit but winter rape volunteers may in any case be less inclined to emerge with the spring crop. Either way serious infestations may be a problem in the crop where it is being grown to a specific quality.

### Weed Competition

#### Volunteer cereals and grass weeds

These are generally much less of a problem in spring-sown than autumn-sown crops. Volunteer cereal populations tend to be lower and bromes are relatively rare. Black-grass may be found in very early sown crops. Wild-oats are more commonly found but are generally out-competed by the crop; however, they should be controlled as part of a long-term control strategy. Couch-grass can be serious in poor crops and reduce crop vigour. Annual meadow-grass can also be present at very high populations, but is a poor competitor once the crop starts growing.

#### Broad-leaved weeds

There has been relatively little research on the impact of weeds in spring sown rape. Most evidence suggests that yield responses to annual broad-leaved weeds are low because of the rapid canopy development in this crop. However, there may also be anecdotal evidence that in northern areas the relative slowness of early growth in colder springs may allow greater weed establishment and early competition. Weeds that smother early growth are the most serious problems in such areas, such as hemp-/ day-nettle, redshank and chickweed. Much more serious is the presence of brassica weeds such as charlock and runch which can grow as fast, if not faster than the crop, and can smother the crop early on and contaminate the grain later on. Given the lack of suitable herbicide treatments in the crop, badly infested fields should be avoided for spring oilseed rape growing.

Given the generally poor yield responses many growers in more favourable areas have omitted weed control in spring rape. However, this has ignored the other reasons for weed control outlined below.

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## 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 and bind-weeds effect harvest efficiency most.

### 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.
- 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 in winter crops.
- Of particular concern are cruciferous/ brassica weeds. These may be implicated with alternaria, downy mildew, powdery mildew and white-leaf spot.
- Some authors report sclerotinia or stem rot in a number of weed species associated with rape, but these are probably of less consequence than sclerotinia 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.
- Pests and diseases have also been associated with crop oil content and glucosinolate content changes. So the presence of weeds could indirectly effect the final quality of the grain.

## Weed Control

### Weed Control through Rotation

Growing spring rape reduces the build-up of grasses and winter tolerant broad-leaved weeds by allowing germination in the autumn of such weeds, which are then killed before flowering and before sowing the spring crop. However, broad-leaved weed control options are limited in spring rape and spring weed seed banks can be built up.

Most grass weeds can be controlled to some extent in spring rape, but where couch is a problem try to control it in previous stubbles or set-aside, or pre-harvest with glyphosate in cereal crops. Pre-harvest with glyphosate is possible in oilseed rape, but this crop tends to be harvested later in Scotland and the couch may be less sensitive.

## Husbandry and Weed Management

### Stale seedbed

The stale seedbed approach allows weeds to emerge in the stubble in reduced tillage situations or in a rough seedbed before being killed by harrowing or a contact herbicide before sowing the next crop. The approach can be of benefit in spring rape, and is essential where weeds such as volunteer rape, runch and charlock are a problem because there are very restricted other options for control (see pyridate below). It is, however, best to avoid fields with such a serious weed problem.

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## Tillage

Ploughing does tend to encourage broad-leaved weeds which can persist in deep seed banks and emerge when brought to the surface, and reduce annual grass weed problems. Reduced tillage tends to reduce broad-leaved weed problems, but may encourage some grass weeds.

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

## Controlling Weeds in the Crop

### Physical Weed Control

Spring 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. 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 (Table 1)*

- Pre-emergence 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 is 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 and rye-grass; also but rarely in wild-oats in some Eastern England counties. These also control volunteer cereals and check couch-grasses.

### *General Weed Control (Table 2)*

Two herbicides have some activity on major grass weeds, annual meadow-grass and some broad-leaved weeds. The range is much more limited in spring than winter crops.

- *Trifluralin* can be used to control or reduce grass weeds whilst giving chickweed plus fat-hen, hemp-nettle, knot-grass and redshank control in the spring crop. It also has the advantage of having some activity on common fumitory. It is relatively cheap. 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, but activity reduces in the drier conditions in spring. It is best applied as a pre-sowing incorporation treatment.
- *Metazachlor* applied pre-emergence (or once the crop has fully expanded cotyledons) is a standard treatment for spring 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, corn marigold, mayweeds and speedwells, plus 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.
- *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, in both spring and winter rape. But only pre-emergence of the crop; it can cause quite a severe temporary whitening of the crop as it emerges under wet conditions. Do not use on broadcast crops.
- *Propachlor* can be used pre-emergence of spring rape (or after 3 leaves have developed) for control of a similar range of weeds to *metazachlor* but is seldom used because it has

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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.

## *Broad-leaved Weed Control (Table 2)*

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 in winter and spring crops, from the crop three leaf stage to before flowerbuds are visible.
- There is an off-label approval (SOLA 011663 until 2008) for the use of *pyridate* in spring rape, but only when the crop has 6-8 hardened leaves and not under any stress. 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.

## *Herbicide Programmes*

In spring rape the options are severely limited and a *metazachlor* and/ or *trifluralin* start to a herbicide programme are the only options; these two can be used in sequence, but care is needed as some crop check has been seen in SAC trials. Only cereal/ grass herbicides or *clopyralid* are readily used as a follow-up. Some products cannot be mixed and need a gap; check the label before using any product in oilseed rape.

## Resowing After Crop Failure

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 oilseed rape is being grown in a less favoured situation, avoid the use of *trifluralin*. 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 (Table 4).

## 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.

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**TABLE 1: Volunteer cereal and grass weed control in oilseed rape (based on label recommendations)**

<b>Herbicide</b>  <b>Weed species</b>	<i>Metazachlor</i>	<i>Trifluralin</i>	<i>Cycloxydim</i>	<i>Fluazifop-p-butyl</i>	<i>Propaquizafop</i>	<i>Quizalofop-p-ethyl</i>
Barley volunteers	-	-	S	S	S	S
Oat volunteers	-	-	S	S	-	S
Wheat volunteers	-	-	S	S	S	S
Annual meadow-grass	S	S	-	-	m	-
Black-grass	S	M	S	S	S	S
Wild-oat	-	M	S	S	S	S
Common couch-grass	-	-	-	M/S	M/S	M/S
Italian rye-grass	-	(m)	S	S	M/S	S
Perennial rye-grass	-	(m)	S	S	M/S	M/S
<b>Weed Growth Stage seedlings</b>	Pre-em > seedlings	Pre-em	2 leaf > 1st node	2 leaf > 1st node	2 leaf > 1st node	2 leaf > 1st node
<b>Crop Growth Stage</b>	Pre-em or cots	Pre-sow	Cots - Crop canopy covers weeds	1 leaf - Crop canopy covers weeds	Cots - Crop canopy covers weeds	Cots - 11 weeks before harvest

M = moderately susceptible, m = seedlings suppressed, M/S = suppression of rhizomes, control of seedlings, (m) effects seen in trials (may be on label)\*

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 2: Susceptibility of common broad-leaved weeds to spring oilseed rape herbicides**

<b>Herbicide</b> <b>Weeds</b>	<i>Clomazone</i>	<i>Metazachlor</i>	<i>Propachlor</i>	<i>Trifluralin</i>	<i>Clopyralid</i>	<i>Pyridate (SOLA)</i>
Bugloss	-	-	-	-	-	S
Charlock	MR	-	-	-	-	M
Chickweed, common	S	S	S	S	-	M
Cleavers	S	M	-	-	-	S
Crane's-bill	-	S	-	-	-	S
Dead-nettles	M	S	S	M	-	S
Fat-hen	-	m	-	S	-	S
Forget-me-not	MR	S	-	-	-	S
Fumitory, common	MR	-	-	M	-	S
Groundsel	M	S	-	-	S	S
Hemp-nettle/ day-nettle	MR	mr	S	S	-	M
Knotgrass	-	-	-	S	-	-
Marigold, corn	-	s	S	-	S	S
Mayweeds	MR	S	S	-	S	M
Nettle, small	M	ms	-	-	-	-
Poppy, common	MR	MS	-	-	-	-
Redshank	-	ms	-	S	-	-
Runch/ wild radish	-	-	-	-	-	-
Shepherd's purse	-	S	S	-	-	M
Speedwells	M	S	-	S	-	S
Spurrey, corn	-	ms	M	S	-	-
Sow-thistles	M	-	-	-	S	-
Thistle, creeping	-	-	-	-	S	-
<b>Weed timing</b>	Pre-em	Pre-em	Pre-em	Pre-em	Post-em	Post-em- to 4 leaves
<b>Crop timing</b>	Pre-em	Pre-em	Pre-em	Pre-sow	From 3 leaf to before flowerbud	6 leaf to 15 cm stem extension

S= susceptible, MS= moderately S, R= resistant, MR= moderately resistant; s,ms,mr = at higher doses.  
Pre-em= pre-emergence, pre-sow= pre-sowing, post-em= post-emergence.

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**TABLE 3: Herbicide Product Information for Oilseed Rape**  
(No LERAP assessment requirement unless indicated)

Active Ingredient and Timing	Products	Manufacturer	Information
<b>Pre-emergence of weeds</b>			
<i>Propachlor</i>	Various (eg Ramrod) C£5/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.
<i>Trifluralin</i>	Various (eg Treflan) C£2.5/l @ up to 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>Clomazone</i>	Centium 0.25l/he C£90/l @	Belchim	Pre-emergence of crop and weeds. Seed covered with 20mm soil. Not on sands or VLS.
<b>Pre-or early post-emergence of weeds</b>			
<i>Metazachlor</i>	Various (eg Butisan S) C£20/l @ up to 1.5l/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.
<b>Post-emergence of crop and weeds</b>			
<i>Clopyralid</i>	Dow Shield C£55/l @ 0.5-1l/ha	Dow	From 2 leaves of crop to flowerbuds visible. Up to 4-6 leaves of weeds.
<i>Cycloxydim</i>	Various (eg Laser) plus adjuvant C£25-33/l @ up to 1.5l/ha	Various	From expanded cotyledons to crop canopy closing, weeds from 2 leaves. Note label for adjuvant requirements.
<i>Fluazifop-P-butyl</i>	Fusilade Max C£22-25/l @ up to 1.5l/ha	Syngenta	From 1 leaf to before flowerbuds on crop. Weeds from 2 leaves.
<i>Propaquizafop</i>	Various (eg Falcon) C£25-30/l @ up to 1.5l/ha Some products (excluding Falcon) require LERAP (B) assessment.	Various	From expanded cotyledons to before flowerbuds appear. Weeds from 2 leaves.
<i>Pyridate</i>	Lentagran WP C£10/kg @2kg/ha (SOLA 011663 until Dec 2008) LERAP (B) assessment required.	Syngenta	From 6 leaves on crop to before flowerbuds. Weeds 4-6 leaves.
<i>Quizalofop-p-ethyl</i>	CoPilot/ Sceptre plus adjuvant C£30/l @ up to 0.625l/ha for CoPilot	Bayer	From expanded cotyledon to before crop canopy closes. Weeds from 2 leaves. Note label for adjuvant requirement.

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**TABLE 4: Residual Effect of Herbicides for Spring Oilseed Rape**

<i>Active Ingredient</i>	<b>Recommended minimum Interval before drilling Cereal/grasses</b>	<b>Less susceptible Crops for spring</b>
<i>Trifluralin</i>	12 months then mouldboard plough	Brassicas, field beans
<i>Propachlor, metazachlor</i>	8-12 weeks	Should be no problems if mouldboard ploughed
<i>Clopyralid</i>	4 weeks	Cereals
<i>Clomazone</i>	6 weeks for winter cereals Mouldboard plough	Cereals, legumes, potatoes, turnip, onion, carrot, linseed

**Check label for recommended cultivation before sowing next crop.**

## **1. 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, stony and 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.

## **2. 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.
- Early residual herbicides tend to be more active in lighter soils, so potentially allowing some dose reduction.

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Acknowledgement

**This Technical Note has been prepared with funding from SEERAD.**