Swedes and Turnips – Integrated weed management

SAC

Technical Note

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Summary

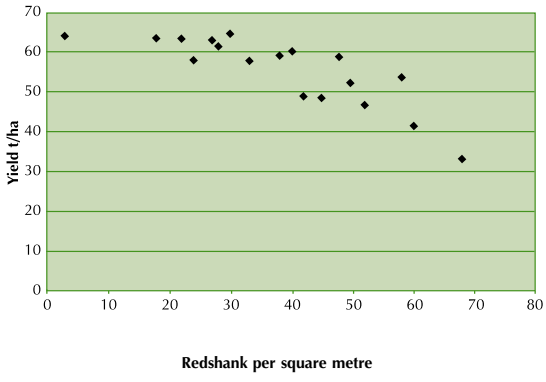
- Swedes and yellow turnip are highly susceptible to weed competition, particularly in the first six to eight weeks from sowing when the crop is open and growth is slow.
- Longer term weed control is also important: particularly for large numbers of later emerging, tall, shading weeds, such as fat-hen, and of tough creeping weeds that can interfere with harvest, such as knot-grass.

- Brassica weeds are very difficult to control in swedes and turnips and an integrated long-term approach is required.
- A low to moderate weed infestation later in the year, however, does not effect yield and is of considerable benefit to farmland birds.
- This note describes weed competition in swedes and turnips and both physical and chemical methods of weed control.

Weed competition

Swede and turnip crops are highly susceptible to weed competition. This is particularly the case for the first 6 – 8 weeks after sowing as the crop comes through the ground with the weeds but is then slower to develop. As a consequence it is readily smothered and outcompeted by the weeds.

Figure 1. Effect of Redshank population on fresh swede yield (SAC trial)



At this time very low populations of some weeds can be competitive. Figure 1 shows the response of swedes to redshank in an SAC trial, and a similar response can be expected to most of the larger weeds. Figure 2 gives the mean yield response to herbicide use in swedes from ADAS and MAFF trials, with losses reaching 4 t/ha from 200 broad-leaved weeds/m^2. The potential for such losses is confirmed from ADAS results shown in Table 1 with a 0.4 t/ha loss from up to 35 weeds/m^2 and up to 2.3 t/ha loss from over 135 weeds/m^2. Grass weeds can also be a problem, and Table 2 shows the crop yield response to common couch-grass control in East of Scotland College of Agriculture and ADAS trials.

Figure 2. Yield response to herbide application for different weed populations (modified from Cromack, 1984)

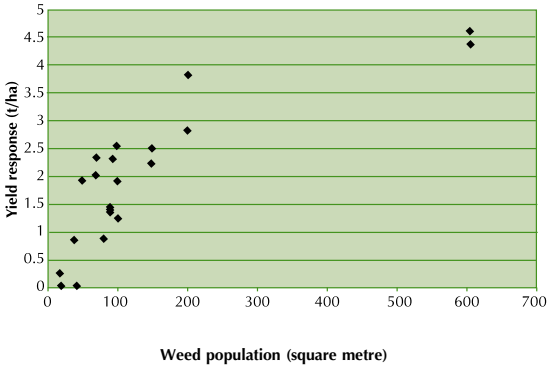


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Table 1: Average yield response to herbicides (from Cromack, 1984)

Broad-leaved weed population/m^2	Herbicide treatment response (t/ha DM)
0–35	+0.4
36–135	+1.5
over 135	+2.3

Table 2: Yield response (t/ha DM) to control of couch-grass *(Elymus repens)* in swedes (modified from Cromack, 1984)

Treatment	ESCA Trial	ADAS Trial
Propachlor/Alloxydim-sodium	6.8	6.2
Unweeded control	6.1	1.5

Although early competition is very important, late emerging weeds can also effect the crop. Notably, tall growing species such as fat-hen can emerge between rows and severely shade the crop later on.

The presence of weeds at harvest can also be a problem. Low growing, creeping species such as knot-grass and black bind-weed can tangle with lifting machinery, slowing harvesting and possibly increasing root damage levels. Where the crop is left in the ground for grazing this is less of a problem.

Benefits of weeds

Recent work by the Royal Society for the Protection of Birds has shown that fodder crops remaining in the ground in the autumn are very important in maintaining farmland bird populations. These crops usually have more weeds than other crops because of the relative limitations in efficacy of herbicides and late weed growth in a non-competitive crop. Farmland birds are very dependent on weed seeds in the autumn and winter, and possibly on arthropods living on weed plants. Allowing some late weed growth in swedes and turnips, particularly those for stock feed, will help local farmland and game-bird populations.

Table 3: Herbicides* for use in swedes and turnips

Active ingredient	Products	Dose per ha	Timing	Harvest Interval
Broad spectrum Chlorthal-dimethyl	Dacthal W75	6 kg	Pre-emergence of weeds; pre-emergence of the crop or once it has 3-4 leaves	–
Metazachlor	Various products*	1.5 *l*	Pre-emergence of the crop	–
Propachlor	Alpha Propachlor 50 SC Ramrod Flowable Tripart Sentinel	9 – 13^{+} *l*	Pre-emergence of weeds; pre-emergence of the crop or once it has 3-4 leaves.	–
Trifluralin	Various products*	1.7^{++} – 2.3 *l*	Pre-sowing incorporated of the crop	–
Broad Leaved weeds Clopyralid	Dow Shield	0.5 – 1 *l*	From two true leaves of the crop	6 weeks
Grass Weeds Cycloxydim	Various products*	0.5 – 2.25^{+++} *l*	From two leaf of swedes only to before crop canopy closure.	8 weeks
Fluazifop-p-butyl	Fusilade 250 EW	0.5 – 1.5^{+++} *l*	From four leaf of the crop up to 50% ground cover **	–
Propaquizafop	Various products*	0.7 – 1.5^{+++} *l*	From two leaf of crop to before weeds are covered by the crop	14 weeks

* Check http://www.pesticides.gov.uk for latest product availability

** Stock feed only

$^{+}$ For organic soils; $^{++}$ For light soils; $^{+++}$ For perennial grasses

Table 4: Susceptibility of common weeds to herbicide programmes for swedes and turnips

Active ingredients(s)	Black-bindweed	Black nightshade	Charlock	Chickweed, common	Cleavers	Dead-nettles	Fat-hen	Fumitory, common	Groundsel	Hemp-(Day)-nettle	Knot-grass	Marigold, corn	Mayweeds	Nettle, small	Oilseed rape	Orache, common	Pale, persicaria	Pansy, field	Penny-cress, field	Poppy, field	Redshank	Runch/Wild radish	Shepherds-purse	Sow-thistle, smooth	Speedwells	Spurry, corn	Thistle, creeping	Couch-grasses	Meadow-grass annual	Volunteer cereals	Wild-oat
RESIDUAL HERBICIDES																															
Trifluralin	S	S	R	S	R	MS	S	MS	R	S	S	R	R	MS	R	–	S	–	R	MS	S	R	R	R	S	MS	–	R	S	MR	MS
Trifluralin/metazachlor sequence	S	S	MR	S	–	S	S	MS	S	S	S	–	S	S	R	–	S	MR	R	MS	S	–	S	–	S	S	–	–	S	MR	MS
Triflurin/propachlor sequence	S	MS	R	S	S	S	S	MS	S	S	S	S	S	S	R	MS	–	–	R	MS	S	R	S	MS	S	S	–	–	S	MR	MS
Metazachlor	MS	MS	MS	S	MS	S	MR	–	S	–	MR	S	S	MS	R	–	–	MR	R	MS	MS	–	S	–	MR	MS	–	–	S	MR	MR
Propachlor	R	MS	R	S	S	MS	MR	R	S	S	R	S	S	S	R	MR	–	R	–	–	R	R	S	MS	S	S	–	–	S	–	R
Propachlor+chlorthal-dimethyl	MS	MS	MR	S	S	MS	S	R	S	S	S	S	S	S	R	S	–	S	R	S	MS	R	MS	MS	S	S	–	–	S	–	–
POST EMERGENCE HERBICIDES																															
Clopyralid	MS	–	–	MR	–	–	MR	–	S	–	MR	S	S	–	R	–	–	–	–	–	MR	–	–	S	MR	–	S	–	R	–	R
Cycloxydim	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	MS	R	S	S
Fluazifop-p-butyl	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	MS	R	S	S
Propaquizafop	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	MS	MR	S	S

S: Susceptible
MS: Moderately Susceptible
MR: Moderately Resistant
R: Resistant

This data is based on available Approved product labels

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Weed control with herbicides

No one herbicide available for use in these crops will give a full spectrum of weed control (Tables 3 and 4). Programmed approaches are necessary which are reliant on early residual herbicide treatments. These are usually based on trifluralin incorporated into the soil before sowing followed by propachlor or metazachlor pre-emergence of the crop. These herbicides are only really active on weeds before they emerge, although metazachlor has some activity on some weeds at cotyledon stage.

For certain situations, chlorthal-dimethyl is added to propachlor for improved speedwell, black-bindweed, knot-grass and redshank control, but it is an expensive option, and is only economically useful for high value ware crops. This combination can also be applied when the crop has 3 – 4 leaves, but this is only a top-up treatment if earlier weed control has prevented germination of weeds; it is not active on emerged weeds. Either product can also be used alone at this time, so long as weeds have not emerged.

These residual herbicides will persist for about six to eight weeks, thereafter the crop is generally reliant on its own ability to compete, or assisted with physical weed control approaches (see below).

If weeds emerge soon after sowing the crop, a contact herbicide (glyphosate or paraquat + diquat) can be added to control them. The swede or turnip crop should not have germinated and must be well covered with soil.

The only post-crop emergence herbicide treatments available are clopyralid for mayweeds, thistles and sow-thistles, and cycloxydim, fluazifop-p-butyl and propaquizafop for volunteer cereals, wild-oat, rye-grass, couch-grasses and some other grass weeds. Propaquizofop has some effect on seedling annual meadow-grass. Fluazifop-p-butyl can only be used on stock feed crops.

So, if the residual herbicides do not work because of dry soil conditions then there is no broad-spectrum fall-back herbicide treatment. The use of physical weed control programmes must then be considered. The other problem with a complete dependency on a herbicide programme is that certain weeds are very poorly controlled with available treatments. These are notably brassica weeds: charlock, runch, mustards, shepherd's-purse, penny-cress and related species, and volunteer oilseed-rape (see Improving Control of Difficult Weeds below), plus fumitory and borage/bugloss-type species.

Limitations on herbicides

There are soil restrictions on residual herbicides for swedes and turnips, outlined in the box below. In organic soils a common practice has been to use propachlor as a band-spray over the sown crop drill, then inter-row cultivate for weed control.

Soil restrictions on residual herbicides for swedes and turnips

Herbicide	Sands	Very Light	Organic	Light/ Medium/ Heavy
Chlorthal-dimethyl	+	+	–	+
Metazachlor	–	–	–	+
Propachlor	+	+	+	+
Trifluralin	–	+	–	+

+ can be used; – cannot be used

Chlorthal-dimethyl has a 3 month minimum interval before sowing other crops, and trifluralin a 5 month interval before sowing cereals or grass and 12 months for fodder beet. Check the product labels for other limitations. Propachlor and metazachlor-use allow re-sowing of some crops after 6-8 weeks. Note the harvest intervals for the post-emergence herbicides in Table 3.

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Improving control of difficult weeds

Weed control in swedes and turnips can be greatly improved by use of land that has been in grass for a number of years, or has had a number of years of cereal crops with good weed control. However, some weeds can persist in the seedbank for a number of years, and this includes the brassica weeds which are particularly difficult to control in swedes or turnips.

Where such weeds are likely to be a problem, and to improve management of other weeds, a stale seedbed approach is encouraged. In organic farming systems it is essential. A rough seedbed is prepared in late March/early April which encourages a flush of weeds. These are then controlled by shallow cultivation or by use of a contact herbicide just before drilling the crop. Glyphosate is the most common herbicide used because of the relatively low cost, but paraquat +/- diquat is also used. The less disturbance of the soil the better so as to reduce further weed germination. If there is time to repeat the operation, all the better. This reduces the seedbank available for germination in that season, and may be the only way serious brassica weed populations can be reduced.

Herbicides for use in stale seed-beds and pre-emergence of the crop

- Glyphosate products, paraquat and paraquat + diquat products can be used to control weeds in a stale seedbed approach. With glyphosate products it is preferable to leave 24 hours before sowing or cultivating, although with some formulations a 6 hour gap is possible. With paraquat +/- diquat, sowing or cultivations can take place after 4 hours. Most seedling weeds are controlled. Perennial weeds will be checked; particularly with use of glyphosate.

- These products can also be tank-mixed with residual herbicides applied soon after sowing if weeds have emerged, or clumps of grass remain after cultivation, so long as the crop has not started to emerge.

- Note that die-back of dense vegetation leaving a lot of surface trash can effect the emergence of the crop.

- Products suggested:

Glyphosate	Various products	1.5–3 l/ha	Before sowing or pre-emergence of the crop
Paraquat	Gramoxone 100; Barclay total	2–5.5 l/ha	Before sowing or pre-emergence of the crop
Paraquat + diquat	PDQ	2–5.5 l/ha	Before sowing or pre-emergence of the crop

Physical weed control

For organic farming systems physical weed control is the only in-crop approach. This may also be the case in conventional systems where residual herbicides have failed, usually due to dry soil conditions, or where certain weeds have escaped treatment. Also in highly organic soils, herbicides are much less active and physical weed control may be essential.

When crops were regularly drilled at 5cm spacing, weeds in the row were controlled during singling, and then inter-row cultivations kept them reasonably clean. Drilling to a stand greatly reduced labour requirement for singling, but weed control in the drilled row without recourse to herbicides requires very skilled inter-row cultivation in order to be able to work close to the crop. The most common inter-row cultivators are based on hoes, with crop shields to deflect the crop from the hoes. Brush-weeders and rolling cultivators can be used, but cannot easily be worked close to the crop rows. The use of cultivators is improved with wider crop rows and drilling on the flat, although especially designed wide beds can be used. Ridging once the crop is well through the ground can smother seedling weeds in the row, but again requires considerable skill.

On small acreage specialist high value organic ware crops, in-row hoeing by hand may still be needed and be economical.

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Inter-row cultivations are very effective on seedling and shallow-rooted weeds, particularly if conditions are dry. Tap-rooted and rhizomatous weeds are much more difficult to control, and some regrowth can be expected. The use of hoes gives better tap-root control than rolling cultivators or brush-weeders. In practice around two to three passes are needed in a season, more where ground conditions remain moist.

Growing under covers

The increasing use of woven covers in ware crops prevents later physical weed control, so the grower is reliant on the selection of relatively weed free fields, efficient use of stale seed-beds and early residual herbicide treatments before the covers are applied. Late tall weed growth is a problem as it lifts the covers and identifying fields without tall weed problems that are difficult to control is important; notably volunteer oilseed rape, charlock and fat-hen.

Transplanted crops

Transplants of swedes and turnips are not used in conventional cropping systems in the UK. Their use may be of benefit in organic systems where the plants can be given a head-start over weed emergence after stale seed-bed preparation approaches.

Safety Precautions

Only use herbicides that are Approved for the treatment. Take great care to prevent spray drift onto neighbouring crops and vegetation. Follow the manufacturer's label recommendations and the FEPA Codes of Practice.

Reference: H T H Cromack (1984). The economics of weed control in fodder root crops.

Proceedings of Crop Protection in Northern Britain, 1984, 202-209.

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