

Weed Management in Organic Brassicas

About the crops:

- Brassicas are well adapted for growing in the UK climate and many can be produced all year round
- Brassica crops require a free draining moisture rich soil with a high level of fertility and pH above 6.0
- Brassicas can follow on directly after a ley or follow a cereal crop. The land should be ploughed and prepared early in the year to allow time for a cultivation before planting that will kill any emerged weeds
- With the exception of turnips and swedes, most brassica's are sown into modules or blocks then transplanted at 4-5 true leaf stage
- Following crop establishment, weeds should be controlled without delay
- Precise row spacing and careful alignment of cultivating tools facilitate mechanical weed control
- Weeding is repeated as necessary, and cultivations can become more thorough as the crop develops
- When the crop plants are large enough not to be buried, tools can be arranged to move a 2.5 cm layer of soil towards and into the crop row
- Brush weeders can be used on lighter soils to remove small weed seedlings close to the transplants when plants are still at a small stage
- Once plants are more robust, finger weeders will achieve good intra row weed control, on lighter soils
- On heavier soils steerage hoes can be used to bury weeds both within and between the rows
- Later in the season, many brassica's achieve adequate canopy cover to suppress weeds



January King cabbage

How can weed problems be reduced?

- Weed control is helped by an appropriate rotation which will avoid the build up of large populations of weeds. Making the most of opportunities for weed control provided in one crop can frequently ease weed control problems in the crop that follows
- Brassicas tend to be vigorous and fast growing and rapidly develop a broad shading canopy to compete well with weeds
- Certain varieties may be better suited in weedier conditions, refer to NIAB handbook for information
- Brassicas that are transplanted will instantly have an advantage over the weeds, being at a more advanced growth stage
- A firm deep tillth is required for successful transplanting and establishment, getting the crop off to a good start is the primary defence measure against the weeds
- The preparation of a false (stale) seedbed in the direct-sown brassica crop may be used to reduce weed numbers before drilling the crop. Secondary cultivations may be used to kill emerged and germinating weed seedlings but must be shallow enough to avoid stimulating a further flush of weed emergence. Flame weeding will also kill the emerged weed seedlings and without disturbing the soil. Germinating weeds beneath the soil surface will not be killed. The period from drilling to crop emergence is usually too short to provide an opportunity to kill early emerging weeds before the crop appears. If conditions allow, delayed drilling of the crop may give weeds more time to emerge and be killed before crop emergence. Careful timing of flame weeding is needed to kill the maximum number of weeds without damaging the crop seedlings



Cabbage after finger weeding

- The use of a false seedbed to reduce weed numbers in the transplanted crop is also feasible. Secondary cultivations prior to planting bare-root or module-raised plants will kill emerged and germinated weeds but success depends on soil conditions
- Mulches laid directly onto the soil surface provide a physical barrier to weeds. Materials available for use as mulches include; black polythene, black non-woven polypropylene and paper. This can be quite an expensive option for a medium value crop which naturally competes well with weeds

Cabbage

- The different types of cabbage include spring, summer, autumn, and winter cabbage including winter white and Savoy
- The crop is established following conventional primary and secondary cultivations
- Cabbage may be direct sown but is more likely to be grown from bare root or module-raised transplants
- Between 50,000 and 70,000 modules are required per ha depending on the type of cabbage being grown
- Free draining, deep soils are best and light, sandy or shallow soils should be avoided

Direct weed control

- Crops can be direct sown with spaced seeds but subsequent weed control needs to be carried out over a longer period
- Autumn ploughing is preferred as this gives time to produce a fine settled tilth
- After ploughing, 2 spring tine cultivations are followed by 2 passes with a harrow
- The land may be rolled before or after drilling
- Spring ploughed land requires more extensive cultivations to achieve even a moderate seedbed
- Row and plant spacings range between 60 x 45 cm and 40 x 40 cm but this depends on the final head size required and the implements available
- Good weed control is essential to maximise crop uniformity, quality and yield
- The key period of weed control is the first four weeks after transplanting. Weeds that emerge after this are less likely to compete with a well established crop
- The crop should be kept free of weeds by surface cultivations using a tractor-mounted cultivator between the rows and hand hoeing around the plant
- If the crop is planted on the square, cross cultivations can be used
- Soil should be drawn up towards the plants
- Inter-row cultivations with brush-weeders, finger-tine weeders, harrows or tractor-drawn hoes will control weeds within the crop row. The number of passes needed will depend on the weed population
- Hand-hoeing between the rows may be used during early crop establishment, but the crop rapidly forms a dense leaf canopy that helps to suppress further weed development
- Hand-labour requirements for weeding have been estimated at 50 man hours/ha
- Using broadspectrum harrows may eliminate the need for hand weeding
- Once the transplanted crop is well rooted, around 3 weeks after planting harrows can be taken through
- There must be adequate speed to ensure the tines vibrate and uproot the weeds, around 8 km/h is ideal
- As the crop develops the leaves spread into the inter-row and care is needed to minimise crop damage
- Transplanted cabbage has a relatively high tolerance to heat, enabling band-flaming to be used along the crop row
- The tolerance of cabbage to flame weeding is due primarily to the waxy nature of the leaves. However, the level of tolerance within each individual crop will depend on the growth stage of the crop and the waxiness of the leaves. Flaming may be successful if applied at 3 weeks after crop planting
- In field trials, a single but thorough weeding 3 to 8 weeks after planting has been shown to prevent yield loss



A tine weeder in transplanted cabbage

Cauliflower

- Cauliflowers can be divided broadly into three maturity groups: summer, autumn and winter
- The edible portion of the cauliflower is the curd which is an arrested stage of flower development
- It is particularly sensitive to compaction and poor soil structure
- Plant spacing ranges from 50 x 50 cm for the faster growing summer types to 70 x 70 cm for the slower growing winter types
- Options for weed control are the same as cabbage above
- As with cabbage, the cauliflower crop has some tolerance to flame weeding and treatment at 2 weeks after crop planting has been evaluated
- Once the canopy closes over the rows any weed understorey will not significantly affect the crop yield



A Cornish organic cauliflower

Broccoli

- Transplanted broccoli rapidly develops a broad, shading leaf canopy
- Inter-row weed control with a row crop cultivator, spider gang tool or a brush hoe 15 to 25 days after planting has given good weed control
- Flexi-tine harrows provide adequate within and between row weed control but damage poorly established crop plants and reduce yield.
- In transplanted broccoli in the USA, a single cultivation 10 days after planting was sufficient to prevent yield losses due to weeds. A further cultivation 10 days later reduced weed biomass but did not improve crop yield. Interseeding with winter cover crops winter rye (*Secale cereale*), hairy vetch (*Vicia villosa*) or a mixture of the two after the final cultivation allowed the cover crop time to establish without sacrificing broccoli yield. However, there was a suspicion that the winter rye was competing with the crop for nitrogen
- As with cabbage, the broccoli crop has some tolerance to flame weeding and treatment at 2 weeks after crop planting has been evaluated

Brussels sprouts

- Brussels sprouts are a generally weed suppressing crop that can be ridged up
- The wide spacing of the crop gives ample scope for mechanical weeding
- Transplanted Brussels sprouts have an initial advantage over emerging weed seedlings, nevertheless, if left unweeded sprout yield is likely to be reduced by 13 to 24%
- Early weeding is needed to avoid yield loss. Weeds have already begun to affect crop growth by mid-August
- Close crop spacing (45 x 45 cm) increases weed suppression compared with wider spacing (61 x 61 cm) but within-crop competition then tends to reduce the yield of individual sprout plants
- At closer row spacing, tractor access for steerage hoeing becomes more difficult after early August
- As with cabbage, the Brussels sprout has some tolerance to flame weeding and treatment at 3 weeks after crop planting has been tried successfully



Variety 'Doric' on trial

Swede

- Unlike other brassicas, swedes do not require a highly fertile soil and should not be grown in a soil that has had muck recently applied
- As they are a directly seeded crop, early weed control is more of an issue. Drilling should take place into a stale seedbed that is flame weeded shortly before emergence, then subsequent weed control achieved using brush weeders and steerage hoes
- In Scotland, swede turnips (*Brassica napus*) were grown for feeding to cattle. The crop was grown on 70 cm spaced ridges and sown at 5 cm spacings. Weed control operations consisted of scarifying down the ridges and hand-hoeing or mechanical inter-row cultivating with a tined cultivator
- Trials have shown the optimum time for weed removal is 6 weeks after sowing or 2-4 weeks after 50% crop emergence

Turnip

- Turnip has been considered a cleaning crop in the rotation because regular inter-row cultivations can be carried out until canopy closure
- By sowing turnips after a ley all the weeds that germinated could be destroyed by cultivations. In the past, the inter-rows were horse-hoed and the rows were hoed when the crop was singled. A second weeding was carried out later if required
- The crop is often sown late to avoid turnip fly and mildew leaving time for cleaning the land before sowing. Inter-row cultivations can be used after crop emergence
- Trials have shown the optimum time for weed removal is 6 weeks after sowing or 2-4 weeks after 50% crop emergence

Kale

- Kale may be sown late, up to the middle of June, missing the main period of germination for many weeds
- Broadcasting the seed or sowing in narrow rows increases the rate of ground covering but prevents mechanical weeding
- In the USA, in transplanted kale, a single cultivation 10 days after planting was sufficient to prevent yield losses due to weeds. A further cultivation 10 days later reduced weed biomass but did not improve crop yield
- Intercropping maize with kale for silage production can have advantages in terms of yield and weed suppression over the crops grown alone

For further information on weed management go to www.gardenorganic.org.uk/weed-management. There you will find the following:

- ◆ Advice on over 130 individual weeds, from Black Grass to Yarrow www.gardenorganic.org.uk/weeds-list
- ◆ Advice on cultivation controls, such as crop rotation, tillage and hygiene www.gardenorganic.org.uk/cultural-weed-controls
- ◆ Direct control methods, such as mulching and mechanical control www.gardenorganic.org.uk/direct-weed-controls
- ◆ Crop weeding strategies, in field vegetables, fruits and grasslands www.gardenorganic.org.uk/crop-weed-management-strategies
- ◆ Further reading in research papers.



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Disclaimer

The information contained in this leaflet has been compiled from a range of sources. It is accurate to the best of our knowledge. Authors are not responsible for outcomes of any actions taken based on this information.

