

Weed Management in Organic Beans

About the crops:

- Weeds are a particular problem in crops grown for processing. At crop harvest, easily uprooted weeds can contaminate the crop with soil and stones carried on their roots. Other weeds become entangled in the harvesting machinery. Berries, flower heads and seed capsules can contaminate the final product unless removed by flotation or by hand

How can weed problems be reduced?

- Weed control is helped by an appropriate rotation which will allow 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
- Certain varieties may be better suited in weedier conditions, refer to NIAB handbook for information
- Transplanted beans will instantly have an advantage over the weeds, being at an advanced growth stage
- A firm deep tilth 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 bean 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 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
- The use of a false seedbed to reduce weed numbers in the transplanted crop is also feasible. Secondary

Broad beans

- Broad beans will grow in a wide range of soils and are relatively hardy, the minimum temperature for active growth is 4-5 °C
- Soils can be of only medium fertility but need to have good drainage and be free from compaction. Water logging can be fatal for overwintering crops. Heavy but well structured and well drained soils are ideal for autumn-sown crops. Early sowings in spring are best on lighter more easily worked soils. The soil should not be deficient in lime and with a pH between 6 and 7. Seedbed preparations should be kept to a minimum to avoid compaction. The beans can tolerate a fairly cloddy soil.
- The earliest crops are sown in October-November. Further sowings are made from late-January-February through to April
- It is important to ensure free air movement around plants to avoid fungal diseases
- Wide row spacings allow inter-row cultivations and hand weeding
- Chain harrowing can be carried out pre-emergence and later the crop can be ridged with care
- In spring-sown broad beans a single weeding at 3 weeks after 50% crop emergence was sufficient to prevent yield loss

Dwarf beans

- In studies of the effect of row spacing on weeds, narrower row spacings had earlier canopy closure, and when the crop was weeded initially further weed growth was reduced
- In trials, yield loss in plots left unweeded was less at the narrow row spacing. Early weeding (during first 5 weeks) was better than leaving the crop weedy for 5 weeks then weeding
- A single pass with a row crop cultivator, a spider gang tool a brush hoe or flexi-tine harrowing did not provide adequate weed control in snap beans. Combinations of the implements provided better weed control but not where rainfall delayed weeding operations. Climatic conditions following the soil disturbance during mechanical inter-row cultivations determined weed abundance. Lower species diversity and richness was observed under drier conditions
- The crop canopy remains open for some time and a single pass is not sufficient for full season weed control
- French beans cannot be harrowed from 3 days prior to emergence until the 1st true leaf stage because the loop of the emerging shoot is easily broken. In the Netherlands harrowing once before this period and hoeing twice after this period gives good weed control. Although early harrowing is damaging, weeds need to be controlled at 2-3 weeks after crop emergence to avoid yield loss

Field beans

- Field beans have a high moisture requirement and grow best on loamy or clay soils
- Grown as a break crop after cereals in the rotation, field beans can be undersown with ryegrass to aid weed suppression
- The cultivations needed for seedbed preparation depend on the weeds present and the time of sowing
- Disking may be required if there is a high weed population present
- Later sowings demand a finer seedbed and may involve using spring-tines
- There may also be time to include a stale seedbed approach.
- Broadcasting the seed or using narrow row spacing gives greater weed suppression but reduces the weed control options.
- Wide row spacing facilitates mechanical weed control, the number of passes depends on weed density and crop and weed growth stages.
- Weed control may be initially with spring-tine harrows then inter-row hoeing.
- Blind harrowing and inter-row cultivations can keep the weeds under control at early crop stages
- Once the early weeds are controlled, field beans tend to smother out later emerging weeds

Runner beans

- The soil should be medium to light textured, freely drained and well structured. The pH should be between 6.0 and 7.0 except on peaty soils where a pH of 5.5 does not adversely affect the crop
- Beans must be able to root deeply to grow well. Runner beans are sensitive to waterlogging. The land should be ploughed in early winter to allow weathering
- Early crops are sown from late March to early April, the main crop from late April to early May. Later sowings at the end of June produce low yields of high quality beans in late September. Early crops may be raised from seed chitted in damp peat prior to sowing or from transplants raised in peat blocks under glass. The chitted seeds are planted out carefully so as not to damage the developing roots and shoots. The young bean transplants are set out when the risk of frost has lessened. Plants may be raised in this way for maincrop plantings too
- The land should be free of couch, creeping thistle, docks and other perennial weeds (ADAS, 1971). Hand hoeing in May takes 45 to 90 man hours per ha
- In runner beans in Poland, a single weeding between 4 and 7 weeks after sowing was sufficient to prevent a significant yield loss, without any weed control, yield loss could reach 90%
- Mulching with black plastic on a field scale is possible with runner beans planted through holes in the sheeting, however, the system is expensive due to the costs of material and labour. Mulching can be combined with the use of crop covers for earlier cropping

Spring beans

- Land can be ploughed in January, spring beans may be drilled and ring-rolled, seed is sown at a depth of 7-8 cm in wide (45-50 cm) or narrow (10 cm) rows; the wide rows allow for mechanical inter-row weed control, the narrow rows are weeded with spring-tines at any time up to a crop height of 15 cm. The crop is not usually harvested before mid-September
- Early removal of volunteer winter barley in spring beans sown in March prevented yield loss if carried out when beans were the 2-4 node stage. Allowing the cereal to remain for a further 4 weeks before removal resulted in some yield loss but not as great as that of the unweeded crop

Winter beans

- Winter beans may be broadcast and ploughed to 15 cm deep or drilled and ring-rolled
- Early to mid-October is considered the best time for sowing to minimise weed competitiveness. The beans are harvested in early August to late September.
- Studies of inter-cropping field beans and wheat have shown the importance of matching harvest dates by choosing an early maturing bean and a late maturing wheat. The optimum crop density was 75% of the recommended sole cropping density for each component. The beans were sown first and the wheat sown a day later at right angles to the beans. The weed biomass under the intercrop was lower than under the crops grown separately. It was possible to harvest both crops together by combine harvester and the seed could be separated mechanically or left as a mixture for stock feed
- Autumn-sown field beans are generally resilient to weed interference and in some field studies the maximum yield loss was only 33%. However, in studies of the time of weed emergence relative to the crop, the earlier the weeds emerged the greater the level of yield reduction. Of the test weeds studied, volunteer barley caused the greatest loss

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.



Formerly HDRA.

This leaflet was produced as part of the 2006 DEFRA funded project '**Participatory Investigation of the Management of Weeds in Organic Production Systems**'. Organisations involved included HDRA, The Organic Research Centre, Warwick Horticultural Research International, ADAS, and Rulivsys. The information has been produced from a range of sources, including farmers, advisors and researchers, and we gratefully acknowledge their contributions. It is one of a number of leaflets written to give an overview of non-chemical weed control opportunities and developments in the crops covered. They include historical information and summaries of more recent research.

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.



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More information and notes:

NIAB (2005). Organic vegetable handbook, available at www.niab.com



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Please let us know of any experiences you have had with weed management in beans, either by contacting us directly or through our website

The information for this leaflet has been produced from a range of sources, including farmers, advisors and researchers, and we gratefully acknowledge their contributions. These leaflets are intended to give an overview of non-chemical weed control opportunities and developments in the crops covered. They include historical information and summaries of more recent research. Although aspects of crop production that have some bearing on weed control may be covered the outlines are not meant to form a full crop management protocol. The leaflets will be updated as further information from further publications or grower experience is received. Most of this information, and further details, are available on our website at <http://www.organicweeds.org.uk>

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Project information

This leaflet has been produced as part of the DEFRA funded project 'Participatory Investigation of the Management of Weeds in Organic Production Systems'. The project aims to involve farmers and growers in all levels of research and is driven by their requirements. The project is led by IOR-HDRA in collaboration with IOR-EFRC, Warwick-HRI, ADAS and RULIVSYS. To date the project is funded until July 2006. The project website holds all information gathered on weeds and their management, including literature from science, the farming press and practical strategies from organic farmers. It can be found at:



www.organicweeds.org.uk



How can I get involved?

There are many ways to get involved:

- Send us your name and address and we will add you on to the database so you are kept informed about the project
- Offer to provide information about weed management on your farm, see 'Case studies' on the website
- Become a 'focus group' member (the farmer groups who steer the project direction)
- Take part in the farmer trials and surveys (see above or see website)
- Tell us what you want from the project by attending meetings, open days and joining discussions on the website

Contact

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