

WEED MANAGEMENT

1. mechanical weed management of vegetable and cereal crops

Key points

- The techniques outlined in this summary are a “toolbox” of possible methods. The appropriate ones will depend on the crop, the growth stage of the weeds, weather, etc.
- Be aware of cultivating in windy conditions – there is a danger of losing soil and organic matter and destroying structure.
- Weed growth stage is significant.
- Try to get rid of perennial weeds.
- Heavy and wet soils, and stony soils, are more difficult.
- Hand weeding may still be needed.
- Intensive weed control is needed in all crops in the rotation.
- Start on a small area and be patient!

Bo Melander, from the Danish Institute of Agricultural Sciences, visited New Zealand and gave a presentation on some aspects of organic farming and research in Denmark. This is a summary of his talk.

VEGETABLE CROPS

Inter-row weeding (between rows)

Weeding between the rows should not be a problem with good machinery. Protective discs can be used to shield the crop. S-shaped tines and goose feet are very popular. Finger tines, which are easy on soil structure, can also be used.

When weeds are too large for tine weeding (e.g. after a spell of wet weather), emergency solutions need to be used, e.g. a PTO mounted brush weeder which can control large weeds even in wet conditions.

Steering is crucial! The old method is to have a person sitting on the implement mounted on the rear of the tractor; or the implement can be front mounted (for the highly skilled!). Nowadays there are automatic steering systems that have a camera box which senses crop rows.

Intra-row (i.e. within the row)

Hand weeding is essential in direct sown and slow developing crops, e.g. onions and carrots. 200-500 hours per ha is common, although this can be reduced to 100 hrs/ha. In transplants (e.g. cabbage, celery and leek) only 5-50 hrs/ha may be needed. Weeding is usually done by 12-13 people lying on a tractor-drawn bench.

Weed growth stage is significant

Example: *Chrysanthemum segetum*

1. white thread stage – mechanical weeding very easy; flame weeding no effect;
2. cotyledon stage – mechanical and flame weeding easy with all implements;
3. two true leaves – harrowing (tine weeding) is possible but high intensity may be required; flaming possible; hoeing, rolling cultivator, brush weeding, rotary cultivator: all easy;
4. seven true leaves – harrowing and flaming no effect; hoeing possible; brush weeder and rotary cultivator: easy.



cotyledon stage



2 true leaves



7 true leaves

Seven True Leaves -
Cirsium discolor proflans
 Harrowing and flaming: no effect
 Hoing: possible
 Rolling cultivator: possible
 Brush weeder and rotary cultivator: easy

PRE-EMERGENT METHODS

These improve the effect of subsequent post-emergent treatments.

1. Cultivation in darkness

- Many weed species need light to break dormancy and germinate, so cultivating in the dark can reduce weed seed germination.
- Reduces number of weeds, delays germination.
- The benefit is not so much a reduction in weed numbers but delay in germination.
- A cheap but difficult technique.
- Highly complex – there are interacting factors of dormancy, soil conditions (structure, humidity, temperature), and composition of the weed flora.
- Other methods are still needed.
- No need to do it at night! A light-proof cover can be put over the cultivator.

2. False (stale) seedbed

- The longer the duration of the false seedbed the better the effect.
- Several cultivations can be used to try to deplete the weed seed bank.
- Good effect on early germinating weed species (25-100% reduction, depending on weather conditions);
- For late germinating weeds there may be the opposite effect (up to 400% more) by having exposed seeds to light and triggering germination.

3. Pre-emergent flame weeding

For best results do as near to crop emergence as possible (if possible 1 day beforehand).

- Can combine with stale seedbed technique.
- Gas consumption is 50-60 kg/ha at a driving speed of 5-6 km/hr.
- Temperatures can reach 800-900 deg C under shield.
- Flaming more effective than harrowing but more expensive and less sustainable.



Tank gas – much cheaper

Flame weeder using tank gas – half the price of bottled gas but a large on-farm supply needed

4. Pre-emergent harrowing (tine weeding)

- Both flaming and harrowing methods create favourable conditions for subsequent post emergent treatments by reducing weed numbers and delaying early weed growth.
- Pre-emergent harrowing is only suitable for crops sown deeper than 2.5 cm.
- Risky operation, but some crops (e.g. onions and leeks) can compensate for a reduction in plant numbers.
- Use of both pre-emergent flaming and harrowing is most effective in slow germinating crops.

POST EMERGENT METHODS

1. Harrowing (tine weeding)

- Simple technology, low purchase and operational costs.
- Use on well-established crops – otherwise there is too much damage.

Post-emergence intra-row weed control – mechanical methods



Weed harrowing

- Well established crops
- Low purchase and operation costs
- Simple technology

2. Finger weeder

- Wheels with rubber fingers – effective on small weeds and well established crops.

3. Brush weeder

- Vertical brushes on either side of crop row (e.g. onions).
- Can move soil onto row or away from it.

4. Torsion weeder

- Goose foot and fingers with protective shields

5. Hoeing close to row

- 50 cm row space/ 2.5 cm from crop plants in single rows (steering crucial!!). Soil can be marked with conical wheel to make steering easier.

ONIONS – Strategies for direct sown

- Start with a false seedbed and delay sowing
- Sow in single rows
- Pre-emergent flame weed or harrow
- Possibly flame weed at flag leaf stage – although risky
- Vertical brush weed at 6-8 cm (moving soil away)
- Second brush at 8-10 cm (move soil in)
- Hand weed
- Brush or weed harrow at 10-12 cm if necessary
- Inter-row harrowing if required

CARROTS – Strategies for direct sown

- Use a false seedbed and delay sowing
- Preferably sow in single rows
- Sow a competitive variety with a large canopy to suppress late emergent weeds
- Pre-emergent flame weed
- Hand weed twice
- Regular inter-row hoeing close to the rows, ridging when possible

CEREAL CROPS

(Using weed harrowing and inter-row hoeing with increased row spacing)

Strategy for weed harrowing in spring cereals

- Pre-emergent – 1-2 days before crop emerges and before the weeds develop true leaves
- Post-emergent – when the crop is at 2-3 leaf stage. Very effective but there is risk of damage. If very competitive weeds are present, the sooner the better.
- Selective – when crop starts to elongate. Effective against weed species with a prostrate growth habit and no tap root. Controls weakly rooted and climbing weed species very effectively; high crop tolerance; can go fast (8-10 km/hr) with little damage; row space 25 cm (but could use 12 cm).
- Some farmers use only one – most use pre and post. If doing pre always follow with post.

Factors to consider:

- Growth stage difference between crop and weeds
- Pre-emergent harrowing important
- Weed species composition and weed pressure affect timing
- Seed bed preparation (level) important
- Crop seed vitality and variety is important and sowing rate should be increased by 10-20%
- Weather conditions

Inter-row hoeing

Advantages of hoeing:

- Effective inter-row control of troublesome weeds (e.g. taproots)
- Some control of perennials
- Less sensitivity to timing
- Breaks soil crusts

Disadvantages:

- Steering is crucial
- Low intra-row weed control
- Low working capacity
- Yield decline due to wider row space