

Weed Management in Carrots

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Factsheet

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INTRODUCTION

In Canada, carrots are an important fresh market and processing vegetable crop. This crop is grown on a wide range of soil types, from light sand to clay loam soils and high organic muck soils, primarily in Ontario and Quebec.

Weed control in carrots is important as this crop is a poor competitor and in the absence of control, yields are often reduced by more than 90 per cent. As well, weeds can host important pests of carrots and at harvest reduce crop quality and harvesting efficiency.

Weeds are also an alternative host for carrot pests. For example, 21 of 32 weed species commonly found in organic soils in southwestern Quebec were found to be hosts for the northern root-knot nematode, which is an important pest in carrot production. Many common weeds such as quack grass, plantain, chicory, knotweed, lamb's-quarters, wild asters, sow-thistle, ragweed, stinkweed, wild carrot, pineapple weed, and Kentucky bluegrass can be hosts for the Aster yellows disease that causes extensive damage to carrot crops.

Knowledge of the 'Critical Weed-free Period' and alternative weed management solutions allows growers to optimize carrot yields and profitability while reducing the risks associated with herbicide use.

THE WINDOW FOR WEED CONTROL

There are two separate periods in the life cycle of the carrot crop when weed control is very important. These are 1) early season — the Critical Weed-free Period and 2) late season — the harvest period (Figure 1). During the critical weed-free period, weeds are controlled to protect yield, and, during the

harvest period, weeds are controlled to facilitate crop harvestability and future production.

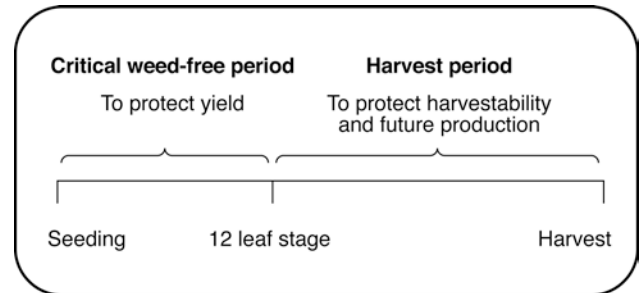


Figure 1. Weed control periods in carrots.

CRITICAL WEED-FREE PERIOD

The critical weed-free period:

- is the period after crop emergence when weeds must be controlled to protect crop yield. Knowledge of this period allows producers to control weeds that impact crop yield while reducing the economic and environmental consequences of unnecessary herbicide use.
- may extend in carrots up until the 12-leaf stage. Controlling weeds during this time will reduce yield losses to less than 5 per cent.

The duration of the critical weed-free period can vary and is influenced by:

- carrot seeding date
- weed species
- the time and duration of weed emergence relative to the crop
- the severity of weed infestation.

Carrots seeded relatively late (mid-late May) with a moderate weed infestation may have a short critical weed-free period lasting until the 4-leaf stage. This is a period of approximately five weeks from the time of

seeding. In contrast, carrots seeded relatively early (late April) in weedy fields may have a longer critical weed-free period, lasting until carrots are in the 12-leaf stage of crop growth, which may be for a period up to 13 weeks.

Few weeds emerge after the critical weed-free period (due to crop competition and carrot canopy growth) and do not make a significant contribution to the weed seedbank. Additional weed management may be required to prevent the spread of “difficult to control” weed species including herbicide resistant populations.

WEED MANAGEMENT OPTIONS

Carrot growers can use herbicides and/or mechanical methods for weed control. Surveys of grower weed management practices indicate that these methods alone do not provide commercially acceptable weed control and are usually supplemented with hand-weeding.

Herbicide solutions

Herbicide options are limited for weed control in carrots. Good crop rotation helps prevent the development of weed populations that are difficult to control. On mineral and muck soils, a typical herbicide weed management program includes Gesagard (*prometryne*) or Lorox (*linuron*) applied preemergent followed by a postemergent application of Lorox (*linuron*) and a grass herbicide, if required.

Consult product labels and provincial weed management guides for registered product uses and precautions.

Note: Potential problems with herbicide resistant weeds

Herbicide resistant weed populations have developed in many of the muck and mineral soil carrot-producing areas of Ontario and Quebec. Herbicide resistance has been identified in common ragweed and several pigweed species (green, redroot, and smooth). These weeds are resistant to herbicides such as Gesagard (*prometryne*) and Lorox (*linuron*).

Mechanical weed management solutions

Carrot seedlings cannot tolerate root damage or displacement for up to 20 days after emergence. Cultivation at the cotyledon stage may reduce carrot stand and yield. Mechanical weeders that leave less than 12 cm of undisturbed area over the carrot rows also result in crop damage. In both muck and mineral soils, apply Lorox pre-emergence as a 30-cm band over the carrot rows and use mechanical weeders between carrot rows.

For effective weed control, the operation of mechanical weeders (Figure 2) can be influenced by many factors including soil type and weed size. For example, on mineral soils both the basket wheel hoe and the torsion weeder combined with spiked disks are effective weeders that differ in several aspects:

- speed of operation: (basket > torsion)
- aggressiveness (torsion > basket)
- number of cultivations over the season (basket \geq torsion)
- range of weed stage susceptibility
 - For example the basket wheel hoe is effective on weeds with 2 leaves or less and the torsion weeder for weeds with 4 leaves or less. However, the basket wheel hoe is more efficient on muck soil, which is easier to disturb and where weeds are more loosely rooted.

CROP HARVEST PERIOD OF WEED CONTROL

This is a later period of weed control, beginning after the critical weed-free period and extending until harvest. Weed control during this period is primarily intended to minimize harvesting losses and future risk due to weeds.

Weeds reduce crop quality by causing deformed and uneven carrot roots. Harvesting efficiency is also reduced if large weeds are present at harvest or if the carrot stems have been weakened by weed competition.

Herbicide and mechanical options are limited for later season weed control and hand-weeding is usually required.

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Figure 2. Two types of mechanical weeders: Torsion weeder (2a); Basket weeder (2b). (Source: Agriculture and Agri-Food Canada)

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