

HOME VEGETABLE CROPS

R. Spencer and S. Barkley

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This document is only a guide. Always follow labelled rates, instructions for use, appropriate pre-harvest intervals and any listed restrictions.

The pesticides listed below for home vegetable crop use are generally available in small package sizes. Products of similar chemical analysis may be available from a number of different companies.

A number of commonly used pesticide products are being re-evaluated to ensure that they conform to current pesticide standards (e.g. carbaryl). Similarly, a number of common products that were available for domestic use are not being manufactured or are being removed from retail environments. Domestic sales of Diazinon products ended as of December 31, 2004 and domestic use will be suspended at the end of 2005. Domestic use of methoxychlor must also cease at the end of 2005. The registration, availability and formulation of products listed in this guide may change and care should be taken to conform to current regulations and to only use registered products.

NOTE: Recommendations are in terms of formulated product, not active ingredient.

APHIDS

Aphids

Cultural Control – *Management*

A trap crop like nasturtiums will indicate early aphid infestations. Remove and destroy infested plants.

Avoid over fertilizing plants with nitrogen; succulent growth attracts aphids.

Sanitation

Remove weeds surrounding garden area

Predators

Lady beetles, damsel bugs, lacewings and flower fly larvae, many tiny wasps

Aphids that have been killed by diseases may be off-color, flattened or bloated. Large numbers of either predators or disease will reduce the need for treatment.

Mechanical Control –

Light-weight row covers can be placed over plants to act as a barrier. It is important that the row cover be anchored in the soil on the sides and ends to prevent pests getting in under cover.

Leave in place until harvest. Floating row covers need to extend at least 15 cm (6 in.) on either side of the seed row, and may be anchored with soil or boards.

Handpick or prune out and destroy the infested plant parts.

Hose down the infested plants with a strong spray of water from a garden hose to reduce populations. Once knocked off, the wingless aphids are seldom able to return to their host. Repeat the water spray as often as necessary.

Yellow sticky traps may be placed in areas where aphids have been observed. These traps can be bought or made. To make a sticky trap, spread petroleum jelly over a yellow index card. Replace the cards weekly.

Yellow pan traps may be filled with soapy water and placed close to the host plant. The aphids will be attracted to the trap. The soap breaks the surface tension of the water, causing the aphid to sink and drown.

Use aluminium foil sheets as mulch. Place the aluminium at the base of low plants. The reflection confuses the winged aphids, making landing difficult.

Chemical Control –

Active Ingredient	Rate
Acetamiprid 0.0064%	See label
Diazinon	
- 6.3%	10ml/L
- 12.5%EC	5-6ml/L
Malathion	
- 4%	3.3g/m ²
- 50%EC	1-2ml/L
Pyrethrin products (dusts/sprays)	See label
Rotenone	
- Dust (1%)	6g/m ²
- Liquid (5%)	5ml/L

Least Toxic Chemical

Insecticidal soap, pyrethrin, summer oil, neem

Restrictions –

CARROT RUST FLY

Carrot Rust Fly

Cultural Control –

Management

Plant as early as possible, harvest early, delay seeding of main crop.

Crop rotation

→ at least one year rotation between crops in carrot family (celery, dill, parsnip and parsley)

Sanitation

Remove weeds in carrot family, e.g. Queen Anne's lace, which act as alternate hosts.

Avoid leaving carrot tops in piles; compost or bury right after harvest.
Remove and destroy any infested carrots. Do not to compost infested tops.

Mechanical Control –

Light-weight row covers can be placed over plants to act as a barrier. It is important that the row cover be anchored in the soil on the sides and ends to prevent pests getting in under cover. Leave in place until harvest. Floating row covers should extend at least 15 cm (6 in.) on either side of the seed row and may be anchored with soil or boards.

Chemical Control –

Active Ingredient	Rate
Diazinon	
- 5% dust	5-6ml/L
- 12.5% EC	1g/m row
- 62.5 g/L	10ml/L

Restrictions:

COLORADO POTATO BEETLE

Colorado Potato Beetle

Cultural Control –

Management

Mulching the potato plot creates a microenvironment that favours beetle predators. Potatoes planted in early-May are likely to be infested by potato beetles during flowering. Avoid this by planting potatoes either a month earlier or a month later than early-May. If potatoes are planted in early-April, so the plants bloom before June, then beetle damage will occur too late to affect yield. Use an early maturing variety and aim for an early-July harvest. Early-planted potatoes can tolerate a lot of leaf feeding. Gardeners must learn to tolerate the presence of infested plants.

Sanitation

Remove alternate weed hosts (e.g. nightshade), therefore removing an early season food source for the beetles, and may reduce beetle populations before potatoes emerge.
Clean up potato culls

Predators

Ladybird beetles, ground beetles, lacewings, predatory stink bugs and spiders.

Mechanical Control –

Pull potato tops early and place them in an area away from the potato patch. The beetles will be drawn to the dying potato top and can be collected and destroyed.
Light-weight row covers can be placed over plants to act as a barrier. It is important that the row cover be anchored in the soil on the sides and ends to prevent pests getting in under cover. Leave in place until harvest. Floating row covers should extend at least 15 cm (6 in.) on either

side of the seed row and may be anchored with soil or boards. A floating row cover is only effective if the beetles have not been present in the garden the year before.
 Handpick adults and larvae. Larvae and egg masses can be killed by freezing, or by dropping into a pail of soapy water.
 Egg masses can be squished.

Chemical Control –

Active Ingredient	Rate
Acetamiprid 0.0064%	As directed
Carbaryl	
- 5%	3-4.5 g/m ²
- 180g/L	2.5-6 g/m ²
- 240g/L	1.75-5 ml/L
- 50% WP	3-5 g/L
- 50% SP	6-12 ml/L
Diazinon	
- 12.5% EC	5 ml/L
- 62.5% g/L	10 ml/L
Methoxychlor 120g/L	20 ml /L
Permethrin	
- 0.5%	18.5 ml/L
- 12.5 g/L	7.5 ml/L
- 0.025%	max 41.5 ml/L
Pyrethrin products	See label
Rotenone	
- 1% (dust)	Cover or 3.6-5 g/m ²
- 5% (liquid)	3-5 ml/L

Restrictions:

- permethrin 0.025% (max 6 applications per year)

CUTWORMS

Cutworms (subterranean spp.)

Cultural Control –

Management

Sow extra seeds of peas, beans and other direct seeded plants to ensure enough survive to fill the row.

Sanitation

Remove crop residue and weeds in late summer and turn soil to reduce cutworm numbers.
 Cultivate in spring (at least 2 weeks before planting) to allow birds to find exposed cutworms.

Mechanical Control –

Use physical barriers around individual plants. These should be pushed into the soil at least 2 cm (1 in.). Gardeners may use tin cans or plastic containers with both ends removed or cardboard or tarpaper strips stapled into a circle.

Handpick adults and larvae. Hand picking at night with the help of a flashlight is an option. Kill insects by dropping into a pail of soapy water. Handpick cutworms from just under soil surface around newly damaged plants.

Removing or squishing eggs can be effective.

Splashing soapy water around garden plants will bring insects to the soil surface.

Chemical Control –

Active Ingredient	Rate
Diazinon	
- 5% dust	5-8 g/m ²
- 6.3%	13.2 ml/m ²
- 12.5%	6-6.5 ml/L (spread over 9m ²)
- 62.5 g/L	13 ml/L (spread over 10m ²)

Least toxic chemical

BtK

Restrictions:

FLEA BEETLES

Flea Beetles

Cultural Control –

Management

Provide good plant growing conditions. This would include good seedbed preparation, optimal water and fertilizer.

Don't put transplants out too early.

Keep young plants well watered so they can outgrow damage.

Rotate in garden with other non-related crops.

Sanitation

Clean up garden refuse.

Check seedlings for flea beetle damage twice a week until the plants are established. Low populations of beetles can cause damage to the plants in the cotyledon or first true leaf stage.

If populations are high, treat infested fields just before thinning to prevent post-thinning damage.

Once plants have 5 leaves they can tolerate several beetles per plant without damage. Older plants are even more tolerant.

Mechanical Control –

Plant a trap crop of bok choy or pak choy.

White or yellow sticky traps can be effective. To make sticky traps, spread petroleum jelly over a yellow or white index card. Replace the cards weekly.

Light-weight row covers can be placed over plants to act as a barrier. It is important that the row cover be anchored in the soil on the sides and ends to prevent pests getting in under cover.

Leave in place until harvest. Floating row covers should extend at least 15 cm (6 in.) on either side of the seed row and may be anchored with soil or boards.

Dust diatomaceous earth around the base of the plant to create barrier. Dust in the late evening.

Chemical Control –

Active Ingredient	Rate
Carbaryl - 5% - 22.5% (240g/L) - 50%	2.5-5 g/m ² 2.5-10 ml/L 6 g/L (spread over 10m ²) or 6-12 ml/L
Diazinon - 6.3% - 12.5%	As directed 5-6 ml/L
Malathion - 4% - 47%	3.3 g/m ² 6 ml/L
Methoxychlor - 25% EC - 120 g/L	3-9 ml/L 20 ml/L
Permethrin 0.5%	12.5 ml/L
Pyrethrin products	See label
Rotenone - 1% (dust) - 5% (liquid)	3.6-6 g/m ² 5 ml/L

Least toxic chemical

Pyrethrin

Restrictions:

GRASSHOPPERS

Grasshoppers

Cultural Control –

Management

Cultivate garden and weedy areas in the fall to discourage egg-laying.

Predators

Birds are natural predators; attract by having bird feeders and baths in yard.

Mechanical Control –

Hand picking

Row covers may be the only protection against very severe infestations. Light-weight row covers can be placed over plants to act as a barrier. It is important that the row cover be anchored in the soil on the sides and ends to prevent pests getting in under cover. Leave in place until harvest. Floating row covers should extend at least 15 cm (6 in.) on either side of the seed row and may be anchored with soil or boards.

Chemical Control –

Active Ingredient	Rate
Malathion	
- 50% EC	1-8 ml/L or 30 ml/L*
- 47%	60 ml/L*
* High rate to control young grasshoppers * DO NOT APPLY THIS RATE TO EDIBLE PLANTS	

Restrictions:

Do not apply high rate of chemical to edible plants

LOOPERS

Loopers, Cabbageworms, Diamondback moth and other caterpillars

Biological Control –

Bacillus thuringiensis (var. *kurstaki*): follow label instructions

Cultural Control –

Predators

Ground beetles, spiders, lacewings, syrphid fly

Mechanical Control –

Light-weight row covers can be placed over plants to act as a barrier. It is important that the row cover be anchored in the soil on the sides and ends to prevent pests getting in under cover.

Leave in place until harvest. Floating row covers should extend at least 15 cm (6 in.) on either side of the seed row and may be anchored with soil or boards.

Use a nylon stocking to cover the cabbage head as soon as it begins to form, to prevent butterfly access to the head.

Hand pick larva when small.

Chemical Control –

Active Ingredient	Rate
Carbaryl	
- 5%	2.5-6 g/m ²
- 22.5% (240 g/L)	7 ml/L
- 50%	3-5 ml/L
Diazinon 12.5% EC	5 ml/L
Malathion	
- 4%	3.3 g/m ²
- 50%	1-2 ml/L
Methoxychlor 25% EC	3-9 ml/L
Permethrin 0.5%	12.5 ml/L
Pyrethrin products	As directed
Rotenone	
- 1% (dust)	As directed
- 5% (liquid)	10 ml/L

Least toxic chemical

Bt, rotenone

Restrictions:

LYGUS BUGS

Lygus bug

Cultural Control –

Sanitation

Eradicate weeds in and near the garden.

Mow permanent sod in the fall to remove overwintering sites.

Cultivate in fall.

Clean up garden refuse.

Chemical Control –

Active Ingredient	Rate
Carbaryl	
- 22.5%	5-12 ml/L
- 50%	4.5-9 g/L

Restrictions:

ONION MAGGOT

Onion Maggot

Cultural Control –

Management

Delay transplanting.

Minimize cultivation injury to onions.

Remove and destroy refuse immediately after harvest.

Onion maggots are more plentiful in wet growing seasons. Long summers with open, warm falls favour the third generation, which will attack the harvestable onions.

Sanitation

Rotate in garden with other non-related crops

Destroy infested plants during growing season and destroy.

Remove crop residue in the fall.

Predators

Robins and crows

Mechanical Control –

Use older plants as a trap crop. Pull infested plants, freeze overnight and compost.

Light-weight row covers can be placed over plants to act as a barrier. It is important that the row cover be anchored in the soil on the sides and ends to prevent pests getting in under cover.

Leave in place until harvest. Floating row covers should extend at least 15 cm (6 in.) on either side of the seed row and may be anchored with soil or boards.

Chemical Control –

Active Ingredient	Rate
Diazinon 12.5% EC	5 ml/L (adult stage only)
Diazinon 5% (in furrow at planting)	10 g/10m row (in furrow at planting)

Restrictions:

ROOT MAGGOTS

Root maggots (cruciferous)

Cultural Control –

Management

Remove and destroy refuse immediately after harvest.

Plant cruciferous crops late

Sanitation

Destroy all crop refuse by burying or composting right after harvest. Destroy any plant material infested with root maggots. Infested plant material may also be frozen for 24 hours and then composted.

Rogue out and destroy any suspicious plants.

Remove all cruciferous weeds (e.g. stinkweed and shepherd's-purse) from the garden and surrounding area.

Rotate in garden with other non-related crops.

Mechanical Control –

Light-weight row covers can be placed over plants to act as a barrier. It is important that the row cover be anchored in the soil on the sides and ends to prevent pests getting in under cover.

Leave in place until harvest. Floating row covers should extend at least 15 cm (6 in.) on either side of the seed row and may be anchored with soil or boards.

These will only protect crops provided the crop is planted in an area where cruciferous crops have not been planted for at least one year.

Barriers

Aluminium or tar paper 20 cm (8 in.) diameter discs give some protection to non-root crops when placed around stems at soil level.

Chemical Control –

Active Ingredient	Rate
Diazinon - 5% G	10-45 g/10m row or 3-15 g/transplant (See label; Rate is crop/product dependent)
Diazinon 12.5%	6 ml/L

Alternative chemicals

Pyrethrin, insecticidal soap, summer oil, neem

Restrictions:

SLUGS

Slugs

Cultural Control –

Management

Water early in the day and avoid overwatering.

Protect seedlings and transplants using row covers and hot caps.

Handpick at night.

Sanitation

Remove daytime refuge sites (weeds, brush piles, soil debris).

Predators

Many animals are predators of slugs. Ducks and chickens relish the critter, as well as other birds. It should be noted that other birds are not usually active at the same time as the slugs. Other predators include garter snakes, which eat both the adults and eggs, toads and salamanders. Insects like ground beetles, soldier beetles, centipedes and rove beetles also prey on the slug.

Mechanical Control –

Place 15 x 15 cm (6 x 6 in.) pieces of board, hollow grapefruit rinds, cantaloupe shells or cabbage leaves around the garden to provide a cool damp spot for the slugs to spend the day. Collect slugs and drop them into a bucket of soapy water.

Shallow pans sunk into the soil containing beer, de-alcoholized beer or a mixture of water, sugar and 1 teaspoon of yeast will lure the pest into the trap, where it will then drown. Traps need to be dumped and bait refreshed daily. The lip of container must be flush with the soil surface.

Barriers

Metal fly screening, 10 cm (4 in.) wide, partially embedded in the soil for support, will keep slugs out of an area. Bending the screening to the outside appears to increase its efficacy. The sharp edge of the fly screen will also damage the slug as it crawls over the barrier.

Abrasive materials, such as ground egg shells, oyster shells or diatomaceous earth, placed at the base of plants will lacerate the slug's body, causing death by dehydration.

Copper striping or flashing (purchased at a hardware store) cut into strips of about 5 cm (2 in.) wide can be attached to wooden frames. Copper carries a very mild electrical charge that the slugs can detect and do not cross it.

Chemical Control –

Active Ingredient	Rate
Metaldehyde	Liquid, pellet or granular bait (Rates varies; See label)
Carbaryl 5%	2.5-5 g/m ²
Insecticidal Soap	See label
Silicon dioxide 97%	5 g/m ² (dry application) 75 g/L (spray over 10m ²)
Pyrethrin products	See label
Ferric Phosphate 0.76%	5 g/m ²

Restrictions:

Do not allow contact with edible plant parts.

Cover traps to improve efficiency and reduce contact with pets.

TUBER FLEA BEETLE

Tuber Flea Beetle

Cultural Control –

Sanitation

Remove garden residues where the beetles over winter.

Destroy any volunteer and cull plants to remove flea beetle populations.

Mechanical Control –

Light-weight row covers can be placed over plants to act as a barrier. It is important that the row cover be anchored in the soil on the sides and ends to prevent pests getting in under cover.

Leave in place until harvest. Floating row covers should extend at least 15 cm (6 in.) on either side of the seed row and may be anchored with soil or boards.

WHITE GRUBS

White grubs

Cultural Control –

Management

Avoid planting in recently cultivated soil

Sanitation

Remove all old plants and overgrown weeds, leaving soil bare. Cultivate to depth of 20 cm (8 in.) in spring, 2 weeks before planting.

Predators

Birds (e.g. robins and crows) are predators.

WIREWORMS

Wireworms (in potatoes)

Cultural Control –

Avoid planting in soil that has been sod or grass for at least 3 years.

Grassed areas that are turned into vegetable gardens are the most affected. In these situations, summerfallow for one year before planting. Cultivate the soil regularly to allow birds to control wireworms.

Mechanical Control –

Hand pick.

Bait with pieces of potato tuber, carrots or balls made of 2 tablespoons of whole wheat flour mixed with enough water to make a sticky ball, before planting. Put bait pieces 10 cm (4 in.) down in the soil. Mark the sites so that the bait can be dug up again in 3-5 days. Put one test spot every 10 m² (108 ft²).