



Assured Produce

Crop Specific Protocol

CELERY

(CROP ID: 36)



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Acknowledgements

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Preface

This crop specific protocol has been written to complement and avoid duplicating the generic principles of the scheme and appendices.

It is advisable to read the Assured Produce Generic Crop Protocol Standards and the Assured Produce Generic Protocol Guidance Notes (referred to in this document as the Generic Standards and Generic Guidance Notes) first before reading this crop specific protocol.

This protocol is designed to stimulate thought in the mind of the reader.

This crop specific protocol contains crop specific parameters and guidance, where applicable, for the requirements stated in the Generic Standards.

This crop specific protocol contains crop specific parameters and guidance, where applicable, for the requirements stated in the Generic Standards. All statements in this protocol containing the words "**strongly recommended**" (in bold type) will be verified during the Assured Produce assessment and their compliance will form a part of the certification/approval decision. The score required for these "strongly recommended" control points can be found on the final page of this document and in the checklists produced by Assured Produce licensed certification bodies.

Disclaimer and trade mark acknowledgement

Although every effort has been made to ensure accuracy, Assured Produce does not accept any responsibility for errors and omissions.

Trade names are only used in this protocol where use of that specific product is essential. All such products are annotated ® and all trademark rights are hereby acknowledged.

Notes:

Pesticides with 'Essential Use' derogations that expired 31 December 2007 can no longer be used or stored.

There may be other withdrawals or revocations. Products containing substances which have been revoked are shown on the PSD website (<http://www.pesticides.gov.uk>). Growers should check with their advisers, manufacturers, the Assured Produce website 'Newsflashes', the PSD website (www.pesticides.gov.uk)

Growers should comply with the 'Use up by' dates for all pesticide products. Growers should also be aware of and comply with changes on new product labels.

There may be changes for the following reasons:

- the deadline for use of NPE formulations has been extended to 31 August 2008, see <http://www.pesticides.gov.uk/approvals.asp?id=2122>
- Pesticides with NPE formulations must be used up by 31 August 2008. In many cases products will be replaced by new non-NPE formulations.
- At re-registration stage after Annex 1 listing there may be: reductions of dose rates; changes in timings and/or number of applications for some products.

In the following Appendices products and use by dates are only listed for SOLAs, and in some cases new product MAPP numbers may not be available yet.

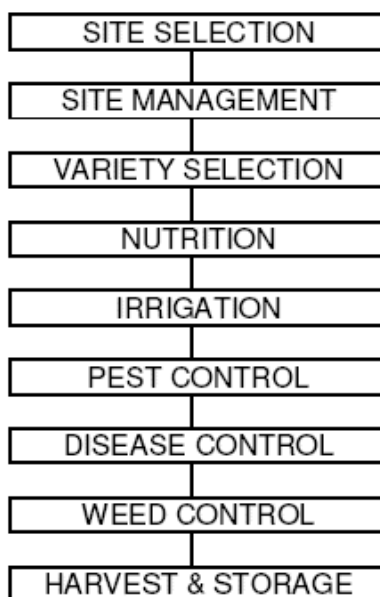
For pesticides on-label, only active substances are shown.

Any new standards have been prefixed in the text with **(NEW)**

1. General Introduction

Following a systematic approach will help growers to identify and manage the risks involved in crop production. This protocol is based on a typical crop production process. Using a flowchart approach, food safety, Health & Safety, environmental and quality hazards are identified. Appropriate controls may then be established to minimise risk. Food safety and Health & Safety issues always take precedence over quality and environmental controls.

The flow chart is structured as shown below. Note that the sectional layout of both this protocol and the crop specific protocols follow the same structure.



The contents of each crop specific protocol are reviewed annually by informed farmers and growers, food technologists, scientists, the relevant fresh produce association, processors and agronomic consultants. Updated editions are issued prior to the cropping season.

The review process considers both new developments and all relevant technology which has emerged throughout the course of the previous year and which have been found to be both workable by the grower and beneficial to the environment. As one aim of the Scheme is to transfer such information and technologies to growers, attention is drawn to those features of specific relevance to ICM by using *italic* script. In order that growers may be confident that they are working to a current document, each protocol is dated and numbered.

2 Planning and records

See Generic Standards and/or Generic Guidance Notes

3 Site selection

3.1 Site history

See Generic Standards and/or Generic Guidance Notes.,

3.2 Crop rotation

A good rotation of crops is essential to help reduce the build-up of pests and diseases and it demonstrates a general concern for the maintenance of soil fertility.

A minimum of two years break between Celery crops is desirable but, due to site/irrigation availability, this may not be feasible so a break of 12 months from harvesting to replanting will minimise carry-over of *Septoria* spores.

4 Site management

4.1 Soil mapping

See Generic Standards and/or Generic Guidance Notes.

4.2 Soil management

See Generic Standards and/or Generic Guidance Notes.

4.3 Soil fumigation

It is **strongly recommended** that if methyl bromide is used to sterilise soil, growers should be aware of the BCPA's 'Guidelines for fumigation with methyl bromide'.

It is strongly recommended that if methyl bromide is used, the usage programme includes reduced dosages and a phase out beyond 2005 (See Generic Guidance Notes 4.3.3).

Whilst it is still legal to apply several methyl bromide products prior to planting until 31st December 2005, there is no critical use exemption for methyl bromide use in protected edible crops for 2005. This means no new methyl bromide can be imported for use in this sector during this year. This situation is unlikely to change prior to the phasing out of methyl bromide in 2008.

5 Variety Selection

5.1 Choice of variety or rootstock

See Generic Standards and/or Generic Guidance Notes.

5.2 Seed quality

See Generic Standards and/or Generic Guidance Notes.

5.3 Seed treatments and dressings

See Generic Standards and/or Generic Guidance Notes.

5.4 Plant and nursery stock

Plant propagation

Producers must satisfy themselves that their transplants are grown in hygienic conditions to ensure that they are planted out in a pest and disease free condition.

Plant raisers must be registered with DEFRA Plant Health and Seeds Inspectorate under the EU Marketing Scheme. The major plant raisers have also produced, and abide by, their own code of practice.

Growers should be able to produce evidence that any propagated material has been produced within a verifiable production system.

Any chemical control of pests and diseases which can be applied at the propagation stage should be used:

- a. to target the problem directly, and
- b. to minimise usage in the field at a later date.

Any treatments used must be agreed with the purchaser and accurate records of application must be kept.

It is **strongly recommended** that growers receive records of all pesticide applications to the celery plants in the propagation stage.

6 Nutrition

A soil analysis for phosphorus, potassium, magnesium and pH is essential prior to deciding on the composition and quantity of base fertiliser to apply.

Use the minimum rates possible, based on ADAS soil indices, to bring the soil to a level considered to be suitable for a Celery crop. Typical major nutrient requirements are listed in Appendix 1 and the figures are expressed in kilograms of plant food per hectare.

Celery is not particularly responsive to nitrogen until the crop has established, usually after about a month, so minimal nitrate levels are needed in the base dressing. Top dressings can subsequently be used as needed, reducing the risk of leaching.

Nitrate fertilisation will require greater sophistication over the next few years to address the concerns of run-off and leaching into watercourses, and to minimise nitrate levels in the harvested crop.

Techniques are available to establish nitrate levels in soil and leaves but, as levels of available nitrate can change rapidly due to environmental conditions, no absolute thresholds for treatment have yet been established.

Regular use of such equipment on a field-by-field basis by an experienced agronomist will however enable more accurate decisions to be taken on rates of nitrogen to be applied.

Other methods of application, such as direct injection, slow release compounds and nitrification inhibitors are being developed and such techniques should be investigated in an effort to make efficient use of nitrogen.

Timing of the application of organic FYM, where used, must be carefully considered as nitrate release can be unpredictable and may lead to excessive crop uptake or leaching through the soil. FYM should not be applied in the autumn. FYM should not be applied to glasshouse soils.

7 Irrigation

See Generic Standards and/or Generic Guidance Notes.

8 Crop Protection

8.1 The basic approach to crop protection

Introduction

The guiding principle is that pesticide inputs should be minimised through prevention rather than cure. An integrated approach should be adopted to achieve this involving the following management steps.

Good management and planning

- a. *Careful site selection to avoid potential or previous problems thereby enhancing plant health.*
- b. *Sensible crop rotations to avoid build-up of problems.*
- c. *Inclusion of resistant varieties (where available) in cropping programmes whilst respecting the need to meet the required quality parameters and eating requirements.*
- d. *Establish the need to take corrective action by regular monitoring referring to thresholds where established. This should be carried out by trained staff. The effect of prevailing weather conditions should also be considered.*

Cultural preventative techniques

- a. *Good crop and field hygiene, promoting crop health by maximising nutrient availability through soil analysis and accurate application to avoid excess nutrient application.*
- b. *Utilise irrigation as a control measure wherever appropriate and feasible.*
- c. *Enable biological and natural methods of pest control to flourish in the crop environment.*

Corrective action

If good management and planning and cultural preventative techniques fail to prevent or control pests, the following approach should be adopted:

- a. Where corrective action is required, additional biological and natural methods of pest and disease control (if available) should be considered first.
- b. If chemical control is needed, the following points should be considered, whilst ensuring effective control is achieved:
 - Use the least toxic and persistent product.
 - Use the most selective product to reduce the impact on naturally occurring beneficial organisms.
 - Use minimum effective dose rate.
 - Use appropriate application methods with effectively maintained equipment, and spot-treating wherever possible.
 - Exceeding the recommended dose rate is wasteful, gives no benefit in terms of control, and is also illegal under COPR.

All crop residues from previous Celery crop should be thoroughly destroyed or ploughed-in as soon as cropping is complete.

The use of pest monitoring and forecasting techniques should be adopted where possible as an adjunct to crop inspection.

Field margins can provide a reservoir of insect predators, including ladybird larvae, hoverflies, ground beetles etc. Care must be taken to avoid spray drift from the crop into these areas.

8.2 Plant protection product choice

See Generic Standards and/or Generic Guidance Notes

Approved uses not included on the product label

In some circumstances product labels do not include all of the approved uses and growers and advisers wishing to check the approval notice of a particular product should note that this information is available from: www.pesticides.gov.uk/psd_databases.asp

A search on the database for a product name should yield a results page. A click on the product name should link to a summary of the approval information. At the bottom of the summary are links to available notices which will give the statutory conditions of use.

In the case of products with older approval an electronic approval may not be available. In these cases growers should contact the PSD Information Services Branch for details of the approved conditions of use. Contact details are: p.s.d.information@psd.defra.gsi.gov.uk tel. 01904 455775.

8.3 Advice on the use of pesticides

See Generic Standards and/or Generic Guidance Notes.

8.4 Application of pesticides

See Generic Standards and/or Generic Guidance Notes.

8.5 Records of application

See Generic Standards and/or Generic Guidance Notes.

8.6 Protective clothing/equipment

See Generic Standards and/or Generic Guidance Notes.

8.7 Pesticide storage

See Generic Standards and/or Generic Guidance Notes.

8.8 Empty pesticide containers

See Generic Standards and/or Generic Guidance Notes.

8.9 Pesticide residues in fresh produce

See Generic Standards and/or Generic Guidance Notes.

See Generic Protocol Guidance Notes 8.9 for further background and generic advice.

Assured produce is aware that a key area in the production of fresh produce which requires continued attention by growers and their advisers is that of keeping pesticide residues to a minimum. This issue is not just one of meeting the MRL trading standard but ensuring that any individual or multi residues are kept as low as possible below this level.

The key targets are -

- **Optimising late applications of fungicides and insecticides to the edible part of the crop.**
- **Optimising the use of post harvest treatments.**
- **Ensuring minimum harvest intervals are followed**
- **Ensuring that application equipment is applying products correctly**

See Appendix 10 for the pesticide targets and guidelines on protected celery.

Currently there are no residue issues associated with outdoor celery crops but awareness needs to be maintained for any future issues.

8.10 Pest, disease and weed control

8.10.1 Pest control

8.10.1.1 Carrot Fly (*Psila rosae*)

Carrot fly is a sporadic pest of Celery but, in an area where Celery and Carrots are grown intensively, a population of flies will usually establish in 2-3 years and thereafter infestation will become regular and heavy. The fly has two full generations a year, adults for the first generation emerge from the soil at the end of April. Eggs are laid in the soil around young plants during May and June from which larvae hatch and bore into the roots and crown bases of the plants. By mid July few first generation adults remain.

A second generation of adults emerges during August and egg laying extends through until September. Damage from the second generation is not generally as serious as that from the first because the period of adult emergence is protracted, giving a lower population to lay eggs at any one time. There may be a partial third generation especially in East Anglia if it has been a warm summer.

Celery plants are at greater risk when they are small as fewer larvae are needed to cause wilting and yellowing of leaves. Larger plants can withstand bigger populations of larvae and can grow away from damage without visible symptoms.

Cultural control: *Regular monitoring of carrot fly activity is essential and yellow sticky traps are available for this purpose. They do not indicate absolute levels of the pest so no thresholds have been set. They do however need an experienced entomologist to identify the catches.*

Good crop rotation and, if possible, siting crops away from previous Celery or Carrot crops, will help to delay the build up of large populations. Carrot flies do not fly large distances and it takes 2-3 years for a damaging population to establish. Carrot flies spend much time in vegetation around the edges of fields so keeping hedgerows well trimmed reduces shelter areas available to them.

When no crop exists, the flies can complete their life cycles on hedgerow umbellifers so regular crops of Carrots or Celery in one area will usually lead to a population reaching pest status.

Crops planted after June are at less risk from attack than the early crops.

No data yet exists on resistant Celery varieties.

Chemical control: If planting in a high risk area before July it is advisable to apply foliar sprays containing lambda-cyhalothrin based on monitoring adult fly activity using sticky traps.

Once damage is identified it is too late to restore effective control.

A list of currently approved insecticides is given in Appendix 2.

Protected crops: No treatment should be necessary for this pest, as early crops are usually ready for harvest before the first generation develops.

8.10.1.2 Carrot willow aphid (*Cavariella aegopodii*)

This pest overwinters as an egg on the bark of willow trees and hatches out in a winged form to infest Carrot, Celery and Parsnip crops during May. Peak infestation lasts until early July when another winged generation emerges to reinfest willows and hedgerow umbellifers.

The aphid itself is not a major pest of Celery but can cause significant damage in areas where Celery and Carrots are grown intensively by transmitting carrot motley dwarf virus. Control measures should be instigated immediately the pest is seen during regular crop inspections.

Cultural control: *As it is not possible to eliminate the aphid's alternative host plants, no practical cultural methods are suitable. Hover fly and ladybird larvae can eat large numbers of aphids and their presence is to be encouraged (see below).*

Chemical control: A number of materials are effective against aphids and those currently approved are listed in Appendix 3. Products containing pirimicarb or pymetrozine are specific to aphids and will not harm beneficial insects.

Protected crops: This pest is not usually seen on protected Celery at least until the crop is nearing maturity. Frequent crop inspections are essential however as other aphids often common in glasshouses can infest a crop of Celery.

8.10.1.3 Caterpillars

Caterpillars rarely reach sufficient numbers to assume pest status in Celery.

Cultural control: As no specific species attack Celery, it is not necessary to consider any preventative measures.

Chemical control: Regular crop inspection will usually identify any infestation by caterpillars which should be localised.

A pyrethroid product will control most caterpillars and spot treatments may be considered if the infestation is not heavy. Currently approved products are listed in Appendix 4.

8.10.1.4 Celery fly/Celery leaf miner (*Euleia heraclei*)

The larvae of these flies feed between the upper and lower leaf surfaces causing transparent mined areas to develop. Damage can be most severe when the plants are small and can occur any time between May to October. As this is only a sporadic pest no control measures should be taken unless damage is seen during regular crop inspections.

Cultural control: *Little can be advised to minimise the chance of attack from this pest.*

Chemical control: At first signs of mining of the leaves apply a pyrethroid product. Currently approved products are given in Appendix 4.

Protected crops: No treatment is usually needed for this pest as early crops are usually ready for harvest before the first generation develops.

8.10.1.5 Cutworms

These pests are the caterpillars of several species of noctuid moths, the most common being the turnip moth (*Agrotis segetum*). The young caterpillars hatch in June and July, feed on the foliage for up to a week and then descend to the soil to feed on the underground parts of the plant.

Cutworm attacks are most severe in hot dry summers. Routine treatment is not required.

Cultural control: *Young cutworm caterpillars are easily drowned so heavy rain effectively controls some attacks. In dry weather, regular irrigation, essential for good Celery crops, is effective in reducing damage especially when used in conjunction with trapping.*

Avoid planting Celery into land which has previously been left very weedy as the moths are attracted to the dense cover to lay eggs.

Chemical control: There are no longer any products approved for cutworm control in celery.

Protected crops: The life cycle of cutworms should not coincide with the protected crop.

8.10.1.6 Slugs

Due to mild winters, slugs have become an increasingly important pest of Celery as they start to infest the crop soon after planting out, therefore early control is essential.

They thrive in soil which is wet from high rainfall or irrigation.

Cultural control: *Large amounts of weed or debris from the previous crop will encourage slugs to breed leading to large population increases therefore do not allow decaying vegetation to accumulate.*

Slugs tend to live in hedgerows and migrate into crops at night so it is advisable to leave a good strip of fallow weed free land between the hedge and crop.

Trapping systems do exist but they are suitable for small scale uses only. Biological control methods are being investigated at present but are not as yet sufficiently developed for commercial use.

Chemical control: Slug pellets containing metaldehyde, copper silicate or ferric phosphate (see Appendix 5) are effective. Most are bran-based, but in very wet seasons pellets based on pasta wheat may last longer.

In the first instance, if monitoring is good enough, only the fallow strip around the edge of the field should need treatment. This is important in Celery because broadcasted pellets can lodge between the leaf stems of the crop causing contamination. This is not acceptable even if the harvest interval is adhered to.

8.10.2 Disease control

8.10.2.1 Leaf spot /Late blight (*Septoria apiicola*)

This is the most serious disease of Celery. The fungus causes brown rusty spots on, first the leaves, and then, spreading to leaf stems of the plants if not treated early enough.

Initially the disease is seed-borne and all seed should have been treated by thiram or hot water soaking. It may subsequently spread from plant to plant in the field.

It also spreads from isolated plants by water or rain splash, particularly in cool damp weather. It can also be spread by infected soil being transferred on boots and farm equipment.

Cultural control: *A break of at least one year from a previous crop is essential to ensure minimal carry-over of spores to another crop. Regular crop walking by someone trained in identification will enable early diagnosis. Hand roguing may help contain the disease in its early stages if the weather is not too wet.*

Chemical control: To minimize the likely onset of disease in areas where it is known to be widespread, a programme of products containing copper oxychloride or copper ammonium carbonate can be applied.

If the disease is subsequently identified, a programme of fungicide applications based on mancozeb azoxystrobin, difenconazole, mancozeb and chlorothalonil should be applied. Currently approved products are listed in Appendix 6.

Protected crops: Control of leaf spot can be a problem in early crops due to the damp conditions, lack of air movement within the glasshouse, low light level and short day lengths.

Frequent crop inspections should be made and any disease treated as early as possible to avoid rapid spread.

8.10.2.2 Other diseases

Sclerotinia can build up in soils where Celery is cropped regularly. Since the withdrawal of carbendazim, no treatments are now available.

Botrytis rarely infects Celery. Treatments for leaf spot should also control *Botrytis*.

Seedling diseases, such as damping-off, will usually be treated by the propagators using etridiazole in the blocks.

For carrot motley dwarf virus control measures see Section 8.10.1.2.

Protected crops: *Botrytis* is much more common in protected crops than outdoors so any infestation must be diagnosed and treated early.

If *Rhizoctonia* is known to be in the soil products containing tolclofos methyl can be applied to the soil before planting the crop.

Bacterial rots can be a problem especially after irrigation, when the crown is wet. It is important to ensure the foliage is dried off quickly after irrigation by ventilating if conditions permit. However, conditions in early spring sometimes preclude these measures being taken. Products containing copper oxychloride or cupric ammonium carbonate, together with their protectant qualities against *Botrytis* and leaf spot, are claimed to have some activity on bacteria and may help to minimise bacterial rotting.

NB: Copper products can leave a blue residue in the leaf bases even after the harvest interval has been observed.

Currently approved fungicides are listed in Appendix 7.

8.10.3 Weed control

8.10.3.1 Cultural

The usual good husbandry practices such as rotation and stale seedbed should be observed to ensure that as few weed seeds as possible remain in the soil at planting.

Use of contact herbicides prior to planting the crop will minimise risk of residues and may reduce the need for herbicide use later in the crop life. Mechanical methods of weed control such as tractor-mounted or hand hoeing should be used wherever practical as such methods reduce chemical usage in the crop.

8.10.3.2 Herbicides

Pre-emergence or pre-planting herbicides containing pendimethalin or propachlor will delay weed emergence. They may be slightly toxic to the plants. An application of a product containing linuron after the plants have established should control weeds until harvest. Any late flushes of weed must be controlled by hoeing.

A list of currently approved products is given in Appendix 8.

9 Harvesting and storage

See Generic Standards and/or Generic Guidance Notes.

It is **strongly recommended** that glasshouses have appropriate "No smoking/No food" signs and staff are provided with clearly defined areas to eat and drink.

10 Pollution control and waste management

See Generic Standards and/or Generic Guidance Notes.

It is **strongly recommended** that within glasshouses, there are written procedures for the management and recording of incidents involving heating oil spillages.

11 Energy efficiency

See Generic Standards and/or Generic Guidance Notes.

12 Health & Safety

See Generic Standards and/or Generic Guidance Notes.

13 Conservation issues

See Generic Standards and/or Generic Guidance Notes.

Appendix 1 Typical nutrients for Celery

Nutrient (kg/ha)	Soil Index					
	0	1	2	3	4	4 +
Phosphate	250	200	150	100	50	nil
Potash	450	400	350 (2-) 300 (2+)	210	50	nil
Magnesium	150	100	nil	nil	nil	nil

Appendix 2 Insecticides currently approved for carrot fly control in Celery

Active ingredient	Product features	Approval type	Harvest interval ⁽¹⁾	Hazard rating	LERAP category	MRL (mg/kg)
lambda-cyhalothrin	Contact pyrethroid. Dangerous to bees and other beneficial insects.	SOLAs 0744/06 3762/06 1295/07 3257/07	none stated	Harmful	A	0.3 (EU)

Notes:

⁽¹⁾ or latest time of application

Appendix 3 Insecticides currently approved for aphid control in Celery

Active Ingredient	Product Features	Approval Type	Harvest Interval ⁽¹⁾	Hazard Rating	LERAP Category	MRL (mg/kg)
deltamethrin	contact pyrethroid. Dangerous to bees and other beneficial insects.	SOLAs 1579/07 1641/07 1659/07 1662/07 1697/07	none stated	harmful	A	0.05* (EU)
lambda cyhalothrin	contact pyrethroid. Dangerous to bees and other beneficial insects.	SOLAs 1559/05 3762/06 3259/07	none stated	harmful	A	0.3 (EU)
natural plant extracts	physical repellent	n/a	none stated	none stated	none stated	none set
nicotine	contact alkaloid.	full	2 days	toxic Part II poison	none stated	none set
pirimicarb	fumigant/translaminar carbamate	SOLAs 0680/04 ⁽²⁾ 1744/05 ⁽²⁾	3 days	harmful	none stated	none set
pymetrozine	ingested azamethine	SOLAs 0503/07 ⁽³⁾ 1062/05 ⁽²⁾	14 days	harmful	none stated	none set

Notes:

(1) or latest time of application

(2) outdoor crops only

(3) protected crops only

* Denotes MRL set at the limit of determination (LOD)

Not all products containing these active ingredients may be currently approved for use on Celery. As label recommendations are revised regularly, read a current label before use.

Appendix 4 Insecticides currently approved for caterpillar and Celery fly control in Celery

Active Ingredient	Product Features	Approval Type	Harvest Interval (1)	Hazard Rating	LERAP Category	MRL (mg/kg)
<i>Bacillus thuringiensis var Kurstaki</i>	bacterial biological	SOLA 0739/04	28 days	none stated	none stated	none set
deltamethrin	contact pyrethroid. Dangerous to bees and other beneficial insects.	SOLAs 1667/07 ⁽²⁾ 1667/07 ⁽³⁾ 1697/07 ^(2, 3) 1641/07 ^(2, 3) 1579/07 ⁽²⁾ 1158/07 ^(2, 3) 1187/04 1529/06	none stated	Harmful	A	0.05* (EU)
lambda-cyhalothrin	contact pyrethroid. Dangerous to bees and other beneficial insects.	SOLAs 0744/06 ⁽²⁾ 3762/06 ⁽²⁾ 1295/07 ⁽²⁾ 3257/07 ⁽²⁾	none stated	Harmful	A	0.3 (EU)
Nicotine	contact alkaloid	Full	2 days	Toxic	none stated	none set

Notes:

(1) or latest time of application.

(2) outdoor crops only

(3) protected crops only

* Denotes MRL set at the limit of determination (LOD)

Appendix 5 Molluscicides currently approved for use in Celery

Active Ingredient	Product Features	Approval Type	Harvest Interval ⁽¹⁾	Hazard Rating	LERAP Category	MRL (mg/kg)
copper silicate	contact inorganic	Provisional	none stated	none stated	none stated	none set
metaldehyde	ingested aldehyde.	Full	none stated	none stated	none stated	none set
ferric phosphate	ingested inorganic	Full	none stated	none stated	none stated	none set

Notes:

⁽¹⁾ or latest time of application

Appendix 6 Fungicides currently approved for leafspot control in Celery

Active Ingredient	Product Features	Approval Type	Harvest Interval (1)	Hazard Rating	LERAP Category	MRL (mg/kg)
azoxystrobin	systemic strobilurin	SOLA 1041/01	14 days	none stated	none stated	5.0 (EU)
chlorothalonil	protectant chlorophenyl. Broad spectrum - also controls botrytis.	Full	7 days	irritant	B	10.0 (EU)
copper oxychloride	protectant copper	Full	none stated	none stated	none stated	none set
cupric ammonium carbonate	protectant copper	Full	none stated	harmful	none stated	none set
difenconazole	eradicator triazole	SOLA 0260/06 ⁽³⁾	14 days	irritant	none stated	none set
mancozeb	protectant dithiocarbamate	SOLAs 0383/06 ⁽³⁾ 0391/06 ⁽³⁾	60 days	irritant	none stated	0.5 (EU) (Proposed 0.2)

(1) or latest time of application

(2) protected crops only

(3) outdoor crops only

* Denotes MRL set at the limit of determination (LOD)

Not all products containing these active ingredients may be currently approved for use on Celery. As label recommendations are revised regularly, read a current label before use.

Appendix 7 Fungicides currently approved for damping-off and Rhizoctonia control in Celery

Active Ingredient	Product Features	Approval Type	Harvest Interval ⁽¹⁾	Hazard Rating	LERAP Category	MRL (mg/kg)
Etridiazole	protectant thiadiazole.	Full	none stated	Irritant	none stated	none set
Thiram	protectant dithiocarbamate seed treatment	Full	none stated	Harmful	none stated	none set
tolclofos methyl ⁽²⁾	protectant O.P.	SOLA 1055/01	none stated	Irritant	none stated	none set

Notes:

(1) or latest time of application

(2) protected crops only

Not all products containing these active ingredients may be currently approved for use on Celery. As label recommendations are revised regularly, read a current label before use.

Appendix 8 Herbicides currently approved for use on Celery

Active Ingredient	Product Features	Approval Type	Harvest Interval ⁽¹⁾	Hazard Rating	LERAP Category	MRL (mg/kg)
chlorpropham	residual carbamate. Apply after crop establishment.	full outdoor only)	none stated	harmful	none stated	none set
linuron	contact and residual substituted urea. Apply after crop establishment up to 2 rough leaves only.	full	none stated	irritant	B	0.1 (EU)
paraquat (expires 11/07/2008)	contact bipyridilium. Apply pre-planting or inter-row only.	full (outdoor) SOLA 0225/02 (protected)	none stated	toxic	none stated	0.05* (EU)
pendimethalin	residual dinitroaniline	SOLA 1430/07	pre-planting or emergence	irritant	B	0.1 (Uk temporary)
propaquizafop	Foliar acting phenoxy-alcanoic acid	SOLAs 1502/02 1629/02 1632/02 1634/02	28 days	Irritant	none stated	none set
propachlor	residual chloroacetanilide	SOLA 1070/05 1699/05	none stated	harmful	none stated	none set
pro sulfocarb	residual carbamate	SOLA 1752/07	50 days	irritant	none stated	none set

Notes:

⁽¹⁾ or latest time of application

Not all products containing these active ingredients may be currently approved for use on Celery. As label recommendations are revised regularly, read a current label before use.

Appendix 9 Specific off-label approvals for use on Celery

Number	Product Name	Ingredient	Expiry
0744/06	Hallmark with Zeon Technology ® ⁽²⁾	lambda-cyhalothrin	01/01/2007
3762/06	Clayton Lanark ® ⁽²⁾		3/11/2009
1295/07	Cleancrop Silo		13/11/2009
3257/07	Markate 50		28/06/2011
1055/01	Basilex ® ⁽¹⁾	tolclofos methyl	31/12/2008
1697/07	Decis ® ^{(1) (2)}	deltamethrin	31/12/2008
1158/07	Decis Protech ® ^{(1) (2)}		31/12/2008
1663/07 ⁽¹⁾	Pearl Micro ®		31/12/2008
1662/07 ⁽²⁾	Pearl Micro ®		31/12/2008
1579/07 ⁽¹⁾	Bandu ®		01/11/2008
1187/04 ⁽²⁾	Bandu ®		01/11/2008
1641/07	Cleancrop Decathan ^{(1) (2)}		01/11/2008
1041/01	Amistar ® ^{(1) (2)}	azoxystrobin	01/07/2008
0260/06	Plover ® ⁽²⁾	difenconazole	31/12/2008
0383/06	Dithane ® 945 ⁽²⁾	mancozeb	31/12/2008
0391/06	Dithane 945 (12545) ® ⁽²⁾		31/12/2008
1502/02	Falcon ® ⁽²⁾	propaquizafop	31/12/2013
1629/02	Shogun ® ⁽²⁾		31/12/2013
1632/02	Raptor ® ⁽²⁾		31/12/2013
1634/02	Cleancrop GYR ® ⁽²⁾		31/12/2013
0739/04	Dipel DF ® ^{(1) (2)}	Bacillus thuringiensis var. Kurstaki	31/12/2008
0680/04	Aphox ® ⁽²⁾	pirimicarb	31/12/2013
1744/05	Phantom ® ⁽²⁾		31/12/2008
1062/05	Plenum WG ® ⁽²⁾	pymetrozine	31/10/2011
0503/07	Chess WG ® ⁽¹⁾		31/10/2011
1071/05	Ramrod ® ⁽²⁾	propachlor	31/12/2008
1699/05	Alpha Propachlor 50 SC		31/01/2009
1430/07	Stomp 400 SC ®	pendimethalin	31/12/2013
1752/07	Defy ® ⁽²⁾	prosulfocarb	31/12/2013

Notes: Specific off-label approval (SOLAs) provide for the use of the product named in respect of crops, situations or pests other than those included on the product label. Such use is undertaken at the user's choosing and the risk is entirely theirs and/or their advisers.

Specific off-label uses may only take place if all the conditions given in the "Notice of Approval" document, the product label and/or leaflet and any additional guidance on off-label approvals have first been read and understood. The conditions of approval given in the "Notice of Approval" are statutory and supersede any on the label which would otherwise apply.

All SOLAs are conditional on the extant approval of the specific product.

⁽¹⁾ protected crops

⁽²⁾ outdoor crops

Appendix 10 Guidelines for Minimising Pesticide Residues in Protected Celery

These guidelines have been produced after consultation between crop stakeholders and the Assured Produce crop author. They will be developed over the coming seasons as knowledge on minimising residues develops. Growers should consult with their crop protection adviser to ensure other best practices are not compromised before considering these guidelines. The table below lists the active ingredients that may give rise to crop residues and details potential alternative strategies.

Active Ingredient	Target: pest, weed, disease	Current position	Suggested guidelines for both active ingredients:
chlorothalonil	Leaf spot (<i>Septoria apiicola</i>)	7 day PHI	<ol style="list-style-type: none"> 1. One year break between celery crops in any block. Carry-over of disease can be considerable if cropped with celery annually. 2. Ensure all seed purchased is treated with a fungicide 3. Check propagators annually for cultural techniques. Seed must be treated and propagation facilities clean. 4. Include Amistar (azoxystrobin) in any protectant fungicide programme. 5. Increase PHI by up to a further 7 days to allow for continued degradation of active ingredients. <p>See guidelines below.</p>

Introduction:

UK grown protected celery is supplied to the markets from May to June from crops transplanted in February to March. Small amounts used to be grown for late autumn production (October - November) but good quality southern European product is available at this time making this crop unviable.

Routine pesticide residue testing of these crops has shown regular incidences chlorothalonil residues, albeit well below its MRL of 10.0mg/kg.

Chlorothalonil is both used to control leaf spot (*Septoria apiicola*). It has a PHI of 7 days.

Chlorothalonil is a protectant fungicide only and will have no eradicant effect on the disease.

The disease is believed to be initially seed borne with spread in the glasshouse by water splash and on debris from previous crops if rotation is not practiced correctly.

Possible actions to reduce residues:

Pesticide residues of chlorothalonil occur in protected crops as its breakdown is slower in cooler conditions experienced in the spring.

In order to minimise the levels of this compound in protected celery guidelines are recommended, in the table above, if it is considered possible to do so without compromising crop quality:

Notes:

Items 1-3 listed in the table above will all help to ensure that the crop is exposed to the minimum level of disease within the glasshouse environment. Regular inspections of the crop will indicate the level of control needed.

Items 4-5 listed in the table above should effectively lower levels of carbendazim and chlorothalonil in the crop. They should only be undertaken by growers using the services of an agronomist experienced in the crop.

N.B. If fungicide applications are deemed necessary, it is not advisable to reduce application rates to lower potential residue levels. This is because the disease is exposed to lower levels of the active ingredients and the potential survival of a larger number of disease organisms could lead to greater mutation levels leading to build up of resistance to the fungicides.

Appendix 11 Control Points: Celery

CS.36 CELERY

CS.36.2 If methyl bromide is used to sterilise soil, you must be able to demonstrate awareness of BCPA's 'Guidelines for fumigation with Methyl Bromide'

- Protocol reference: Section 4.3

CS.36.3 Within your glasshouses, you must have written procedures for the management and recording of incidents involving heating oil spillages

- Protocol reference: Section 10

CS.36.4 Your glasshouses must have appropriate "No Smoking/No Food" signs and your staff provided with a clearly defined area to eat/drink

- Protocol reference: Section 9