Assured Produce

Crop Specific Protocol

ONIONS (SALAD)

(CROP ID: 32)

January 2009

Control Document No: 00037/09

Acknowledgements

Assured Produce gratefully acknowledges the contribution of all consultees in the preparation of this protocol, particularly Gareth Skinner of Vale Vegetable Crop Consultancy.

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.

All statements in this protocol containing the words **"must"** (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 **"must"** control points can be found in Appendix 8 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:
There may be other withdrawals or revocations during the currency of this protocol. Products containing substances which have been revoked are shown on the PSD website (http://www.pesticides.gov.uk).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:

- 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.

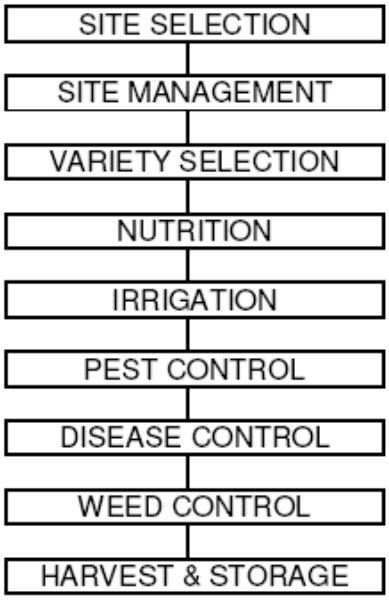
For pesticides on-label, only active substances are shown.

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 three years break between allium crops is desirable. However, owing to the availability of suitable irrigated land, this may not be feasible. A break of 12 months from harvesting to replanting will minimise carry-over of fungal spores.

4 Site management

See Generic Standards and/or Generic Guidance Notes.

5 Variety selection

See Generic Standards and/or Generic Guidance Notes.

6 Nutrition

Salad Onions grow best on light, well-drained soils. The crop will not tolerate acid conditions. A pH of 7.0 is optimal. Detailed field testing with a reliable soil indicator is essential if isolated acid pockets are to be identified. Composite sampling can give misleading pH figures, which can lead to uneven crop growth.

A soil analysis is essential prior to drilling to determine phosphorous, potassium and magnesium levels. Typical major nutrient requirements are given in Appendix 1 and the figures are expressed in kilograms of plant food per hectare.

Nitrogen

Winter onions have little need for nitrogen prior to sowing. Much will depend on the previous crop but in most cases, no nitrogen is needed until the spring.

For spring and summer onions, much will depend on soil the indices, but usually 50 kg/ha of nitrogen is sufficient to establish the crop.

Most Salad Onion crops will require top dressing. Much will depend on the soil type and the experience of the grower. Most crops will not require more than 125 kg/ha of nitrogen.

Trace elements

Onions are particularly responsive to manganese, especially if the soil is alkaline. Manganese sulphate is usually the most economical source of manganese. The addition of a non-ionic wetter will help uptake into the plant.

Timing of the application of organic farmyard manure (FYM), where used, must be carefully considered as nitrate release can be unpredictable, leading to excessive uptake by the crop loss by leaching through the soil. FYM should not be applied in the autumn.

7 Irrigation

See Generic Standards and/or Generic Guidance Notes.

Control Document No: 00037/09

8 Crop Protection

8.1 The basic approach to crop protection

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. Trained staff should carry this out. 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 these actions fail to prevent or control pests and disease, 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 salad onion crop should be thoroughly destroyed or ploughed-in as soon as cropping is complete.

The use of pest and disease monitoring and forecasting techniques should be adopted where possible as an adjunct to crop inspection, thus minimising insecticide and fungicide use. 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 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 8 for the pesticide targets and guidelines on this crop.

8.10 Pest, disease and weed control

8.10.1 Pest Control

8.10.1.1 Onion thrip *(Thrips tabaci)*

Onion thrip is a cosmopolitan species living on a wide range of vegetables and flowers. Emergence in the spring is temperature dependent and therefore varies widely. The dispersal of the emerged adults can be extensive as they are usually carried on thermal air currents. Males are very rare and most breeding is parthenogenetic. The females lay 60-80 eggs in the leaf axils during their life span of about a month.

The larvae hatch within a week. They look similar to adults but possess only rudimentary wing buds. They are at first straw yellow colour but darken rapidly to near black. They graze the epidermis of the leaves causing characteristic contorted silvery trails. The larvae feed for 2-3 weeks depending on temperature and then descend to the soil to pupate.

There are usually 2 generations of adults a year but weather conditions often cause what seem to be repeat infestations from April to September.

Cultural control:*Regular weekly monitoring of thrips activity is essential. Plants should be pulled up, and the leaves parted. The thrips usually live in the damper areas between the leaves during the day. Regular inspections should ensure that the young yellow larvae are spotted before they start to disfigure the leaves.*

When no crop exists, the thrips will complete their life cycles on a wide variety of alternative host plants. The pest therefore can quickly reach economically damaging levels even when no other onion crops are in the vicinity.

Crops planted for overwintering are at rarely at risk in the autumn but can suffer severe infestations as temperatures rise in the spring.

There is no evidence of any resistance to thrips in any of the commonly used varieties of either Allium cepa or Allium fistulosum or their hybrids.

Chemical control: As soon as thrips are identified in the crop, an application of any approved product will be partially effective. Repeat applications may be necessary if the infestation is heavy. Check the harvest interval is adequate for growth stage of the crop.

A list of currently approved insecticides is given in Appendix 2. There is increasing evidence that a degree of resistance has occured to the pyrethroid insecticides so their use may not give the required level of control.

Tracer (Spinosad) works best if applied early in an infestation.

8.10.1.2 Onion fly *(Delia antiqua)*

This is an uncommon pest of Salad Onions and is often mistaken for infestations of bean seed fly (see Section 8.10.1.3). It overwinters in the soil as a pupa and emerges during April and May. The female lays her eggs in the soil adjacent to emerging seedlings. The larvae enter the seedling and usually destroy the growing point. The seedling then either fails to emerge or dies at the early then cotyledon or 1 true leaf stage. There are 2-3 generations a year but the short growing time of the salad onion crop means that onion fly populations rarely build up to provide a consistent threat to the crop.

Cultural control:*Yellow water or sticky traps indicate the presence of dipterous pests and can be used to highlight periods of infestation. An experienced agronomist with entomological training is usually needed to identify the catches. Due to the sporadic nature of onion fly no cultural control measures are possible.*

Chemical control: Control can be effected by using seed coated with products containing tefluthrin (see Appendix 3). There are no products that can be used once an infestation is established but chlorpyrifos, approved for cutworm control, may give partial control of an established infestation.

8.10.1.3 Bean seed fly *(Delia platura)*

This pest of the salad onion crop is much more common than the onion fly because its host range is very wide and it will thrive on many crops and hedgerow plants. It also thrives in decaying vegetation and heaps of packhouse waste. It emerges in April from pupae overwintering in the soil. The female lays her eggs below the soil near to the germinating seed. The larvae burrows into the seedling causing identical symptoms to those described for the onion fly above.

The pest has 4-5 generations a year but these can overlap creating difficulties in predicting significant outbreaks.

Cultural control:*Yellow water or sticky traps can be used as for onion fly (above) but the same reservations apply.*

It is extremely unwise to create packhouse waste dumps anywhere near growing vegetable crops. Bean seed flies will readily multiply in them and form a large source of from which adults will fly to infest crops.

Prompt ploughing of previously cropped land together with dispersal of any waste around field boundaries, etc. will help to reduce the build-up of this pest.

Chemical control: The control measures for bean seed fly are as outlined for onion fly (see Section 8.10.1.2). It is not necessary to treat seed which is drilled in February or March as there are no flies emerging to infect the crops at this time.

8.10.1.4 Cutworms

These pests are the caterpillars of several species of noctuid moths, the most common being the turnip moth *(Agrotis segetum)* . They occur only infrequently in salad onion crops, usually in hot dry summers. The first signs of attack are short lengths of row falling over. Inspection will show that the caterpillars have eaten-off the plants at ground level. Young caterpillars hatch in June and July, start to feed on the foliage and then descend to the soil to feed at ground level, usually at night.

Treatment is only required if damage is seen or if forecast or trapping systems indicate an attack is likely.

Control Document No: 00037/09

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

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

Chemical control: Spray timings are critical, as large caterpillars are much more difficult to kill than small young ones. Base any treatments on warnings from subscribed forecasting systems or trapping, and use high volumes of water on to dry soil in warm weather.

The currently approved product for cutworm control is listed in Appendix 4.

8.10.1.5 Nematodes

The stem nematode *(Ditylenchus dipsaci)* is an occasional pest of Salad Onions. It is occasionally referred to as 'onion bloat' as the onion seedlings have a swollen or bloated appearance. Oats, Parsnips, Broad Beans and other market garden crops are attacked by the same race of nematode. The nematode can reproduce on certain common farm weeds.

Cultural control:*Good crop rotations are essential. If the problem has occurred in a previous host crop it is vital that Salad Onions are not planted on the infected land. Good weed control is also very important. As nematodes tend to thrive in wet conditions it is essential to make certain that the land is well drained.*

Chemical control: There are no chemicals recommended for the control of this pest on outdoor Salad Onions. Oxamyl (Vydate) is approved off-label for protected crops (see Appendix 7).

8.10.2 Disease control

8.10.2.1 Leaf Rot *(Botrytis squamosa)*

Leaf rot is perhaps the most common disease of Salad Onions. *Botrytis* can be very damaging if attacks occur in warm humid conditions. This causes severe leaf spotting which render the onions unmarketable.

Cultural control:*Keeping the crop free from weeds will encourage better air movement within the crop. Ploughing in infected debris and good rotation will also help to improve control of this disease. Warwick HRI are developing a weather based system to indicate periods of high risk of infection.*

Chemical control: There are fungicides that will assist in the control of this disease. These contain the fungicides, azoxystrobin, chlorothalonil, cyprodinil/fludioxonil, boscalid/pyraclostrobin and iprodione. As they come from different chemical groups (see Appendix 5), it is sensible if materials are used in an alternating programme, in order to reduce the risk of building up of resistant strains. Iprodione and cyprodinil/fludioxonil are the most effective active ingredient for curative treatments. Most formulations of chlorothalonil are no longer approved for use on salad onions. Check your products registration number prior to use. Chlorothalonil now has full approval for use on salad onions in mixture with azoxystrobin.

8.10.2.2 Collar rot *(Botrytis cinerea)*

This disease is common on living tissue that is not growing actively; hence it is a particular problem on overwintering onions. It causes die back of foliage and, in the worst cases, will kill the plant.

Cultural control:*Good drainage is essential to eliminate waterlogged conditions, especially in overwintered onions.*

Chemical control: Early application of suitable fungicides is essential. Fungicides containing iprodione, cyprodinil/fludioxonil, boscalid/pyraclostrobin and chlorothalonil/ azoxystrobin are particularly effective in controlling this disease (see Appendix 5).

Copper oxychloride has a SOLA for bacterial rots of onions. It may prove effective in protecting overwintering Salad Onions from both species of *Botrytis* .

8.10.2.3 Downy mildew *(Peronospora destructor)*

This disease occurs most frequently during the autumn when heavy dews often accompany warm nights. It is also becoming increasingly common in early spring on overwintered crops. It can be extremely serious for if conditions are suitable, downy mildew will spread very rapidly thorough a crop.

Cultural control:*Avoid autumn production near rivers or in areas where there is poor air movement as this encourages the spread of the disease. Regular inspection of the crop is essential to identify an outbreak at an early stage to enable swift remedial action to be taken. Warwick HRI is operating a weather based system to indicate periods of high risk of sporulation.*

Chemical control: Fungicides based on metalaxyl-M, mancozeb, dimethomorph, fosetyl aluminium, boscalid/pyraclostrobin, chlorothalonil or azoxystrobin are approved for this disease (see Appendix 5). It is most unwise to spray metalaxyl or strobilurin based fungicides routinely, as this could quickly lead to the development of resistant strains. The timing of strobilurin applications is critical as they have no curative activity.

8.10.2.4 White rot *(Sclerotium cepivorum)*

This is a most serious disease of Alliums and Salad Onions in particular. The black resting bodies (sclerotia) can persist in the ground for many years. The first visible sign of the disease is when the leaves turn yellow, wither and die. If the plant is carefully removed from the soil and the roots examined, a white mycelium can be observed colonising the base of the stem. In autumn-sown onions, the loss can be particularly severe when the soil warms up in the spring.

Cultural control: *Where a light infestation is known to exist and there is a limitation on land, it is best to try to grow a summer crop. Very often, in hot summers, the germination of sclerotia is inhibited by high soil temperatures.*

Care must be taken not to transfer infected soil from one site to another. Washing of cultivation and harvesting equipment is essential if cross-field contamination is to be avoided.

Chemical control: Tebuconazole is approved "off-label" both as a seed treatment and a foliar spray. Boscalid/pyraclostrobin has a SOLA for foliar applications only (see Appendices 5 & 7). These treatments should be applied only if there is a known risk of white rot in the field. The treatments are more effective on summer onions that overwintered crops due to the different length of time the crops are in the ground. The seed treatment will lower germination by up to 10% and delay emergence by up to one week.

8.10.2.5 White tip *(Phytophthora porri)*

This very occasional disease of onions chiefly infects overwintered crops. It is sometimes difficult to distinguish between white tip and leaf blotch. A pathologist should be consulted if there is any doubt as the chemical treatment for each disease is very different. White tip is encouraged by wet weather and waterlogged soil.

Cultural control: *As this disease survives in the soil on infected debris, it is important to pay particular attention to crop hygiene. Good drainage will assist in helping to discourage the disease.*

Chemical control: Fungicides containing metalaxyl-M and azoxystrobin will offer some control of this disease (see Appendix 5). One of the major problems in controlling white tip by chemical means is that when the disease is first observed, soil conditions are such that spraying is very difficult.

The metalaxyl-M and azoxystrobin based fungicides are effective against both white tip and downy mildew. Note however that only 3 applications of metalaxyl-M and 4 applications of azoxystrobin may be made to any crop. Ensure this number is not exceeded, especially on overwintering crops.

8.10.2.6 Leaf blotch *(Cladosporium allii-cepae)*

A very aptly named disease as the leaf of the onion is 'spotted' or 'blotched'. It usually occurs more frequently during the winter months. The fungus appears to reproduce more actively in periods of short day length.

Cultural control: *A correct rotation and good crop hygiene should help lessen the risks of the disease.*

Chemical control: Ensure that the disease has been correctly confirmed as Leaf Blotch by a qualified pathologist before applying any treatment. No fungicides, currently approved for use on salad onions, are specific to leaf blotch.

8.10.3.1 Cultural methods

Salad Onions are not very competitive; therefore, it is essential the crop is kept relatively free of weeds. Weedy crops encourage pests such as cutworm and bad infestations can restrict the airflow within the crop leading to an increase in diseases such as *Botrytis* .

Herbicide use can sometimes be minimised by using the stale seedbed technique. This is often useful if a weed is present with limited options for chemical weed control. eg. fumitory in the field.

If mechanical means of weed control are employed, consideration must be given at drilling at suitable row spacing.

8.10.3.2 Herbicides

Herbicidal techniques using repeat low dose treatments have been developed. This enables good weed control to be achieved with the minimum potential crop damage.

When planning to use contact herbicides, it is important to ensure the crop has sufficient wax on its leaves to enable it to "shed" the product being applied, thus providing adequate crop selectivity.

This "wettability" is simply tested by dipping the onion leaves into a solution of crystal violet. If adequate wax is present on the leaf the solution will not adhere to the leaf surface.

Always be mindful of the correct soil and weather conditions before applying herbicides. eg. applying a residual herbicide on to a dry soil will not usually be efficacious and volatile herbicides such as chlorpropham or propachlor are best not applied during very hot conditions.

Herbicides currently approved for use on Salad Onions are listed in Appendix 6.

9 Harvesting and storage

See Generic Standards and/or Generic Guidance Notes

10 Pollution control and waste management

See Generic Standards and/or Generic Guidance Notes

Conservation of water must be considered as a priority when washing the harvested crop.

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

Control Document No: 00037/09

Appendix 1 Typical nutrition requirement for fresh Salad Onions (kg/ha)

Nutrient (kg/ha)	**Soil Index**					
	0	**1**	**2**	**3**	**4**	**4+**
Phosphate	200	150	100	50	nil	nil
Potash	275	225	175 (2-) 125 (2+)	35	nil	nil
Magnesium	150	100	nil	nil	nil	nil

N.B.

A new version of RB209 is due to be published in 2009.

The values quoted in Appendix 1 are likely to be revised.

Appendix 2 Insecticides currently approved for thrips control in Salad Onions

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 1641/07 1697/07 1662/07 1652/07 1579/07 1261/07	none stated	Harmful	A	1.0
lambda-cyhalothrin	contact pyrethroid. Dangerous to bees and other beneficial insects	SOLAs 0730/06 3756/06 3256/07 1287/07	14 days	Harmful	A	0.05
nicotine	contact alkaloid. Dangerous to bees and other beneficial insects.	Full	2 days	Toxic	none stated	none set
rotenone	natural contact. Low persistence	Full	1 day	none stated	none stated	0.01*
spinosad	ingested naturalite	PPPR (31/01/2017)	7 days	none stated	B	0.2

Notes:

[1] or latest time of application. Not all products containing these active ingredients may be currently approved for use on Salad Onions. As label recommendations are revised regularly, read a current label before use.

Control Document No: 00037/09

Appendix 3 Insecticides currently approved for onion fly/bean seedfly control in Salad Onions

Active Ingredient	Product Features	Approval Type	Harvest Interval (1)	Hazard Rating	LERAP Category	MRL (mg/kg)
tefluthrin	pyrethroid	SOLA 0546/05	none stated	none stated	none stated	0.05

Appendix 4 Insecticides currently approved for cutworm control in Salad Onions

Active ingredient	Product features	Approval type	Harvest interval (1)	Hazard rating	LERAP category	MRL (mg/kg)
chlorpyrifos	contact O.P. dangerous to bees and other beneficial insects.	Full	21 days	Harmful	A	0.05*

N.B.

Some formulations of chlorpyrifos are approved for use on ‘onions’. Whilst it is still legal to use these formulations on salad onions, PSD advise against its use as no data exists on its safety or efficacy on this crop.

Control Document No: 00037/09

Appendix 5 Fungicides currently approved for use on Salad Onions

Active Ingredient	Product Features	Approval Type	Harvest Interval (1)	Hazard Rating	LERAP Category	MRL (mg/kg)
azoxystrobin	protectant strobilurin	SOLA 1687/02	7 days	none stated	none stated	2.0
chlorothalonil	protectant chlorophenyl.	Full	14 days	irritant	B	10.0
copper oxychloride	protectant fungicide & bacteriacide	SOLA 1127/99	14 days	none stated	none stated	5.0
azoxystrobin/chlorothalonil	protectant mixture	Full	14 days	harmful	B	2.0/10.0
cupric ammonium carbonate	protectant copper	Full	none stated	harmful	none stated	5.0
dimethomorph / mancozeb	systemic morpholine / dithiocarbamate	SOLA 2953/06	7 days	irritant	B	0.3/1.0
fosetyl-aluminium	systemic phosphoric acid	SOLAs 3515/06 3565/07	3 days	irritant	none stated	30.0
iprodione	protectant & eradicant dicarboxamide	Full	7 days	irritant	none stated	3.0
mancozeb/ metalaxyl-M	systemic phenylamide/ dithiocarbamate	SOLA 2324/03	14 days	irritant	none stated	1.0/ 0.2
metalaxyl-M	systemic phenylamide	SOLA 2194/07	14 days	irritant	none stated	0.2
propamocarb hydrochloride	Translocated protectant carbamate	Full	3 days	none stated	none stated	0.1*
tebuconazole	systemic triazole. Seed treatment (a) and foliar spray (b)	SOLAs 2408/04 (b) 1968/06 (a) 2407/04 (a) 1387/07 (b) 1361/07 (b) 0533/07 (b) **1826/08 (b)**	14 days	Irritant	none stated	0.5
thiram	dithiocarbamate seed treatment	Full	none stated	none stated	none stated	0.1*
cyprodinil/fladioxonil	protectant and eradicant anilidopyrimidine/cyanopyrrole	SOLA 0239/07	14 days	none stated	B	1.0/0.3

Notes:

(1) or latest time of application

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

Not all products containing these active ingredients may be currently approved for use on Salad Onions.

As label recommendations are revised regularly, read a current label before use

Appendix 6 Herbicides currently approved for use on Salad Onions

Active Ingredient	Product Features	Approval Type	Harvest Interval (1)	Hazard Rating	LERAP Category	MRL (mg/kg)
clopyralid	translocated picolinic	Full	42 days	none stated	none stated	0.5
chloridazon	residual pyridazinone.	SOLAs 0732/97 2570/01, 1819/02	none stated	harmful	none stated	0.5
chloridazon + propachlor	residual mixture	SOLA 2573/08	none stated	irritant	none stated	0.5/0.2
chlorthal-dimethyl / propachlor	residual mixture	Full 18/03/2010	none stated	harmful	none stated	0.5/0.2
cycloxydim	translocated oxime.	Full	28 days	irritant	none stated	1.0
chlorpropham	residual carbanate.	SOLA 1837/08	none stated	harmful	none stated	0.05*
fluazifop-p-butyl	contact phenoxyproprionic acid.	Full	28 days	irritant	none stated	0.2
ioxynil	contact HBN, can be used at repeat low doses.	Full	14 days	harmful	none stated	3.0
pendimethalin	residual dinitroaniline.	SOLAs 2375/06 2207/05 2106/06 1438/07	none stated	none stated	none stated	0.05*
propachlor	residual chloroacetanilide	Full	none stated	harmful	none stated	0.2
prosulfocarb	residual carbamate	SOLA 0085/08	<3T/L	irritant	B	0.05*
tepraloxydim	Systemic oxime	SOLA 4024/06	28 days	irritant	none stated	0.3

Notes:

(1) or latest time of application

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

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

Appendix 7 Specific off-label approvals for use on Salad Onions

Number	Product name	Ingredient	Expiry
3565/07	Cleancrop Chicane ®	fosetyl-aluminium	31/05/2009
1687/02	Amistar ®	azoxystrobin	31/12/2011
1697/07	Decis ®	deltamethrin	31/12/2013
3083/08	MetMan 680	mancozeb/metalaxyl-M	30/06/2011
1641/07	Cleancrop Decalthon ®	deltamethrin	31/12/2013
1662/07	Pearl Micro ®	deltamethrin	31/12/2013
1579/07	Bandu	deltamethrin	31/12/2013
1652/07	Decis Protech ®	deltamethrin	31/12/2013
2953/06	Invader ®	dimethmorph / mancozeb	30/09/2011
1819/02	Lidazone 65 WG ®	chloridazon	31/12/2013
0732/97	Pyramin DF ®	chloridazon	31/12/2013
2570/01	Better DF ®	chloridazon	31/12/2013
2573/08	Ashlade CP ®	chloridazon + propachlor	18/03/2010
1127/99	Cuprokylt ®	copper oxychloride	31/12/2013
3515/06	Aliette 80 WG ®	fosetyl-aluminium	31/12/2013
2408/04	Folicur ®	tebuconazole	31/12/2013
1826/08	Orius ®	tebuconazole	31/07/2009
2407/04	Raxil ®	tebuconazole	31/12/2013
1968/06	Bayer UK 226 ®	tebuconazole	31/12/2013
0546/05	Force ST ®	tefluthrin	31/12/2013
4024/06	Aramo ®	tepraloxydim	30/11/2009
0925/94	Vydate r (1)	oxamyl	31/12/2013
1438/07	Stomp 400 SC ®	pendimethalin	31/12/2013
0085/08	Defy ®	prosulfocarb	01/08/2013
2324/03	Fubol Gold WG ®	mancozeb/metalaxyl-M	31/12/2013

Specific off-label approvals (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.

(1) Protected only:
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.

Appendix 7 Specific off-label approvals for use on Salad Onions (Cont'd)

Number	Product name	Ingredient	Expiry
0730/06	Hallmark with Zeon Technology ®	lambda-cyhalothrin	13/11/2009
0156/08	Headland Inorganic Copper	copper oxychloride	31/12/2013
3756/06	Clayton Lanark ®	lambda-cyhalothrin	13/11/2009
0790/08	Signum	boscalid/pyraclostrobin	30/09/2013
2194/07	SL567a ®	metalaxyl-M	30/09/2012
0263/08	Standon Full Stop	fosetyl aluminium,	31/12/2013
1837/08	Jupliter 40EC ®	clorpropham	31/12/2013
0239/07	Switch ®	cyprodnil/fludioxonil	31/12/2013
1361/07	Mitre ®	tebuconazole	31/12/2013
1387/07	Alpha Tebuconazole ®	tebuconazole	31/12/2013
3256/07	Markate 50 ®	lambda-cyhalothrin	28/06/2011
1287/07	Cleancrop Silo ®	lambda-cyhalothrin	31/11/2009
0553/07	Riza ®	tebuconazole	21/12/2013

Specific off-label approvals (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.

(1) Protected only:
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.

Appendix 8 Guidelines for Minimising Pesticide Residues in Salad Onions

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:**
azoxystrobin	Leaf rot/collar rot *(Botrytis squamosa/cinerea)* Downy mildew *(Peranospora destructor)*	7 day PHI	1. Lengthen the PHI by up to a further 7 days. This will give the active ingredients more time to degrade. 2. Use azoxystrobin early in the life of the crop. It is a protectant fungicide only and will not cure an established infection. 3. Include chlorothalonil based products in any protectant programme for both Botrytis and downy mildew. It has a different mode of action than azoxystrobin or iprodione. 4. Include Fubrol Gold W or SL567a later in any programme for downy mildew control. It has curative properties. 5. If applications of fungicides for downy mildew are needed close to harvest, use Aliette WG. It has a short PH (3 days) and no residues have been found. 6. Participate in a disease forecasting programme. It will assist in decision making on whether to apply fungicides for both Botrytis and downy mildew (See notes) **See guidelines below.**
iprodione	Leaf rot/collar rot *(Botrytis squamosa/cinerea)*	7 day PHI	

Introduction:

UK grown salad onions are supplied between April and June from crops drilled from August to September and over-wintered. Supply from June to October is from crops drilled from February to July. Supplies from November to March are sourced mainly from Mexico and Egypt.

Routine pesticide residue testing of UK salad onions has shown a regular incidence of azoxystrobin and ipriodione residues, albeit well below their MRL's of 2.0mg/kg and 3.0mg/kg respectively, in UK crops harvested in the early spring and autumn.

Azoxystrobin is used as a protectant fungicide and has activity against both botrytis (*Botrytis cinerea* and *Botrytis squamosa*) and downy mildew (*Peranospora destructor*). It will not eradicate an established infection of either disease.

Iprodione is used as both a protectant and eradicant fungicide for the control of botrytis. It has no activity against downy mildew.

The life cycle of the two diseases are closely governed by temperature humidity and leaf wetness. Ideal conditions for infection exist in the spring and autumn, hence the increased incidence of these diseases then.

Salad onion quality is fundamentally affected by any blemishes on the leaves caused by pests or diseases. Growers have to ensure that the crops are effectively blemish free as the supermarket specifications allow only minor imperfections.

It is common to estimate crop maturity and apply iprodione (as Rovral Flo) and/or azoxystrobin (as Amistar) both with a 7 day harvest interval as close to harvest as possible to ensure that any late incidence of disease is minimised.

It is these late applications of the fungicides which are giving low levels of residues.

Notes on table:

Items 1-5 detailed in the table should effectively lower levels of azoxystrobin and iprodione residues in salad onions. They should only be undertaken by growers utilising the services of an agronomist experienced in the crop and who is able to inspect crops at risk at least weekly, and preferably more frequently in times of perceived risk.

Item 6, forecasting, may not in itself reduce residues as infection periods, not picked up by inspections, may trigger further applications of fungicides. It will however help to avoid unnecessary applications.

There are currently two forecasting programmes available, one operated by Dacom/Plant Plus and the other by Warwick HRI. The latter is specifically geared towards salad onion growers and is already being operated by the major suppliers.

Their inputs are derived from remote weather stations sited in salad onion crops. The data is regularly downloaded to the computer model via a modem. Their output is sent to subscribers weekly and gives the incidence of sporulation and infection of both diseases and has already proved valuable in identifying the correct time to apply fungicides for maximum efficacy. With the on-going co-operation of the growers, HRI is continually modifying the computer model to make the forecasting more accurate year-on-year.

Documented inspections, along with forecasts from the weather station data and computer models are the best way of using the minimum number of pesticide applications whilst ensuring the crops reach maturity without any quality defects.

N.B. It is not advisable to reduce application rates to lower potential residue levels. This is because the diseases are exposed to lower levels of the active ingredients and the surviving disease organisms could potentially mutate on multiplication causing a build up of resistance to the fungicides.

Control Document No: 00037/09

Appendix 9 Control Points: Onions (Salad)

CS.32 **ONIONS (SALAD)**

CS.32.1	You should be able to show that water used for washing the harvested crop is used with conservation as a priority - Protocol reference: Section 10