



**Assured Produce**

**Crop Specific Protocol**

**PEAS (VINING, PROCESSED)**

**(CROP ID: 48)**



**January 2008**

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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.

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<sup>®</sup> 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 Products containing substances which have been revoked are shown on the PSD website (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](http://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.

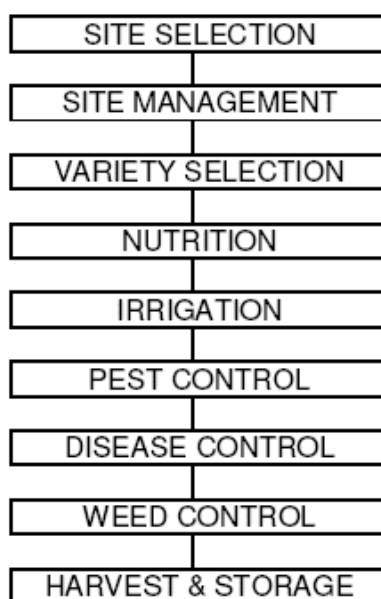
For pesticides on-label, only active substances are shown.

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

#### 3.1.1 Climate

Excessive rainfall during the later stages of Pea growth is undesirable. Plant habit becomes indeterminate and flowering prolonged. The bulk of haulm produced contributes to a humid microclimate that encourages fungal

growth.

Temperature is not a limiting factor to Pea growing within the UK, but it influences earliness of drilling which can be achieved and rate of growth. Peas do not grow at temperatures below 4.4°C. Although Peas at early growth stages can survive frost, more advanced crops suffer damage. Damage from frost is unlikely if Peas are sown after mid-February. Vining Pea varieties have not been bred for winter hardiness.

### 3.2 Crop rotation

Crop rotation is essential to reduce the build up of pests and soil-borne diseases. Several root-infecting fungi cause foot and root rots to Peas, Field, Broad and Green Beans. All Pea and Bean crops should be treated as one crop and a break of at least four legume-free years should be maintained between them.

## 4 Site management

### 4.1 Soil mapping

See Generic Standards and/or Generic Guidance Notes.

### 4.2 Soil management

#### Soil type

Deep, free-working loams are suitable for Peas. Extremes of soil type are to be avoided: drought prone sands (unless irrigated) and heavy clays are unsuitable. Pea roots are very sensitive to the physical condition of the soil and compaction and waterlogging are very damaging.

## 5 Variety selection

Continuity of cropping is achieved with the use of varieties with maturities from early to late and with sequential sowings based on accumulated heat units or on observations of seedling development.

Corn drills are suitable for sowing Peas, which are drilled at about 5 cm depth. The seed is thus covered by about 2-3 cm of settled soil after rolling sufficient to avoid damage from any leaching of residual herbicides.

## 6 Nutrition

### 6.1 Nutrient requirement

#### Major nutrients

*Prior to cropping the field, nutrient status should be determined by sampling and analysis. Fertiliser application must be in accordance with crop needs and soil reserves. Particular care should be taken to avoid build up of unnecessarily high levels of phosphorus in the soil as this can cause pollution of surface waters.*

Nitrogen-fixing *Rhizobia* bacteria, responsible for root nodulation of Peas, occur naturally in UK soils and supply Peas with their nitrogen requirement. Applications of nitrogen fertiliser, farm manure or sewage sludge are unnecessary and will delay and suppress nodulation. If Peas show symptoms of nitrogen deficiency this may be due to the destruction of root nodules. In conditions of waterlogging, for example, do not apply nitrogen fertiliser as it will not be effective because the damaged root system is unable to take up nitrogen.

Examples of typical fertiliser recommendations are given in Appendix 1.

Phosphate and potash are applied as a base fertiliser before cultivation.

Peas may suffer from sulphur deficiency on sandy, shallow or medium textured soils with low organic matter, and which are far from industrial S emissions. Where deficiency is likely, apply 37.5 to 50 kg/ha SO<sub>3</sub> to the seed bed before sowing.

Proprietary foliar feeds are unnecessary and unlikely to give lasting beneficial effects. Under some conditions they may cause crop scorch.

### **Lime and pH**

Peas require a pH of at least 5.9 to 6.5. If the pH is below 5.8 an application of lime will be needed. Over-liming should be avoided as it can induce deficiency of trace elements such as manganese.

### **Trace elements**

*Treatments should only be applied where a deficiency problem has been identified.*

Manganese deficiency symptoms are chlorosis between veins and round margins of the leaves. Occasionally 'Marsh Spot' disorder, a necrotic spot that appears on the adaxial surfaces of the cotyledons, occurs in Vining Peas. It occurs where the soil is deficient or where manganese is unavailable to the plant and is common on peaty organic or sandy soils and where the pH is over 6.8. Soil analysis for manganese is of little value. Foliar sprays of manganese sulphate and wetter can correct the deficiency.

Magnesium deficiency is less common, occurring late in the growth of the crop. Symptoms are interveinal chlorosis but the leaf margins remaining green with older leaves affected first. It is more likely to occur on sandy, acid soils and where there is excess potash. Soil analysis will identify the problem. At an index of 0 and if lime is also needed, correction can be made by an application of with magnesian limestone (Appendix 1) either before Peas are sown or elsewhere in the rotation. If crop treatment becomes necessary corrective foliar sprays with magnesium sulphate should be applied.

### **Post harvest cultivations**

Green crop residues from Peas have a high nitrogen content and in order to reduce leaching of nitrogen into ground water, ploughing or cultivating them in after harvest should be delayed until just before planting the next crop (see DEFRA's Code for Good Agricultural Practice for Water).

## **7 Irrigation**

Peas are highly responsive to irrigation and scheduling systems will help forecast the timing and the priority order. Peas are most sensitive to soil moisture deficits at the beginning of flowering and during pod swelling. Irrigation during petal fall may increase the occurrence of *Botrytis*.

## **8 Crop protection**

### **8.1 The basic approach to crop protection**

*The guiding principle is that pesticide use should be minimised. An integrated approach should be adopted to achieve this involving the following management steps.*

#### **Planning:**

- a. *Sensible crop rotations to avoid build-up of problems.*
- b. *Careful site selection to avoid potential or previous problems thereby enhancing crop health and*

*cleanliness.*

- c. *Inclusion of resistant varieties in cropping programmes whilst retaining the required quality parameters and eating characteristics.*

#### **Cultural preventative techniques:**

- a. *Good crop and field hygiene.*
- b. *Promoting crop health by ensuring effective nutrient availability through soil analysis and accurate application of fertilisers and trace elements.*
- c. *Utilising available irrigation to promote healthy growth and as a control measure wherever appropriate and feasible.*

#### **Corrective action:**

Where corrective or protective action is necessary the following approach should be adopted.

- a. The need to take corrective or protective action must be established by regular monitoring and reference to established thresholds. The effect of prevailing and predicted weather conditions on the need for treatments must be considered.
- b. The availability and use of biological and natural methods of pest and disease control must be reviewed and applied if appropriate.
- c. Where chemical control is essential:
  - *The least toxic and persistent product should be selected with due regard to its efficiency and ecotoxicity.*
  - *The minimum effective dose should be used.*
  - *It is **strongly recommended** that seed treatment is considered as a first line of defence against certain diseases.*
  - *An appropriate application method with effectively maintained equipment should be chosen.*
  - *Selective and spot treatments should be used whenever appropriate.*
  - *It is **strongly recommended** that the use of foliar fungicides is justified.*

## **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](http://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](mailto: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 harvests intervals are followed**
- **Ensuring that application equipment is applying products correctly**

Currently there are no residue issues associated with this crop 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 Field thrips (*Thrips angusticeps*)**

Early sown Peas on stony soils are susceptible to thrips damage. The tiny black "thunderflies" feed within the enclosed leaves of the growing point just as the seedlings are emerging from the soil. Damaged leaves are pale, distorted and thickened.

**Chemical control:** Where the pest is known to be an annual problem, a single spray of insecticide should be made as soon as the seedlings have begun to emerge and more than 4-5 thrips can be found in the tightly enclosed leaves. Recent work has indicated that good control of thrips can be achieved by Hallmark with Zeon Technology.

**Cultural control:** *Thrips live for most of the year in the soil and are also pests of brassicas, Linseed, Spring Barley and Sugar beet, avoiding these crops in the rotations may reduce the surviving populations in susceptible soils.*

#### 8.10.1.2 Pea weevil (*Sitona lineatus*)

Early sown crops in a dry spring can be more severely affected by pea weevil. The adults feed on the leaves leaving semi-circular notches around the leaf margins. Larvae from eggs, laid by weevils during the feeding period, feed below ground on the root nodules. Occasionally, backward crops are retarded by a heavy weevil attack, but often, Peas outgrow the initial setback.

**Chemical control:** Often Peas recover from weevil attack and treatment is unnecessary, but where damage is experienced every year, a monitoring system can be used to establish the need for treatment. The system comprises five traps which should be sited in mid February on the edge of the previous year's Pea crop. If weevil catches are high close to the time of crop emergence, then spraying may be justified. An insecticide should be applied at the first sign of leaf injury which will reduce further damage and disrupt egg-laying.

**Cultural control:** *Avoid producing cloddy seedbeds, as the weevils prefer these. A well-established crop, growing in good soil conditions, is more likely to grow away from the effects of the weevil. Later sown crops are less likely to suffer severe attacks.*

*A monitoring system is available from Agralan Ltd, Ashton Keynes, Swindon.*

#### 8.10.1.3 Pea cyst nematode (*Heterodera göttingiana*)

Peas affected by pea cyst nematode usually show signs of failure in late June. The damage occurs in clearly defined patches, in which the plants are short, upright and small leaved. Flowering commences early and the foliage becomes increasingly yellow. The root system is poorly developed, there are very few nodules present and many tiny cream to brown coloured lemon-shaped cysts can be found embedded in the root surface. Peas within the infested areas usually die prematurely.

**Chemical control:** There are no nematicides approved for use in Peas.

**Cultural control:** *Pea cyst nematode builds up in the soil as a result of frequent cropping with host crops. These include Field and Broad Beans, Sweet Peas and vetches. A rotation of one of these crops in five years will help to prevent the establishment of the nematode. Once present, the cysts are very persistent and may remain viable for twenty years or longer. Where infestation is suspected, soil samples can be assayed for pea cyst nematode and further cropping should be avoided and care taken to avoid transport of soil from infested areas to clean fields. There are no varieties available which are resistant to pea cyst nematode.*

#### 8.10.1.4 Pea aphid (*Acyrtosiphon pisum*)

The large green aphid produce colonies in the growing points of Peas causing flower loss, poor pod development and severe loss of yield if uncontrolled. They can also transmit viruses including pea enation mosaic virus (see Section 8.10.2.8).

**Chemical control:** Several approved insecticides are available for control of pea aphid. There are no reports

of insecticide resistant strains in the UK. Crops should be examined regularly, particularly as they begin to flower and sprayed when aphids can be found on 15% of the plants. On late sown Peas, examination should commence about three weeks after seedling emergence. A pea aphid population model (PAM) is available to aid decisions on treatment timing.

**Cultural control:** *If the aphid threshold is not reached, then spraying is unnecessary. Pea aphid migrate to the crop in early summer from overwintering hosts and therefore cropping Peas next to Clover or Lucerne should be avoided. Ladybird and hoverfly larvae predate aphids and these insects may keep down low infestations, however hoverfly pupae can contaminate vined Peas. An infestation prediction model (PAM) is available from Horticultural Development Council.*

#### **8.10.1.5 Pea moth (*Cydia nigricana*)**

Peas producing flowers from mid June onwards are susceptible to attack particularly in areas where combining Peas have been grown for several years. Damage is caused by the caterpillar that feeds on Peas inside the pod. The moths are small (10-12 mm), silvery brown and fly to flowering Peas on warm days from June onwards. The larvae are creamy white, 3-6 mm and can be found inside the pod.

**Chemical control:** Insecticides should be applied to control the caterpillar as it leaves the egg and moves to the young developing pod. Monitoring of pea moth is carried out using a pheromone-based pea moth trap (Oecos Ltd and Agralan Ltd). Traps are placed in the Pea field in mid May and when moths are caught, a single spray is applied to flowering as soon as they have produced the first pod.

**Cultural control:** *Pea moth populations develop where Peas are left in the field to full maturity. Areas where combining Peas are grown are likely to be a reservoir of moths. In other situations, unharvested green Peas should be ploughed in before the larvae have left the dried pods, so breaking the life cycle. Early maturing Peas may miss the moth flight period so control will be unnecessary. Growers with monitoring traps need not spray if no moths are caught.*

#### **8.10.1.6 Pea midge (*Contarinia pisi*)**

A serious pest of Vining Peas, particularly in localised areas of Lincolnshire and Yorkshire, midge damage can cause yield loss in some seasons. The tiny midge adults lay eggs close to the developing flower bud and the larvae then feed at the base of the flowers causing them to become sterile. Larvae then swarm out of damaged flowers and fall to the soil where they overwinter.

**Chemical control:** Where the pest is known to be a problem each year, a monitoring system using pheromone traps is available from Oecos, Kimpton, Herts. Traps should be placed in early June in fields which grew peas the previous year. Regular monitoring shows peak activity and susceptible crops should be examined immediately and an insecticide applied to the crop as soon as adults are found within the shoots, will help to reduce egg laying. Plants should be examined as they reach the green bud stage by pinching together the leaves surrounding the buds and then opening up the leaves to look for the presence of the adult.

**Cultural control:** *Varieties of Peas with an extended flowering period can compensate for some loss of flowers and pods and should be grown in areas where midge is known to be a problem. Cropping in close proximity to the previous years infested crops should also be avoided. Where no midge are caught in the monitoring traps, crops in the near vicinity should not be sprayed.*

#### **8.10.1.7 Silver Y moth (*Autographa gamma*)**

The caterpillars of the silver Y moth cause damage by feeding on the foliage and pods of Vining Peas. The caterpillars, pupae and chrysalis can contaminate the vined produce. Adult moths migrate from the Mediterranean and North Africa in late May onwards. They are grey brown in colour, with a wing span of 4 cm and a characteristic inverted silvery white Y shape on each forewing. Eggs are laid on the foliage and

caterpillars hatch 10-14 days later. The large green caterpillars move with a characteristic looping action and feed for about 3 weeks before spinning a cocoon in the upper foliage. Adults emerge from the shiny black chrysalids about 7 days after pupation.

**Chemical Control:** Monitoring of silver Y moth is carried out using a pheromone based funnel trap (Agralan Ltd.). Traps are placed in Pea crops from mid May and monitored regularly. Crop treatment is warranted when more than 50 moths have been caught in a trap by the time that the crop has set the first pods. A spray should be applied then and repeated 10 days later. Pyrethroid insecticides currently approved for pea moth control give good control of Silver Y caterpillars.

**Cultural control:** *Early-maturing peas may miss the moth flight period and control will be unnecessary. Growers with monitoring traps need not spray if the threshold is not reached.*

#### 8.10.1.8 Slugs and snails (eg. *Deroceras*, *Milax* and *Cerutuella* spp.)

Slug feeding can result in poor seedling establishment on wet or heavy soils with high organic matter. Seedling stems may be rasped through and the appearance of ragged leaves and slime trails are characteristic of slug attack. Later in the season, in wet conditions, slugs can feed higher in the foliage and can contaminate vined Peas, inclusion in the product can lead to rejection by the processor.

Snails favour chalky soils and migrate into the crop from vegetation surrounding the crop. The small-banded snails feed on the foliage and are a major contaminant in vined Peas in some areas.

**Chemical control:** Slug damage to seeds and seedlings can be reduced using broadcasted pellets early in the crop growth stages. Wet weather conditions encourages slug feeding up to the cream bud growth stage, as it is difficult to control slugs immediately prior to vining. Late application of pellets could lead to contamination of the vined produce.

**Cultural control:** *Soils containing high levels of organic debris including straw are most likely to harbour slugs. Such debris should be well dispersed, chopped and spread or disced before ploughing in the autumn. Avoid growing Peas in close rotation with Oilseed Rape.*

*Maintaining a rotovated strip around the edge of the crop can discourage the migration of snails from the surrounding vegetation.*

#### 8.10.2 Disease control

##### 8.10.2.1 Damping off (*Pythium* spp.)

Peas sown early in cold and wet conditions are prone to pre-emergence damping-off diseases. The main fungus attacking Peas is *Pythium ultimum*, although other species may also be involved. The seed is attacked shortly after imbibition and a soft rot develops which eventually affects the developing root and shoot. Seedlings may fail to emerge, or collapse shortly after emergence.

**Chemical control:** Seed treatments, which contain thiram, protect the seed and seedlings from infection.

**Cultural control:** *Avoid planting in cold wet soil conditions and for early maturing varieties, choose seed of high vigour. The electrical conductivity test for assessing Pea seed vigour can be carried out by several seed testing laboratories and seed with medium vigour should only be used for later sowings when soil conditions are warmer. Good soil structure is also important and Peas should not be sown deeper than 5 cm to allow rapid germination and emergence.*

##### 8.10.2.2 Foot rot/Root rot (*Fusarium solani* f. sp. *lisi*, *Phoma medicaginis* var *pinodella*/*Aphanomyces euteiches*)

Affected plants appear in patches or along sections of rows, with symptoms that begin to show up from mid May to July. Plants are stunted, pale and the lower foliage may dry up. The flowering period is shortened and often infected plants die before pods have developed. The root system may be brown and poorly developed and the base of the stem discoloured. *Fusarium* causes a brick-red discolouration in the vascular tissue which can be found after scraping back the epidermis at the stem base with a sharp knife. Infection by *Phoma* results in a blackening of the stem base which eventually shrivels the stem causing the plants to collapse or break-off at soil-level. *Aphanomyces* root rot is encouraged by wet soils. The roots are discoloured and outer layers of tissue easily slough off, leaving the stringy vascular tissue intact.

**Chemical control:** No fungicides are approved for the control of these soil-borne diseases, however, *Phoma medicaginis* can be seed-borne and seed treatments which contain thiabendazole or fludioxonil will give some control for seed known to be infected.

**Cultural control:** *A strict rotation of Peas and Beans is necessary to prevent the build up of these diseases in the soil. Peas and Beans should be treated as one and the same crop and a break of at least four years should elapse between crops. Consolidated or poorly drained soils can also predispose Peas to infection and over working of soils prior to drilling should be avoided. A predictive soil test has been developed to avoid planting Peas in high-risk fields and is available from Processors and Growers Research Organisation.*

*There are no varieties currently available which are resistant to these diseases. Use healthy seed.*

#### **8.10.2.3 Leaf and pod spot (*Ascochyta pisi*, *Mycosphaerella pinodes*, *Phoma medicaginis* var *pinodella*)**

This group of diseases, caused by three closely related fungi, is also referred to as the 'Ascochyta complex'. All are seed-borne, but *M. pinodes* and *P. medicaginis* can also survive in the soil for several years. *P. medicaginis* also causes a foot rot (see Section 8.10.2.2). The most common leaf and pod spotting is caused by *M. pinodes*. In wet weather, many small dark-brown or purple spots develop small, circular, sunken spots, brown to black in colour and 1-2 mm in diameter. In severe infection, the plants may be defoliated and patches die prematurely.

**Chemical control:** The fungi are seed-borne and if tested seed is found to be infected then seed treatments containing thiabendazole or fludioxonil should be used. To prevent leaf and pod spot developing in wet seasons, fungicides can be applied as soon as the first spots are seen on the foliage. In order to reduce pod infection, a spray should be applied as soon as the first pod is visible following a disease risk assessment. In dry seasons, such treatment is unnecessary.

Amistar can be used on processed Peas for the control of leaf and pod spot. Some control of grey mould (*Botrytis cinerea*) and *Mycosphaerella* blight may also be achieved.

Consult your processor before using a fungicide.

**Cultural control:** *Use only healthy seed and avoid excessive overhead irrigation during the pod setting period. Crops that produce a drier microclimate are less likely to become infected. Peas should not be grown more frequently than once in five years on the same land.*

#### **8.10.2.4 Downy mildew (*Peronospora viciae*)**

Symptoms can appear at any time from emergence onwards. The fungus is soil-borne and commonly infects seedlings before emergence. Infected plants are pale and remain stunted. The undersides of the leaves are thickly covered with grey-mauve coloured velvety mycelium. Infection then spreads from these plants by air-borne spores. Other plants then produce leaves with yellow-green spots or areas on the upper surface of the leaves with the velvety mildew on the underside. The growing points of the plants may also become infected

and pods may appear yellow and blotchy, fail to fill and a cottony white growth occurs within the pod wall.

**Chemical control:** There are no effective means of control once the disease has become established. Seed treatment with a cymoxanil and metalaxyl M or fosetyl-aluminium-based product is effective in preventing the initial seedling infection thereby reducing the amount of air-borne inoculum that causes the secondary infection.

**Cultural control:** *Avoid planting Peas in fields where there has been a history of downy mildew infection. Some early maturing varieties are very susceptible to mildew and these should be avoided in high-risk fields. Later sown crops are not so susceptible to seedling infection. Information on the relative susceptibility of varieties to downy mildew is available in the PGRO Descriptive List of Vining Pea varieties*

#### 8.10.2.5 Powdery mildew (*Erysiphe pisi*)

Peas can become infected from early flowering onwards, maincrop and late maturing Peas are particularly susceptible. Leaves and stems become covered with a white 'dusty' film. Diseased tissue can then become discoloured and pods may also be severely infected and the produce is spoilt both by the surface pod infection and the failure of such pods to fill adequately. The disease is followed by hot dry conditions during the day, and high humidity at night.

**Chemical control:** There are no fungicides approved in Peas for the control of powdery mildew, although metconazole may reduce the risk of infection in late sown crops.

**Cultural control:** *Several varieties are completely resistant to powdery mildew and these are particularly useful for maincrop and late season planting. Information on the relative susceptibility of varieties to powdery mildew is available in PGRO Information Sheet No 166, Varietal resistance of peas to powdery mildew*

#### 8.10.2.6 Botrytis pod rot (*Botrytis cinerea*)

Pod rot (grey mould) occurs in wet seasons when the flower petal sticks to the developing pods or lodges on the stems in the leaf axils. Botrytis colonises the moribund petals and then infects the pod or stem causing a grey-brown rot that may eventually become covered with grey fluffy mycelium.

**Chemical control:** In wet seasons, a fungicide should be applied as soon as the first pod is visible. In dry seasons, treatment is unnecessary.

Consult your processor before using a fungicide.

**Cultural control:** *The disease is favoured by wet conditions and dense crops are more susceptible to infection.*

#### 8.10.2.7 Sclerotinia (*Sclerotinia sclerotiorum*)

The disease causes a white mould of the stems and pods in dense crops with lush foliage. It spreads rapidly in warm humid conditions. The stems become covered with dense white mycelium and then collapse. The infection can progress to the pods. After a short time, hard black resting bodies (sclerotia) develop in the mycelium and within the stems of infected pods.

**Chemical control:** Some fungicides applied at first pod stage to prevent *Botrytis* infection will also provide good protection against *Sclerotinia* .

Consult your processor before using a fungicide.

**Cultural control:** *Sclerotinia* can affect a wide range of crops including Carrots, Green Beans, Potatoes, Brassicas, Oilseed Rape and Linseed. Cereals are not infected and a rotation, which allows at least three years between host crops, will prevent a build-up of the fungus in the soil. Sclerotia remain viable for several years, but germinate in the spring. Where infection occurs, the land should be deeply cultivated before planting cereals. Peas should not be grown in fields adjacent to the previous years infected crop.

#### **8.10.2.8 Pea enation mosaic virus (PEMV)**

The symptoms are not often noticed until the flowering or pod setting stage. The virus causes vein clearing and the formation of translucent spots on the leaves and stipules. Leaves may be crinkled and the top of the plants becomes yellow and mottled. Pods may be distorted or develop sharp ridges across or along the surface. Infected plants can appear in patches as the virus is transmitted by the pea aphid (see Section 8.10.1.4).

**Chemical control:** Control of aphid infestation will prevent the virus becoming established.

**Cultural control:** *The disease is not seed-borne. Some newer varieties are resistant to PEMV. The virus can also infect broad and field Beans and sweet Peas and cropping in close proximity to these alternative hosts should be avoided.*

#### **8.10.2.9 Pea bacterial blight (*Pseudomonas syringae* pv *pisi*)**

Although not often seriously affecting spring sown Peas, early-planted crops may develop symptoms particularly if the Peas have been damaged by a late spring frost. Leaves and stems develop water-soaked lesions that may extend into larger areas. Eventually such lesions dry out and turn brown, stems may collapse and pods also develop watersoaked spotting together with bacterial ooze.

**Chemical control:** There is no means of controlling pea blight.

**Cultural control:** *The use of healthy seed is essential, especially for varieties that are early sown. A seed test is available from Processors and Growers Research Organisation, NIAB and SASA.*

#### **8.10.3 Weed control**

Weed infestations cause yield depression of Peas. Weedy contaminants in machine-harvested produce may cause crops to be rejected. Every effort should be made to eliminate weeds in the field.

Efficient ploughing can reduce many weed problems. An application of glyphosate either pre-harvest of cereals or in autumn before sowing Peas, is the most effective way of eradicating perennial grasses. Over-wintered weeds should be eliminated before drilling by cultivations. Any remaining, together with weeds which emerge before the crop, are killed by non-selective herbicides (glufosinate-ammonium and glyphosate).

Weed control is achieved with a combination of pre-emergence residual and foliar acting post-emergence herbicides. Post-emergence herbicides with contact activity should only be applied to Peas with good leaf wax cover. Leaf wax can be tested with crystal violet dye. If herbicides containing MCPB are applied after flower buds can be found in the terminal shoot, abscission of the pods may result.

Some Pea varieties are sensitive to herbicides and information is available from Processors and Growers Research Organisation.

Currently approved herbicides are listed in Appendix 9.

Recent work has indicated the usefulness of mechanical weeding techniques to control seedling annual weeds. This technique is suitable for light soils and should be carried out in dry conditions. Weeding can be made

either across or in the direction of the pea rows when the peas are between the second and fifth node growth stage. The technique is not suitable for grass weeds, perennials or deep-rooted weeds such as black-bindweed, nor is it suitable to control volunteer potatoes. A post-emergence herbicide may be required where late germinating or vigorous weeds become established.

#### 8.10.3.1 Problem weeds

It is **strongly recommended** that growers adopt a policy for reducing volunteer problems for oilseed rape and potatoes by using appropriate husbandry practices after harvest of these crops. Volunteer potatoes can be a severe problem. *After the Potato harvest do not plough down remaining tubers, this aids their survival. Potato tubers left on or near the soil surface are likely to be affected by frosts or eaten by animals.*

**Every attempt should be made to control them in other crops in the rotation because they cannot be killed in Peas. In the past potato berry formation could be prevented by application of cyanazine + MCPB/MCPA, but cyanazine can no longer be used. Rotations must therefore be planned carefully.**

Volunteer oilseed rape is controlled with some post-emergence herbicides (MCPB; or isoxaben/terbuthylazine + bentazone).

### 9 Harvesting and storage

It is recommended that areas of crop adjacent to lay-bys, public high ways, footpaths and housing etc. are inspected just before machine harvest. Any glass, metal, plastic or other foreign bodies should be removed to avoid product contamination and the resulting problems in the factory.

### 10 Pollution control and waste management

See Generic Standards and/or Generic Guidance Notes.

### 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 application rates for major nutrients for Vining Peas

Major nutrient requirements (kg/ha) (Source: DEFRA booklet RB209)

Nutrient	Soil Index				
	0	1	2	3	3+
Phosphate (P <sub>2</sub> O <sub>5</sub> )	85	60	35M	0	0
Potash (K <sub>2</sub> O)	90	65	40M (2-) 20M (2+)	0	0
Magnesium <sup>(1)</sup> (MgO)	100	50	0	0	0

### Notes:

(1) Magnesium is not necessary for every crop and can be applied elsewhere in the rotation as magnesian limestone on acid soils

At low soil indices (0 or 1) (ADAS classification) the recommendations for phosphate and potash are adequate to increase yields and also to leave a residue that will build up soil reserves over a number of years. If there is no long-term policy of building up soil P + K at index 0 or 1, the recommendations may be reduced by 50 kg/ha at index 0 and 25 kg/ha at index 1.

At indices of 2 or above, the amounts give are maintenance dressings M and in practice are rarely applied.

The fertiliser is applied prior to cultivation. Not more than 50 kg/ha of K<sub>2</sub>O should be combine drilled otherwise germination may be affected.

Peas may suffer from sulphur deficiency on sandy, shallow or medium textured soils with low organic matter and which are far from industrial S emissions. Where deficiency is likely apply 37.5 to 50 kg/ha SO<sub>3</sub> to the seedbed before sowing.

Where FYM is used, reduce the amount of fertiliser accordingly.

### Consult your processor before using FYM. Untreated and digested sewage sludge must not be applied within the crop rotation

Only advanced treated sewage sludge may be used within the crop rotation and it must not be applied within 10 months of harvest. Applications shall be carried out in accordance with the Regulations and the current DEFRA Code of Practice for the Agricultural Use of Sewage Sludge (see Appendix 1 in the Generic Guidance Notes).

**Exempted wastes** for example septic tank sludge and blood and guts from abattoirs should not be used within the rotation.

Consult your processor if vegetable waste is to be applied to the field.

## Appendix 2 Insecticides currently approved for aphid control in Vining Peas

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
alpha-cypermethrin	contact and ingested pyrethroid: emulsifiable concentrate. Dangerous to bees. Extremely dangerous to fish and aquatic life	1 day	Harmful Irritant	A	0.05*
bifenthrin	Contact and residual pyrethroid: suspension concentrate. Dangerous to bees and very toxic to aquatic organisms	3 days	Harmful	A	0.05*
cypermethrin	contact and stomach acting pyrethroid insecticide: emulsifiable concentrate. Dangerous to bees. Extremely dangerous to fish and other aquatic life.	none stated	Harmful	A	0.05*
deltamethrin	contact pyrethroid: emulsifiable concentrate or granule. Dangerous to bees. Extremely dangerous to fish and aquatic life.	none stated	Harmful Irritant	A	0.05*
fatty acids	a soap concentrate insecticide. A soluble concentrate. Harmful to fish or other aquatic life.	none stated	none stated	none stated	none set
lambda-cyhalothrin	contact and ingested pyrethroid: emulsifiable concentrate or oil in water suspension, very quick acting. Extremely dangerous to bees, fish and other aquatic life.	none stated	Harmful Irritant	A	0.02
lambda cyhalothrin + pirimicarb	contact and ingested pyrethroid emulsifiable concentrate or oil in water suspension. Very quick acting. Formulated with a carbamate insecticide. Extremely dangerous to fish and other and other aquatic life.	3 days	Harmful Irritant	A	0.02
nicotine	a general purpose non-persistent contact alkaloid insecticide. Harmful to bees. Dangerous to fish or other aquatic life.	2 days	Toxic Poison Highly flammable	none stated	none set
zeta-cypermethrin	contact and stomach acting pyrethroid: oil in water emulsion. Extremely dangerous to fish and other aquatic life.	none stated	Harmful	A	0.05*

### Notes:

<sup>(1)</sup> or latest time of application

\* set at or about the limit of determination

**Category A**. This product is not eligible for buffer zone reduction under the Local Environmental Risk Assessment for Pesticides (LERAP) scheme.

Consult processors before using any of these agrochemicals. Not all formulations of each active ingredient may be currently approved for use on Vining Peas. Check before use. Label recommendations are revised regularly, read a current label before use.

### Appendix 3 Insecticides currently approved for pea midge in Vining Peas

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
deltamethrin	contact insecticide with residual activity. Oil in water formulation. Extremely dangerous to fish or other aquatic life. High risk to bees.	None stated	Harmful Irritant	A	0.05*
Lambda cyhalothrin	contact and ingested pyrethroid emulsifiable concentrate or oil in water emulsion. Very quick acting. Extremely dangerous to fish and other and other aquatic life	None stated	Harmful Irritant	A	0.02*
lambda cyhalothrin + pirimicarb	contact and ingested pyrethroid emulsifiable concentrate or oil in water emulsion. Very quick acting. Formulated with a carbamate insecticide. Extremely dangerous to fish and other and other aquatic life.	3 days	Harmful  Irritant	A	0.02

#### Notes:

(1) or latest time of application

\* set at or about the limit of determination

**Category A** . This product is not eligible for buffer zone reduction under the Local Environmental Risk Assessment for Pesticides (LERAP) scheme.

Consult processors before using any of these agrochemicals. Not all formulations of each active ingredient may be currently approved for use on Vining Peas. Check before use. Label recommendations are revised regularly, read a current label before use.

#### Appendix 4 Insecticides currently approved for control of pea weevil in Vining Peas

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
alpha-cypermethrin	contact and ingested pyrethroid: emulsifiable concentrate. Dangerous to bees. Extremely dangerous to fish and aquatic life.	1 day	Harmful Irritant	A	0.05*
cypermethrin	contact and stomach acting insecticide: emulsifiable concentrate. Dangerous to bees. Extremely dangerous to fish and other aquatic life.	7 days	Harmful	A	0.05*
deltamethrin	contact pyrethroid: emulsifiable concentrate or granule. Dangerous to bees. Extremely dangerous to fish and aquatic life.	none stated	Harmful Irritant	A	0.05*
lambda cyhalothrin	contact and ingested pyrethroid: emulsifiable concentrate or oil in water emulsion, very quick acting. Extremely dangerous to bees, fish and other aquatic life.	none stated	Harmful Irritant	A	0.2
lambda cyhalothrin + pirimicarb	contact and ingested pyrethroid emulsifiable concentrate. Very quick acting. Formulated with a carbamate insecticide. Extremely dangerous to bees, fish and other and other aquatic life.	3 days	Harmful Irritant	A	0.2
zeta-cypermethrin	contact and stomach acting pyrethroid: oil in water emulsion. Extremely dangerous to fish and other aquatic life.	14 days	Harmful	A	none set

#### Notes:

1. or latest time of application

\* set at or about the limit of determination

**Category A** . This product is not eligible for buffer zone reduction under the Local Environmental Risk Assessment for Pesticides (LERAP) scheme.

Consult processors before using any of these agrochemicals.

Not all formulations of each active ingredient may be currently approved for use on Vining Peas. Check before use. Label recommendations are revised regularly, read a current label before use.

### Appendix 5 Insecticides currently approved for control of pea moth in Vining Peas

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
alpha-cypermethrin	contact and ingested pyrethroid: emulsifiable concentrate. Dangerous to bees. Extremely dangerous to fish and aquatic life.	1 day	Harmful Irritant	A	0.05*
cypermethrin	contact and stomach acting pyrethroid: emulsifiable concentrate. Dangerous to bees. Extremely dangerous to fish or other aquatic life.	7 days	Harmful	A	0.05*
deltamethrin	contact pyrethroid: emulsifiable concentrate or granule. Dangerous to bees. Extremely dangerous to fish and aquatic life.	none stated	Harmful Irritant	A	0.05*
lambda cyhalothrin	contact and ingested pyrethroid: emulsifiable concentrate, very quick acting. Extremely dangerous to bees, fish and other aquatic life.	none stated	Harmful Irritant	A	0.2
lambda cyhalothrin + pirimicarb	contact and ingested pyrethroid emulsifiable concentrate or oil in water emulsion. Very quick acting. Formulated with a carbamate insecticide. Extremely dangerous to fish and other and other aquatic life.	3 days	Harmful Irritant	A	0.2
zeta-cypermethrin	contact and stomach acting pyrethroid: oil in water emulsion. Extremely dangerous to fish and other aquatic life.	none stated	Harmful	A	0.05*

#### Notes:

<sup>(1)</sup> or latest time of application

\* set at or about the limit of determination

**Category A** . This product is not eligible for buffer zone reduction under the Local Environmental Risk Assessment for Pesticides (LERAP) Scheme.

Consult processors before using any of these agrochemicals. Not all formulations of each active ingredient may be currently approved for use on Vining Peas. Check before use. Label recommendations are revised regularly, read a current label before use.

### Appendix 6 Insecticides currently approved for control of thrips in Vining Peas

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
nicotine <sup>(2)</sup>	a general purpose non-persistent contact alkaloid insecticide. Harmful to bees. Dangerous to fish or other aquatic life.	2 days	Toxic Poison Highly flammable	none stated	none set

**Notes:**

(1) or latest time of application

(2) For protected crops

**Category A** . This product is not eligible for buffer zone reduction under the Local Environmental Risk Assessment for Pesticides (LERAP) Scheme.

Consult processors before using any of these agrochemicals.

Not all formulations of each active ingredient may be currently approved for use on Vining Peas. Check before use. Label recommendations are revised regularly, read a current label before use.

### Appendix 7 Fungicides currently recommended for control of *Botrytis* in Vining Peas

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
cyprodinil and fludioxonil	Broad spectrum fungicide: water dispersible granule formulation	14 days	Irritant	B	none set
iprodione	off-label approval for control of <i>Botrytis</i> , <i>Sclerotinia</i> and <i>Stemphylium</i>	21 days	Irritant	none stated	0.2

**Notes:**

(1) or latest time of application

(2) consult processor before using vinclozolin

**Consult processors before using any of these agrochemicals** . Not all formulations of each active ingredient may be currently approved for use on Vining Peas. Check before use. Label recommendations are revised regularly, read a current label before use.

### Appendix 8 Fungicides currently recommended for control of leaf and pod spot in Vining Peas

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
azoxystrobin	a systemic translaminar and protectant strobilurin: dangerous to fish and other aquatic life.	14 days	none	none stated	0.2
cyprodinil and fludioxonil	broad spectrum fungicide: water dispersible granule formulation	14 days	Irritant	B	none set
metconazole <sup>(2)</sup>	a conazole fungicide. Soluble concentrate. Harmful to fish and other aquatic life.	14 days	Irritant	none stated	none set

**Notes:**

(1) or latest time of application

(2) Consult processor before use

**Consult processors before using any of these agrochemicals** . Not all formulations of each active ingredient may be currently approved for use on Vining Peas. Check before use. Label recommendations are revised regularly, read a current label before use.

### Appendix 9 Herbicides currently approved for use in Vining Peas

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
bentazone	contact diazinone: soluble concentrate or water soluble granule. Apply post-emergence for annual broad-leaved weeds alone or in a tank-mix with MCPB (see label). Minimum 6 hr free from rain after application. Harmful to aquatic organisms	before flower buds visible	Harmful Irritant. Risk of serious damage to eyes	none stated	0.2 (peas without pods)
bentazone/MCPB \$	contact diazinone/translocated phenoxy-butanoic acid: soluble concentrate. Apply post-emergence for annual broad-leaved weeds. Minimum 6 hr free from rain after application. Toxic to aquatic organisms.	before flower buds found enclosed in terminal shoot	Irritant	none stated	bentazone 0.2/ 0.1 MCPB (peas without pods)
carfentrazone-ethyl	contact triazolinone: microemulsion (ME). Non-selective. Apply pre-planting for control of emerged annual broad-leaved weeds. It does not control grasses. Dangerous for environment, very toxic to aquatic organisms.	one month pre-planting	Irritant	none stated	0.01*
clomazone	residual oxaladonine: capsule suspension. Apply pre-emergence of crop and weed for control of cleavers and some other broad-leaved weeds.	pre-emergence	Irritant	none stated	none set
cycloxydim	translocated oxime: emulsifiable concentrate. ACCase inhibitor #. Apply post-emergence for annual and perennial grass weeds and volunteer cereals. Not annual meadow-grass. Toxic to aquatic organisms.	5 weeks	Harmful Irritant	none stated	none set
fluazifop-p-butyl	translocated phenoxypropionic acid: oil in water emulsion. ACCase inhibitor #. Apply post-emergence for annual grasses including wild oats and volunteer cereals. Not annual meadow-grass. Couch rate must not be used in Peas. Harmful to fish and other aquatic life. (Very toxic to aquatic organisms).	before flower buds visible	Harmful	none stated	none set
glufosinate- ammonium	contact phosphinic acid: soluble concentrate. Non-selective. Apply only between 1 March - 30 Sept. Apply pre-drilling or pre-emergence of the crop, alone or in tank-mix with some residual herbicides. Rain free period of 4 hr should follow spraying. Harmful to fish and other aquatic life.	pre-drilling or pre-emergence	Harmful Irritant	none stated	none set

**Notes: \$Pulsar: the marketing company have indicated that they are not selling this product**

<sup>(1)</sup> or latest time of application

# to avoid the build up of resistance do not apply products on ACCase inhibitor herbicide more than twice to any crop.

Consult processors before using any of these agrochemicals. Not all formulations of each active ingredient may be currently approved for use on Vining Peas. Check before use. Label recommendations are revised regularly, read a current label before use.

There may be varietal restrictions.

**Appendix 9 Herbicides currently approved for use in Vining Peas (Cont'd)**

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
glyphosate	translocated phosphonic acid: soluble concentrate or water-soluble granule. Non-selective. Apply pre-drilling and (some formulations) pre-emergence of the crop alone or in tank-mix with some residual herbicides. Rain free period of 6 hr should follow spraying. Toxic to aquatic organisms	pre-drilling or pre-emergence	Irritant	none stated	0.1*
isoxaben/ terbuthylazine	Soil-acting amide/triazine: suspension concentrate. Apply pre-emergence for control of annual meadow-grass and broad-leaved weeds or (+ bentazone) before 2 <sup>nd</sup> node stage. Very toxic to aquatic organisms.	Before 2 <sup>nd</sup> node stage	Harmful	none stated	none set
linuron/ trifluralin Use up by 20 March 2009	Residual and contact urea / dinitroaniline:emulsifiable concentrate. Apply pre-emergence for control of annual meadow-grass and annual broad-leaved weeds. Very toxic to aquatic organisms.	pre-emergence	Harmful  Irritant	B	0.1 linuron (peas without pods)/none set
MCPB	translocated phenoxybutanoic acid: soluble concentrate. Apply post-emergence for control of some annual and perennial broad-leaved weeds. Harmful to fish and other aquatic life.	before flower buds detectable	Harmful  Irritant  Risk of serious damage to eyes	none stated	0.1 (peas without pods)
MCPB/MCPA	translocated phenoxybutanoic/phenoxyacetic acid: soluble concentrate. (Triflex-Tra is not recommended for use alone in peas). Apply post-emergence to control annual and perennial broad-leaved weeds. Harmful to fish and other aquatic life.	before flower buds visible	Harmful  Irritant  Risk of serious damage to eyes	none stated	0.1/0.1 (peas without pods)
paraquat Use by 11 July 2008	contact bipyridyl: soluble concentrate. Non-selective. Apply to stubble, pre-sowing or pre-emergence of the crop or as a tank-mix with some residual herbicides. Spray is rainfast after 10 minutes. Very toxic to aquatic organisms.	pre-drilling or pre-emergence	Harmful  Irritant  Poison: Paraquat can kill if swallowed	none stated	0.02*

**Notes:**

(1) or latest time of application

# to avoid the build up of resistance do not apply products containing ACCase inhibitor herbicide more than twice to any crop.

Consult processors before using any of these agrochemicals. Not all formulations of each active ingredient may be currently approved for use on Vining Peas. Check before use. Label recommendations are revised regularly, read a current label before use.

There may be varietal restrictions.

**Appendix 9 Herbicides currently approved for use in Vining Peas (Cont'd)**

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
paraquat/diquat Use up by 11 July 2008	contact bipyridyl: soluble concentrate. Nonselective. Apply to stubble, pre-sowing or preemergence of the crop, alone or in a tank-mix with some residual herbicides. Spray is rainfast after 10 minutes. Very toxic to aquatic organisms.	pre-drilling or pre-emergence	Harmful Irritant Poison: Paraquat can kill if swallowed	none stated	0.02*/0.05*
pendimethalin(2)	SOLAs (maximum dose rate 2.5 L/ha. Do not apply if the plumule is less than 13mm from the soil surface. Very toxic to aquatic organisms.	pre-emergence	Irritant	B^	0.2 (peas without pods)
pendimethalin/imazamox	dinitroaniline/imidazolinone residual; emulsifiable concentrate. Apply pre-emergence of the crop for broad-leaved weeds. Very toxic to aquatic organisms. Winter oilseed rape should not be drilled as the following crop.	pre-emergence	Irritant	B	0.2 pendimethalin/UK temporary 0.1 imazamox (peas without pods)
quizalofop-p-ethyl	translocated aryl phenoxypropionic acid: emulsifiable concentrate or suspension concentrate. ACCase inhibitor #. Apply post-emergence for annual and perennial grass weeds and volunteer cereals. Not for annual meadow-grass. Toxic to aquatic organisms EC.Dangerous to fish or other aquatic life.SC	5 weeks	Harmful Irritant  Risk of serious damage to eyes (EC)  Irritant (SC)	none stated	none set
tepraloxydim	translocated oxime: emulsifiable concentrate. ACCase inhibitor #.Do not apply between 1 Nov and 31 March. Apply post-emergence for blackgrass, volunteer cereals and annual meadow-grass.Toxic to aquatic organisms. Marine pollutant. Do not apply by knapsack sprayer.	5 weeks	Harmful	none stated	UK temporary 0.2 (peas without pods)
tri-allate	soil acting thiocarbamate granules, apply pre- or post drilling and incorporate, but pre-emergence of the crop for wild oats, blackgrass and annual meadow-grass. Not volunteer cereals. Harmful to fish and other aquatic life. Toxic to aquatic organisms.	pre-emergence	Harmful Irritant	none stated	none set

**Notes:**

<sup>(1)</sup> or latest time of application

# to avoid the build up of resistance do not apply products containing ACCase inhibitor herbicide more than twice to any crop.

Consult processors before using any of these agrochemicals. Not all formulations of each active ingredient may be currently approved for use on Vining Peas. Check before use. Label recommendations are revised regularly, read a current label before use.

There may be varietal restrictions..

**Appendix 10 Molluscicides approved for control of slugs in Vining Peas**

<b>Active Ingredient</b>	<b>Product Features</b>	<b>Harvest Interval <sup>(1)</sup></b>	<b>Hazard Rating</b>	<b>LERAP Category</b>	<b>MRL (mg/kg)</b>
metaldehyde	molluscicide bait: pellet. Dangerous to game, wild birds and animals. Harmful to fish and aquatic life.	none stated	none stated	none stated	none set

### Appendix 11 Seed treatments currently approved Vining Peas

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
cymoxonil + metalaxyl M + fludioxonil	a mixture of acylanilines and cyanopyrrole fungicide seed treatment for control of downy mildew, damping-off and <i>Ascochyta</i>	none stated	Irritant	none stated	none set
fosetyl aluminium <sup>(2)</sup>	off-label approval for downy mildew control.	none stated	none stated	none stated	none set
thiram	a protectant dithiocarbamate fungicide: flowable concentrate for control of damping-off.	none stated	Irritant	none stated	none set
thiram + thiabendazole	mixture of dithiocarbamate and benzimidazole: flowable concentrate for control of <i>Ascochyta</i> and damping-off.	none stated	Irritant	none stated	none set

**Notes:**

- (1) or latest time of application
- (2) Specific off-label approval

Consult processors before using any of these agrochemicals. Not all formulations of each active ingredient may be currently approved for use on Vining Peas. Check before use. Label recommendations are revised regularly, read a current label before use.

**Appendix 12 Specific off-label approvals for use on Vining Peas (Herbicide)**

Number	Product name	Ingredient	Expiry
3518/06	Aliette 80 WG <sup>®</sup> (seed treatment)	fosetyl-aluminium	31/12/2013
0367/03	Standon Fosetyl AL 8WG <sup>®</sup>	fosetyl aluminium	31/12/2008
2108/06 #	Bunker <sup>®</sup> (Maximum dose rate 2.5 kg/ha)	pendimethalin	31/12/2008
2368/06 #	Alpha Pendimethalin 330 EC <sup>®</sup> (Maximum dose rate 3.0 L/ha)	pendimethalin	31/12/2008
0520/05 #	Stomp 400 SC <sup>®</sup> (Maximum dose rate 2.5 L/ha)	pendimethalin	31/12/2008
1437/07#^	Stomp 400 SC <sup>®</sup> (Maximum dose rate 2.5 L/ha)	pendimethalin	31/12/2008

**Notes:**

# Do not apply if the plumule is less than 13mm from the soil surface.

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.

The off-label use 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 when "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 12 Specific off-label approvals for use on Vining Peas (Fungicides)**

Number	Product name	Ingredient	Expiry
1928/07	Rovral WP	iprodione	31/12/2008
3518/06	Aliette 80 WG <sup>®</sup> (seed treatment)	fosetyl-aluminium	31/12/2013
1779/07	Standon Fosetyl AL 8WG <sup>®</sup> (seed treatment)	fosetyl aluminium	31/12/2008
3566/07	Cleancrop Chicane (seed treatment)	fosetyl aluminium	31/05/2009
0265/08	Standon Fullstop (seen treatment)	fosetyl aluminium	31/12/2013
2108/06 #	Bunker <sup>®</sup> Maximum dose rate 2.5 kg/ha	pendimethalin	31/12/2008
2368/06 #	Alpha Pendimethalin 330 EC <sup>®</sup> Maximum dose rate 3.0 L/ha	pendimethalin	31/12/2008
0520/05 #	Stomp 400 SC <sup>®</sup> Maximum dose rate 2.5 L/ha	pendimethalin	31/12/2008
1437/07#^	Stomp 400 SC <sup>®</sup> Maximum dose rate 2.5 L/ha	pendimethalin	31/12/2013

**Notes:**

# Do not apply if the plumule is less than 13mm from the soil surface.

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.

The off-label use 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 when "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 13 PGRO Publications

The following is a list of PGRO publications applicable to Pea production:

The choice of herbicides for vining peas	Inf. sheet 176	
Pea leaf wax assessment	Inf. sheet 143	
Reaction of pea varieties to herbicides	Inf. sheet 144	
Pea moth ( <i>Cydia nigricana</i> )	Inf. sheet 149	
Checklist of herbicides for vining peas	Inf. sheet 181	
Checklist of fungicides & insecticides for vining peas	Inf. sheet 175	
Fungicides for peas	Inf. sheet 158	
Varieties of vining peas	Descriptive list	
Tenderometer standardisation & maintenance	Inf. sheet 141	
Pea and bean weevil ( <i>Sitona lineatus</i> )	Inf. sheet 164	
Pea midge ( <i>Contarinia pisi</i> )	Inf. sheet 148	
Varietal resistance of vining and fresh market peas to powdery mildew		Inf. sheet 166
Pests & diseases of peas & beans	Booklet	
Herbicide damage in peas & beans	Booklet	
PGRO Pea Growing Handbook, 1988	Handbook	

PGRO publications are available from:

The Information Officer, PGRO, Thornhaugh, Peterborough, PE8 6HJ.

Tel: 01780 782585 Fax: 01780 783993 or [www.pgro.co.uk](http://www.pgro.co.uk)

## Appendix 14 Control Points: Peas (Vining, Processed)

### CS.48 PEAS (Vining, Processed)

- CS.48.1      You should have a policy for reducing volunteer problems for oilseed rape and potatoes by using appropriate husbandry practices after harvest of these crops
- Protocol reference: Section 8.10.3.1
- CS.48.2      You must be able to justify the use of foliar fungicide application in any season
- Protocol reference: Section 8.1
- CS.48.3      Deleted 2008
- Protocol reference: Section 8.10.3
- CS.48.4      You should consider seed treatment as a first line of defence against certain diseases
- Protocol reference: Section 8.1