



**Assured Produce**

**Crop Specific Protocol**

**BEANS (RUNNER)**

**(CROP ID: 34)**



**January 2008**

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## Acknowledgements

Assured Produce gratefully acknowledges the contribution of all consultees in the preparation of this protocol, particularly Anthony Biddle of the Processors and Growers Research Organisation, and Cathy Knott.

## 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 Products containing substances which have been revoked are shown on the PSD website (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.

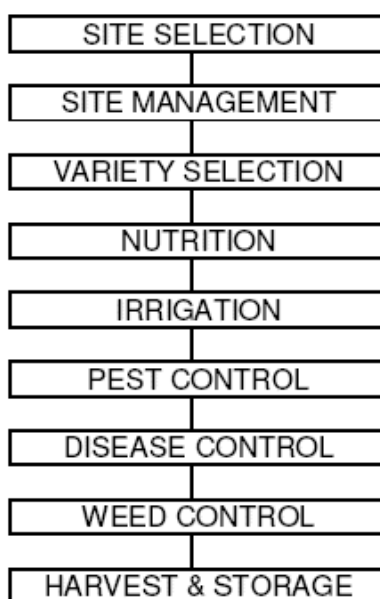
For pesticides on-label, only active substances are shown.

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

Can be grown in most parts of England, but crops grown in warmer parts of the country mature earlier. Runner Beans are very susceptible to frost damage. High winds can be damaging to climbing Runner Beans, causing

pod scarring which reduces quality. A sheltered field is therefore desirable.

### 3.1.2 Soil type

A deep free draining but moisture retentive loam soil will encourage rapid establishment and steady, uninterrupted growth. Capping of the soil surface is detrimental where seed is sown.

## 3.2 Crop rotation

Crop rotation will help reduce the build up of pests, diseases and perennial weeds. However, Runner Beans are often grown repeatedly on particularly favourable soils or where irrigation facilities have been installed, therefore, the more beneficial longer breaks are not always achievable. Fungal diseases such as foot rots or vascular wilt may develop after long term cropping and if such problems become apparent, then alternative sites for production must be found. Crop hygiene is also important, as pests such as two-spotted spider mite and rust disease can survive on crop debris or in canes etc.

## 4 Site management

### 4.1 Soil mapping

See Generic Standards and/or Generic Guidance Notes.

### 4.2 Soil management

See Generic Standards and/or Generic Guidance Notes.

### 4.3 Soil fumigation

See Generic Standards and/or Generic Guidance Notes.

### 4.4 Substrates

See Generic Standards and/or Generic Guidance Notes.

### 4.5 Growing systems

It is necessary to support the plants and to allow access for hand picking with paths between rows. Runner Beans are grown in single or double rows and the plants are supported by canes, or strings laced between two horizontal wires.

At high plant density Runner Beans crop heaviest over the early and middle periods of the picking season, while those sown at lower densities give maximum yields late in the season.

Runner bean seeds require gentle handling and they are sown with specialist precision drills or by hand.

Runner Beans are dependent on insects for pollination and hives of honeybees are sometimes introduced into the crop.

## 5 Variety selection

See Generic Standards and/or Generic Guidance Notes.

## 6 Nutrition

### 6.1 Nutrient requirement

#### Major nutrients

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

Examples of typical fertiliser recommendation are given in Appendix 1.

Phosphate and potash are applied as a base fertiliser before cultivations. Nitrogen is also applied just before cultivation, but no more than 100 kg/ha, the remainder is applied when fully established. Where rain or irrigation can be relied on, so that nitrogen is moved into the root zone, a top dressing may be applied, often at early picking stage. Nutrients are sometimes applied in trickle irrigation (fertigation).

Organic manure (FYM) is also very beneficial not only for supply and nutrients but for soil improving qualities. Where FYM is used adjustments to the balance of mineral fertiliser are necessary. It is **strongly recommended** that if FYM is used, retailers are consulted first and appropriate measures are taken to reduce the risk of E-coli. *The guidelines in 'Managing Farm Manures for Food Safety: Guidelines for Growers to Minimise the Risks of Microbiological Contamination of Ready to Eat Crops' should be followed (<http://www.food.gov.uk>). The guidelines in the Code of Good Agricultural Practice for the Protection of Water should be followed, for example, avoid application of FYM in the wet autumn months.*

#### Inoculation

Effective strains of nitrogen-fixing *Rhizobia* bacteria which nodulate Runner Beans rarely occur naturally in UK soils. Where they are present, nitrogen fertiliser suppresses their nitrogen fixation..

#### Lime and pH

Runner Beans require a pH of at least 6.5. If the pH is below 5.5 they are likely to suffer from poor growth and 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. It occurs where the soil is deficient or where manganese is unavailable to the plant and is common on peaty organic and sandy soils and where the pH is over 6.8. Soil analysis for manganese is of little value. The deficiency can be corrected with foliar sprays of manganese sulphate plus wetter.

**Magnesium** deficiency symptoms are interveinal chlorosis or necrosis of older leaves with leaf margins remaining green. It is uncommon but may 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 magnesium limestone (Appendix 1) either before green beans are sown or elsewhere in the rotation. If crop treatment becomes necessary, corrective foliar sprays with magnesium sulphate should be applied.

## 7 Irrigation

Runner Beans are responsive to irrigation. The abscission of flowers and pods is reduced, number of pods set and pod yield is increased. Irrigation during early flower bud stage has been shown to be the most important timing. Correction of soil moisture deficit during pod development may also be beneficial and overhead irrigation may reduce bean rust infection (see Section 8.10.2.4).

Scheduling systems are useful to help forecast irrigation timing and the priority order.

## 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 enhances 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:
  - *Runner Beans are dependent on insects, for example bees, for pollination. Pesticides classed as harmful, dangerous or extremely dangerous to bees must not be used when Runner Beans are in flower.*
  - *The least toxic and persistent product should be selected with due regard to its efficiency and ecotoxicity.*
  - *The minimum effective dose should be used.*
  - *An appropriate application method with effectively maintained equipment should be chosen.*
  - *Selective and spot treatments should be used whenever appropriate.*

### 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**

## 8.10 Pest, disease and weed control

### 8.10.1 Pest control

#### 8.10.1.1 Bean seed fly (*Delia platura*)

Attack by the larvae of the bean seed fly is usually first apparent due to partial or even total failure of seedlings to emerge. Surviving seedlings may be malformed with swollen stem bases and secondary fungal diseases often invade damaged tissue.

Seedlings can be attacked at any time from April onwards. The fly lays eggs on the surface of freshly disturbed soil and the emerging larvae tunnel into newly planted and germinating seeds. The larvae are white, about 6-8 mm long and have a pointed head end and blunt posterior. They can be found burrowing inside the seed or within the stems.

**Chemical control:** The only effective means of chemical control is by using an insecticidal seed treatment. Seed, therefore, should be obtained pre-treated with a chlorpyrifos-based product.

**Cultural control:** *Eggs are laid on freshly disturbed soil and therefore attacks are less likely to be serious where seeds have been planted into a stale seedbed. Plastic mulches are also beneficial in preventing egg laying. For small-scale bean production, seedlings raised in pots or modules can be planted in the field to avoid damage.*

#### 8.10.1.2 Bean aphid (*Aphis fabae*)

Colonies of black aphid can often develop around the stalks of the flower clusters and can result in deformed, blemished, or poorly developed pods.

**Chemical control:** Care must be taken to avoid the use of insecticides that are harmful to bees during flowering. Where aphids are known to occur regularly each year, insecticide granules should be applied before flowering.

#### 8.10.1.3 Two-spotted spider mite (*Tetranychus urticae*)

Attacks are more pronounced in dry seasons. First signs of infestation are small white patches on the leaf surface, which indicate the position of colonies of young mites on the underside. As the infestation develops, the leaves become more speckled, chlorotic and may turn a bronze colour. Plant growth, pod set and yield can be severely affected. The colonies on the undersides of the leaves produce fine white webbing within which, the mites and eggs can be seen.

**Chemical control:** There are no approved chemicals for two-spotted spider mite control in Runner Beans.

**Cultural control:** *Hollow bamboo canes provide an overwintering site for the mite. As the temperature rises in early summer, the mites leave the canes and infest the young climbing plants. After a severe infestation, there may be some benefit in exposing covered canes to sunshine in early spring to encourage mites to swarm. More frequent replacement of canes may also be considered.*

**Biological control:** Predator control of red spider mite is becoming more widely used, but the introduction of the predator (*Phytoseiulus persimilis*) must be made early in the season and repeated after two or three

weeks. Where infestation builds up late in the season, particularly in a hot dry summer, a further introduction of predators will help to reduce the overwintering population.

#### **8.10.1.4 Capsids (*Lygus spp.* )**

Capsids (plant bugs) can be a problem in some areas. They overwinter as adults on evergreen foliage and in all types of leaf litter. They emerge from their overwintering sites in late spring and can feed on a wide range of plants. The main damage to Runner Beans occurs just after pod formation, when the adults puncture the pod with their hollow piercing-sucking mouthparts. While feeding, the capsids secrete a toxin from their salivary glands, which kills the tissue surrounding the feeding site. The puncture marks are therefore discoloured and the pod may become malformed.

**Chemical control:** Insecticides applied for caterpillar control will also reduce the amount of damage caused by capsids to the production of the early pods.

**Cultural control:** *Try to avoid planting beans in close proximity to large hedges or areas of perennial vegetation, which are ideal overwintering sites for aphids.*

#### **8.10.1.5 Slugs (*Deroceras* and *Milax spp.*)**

In some areas, slugs are becoming a regular problem, particularly where early beans are grown under plastic covers. The slugs move easily on the inside of the wet plastic and cause damage to seedlings by rasping or tunnelling the young stems. Leaves may also be damaged. The effects are not to be confused with bean seed fly (see Section 8.10.1.1).

**Chemical control:** Slug pellets or baits should be applied at the first signs of damage. They may need to be applied at regular intervals during the early part of the season until the young plants have become well established.

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

### **8.10.2 Disease control**

#### **8.10.2.1 Foot rot (*Fusarium solani f. sp. phaseoli*) /Wilt (*Fusarium oxysporum f. sp. phaseoli*)**

Both diseases are characterised by premature death of either individual, or groups of plants. Beans affected by foot rot may be stunted, with pale foliage that eventually withers and dies. The root system is poorly developed and dark brown to black in colour and the vascular tissue within the root and stem base may be brick red in colour.

Beans infected by the wilt fungus usually begin to show symptoms during flowering, when the weather is warm. The older leaves become chlorotic generally around the margins at first, and then the whole leaf becomes dry and brittle. There may be leaf rolling and yellowing of the younger leaves as the disease progresses, until the whole plant withers and dies. A brown discolouration of the vascular tissue may be seen within the stem, when cut lengthways.

**Chemical control:** There are no effective means of control although soil sterilisation may reduce the risk of build up of the pathogens in the soils.

**Cultural control:** *Both fungi are soil-borne and occur as a result of long term cropping. They are also encouraged by poor drainage and consolidated soil conditions and therefore good soil management should be maintained to avoid these problems. Where crops become infected, the ground should not be*

*cropped with beans for a least ten years and where wilt has been confirmed, a longer period may be necessary.*

#### **8.10.2.2 Halo blight (*Pseudomonas syringae* pv *phaseolicola*)**

Halo blight attacks the foliage and pods of beans. The disease is most destructive where temperatures are cool and rainfall is frequent. Halo blight is caused by a seed-borne bacterium and has the ability to spread rapidly particularly during wet weather when pickers are moving regularly through the crop.

Infected seeds may give rise to yellow leafed seedlings with conspicuous green veins, however other environmental conditions may also cause this. Later these plants become the primary foci of infection. Infected leaves show small angular water-soaked spots about 3 mm across and surrounded by a conspicuous yellow area (halo). These spots can become larger and coalesce and then dry up causing the leaves to wither. Pods may become covered with water-soaked spots from which a greasy substance exudes.

**Chemical control:** There are no chemicals approved for control of halo blight.

**Cultural control:** *It is essential to use healthy seed. NIAB or Processors and Growers Research Organisation can test seed for the presence of halo blight. If an occasional infected plant is found, then this and surrounding plants may be removed from the field to help to reduce the inoculum level if wet weather conditions are imminent or if overhead irrigation is used.*

#### **8.10.2.3 Botrytis pod rot (*Botrytis cinerea*)/Sclerotinia white mould (*Sclerotinia sclerotiorum*)**

Both diseases can be an occasional problem when wet weather conditions persist during the flowering and pod setting period. *Botrytis* is characterised by a grey 'furry' mould occurring on the pod and develops as a result of the flower petal sticking to the pod and becoming infected by the fungus.

*Sclerotinia* produces a water-soaked soft-rot of the stem or pod which rapidly becomes covered with a mass of white fungal mycelium. The black resting bodies of the fungus may appear on or inside infected pods or stems.

**Chemical control:** Fungicides applied at the beginning of flowering when weather conditions are wet and unsettled, help to prevent both diseases becoming established. However, a harvest interval of 14 days should elapse following application of vinclozolin or cyprodinil plus fludioxinil and 7 days following iprodione (see Appendices 3 and 8). Azoxystrobin has a SOLA for *Botrytis* control (Appendix 8)

**Cultural control:** *Excessive overhead irrigation during flowering should be avoided. The resting bodies (sclerotia) of Sclerotinia sclerotiorum can survive in the soil over winter and produce air-borne spores in the following summer. Runner Beans should not be grown on soil where the previous crop was heavily infected, leaving a break of 4-5 years.*

#### **8.10.2.4 Rust (*Uromyces appendiculatus*)**

The disease can occur at any time during the summer, but is more commonly found from early August onwards when humidity is high. Rust appears as reddish brown circular pustules (1-2 mm diameter) on the leaves and stems, often surrounded by a halo of yellow tissue. Later, pods may become infected with the pustules which may be blacker in colour. In severe cases, the plants defoliate, there is a reduction of flower production and pods fail to set.

**Chemical control:** Tebuconazole, applied as soon as rust pustules are found, gives good control of rust (see Appendix 8). A second application can be made 14 days later if conditions encourage further disease development.

**Cultural control:***Rust can survive on crop debris and the elimination of debris by removal or cultivations will help to reduce early infection. However, once a new infection has commenced, air-blown rust spores can travel by wind long distances. Overhead irrigation may be useful in suppressing infection during dry periods.*

### **8.10.3 Weed control**

Runner Beans offer little competition to weed growth. They are particularly susceptible at early stages of growth, and later, weeds interfere with hand picking. The growing season is long and herbicides lack the persistence required to control weeds throughout.

Some Runner Beans are covered by polythene film just after sowing until small plant stage and dry conditions may reduce the efficacy of a residual herbicide but it may also reduce weed emergence. Black polythene in particular will reduce weed emergence and it is also used in trickle irrigation systems and for water conservation. When the film is removed, post emergence herbicide should not be applied too soon or the soft growth will be damaged. In addition the system of growing with support means that post-emergence treatments are difficult to apply although vibra-jet sprayers may be used.

It is **strongly recommended** that plastic crop covers are recovered and re-used where possible or recycled, or disposed of at licensed landfill sites.

Runner Beans should not be grown on land infested with couch.

*Successive weed flushes can be encouraged to germinate by cultivations before sowing.*

If there is a danger of the seedbed drying out, a stale seedbed technique is used, i.e. weeds which emerge before the crop is sown, are killed with a non-selective herbicide (e.g. glufosinate-ammonium, glyphosate, carfentrazone-ethyl).

#### **8.10.3.1 Herbicides**

Following the withdrawal of certain herbicides for Runner Beans, there are now very few available. Thus effective weed control has become extremely difficult.

A list of the currently approved herbicides is given in Appendix 4.

#### **8.10.3.2 Soil fumigation**

A soil fumigant, dazomet, is sometimes used to sterilise weed seeds, and also soil-borne diseases, insects and nematodes (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.

## **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 nutrients for Runner Beans

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

Nutrient (kg/ha)	Soil Index						
	0	1	2	3	4	5	6
Nitrogen (N)	180	150	120	80	30	0 <sup>(2)</sup>	0 <sup>(2)</sup>
Phosphate (P <sub>2</sub> O <sub>5</sub> )	200	150	100	50M	0	0	0
Potash (K <sub>2</sub> O)	200	150	100(2-) 50M(2+)	0	0	0	0
Magnesium (MgO) <sup>(1)</sup>	100	50	0	0	0	0	0

#### Notes:

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

<sup>(2)</sup> A small amount of nitrogen may be needed if SMN levels are low in the 0-30cm of soil.

At low soil indices of 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.

At indices of 2 or above, yield increase from phosphate or potash may be small. The amounts shown as M replace nutrients removed by typical crop yields and are maintenance dressings.

No more than 100 kg/ha of nitrogen should be applied to the seedbed, the rest when the crop is fully established. A top dressing of 75 kg/ha may be applied at early picking stage. Where FYM is used, reduce the amount of fertiliser accordingly.

#### Consult your retailer before using FYM.

**Runner Beans are classed as "Ready to Eat" crops - i.e. they can reasonably be expected to be eaten without any further processing to reduce microbial contamination, other than by washing. The guidelines in 'Managing Farm Manures for Food Safety: Guidelines for Growers to Minimise the Risks of Microbiological Contamination of Ready to Eat Crops' should be followed (see FSA website <http://www.food.gov.uk>)**

Select fields carefully to avoid risk of indirect contamination via surface run-off from manure heaps or stores, and during or following spreading of manures on the land.

Treated or batch stored solid manures and slurries can be applied before sowing.

**You should not apply fresh solid manures and slurries within 12 months of harvest, subject to there also being a minimum of 6 months between application and sowing.**

Ensure water sources used on the farm are not contaminated with manures or run-off

Do not harvest pods touching the soil.

**Untreated and digested sewage sludge must not be applied within the crop rotation.**

Only advanced treated sewage sludge maybe 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.

## Appendix 2 Insecticides currently approved for use on Runner Beans

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
lambda cyhalothrin <sup>(2)</sup>	contact and ingested pyrethroid: microcapsule suspension, very rapid acting. Extremely dangerous to fish and other aquatic life.	7 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
pirimicarb	carbamate with contact fumigant and translaminar activity: water dispersible granule. Has little effect on bees, ladybirds or other insects.	3 days	Harmful	none stated	none set
rotenone	natural contact insecticide of low persistence. Emulsifiable concentrate. Dangerous to fish or other aquatic life.	1 day	Irritant	none stated	none set

### Notes:

- (1) or latest time of application
- (2) SOLA - see Appendix 8 for the specific product details and expiry dates
- \* 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.

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

### Appendix 3 Fungicides currently approved on Runner Beans

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
azoxystrobin (2)	systemic translaminar and protectant strobilurin; dangerous to fish and other aquatic life	12 days	None	none stated	1.0
cyprodinil and fludioxinil	Broad spectrum fungicide: water dispersible granules	14 days	Irritant	B	none set
iprodione <sup>(2)</sup>	a protectant dicarboximide	7 days	Irritant	none stated	5.0
thiram	protectant dithiocarbamate seed treatment for damping-off diseases.	none stated	Irritant	none stated	none set

**Notes:**

(1) or latest time of application

(2) SOLA - See Appendix 8 for the specific product details and expiry date

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

### Appendix 4 Herbicides currently approved for use on Runner Beans

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
bentazone	contact diazinone: soluble concentrate SL or water soluble granule SG. Apply post-emergence for annual broad-leaved weeds. One application, or two as a split dose. Minimum 6 hr free from rain required after application.	before flower buds visible	Harmful Irritant	none stated	0.1* (beans with pods)
carfentrazone-ethyl	contact triazolinone: microemulsion (ME). 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*
chlorthal-dimethyl	residual benzoic acid; wettable powder. Apply after drilling or planting and before weed emergence for annual broad-leaved weeds.	post-drilling or planting	Harmful	none stated	none set
cycloxydim <sup>(2)</sup>	SOLA ACCase inhibitor # Apply post-emergence for annual and perennial grass weeds and volunteer cereals. Not annual meadow-grass. Toxic to aquatic organisms.	5 weeks	Irritant Harmful	none stated	none set
glufosinate-ammonium	contact phosphinic acid: soluble concentrate. Non-selective. Apply only between 1 Mar - 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
glyphosate	translocated phosphonic acid: soluble concentrate or water soluble granule formulations. 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*
linuron <sup>(2)</sup>	SOLA Maximum dose rate 0.75L/ha Dangerous to fish or other aquatic life.	pre-emergence	Do not apply by hand-held equipment	B	0.05* (beans with pods)

#### Notes:

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

<sup>(2)</sup> SOLA - see Appendix 8 for the specific product details and expiry dates

\* Level at or about the limit of determination

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

**Buffer Zone: Category B.** This product qualifies for inclusion within the LERAP scheme for ground crop sprayers if there are measures applicable (eg. nozzles).

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

### Appendix 4 Herbicides currently approved for use on Runner Beans (Cont'd)

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
paraquat <b>Use up by 11 July 2008</b>	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*
paraquat / diquat <b>Use up by 11 July 2008</b>	contact bipyridyls: soluble concentrate. Non-selective. Apply to stubble, pre-sowing or pre-emergence 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 <sup>(2)</sup>	SOLA  Very toxic to aquatic organisms.	pre-emergence	Irritant	none stated	0.2 (beans with pods)
trifluralin \$  <b>Use up by 20 March 2009 (a few products by 31 August 2008)</b>	Soil-incorporated dinitroaniline: emulsifiable concentrate. Apply pre-sowing and incorporate for annual meadow-grass and some broad-leaved weeds; mayweeds and cruciferous weeds resistant. Very toxic to aquatic organisms.	pre-drilling	Harmful  Irritant	none stated	none set

#### Notes:

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

<sup>(2)</sup> SOLA - see Appendix 8 for the specific product details and expiry dates

\* Level at or about the limit of determination

\$ Take care with waste disposal. Substance prescribed under Water Resources Act.

**Buffer Zone: Category B.** This product qualifies for inclusion within the LERAP scheme for ground crop sprayers if there are measures applicable (eg. nozzles).

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

## Appendix 5 Seed treatments for Runner Beans

Imported runner bean seed may be treated with chlorpyrifos plus thiram (Lorsban<sup>®</sup>) for control of bean seed fly and damping-off diseases.

Seed may be treated with metalaxyl plus thiabendazole plus thiram (Apron Combi 453 FS<sup>®</sup>) for protection against damping-off diseases.

### Appendix 6 Soil fumigants approved for use on Runner Beans

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
dazomet	Releases methyl isocyanate: granule. Applied pre-planting	pre-planting	Harmful	none stated	none set
metam-sodium	Releases methyl isocyanate:SL. Applied pre-planting	pre-planting	Harmful Irritant	none stated	none set

**Notes:**

(1) or latest time of application

### Appendix 7 Molluscicides approved for slug control on Runner Beans

Active Ingredient	Product Features	Harvest Interval <sup>(1)</sup>	Hazard Rating	LERAP Category	MRL (mg/kg)
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

**Notes:**

(1) or latest time of application

## Appendix 8 Specific off-label approvals for Runner Beans

Number	Product Name	Ingredients	LERAP Category	Expiry	MRL (mg/kg)
2360/06	Alpha Pendimethalin 330 EC <sup>®</sup> (12214)	pendimethalin	none stated	31/12/08	0.2
2310/04	Stomp 400SC <sup>®</sup>	pendimethalin	none stated	31/12/08	0.2
2115/06	Bunker <sup>®</sup>	pendimethalin	none stated	31/12/08	0.2
2022/05	Claymore <sup>®</sup>	pendimethalin	none stated	31/12/08	0.2
1973/07	Standon Cycloxydim <sup>®</sup>	cycloxydim	none stated	31/08/08	none set
1878/07	Marnoch Clodim <sup>®</sup>	cycloxydim	none stated	31/08/08	none set
1873/07	Greencrop Valentia <sup>®</sup>	cycloxydim	none stated	31/08/08	none set
1698/05	Alpha linuron 50 SC <sup>®</sup>	linuron	B	31/12/08	0.05*
1437/07	Stomp 400SC <sup>®</sup>	pendimethalin	B ^	31/12/13	0.2
3110/07	Cleancrop Curve <sup>®</sup>	carbendazim	none stated	20/06/08	none set
3102/07	Clayton Chizm FL <sup>®</sup>	carbendazim	none stated	30/06/08	none set
2535/07	IT Carbendazim <sup>®</sup>	carbendazim	none stated	30/06/08	none set
2311/03	Amistar <sup>®</sup>	azoxystrobin	none stated	31/12/11	0.2
1919/07	Rovral WP <sup>®</sup> (11693)	iprodione	none stated	31/08/08	none set
1880/03	Folicur <sup>®</sup>	tebuconazole	none stated	31/12/13	none set
1789/07	Rovral WP <sup>®</sup>	iprodione	none stated	31/12/08	none set
1401/05	Orius <sup>®</sup>	tebuconazole	none stated	31/12/08	none set
1385/07	Alpha Tebuconazole 20 EW <sup>®</sup>	tebuconazole	none stated	31/12/08	none set
1357/07	Mitre <sup>®</sup>	tebuconazole	none stated	31/12/13	none set
1320/07	Orius 20 EW <sup>®</sup>	tebuconazole	none stated	31/12/13	none set
1291/07	Cleancrop Silo <sup>®</sup>	lambda-cyhalothrin	none stated	13/11/09	none set
0739/06	Hallmark With Zeon Technology <sup>®</sup>	lambda-cyhalothrin	none stated	13/11/09	none set
0551/07	Riza <sup>®</sup>	tebuconazole	none stated	31/12/13	none set
0431/07	Dipel DF <sup>®</sup>	Bacillus thuringiensis var. kurstaki	none stated	31/12/13	none set
2002/08	Markate 50 <sup>®</sup>	lambda-cyhalothrin	none stated	28/06/11	none set
0356/08	Laser <sup>®</sup>	cycloxydim	none stated	31/12/13	none set

### Notes:

(1) This product is not recommended for reasons of insufficient margin of crop safety.

\* Level at or about the limit of determination

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

**Buffer Zone: Category B.** This product qualifies for inclusion within the LERAP scheme for ground crop sprayers if there are measures applicable (eg. nozzles).

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.

Specific 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 in the "Notice of Approval" are statutory and supersede any on the label that would otherwise apply.

## Appendix 9 Control Points: Beans (Runner)

### CS.34 BEANS (RUNNER)

CS.34.1 You should ensure that plastic film crop cover waste is recovered and disposed of or recycled in a responsible way -

Protocol reference: Section 8.10.3

CS.34.2 You must consult your retailer before using FYM and take appropriate measures to reduce the risk of E-coli -

Protocol reference: Section 6.1