



Assured Produce

Crop Specific Protocol

BEETROOT

(CROP ID: 45)



February 2008

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Acknowledgements

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[®] and all trademark rights are hereby acknowledged.

Notes:

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

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 Products containing substances which have been revoked are shown on the PSD website (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

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

There may be changes for the following reasons:

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

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

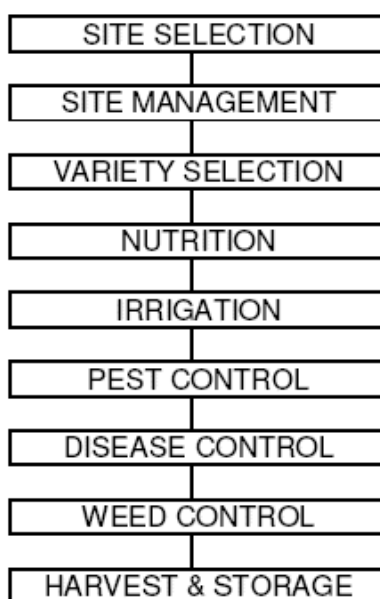
For pesticides on-label, only active substances are shown.

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

1 General introduction

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

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



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

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

2 Planning and records

See Generic Standards and/or Generic Guidance Notes.

3 Site selection

3.1 Site history

See Generic Standards and/or Generic Guidance Notes.

3.2 Crop rotation

Crops must be rotated to produce a balanced economic and environmental system of farming and to limit the build up of specific pests, diseases and disorders that adversely affect yield and quality.

In planning crop rotations for red beet it is important to recognise that sugar beet, mangels and spinach also encourage many of the pests and diseases which affect this crop. Carrots, parsnips and potatoes are also important hosts to violet root rot that can seriously affect red beet.

To avoid further build up of violet root rot in root crop rotations the practice of growing sugar beet one year in three or four must be avoided whenever possible.

A continuing policy of sound rotation is essential for the future of red beet and other important vegetable and arable root crops.

4 Site management

4.1 Soil mapping

See Generic Standards and/or Generic Guidance Notes.

4.2 Soil management

Soil type

The choice of a suitable soil is an essential requirement for the production and harvesting of good quality red beet. High yields of well-shaped roots will only be obtained if they are able to grow and develop without restriction.

Suitable soils range from sandy loams and silts to organic loams and fen peats. Silt soils can produce good quality crops but access for harvesting and effective soil separation can be extremely difficult in wet autumn conditions. For this reason only medium to light silts should be cropped with red beet.

Stones are a common feature in sandy soils; where many stones are present and where crops are to be share harvested, mechanical stone separation and burying techniques must be employed to minimise contamination and root damage.

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 Drilling and transplanting

See Generic Standards and/or Generic Guidance Notes.

4.6 Growing systems

4.6.1 Early crops

Early crops of red beet for harvesting in June and July are grown in early production areas where irrigation can be used in dry periods. Crops are seeded in February or early March at low density and the beds are covered in clear film plastic or non-woven fleece covers to warm the soil.

The covers are removed when the seedlings are well developed during April or May. The crop is encouraged to grow quickly through the application of water and nutrients and avoiding any checks to growth.

Because the crop is thinly seeded, each plant receives the maximum amount of sunlight and will grow quickly to a marketable size. When an acceptable proportion of roots have reached marketable size the crop is harvested. The yields of early crops are often particularly low due to low plant populations.

Early crops rarely require protection from pests and foliar diseases and can, therefore, be grown with minimal pesticide input.

*It is **strongly recommended** that all polythene and fleece crop covers used in early production are recycled wherever possible.*

4.6.2 Main season and late crops

Crops for harvesting from July onwards are normally sown between March and June, the later sowings being used for late autumn lifting. Rubbed and graded natural seed is used in belt, cell wheel or vacuum drills. The introduction of modern vacuum seeders, together with improved seedbed preparation, should lead to a greater precision of seeding and consistency of red beet size and quality.

Crops reach marketable size in succession according to variety, drilling date, plant population, site and management aspects. Once mature, crops are machine lifted, graded and marketed. Frosts, which will damage red beet, are commonly experienced in most areas of the UK from January onwards. Therefore, for winter and spring production, some form of clamp or controlled environment storage is required.

Main season crops are exposed to all normal pests and disease pressure during growth and development. Regular inspections, combined with trapping and forecasting techniques, should be used to guide the crop protection program.

4.6.3 Clamp storage

Clamp storage is employed in many areas to provide supplies for grading until well into March. The environment temperature within the heap can be partially controlled by the use of forced ambient air ventilation. This improves the control of storage life and marketable quality.

4.6.4 Controlled environmental storage

Cool storage in insulated buildings is an established technique for production of produce for grading and marketing during April and May.

Vegetable crops must not be stored in the same chamber as fruit or other ethylene-producing crops because physiological damage to the vegetable can rapidly result.

5 Variety selection

5.1 Choice of variety or rootstock

In choosing varieties of red beet, due regard must be paid to the following characteristics:

- Agronomic characteristics of yield, uniformity and quality.
- Tolerance to root and foliar diseases. Varieties exhibiting strong healthy foliage with tolerance to the normal range of root diseases are preferred.

6 Nutrition

6.1 Nutrient requirement

Major nutrients

Prior to cropping, the field nutrient status should be determined by sampling and analysis. Analysis is required for each field or group of fields as fertiliser application must be in accordance with crop need and soil reserves.

Where the soil pH is low it will be necessary to apply a liming material to provide a suitable pH value for satisfactory growth.

Phosphate, potash and magnesium blended base fertiliser is normally applied as a soil treatment prior to ploughing, stone separation or bed making.

Nitrogen fertiliser must be applied to growing crops in such a way that leaching and run off are minimised. This is particularly important on sandy soils. Only a small part of the total requirement is needed during the establishment phase, the balance should be applied as the crop develops.

Typical fertiliser recommendations may be found in Appendix 1.

Trace elements

Many sandy and organic soils, particularly where the pH is high, are deficient in trace elements. Deficiencies of manganese and copper are common and are best corrected using specific inorganic trace element foliar sprays. If the soil boron status is low, it may be conveniently corrected by applying a boronated base fertiliser and/or foliar spray.

The crop nutrient status can be readily checked during growth using leaf tissue analysis which can be a useful guide to the need or otherwise for trace element treatments.

*It is **strongly recommended** that where trace element and multi-nutrient foliar feeds are used routinely, it can be demonstrated that such treatments are justified through tissue or other appropriate analysis.*

All unnecessary fertiliser and trace element treatments must be identified and avoided.

7 Irrigation

Irrigation response

Adequate soil moisture at seeding depth is essential to give satisfactory plant establishment. The timing of irrigation for germination has been identified as critical but in practice it is likely that growers will only be able to apply the optimum irrigation treatment to a small proportion of their crops.

Therefore conservation of moisture during land preparation and at drilling is essential.

Many of the soils used for red beet production contain limited amounts of available water for growth and development. Typical moisture holding values for a loamy sand soil are 130 mm per metre depth, which is

sufficient in mid-season to satisfy the transpiration demand of main crop red beet for only two weeks. For consistent quality, combined with commercially worthwhile yields, adequate irrigation is essential.

Early crops by definition do not have time to grow by relying on natural moisture so these must be well watered to maintain a high growth rate and to achieve a good yield.

Irrigation scheduling

Crop water balance systems, neutron probes and other techniques can be used to help forecast the timing of irrigation and the priority order.

A field inspection using a spade to examine the soil is essential to confirm when the profile is becoming dry and to check on the success of applied irrigation.

Irrigation water is a scarce resource and must only be applied in accordance with need.

8 Crop protection

8.1 The basic approach to crop protection

See Generic Standards and/or Generic Guidance Notes.

8.2 Plant protection product choice

See Generic Standards and/or Generic Guidance Notes.

Approved uses not included on the product label

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

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

In the case of products with older approval an electronic approval may not be available. In these cases growers should contact the PSD Information Services Branch for details of the approved conditions of use.

Contact details are: p.s.d.information@psd.defra.gsi.gov.uk tel. 01904 455775

8.3 Advice on the use of pesticides

See Generic Standards and/or Generic Guidance Notes.

8.4 Application of pesticides

See Generic Standards and/or Generic Guidance Notes.

8.5 Records of application

See Generic Standards and/or Generic Guidance Notes.

8.6 Protective clothing/equipment

See Generic Standards and/or Generic Guidance Notes.

8.7 Pesticide storage

See Generic Standards and/or Generic Guidance Notes.

8.8 Empty pesticide containers

See Generic Standards and/or Generic Guidance Notes.

8.9 Pesticide residues in fresh produce

See Generic Standards and/or Generic Guidance Notes.

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

Assured Produce is aware that a key area in the production of fresh produce which requires continued attention by growers and their advisers is that of keeping pesticide residues to a minimum. The 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 application of fungicides and insecticides to the edible part of the crop**
- **Optimising the use of post harvest treatments**
- **Ensuring minimum harvest intervals are followed**
- **Ensuring that application equipment is applying products correctly**

Currently there are no residue issues associated with this crop but the awareness needs to be maintained for any future issues.

8.10 Pest, disease, physiological disorder and weed control

8.10.1 Pest control

8.10.1.1 Nematodes

Several cyst-forming nematodes can cause damage to red beet crops through larval feeding injury to the roots. Some of these nematodes will also happily reproduce on other crops such as brassicas. Soil migratory nematodes are not normally problematic in red beet crops.

Soil sampling can broadly determine the cyst nematode status of a field. Where significant levels of cyst nematode are present, relocation of the crop to cleaner land is the recommended approach.

8.10.1.2 Foliar-feeding aphids

Red beet will host several species of aphids, some of which can transmit serious virus diseases.

Warnings of the first aphid migrations are issued by specialist consultants alerting growers to check their crops. Unless aphids are found to be present in crops aphicide sprays should not be applied.

8.10.1.3 Cutworm

Cutworm attacks are common every year but larval survival and economic damage is mostly confined to dry seasons. Cutworms may reduce yield on late-drilled crops by severing seedling plants from their tap roots but the most serious effect is on the loss of quality caused when cutworm larvae bite into maturing red beet.

It is not practical to monitor turnip moth eggs or juvenile cutworms on foliage, as they are just 1.2-1.3 mm long when they burrow underground.

Monitoring systems for turnip moth (adult cutworm) activity are well developed but turnip moth monitoring alone will not give a guide to correct spray date that is related to the development of the larvae. Spray warnings are based on dynamic models that will show when sensitive crops should be treated.

Routine treatment can be unnecessary or wrongly timed. Regularly irrigated crops often do not require treatment. Producers are urged to seek professional advice in this area.

A list of insecticides for use in red beet is given in Appendix 2.

8.10.2 Disease control

8.10.2.1 Seedling diseases

Damping-off diseases can reduce plant stand, particularly in conditions of adverse emergence. *Phoma* species, which can adversely affect establishment and can cause root decay, are carried on seed and commercial seed lots are routinely treated with fungicide to control these pathogens. Some soil-borne diseases can also be suppressed by fungicide seed treatments.

Seed treatments are a relatively cheap, effective and desirable method of control because they use a minimum quantity of fungicide, clearly targeted on the pathogen concerned. Seed which is known to be infected must be treated with an appropriate fungicide before sowing.

8.10.2.2 Root diseases

Root rot complex (*Pythium* and *Rhizoctonia* species)

Root rot can cause serious losses in beet crops that have been grown on land that has had a long history of beet production. The avoidance of such sites is essential.

Violet root rot (*Helicobasidium purpureum*)

Incidences where violet root rot causes economic damage to all root crops appear to be increasing. Long rotations and avoidance of sites where there is any history of violet root rot is the only control measure currently available. Red beet and many arable root crops are susceptible (see Section 3.1 and 5.1).

Common scab (*Streptomyces scabies*)

Scab is prevalent on red beet grown on many soils of high pH but also occurs on other soil types particularly in seasons when the early summer period is dry. The root appears particularly susceptible to infection at the seedling stage and well-timed irrigation can provide some control. Scab lesions darken and enlarge with age and can become infected with secondary rots. Severe scab causes wastage and must be avoided.

Phoma heart rot (Phoma beta)

This seed and soil borne pathogen causes seedling damping off, a brown leaf spot and dark dry lesions on the crown and side of the root. A thiram soak seed treatment is used to control the seed borne phase of this disease.

Aphanomyces black root (Aphanomyces cochlioides)

Aphanomyces is encouraged by wet soil conditions and can cause considerable losses to seedlings. Later infection of roots can result in wilting, stunting and root scarring. A serious attack kills the entire plant. Correct drainage and sound rotation are effective controls. A seed treatment using hymexazol is available for use on pelleted beet seed.

8.10.2.3 Foliar diseases***Downy mildew (Peronospora farinosa)***

The development of downy mildew is favoured by cool moist conditions. Under certain circumstances this disease may lead to root distortion in red beet when the crop is affected at the seedling stage. Use Wakil XL as a seed treatment and consider tank mixing mancozeb and SL567A for applying where necessary to the young seedlings.

Powdery mildew (Erysiphe poligoni)

Powdery mildew develops as a grey mycelium on the upper leaf surface. Yield may be reduced following early severe attack that is more likely in warm dry seasons. Sulphur, applied as a foliar feed, may give some control of powdery mildew. Routine treatments should be avoided.

Avoidance of moisture stress can control powdery mildew.

Rust (Uromyces beta)

Rust occurs in beet crops in Europe and elsewhere. All stages occur in red beet crops, starting in the spring with the orange stage developing into the reddish stage and finally the black stage. Rust development can seriously damage the foliage of red beet, leading to loss of productivity and difficulties in harvesting by top lifter.

Development of rust in crops must be monitored so that any applied treatments can be justified. Routine treatments should be avoided.

A list of approved fungicides is given in Appendix 3.

8.10.2.4 Storage diseases

Various fungal and bacterial pathogens can readily develop on stored roots. Only produce that is predominantly free of disease symptoms should be stored. The lifting and handling system needs to be carefully designed and managed to eliminate, as far as possible, all sources of damage. Once roots are in the store the temperature must be reduced rapidly to avoid the development of bacterial rots. All stored crops must be monitored regularly to detect the development of any storage problem so that appropriate action can be taken to reduce potential marketable yield.

Good husbandry and handling together with the maintenance of the correct storage environment will assist in lowering the incidence of fungal and bacterial rots.

8.10.2.5 Other diseases

Beet yellows virus (BYV) and beet mild yellowing virus (BMYV)

Many beet and weed species are hosts to BYV. It is predominantly spread by the peach potato aphid (*Myzus persicae*) but can also be transmitted by the black bean aphid (*Aphis fabae*). Infected sugar beet plants have outer and middle leaves that are yellow, thickened and brittle. Infected roots fail to develop normal size, sugar and yield.

Good control of the aphid vector will limit the spread of virus within and between crops and good field hygiene will limit the over-wintering opportunities of these viruses.

Infection pressure can be reduced by good hygiene with respect to residues of old red beet, sugar beet, other susceptible crops and perennial weed hosts.

Bacterial diseases

Various bacterial pathogens occasionally cause losses in red beet crops including *Pseudomonas* , *Erwinia* and *Corynebacterium* . As many are seed-transmitted, the use of good quality clean seed is essential.

8.10.3 Weed control

Significant weed growth cannot be tolerated in any vegetable crop and red beet is no exception. Control is achieved with a combination of pre- and post-emergence herbicide treatments and occasionally by machine hoeing and hand weeding.

A balance between herbicide efficacy and persistence must be considered. Repeat 'low-dose' programs and tank mixes are often necessary in order to cover the complete weed spectrum.

Certain weeds, e.g. wild beet, are so closely related to red beet that selective chemical control is impossible. Fields containing significant proportions of these weeds must not be cropped with early polythene-covered red beet, as mechanical control methods are not possible while the crop is covered.

All such weeds emerging through the crop and producing viable flowering shoots must be machine topped, weed wiped or hand pulled to prevent the production of seed and further contamination.

Where weed pressure is low but the species present are important (i.e. volunteer potatoes) hand weeding should be considered as a priority over spray applications. Where the weeds present occupy distinct areas of the field or the sides of the beds, use selective or directed treatment as necessary.

Where red beet are grown on soils that are prone to leaching or run-off, care must be taken to ensure that herbicides do not appear as major pollutants of ground water.

Currently approved herbicides are listed in Appendix 4.

9 Harvesting and storage

9.1 Hygiene

See Generic Standards and/or Generic Guidance Notes.

9.2 Post-harvest treatments

See Generic Standards and/or Generic Guidance Notes.

9.3 Post-harvest washing

See Generic Standards and/or Generic Guidance Notes.

9.4 Harvesting

Specialised top lifting machines are used in the early and main season when red beet foliage is strong. As foliar strength declines share lifters are used.

Red beetroots are susceptible to mechanical damage and care is needed to ensure damage is minimised during all harvesting and handling operations. Damage from scuffing and abrasion is a major cause of wastage during storage and must be avoided.

It is vital that harvesting and handling systems are well designed, maintained and managed to reduce the incidence of crop loss through mechanical damage.

9.5 Grading and preparation for sale

In summer and autumn the crop is harvested and graded as required for production and sales. If holding or buffering is necessary then fresh produce must be kept cool and not be allowed to dehydrate.

It is essential that the grading area allows an efficient and rapid throughput of raw material in order to maintain quality in the final product. The grading area must be separated from any processing area so that clean and dirty areas are distinct.

All equipment must be well designed and manufactured for minimal damage and ease of cleaning.

All roots to be marketed must be inspected on a well-lit belt or roller table where defective roots can be removed from the sample.

10 Pollution control and waste management

Disposal of waste solids

Particular attention must be given to the disposal of infected red beet waste, as this can be a major source of violet root rot and other important root crop diseases. Wherever possible, waste must be composted on land that will not be used for crop production. A safe and effective disposal routine is considered essential.

The sale of infected stock feed can lead to the further spread of persistent diseases and customers should be made aware of the risks of feeding infected roots to livestock on fields which will be cropped with roots.

11 Energy efficiency

See Generic Standards and/or Generic Guidance Notes.

12 Health and 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

Major nutrient requirements (kg/ha)

Nutrient (kg/ha)	Soil Index						
	0	1	2	3	4	5	6
Nitrogen	300	263	241	219	185	119	63
Phosphorus	200	150	100	50	0	0	0
Potassium	300	250	200 (2-) 150 (2+)	60	0	0	0
Magnesium	150	100	0	0	0	0	0

Notes:

(1) a small amount of nitrogen may be needed if soil mineral nitrogen (SMN) levels are low in the 0 to 30cm depth of soil. Apply no more than 100kg/ha N in the seedbed. The remainder should be applied as a top dressing when the crop is fully established.

(2) The recommendations are based on a 60 tonnes per hectare crop. The above recommendations will need adjusting when higher yields are probable.

Appendix 2 Insecticides currently approved for use on red beet

Active ingredient	Product features	Harvest Interval ⁽¹⁾	Hazard Rating
cypermethrin	a contact and stomach acting pyrethroid insecticide. Dangerous to bees.	none stated	Harmful Irritant Flammable
dimethoate ⁽³⁾	a contact and systemic organophosphorus insecticide. Harmful to game, wild birds, animals, livestock. Dangerous to bees, fish and other aquatic life.	14 days. Latest time of application: 30 June in year of harvest	Harmful Flammable
dodecylphenol ethoxylate	sold as Agral 50 E. Acts by physical means. No buffer zone requirement.	0 days	Irritant
lambda cyhalothrin ⁽²⁾	a contact and ingested pyrethroid insecticide: extremely dangerous to bees, fish and other aquatic life.	3 days	Harmful Irritant Flammable
natural plant products	act by physical means, no buffer zone requirements. <ul style="list-style-type: none"> Garlic Barrier: not prohibited in organic systems. Majestic: permissible in organic situations. 	none stated 0 days	Harmful Irritant
nicotine	contact insecticide	2 days	Toxic Flammable
pirimicarb ⁽²⁾	an anticholinesterase carbamate compound, with fumigant, contact and translaminar activity. Harmful to fish and other aquatic life. Little effect on bees. Do not use if under medical advice not to work with such compounds.	3 days	Harmful
rotenone	a natural, contact insecticide of low persistence. A formulation of liquid Derris. Dangerous to fish and other aquatic life.	1 day	Flammable

Notes:

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

⁽²⁾ SOLA - see Appendix 5 for the specific product and expiry dates.

⁽³⁾ Final use-up date of dimethoate is dependent on product choice:

Product	Final use up date
BASF Dimethoate 40	31/12/08
Danadim	31/12/08
Rogor L 40	31/12/08
Sector, from Cheminoua	31/12/08
Copper silicate	None stated

molluscicide with provisional approval to 31/12/08

Appendix 3 Fungicides currently approved for use on red beet

Active ingredient	Product features	Harvest Interval ⁽¹⁾	Hazard Rating
azoxystrobin	a systemic translaminar and protectant strobilurin fungicide. Dangerous to fish and aquatic life.	35 days	
cupric ammonium carbonate	used as a seedling drench	none stated	Harmful Irritant
cymoxanil fludioxonil + metalaxil - M	a fungicidal seed dressing with a SOLA for use on red beet	none stated	Treated seed is harmful
cyproconazole	a contact and systemic conazole fungicide for the control of Brown Rust and powdery mildew. 21 days interval between applications. Harmful to fish and aquatic life.	14 days	Irritant Harmful
fenpropimorph ⁽²⁾	a contact and systemic morpholine fungicide. Dangerous to fish and aquatic life.	21 days	Harmful Irritant
hymexazol	fungicidal seed dressing	pre-drilling	harmful to aquatic organisms
iprodione ⁽³⁾	fungicide for use pre-storage for control of <i>Botrytis cinerea</i> and <i>Phoma betae</i> .	16 weeks	none stated
mancozeb ⁽²⁾	fungicide for control of downy mildew	30 days	very toxic to aquatic organisms
metalaxyl - M	a phenylamide systemic fungicide	28 days	harmful
propamocarb hydrochloride	a translocated protectant carbamate	14 days	
potassium hydrogen carbonate	a commodity substance approval. Not prohibited in organic systems. Final use date 31/12/08. Crop phytotoxicity can occur. No buffer zone requirement.	none stated	none stated
thiram	a protectant, dithiocarbamate fungicide and animal repellent. For use as a seed soak. Harmful to fish and aquatic life.	none stated	Irritant
cymoxanil fludioxonil/ metalaxyl-M	a fungicidal seed treatment with an off label for use on red-beet seed	latest use pre-drilling	

Notes: ⁽¹⁾or latest time of application. ⁽²⁾ SOLA - see Appendix 5 for the specific product and expiry dates. ⁽³⁾ hymexazol as Tachigaren 70, and iprodione both have full label approval for Red Beet.
Not all products containing these active ingredients may be currently approved for use on red beet. As label recommendations are revised regularly, read a current label before use.

Appendix 4 Herbicides currently approved for use on red beet

Active ingredient	Product features	Harvest Interval ⁽¹⁾	Hazard Rating
clopyralid	a foliar, translocated picolinic herbicide. High activity on weeds of <i>Compositae</i> family.	6 weeks	none stated
ethofumesate	a benzofuran herbicide for grass weed control. Pre- or post-emergence. Latest time of application when crop meets across the rows. Harmful to fish or aquatic life.	none stated	Flammable
fluazifop-P-butyl ⁽²⁾	a phenoxypropionic acid grass herbicide. Annual meadow-grass is not controlled. Harmful to fish and aquatic life.	3 weeks	Irritant Flammable
lenacil	a residual soil-acting herbicide. Effectiveness may be reduced by dry conditions. Pre-emergence. Harmful to fish or aquatic life.	none stated	Irritant
metamitron	a contact and residual triazinone herbicide. Can be used as a low dose programme.	none stated	none stated
phenmedipham	a carbamate herbicide. Apply before crop leaves meet between the rows. Harmful to fish or aquatic life.	none stated	Harmful Irritant
propaquizafop ⁽²⁾	a foliar, systemic herbicide for the control of annual and perennial grass weeds. Harmful to fish.	4 weeks	none stated
tri-allate	a soil-acting thiocarbamate herbicide for grass weed control. Harmful to fish or other aquatic life.	pre-drilling	Harmful Irritant
triflusalufuron-methyl ⁽²⁾	a foliar acting herbicide for the control of flixweed, fools parsley, cleavers annual dicotyledons, wild chrysanthemum, nipplewort and charlock. Extremely dangerous to fish.	4 weeks	Extremely dangerous to fish
quizalofop-P-ethyl	a post-emergence grass herbicide but it does not control annual meadowgrass. Final use up period for some formulations is 31st August 2008.	112 days	Harmful Irritant Flammable

Notes:

⁽¹⁾ or latest time of application.

⁽²⁾ SOLA - see Appendix 5 for the specific product and expiry dates.

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

Amitrole, Carfentrazone-ethyl and/or glyphosate may be used for total weed control before sowing.

Glufosinate-ammonium, diquat/paraquat and mixtures of both can be used pre-crop emergence or see label as inter row applications.

Appendix 5 Specific off-label approvals for red beet

Number	Product Name	Active Ingredient	Final use date
1844/07	Aramo	tepraloxymid	31-05-15
1292/01	Aphox [®]	pirimicarb	31-12-13
2022/03	Bulldog	propaquizafop	31-12-13
1753/07	Cabaret	cyproconazole	31-08-08
1755/07	Caddy 240 EC [®]	cyproconazole	31-08-08
1634/02	Cleancrop GYR [®]	propaquizafop	31-12-13
3763/02	Cleancrop Fenpro [®]	fenpropimorph	31-12-13
0629/04	Cleancrop Fenpropimorph [®]	fenpropimorph	31-12-13
1294/07	Cleancrop Silo	lambda-cyhalothrin	13-11-09
3751/02	Corbel [®]	fenpropimorph	31-12-13
3629/02	Debut [®]	triflusaluron-methyl	31-12-13
0387/06	Dithane 945 (12545)	mancozeb	31-03-13
0148/02	Falcon [®]	propaquizafop	31-12-13
1247/03	Filex	propamocarb hydrochloride	30-06-08
1256/07	Fubol Gold WG	Mancozeb / metalaxyl-M	30-06-11
2231/04	Fusilade 250 EW [®]	fluazifop-P-butyl	31-12-13
0743/06	Hallmark with Zeon Technology [®]	lambda-cyhalothrin	13-11-09
1747/05	Phantom	pirimicarb	31-12-13
1453/03	Proplant	propamocarb hydrochloride	31-07-08
1632/02	Raptor [®]	propaquizafop	31-12-13
1629/02	Shogun [®]	propaquizafop	31-12-13
1307/05	SL 567A	metalaxyl-M	30-09-12
2313/03	Wakil XL	cymoxanil/fludioxonil metalaxyl-M	31-12-08
2835/06	Tachigaren 70 WP	hymexazol	31-12-13

Notes:

(1) for protected crops only

* pre-storage dip

** for Beetroot seed to be sown outdoors

See further Notes on following page:

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.

Specific off-label uses may only take place if all the conditions given in the "Notice of Approval" document, the product label and/or leaflet and any additional guidance on off-label approvals have first been read and understood. The conditions of approval given in the "Notice of Approval" are statutory and supersede any on the label which would otherwise apply. To use an off-label you must be in possession of a copy of the original SOLA and any amendment notice.

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

Appendix 6 Control Points: Beetroot

CS.45 BEETROOT

CS.45.2 Growers should justify routing trace element and multi nutrient foliar feeds through tissue or other appropriate analysis -

Protocol reference: Section 6.1

CS.45.3 Polythene and fleece crop covers used in early production should be recycled wherever possible -

Protocol reference: Section 4.6.1