



**Red Tractor
Assurance *for Farms***
Fresh Produce Scheme



Crop Module: Rhubarb

Effective 1st September 2015



**Red Tractor
Assurance**

Welcome



This crop specific module for rhubarb has been written to complement and avoid duplicating the generic principles of the Red Tractor Farm Assurance Fresh Produce Scheme standards. It is advisable to read the Red Tractor Farm Assurance Fresh Produce standards before reading this crop specific module. This module is designed to stimulate thought in the mind of the reader. It contains crop specific guidance and standards, where applicable, in addition to the requirements stated in the generic Fresh Produce standards.

Within this module the important requirements outlined in the crop specific standards section will be verified during the Red Tractor Farm Assurance assessment and compliance will form a part of the certification/approval decision.

Disclaimer and trade mark acknowledgement

Although every effort has been made to ensure accuracy, Assured Food Standards does not accept any responsibility for errors and omissions. Trade names are only used in this module where use of that specific product is essential. All such products are annotated® and all trademark rights are hereby acknowledged.

Notes: Pesticide Information

The Red Tractor Fresh Produce team has been working with Fera to provide tailored access to the LIAISON database for all Red Tractor Fresh Produce members. This system allows individual growers access to all information for plant protection products approved for use under the Red Tractor Fresh Produce Scheme.

LIAISON can be accessed under the Produce tab via the “Checkers and Services” page where you will also find a user manual. Searches will be filtered specifically for the crops for which you are registered. Once you have logged onto the site and clicked on the LIAISON hyperlink you will be directed to the LIAISON home screen.

You will need a username and password and these will be sent once you have registered:

<http://assurance.redtractor.org.uk/rtassurance/services/Registration/members.eb> .

General Introduction

Following a systematic approach will help growers identify and manage the risks involved in crop production. This module is based on a typical crop production process and 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 precedent over quality and environmental controls. The layout of this module follows the same structure as that used in the Red Tractor Farm Assurance Fresh Produce Standards. The content of the module is reviewed prior to the issue of updated editions. The review process considers both new developments and all relevant technology which has emerged since the last review was completed and which have been found to be both workable by the grower and beneficial to the environment. The aim is to transfer such information and technologies to growers.

Acknowledgements

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ADDITIONAL REQUIREMENTS AGAINST CURRENT STANDARDS

None for this crop module

ADDITIONAL STANDARDS

None for this crop module



GUIDANCE

CHOICE OF VARIETY OR ROOTSTOCK AND PLANT HEALTH CERTIFICATION

Propagation

Propagation from seed is not recommended due to the lack of uniformity of stock.

Rhubarb is traditionally propagated by dividing crowns in the field in autumn. Vigorous crowns can be divided into three or four pieces after two years, with larger crowns capable of being split into five or six pieces, referred to as sets.

Only vigorous crowns should be retained and any off-types discarded. Older crowns should be avoided since the middle of crowns can be hollow and a source of diseased stock.

Only buy new stock from reputable plant producers to avoid the risk of buying diseased roots. This will also ensure that varieties are true to type.

New varieties can be bulked up by micropropagation but problems can be experienced in cleaning up the plant material prior to multiplication.

Planting

Planting in the autumn or late winter before growth begins is preferable. Soil cultivations should be carefully timed to avoid soil compaction which could affect crop establishment and reduce the cropping potential of the plantation.

Plants should be carefully handled to avoid damaging the buds. Most plants are planted on ridges to avoid the crowns sitting in cold wet soils during the winter months.

Life of plantation

Most rhubarb fields are capable of producing good yields of high quality rhubarb for at least four years. Good crop management can extend the life of the plantation particularly by maximising weed control so that the growth of perennial weeds is minimised. Perennial weeds are usually the main reason why fields are grubbed.

Plantations should be replaced at the optimal time to maintain product quality.

Crop advancement

Crop maturity can be advanced by covering the crop with a thick layer of straw in January, and depending on season and location the first outdoor rhubarb can be available from mid-February onwards. Gibberellin can be applied at the first signs of bud growth to advance maturity and early yield.

The forced crop is usually available from early December through until late March. Early yields from Timperley Early can be low compared to late lifted Stockbridge Arrow which requires more cold units before it can be lifted and forced. Work has looked at ways to bring forward the maturity of the forced crop by lifting crowns for cold storage during September and early October. Gibberellin can be used as a replacement for cold units and is applied to crowns after placing in forcing sheds in November.

Crop scheduling

By using a range of varieties outdoor cropping can be achieved from March to November but will depend on weather conditions and location. Early maturing varieties will produce later flushes of good quality rhubarb but yields are likely to depend on rainfall. There is no consensus of opinion on whether flower stalks should be removed and will usually depend on the availability of labour. Forced yields are higher if flower stalks are removed in the summer before forcing.

SITE AND SOIL MANAGEMENT

Rhubarb remains in the field for many years and sites should be carefully selected prior to planting. Fields which are known to have a serious perennial weed problem should be avoided, as soil cultivations are very limited once the crop is established. Fields which have stem nematodes should also be avoided.

Crowns for forcing should be grown on sites which can allow access to machinery during November, December and January.

Climate

Rhubarb has traditionally been grown in Yorkshire but the crop grows well in all locations. Most counties are suitable for the outdoor crop but for forcing the crowns need to be exposed to cold temperatures during October and November and colder areas are required. Soil temperatures at 10cm depth need to regularly go below 5°C from October onwards before the crowns can be lifted for forcing.



Soil Management

Rhubarb will grow on almost any type of soil providing it is well drained. Cold, poorly drained fields should be avoided as this will delay maturity, reduce yields and reduce the length of the life of the plantation.

When selecting fields for rhubarb production, soil texture, soil structure and access should be considered.

ENVIRONMENTAL IMPACT/ CONSERVATION AND SUSTAINABILITY

MAJOR NUTRIENTS

Soil sampling should be undertaken prior to planting to determine nutrient status. Fertiliser application rates must be based on soil reserves and crop requirements.

Example of typical fertiliser recommendations are given in the Appendix.

Phosphate and potash are applied as a base fertiliser before planting with nitrogen applied in the spring after planting. Subsequent applications of nitrogen and sometimes phosphate and potash are usually made in the spring of each year usually before strawing or shoot regrowth. Timing of fertiliser applications should conform to any restrictions based on protecting the environment and reducing the risk of leaching.

Lime and pH

Although rhubarb is relatively tolerant of acidity, the soil pH should be maintained at 6.5-7.0 on mineral soils (5.8 on peats).

Trace elements

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

ENVIRONMENTAL PROTECTION & CONTAMINATION CONTROL

Planning

- Careful selection of the site to ensure that the crop is maintained in a healthy condition and to avoid build-up of weed problems
- Use only healthy rootstocks to propagate from and plant at the correct time to avoid soil compaction and poor soil structure

- For forced crops use only vigorous crowns and discard remainder in the field.

Cultural preventative techniques

- Good crop and field hygiene
- Promoting strong healthy growth by applying nutrients according to soil analysis and accurate application of fertilisers and trace elements
- Utilising irrigation to promote healthy growth and particularly by using trickle irrigation which could allow fertigation and improve water use efficiency
- Keep forcing sheds in a clean condition to prevent the carry-over of pests and diseases.

Corrective action

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

- The need to take corrective or protective action must be established by regular monitoring and establishing thresholds. The effect of prevailing weather and predicted weather conditions on the need for treatment must be considered
- Where chemical control is considered appropriate:
 - The least toxic and persistent product should be selected with due regard to its efficacy and harvest interval.
 - 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 to known 'hot spots' based on previous years' experience.

Pest control

Rosy Rustic Moth (*Hydraecia micacea*)

Caterpillars are sometimes found tunnelled into the base of sticks. Due to the minimal trimming of the sticks the damage can render the stick unmarketable and lead to rejection.

Chemical control

Insecticides should be applied to control the caterpillars at the start of bud growth. Applications directed to the leaf stalk bases in late March and early April are the best method of control.



Cultural control

The moth lays her eggs on weeds so maintaining good control of weeds can minimise places where eggs can be laid. Careful monitoring can allow sprays to be targeted at the crops most at risk.

Slugs and Snails (*Derocerus*, *Milax*, *Helix* and others)

A potentially serious pest of rhubarb due to the damp soil conditions around the crowns. They damage the crowns and can eat into the petioles causing unmarketability. Probably more serious in forced crops due to the dark, damp conditions and the difficulty in observing early damage in the dark forcing sheds.

Chemical control

Where the pest is known to be a problem, field applications of a molluscicide should prevent damage. In forcing sheds an application after planting and following the first watering may be required. At present there are no insecticides approved for the control of this pest on forced rhubarb.

Cultural control

Avoid using heavy soils and fields known to have poor drainage. Inspect crowns carefully before placing into the forcing sheds. Removal of all trash before planting may further reduce potential damage.

Stem nematode (*Ditylenchus dipsaci*)

Stem nematodes can be found in high numbers in crowns and have been linked with a condition called crown rot caused by the bacterium *Erwinia rhapontici*. Nematodes are also found in buds and leaf stalks, which become swollen at the base, then split and soon start to rot. The nematode can infect and seriously damage crowns and leaves of young plants. The race attacking rhubarb is the same one that attacks Oats and Onion.

Chemical control

No nematicides are approved for use on rhubarb.

Cultural control

High standard of cultivation and hygiene, good drainage and soil structure can reduce crop losses. Adequate crop rotations and the use of healthy planting material are essential. The nematodes can live in many common weeds so crops should be kept as weed-free as possible. Damaged crowns should be carefully removed and burnt. Only clean rootstocks should be used for propagation.

DISEASE CONTROL

Botrytis (*Botrytis cinerea*)

The most widespread and important disease of rhubarb. Moist conditions encourage the disease but vigorously growing petioles are resistant to infection. Symptoms can develop after harvesting as a result of wounding and moisture loss. Forced rhubarb can be seriously affected with reduced yield and quality as it affects the upper part of the petiole and leaf, encouraged by the moist conditions in the forcing shed.

Chemical control

No fungicides are approved for this disease on the outdoor crop but there is one SOLA for use on the forced crop. Fungicides should only be used when there is disease in the crop. Tissue damaged by pests could allow secondary infection by Botrytis.

Cultural control

The disease is favoured by high temperatures and high humidities. Good ventilation in forcing sheds should help minimise disease development. Crowns should be carefully handled during lifting and planting in forcing sheds to avoid damage to roots and buds which could allow entry by secondary pathogens. Removal of weak and damaged shoots during forcing, known as trashing, can reduce the incidence of Botrytis and the condition known as 'blacktop'. Careful handling of the harvested produce can reduce the incidence of this disease.

Minor diseases

Fortunately, Crown rot (*Erwinia rhapontici*), Violet root rot (*Helicobasidium purpureum*) and Honey fungus (*Armillaria mellea*) rarely affect rhubarb plantations, as there are no fungicides approved for their control. Downy Mildew (*Peronospora jaapiana*) can cause serious leaf damage and affect petiole quality. This has been observed in Norfolk in May/June in the past few seasons.

Cultural control

Avoid sites known to be infected and avoid using land that has recently grown susceptible crops. For most soil borne diseases the only option is to remove and burn infected crowns.

Weed Control

Weed infestations cause yield depression in rhubarb plantations, and when severe usually result in the grubbing of the field. Spot applications of contact herbicides may also be used to control perennial weeds.

Weeds are usually controlled using residual herbicides but some growers also rely on mechanical cultivation techniques. Growers of crowns for forcing prefer generally not to use herbicides in the first year after planting. Several products can only be used as spot applications avoiding contact with the crop.

APPROVED USES NOT INCLUDED ON THE PRODUCT LABEL

In many circumstances, particularly for minor crops, product labels do not include all of the approved uses and growers wishing to check the approval notice of a particular product should note that this information is available using the LIAISON® search accessible via their Red Tractor Farm Assurance home page after logging in.

A search on the Extension of Authorisation for minor use in the UK (formerly known as 'SOLAs') by crop or product name should yield a results page. A click on the product name should link to a summary of the approval information. Near the bottom of the summary is the specific off-label number (e.g. 0246/09) and this link will open up a pdf of the current EAMU document giving details of the extension of use.

IRRIGATION

Irrigation may be required to help establishment in newly planted plantations.

During early summer irrigation may be required to maintain vigour but should be applied according to soil moisture levels. Some growers are investing in trickle irrigation which allows fertigation so that fertilisers could be applied 'little and often' rather than as top dressings in the spring.

Irrigation will be required in dry summers to ensure that crowns grown for forcing reach the required size to maximise stick quality.

In the forcing sheds crowns will normally be irrigated weekly. The crop does not respond to excess irrigation, which only serves to increase relative humidity and encourage diseases.

HARVEST AND STORAGE

Rhubarb should be carefully pulled to avoid damage to the sticks and developing buds. Unduly heavy pulling weakens the crowns. Mechanised harvesting rigs are used to minimise lifting and carrying large quantities of rhubarb. Sticks with insect damage, disease, honeycombing or any discoloration should be discarded.

Harvesting staff should be trained to harvest and pack rhubarb so that shelf life is maximised.

Fresh Market:

Forced rhubarb should be picked very carefully due to the tender nature of the sticks. This allows later developing buds to produce good quality sticks and minimises unmarketable yield.

The sticks will normally be trimmed in the field or at the packhouse to remove most of the leaf and the stem base. Some leaf material is retained to reduce stick splitting.

Processing:

Rhubarb for processing is normally derived from main crop production during late May and June. The rhubarb is hand-picked and fully trimmed at both ends by completely removing the white heel at the base of the stick and all the leaf portion at the top. Produce is carefully packed into plastic boxes or tied firmly in bundles for delivery to the factory.

PRODUCE HANDLING AND PACKING

After trimming into boxes or plastic crates rhubarb will be placed in cold stores. This reduces field heat and extends shelf life.

Poor handling increases the risks of damage to the sticks and the development of bacterial soft rots and *Botrytis*.

RESIDUES AND CONTAMINANTS

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

The key targets are:

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

See Appendix for the pesticide targets and guidelines on this crop.



APPENDIX 1: TYPICAL APPLICATION RATES FOR MAJOR NUTRIENTS (KG/HA)

Nutrient (kg/ha)	Soil Index					
	0	1	2	3	4	4+
Nitrogen (N)	175	125	75	Nil	Nil	Nil
Phosphate(P ₂ O ₅)	175	150	120	100	50	Nil
Potash (K ₂ O)	250	225	200	150	125	Nil
Magnesium light soils other soils	90	60	Nil	Nil	Nil	Nil
	60	30	Nil	Nil	Nil	Nil

Notes:

Additional applications of nitrogen will be required in each year but should be targeted to previous crop growth and vigour of the plantation.

In the spring prior to forcing up to 400kg/ha N may be required, split as two or more top dressings. The timing of any applications must conform to rules to protect the environment from the risk of pollution.

APPENDIX 2: GUIDELINES ON MINIMISING PESTICIDE RESIDUES

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

Active ingredient	Target: pest, weed, disease	Current position	Suggested guidelines
dichlobenil,⁽¹⁾ glufosinate-ammonium, glyphosate, propyzamide	weeds	residues not found	Follow label instructions or SOLA
metaldehyde	pests	residues not found	Follow label instructions
iprodione	diseases	residues not found	Follow SOLA
metalaxyl-M + mancozeb	downy mildew	residues not found in survey, but there is a risk of residues due to the MRL	Follow SOLA

⁽¹⁾ This herbicide is no longer approved for rhubarb.

In 2013 the Pesticide Residues in Food Committee (PRiF) undertook a survey between January and March on rhubarb. Twenty one samples covering fresh, frozen, prepared and whole stems were tested for up to 322 pesticides. None of the 21 samples contained residues of those 322 pesticides sought. A second survey was also undertaken at the same time on tinned rhubarb. None of the 24 samples contained any pesticide residues. The survey was repeated in late summer 2013 but the results are not yet available.

Vigilance by growers will be required to maintain this situation.



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**Red Tractor
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Certification Bodies

Your routine point of contact with the Scheme is through your Certification Body.

Certification Bodies are licensed by Red Tractor to manage membership applications and to carry out assessment and certification against the Standards. The table below shows which Certification Bodies apply to each enterprise.

Certification Body	Beef and Lamb	Dairy	Combinable Crops and Sugar Beet	Fresh Produce	Pigs	Poultry
NSF	✓	✓	✓	✓	✓	✓
Kiwa PAI	✓	✓	✓	✓	✓	✓
SAI Global	✓	✓	✓	✓	✓	✓
SFQC	✓	✓	✓	✓		
NIFCC (Northern Ireland)		✓				✓
QWFC (Wales)		✓				



NSF Certification

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Fresh Produce Standards