

# STRAWBERRIES

## PHPS 5

### Special conditions for Strawberry certification: Foundation (F), Super Elite (SE), Elite (E), A, and Approved-Health (A-H) grades

## GRADES

Inspected for	Trueness to variety, health and vigour. <b>Note:</b> <i>Approved-Health</i> – health and vigour only.
Applications	To be made on form PHPS 6 by 1 May. A field plan must also be submitted with each application. Fera Plant Health and Seeds Inspectors require notification by 1 May of any stocks to be planted after this date where possible, although notifications after this date are acceptable, where at least 5 days notice (confirmed in writing) is given prior to inspection and the applicant has indicated prior to 1 May that such requests may be made.
Eligible material	<p><b>Foundation:</b> Any material which meets the requirements for Nuclear Stock as specified in PHPS 5 (NS), or any variety certified F1 or F2 in the previous year. Applications for any variety not listed in Appendix 2 must be accompanied by a varietal description.</p> <p><b>Super Elite:</b> Any variety certified at Foundation grade in the previous year.</p> <p><b>Elite:</b> Any variety certified at Foundation or Super Elite grade in the previous year.</p> <p><b>A:</b> Any variety certified at Foundation, Super Elite or Elite grade in the previous year.</p> <p><b>Note:</b> Material entering from other certification schemes must be tested for <i>Xanthomonas fragariae</i> (angular leaf spot) and <i>Xanthomonas arboricola pv. fragariae</i> (bacterial leaf blight) prior to planting.</p> <p><b>Approved-Health:</b> Any material, including plants produced directly from seed, providing it is not a variety listed in Appendix 2. All stocks (except plants produced directly from seed) entered for <i>Approved-Health</i> must be tested, prior to planting, for freedom from strawberry blackspot and <i>Xanthomonas fragariae</i> (angular leaf spot) and <i>Xanthomonas arboricola pv. fragariae</i> (bacterial leaf blight), unless parent plants were certified in the previous year.</p> <p>If a stock subsequently fails certification due to <i>Verticillium</i> wilt in excess of tolerance, it can enter certification the following year, without additional strawberry blackspot and <i>Xanthomonas</i> testing.</p> <p><b>Note:</b> Parent stock that has been produced by micropropagation must have been granted an appropriate micropropagation certificate. However, a certificate is not required for material entering at <i>Approved-Health</i>.</p>
Freedom from quarantine diseases	Crops must not be grown on land known to be infected with the following soil-borne diseases: Rhizomania, strawberry red core or verticillium wilt disease of hops or which is under notice for potato wart disease or potato cyst nematode.
Soil sampling	<b>Foundation and Super Elite:</b> Soil sampling of the proposed field and its boundary hedge is required for freedom from the soil living virus vector nematodes <i>Xiphinema diversicaudatum</i> (dagger nematode), <i>Longidorus attenuatus</i> , <i>L. elongatus</i> and <i>L. macrosoma</i> (needle nematodes), prior to the planting and entry of material for certification.



	<p>Applications should be made on form PHPS 2 as soon as the field to be used is known. For gauzehouse production of Foundation grade material, soil sampling is required every third year. Fields found to be infested cannot be used for planting unless one of the following requirements has been complied with:</p> <p>(a) the field must be treated with an approved soil fumigant; or</p> <p>(b) a soil bait test must be carried out for the relevant viruses. If the result is negative for virus, treatment with a soil fumigant will not be required. If virus is found, treatment will be required; or</p> <p>(c) the field may be left bare fallow with no weed covering for 1 year or more before a soil bait test and further action as at (b).</p> <p>No stock may be planted within 10 metres of any hedge found to be infested.</p> <p><b>Elite, A and Approved-Health:</b> Not required for free living nematodes.</p>
Rotation	<p>The site <b>must not</b> have been used to grow strawberries, potatoes or linseed in the previous 4 years.</p>
Isolation	<p>Stocks entered must be at least the distance shown from the following:</p> <p><b>Foundation</b>  Variety of the same grade, Super Elite and Elite: 3 metres  A grade: 50 metres  <i>Approved-Health</i> grade: 400 metres  Fruiting crop (including gardens): 1500 metres*</p> <p><b>Note:</b> Plants grown in non-aphid proof gauze houses, the isolation must be at least 1500 metres from fruiting crops and 400 metres from crops entered into the PHPS at <i>Approved-Health</i>.</p> <p><b>Super Elite</b>  Variety of same grade and Elite: 3 metres  A grade: 50 metres  <i>Approved-Health</i> grade 400 metres  Fruiting crop (including gardens): 1500 metres*  *grower to confirm compliance with isolation distance beyond 500 metres.</p> <p><b>Elite</b>  Variety of same grade and A grade: 3 metres  <i>Approved-Health</i> grade: 400 metres  Fruiting crop (including gardens): 500 metres</p> <p><b>A</b>  Variety of same grade: 3 metres.  <i>Approved-Health</i> grade: 10 metres  Fruiting crop (including gardens): 500 metres</p> <p><b>Approved-Health</b>  Variety of the same grade: 3 metres  Fruiting crop (including gardens): 500 metres.</p> <p><b>Note:</b> Isolation distances between stocks in aphid-proof structures (contact Fera Plant Health and Seeds Inspectors in advance of using such structures about additional requirements) and those outside can be reduced provided no strawberry fruiting, passporting or A-H stocks are grown adjacent to the structure and stocks grown within specified isolation distances are subject to stringent aphid control measures. All material grown in the structure must be entered in the PHPS; any A-H material must be grown in a separate cubicle or outside.</p>
Control of diseases	<p><b>Foundation grade:</b> Plants certified at the F1 generation will be sampled by Fera Plant Health and Seeds Inspectors and tested for freedom from red core, crown rot and strawberry blackspot.</p> <p><b>Approved-Health:</b> All stocks not approved at <i>Approved-Health</i> grade the previous year must be tested, prior to planting, for freedom from strawberry</p>

	<p>blackspot and <i>Xanthomonas fragariae</i> (angular leaf spot) and <i>Xanthomonas arboricola</i> pv. <i>fragariae</i> (bacterial leaf blight).</p> <p><b>All grades:</b> Fungicide treatments that could mask symptoms of red core and crown rot <b>must not</b> be used.</p>
Roguing	Limited roguing is permissible after inspection with prior approval of the Fera Plant Health and Seeds Inspectors provided that records are kept of stocks rogued and the reason for roguing i.e. pest, disease or impurity. Stocks may not be certified where records are not kept.
Gapping up	Gapping up is permissible providing that the material used is eligible. Material entered at Foundation grade will require the prior approval of Fera Plant Health and Seeds Inspectors. Growers must keep records of this procedure and make them available if requested to do so.
Number of inspections	<p><b>Foundation and Super Elite:</b> Three, normally during June, July and September.</p> <p><b>Elite, A and Approved-Health:</b> Two, normally during June and September. Growers will need to inform Fera Plant Health and Seeds Inspectors of any intention to lift runners early so that the two inspections can be carried out.</p>
Standards to be met	A summary of tolerances for pests and diseases is at Appendix 1.
Additional requirements for tip production	<p>Progeny must be inspected before removal from the mother plant. Two inspections are required for the mother plants. Following removal the tips must be maintained in discrete, identifiable batches.</p> <p>The height of the mother plants from the ground must not jeopardise the health and safety of inspectors; arrangements to be agreed locally with Fera Plant Health and Seeds Inspectors.</p> <p>There is no minimum spacing distance between stocks, but runners should be kept separate from neighbouring stocks to facilitate inspection and avoid mixing of varieties.</p> <p>For field tray plant production, the mother plants must have two inspections and the tips removed from the field should be inspected just before sale after rooting.</p> <p>For waiting bed production, one inspection of the original mother plants is required plus two inspections of the progeny plants re-planted back into the same area used for the mother plants. If any soil-borne diseases are found in the first inspection these areas are advised to be avoided during re-planting.</p> <p><b>(A grade and Approved-Health only):</b> Where tips are used to produce tray plants, such plants must reach sufficient size to enable the second inspection to be carried out adequately.</p>
Quarantine diseases	<p>Under, in England, the Plant Health (England) Order 2005, or in Wales, the Plant Health (Wales) Order 2006, growers who become aware of or suspect the presence of any quarantine disease on their premises must immediately notify their local Fera Plant Health and Seeds Inspector.</p> <p>Those relating to strawberries are: arabis mosaic virus, raspberry ringspot virus, red core disease, strawberry crinkle virus, strawberry latent ringspot virus, strawberry mild yellow edge virus, strawberry blackspot, tomato black ring virus and <i>Xanthomonas fragariae</i>.</p>
Validity of certificates	<p>Harvested runners from certified (approved as regards <i>Approved-Health</i>) crops may be described as certified/approved at the appropriate grade.</p> <p>Runners kept in cold store may be described as certified/approved until 31 July in the year after certification/approval.</p> <p>Runners not kept in cold store or subsequently potted up may be described as certified/approved until 31 May in the year after certification/approval.</p>

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## APPENDIX 1

## Summary of tolerances:

### Foundation and Super Elite grades

	First Inspection	Second Inspection	Third Inspection
Rogues	NIL	NIL	NIL
Virus disease symptoms: +Arabis mosaic virus +Raspberry ringspot virus +Tomato black ring virus +Strawberry crinkle virus +Strawberry latent ringspot virus +Strawberry mild yellow edge virus	NIL	NIL	NIL
Other virus diseases e.g. strawberry green petal phytoplasma	NIL	NIL	NIL
+Red core ( <i>Phytophthora fragariae</i> <i>var. fragariae</i> )	NIL	NIL	NIL
Crown rot ( <i>Phytophthora cactorum</i> )	NIL	NIL	NIL
++Verticillium wilt ( <i>Verticillium dahliae</i> )	NIL	NIL	NIL
+Strawberry blackspot ( <i>Colletotrichum acutatum</i> )	NIL	NIL	NIL
Stem eelworm ( <i>Ditylenchus dipsaci</i> )	NIL	NIL	NIL
Leaf eelworm ( <i>Aphelenchoides ritzemabosi</i> and <i>Aphelenchoides fragariae</i> )	NIL	NIL	NIL
+++ Strawberry tarsonemid mite ( <i>Phytonemus pallidus fragariae</i> )	NIL	NIL	NIL
Other pests and diseases including: mildew, aphids, capsid bugs, two spotted (red spider) mite, caterpillars	<b>Substantial freedom</b>		
Streaky yellows	NIL	NIL	NIL

+ These diseases are notifiable under, in England, the Plant Health (England) Order 2005, or in Wales, the Plant Health (Wales) Order 2006. Growers must inform Fera Plant Health and Seeds Inspectors if they suspect the presence of these diseases on their premises.

++ Where infection is present in discrete patches only, these may be rogued together with other plants within a one metre radius. For more substantial, scattered infection, the stock will be downgraded or failed.

+++ Where live mites are detected/confirmed by laboratory analysis, the affected plants must be rogued, plus those within a 2 metre radius. If suspect plants only occur in one discrete patch then this may be removed, plus a 2 metre boundary around it. The whole stock must immediately be treated with a chemical spray programme for the rest of the season. The programme should commence as soon as possible after notification by Fera Plant Health and Seeds Inspectors.

A maximum of 4 inspections are permitted – if more than 0.2% of plants show symptoms or live mites are confirmed at the 4th inspection, the stock will be failed.

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## Summary of tolerances: Elite, 'A' & *Approved-Health* grades

APPENDIX 1  
(continued)

	Elite		'A' & 'A-H'	
	First Inspection	Second Inspection	First Inspection	Second Inspection
Rogues	<b>NIL</b>	<b>NIL</b>	<b>0.5%</b>	<b>0.5%</b>
Virus disease symptoms: +Arabis mosaic virus +Raspberry ringspot virus +Tomato black ring virus +Strawberry crinkle virus +Strawberry latent ringspot virus +Strawberry mild yellow edge virus	<b>NIL</b>	<b>NIL</b>	<b>NIL</b>	<b>NIL</b>
Other virus diseases e.g. strawberry green petal phytoplasma	<b>0.2%</b>	<b>0.2%</b>	<b>5%</b>	<b>5%</b>
+Red core ( <i>Phytophthora fragariae</i> <i>var. fragariae</i> )	<b>NIL</b>	<b>NIL</b>	<b>NIL</b>	<b>NIL</b>
Crown rot ( <i>Phytophthora cactorum</i> )	<b>NIL</b>	<b>NIL</b>	<b>0.5%</b>	<b>0.5%</b>
++Verticillium wilt ( <i>Verticillium dahliae</i> )	<b>5%</b>	<b>5%</b>	<b>5%</b>	<b>5%</b>
+Strawberry blackspot ( <i>Colletotrichum acutatum</i> )	<b>NIL</b>	<b>NIL</b>	<b>NIL</b>	<b>NIL</b>
Stem eelworm ( <i>Ditylenchus dipsaci</i> )	<b>0.5%</b>	<b>0.5%</b>	<b>2%</b>	<b>2%</b>
Leaf eelworm ( <i>Aphelenchoides ritzemabosi</i> and <i>Aphelenchoides fragariae</i> )	<b>NIL</b>	<b>NIL</b>	<b>2%</b>	<b>2%</b>
+++Strawberry tarsonemid mite ( <i>Phytonemus pallidus fragariae</i> )	<b>NIL</b>	<b>NIL</b>	<b>NIL</b>	<b>NIL</b>
Other pests and diseases including: mildew, aphids, capsid bugs, two spotted (red spider) mite, caterpillars	<b>Substantial freedom</b>			
Streaky yellows	<b>0.5%</b>	<b>0.5%</b>	<b>0.5%</b>	<b>0.5%</b>

+ These diseases are notifiable under, in England, the Plant Health (England) Order 2005, or in Wales, the Plant Health (Wales) Order 2006. Growers must inform Fera Plant Health and Seeds Inspectors if they suspect the presence of these diseases on their premises.

++ Where infection is present in discrete patches only, these may be rogued together with other plants within a one metre radius. For more substantial, scattered infection, the stock will be downgraded or failed.

+++ Where live mites are detected/confirmed by laboratory analysis, the affected plants must be rogued, plus those within a 2 metre radius. If suspect plants only occur in one discrete patch then this may be removed, plus a 2 metre boundary around it. The whole stock must immediately be treated with a chemical spray programme for the rest of the season. The programme should commence as soon as possible after notification by Fera Plant Health and Seeds Inspectors.

A maximum of 4 inspections are permitted – if more than 0.2% of plants show symptoms or live mites are confirmed at the 4th inspection, the stock will be failed.

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List of varieties which will be ineligible for entry at Approved-Health grade (2009 update)

Alice	Flamenco	Pegasus
Aromel	Florence	Red Gauntlet
Calypso	Hapil	Rosie
Cambridge Favourite	Honeye	Royal Sovereign
Christine	Judibell (EM965)	Salsa
Delia (EM385)	Korona	Sophie
Elsanta	Mae	Symphony
Emily	Marshmello	
Eros	Pandora	

## *Xanthomonas Fragariae* and Strawberry Blackspot Sampling and Testing

Testing of A-H stocks derived from non-certified parent material entered into PHPS for the first time and other countries' certified material being entered into PHPS requiring *Xanthomonas* and Blackspot testing (see equivalence table at [www.defra.gov.uk/fera/plants/plantHealth/documents/strawberry.pdf](http://www.defra.gov.uk/fera/plants/plantHealth/documents/strawberry.pdf)).

<p>Sample Size</p>	<p>When sampling a variety or stock comprising less than 300 plants the samples for each of the blackspot (<i>Colletotricum acutatum</i>) and <i>Xanthomonas fragariae</i> test should consist of 300 petioles with at least one petiole taken from each plant within the variety/stock.</p> <p>For stocks of less than 300 plants where the plants are also very small one sample may be submitted for both tests, however this must be verified as acceptable with the testing laboratory and Fera Plant Health and Seeds Inspectors. In this case the sample submitted should clearly state that both tests are to be conducted on the one sample.</p> <p>For larger consignments of more than 300 plants the samples for each of blackspot and <i>Xanthomonas</i> testing should consist of 300 petioles for each test taken from throughout the consignment to be representative of that consignment.</p> <p>Where stock size permits the sample for <i>Xanthomonas</i> testing should consist of crowns in preference to petioles. When sampling crowns roots should be removed from the sampled plants and the remainder of the plant submitted for testing.</p> <p>Sampling of 300 plants per variety/stock will give a detection level of 1% or more infection at 95% confidence.</p>
<p>Sample Protocol</p>	<p>From each plant sampled, one oldest living petiole base should be removed, discarding all but the bottom 3cm such that the sample includes the two stipules at the base of the petiole. (The upper portion of the petiole and the leaf lamina can be discarded except for small stocks consisting of small plants where only one sample is being submitted).</p> <p>A second petiole base should be similarly sampled from the base of the plant for submission for <i>Xanthomonas</i> testing. This may (but need not necessarily) be from the same plant as that from which the blackspot sample was taken. Where stock size permits the sample for <i>Xanthomonas</i> testing should consist of crowns in preference to petioles.</p> <p>Wherever possible the sampling procedure should be undertaken or overseen by an official of the statutory authorising authority, but could be by an employee of a laboratory recognised to ISO 9001 standard by UKCAS.</p> <p>Good laboratory practice and hygiene measures must be employed throughout the sampling and dispatch of the samples. Material should be sampled with a new set of disposable gloves used for each sample.</p> <p>Any equipment used in the sampling process should be disinfected between samples. New sampling bags should be used for each sample. All sample bags should be clearly labelled stating sampling date and variety. Records of sample numbers dates and varieties should be maintained by the sampler.</p> <p>For packing avoid polythene wrapping and send sample to the laboratory within 24 hours to reduce problems with growth of saprophytic organisms. Where a sample is stored prior to dispatch this should be held in a fridge at around 4°C.</p> <p>The submitted samples should be tested using the validated EPPO protocol PM 7/25 for <i>Glomerella acutata</i> (<i>Colletotrichum acutatum</i>) and protocol PM 7/65 (1) for <i>Xanthomonas fragariae</i>. When testing for <i>Xanthomonas fragariae</i>, the preference for the molecular test is for a real time PCR test to be used, rather than a conventional PCR.</p> <p>Stocks will be considered positive by a presumptive diagnosis for <i>Xanthomonas fragariae</i> if both a positive serological test (IF or ELISA) AND a positive molecular test (PCR or RT-PCR) are obtained.</p> <p>Sampled stocks should not be planted or entered into the PHPS until the test results have been confirmed negative. There should be a negative test result for both a serological test (IF or Elisa) and a negative molecular test (PCR or Real time PCR). The full results and test methods used must be made available to the Fera Plant Health and Seeds Inspectors prior to inspection within the scheme.</p>