



Department
for Environment
Food & Rural Affairs

Pest specific plant health response plan:

Outbreaks of *Ralstonia solanacearum* (bacterial wilt of tomato) in tomato crops



Figure 1. Tomato plant infected with *Ralstonia solanacearum*, displaying wilt symptoms in a glasshouse (Image courtesy of Gilles Cellier via EPPO Global database [Ralstonia solanacearum \(RALSSL\)\[Photos\]](https://gd.eppo.int/taxa/Ralstonia_solanacearum/RALSSL/Photos) | [EPPO Global Database](https://gd.eppo.int)).

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This contingency plan takes into account the environmental principles laid out in the [Environment Act 2021](#). Of particular relevance are:

The prevention principle, which means that any policy or action taken, or not taken should aim to prevent environmental harm.

The precautionary principle, which assists the decision-making process where there is a lack of scientific certainty.

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Executive summary

Background	
Regulation	GB Quarantine Pest
Key Hosts	Tomatoes, potatoes and other solanaceous plants
Distribution (Appendix A)	Widespread in South America, now present in regions of Africa, Asia, Europe and Oceania
Key pathways	Contaminated irrigation water, infected seedlings and contaminated seed
Industries at risk	Tomato production industries
Symptoms (2.4)*	• Leaves and shoots can wilt, particularly during the warmest part of the day • After severe wilting, plants can fail to recover leading to necrosis and mortality • When stems are cut, a bacterial ooze can be observed alongside discoloration of the vascular tissue
Surveillance	
Demarcated zones (5.40-5.45)	• Established based on the identification of infested and probably infested plants, other material, and the potential for spread
Surveillance activities (5.18, 5.40)	• Visual surveillance of crops, testing of symptomatic plants and water sampling will be carried out to guide future surveillance and designation of infested and probably infested plants, places of production, watercourses and other premises handling tomatoes, machinery, vehicles, vessels, stores and any other objects including packaging material
Response measures	
Interceptions (5.1-5.10)	• The consignment should be destroyed if <i>R. solanacearum</i> is confirmed • Contaminated vehicles, equipment etc., should be cleansed and disinfected • Tracing exercises should be carried out where required • A notification through the UK Plant Health Interception Notification System should be made
Outbreaks (5.46-5.67)	• Destruction of growing plants • Contaminated production sites, vehicles, equipment etc., should be cleansed and disinfected • Volunteer hosts should be controlled • Irrigation restrictions
Key control measures	
Biological	N/A
Chemical	Herbicide applications
Cultural	Cleaning of contaminated equipment and machinery, removal and destruction of infected plants and waste. Prohibiting use of contaminated water courses for irrigation or spraying.
Declaration of eradication	
The length of time to declare eradication varies between at least one year and at least 4 years depending on if growing media can be removed. See section 6.1.	

*Numbers refer to relevant points in the plan

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Glossary of terms (from ISPM 5)

Place of production - Any premises or collection of fields operated as a single production or farming unit.

Production site - A defined part of a place of production, that is managed as a separate unit for phytosanitary purposes.

1. Introduction and scope

- 1.1. This pest specific response plan has been prepared by the Defra Risk and Horizon Scanning team. It describes how the Plant Health Service for England will respond if an outbreak of *Ralstonia solanacearum* is discovered in a tomato crop, causing bacterial wilt of tomato. A separate plan is available outlining the response plan for outbreaks of *R. solanacearum* in potato crops.
- 1.2. The plant health authorities in Scotland, Northern Ireland, Wales and the Crown dependencies have been consulted on this plan and will use it as the basis for the action they will take in the event of *R. solanacearum* being detected in a tomato crop in their territories.
- 1.3. This document will be used in conjunction with the Defra Generic Contingency Plan for Plant Health in England (<https://planthealthportal.defra.gov.uk/pests-and-diseases/contingency-planning/>), which gives details of the teams and organisations involved in pest response in England, and their responsibilities and governance. It also describes how these teams and organisations work together in the event of an outbreak of a plant health pest.
- 1.4. The aims of this response plan are to facilitate the eradication of *R. solanacearum* in a tomato crop and to make stakeholders aware of the planned actions.

2. Summary of the threat

- 2.1. *Ralstonia solanacearum* can persist in both the soil and water, it is a Gram-negative, motile bacterium which has been shown to infect a wide range of both cultivated and wild hosts. Hosts of particular economic importance to the UK are solanaceous crops such as tomato, potato and peppers (EPPO 2025b).
- 2.2. This plan focuses on *R. solanacearum sensu stricto* the causal agent of bacterial wilt of tomato and is based on the EPPO Standard on national regulatory control system for *R. solanacearum* (EPPO 2023). Measures outlined in this plan could be used as the basis to control other species, in particular *R. pseudosolanacearum* in tomato which has become more prevalent within Europe in recent years (EPPO 2025a). Previously *R. solanacearum* was subdivided into four Phylotypes which sat within the wider *R. solanacearum* species complex (RSSC) (Fegan & Prior 2005). Subsequent reclassification resulted in the replacement of the four Phylotypes with three species: *R. solanacearum* (previously Phylotype II), *R. pseudosolanacearum* (previously Phylotype I and III) and *R. syzygii* (Phylotype IV) (Safni *et al.*, 2014).
- 2.3. *Ralstonia solanacearum* is thought to have originated in Central and South America, which is where the largest diversity of genotypes is present (EPPO

2025b). *Ralstonia solanacearum* is present in certain watercourses in England and as the bacterium can spread through surface water, restrictions are in place on irrigation from waterways which are under official control. More details on specific watercourses can be found on: <https://www.gov.uk/guidance/plant-health-controls#potato-brown-rot>. Isolated outbreaks of *R. solanacearum* have occurred in ware potato crops in England between 1992 and 2010, as well as an outbreak in tomato crops in two adjacent glasshouses in 1997 and 1998 (EPPO 1997). The outbreak in tomato and all but one in potato were caused by the irrigation of crops with contaminated river water. The most recent outbreak in potato in 2010, was caused by importing infected seed potatoes (Allen & Lindley-Klassen 2023).

- 2.4. *Ralstonia solanacearum* can be spread unintentionally, because of latent infections. Symptoms in tomato plants commence with the wilting of young leaves and shoots, particularly during the warmest part of the day, although plants may show recovery at night (EFSA 2019a, EFSA 2019b, EPPO 2025b). In cooler climatic conditions symptoms will initially appear to be less severe, tomato plants may appear stunted and produce adventitious roots (EFSA 2019b, EPPO 2025b). However, if severe wilting occurs, plants can fail to recover leading to necrosis and mortality. When stems are cut a bacterial ooze can be observed alongside discoloration of the vascular tissue (EFSA 2019a).
- 2.5. The bacterium can be spread by infected vegetative propagating material of host plants which span many food crops and ornamental species (see Appendix A for a full host list). This is especially problematic for unintentional spread as infections in some ornamental species, such as *Rosa* sp. can be asymptomatic (Blom *et al.*, 2024). Another pathway for entry is through the release of contaminated processing and wash water of imported infected produce into watercourses. The population of *R. solanacearum* can be sustained on wild hosts which grow on riverbanks such as *Solanum dulcamara* (bittersweet or woody nightshade), these act as a continuing source of contamination in the water. If water from contaminated watercourses is used for irrigation, or for spraying susceptible crops, outbreaks can occur. Historically, this has been the main cause of outbreaks in England as, once *R. solanacearum* has contaminated a watercourse with wild hosts present, eradication is extremely difficult. Therefore, irrigation and spraying with water from watercourses designated as contaminated is officially prohibited, unless a validated method for obtaining pathogen-free water is used and licensed by the Animal & Plant Health Agency (APHA). Irrigation of seed potato crops will not be permitted regardless of any measures taken (Elphinstone & Matthews-Berry 2017).

3. Risk assessments

- 3.1. *Ralstonia solanacearum* has unmitigated and mitigated UK Plant Health Risk Register (UKPHRR) scores of 100 and 30, respectively. Overall scores range from 1 (very low risk) to 125 (very high risk). These scores are reviewed as and when new information becomes available (<https://planthealthportal.defra.gov.uk/pests-and-diseases/uk-plant-health-risk-register/viewPestRisks.cfm?cslref=11066>).
- 3.2. The UKPHRR rates the impact of the bacterium to the UK to be very high.
- 3.3. The European Food Safety Authority (EFSA) published a scientific opinion on the pest categorisation of the RSSC in 2019, which concluded that losses due to the RSSC would be extremely high if epidemics were to occur in the EU (EFSA 2019b). EFSA noted that this is likely the case for all phylotypes/species within the complex.
- 3.4. *Ralstonia solanacearum* is on the EPPO A2 list and is therefore recommended for regulation by EPPO member countries.

4. Actions to prevent outbreaks

- 4.1. *Ralstonia solanacearum* is a GB Quarantine Pest listed in [Annex 2](#) part B of [the GB Phytosanitary Conditions Regulations 2019/2072](#), and is therefore prohibited from being introduced into, moved within or held, multiplied or released into GB. Further pest and host specific requirements are listed in [Annex 6](#), [Annex 7](#) and [Annex 8](#). *Ralstonia pseudosolanacearum* and *R. syzygii* (as *R. syzygii* subsp. *celebesensis* and *R. syzygii* subsp. *indonesiensis*) are also listed as GB Quarantine Pests in [Annex 2](#) Part A of [2019/2072](#).
- 4.2. As *R. solanacearum* is present in some UK watercourses the restrictions mentioned in 2.3 and continuing surveillance on tomato, potato and surface water also helps to prevent outbreaks. This surveillance is performed using a risk-based approach to provide assurance the whole production system is pest free.
- 4.3. The Plant Health Service for England (including APHA, Defra and Fera Science Ltd.) should be aware of the measures described in this plan and be trained in responding to an outbreak of *R. solanacearum*. It is important that capabilities in detection, diagnosis, and risk management are available.

5. Response

Official action to be taken following the suspicion of an interception of *R. solanacearum*

- 5.1. If *R. solanacearum* is suspected by the Plant Health and Seeds Inspectorate (PHSI) to be present in a consignment moving in trade, the PHSI must hold the consignment until a diagnosis is made. Any opened containers should be resealed. Other consignments that are at risk of cross-contamination should also be held prior to a risk assessment on whether cross-contamination has or could have potentially occurred. Samples should be sent by the PHSI immediately to Fera Science Ltd., Plant Clinic, York Biotech Campus, Sand Hutton, York, YO41 1LZ (0300 100 0323) in a sealed bag or container, within at least two other layers of containment, which are not liable to be crushed during transit.
- 5.2. Screening tests for *R. solanacearum* include isolation, or molecular tests in line with EPPOs PM 7/21 (3) Diagnostic Standard (EPPO 2022b). Fera Science Ltd. will inform Defra of any suspicious test results. Subsequent tests to confirm the identity of *R. solanacearum* will be performed which can include Fatty Acid Profile analysis, molecular tests, DNA barcoding, and Matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALDI-TOF). The diagnostic standard presents a detailed flow diagram describing the diagnostic procedure, although it is important to note that when two tests are required at a given stage these should be based on different biological principles or target different parts of the genome.
- 5.3. All other material, not including consignments which may have become cross contaminated in 5.1, that has had contact with the suspected consignment, such as equipment, vehicles, machinery, storage facilities and washings, could be contaminated and should be designated as infested until testing has been completed.

Official action to be taken following the confirmation of an interception of *R. solanacearum*

- 5.4. When infection with *R. solanacearum* is confirmed, the PHSI should advise the client of the action that needs to be taken by way of an official plant health notice.
- 5.5. The consignment should be destroyed by either incineration, deep burial or one of the other methods described in point 5.53. If it is not possible to organise destruction via one of these methods, a suitable alternative should be discussed with the Defra Risk and Horizon Scanning team.

- 5.6. Contaminated materials, such as equipment, vehicles, machinery, storage facilities and washings should be disinfected as in point 5.54.
- 5.7. An UKPHINS (UK Plant Health Interception Notification System) notification should be made upon confirmation of an interception of *R. solanacearum*. UKPHINS is the IT system for recording findings and non-compliance to maintain records and to notify other National Plant Protection Organisations (NPPOs) of plant health issues.
- 5.8. If all or part of the consignment has not been held and has been distributed to other premises prior to diagnosis, trace forward and trace back inspections should take place upon suspicion or confirmation of *R. solanacearum*. Details of recent past and future consignments from the same grower/supplier should also be obtained and a decision on action taken on a case-by-case basis.

Official action to be taken following the suspicion of a *R. solanacearum* outbreak

- 5.9. Suspected outbreaks will be assessed on a case-by-case basis. An Outbreak Triage Group (OTG), chaired by the Chief Plant Health Officer (CPHO) or their deputy, including specialists from APHA, Defra and other organisations, should be set up to assess the risk and decide on a suitable response. Where appropriate, the OTG will also decide who will be the control authority (the lead organisation responsible for the eradication or containment of the pest), and the control authority will then nominate an Incident Controller. For an outbreak of *R. solanacearum* in tomato crops, APHA will likely be the control authority. An Incident Management Team (IMT) meeting, chaired by the Incident Controller, will subsequently convene to produce an Incident Action Plan (IAP) to outline the operational plan. See the [Defra Generic Contingency Plan for Plant Health in England](#) for full details.
- 5.10. The OTG will determine an alert status, which will consider the specific nature of the outbreak. The alert levels, in order of increasing severity, are white, black, amber and red (more detail on these levels can be found in table 2 of the [Defra Generic Contingency Plan for Plant Health in England](#)). Under most scenarios, an outbreak of *R. solanacearum* in a tomato crop is likely to be given a black alert status. A black alert status refers to a plant pest/disease with potential for limited geographical spread leading to moderate economic, environmental or social impacts. However, this could be upgraded to an amber alert status (extensive geographic spread) depending on the extent of spread and situation.
- 5.11. A factsheet to raise awareness of *R. solanacearum* and its symptoms should be distributed to packers/processors and importers and displayed at public locations, nearby to the infested site and other areas at risk. The factsheet should be distributed to residential addresses nearby to the outbreak site, if it is deemed likely

that hosts of *R. solanacearum* could be growing in residential gardens. Confidential information about the location of the infestation will not be released. The current factsheet along with a guide to irrigating to reduce the risk of *R. solanacearum* can be found on the plant health portal - <https://planthealthportal.defra.gov.uk/pests-and-diseases/pest-and-disease-factsheets/notifiable-diseases/>.

Restrictions on the movement of material, equipment and machinery to and from the place of production

- 5.12. *Ralstonia solanacearum* can be associated with several plant species, although the focus of this plan is on tomato crops. Therefore infected, or potentially infected plants or fruit should be restricted from leaving the production site, except when they are being sent for disposal. The material mentioned above may also be moved under exceptional circumstances under notice in consultation with the Defra Risk and Horizon Scanning team, provided there is no identifiable risk of *R. solanacearum* spreading.
- 5.13. *Ralstonia solanacearum* is frequently spread by surface water, which can include processing waste of produce, therefore particular care needs to be taken into identifying potential movement pathways in contaminated water. On suspicion of presence of *R. solanacearum* in a watercourse, the use of surface water for irrigation or spraying of host plants should be prohibited. The movement of material, equipment, vehicles and machinery should also be restricted to prevent the movement of the bacterium to non-infected areas. However, if movement is necessary, the material, equipment, vehicles and machinery should be thoroughly cleansed and disinfected at the designated outbreak site to eliminate the bacterium as in points 5.52 – 5.54, again with a particular focus on any wastewater produced.
- 5.14. Movement of personnel into and out of the affected production site poses a risk of spread, as *R. solanacearum* can be transferred on clothing, footwear and possessions. Personnel should therefore be briefed on the importance of good hygiene practice to reduce the risk of spread, and movement into the affected production site should be minimised as best as possible.

General biosecurity advice and advisory measures for growers

- 5.15. To prevent the water borne, soil borne or mechanical transfer of *R. solanacearum* in tomato crops, hygiene best practice should be followed as below:
- Training staff to identify symptoms of *R. solanacearum*.
 - Using disposable PPE (including overshoes), which will be destroyed after working on a contaminated production site, or which should only be used in the contaminated area. If disposable overshoes are not practical, footwear

should be cleaned and disinfected before leaving the contaminated area. Using disposable gloves that can be destroyed following work on a particular crop, between different areas within a crop, or between plants, or only used in the contaminated area.

- Avoid using the same equipment and machinery when growing, packing or processing, particularly from different growers, as there is a higher risk of cross-contamination.
- The fewer people entering a particular production site, the less chance of spread of *R. solanacearum*. Only trained staff should be able to access restricted areas, and there should be a sign in/sign out sheet to record movements.
- Wherever possible during work shifts, uninfected areas should be worked in first before finishing in areas that could potentially be infected. There should be no movement between infected crops and those assumed to be uninfected.
- Maintain up-to-date records of cleansing and disinfection.
- Surrounding native vegetation may act as reservoirs for *R. solanacearum*. Controlling these plants reduces the chance of the crop becoming infected and reduces survival and persistence in the event of an outbreak. Vegetation can be controlled mechanically (e.g. by hoeing, roguing, flame weeding) and chemically (e.g. using plant protection products). Any disposal required should be as in point 5.53.

Preliminary trace forward / trace backward

- 5.16. Information obtained on the origins of suspected infected consignments should be used to locate other related and therefore potentially infected consignments. The NPPO of the exporting country should be contacted, and delivery notes requested upon confirmation of *R. solanacearum*. If material which is suspected as infected with *R. solanacearum* presents a risk to another country, the NPPO of that country should be informed.
- 5.17. In addition to tracing investigations relating to consignments, trace forward/back investigations linked to equipment, vehicles and machinery used in the infected production site should be carried out.

Confirming a new outbreak

How to survey to determine whether there is an outbreak

5.18. Information to be gathered by the PHSI on suspicion of an outbreak of *R. solanacearum*, in accordance with ISPM 6 guidelines for surveillance (<https://www.ippc.int/en/publications/615/>) includes:

- The origin of the host plants and associated pathways.
- Details of other premises or destinations where the host plants/products have been sent, where *R. solanacearum* may be present.
- The layout of the premises and surrounding area (in relation to potential demarcated areas), including a map of the production site, at-risk growers, and details of neighbouring crops, especially any commercial or non-commercial hosts in fields, allotments, gardens or glasshouses.
- Details of the host variety, growth stage and any other relevant information.
- Details of all tomato crops on site, particularly those from the same source as the infected plants or which share an irrigation source.
- Area and level of infection, including a description of symptoms (photos should be taken).
- The locations where *R. solanacearum* has been detected, including grid references and glasshouse description.
- The date and time the sample was taken, how it was identified and by whom.
- Current treatments/controls in place e.g. chemical treatments.
- Details of the movement of people, equipment, machinery etc. to and from the infected area, and the associated premises.
- Cultural, biosecurity and working practices.
- The name, address, email and telephone number of the person who found the pest and/or its symptoms, and the business owner/person responsible for the infected premise and crops/consignments.

5.19. Due to the nature of *R. solanacearum*, additional investigation may be required of:

- Places/sites of production using common sources of surface water for spraying or irrigation, or flooded, from a source suspected or confirmed to be contaminated.
- The source of water used for such irrigation (river, lake, reservoir, canal etc.).

5.20. This information should be included on the plant pest investigation template.

5.21. Further to information gathering, samples of other potentially infected plants should be taken to confirm the extent of the infection e.g. in associated glasshouses or fields. This initial survey will be used to determine if it is an isolated finding or an established outbreak.

5.22. Finance for the surveys will depend on the individual circumstances of the outbreak, and will be subject to discussion, usually between Defra policy and the PHSI.

5.23. The PHSI carry out annual monitoring of watercourses for *R. solanacearum*. The following section refers to sampling on suspicion and in the event of an outbreak.

Tomato plant sampling

5.24. Before commencing inspection change into new disposable overalls, overshoes and gloves before entering any production areas. If the site has more than one glasshouse to be inspected, then these may need to be changed for new ones between houses.

5.25. Only take essential sampling equipment onto site i.e. new sample bags, tubes, marker pen, clean hand lens, secateurs/knife and sterilising wipes.

5.26. Tomato plants should ideally be at peak vegetative growth when surveyed, this is typically in early flowering, when plants have developed a substantial canopy (IPPC 2023). However, during an outbreak situation this may not always be possible. To increase the chances of observing symptoms surveys should be performed during the hottest part of the day.

5.27. Samples should include the crown and stem, and, if practical and plants are small enough, the entire plant including roots and fruit could be sent as a sample (IPPC 2023). Each sample should be labelled with full details of sample number, location, variety etc.

5.28. If multiple plants are displaying suspect symptoms of *R. solanacearum* multiple samples should be taken which cover the range of symptoms observed, although material which is dead or completely desiccated should not be sampled. Gloves should be changed or sanitised between plants alongside sanitisation of secateurs/knives.

- 5.29. Ensure that samples are packaged in three layers of containment (two inner & one outer) to protect sample integrity and meet requirements of the scientific authorisation. Samples are to arrive at the laboratory as quickly as is practicably possible following sampling to limit deterioration in transit and support an accurate diagnosis.

Water Sampling

- 5.30. Instructions for taking water samples near to and within tomato production sites:
- In both flowing and non-flowing water bodies samples should be taken near host plants (e.g. *Solanum dulcamara*) if present.
 - For rivers, water should be collected from flowing water, not stagnant water, and using a sterile water bottle.
 - Collection can be achieved by throwing the bottle attached to a weighted soil basket in on a rope or telescopic rod. Ideally water samples should be 500 ml and collected from the middle of the watercourse if no host plants are identified, and from a depth of approximately 30 cm. If a bucket is used to collect a larger sample, then disinfection should be carried out between sampling points. A label should be attached to the sample bottle detailing the sample ID, inspector, sampling date, sampling point description, grid reference and water temperature.
 - Although outbreaks would be less likely in hydroponics, if a suspected outbreak is in a hydroponic crop, water and growing media samples should be taken from the growing solution. Similarly, if water is collected and stored for irrigation purposes at the production site, water samples should be taken
 - Water samples are to be sent to Fera Science Ltd. using guaranteed next day delivery. It is preferable for samples to arrive before 12 noon the day following sampling. Any samples arriving more than 24 hours after sampling will not be tested as results would be unreliable.

Diagnostic procedures

- 5.31. Identification of *R. solanacearum* is carried out in line with [Commission Implementing Regulation \(EU\) 2022/1193](#) (EU 2022) and following additional guidelines given in the EPPO Diagnostic Protocol PM7/21 (3) (EPPO 2022b).
- 5.32. At Fera Science Ltd., screening is routinely carried out by selective plating on semi-selective mSMSA medium. Where colonies with typical morphology are isolated, two identification tests are utilised to confirm detection and identification. Two

TaqMan real-time PCR assays are routinely utilised for identification. The first of which uses real-time PCR primers and probes RS-I-F, RS-II-R and RSP-55T which target specific 16S rRNA gene sequences conserved within all members of the *R. solanacearum* species complex. This provides a first indication of whether the isolate is a member of the *R. solanacearum* species complex. If the first test is positive then a second assay uses Real-time PCR primers and probes B2-I-F, B2-II-R and B2-P which target specific prophage sequence specific to strains of *R. solanacearum* Phylotype IIB-1 (race 3, biovar 2). These two sets of primers target two different parts of the genome as recommended in PM7/21 (3). If both assays provide positive results, the isolate is identified as *R. solanacearum* (this result will be supplemented by a phylotyping PCR in line with EU legislation). If the *R. solanacearum* assay provides a positive result and the biovar 2 assay a negative result, then a phylotyping PCR is carried out to determine species.

It is possible to utilise the RS TaqMan assay described above as an initial rapid screening test of symptomatic material or processed asymptomatic samples. This approach may be taken where initial results are under significant time pressure. A positive result would provide a first indication that a member of the RSSC was detected. Isolation would then be attempted to allow identification and confirmation of pathogenicity.

- 5.33. A pure culture of the isolate can be subjected to additional identification tests which could include matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALDI-TOF), Fatty Acid Profile analysis or DNA barcoding. As these analyses require a pure culture, results will take 5 to 10 days.
- 5.34. In EPPO's diagnostic protocol it is also recommended that a pathogenicity test is performed in critical cases. The definition of critical cases are described in PM 7/76 (6) Use of EPPO Diagnostic Standards where additional confidence in the outcome of the diagnosis will be required (EPPO 2024a). These are when i) detection of a pest in an area where it is not known to occur, ii) cases where a pest is identified by a laboratory for the first time and iii) detection of a pest in a consignment originating in a country where the pest is declared to be absent. Pathogenicity tests can be performed by Fera Science Ltd. using a host plant species (for example: *Solanum lycopersicum*) and can confirm pathogenicity of the isolate if Koch's postulates are met by reisolating *R. solanacearum* from test plants which are displaying wilt and flaccidity symptoms.

Criteria for determining an outbreak

- 5.35. If *R. solanacearum* is detected at a location other than at a port or confined to a particular consignment or watercourse with no risk of spread, then an outbreak should be declared. For example, if it is identified in a tomato crop, then this would

be classified as an outbreak. However, if it is restricted to recently imported tomatoes within a cold store, tomato seedlings or plantlets awaiting movement to a production site then this would be classified as an interception. If only symptoms are found, then the outbreak should be treated as suspected until it is confirmed by testing.

Official action to be taken following the confirmation of an outbreak

5.36. The scale of the outbreak will determine the size and nature of the IMT and action.

Communication

5.37. The IMT (and LGD as appropriate) will assess the risks and communicate details to the IPPC and EPPO, in accordance with ISPM 17: pest reporting (<https://www.ippc.int/en/publications/606/>), as well as to Defra Ministers, senior officials, devolved governments, and other government departments and agencies (e.g., the Environment Agency) on a regular basis as appropriate; and to stakeholders. This process will be coordinated by the Defra International Plant Health Policy team.

5.38. If there is a risk of contaminated tomatoes coming from, moving into another country or moving internally within the UK, the country should be informed of the relevant details.

5.39. A generic communications plan is available for use across all plant health outbreaks. This is owned by APHA and FC communications teams and is intended to provide consistency across outbreaks. This plan can be tailored to the outbreak, using pest and outbreak specific information. It includes a list of key stakeholders and templates for:

- Core narratives
- Press releases
- Reactive lines
- Frequently asked questions

Surveillance and demarcated zones

5.40. In line with section 3 of EPPO Standard PM 9/3 (3) ([EPPO Standards on national regulatory control systems](#)) (EPPO 2023), designate as **infested** the plants or fruit, consignment and/or lot, the waste (e.g. soil, growing media, processing waste) from

the infested lot, and the machinery, vehicle, vessel, store, watercourses or units thereof, and any other objects including packaging material, from which the sample was taken, and, where appropriate, the place(s) of production from which the lot was grown. This is akin to the **infested zone** in the generic contingency plan.

5.41. In line with section 3 of EPPO Standard PM 9/3 (3) (EPPO 2023), designate the extent of **probable infestation** as the following, which is akin to the **buffer zone** in the generic contingency plan:

- Plants or fruit grown at a **place of production** designated as infested.
- **Places of production** with some production link to the plants or fruit designated as infested, including those sharing production equipment, irrigation water and facilities directly or through a common contractor.
- Plants or fruit produced in the place(s) of production referred to in the previous bullet point, or present in such place(s) of production during the period when the plants or fruit designated as infested were present on the place of production referred to in the first bullet point.
- Premises handling tomatoes from the places of production referred to in the previous bullet points.
- Any machinery, vehicle, vessel, store, or units thereof, and any other objects including packaging material, that may have had contact with the plants or fruit designated as infested.
- Any plants or fruit stored in, or in contact with, any of the structures or objects listed in the previous bullet point, prior to the cleansing and disinfection of such structures and objects.
- Places of production which share the same surface water, due to flooding or use of water due to irrigation and spraying.

5.42. In line with section 3 of EPPO Standard PM 9/3 (3) (EPPO 2023), a demarcated area should be established based on the designation of infestation (5.40), the designation of probable infestation (5.41), and the possible spread of the organism based on the proximity of other places of production growing tomatoes or other host plants, and shared surface water sources. This should include premises in the immediate vicinity where there is a perceived risk, such as neighbouring production sites, the demarcated area will form the basis for future surveillance.

5.43. Initial surveillance efforts should be targeted at the areas of the place(s) of production with the highest risk for spread, for example if plants are going to be moved on from a site.

- 5.44. Initial maps of outbreak sites should be produced by members of the plant health service.
- 5.45. The demarcated area should be adjusted in response to further findings.

Pest management procedures

- 5.46. The primary means of spread of *R. solanacearum* is by contaminated water, therefore every effort should be made to minimise the production of contaminated water when an outbreak is confirmed.
- 5.47. Host plants should not be moved off site unless for destruction, with exception to fruit that may be moved off site for retail if agreed by the IMT.
- 5.48. When a crop is identified as being infected with *R. solanacearum* within the growing season destruction of the growing plants is recommended. The plants should be treated with an approved plant protection product (PPP) such as a desiccant/herbicide.
- 5.49. Tomato plants designated as infected should then be disposed of by approved means in 5.53.
- 5.50. Any other plants designated as probably infested must not be planted and should be disposed of using one of the options outlined in point 5.53.
- 5.51. Any machinery, vehicle, vessel, store, or units thereof, and any other objects including packaging material, designated as infested or probably infested must either be destroyed as in point 5.53 or cleansed and disinfected as in point 5.54.

Disposal plan

Infected plant material

- 5.52. The primary means of destruction of tomato plants in a production site is through herbicide application. The Defra Risk and Horizon Scanning team will advise on possible treatments.
- Prior to any herbicide being used, the risk posed by the herbicide to people and the environment will be assessed.
 - Any applications should be made following the advice on the product label and be in accordance with HSE guidance. In some cases, there may be a requirement to carry out a Local Environment Risk Assessment for Pesticides (LERAP) depending on the product used and the situation of the finding.

- Growers will be placed under notice to apply the recommended herbicides and make the applications using their own or contractor's equipment. Records of applications will be kept, including details of the amount of product and water used.

Infected fruit/soil/growing media/plant debris/washings

5.53. Disposal and/or destruction should be under the approval and supervision of the PHSI. If the material must be moved off the premises, it should be contained within at least one sealed layer, and two layers if possible, and should not be split open prior to being buried or incinerated. The vehicle used for transport must be cleaned and disinfected after use. The following disposal methods are approved for *R. solanacearum* infected material:

- **Deep burial** (minimum 2 m with immediate backfill), which can be done at an approved landfill site, or on the site or nearby farm, but only in agreement with the local Environment Agency, who is satisfied that there will be no risk of contaminating ground water.
- **Incineration**, which must comply with appropriate waste management regulations laid out by the Environment Agency in England.
- **Use as animal feed** following steaming / boiling for at least 30 minutes.
- **Approved commercial composting** according to PM 3/66 (EPPO 2022a). Waste should be composted in such a way that run-off is controlled. The resulting compost should not be used on arable land. It can be returned to non-agricultural land, permanent wooded areas, grassland or pastures, as well as land which is not, and will not be used for arable crop production, such as orchards, Christmas tree production sites or short rotational plantations (e.g. fast-growing trees for biomass production).
- **Direct and immediate delivery for industrial processing** to a site which operates officially approved waste disposal facilities, and which has a system of disinfection of storage areas and departing vehicles.
- Treatment of liquid washing or drainage effluent will be decided on a case-by-case basis but will likely include an **approved treatment to remove all solids, followed by a treatment to kill the bacteria, such as heat or UV treatment**. EPPO Standard PM 9/3 (3) (EPPO 2023) recommends that liquid waste should be heated to a minimum of 60°C throughout the entire volume consistently, for at least 30 minutes prior to disposal. Solid waste should be disposed of by deep burial or incineration as above.

- 5.54. All objects designated as 'infested' or 'probably infested', such as equipment, vehicles, machinery, boxes and storage facilities, should be thoroughly cleansed and disinfected to eliminate the risk of spread of *R. solanacearum*. This should be carried out at the outbreak site or a site nearby in agreement with a Plant Health and Seeds Inspector (PHSI). Any waste material generated, including liquid waste, should be disposed of as in point 5.53.

Measures in subsequent seasons

Infested places of production

- 5.55. Measures for infested **places of production**:

- All objects which have or may have been in contact with either infested or probably infested material should be treated, the EPPO standard PM 10/1 (1) ([PM10 - Phytosanitary Treatments|EPPO Global Database](#)) describing cleaning and disinfection procedures in potato production could be used as a basis (EPPO 2006).
- This cleaning and disinfection process should occur in the year of infection and also after the first subsequent growing year.
- Due to the importance of volunteer and natural hosts in the persistence of *R. solanacearum*, these should be eliminated from all sites of the place of production. Controlling these plants within and around production sites reduces the chance of the crop becoming infected and reduces the risk of survival and persistence of the pest in the event of an outbreak. Volunteer plants and weeds can be controlled mechanically (e.g. hoeing), chemically (e.g. plant protection products), and manually (e.g. roguing).

- 5.56. Measures for infected **production sites** must follow I or II:

- I. For sites where the changing of growing medium is possible (e.g. hydroponically grown crops in rockwool or coir):
 - Host plants should not be planted until the **production site** (e.g. unit in the facility) has been subjected, under official control, to measures to eliminate *R. solanacearum*, including the removal of all host-plant material, crop debris, change of the growing medium, testing of irrigation water, controls on irrigation and spraying programmes, cleaning and where appropriate disinfection of the unit and all equipment.
 - Once the above has been performed host plants can be grown, this can be for fruit production only in the following crop cycle.

- When tomato or other host plants are grown for the first time (for fruit/produce production only), the plants should be inspected for *R. solanacearum* at the appropriate time of day and growth stage, and tested (as per 5.26). Water sampling should also take place (as per 5.30).
- II. For sites where the changing of growing medium is not possible (e.g. soil grown):
- Host plants for which there is an identifiable risk of *R. solanacearum* persisting or spreading, should not be grown at the **production site** for at least four years and until no volunteer tomato plants or other natural host species are found for two consecutive years.
 - When tomato (for fruit production only), or other host plants (excluding potato) are grown for the first time the plants should be inspected for *R. solanacearum* at the appropriate time of day and growth stage and tested (as per 5.26).
 - If potato is to be grown rather than tomato or other hosts, only ware potatoes should be produced. Harvested tubers should be inspected and tested for *R. solanacearum*. If the tests show no presence of *R. solanacearum*, a second crop of potatoes can be grown after an appropriate rotation cycle, and either seed potatoes or ware potatoes can be produced. A survey should be carried out at the appropriate time of day and growth stage, and harvested tubers should be inspected and tested for *R. solanacearum*. There should be at least a two-year period between the first potato crop and the second potato crop, if seed potatoes will be grown.

Or

- For the next three years from the start of the next growing season the infested **production site** may be left in bare fallow, used for cereals, under permanent pasture with frequent cutting or intensive grazing, or as grass for seed production.
- This is followed by planting in the next two years with non-host plants for which there is no identifiable risk of *R. solanacearum* persisting or spreading.
- When tomato or other host plants (excluding potato) are grown for the first time, the plants should be tested for *R. solanacearum* at the appropriate time of day and growth stage (as per 5.26).
- If potato is to be grown rather than tomato or other hosts, either seed or ware potatoes may be produced. Harvested tubers should be inspected and tested for *R. solanacearum*.
- With regard to leaving the field in bare fallow, if the site is at particularly high risk of diffuse pollution running into water courses alternatives will be considered to adhere

to The Reduction and Prevention of Agricultural Diffuse Pollution (England) Regulations 2018.

Further measures applied to the whole regulated area for soil grown tomatoes

In the first year of infection (at infested and probably infested **places of production**):

- 5.57. All machinery, equipment and storage facilities involved with tomato production must be cleansed and disinfected, as in point 5.54.

For three years (at other **places of production**), or if the infected **production sites** are subject to the above requirements:

- 5.58. In the first year following detection, plants may be planted for fruit production only. In the second and third years, tomato crops can be grown for either the production of plants for planting or for fruit. The PHSI should inspect the growing crop each year at both an appropriate time of day and crop growth stage (as per 5.26).
- 5.59. Only tomato seed or tomato plants grown under official control from seeds, should be planted.
- 5.60. Any premises growing, storing or handling tomatoes (including those of contractors) will be supervised and controlled under notice.
- 5.61. An annual official survey will be carried out. The official survey will include visual inspection of plants.

Measures for regulated surface water

- 5.62. Regulated surface water should not be used for irrigation or spraying host crops, unless appropriately treated as per 2.3.
- 5.63. If a complete watercourse is regulated and likely to remain so due to the presence of natural hosts no further testing for *R. solanacearum* is necessary. In all other situations, samples of surface water should be taken and tested within and around the regulated areas at appropriate times according to the EPPO standard PM 7/21 (3) (EPPO 2022b).
- 5.64. Where appropriate, in the area around the water course, all tomato and other host crops should be inspected, and seed potatoes tested.
- 5.65. Samples of *S. dulcamara*, *S. nigrum*, *Urtica dioica* or *U. urens* may also be tested.
- 5.66. Following the results of inspections and tests the regulated areas should be updated accordingly.

- 5.67. When host crops may have been in contact with contaminated surface water, these should be designated as probably infested.

6. Criteria for declaring eradication / change of policy

- 6.1. When changing of growing medium is carried out, *R. solanacearum* can be declared eradicated (by the Chief Plant Health Officer) in tomato after:
- I. One year or after a full cycle of the next host crop, if *R. solanacearum* has not been found following inspection and sampling of the new crop. In cases where no crop, or a non-host crop, is intended to be grown in the affected production site(s) for more than one year following the outbreak and clean up, eradication can be declared one year after eradication action, without the need for follow up inspection and sampling. As a grower may not know immediately what they intend to plant more than one year following the outbreak, the decision on whether eradication can be declared will be made at least one year after eradication action.
- 6.2. If changing of the growing media is not possible, *R. solanacearum* can be declared eradicated (by the Chief Plant Health Officer) in tomato after:
- II. At least four years if changing of the growing media at the infested production site is not carried out and non-hosts are grown for four years and until no volunteer tomato plants or other host plants are found for two consecutive years, and *R. solanacearum* has not been found during inspections of the next host crop (or second crop if potatoes are to be grown).

Or

At least five years if for three years left in bare fallow, used for cereals, under permanent pasture with frequent cutting or intensive grazing, or as grass for seed production. Followed by two years of planting non-hosts, and *R. solanacearum* has not been found during inspections of the next host crop.

7. Evaluation and review of the contingency plan

- 7.1. This pest specific contingency plan should be reviewed regularly to consider changes in legislation, control procedures, pesticides, sampling and diagnosis methods, and any other relevant amendments.
- 7.2. Lessons should be identified during and after any outbreak, including what went well and what did not. These should be included in any review of the contingency plan leading to continuous improvement of the plan and response to outbreaks.

8. Appendix A

Datasheet for *Ralstonia solanacearum*

Identity

PREFERRED SCIENTIFIC NAME	AUTHOR (taxonomic authority)
<i>Ralstonia solanacearum</i>	(Smith 1896) Yabuuchi <i>et al.</i> 1996 emend. Safni <i>et al.</i> (2014)

CLASS: Betaproteobacteria

ORDER: Burkholderiales

FAMILY: Burkholderiaceae

GENUS: *Ralstonia*

SPECIES: *Ralstonia solanacearum*

SYNONYMS

Pseudomonas solanacearum

Bacterium solanacearum

Burkholderia solanacearum

COMMON NAMES

Brown rot of potato

Bacterial wilt of tomato

Moko disease of banana

Notes on taxonomy and nomenclature

Ralstonia solanacearum is a motile, Gram-negative bacterium with a complex taxonomic history. This species was originally named *Bacillus solanacearum*, later renamed as *Pseudomonas solanacearum*, then renamed *Burkholderia solanacearum* and subsequently assigned to a new genus *Ralstonia* (Yabuuchi *et al.*, 1995). Earlier subdivisions of the species were based on differences in host range (races), differences in biochemical and phage reaction (biovars) and phylogenetics (Phylotypes) (EFSA 2019b). These subdivisions were described under the broad term *Ralstonia solanacearum* species complex (RSSC) containing four phylotypes (Fegan & Prior 2005). In 2014 Safni *et al.* placed the four phylotypes into three distinct species: *R. solanacearum* (Phylotype II), *R. pseudosolanacearum* (Phylotypes I and III) and *R. syzygii* (Phylotype IV). This datasheet

applies to *R. solanacearum sensu stricto* (previously Phylotype II and particularly Phylotype IIB, sequevar I (IIB-I), formerly known as race 3, biovar 2).

Biology and ecology

Lifecycle

Ralstonia solanacearum can enter the host plant through natural openings (stomata) or through root and stem wounds, which have either been created naturally (excision of leaves or root emergence) or by mechanical and feeding damage. Once inside the plant, the bacterium moves within the vascular system and colonises the xylem resulting in blockage of the xylem vessels which disrupts the transport of water producing wilt associated symptoms and in severe cases plant death. Over the winter, the bacterium survives within plant debris, tubers left in the field and in other hosts such as the perennial plant *Solanum dulcamara* (bittersweet or woody nightshade) serving as a source of inoculum for the next cycle (EFSA 2019a).

Ralstonia solanacearum is closely associated with living host plants and host-plant debris, however, *R. solanacearum* can persist for limited periods of time in soil and water. In soil, the bacterium has a survival time of around 200 days depending on biotic factors. In temperate conditions soil borne inoculum does not seem to play a role in the overwintering of the bacterium (EFSA 2019a). In water, bacterium's survival depends on physical and biotic factors and can vary from several years in sterile water to less than a month in ditch water. *Ralstonia solanacearum* can persist for prolonged periods of time in surface water where host plants such as *S. dulcamara* grow along the water banks with roots leaking bacterial cells into the watercourses. The presence of perennial host plants can act as a reservoir for the bacterium, playing an important role in the survival and establishment of the pathogen (EFSA 2019b).

The information on survival of the bacterium on the surfaces of tools or containers is limited and highly variable. Studies have reported *R. solanacearum* surviving for 5 hours on wood, 17 days on metal and more than 87 days on rubber (Wenneker *et al.*, 1998).

Modes of transmission

1. **Vegetative propagation material** including infected **seed potatoes** and **ornamental species** are the main pathways for long distance spread. *Ralstonia solanacearum* infection can often be latent, especially at low temperatures and in tolerant varieties, this can contribute to the unintentional spread of the bacterium. *Rosa* sp. have been added to the list of ornamental species which could potentially facilitate the long-distance spread of *R. solanacearum* acting as symptomless reservoir for infection (Blom *et al.*, 2024). The study which reported this also demonstrated that *R. solanacearum* which was isolated from *Rosa* sp. was pathogenic to potato (Blom *et al.*, 2024).

2. **Imported ware potatoes** and other products.

3. **Infested potato waste** can occur when infested potatoes are cleaned and processed by industry and untreated contaminated waste is discharged into watercourses (EFSA 2019a).

4. **Contaminated water.** Surface water can also become contaminated where wild host plants such as *S. nigrum* and *S. dulcamara* are present along the banks of waterways. The use of contaminated water for irrigation or spraying can spread the bacterium into new crops and is considered the source of many outbreaks of potato brown rot in Europe (EPPO 2024b).

5. **Infected volunteer plants** can be a source of inoculum for subsequent crops and infect healthy plants.

6. **Soil.** As with other soilborne bacteria, infection can also occur by movement of infected soil and growing media.

7. **True seed.** Although there have been cases of contaminated seed of tomato and Capsicum, there is no evidence of seed infection and transmission (EPPO 2024b).

Hosts/crops affected

Ralstonia solanacearum is known to infect a wide range of cultivated and wild hosts. Major hosts of economic importance in the UK are, *Solanum tuberosum* (potato), *S. lycopersicum* (tomato), *S. melongena* (aubergine) and *Capsicum annuum* (sweet pepper). Other major hosts of global economic significance include *Musa* crops (banana and plantain), *Nicotiana tabacum* (tobacco) and *Arachis hypogaea* (peanut) (EPPO 2024b).

This pathogen is also known to infect solanaceous weeds including *S. nigrum* (black nightshade) and *S. dulcamara* (woody nightshade) which are the main alternative hosts of the pathogen, and other weeds such as *Urtica dioica* (common nettle), *U. urens* (small nettle) and *Senecio vulgaris* (groundsel). There are also several ornamental hosts grown in the UK including *Pelargonium zonale*.

Historical reports of plant hosts have not always distinguished between different races, biovar, phylotypes or species, for example CABI provides a comprehensive host list but it does not identify the pathogen at the phylotype or species level (CABI 2022).

The host list for *R. solanacearum* (RSSC phylotype II) reported here has been collected from EPPO (2024b).

Anthurium, *Arachis hypogaea*, *Bidens mitis*, *Bidens pilosa*, *Canna indica*, *Capsicum annuum*, *Capsicum pubescens*, *Casuarina equisetifolia*, *Chenopodium album*, *Cichorium intybus*, *Citrullus lanatus*, *Cleome viscosa*, *Coleus amboinicus*, *Cucumis melo*, *Cucumis*

sativus, *Cucurbita maxima*, *Cucurbita pepo*, *Datura stramonium*, *Eleusine indica*, *Emilia sonchifolia*, *Epipremnum pinnatum*, *Eucalyptus*, *Eupatorium cannabinum*, *Galinsoga parviflora*, *G. quadriradiata*, *Gliricidia sepium*, *Heliconia*, *Hydrangea macrophylla*, *H. paniculata*, *Hydrangea sp.*, *Hydrocotyle ranunculoides*, *Impatiens*, *Ipomoea hildebrandtii*, *Marsypianthes chamaedrys*, *Musa sp.*, *Musa x paradisiaca*, *Nicotiana tabacum*, *Oxalis sp.*, *Pandanus sp.*, *Pelargonium x hortorum*, *Pelargonium*, *Peperomia pellucida*, *Persicaria capitata*, *P. pensylvanica*, *Phaseolus vulgaris*, *Physalis angulata*, *Piper dilatatum*, *Piper hispidum*, *Polygonum arenastrum*, *Portulaca oleracea*, *Psidium guajava*, *Rosa sp.*, *Salpiglossis sinuata*, *Senecio vulgaris*, *Sesbania*, *Solanum aethiopicum*, *S. americanum*, *S. betaceum*, *S. carolinense*, *S. cinereum*, *S. dulcamara*, *S. lycopersicum*, *S. melongena*, *S. nigrum*, *S. pseudocapsicum*, *S. sarrachoides*, *S. scabrum*, *S. tuberosum*, *S. villosum subsp. miniatum*, *S. villosum*, *Soliva anthemifolia*, *Tagetes*, *Urtica urens*, *Vaccinium corymbosum*, *Vaccinium hybrids*, *Xanthosoma sp.*

Plant stages affected

Flowering, fruiting, vegetative and post-harvest stages are all affected.

Plant parts affected

Tubers, leaves, roots, seedlings, stems and accompanying soil are all affected.

Symptoms/signs - description

Symptom expression occurs at different rates in different varieties and is favoured by warm temperatures (above 15 °C with optimum around 25°C) and other environmental conditions (especially high soil moisture). In some cases, the bacteria can latently infect tubers without causing noticeable symptoms and can survive in seed tubers during storage causing disease when planted the next season.

Potato

The first visible symptoms of infection occur on the foliage of the plant with the wilting of leaves and shoots during the warmest part of the day, although plants may recover at night. In cool climates plants may not manifest foliar symptoms at all (EFSA 2019a). As the disease develops, stems can show streaky brown discolorations, and leaves may have a bronze tint. Eventually, plants can fail to recover resulting in necrosis and plant mortality. When stems are cut, brown discoloration of the vascular system and bacterial ooze can often be observed (EFSA 2019a).

External symptoms on potato tubers may not be visible, depending on the state of development of the disease. It is more likely to observe symptoms when tubers are cut if

present. The initial symptom is brown staining of the vascular ring which starts from the stolon and progresses through the vascular tissue. A few minutes after cutting a creamy bacterial exudate may appear spontaneously on the vascular ring. As disease develops bacterial ooze may emerge from the eyes and stolon end of infected tubers. Soil may adhere to the tubers when this bacterial exudate dries, giving tubers a dirty appearance.

Tomato

The first symptom of the bacterial infection in tomato plants is the wilting of the youngest leaves, usually during the warmest time of the day. Under favorable conditions for the pathogen, rapid wilting of the whole plant may follow. Under less favorable conditions, the disease progression is slower, stunting can occur and a proliferation of roots from the stem may occur (adventitious roots). When stems are cut, the vascular tissues of the stem show a brown discoloration and a drop of white or pale creamy bacterial ooze may be released.

Similarities to other species/diseases/plant damages

Wilting symptoms of brown rot (*R. solanacearum*) may be confused with other wilting pathogens on potato such as ring rot (*Clavibacter sepedonicus*), dry rot (*Fusarium* spp.), wilt (*Verticillium* spp.), and black leg (*Dickeya* / *Pectobacterium* & *Dickeya* spp.) (EPPO 2022b). Brown rot usually develops earlier and more rapidly than ring rot. For ring rot bacterial slime does not exude spontaneously and the tuber needs to be pressed for a mass of whitish-yellow decayed vascular tissue to emerge.

Symptoms of bacterial wilt in tomato may be confused with those of bacterial canker (*Clavibacter michiganensis*) which can show necrotic windowing on leaves and yellow to brown vascular discoloration (EPPO 2022b).

Detection and inspection methods

The EPPO Standard on Diagnostics PM 7/21 (3) provides guidance on sampling, screening and identification testing for symptomatic and asymptomatic plant samples and water samples (EPPO 2022b).

For field diagnosis from symptomatic tissues, a rapid presumptive test for the RSSC can be performed by observation of bacteria streaming from the cut surface of a stem suspended in water and which can be followed by lateral flow serological tests (EPPO 2022b).

Official laboratory testing in line with PM 7/21 (3) includes screening tests (isolation on selective media, immunofluorescence (IF) and molecular tests (LAMP, conventional and real-time PCRs) and identification tests (IF, Molecular tests, DNA barcoding and Matrix-

assisted laser desorption/ionization time of flight mass spectrometry (MALDI-TOF)). Additional information regarding diagnostics can be found on the Standards [PM 7/21 \(3\)](#) including a flow diagram describing the diagnostic procedures.

Distribution

History of introduction/spread

R. solanacearum (phylotype II) originates in Central and South America and has spread around the world with the international movement of infected potato tubers and *Pelargonium* cuttings (EPPO 2025b). It is now present in many countries in the EPPO region (Figure 2), and it has established in wild plants along watercourses, continually recontaminating these water sources which makes eradication difficult.

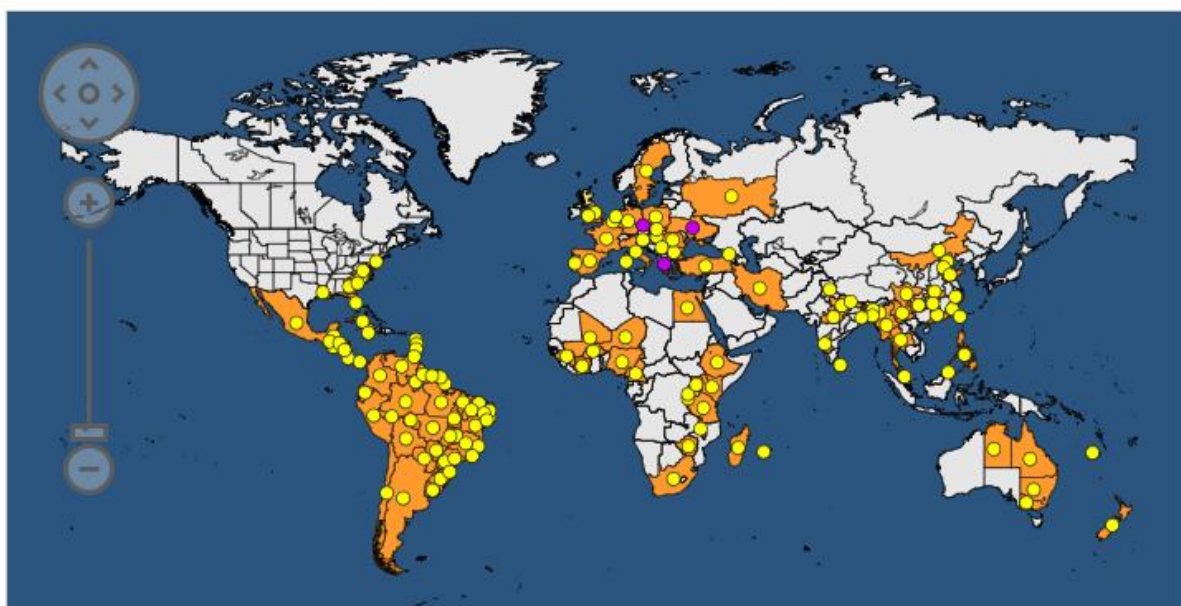


Figure 2. Global Distribution of *Ralstonia solanacearum* (EPPO 2025c).

Phytosanitary status

Ralstonia solanacearum is a GB Quarantine Pest (Annex 2 Part B) in the assimilated Phytosanitary Conditions Regulations (EU) 2019/2072 and is therefore prohibited from being introduced into or spread within GB. It is also on the EPPO A2 list and is therefore recommended for regulation by EPPO member countries. A full table of country and regional categorisation is provided (Table 1).

Table 1. Global categorisations of *Ralstonia solanacearum* (adapted from EPPO (2025c)).

Country / Region	List	Year of addition
Africa		
Guinea	A1 List	2022
Morocco	Quarantine pest	2018
Tunisia	Quarantine pest	2012
America		
Argentina	A2 list	2019
Brazil	A2 list	2018
Chile	A2 list	2019
Asia		
China	Quarantine pest	2021
Iran	A1 list	2018
Europe		
Azerbaijan	A1 list	2024
Georgia	A2 list	2018
Serbia	A1 list	2015
Switzerland	A1 list	2019
Ukraine	A1 list	2019
United Kingdom	A2 list	2020
RPPO / EU		
EPPO	A2 list	2017
EU	A2 Quarantine pest (Annex II B)	2019

Ralstonia pseudosolanacearum and *R. syzygii* (as *R. syzygii* subsp. *celebesensis* and *R. syzygii* subsp. *indonesiensis*) are also listed as GB Quarantine Pests in Annex 2 Part A of 2019/2072.

Means of movement into the UK

The most likely method of dispersing *R. solanacearum* into the UK is through the international movement of infected vegetative propagating material of host plants, mainly seed potatoes. In England the majority of outbreak have been a result of using contaminated irrigation water.

Another pathway for entry is through importing infected ware potatoes for consumption or for industrial processing. The bacterium can be introduced into the agricultural system when waste produced during washing and processing of potatoes is discharged into watercourses and this water is used to irrigate susceptible crops.

Control

Currently there are no effective biological or chemical control methods for *R. solanacearum*, and breeding for resistant varieties of tomatoes or potatoes has been largely unsuccessful. There is therefore a reliance on starting with clean planting material, crop hygiene, monitoring and rotations.

Some resistant varieties of tomatoes have been reported however resistance is suggested to be strain specific and often varieties lose desirable agronomic and commercial properties. Breeding of tolerant varieties shouldn't be encouraged as they can shelter virulent bacteria and act as reservoirs of the disease (Huet 2014). The most effective control is through using pathogen-free planting material and irrigation water along with effective crop surveillance and monitoring for symptoms to protect areas which are free from the bacteria. For potatoes, obtaining disease free material using certification schemes, and post-harvest testing of seed potatoes is also recommended (EPPO 2025c). For tomato, in addition to planting tested material free of the bacteria, production systems disinfection of the recirculating water in hydroponics or irrigation systems in greenhouses can prevent the spread of any introduced bacteria.

Appropriate sanitation procedures are also important for minimising introduction and spread of the disease including:

- Regularly clean and disinfect machinery, equipment, containers, vehicles and storage facilities used during potato production.
- Avoid sharing machinery, equipment, containers and vehicle where possible to avoid the spread of the disease by contact.
- Avoid surface water for irrigation.
- Avoid planting ware potatoes, plant only certified potato seed (Yuliar *et al.*, 2015).
- Avoid cutting seed potatoes (CABI 2022).
- Control of weed hosts and volunteer plants.
- Implement crop rotation without susceptible crops (CABI 2022, Wang *et al.*, 2023).

Impact

Ralstonia solanacearum is one of the world's most important plant pathogenic bacteria due to its extensive distribution, wide host range including economically important species, disease severity, genome plasticity and eradication difficulty.

Ralstonia solanacearum, is on the UK Strategic Export Control L (Department for Business & Trade 2025)^[OBJ] and (EFSA 2019b)^[OBJ]. Potato crop losses of 90 and 100% have been reported from Bangladesh and China (Jiang *et al.*, 2017, Karim *et al.*, 2018)^[OBJ]. Historically,

heavy losses were reported on (Cruz *et al.*, 2012)^[OBJ]. In addition to direct yield losses, economic losses are also incurred through reduced marketability of the crop, disposal of infected seed material and replacement of seed material, loss of certification status, increased surveillance, statutory eradication measures and restrictions on further production on contaminated land.

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