



19th August 2019

Earlier this year seed potato growers were asked to share their feedback on the future direction of the Safe Haven Standards, the seed potato assurance scheme run by Red Tractor.

Initially introduced after a ring rot outbreak in England and Wales in 2003 from seed sourced from the Netherlands the current scheme also affords protection from *Dickeya*. It has been very successful at protecting GB seed stocks from these diseases and currently around 60% of UK seed growers are certified by the Safe Haven Standards.

All Red Tractor assurance schemes are reviewed regularly to ensure they are fit for purpose and offer the best possible protection for growers. With the potential for change to the trade landscape in the future it is timely to review the current scope of the Safe Haven Scheme, taking the opportunity to strengthen it further, in terms of the protection it offers from other pests and diseases and in enhancing the reputation of British seed potatoes. Following advice from leading industry bacteriologists and plant health experts, the new range of standards will also provide protection from brown rot and *Epitrix*.

Presented here is a revised set of standards for seed potato growers, which will replace the current Safe Haven Scheme. While the look and feel of the document is materially different from the previous version of the standards it is important to point out that many of the changes amount to greater clarity in the audit requirement and the exact nature of records needed to ensure compliance. Of the 24 standards presented just eight are completely new. The new layout brings the Safe Haven Standards in line with all the other Red Tractor Standard manuals.

The **highlighted** sections in the document relate to upgraded or new standard wording.

Feedback is invited before noon on Friday 4th October by following the link below

<https://www.surveymonkey.co.uk/r/XTQW5PP>

We will consider all responses before finalising the standards ready for implementation early in 2020.

Regards

The Red Tractor Team

No	Old Standard No	Fresh Produce Standard Equivalent	Standard	How You Will be Measured	Records	Comments
Aim: Plans and procedures are in place to avoid and manage risks						
1	NEW	DP.a.2	Farm map (s) must be available on site showing all sites including rented land. (New)	<ul style="list-style-type: none"> Farm map (s) are accessible and available for all staff and visitors to reference. Farm map (s) should show details of fields, glasshouses, polytunnels, watercourses, reservoirs, (details of water sources and irrigation distribution systems), rented land, packing facilities, stores and third-party storage facilities. 	<ul style="list-style-type: none"> Farm Map (s) (This could include a Google map/earth screen shot) 	
2	1.3	DP.e	Where records are required by the standard they are kept for a minimum of three years unless otherwise specified in a standard. (Upgraded)	<ul style="list-style-type: none"> Records of the multiplication history of each seed stock grown on the Safe Haven-assured production unit must be kept. 	<ul style="list-style-type: none"> Multiplication history records 	
Aim: To avoid and manage risks through the use of classified seed stocks						
3	NEW	Tl.a Key	Systems must be in place which deliver traceability of seed and ware potatoes throughout the Safe	<ul style="list-style-type: none"> Product identification / coding used throughout the operation from classified seed purchase to field, 	<ul style="list-style-type: none"> Traceability records 	

No	Old Standard No	Fresh Produce Standard Equivalent	Standard	How You Will be Measured	Records	Comments
			Haven-assured production unit. (New)	storage, packing and customer.		
4	1.1		All seed potato crops must be registered in the seed potato classification system of the relevant UK authority.	<ul style="list-style-type: none"> Evidence that all seed crops have been entered in the Seed Potato Classification System. Details of all seed potato crops published in the official seed potato register. 	<ul style="list-style-type: none"> Entry records into the Seed Potato Classification System, e.g. My Spud Official seed potato register 	
5	1.2		All seed for seed multiplication must be from classified seed.	<ul style="list-style-type: none"> Documentation showing that classified seed has originated from: <ul style="list-style-type: none"> Either the Safe Haven-assured production unit itself. Or grown by another Safe Haven-assured production unit. Or for first generation Pre Basic production, all seed has been derived in a direct line (without further clonal selection) from UK nuclear stock, e.g. SASA ring rot tested nuclear stock or SASA quarantine tested <i>in-vitro</i> plant material, and have been produced by an officially approved mini-tuber producer. 	<ul style="list-style-type: none"> Purchase records including seller's Safe Haven membership number. Traceability records 	

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				<ul style="list-style-type: none"> • Or seed produced from true potato seed. 		
6	1.4 Key		Cutting of seed for seed and ware production is not permitted.	<ul style="list-style-type: none"> • Signed declaration that seed is not cut. 	<ul style="list-style-type: none"> • Signed declaration 	
Aim: To avoid and manage risks through growing classified ware crops						
7	2.1		Potatoes grown for ware purposes on the Safe Haven-assured production unit must be from classified seed.	<ul style="list-style-type: none"> • Ware crops grown on the Safe Haven-assured production unit do not require to be entered in the Seed Potato Classification System, but will otherwise be subjected to all the Standards in the Safe Haven Scheme • Documentation showing that ware crops have originated from classified seed from: <ul style="list-style-type: none"> - Either the Safe Haven-assured production unit itself. - Or grown by another Safe Haven-assured production unit. 	<ul style="list-style-type: none"> • Purchase records including seller's Safe Haven membership number. • Traceability records 	
Aim: To avoid and manage risks from water use on the Safe Haven Assured Production Unit						
8	NEW		There must be a documented risk assessment for water use	The Water Risk Assessment takes into account:	<ul style="list-style-type: none"> • Water Risk Assessment 	

No	Old Standard No	Fresh Produce Standard Equivalent	Standard	How You Will be Measured	Records	Comments
			<p>on the Safe Haven-assured production unit which covers all water used in seed or ware potato production, harvesting, packing, storage, transport, cleaning and disinfection of equipment and machinery, e.g. irrigation, mixing for fertilisers and PPPs. (New)</p>	<ul style="list-style-type: none"> All sources of water used on the Safe Haven-assured production unit Any water distribution and storage facilities. All disease risks. The Water Risk Assessment is reviewed at least annually or when risks change, e.g. when new land is rented. An example decision tree to support the development of water risk assessment is given in Appendix 2. 		
9	NEW		<p>Records must be kept of water usage. (New)</p>	<ul style="list-style-type: none"> Date of usage Water sources used Volume used 	<ul style="list-style-type: none"> Water usage records 	
Aim: To avoid and manage risks from people, tools and equipment						
10	NEW		<p>Access to the Safe Haven-assured production unit's fields, packing facilities and stores must be limited to essential visitors and visitor records must be kept. (New)</p>	<ul style="list-style-type: none"> Records include date, time of arrival, name, organisation and contact number Before entry to a Safe Haven-assured production unit's fields, packing facilities and stores visitors must: <ul style="list-style-type: none"> Wash or sanitise their hands Change into clean boots and leggings or use 	<ul style="list-style-type: none"> Visitor records 	

No	Old Standard No	Fresh Produce Standard Equivalent	Standard	How You Will be Measured	Records	Comments
				<p>disinfectant foot dips. Approved disinfectants are listed in Appendix 1.</p>		
11	4.2		<p>All cleaning and disinfection of tools, planting, harvesting, grading and packing equipment, containers, crates, boxes, trailers, transport vehicles and stores must be recorded.</p>	<ul style="list-style-type: none"> • Cleaning must be done with mains water. • Cleaning and disinfection schedules are in place, which document how and when to clean. See Appendix 1. • Members must demonstrate that discharge from the cleaning and disinfection process is not returned to agricultural land or water sources. • Only validated disinfectant chemicals with proven activity against ring rot, <i>Dickeya</i> and brown rot can be used. See list in Appendix 1. • Records must detail: <ul style="list-style-type: none"> • Name / identification of equipment • Event triggering the need for cleaning / disinfection • Date of cleaning and disinfection operation (s) • Source of water used 	<ul style="list-style-type: none"> • Cleaning and disinfection schedules and records 	

No	Old Standard No	Fresh Produce Standard Equivalent	Standard	How You Will be Measured	Records	Comments
				<ul style="list-style-type: none"> • Cleaning agent and disinfectant used • Contact time • Name and signature of operative 		
12	4.3		<p>It is recommended that Safe Haven-assured members' own tools, planting, harvesting, grading and packing equipment, containers, crates and boxes are cleaned and disinfected before use.</p>		<ul style="list-style-type: none"> • Cleaning records 	
13	3.1 and 3.2		<p>Containers, crates and boxes used to store and transport Safe Haven-assured seed and ware potatoes must be dedicated to that use.</p>	<ul style="list-style-type: none"> • Either a signed declaration that boxes, crates or containers have never been used for potatoes produced outside the Safe Haven-assured production unit. • Or seed and ware potatoes are transported from the Safe Haven-assured production unit in non-returnable containers. • Or before leaving the Safe Haven-assured production unit an annual written assurance must be obtained from the packer / other outside Safe Haven-assured 	<ul style="list-style-type: none"> • Signed declaration • Purchase invoices for non returnable containers • Written assurance from packer or outside production unit • Cleaning records 	

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				<p>production unit that these boxes will not be used for handling other potatoes before being returned. Boxes sent outside the Safe Haven-assured production unit must be clearly labelled to identify the Safe Haven grower / business.</p> <ul style="list-style-type: none"> • Or boxes, crates and containers are thoroughly cleaned and disinfected before use (see Standard 11) • Any boxes or crates belonging to other growers must not be used for storing Safe Haven seed or ware potatoes. They must be isolated and stored away from those belonging to the Safe Haven-assured production unit and returned to their owner. • Containers, crates and boxes must not be used to store any chemicals. • Any boxes used for waste / brock must be clearly labelled and dedicated to that use only. 		

Aim: To avoid and manage risks during transport

No	Old Standard No	Fresh Produce Standard Equivalent	Standard	How You Will be Measured	Records	Comments
14	3.1 Key and 3.3		Producers must visibly inspect boxes, containers, trailers and bulkers before loading.	<ul style="list-style-type: none"> • Where transport is to be in bulk or in containers, crates or boxes from outside the Safe Haven-assured production unit a record of inspection for each load must be retained. • Any boxes, containers and bulkers not meeting the required standard of cleanliness must not be loaded. 	<ul style="list-style-type: none"> • Inspection records 	
15	3.4		Bulk transport is not recommended, but where it is used, the Safe Haven-assured member must obtain details of the previous three loads carried by the vehicle from the haulage contractor. (Upgraded)	Records include: <ul style="list-style-type: none"> ○ Date ○ Haulage contractor ○ Details of load to be transported ○ Previous 3 loads by postcode 	<ul style="list-style-type: none"> • Haulage records 	
Aim: To avoid and manage risks from contracted or shared machinery						
16	4.1		Contract and / or shared machinery / equipment e.g. tools, sprayers, harvesters, graders, planters, trailers etc, must be thoroughly cleaned and disinfected	<ul style="list-style-type: none"> • This standard applies where the Safe Haven member uses the services of a contractor or where the Safe Haven member provides contract services to other Safe Haven growers. 	<ul style="list-style-type: none"> • Contracted and / or shared machinery and equipment records • Cleaning and disinfection 	

No	Old Standard No	Fresh Produce Standard Equivalent	Standard	How You Will be Measured	Records	Comments
			<p>before entry and use on the Safe Haven-assured production unit. (Upgraded)</p>	<ul style="list-style-type: none"> • Contracted and/or shared machinery/equipment records must detail: <ul style="list-style-type: none"> ○ Date of arrival ○ Operation / use of equipment ○ Contractor name / Producer name sharing equipment, including Safe Haven membership number. ○ Name / identification of the contracted/shared equipment ○ Cleaning and disinfection records prior to use on / return to the Safe Haven-assured production unit ○ Date of return 	<p>schedules and records</p>	
17	5.1		<p>Safe Haven members must ensure that any contractors undertaking work on the production of seed or ware potato crops on the Safe Haven-assured production unit adhere to the Safe Haven Scheme standards.</p>	<ul style="list-style-type: none"> • Contractors must sign the Contractors Commitment document. See Appendix 3. • There must be a separate record for each potato operation. 	<ul style="list-style-type: none"> • Signed Contractor Commitment document • Records for each potato operation 	

No	Old Standard No	Fresh Produce Standard Equivalent	Standard	How You Will be Measured	Records	Comments
Aim: To avoid and manage risks during grading and packing						
18	3.5 Key		Non-Safe Haven-assured seed or ware potatoes must not be handled, graded or stored on the Safe Haven-assured production unit.			
19	3.6 Key		Safe Haven-assured seed potatoes must not be handled, graded or stored on a non-Safe Haven-assured production unit.	<ul style="list-style-type: none"> • Where Safe Haven-assured seed potatoes are stored in third party storage they must only be stored with other Safe Haven-assured seed potatoes. • Where third party storage facilities are used, a contract or formal agreement must be in place defining storage requirements. • The contract / agreement must confirm that third party storage conditions meet Safe Haven Standards including: <ul style="list-style-type: none"> - Safe Haven-assured potatoes will only be stored with other Safe Haven-assured seed potatoes. - Store cleaning and disinfection 	<ul style="list-style-type: none"> • Traceability records showing third party stores • Contract / agreement 	

No	Old Standard No	Fresh Produce Standard Equivalent	Standard	How You Will be Measured	Records	Comments
				<ul style="list-style-type: none"> - Traceability - Temperature and storage conditions <p>Where to find more help: AHDB Seed Storage Guide</p>		
20	6.2		Packing records must be kept for all seed and ware potatoes from the Safe Haven-assured production unit.	<ul style="list-style-type: none"> • If a packing site handles Safe Haven-assured seed potatoes from more than one Safe Haven-assured member records must be kept in order to demonstrate traceability from final pack to supplier. 	<ul style="list-style-type: none"> • Documented controls for packing. • Packing records 	
21	6.1, 6.3		The Red Tractor Safe Haven logo must only be used in conjunction with the Safe Haven Scheme membership number.	<ul style="list-style-type: none"> • Packaging, stationary, trade documentation, website and social media must display the Safe Haven member's number alongside the Safe Haven logo. • You must only use the version of the logo that is relevant to the certification you hold. • Copies of original artwork for printing are available from Red Tractor at safehaven@redtractorassurance.org.uk • Safe Haven Logo must always be reproduced in 	<ul style="list-style-type: none"> • Examples of stationary, packaging, trade documentation, website, social media etc 	

No	Old Standard No	Fresh Produce Standard Equivalent	Standard	How You Will be Measured	Records	Comments
				accordance with guidelines on the Red Tractor website https://assurance.redtractor.org.uk/contentfiles/files/SchemeLogoRules.pdf		
Aim: To avoid and manage risks during storage						
22	NEW	ST. a and e	Storage areas must be cleaned annually. (New)	<ul style="list-style-type: none"> Seed potato stores must be inspected, cleaned and disinfected each season. <p>Where to find more help: AHDB Seed Storage Guide</p>	<ul style="list-style-type: none"> Store cleaning and disinfection records 	
23	NEW (REC)	ST. b	It is recommended that temperature and humidity of storage facilities used to store seed and ware potatoes are monitored and documented to ensure appropriate storage conditions. (New recommendation)	<ul style="list-style-type: none"> Appropriate conditions and acceptable ranges are clearly defined Storage conditions are routinely monitored to ensure conditions are within acceptable range <p>Where to find more help: AHDB Seed Storage Guide</p>	<ul style="list-style-type: none"> Storage and product checks 	
Aim: To ensure Members comply with Scheme Member Rules						
24	NEW		Safe Haven members must inform Red Tractor via their Certification Body if ring rot, <i>Dickeya</i>,			

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			brown rot or <i>Epitrix</i> is found on their seed or ware potatoes or production unit. (New)			

Appendix 1: (Revised)

Guidelines for Cleaning and Disinfection of Tools, Planting, Harvesting, Grading and Packing Equipment, Containers, Crates, Boxes, Trailers, Transport Vehicles and Stores

These guidelines for cleaning and disinfection of tools, planting, harvesting, grading and packing equipment, containers, crates, boxes, trailers, transport vehicles and stores are designed to help members develop their own cleaning and disinfection schedules, which detail how and when to clean, required under Standard 11.

Introduction to Cleaning and Disinfection:

Before starting to clean tools, planting, harvesting, grading and packing equipment, containers, crates, boxes, trailers, transport vehicles and stores members must ensure they have met their Statutory requirements including that

- A COSHH risk assessment has been completed
- Cleaning chemicals and disinfectants are only used in accordance with the manufacturers' directions.
- All staff have appropriate personal protective equipment.

Cleaning of tools, planting, harvesting, grading and packing equipment, containers, crates, boxes, trailers, transport vehicles and stores

Systematic cleaning must allow sufficient time to remove plant residues and soil, which can harbour infections. The efficacy of many disinfectants, especially those acting through oxidative reactions, is reduced or eliminated by the presence of organic material. It is therefore important that surfaces are thoroughly cleaned prior to application of disinfectants.

- Start at the top of the equipment and work downwards.
- Start at the top of the trailer and clean from the inside to the edges.
- First remove obvious dust, soil, potato debris and potatoes using a broom.
- Remove adhered dust, soil and potato debris from the surfaces of the machinery/equipment/ trailer, using a detergent.
- Wash down surfaces, preferably with heated water (steam is particularly effective) where possible.
- Members must demonstrate that discharge from the cleaning and disinfection process is not returned to agricultural land or water sources.

Disinfection of tools, planting, harvesting, grading and packing equipment, containers, crates, boxes, trailers, transport vehicles and stores:

Disinfection must take place following the cleaning of tools, planting, harvesting, grading and packing equipment, containers, crates, boxes, trailers, transport vehicles and stores and after obvious dust, soil and potato debris has been removed. The efficacy of many disinfectants, especially those acting through oxidative reactions, is reduced or eliminated by the presence of organic material.

The removal of obvious soil and debris prior to disinfection is the **most important** phase of the cleaning process.

The efficacy of different disinfectants varies according to the type of bacterial pathogen and the surface material treated. For more information see the section on Background Information on Experimental Validation of Disinfectants below.

- Surfaces must be thoroughly cleaned prior to application of disinfectants.
- Efficacy of some disinfectants is pH dependent (see product labels for optimum pH). Detergents used in pre-cleaning can affect the pH and surfaces should therefore be rinsed with water and allowed to dry prior to application of disinfectant. This includes any water pools on the tools, planting, harvesting, grading and packing equipment, containers, crates, boxes, trailers, transport vehicles and stores.
- Use one of the types of disinfectants in the list of currently approved disinfectants below that is appropriate for the surface material to be treated.
- Use disinfectants in accordance with the manufacturers' directions.
- If directions require rinsing, wait at least 10 -15 minutes after application in order to kill target bacteria. However, if bacteria are in biofilms or dried vegetable matter they may remain protected from chemical activity.
- Members must demonstrate that discharge from the cleaning and disinfection process is not returned to agricultural land or water sources.

Approved Disinfectants.

This updated list of recommended choices of disinfectants for use in seed potato production is based on EPPPO recommendations, recent research findings and current approvals on the use of biocides. Particularly relevant is phytosanitary standard PM 10/1 (1), published by the European and Mediterranean Plant Protection Organisation (EPPPO, 2006), describing cleaning and disinfection measures in potato production against the quarantine pests *Clavibacter sepedonicus* (ring rot bacterium) and *Ralstonia solanacearum* (brown rot bacterium).

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

The following list of approved disinfectants is correct as at June 2019. Members must check the approval status of disinfectants prior to use as new approvals can be granted or existing approvals revoked at any time.

- Lists of disinfectants approved by Defra for general use in England Scotland and Wales can be checked at: <http://disinfectants.defra.gov.uk>
- Biocides that are authorised for sale and use in the UK under the Biocidal Products Regulation (BPR, Regulation (EU) 528/2012) can be at: https://echa.europa.eu/documents/10162/27434452/art_95_list_en.pdf

In addition:

- Recommended application rates and/or contact times may vary according to the surfaces to be treated (see product labels). Minimum contacts times of 10-15 minutes are usually required to kill target bacteria, although bacteria in biofilms or dried vegetable matter may remain protected from chemical activity.
- Some disinfectants can be applied as dips, fogs or foams for which application rates usually differ from spray treatments.
- Some disinfectants are potentially corrosive to certain surface materials (see product labels).

Currently Approved Disinfectants:

Disinfectants currently approved for sale in the UK, as at June 2019, with expected activity against *Clavibacter sepedonicus*, *Ralstonia solanacearum*, *Dickeya* spp. and *Pectobacterium* spp. include:

- Chlorine-based products with at least 1% active chlorine (e.g. hypochlorite bleaches)
- Stabilised chlorine dioxide (e.g. Purogene®, Clorious₂®)
- Chloramides (e.g. Halamid®)
- Iodine-based products (e.g. Fam-30®, Virophor®, Iodo-pharm®, Virudine®, Deosan Iodel FD®)
- Peroxide/peracetic acid/peroxyacetic acid/peroxygen -based products (e.g. Virex®, HPPA®, Jet-5®, Sanprox-P®, Vanodox®, Virkon S®)
- Organic acids (e.g. Menno-Florades®; Menno-Clean®)
- Gluteraldehyde-based products (e.g. Unifect-G®, Korsolin®, Virakil®)
- Quaternary ammonium- based products (e.g. Ambicide®, Bardac 22®, Hortisept Pro®, Vitafect®)

Background Information on Experimental Validation of Disinfectants:

Kaponen *et al.* (1992) demonstrated that effective control of different bacterial pathogens varied according to the disinfectant used and the surface material treated. Good control of the ring rot bacterium (*Clavibacter sepedonicus*) was achieved after 20 minutes contact at room temperature with peroxygen-, iodine- or glutaraldehyde-based disinfectants, applied on plastic, wood or metal surfaces. Quaternary ammonium disinfectants were less effective, especially in the presence of organic peat. Iodine-based disinfection was also the most effective against the blackleg bacterium *Pectobacterium atrosepticum* on all surfaces and in the presence of organic peat. In this case, quaternary ammonium disinfectants were only effective at high doses on clean plastic surfaces, whereas peroxygen and glutaraldehyde disinfection was least effective.

Czajkowski *et al.* (2013) showed good levels of control of the blackleg pathogen *Dickeya solani* with various disinfectants, including 1 % sodium hypochlorite, 5 % peracetic acid, 10 % hydrogen peroxide and 1 % benzoic acid (MennoClean®), when applied in axenic cultures for at least 5 mins. All except the hydrogen peroxide treatment effectively killed *D. solani* when mixed with homogenised potato tuber tissue.

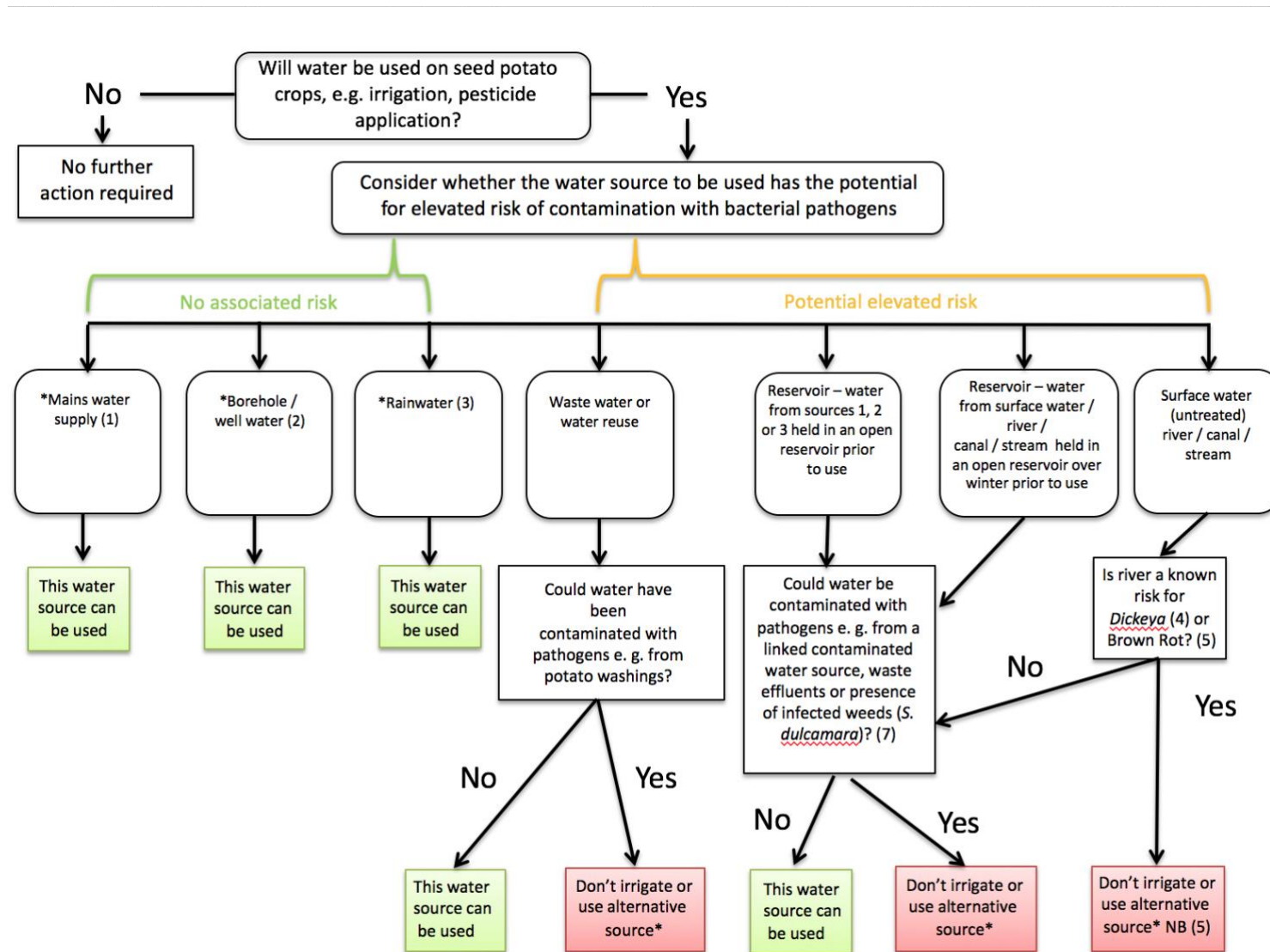
More recently, Howard *et al.* (2015) compared efficacy of three disinfectants on biofilms of *C. sepedonicus* on surface materials typically found in commercial potato storage facilities. Sodium hypochlorite was the most effective disinfectant on wood and hydrogen peroxide was best on mild steel whereas efficacies of hypochlorite, hydrogen peroxide or quaternary ammonium disinfectants were not significantly different on concrete, rubber or polycarbonate surfaces. Only hydrogen peroxide was able to achieve effective disinfection (3 log reduction in bacterial viable count) on all five surfaces when applied at 0.27% hydrogen peroxide. Their results clearly showed that plant pathogenic bacteria in the biofilm state, particularly when spread and dried onto surfaces of agricultural machines and other equipment, are very resistant to a range of commonly applied disinfectants.

Disinfectant efficacy was also recently tested against *Clavibacter sepedonicus* on wooden potato storage crates smeared with infected potato tuber pulp containing a high inoculum (Stevens *et al.*, 2017). Effective control was achieved by dipping for 1-2 min in the hypochlorite-releasing chloramide (1% Halamid®), for 2-5 min in pentapotassium bis(peroxymonosulphate) bis(sulphate) (1% Virkon S®) or for 5-10 min in either the quaternary ammonium disinfectant didecyldimethylammoniumchloride (0.3% Bardac 22®) or in benzoic acid-based disinfectant (2% MennoClean®). It was also possible to achieve disinfection of contaminated wooden crates in a commercial crate washer that combined the disinfection process with biofilm disruption by power jet cleaning.

References

1. Czajkowski, R., de Boer, W.J. & van der Wolf, J.M. (2013) Chemical disinfectants can reduce potato blackleg caused by *Dickeya solani*. Eur. J. Plant Pathol. 136: 419. <https://doi.org/10.1007/s10658-013-0177-8>
2. EPPO (2006) Disinfection procedures in potato production. Bulletin OEPP/EPPO Bulletin 36, 463– 466.
3. Howard, R.J., Harding, M.W., Daniels, G.C., Mobbs, S.L., Lisowski S.L.I. and De Boer S.H. (2015) Efficacy of agricultural disinfectants on biofilms of the bacterial ring rot pathogen, *Clavibacter michiganensis* subsp. *sepedonicus*, Canadian Journal of Plant Pathology, 37:3, 273-284, DOI: 10.1080/07060661.2015.1078413
4. Koponen, H., Manninen, M., Harju, P., Avikainen, H. and Tahvone, R. (1992) The effect of disinfectants on *Clavibacter michiganensis* subsp. *sepedonicus* and *Erwinia carotovora* subsp. *atroseptica* on different surface materials. Agric. Sci. Finl. 1; 597-602.
5. Olsen, N., & Nolte, P. (2011) Cleaning and Disinfecting Potato Equipment and Storage Facilities. University of Idaho Extension CIS 1180. Moscow, ID: University of Idaho Extension. <http://www.cals.uidaho.edu/edComm/pdf/CIS/CIS1180.pdf>.
6. Stevens, L.H., Lamers, J.G., van der Zouwen, P.S. et al. (2017) Chemical Eradication of the Ring Rot Bacterium *Clavibacter michiganensis* subsp. *sepedonicus* on Potato Storage Crates Potato Res. 60: 145. <https://doi.org/10.1007/s11540-017-9342-3>

Appendix 2: Decision tree for the risk assessment of water use on a Safe Haven Production Unit (New)



**Notes to decision tree for the risk assessment of water for use on seed and ware potatoes on a
Safe Haven Assured Production Unit**



Water can be used on seed potato crops.



Water with high disease risk. Do not use on seed potato crops

1. Where mains water is stored in an open reservoir prior to use then see point (6)
2. Water taken from borehole or well point that is either applied directly to the crops or stored in a reservoir prior to application. Where water is stored in a reservoir see point (6)
3. Rainwater (collected from rainwater or snow and sometimes known as rainwater harvesting) captured from building roofs etc.
4. No systematic river surveys are carried out for *Dickeya* spp. in England and Wales.
Current information from surveys conducted in Scotland may be obtained from:
<http://www.gov.scot/Topics/farmingrural/Agriculture/plant/18273/PotatoHealthControls/PotatoQuarantineDiseases/Dickeya>
5. Information on brown rot-designated rivers in England and Wales can be found here:
<https://www.gov.uk/guidance/plant-health-controls#quarantine-pests>
There are no currently brown rot-contaminated rivers designated in Scotland.
Growers considered at risk would be officially notified by Defra or Scottish Government.
Please note that it is **illegal** to irrigate solanaceous crops from water sources designated as contaminated with the brown rot bacterium.
A Defra Plant Health Factsheet offers for more information on potato brown rot in irrigation water
<https://planthealthportal.defra.gov.uk/assets/factsheets/irrigation-guidelines-factsheetformat-2017-final2.pdf>
6. Water abstracted during winter months (November to March), when pathogen populations are generally below detectable levels, can be stored and used for irrigation the following season, provided the banks of the reservoir/lagoon are kept free from *Solanum dulcamara*. For more information see Defra factsheet in point 5.
7. Information on weed hosts for brown rot can be found here:
<https://planthealthportal.defra.gov.uk/assets/factsheets/brownrot.pdf>

Appendix 3: Contractors Commitment Document (Revised)

Safe Haven Member's Name	
Safe Haven Business Name	
Safe Haven Membership Number	
Address	
Contractor's Name	
Contractor's Address	
Full details of Contractor's service, e.g. ploughing, spraying etc	

a) Contractor's Commitment

It is the responsibility of the Safe Haven Member to make known to the contractor any special conditions or work practises that are necessary as a consequence of the Safe Haven and Red Tractor Assurance for Farms standards and or associated protocols.

In the absence of any such information, the contractor will ensure that all contract work will be undertaken to a reasonable standard given the quality of the equipment and materials supplied by the grower.

In consequence we, the contractors, have read and understood the Safe Haven Standards and the relevant Red Tractor Assurance for Farms standards and associated protocols. We commit ourselves to abide by Statutory Requirements and phytosanitary procedures detailed therein.

b) Contractor's required documentation evidence:

When undertaking any services on a Safe Haven Assured Production Unit we will supply to the above member documentary evidence of:

- Contract and / or shared machinery and equipment records
- Cleaning and disinfection records for any contract and / or shared machinery before entry and use on the Safe Haven Assured production unit.
- That any water used on the Safe Haven Assured production unit meets the requirements of the water risk assessment.
- Water usage records showing date, source and volume of any water used.

c) Please confirm that either:

- Written instructions have been provided to the contractor by the Safe Haven member (attach a copy) or**
- A verbal briefing of requirements has been given to the contractor by the Safe Haven member**

Safe Haven member signature.....

Contractor's signature.....

Note: A duplicate copy of this document must be provided to the contractor.