



Department of  
**Primary Industries and  
Regional Development**

# Department of Primary Industries and Regional Development

**Submission:**

**Draft Review of Import Conditions for Brassicaceous Crop  
Seeds for Sowing into Australia**

**16 April 2018**



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## Introduction

Western Australia is naturally free from many quarantine pests that are present in other parts of Australia or other countries. Western Australia's geographical isolation in conjunction with its robust plant biosecurity system—including border quarantine checkpoints, inter and intrastate regulatory controls, industry and public awareness campaigns and surveillance programs—help maintain this status.

Plants and plant products may be imported into Western Australia subject to specified import conditions. This includes general import conditions and specific import conditions where appropriate for various commodities or pests. Underpinning these general and specific import conditions is the legislative requirement for potential carriers to be presented for inspection upon entry into Western Australia. The detection of any quarantine pests during an inspection results in remedial action.

Ongoing surveillance systems are also in operation within Western Australia. Operating alongside targeted surveillance is an effective passive surveillance program. Biosecurity concerns are communicated via a variety of platforms to growers and the wider community, ensuring public awareness of current issues, and results in suspect samples regularly submitted by the public for identification via the Department of Primary Industries and Regional Development (DPIRD) Diagnostic Laboratory Services Seed Testing and Certification Services or the Pest and Disease Information Service. Industry awareness and participation is achieved via programs such as HortGuard and GrainGuard, and includes the development of industry biosecurity plans and other extension material.

In maintaining Western Australia's freedom from quarantine pests DPIRD continues to take a strong interest in all biosecurity risk analyses and related documents and decisions made by the Australian Department of Agriculture and Water Resources.

## General Comments

**Comment 1:** DPIRD notes the deviation in methodology from past pest risk assessments in that the pest risk assessments have been approached as a single group assessment—encompassing all quarantine pests identified for the assessment of the probability of entry, establishment and spread—with the assessment of economic consequences being made for each individual pathogen. DPIRD acknowledges that this approach is appropriate given the nature of the crop seed pathway however, where any particular pathogen differs from the group assessment this should be highlighted.

**Comment 2:** DPIRD notes the following statements in the “Appendix 1: Pest categorisation – pathogens associated with representatives of the Brassicaceae family.”

*“Regional pests are considered further if they are absent from the region, or meet the International Plant Protection Convention requirements for official control in the region”*

This is followed by:

*“As Western Australia (WA) does not currently regulate the movement of brassicaceous crop seeds from the eastern states of Australia, and visual inspection on-arrival will not detect pathogens that do not produce visible symptoms on seed, declared regional pests of WA are not considered further in the pest categorisation process.”*

However, the initial statement indicates that regional pests will be considered further if they are absent from the region, **OR** meet the IPPC definition of official control. It is not indicated that the pest must be absent and meet the IPPC definition of official control.

Further, the application of phytosanitary measures occurs if the unrestricted risk estimate (URE) of a pest on a particular pathway is shown to exceed Western Australia’s acceptable level of protection (ALOP), generally after undertaking a risk assessment. The absence of measures on a particular pathway may be due to a risk assessment not having been completed yet for that pathway or the URE having been assessed as not exceeding WA’s ALOP. Lack of phytosanitary measures on a specific pathway does not indicate that a pest is either present in the region or that official control is not in place as other pathways exceeding ALOP for that pest may be regulated.

**Comment 3:** DPIRD notes the following pests have been recognised as regional pests in WA but they are not considered further. The reason provided is that they are present in Australia, but not under official control.

1. *Pseudomonas marginalis* pv. *marginalis* (Brown 1918) Stevens 1925 (no pathway association found)
2. *Alternaria japonica* Yoshii (1941)
3. *Fusarium oxysporum* f. sp. *conglutinans* (Wollenw.) Snyder & Hansen (1940)
4. *Fusarium poae* (Peck) Wollenw. (1913)
5. *Pythium deliense* Meurs (1934) (no pathway association found)
6. *Valsaria insitiva* (Tode: Fr.) Ces. & De Not. (1863) (no pathway association found)
7. *Ditylenchus dipsaci* (Kühn 1857) Filipjev 1936 (no pathway association found)

8. *Heterodera cruciferae* (Franklin 1945) Skarbilovich 1959 (no pathway association found)
9. *Radopholus similis* (Cobb 1893) Thorne 1949 (no pathway association found)
10. *Arabid mosaic virus* (ArMV)

It is noted that some of these pathogens are not associated with Brassicaceae seed pathway, and hence would not be considered further in the pest categorisation process. Therefore, they would not be subject to a pest risk assessment and application of phytosanitary measures on the Brassicaceae seed pathway.

**Comment 4:** A number of Brassicaceae seed species listed in *Table 1. Brassicaceous crops under review* are regulated as a prohibited organisms under s. 12 of the BAM Act 2007; and their entry into Western Australia is restricted under s. 15(1), or are unlisted organisms (s. 14) and their entry into Western Australia is restricted under s. 15(2) of the BAM Act 2007. These include:

1. *Brassica elongata* Ehrh. (prohibited s. 12)
2. *Lepidium campestre* (L.) W. T. Aiton (prohibited s. 12)
3. *Lepidium ruderae* L. (prohibited s. 12)
4. *Lepidium squamatum* Forssk. (unlisted s. 14)
5. *Lepidium virginicum* L. (unlisted s. 14)
6. *Nasturtium microphyllum* Boenn. ex Rchb. (unlisted s. 14)
7. *Rorippa islandica* (Oeder) Borbas (unlisted s. 14)
8. *Sinapis eruroides* (current name = *Diploaxis eruroides* (L.) DC. , prohibited s. 12)

**Recommendation 1:** That pests for which regional freedoms exist for Western Australia be considered further in the pest categorisation process as per the statement in “Appendix 1: Pest categorisation – pathogens associated with representatives of the Brassicaceae family”:

*“Regional pests are considered further if they are absent from the region, or meet the International Plant Protection Convention requirements for official control in the region”*

**Recommendation 2:** DPIRD requests to be given the opportunity to present a case to support the national status of ‘Present: subject to official control’ for pests where regional freedom is recognised for Western Australia to support the pest categorisation process and subsequent pest risk assessment where the pest is a categorised as a quarantine pest associated with that pathway.

## Pathology comments regarding the pest categorisation

*Pseudomonas syringae* pv. *alisalensis* Cintas et al. 2000 [Pseudomonadales: Pseudomonadaceae]

**Comment 1:** *Pseudomonas syringae* pv. *alisalensis* is an unlisted organism (s. 14) and its entry into Western Australia is restricted under s. 15(2) of the BAM Act 2007. The reference provided for presence in Australia (Persley et al. 2010) doesn't specify *P. syringae* pv. *alisalensis* as the causing pathogen of the bacterial blight in rocket in Australia. Bull and Rubio (2011) reported bacterial blight of crucifers caused by *P. syringae* pv. *alisalensis* with the samples sourced from New South Wales. No records for *P. syringae* pv. *alisalensis* could be found for Western Australia.

**Comment 2:** *Pseudomonas cannabina* (ex Sutic & Dowson 1959) Garden et al. 1999 emend Bull et al. 2010) is listed as a synonym of *P. syringae* pv. *alisalensis* in the pest categorisation. However, there appears to be confusion over the taxonomy of this pathogen. Bull et al. (2010) moved *P. syringae* pv. *alisalensis* to an emended description of *P. cannabina* as a pathovar, *P. cannabina* pv. *alisalensis*, therefore *P. syringae* pv. *alisalensis* should be listed as a synonym of *P. cannabina* pv. *alisalensis*.

**Comment 3:** *Pseudomonas syringae* pv. *alisalensis* is seed-borne (Koike et al. 2006) indicating that it has potential to be on the seed pathway.

**Comment 4:** *Pseudomonas syringae* pv. *alisalensis* may cause bacterial blight of broccoli, broccoli raab and arugula (Koike et al. 2006) indicating that it has the potential for economic consequences.

**Recommendation 1:** Reference for Australia presence should be changed from (Persley et al. 2010) to (Bull & Rubio 2011).

**Recommendation 2:** Taxonomy of *Pseudomonas syringae* pv. *alisalensis* should be reviewed and the correct name of the pathogen should be listed.

**Recommendation 3:** As *P. syringae* pv. *alisalensis* is considered absent from Western Australia and has the potential for economic consequences, it has been recommended to be regulated as a prohibited organism under s. 12 of the BAM Act 2007. DPIRD requests that it be considered a regional pest for Western Australia, noting its entry into Western Australia is currently restricted under s. 15(2) of the BAM Act 2007.

**Recommendation 4:** *Pseudomonas syringae* pv. *alisalensis* has potential to be on the pathway (Koike et al. 2006). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for *P. syringae* pv. *alisalensis* to be on the pathway should be assessed as "Yes".

**Recommendation 5:** Koike et al. (2006) indicates that *P. syringae* pv. *alisalensis* has potential for economic consequences and DPIRD suggests that this criterion be rated 'Yes'.

**Recommendation 6:** DPIRD requests that *P. syringae* pv. *alisalensis* be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate.

**Recommendation 7:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

*Rhodococcus fascians* (Tilford 1936) Goodfellows 1984 [Actinomycetales:  
Nocardiaceae]

**Comment 1:** *Rhodococcus fascians* is an unlisted organism (s. 14) and its entry into Western Australia is restricted under s. 15(2) of the BAM Act 2007. The reference provided for presence in Australia (Pilkington et al. 2003) provides a record for New South Wales, and no records for *R. fascians* could be found for Western Australia.

**Comment 2:** *Rhodococcus fascians* is found seed borne in *Nasturtium* (Putnam & Miller 2007; Aysan & Horuz 2015) indicating that it has potential to be on the seed pathway.

**Comment 3:** *Rhodococcus fascians* may cause high economic damage in ornamental plants and other horticultural and greenhouse crops are vulnerable as well including brassicas Kannan et al. (2015) indicating that it has the potential for economic consequences.

**Recommendation 1:** As *R. fascians* is considered absent from Western Australia and has the potential for economic consequences, it has been recommended to be regulated as a prohibited organism under s. 12 of the BAM Act 2007. DPIRD requests that it be considered a regional pest for Western Australia, noting its entry into Western Australia is currently restricted under s. 15(2) of the BAM Act 2007.

**Recommendation 2:** *Rhodococcus fascians* has potential to be on the pathway (Aysan & Horuz 2015). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for *R. fascians* to be on the pathway should be assessed as “Yes”.

**Recommendation 3:** Kannan et al. (2015) indicates that *R. fascians* has potential for economic consequences and DPIRD suggests that this criterion be rated ‘Yes’.

**Recommendation 4:** DPIRD requests that *R. fascians* be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate.

**Recommendation 5:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

*Xanthomonas campestris* pv. *aberrans* (Knosel 1961) Dye 1978 [Xanthomonadales:  
Xanthomonadaceae]

**Comment 1:** *Xanthomonas campestris* pv. *aberrans* is an unlisted organism (s. 14) and its entry into Western Australia is restricted under s. 15(2) of the BAM Act 2007. The reference provided for presence in Australia (Tesoriero 2004) provides a record for Queensland, and no records for *X. campestris* pv. *aberrans* could be found for Western Australia.

**Comment 2:** *Xanthomonas campestris* pv. *aberrans* is a seed-borne pathogen of crucifers (Berg et al. 2005) indicating that it has potential to be on the seed pathway.

**Comment 3:** *Xanthomonas campestris* pv. *aberrans* is one of the six recognised pathovars which may cause black rot and leaf spot disease of crucifers (Berg et al. 2005) indicating that it has the potential for economic consequences.

**Recommendation 1:** As *X. campestris* pv. *aberrans* is considered absent from Western Australia and has the potential for economic consequences, it has been recommended to be regulated as a prohibited organism under s. 12 of the BAM Act 2007. DPIRD requests that it be considered a regional pest for Western Australia, noting its entry into Western Australia is currently restricted under s. 15(2) of the BAM Act 2007.

**Recommendation 2:** *Xanthomonas campestris* pv. *aberrans* has potential to be on the pathway (Berg et al. 2005). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for *X. campestris* pv. *aberrans* to be on the pathway should be assessed as “Yes”.

**Recommendation 3:** Berg et al. (2005) indicates that *X. campestris* pv. *aberrans* has potential for economic consequences and DPIRD suggests that this criterion be rated ‘Yes’.

**Recommendation 4:** DPIRD requests that *X. campestris* pv. *aberrans* be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate.

**Recommendation 5:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

#### *Xanthomonas campestris* pv. *armoraciae* (McCulloch 1929) Dye 1978 [Xanthomonadales: Xanthomonadaceae]

**Comment 1:** *Xanthomonas campestris* pv. *armoraciae* is an unlisted organism (s. 14) and its entry into Western Australia is restricted under s. 15(2) of the BAM Act 2007. The reference provided for presences in Australia (Conn & Rosenberger 2013; CABI 2017) provide no specific Australian states/territories, and no records for *X. campestris* pv. *armoraciae* could be found for Western Australia.

**Comment 2:** *Xanthomonas campestris* pv. *armoraciae* is reported as seed-borne in crucifers (Berg et al. 2005; Conn & Rosenberger 2013) indicating that it has potential to be on the seed pathway.

**Comment 3:** *Xanthomonas campestris* pv. *armoraciae* is one of the six recognised pathovars which may cause black rot and leaf spot disease of crucifers (Berg et al. 2005) indicating that it has the potential for economic consequences.

**Recommendation 1:** As *X. campestris* pv. *armoraciae* is considered absent from Western Australia and has the potential for economic consequences, it has been recommended to be regulated as a prohibited organism under s. 12 of the BAM Act 2007.

DPIRD requests that it be considered a regional pest for Western Australia, noting its entry into Western Australia is currently restricted under s. 15(2) of the BAM Act 2007.

**Recommendation 2:** *Xanthomonas campestris* pv. *armoraciae* has potential to be on the pathway (Berg et al. 2005; Conn & Rosenberger 2013). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for *X. campestris* pv. *armoraciae* to be on the pathway should be assessed as “Yes”.

**Recommendation 3:** Berg et al. (2005) indicates that *X. campestris* pv. *armoraciae* has potential for economic consequences and DPIRD suggests that this criterion be rated ‘Yes’.

**Recommendation 4:** DPIRD requests that *X. campestris* pv. *armoraciae* be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate.

**Recommendation 5:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

#### *Xanthomonas campestris* pv. *raphani* (White 1930) Dye 1978 [Xanthomonadales: Xanthomonadaceae]

**Comment 1:** *Xanthomonas campestris* pv. *raphani* is an unlisted organism (s. 14) and its entry into Western Australia is restricted under s. 15(2) of the BAM Act 2007. The reference provided for presence in Australia (Tesoriero 2016) provides no specific Australian states/territories, and no records for *X. campestris* pv. *raphani* could be found for Western Australia.

**Comment 2:** *Xanthomonas campestris* pv. *raphani* is reported as seed-borne in crucifers (Berg et al. 2005) indicating that it has potential to be on the seed pathway.

**Comment 3:** *Xanthomonas campestris* pv. *raphani* is one of the six recognised pathovars which may cause black rot and leaf spot disease of crucifers (Berg et al. 2005) indicating that it has the potential for economic consequences.

**Recommendation 1:** As *X. campestris* pv. *raphani* is considered absent from Western Australia and has the potential for economic consequences, it has been recommended to be regulated as a prohibited organism under s. 12 of the BAM Act 2007. DPIRD requests that it be considered a regional pest for Western Australia, noting its entry into Western Australia is currently restricted under s. 15(2) of the BAM Act 2007.

**Recommendation 2:** *Xanthomonas campestris* pv. *raphani* has potential to be on the pathway (Berg et al. 2005). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for *X. campestris* pv. *raphani* to be on the pathway should be assessed as “Yes”.

**Recommendation 3:** Berg et al. (2005) indicates that *X. campestris* pv. *raphani* has potential for economic consequences and DPIRD suggests that this criterion be rated ‘Yes’.

**Recommendation 4:** DPIRD requests that *X. campestris* pv. *raphani* be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate.

**Recommendation 5:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

#### *Alternaria cheiranthi* (Lib.) Bolle (1924) [Pleosporales: Pleosporaceae]

**Comment 4:** *Alternaria cheiranthi* is an unlisted organism (s. 14) and its entry into Western Australia is restricted under s. 15(2) of the BAM Act 2007. The reference provided for presence in Australia (Plant Health Australia 2001) provides a record for New South Wales, and no records for *A. cheiranthi* could be found for Western Australia.

**Comment 5:** *Alternaria cheiranthi* can penetrate the pod and infect seeds in crucifers (Neergaard 1977) indicating that it has potential to be on the seed pathway.

**Comment 6:** *Alternaria cheiranthi* is one of the four *Alternaria* species which cause *Alternaria* blight in crucifers and is common on wallflowers (Saharan et al. 2016) indicating that it has the potential for economic consequences.

**Recommendation 1:** As *A. cheiranthi* is considered absent from Western Australia and has the potential for economic consequences, it has been recommended to be regulated as a prohibited organism under s. 12 of the BAM Act 2007. DPIRD requests that it be considered a regional pest for Western Australia, noting its entry into Western Australia is currently restricted under s. 15(2) of the BAM Act 2007.

**Recommendation 2:** *Alternaria cheiranthi* has potential to be on the pathway (Neergaard 1977). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for *A. cheiranthi* to be on the pathway should be assessed as “Yes”.

**Recommendation 3:** Saharan et al. (2016) indicates that *A. cheiranthi* has potential for economic consequences and DPIRD suggests that this criterion be rated ‘Yes’.

**Recommendation 4:** DPIRD requests that *A. cheiranthi* be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate.

**Recommendation 5:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

#### *Alternaria japonica* Yoshii (1941) [Pleosporales: Pleosporaceae]

**Comment 1:** *Alternaria japonica* is listed as present in Australia and recognised by the Commonwealth as a regional pest for Western Australia; however, it was not considered further with the reason provided that “it is not under official control”.

**Comment 2:** *Alternaria* species are seed borne pathogens in brassicas (Rimmer et al. 2007) indicating it has potential to be on the seed pathway.

**Comment 3:** *Alternaria japonica* causes *Alternaria* diseases and is mainly associated with black spot of radish (Rimmer et al. 2007) indicating that it has potential for economic consequences.

**Recommendation 1:** *Alternaria japonica* has potential to be on the pathway (Rimmer et al. 2007). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for *A. japonica* to be on the pathway should be assessed as “Yes”.

**Recommendation 2:** Rimmer et al. (2007) indicates that *A. japonica* has potential for economic consequences and DPIRD suggests that this criterion be rated ‘Yes’.

**Recommendation 3:** DPIRD requests that *A. japonica* be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate based on the comments and recommendations provided in the General Comments section above.

**Recommendation 4:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

#### *Calonectria morganii* Crous et al. (1993) [Hypocreales: Nectriaceae]

**Comment 1:** DPIRD now considers *Calonectria morganii* an exotic to Australia, as all previous Australian isolates were misidentified and most records of *C. morganii* (under name of *Cylindrocladium scoparium*) outside mainland USA are now believed to be *Cylindrocladium pauciramosum* (synonym *Calonectria pauciramosa*) (Crous 2002), although testing of each misidentified isolate would be required.

**Comment 2:** To date there is no available evidence demonstrating that *C. morganii* is seed-borne in these hosts.

**Recommendation 1:** Records of *Calonectria morganii* and its related *Cylindrocladium* species be clarified where possible.

**Recommendation 2:** *Calonectria morganii* should be treated as an exotic to Australia as explained by (Lombard et al. 2010), but no further assessment need be considered in the pest categorisation table as no evidence of seed pathway association in brassicaceous crops has been available.

**Recommendation 3:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

#### *Cercospora brassicicola* Henn. (1906) [Capnodiales: Mycosphaerellaceae]

**Comment 1:** *Cercospora brassicicola* is an unlisted organism (s. 14) and its entry into Western Australia is restricted under s. 15(2) of the BAM Act 2007. The reference

provided for presence in Australia (Simmonds 1966) provides a record for Queensland, and no records for *C. brassicicola* could be found for Western Australia.

**Comment 2:** *Cercospora bloxamii* Berk. & Broome is listed as a synonym of *C. brassicicola* in Appendix 1. However, *Cercospora bloxamii* is not believed to be a synonym of *C. brassicicola*, rather it is a synonym of the *Alternaria brassicae* based on Simmons (2007) and Robert et al. (2005).

**Comment 3:** *Cercospora brassicicola* can be seed-borne in crucifers (Conn & Rosenberger 2013) indicating that it has potential to be on the seed pathway.

**Comment 4:** *Cercospora brassicicola* causes a leaf spot of many *Brassica* species, *Cichorium* species and *Raphanus sativus* (Farr & Rossman 2018) indicating that it has the potential for economic consequences.

**Recommendation 1:** As *C. brassicicola* is considered absent from Western Australia and has the potential for economic consequences, it has been recommended to be regulated as a prohibited organism under s. 12 of the BAM Act 2007. DPIRD requests that it be considered a regional pest for Western Australia, noting its entry into Western Australia is currently restricted under s. 15(2) of the BAM Act 2007.

**Recommendation 2:** The synonym *Cercospora bloxamii* Berk. & Broome should be deleted from the listed name.

**Recommendation 3:** *Cercospora brassicicola* has potential to be on the pathway (Conn & Rosenberger 2013). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for *C. brassicicola* to be on the pathway should be assessed as “Yes”.

**Recommendation 4:** Farr and Rossman (2018) indicates that *C. brassicicola* has potential for economic consequences and DPIRD suggests that this criterion be rated ‘Yes’.

**Recommendation 5:** DPIRD requests that *C. brassicicola* be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate.

**Recommendation 6:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

#### *Fusarium oxysporum* f. sp. *conglutinans* (Wollenw.) Snyder & Hansen (1940) [Hypocreales: Nectriaceae]

**Comment 1:** *Fusarium oxysporum* f. sp. *conglutinans* is listed as present in Australia and recognised by the Commonwealth as a regional pest for Western Australia; however, it was not considered further with the reason provided that “it is not under official control”.

**Comment 2:** *Fusarium oxysporum* f. sp. *conglutinans* is a soilborne pathogen but purchase of seeds from a reputable sources is recommended in management (Rimmer et al. 2007) implying it has potential to be on the seed pathway.

**Comment 3:** *Fusarium oxysporum f. sp. conglutinans* causes Fusarium Wilt in a range of brassicaceous crops (Rimmer et al. 2007) indicating that it has potential for economic consequences.

**Recommendation 1:** *Fusarium oxysporum f. sp. conglutinans* has potential to be on the pathway (Rimmer et al. 2007). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for *F. oxysporum f. sp. conglutinans* to be on the pathway should be assessed as “Yes”.

**Recommendation 2:** Rimmer et al. (2007) indicates that *F. oxysporum f. sp. conglutinans* has potential for economic consequences and DPIRD suggests that this criterion be rated ‘Yes’.

**Recommendation 3:** DPIRD requests that *F. oxysporum f. sp. conglutinans* be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate based on the comments and recommendations provided in the General Comments section above.

**Recommendation 4:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

### *Fusarium poae* (Peck) Wollenw. (1913) [Hypocreales: Nectriaceae]

**Comment 1:** *Fusarium poae* is listed as present in Australia and recognised by the Commonwealth as a regional pest for Western Australia; however, it was not considered further with the reason provided that “it is not under official control”.

**Comment 2:** *Fusarium poae* is isolated from oilseed spring rape seeds (Kurowski et al. 2009) indicating it has potential to be on the seed pathway.

**Comment 3:** *Fusarium poae* is one of the pathogens causing *Fusarium* head blight, one of the diseases that cause significant yield loss in several crops worldwide such as wheat, maize, oat, barley and rice (Leplat et al. 2013) indicating that it has potential for economic consequences.

**Recommendation 1:** *Fusarium poae* has potential to be on the pathway (Kurowski et al. 2009). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for *F. poae* to be on the pathway should be assessed as “Yes”.

**Recommendation 2:** Leplat et al. (2013) indicates that *F. poae* has potential for economic consequences and DPIRD suggests that this criterion be rated ‘Yes’.

**Recommendation 3:** DPIRD requests that *F. poae* be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate based on the comments and recommendations provided in the General Comments section above.

**Recommendation 4:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

### *Peronospora lepidii* (McAlpine) Wilson (1914) [Peronosporales: Peronosporaceae]

**Comment 1:** *Peronospora lepidii* is an unlisted organism (s. 14) and its entry into Western Australia is restricted under s. 15(2) of the BAM Act 2007. The reference provided for presence in Australia (Farr & Rossman 2017) provides a record for Victoria, and no records for *P. lepidii* could be found for Western Australia.

**Comment 2:** *Peronospora lepidii* can infect pods of crop species in the Brassicaceae family, and there is some evidence the pathogen may be seed-borne (Koike et al. 2006) indicating that it has potential to be on the seed pathway.

**Comment 3:** *Peronospora lepidii* may cause diseases in garden cress, which is considered a serious risk to production of this crop (Soylu et al. 2017) indicating that it has the potential for economic consequences.

**Comment 4:** Except for the listed synonym *Perofascia lepidii* (McAlpine) Constant, another synonym *Peronospora parasitica* var. *lepidii* has been found in Robert et al. (2005) and been used in the literature (Koike et al. 2006).

**Recommendation 1:** As *P. lepidii* is considered absent from Western Australia and has the potential for economic consequences, it has been recommended to be regulated as a prohibited organism under s. 12 of the BAM Act 2007. DPIRD requests that it be considered a regional pest for Western Australia, noting its entry into Western Australia is currently restricted under s. 15(2) of the BAM Act 2007.

**Recommendation 2:** *Peronospora lepidii* has potential to be on the pathway (Koike et al. 2006). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for *P. lepidii* to be on the pathway should be assessed as “Yes”.

**Recommendation 3:** Soylu et al. (2017) indicates that *P. lepidii* has potential for economic consequences and DPIRD suggests that this criterion be rated ‘Yes’.

**Recommendation 4:** DPIRD requests that *P. lepidii* be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate.

**Recommendation 5:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

**Recommendation 6:** The following synonym should be added to the pathogen name: *Peronospora parasitica* var. *lepidii* McAlpine (1895) (Robert et al. 2005).

### *Pyrenopeziza brassicae* Sutton & Rawl. (1979) [Helotiales: Dermateaceae]

**Comment 1:** *Pyrenopeziza brassicae* is listed as present in Australia, however, it is absent from Western Australia and regulated as a prohibited organism under s. 12 of the BAM Act 2007; and its entry into Western Australia is restricted under s. 15(1).

**Comment 2:** *Pyrenopeziza brassicae* has been found associated with brassica seeds (Maddock & Ingram 1981; Richardson 1990) indicating it has potential to be on the seed pathway.

**Comment 3:** *Pyrenopeziza brassicae* causes light leaf spot in brassicas reducing marketability and yields, killing infected seedlings (Rimmer et al. 2007) indicating that it has potential for economic consequences.

**Recommendation 1:** As *P. brassicae* is a regulated pest for Western Australia, DPIRD requests that it is recognised as a regional pest for Western Australia.

**Recommendation 2:** *Pyrenopeziza brassicae* has potential to be on the pathway (Maddock & Ingram 1981; Richardson 1990). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for *P. brassicae* to be on the pathway should be assessed as “Yes”.

**Recommendation 3:** Rimmer et al. (2007) indicates that *P. brassicae* has potential for economic consequences and DPIRD suggests that this criterion be rated ‘Yes’.

**Recommendation 4:** DPIRD requests that *P. brassicae* be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate.

**Recommendation 5:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

#### *Arabis mosaic virus* (ArMV) [Secoviridae: Nepovirus]

**Comment 1:** *Arabis mosaic virus* (ArMV) is listed as present in Australia and recognised by the Commonwealth as a regional pest for Western Australia; however, it was not considered further with the reason provided that “*it is not under official control*”.

**Comment 2:** ArMV could infect *Capsella* seeds (Murant & Lister 1967), another genus in the family Brassicaceae, indicating it has potential to be on the seed pathway.

**Comment 3:** ArMV causes Chlorotic Stunt, a severe lettuce disease (Walkey 1967) indicating that it has potential for economic consequences.

**Recommendation 1:** ArMV has potential to be on the pathway (Richardson 1990). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for ArMV to be on the pathway should be assessed as “Yes”.

**Recommendation 2:** Walkey (1967) indicates that ArMV has potential for economic consequences and DPIRD suggests that this criterion be rated ‘Yes’.

**Recommendation 3:** DPIRD requests that ArMV be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate based on the comments and recommendations provided in the General Comments section above.

**Recommendation 4:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

#### *Broad bean wilt virus* (BBWV) [Secoviridae: Fabavirus]

**Comment 1:** *Broad bean wilt virus* (BBWV) is listed as present in Australia, however, it is absent from Western Australia and regulated as a prohibited organism under s. 12 of the BAM Act 2007; and its entry into Western Australia is restricted under s. 15(1).

**Comment 2:** To date there is no available evidence demonstrating that BBWV is seed-borne in brassicaceous crops.

**Recommendation 1:** As BBWV is a regulated pest for Western Australia, DPIRD requests that it is recognised as a regional pest for Western Australia.

**Recommendation 2:** Add the following statement to “Potential to be on the pathway” in the Categorisation table:

“No: To date there is no available evidence demonstrating that this virus is seed-borne in this host.”

### *Tobacco streak virus* (TSV) [Bromoviridae: Ilarvirus]

**Comment 1:** *Tobacco streak virus* (TSV) is listed as present in Australia, however, it is absent from Western Australia and regulated as a prohibited organism under s. 12 of the BAM Act 2007; and its entry into Western Australia is restricted under s. 15(1).

**Comment 2:** TSV is a seedborne virus found in the infected wild radish (*Raphanus raphanistrum*) (Cupertino et al. 1984) indicating it has potential to be on the seed pathway.

**Comment 3:** TSV causes stem and leaf necrosis and ring spotting of fruit in tomato (Cupertino et al. 1984) indicating that it has potential for economic consequences.

**Recommendation 1:** As TSV is a regulated pest for Western Australia, DPIRD requests that it is recognised as a regional pest for Western Australia.

**Recommendation 2:** TSV has potential to be on the pathway (Cupertino et al. 1984). To be consistent with ISPM 11 and the methodology outlined in the draft report, the potential for TSV to be on the pathway should be assessed as “Yes”.

**Recommendation 3:** Cupertino et al. (1984) indicates that TSV has potential for economic consequences and DPIRD suggests that this criterion be rated ‘Yes’.

**Recommendation 4:** DPIRD requests that TSV be considered further in the pest categorisation process to establish its quarantine pest status for this pathway; and, where appropriate, a risk assessment conducted to determine an unrestricted risk estimate.

**Recommendation 5:** DPIRD requests the opportunity to review and provide comments on any changes relating to Western Australia prior to the release of the provisional final policy review.

## References

- Aysan Y & Horuz S 2015, 'Plant Pathogenic Bacteria Control through Seed Application', in VR Kannan, KK Bastas (eds.), *Sustainable Approaches to Controlling Plant Pathogenic Bacteria*. CRC Press, p. 323.
- Berg T, Tesoriero L & Hailstones D 2005, PCR-based detection of *Xanthomonas campestris* pathovars in *Brassica* seed. *Plant Pathology*, **54**:416-427.

- Bull C & Rubio I 2011, First report of bacterial blight of crucifers caused by *Pseudomonas cannabina* pv. *alisalensis* in Australia. *Plant Disease*, **95**:1027-1027.
- Bull CT, Manceau C, Lydon J, Kong H, Vinatzer BA & Fischer-Le Saux M 2010, *Pseudomonas cannabina* pv. *cannabina* pv. nov., and *Pseudomonas cannabina* pv. *alisalensis* (Cintas Koike and Bull, 2000) comb. nov., are members of the emended species *Pseudomonas cannabina* (ex Šutič & Dowson 1959) Gardan, Shafik, Belouin, Brosch, Grimont & Grimont 1999. *Systematic and applied microbiology*, **33**:105-115.
- CABI 2017, Crop Protection Compendium, *Crop Protection Compendium* [online database]. CAB International (CABI), Wallingford, UK, available at <http://www.cabi.org/cpc/>. <<http://www.cabi.org/cpc/>> [2017].
- Conn KE & Rosenberger SA, (eds) 2013, *Crucifer disease guide: A practical guide for seedsmen, growers and agricultural advisors*. Seminis Vegetable Seeds Inc., California, USA.
- Crous PW 2002, *Taxonomy and pathology of Cyindrocladium (Calonectria) and allied genera*. American Phytopathological Society Press, St Paul, Minnesota.
- Cupertino F, Grogan R, Petersen L & Kimble K 1984, Tobacco streak virus infection of tomato and some natural weed hosts in California. *Plant Disease*, **68**:331-333.
- Farr DF & Rossman AY 2017, Systematic Mycology and Microbiology Laboratory, *Fungal Databases* [online database], Systematic Mycology and Microbiology Laboratory. United States Department of Agriculture: Agricultural Research Service. <<http://nt.ars-grin.gov/fungaldatabases/>> [2017].
- Farr DF & Rossman AY 2018, Systematic Mycology and Microbiology Laboratory, *Fungal Databases* [online database], Systematic Mycology and Microbiology Laboratory. United States Department of Agriculture: Agricultural Research Service. <<http://nt.ars-grin.gov/fungaldatabases/>> [2018].
- Kannan VR, Bastas KK & Devi RS 2015, 'Scientific and Economic Impact of Plant Pathogenic Bacteria', in VR Kannan, KK Bastas (eds.), *Sustainable Approaches to Controlling Plant Pathogenic Bacteria*, pp. 369-392.
- Koike ST, Gladders P & Paulus A 2006, *Vegetable diseases: A colour handbook*. CRC Press.
- Kurowski T, Majchrzak B & Kowalska E 2009, The effectiveness of the biological control of clubroot (*Plasmodiophora brassicae*) in brassicaceae plants. *Phytopathologia*, **52**:5-12.
- Leplat J, Friberg H, Abid M & Steinberg C 2013, Survival of *Fusarium graminearum*, the causal agent of *Fusarium* head blight. A review. *Agronomy for Sustainable Development*, **33**:97-111.
- Lombard L, Crous PW, Wingfield BD & Wingfield MJ 2010, Multigene phylogeny and mating tests reveal three cryptic species related to *Calonectria pauciramosa*. *Studies in Mycology*, **66**:15-30.
- Maddock SE & Ingram DS 1981, Studies of survival and longevity of the light leaf spot pathogen of brassicas, *Pyrenopeziza brassicae*. *Transactions of the British Mycological Society*, **77**:153-159.



- Murant A & Lister R 1967, Seed-transmission in the ecology of nematode-borne viruses. *Annals of Applied Biology*, **59**:63-76.
- Neergaard P 1977, *Seed pathology*. 1&2. The MacMillan Press Ltd, London.
- Persley D, Cooke T & House S 2010, *Diseases of vegetable crops in Australia*. CSIRO Publishing, Collingwood, Victoria.
- Pilkington LJ, Gibb KS, Gurr GM, Fletcher MJ, Nikandrow A, Elliott E, Ven Rvd & Read DMY 2003, Detection and identification of a phytoplasma from lucerne with Australian lucerne yellows disease. *Plant Pathology*, **52**:754-762.
- Putnam M & Miller M 2007, Rhodococcus fascians in herbaceous perennials. *Plant Disease*, **91**:1064-1076.
- Richardson MJ 1990, *An annotated list of seed-borne diseases*, 4th.
- Rimmer RS, Shattuck VI & Buchwaldt L (eds). 2007, *Compendium of Brassica diseases*. The American Phytopathological Society, St Paul, Minnesota.
- Robert V, Stegehuis G & Stalpers J 2005, The MycoBank engine and related databases, *The MycoBank engine and related databases* [online database]. <<http://www.mycobank.org/>> [2016].
- Saharan GS, Mehta N, Meena PD & Dayal P 2016, *Alternaria diseases of crucifers: biology, ecology and disease management*. Springer, Singapore.
- Simmonds JH 1966, *Host index of plant diseases in Queensland*. Queensland Department of Primary Industries, Brisbane.
- Simmons E 2007, *Alternaria: An Identification Manual*. APS Press.
- Soylu E, Kara M, Kurt Ş, Uysal A, Shin H, Choi Y & Soyly S 2017, First Report of Downy Mildew Disease Caused by Perofascia lepidii on Garden Cress Lepidium sativum in Turkey. *Plant Disease*, **101**:1827-1827.
- Tesoriero L 2004, *Improved management of black rot of brassicas*. Horticultural Australia Ltd, Sydney, Australia.
- Tesoriero L 2016, Diseases of leafy vegetables and herbs in Australia. *Acta Horticulturae*, **1123**:109-116.
- Walkey D 1967, Chlorotic stunt of lettuce caused by Arabis mosaic virus. *Plant Pathology*, **16**:20-22.