

California Pest Rating Profile for

Neofusicoccum protearum

(Denman & Crous) Crous, Slippers & A.J.L. Phillips 2006

Pest Rating: C

Kingdom: Fungi, Phylum: Ascomycota,
Subphylum: Pezizomycotina, Class: Dothideomycetes,
Order: Botryosphaeriales, Family: Botryosphaeriaceae

Comment Period: **07/21/2026 through 09/04/2026**

Initiating Event:

In 2016, as part of a regulatory nursery inspection, a Santa Barbara County agricultural biologist submitted a cut flower stem with leaf spots. The cut flower was identified as *Leucadendron* by CDFA botanist Robert Price. The leaf spots yielded *Neofusicoccum protearum* in culture for CDFA plant pathologist Suzanne Latham. The cut flowers were traced back to a grower in San Diego County. In the last 10 years, this pathogen has been detected from multiple *Leucadendron* species, including from the UCSC Arboretum in Santa Cruz County. It has also been intercepted by Santa Clara County agricultural inspectors on an incoming shipment of *Protea* from Hawaii. This pathogen has not been through the pest rating process. The risk to California from *Neofusicoccum protearum* is described herein, and a permanent rating is proposed.

History & Status:

Background:

Neofusicoccum protearum is an ascomycete fungus in the family Botryosphaeriaceae. The species was originally described as *Botryosphaeria protearum* with the anamorph *Fusicoccum protearum* from Proteaceae after Denman et al. 2003 examined 46 isolates of Botryosphaeria-like fungi from proteaceous hosts using morphology, culture characters, and ITS rDNA sequence data. The accepted name is *Neofusicoccum protearum* (Denman & Crous) Crous, Slippers & A.J.L. Phillips, and the synonyms *Botryosphaeria protearum* Denman and Crous and *Fusicoccum protearum* Denman and

Crous are listed by EPPO and Index Fungorum (Denman et al. 2003; Crous et al. 2006; EPPO 2026; Index Fungorum 2026).

Denman et al. (2003) reported *B. protearum* from South African Proteaceae in South Africa and from cultivated South African Proteaceae in Australia, Portugal, and the Madeira Islands. Marincowitz et al. (2008) later confirmed *N. protearum* from Proteaceae in Hawaii and Tenerife in the Canary Islands. The pathogen has also been reported from *Santalum acuminatum* in Australia, but the majority of detections are from Proteaceae (Denman et al. 2003; Marincowitz et al. 2008; Taylor et al. 2009).

The original description reported pseudothecial ascomata embedded in host tissue and pycnidial conidiomata, with hyaline, aseptate conidia that become irregularly fusoid when mature. Cultures grew below 5 degrees C and above 35 degrees C, had an optimum near 25 degrees C, and showed no growth at 40 degrees C (Denman et al. 2003). Members of the Botryosphaeriaceae can occur as endophytes or latent pathogens in woody plant tissues, and this biology is important for phytosanitary risk because infected plants may be asymptomatic when moved in trade (Slippers and Wingfield 2007; Marincowitz et al. 2008; Mehl et al. 2013).

Hosts: Most of the confirmed hosts are in Proteaceae. *Heteropyxis natalensis* (lavender tree), *Leucadendron* × *laureolum-salignum* (*Leucadendron* hybrid), *L. laureolum*, *L. salignum* (common sunshine conebush), *Leucadendron* sp. (conebush), *L. tinctum* (spicy cone-bush), *L. xanthoconus*, *L. conocarpodendron* (tree pincushion), *Protea* × *compacta-susannae* (*Protea* hybrid), *P. cynaroides* (king protea), *P. eximia* (duchess protea), *P. magnifica* (queen protea), *P. neriifolia* (oleander-leaf protea), *P. repens* (common sugarbush), *Protea* sp. (sugarbush), *Santalum acuminatum* (quandong), and *Serruria* sp. (spiderhead) (Farr et al., 2026; Taylor et al., 2009).

Symptoms: *Neofusicoccum protearum* causes cankers, shoot blight, branch dieback, and stem lesions on members of Proteaceae. Initial symptoms often include small, dark, sunken lesions on stems or branches that enlarge and become elongated. As infections progress, bark tissues become necrotic, stems may become girdled, and distal shoots wilt and die. Cross sections through affected stems typically reveal brown to dark brown discoloration of the vascular tissues. Under favorable conditions, black pycnidia develop within the dead bark and produce conidia that exude in tendrils during wet weather. Infections may lead to progressive dieback of branches and, in severe cases, death of entire plants, particularly when plants are stressed by drought, pruning, frost injury, or other environmental factors. Similar symptoms have also been reported from infected sandalwood (*Santalum acuminatum*), where the pathogen causes branch dieback and stem cankers (Denman et al. 2003; Crous et al. 2004; Taylor et al. 2009).

Transmission: The pathogen survives in infected woody tissues and in pycnidia formed on dead or dying branches. Conidia are dispersed primarily by splashing rain and irrigation water and infect hosts through fresh wounds, pruning cuts, insect injuries, or other damaged tissues. Long-distance movement occurs through the transport of infected nursery stock, cut flowers, propagation material, and other infected plant parts. As with other members of the Botryosphaeriaceae, infections may remain latent in apparently healthy plants until environmental stress favors disease development. Pruning tools may contribute to local spread if contaminated, although rain splash and infected

planting material are considered the principal means of dissemination (Denman et al. 2003; Slippers and Wingfield 2007; Mehl et al. 2013). Denman et al. (2003) noted there is global trade in protea cut flowers and germplasm, including seed and rooted cuttings, and Marincowitz et al. (2008) emphasized the latent nature of Botryosphaeriaceae in Proteaceae allows plants to move asymptotically. No evidence was found that *N. protearum* is seedborne.

Damage Potential: *Neofusicoccum protearum* is an important canker and dieback pathogen of cultivated proteas and other members of the Proteaceae. The pathogen reduces the quality and marketability of cut flowers by causing stem lesions, shoot dieback, and premature death of flowering stems. In nurseries, infections can result in significant losses due to plant mortality and reduced vigor, while landscape plantings may suffer chronic branch dieback and decline. The fungus has demonstrated the ability to infect multiple genera within the Proteaceae and has also been reported from unrelated hosts such as *Heteropyxis natalensis* and *Santalum acuminatum*, indicating some capacity for host expansion. Disease severity is greatest when plants are subjected to environmental stress, particularly drought or mechanical injury. Although the pathogen has not been associated with widespread forest mortality, it can cause economically significant losses in commercial protea production and ornamental plantings where susceptible hosts are grown (Denman et al. 2003; Crous et al. 2004; Taylor et al. 2009; Slippers and Wingfield 2007).

Worldwide Distribution: Africa: Canary Islands (Spain), South Africa. Europe: Portugal, Spain. North America: United States (California). Oceania: Australia, Hawaii (Farr et al., 2026; CDFA PDR Database, 2026).

Official Control: *Neofusicoccum protearum* is a quarantine pest for Hawaii but non-quarantine for CONUS (N. Mullaly, USDA, pers. comm.).

California Distribution: San Diego, Santa Barbara, and Santa Cruz counties, from nurseries and ornamental plantings (CDFA PDR database, 2026).

California Interceptions: There was one interception made by Santa Clara County agricultural inspectors on *Protea* flowers shipped from Maui in 2025 (CDFA PDR database).

The risk that *Neofusicoccum protearum* would pose to California is evaluated below.

Consequences of Introduction:

- 1) Climate/Host Interaction:** The fungus was originally associated with South African Proteaceae and has been reported from regions with Mediterranean, subtropical, and mild production environments. California has suitable managed environments for ornamental Proteaceae in container nurseries, landscapes, and where they are grown for cut flowers.

Evaluate if the pest would have suitable hosts and climate to establish in California.

Score: 2

- Low (1) Not likely to establish in California; or likely to establish in very limited areas.
- **Medium (2) may be able to establish in a larger but limited part of California.**
- High (3) likely to establish a widespread distribution in California.

2) Known Pest Host Range: Hosts are mainly in the family Proteaceae plus a few in other families.

Evaluate the host range of the pest.

Score: 2

- Low (1) has a very limited host range.
- **Medium (2) has a moderate host range.**
- High (3) has a wide host range.

3) Pest Reproductive Potential: *Neofusicoccum protearum* produces both sexual and asexual fruiting structures in host tissue, and Botryosphaeriaceae on Proteaceae can exist latently in apparently healthy tissues. Human-assisted dispersal is significant because Proteaceae move as cut flowers, rooted cuttings, and nursery or germplasm material, and infected material may be asymptomatic.

Evaluate the natural and artificial dispersal potential of the pest.

Score: 3

- Low (1) does not have high reproductive or dispersal potential.
- Medium (2) has either high reproductive or dispersal potential.
- **High (3) has both high reproduction and dispersal potential.**

4) Economic Impact: Damage potential is documented for commercial protea production.

Evaluate the economic impact of the pest on California using the criteria below.

Economic Impact: A, B,

- A. The pest could lower crop yield.**
- B. The pest could lower crop value (including increasing crop production costs).**
- C. The pest could trigger the loss of markets (including quarantines).
- D. The pest could negatively change normal cultural practices.
- E. The pest can vector, or is vectored, by another pestiferous organism.
- F. The organism is injurious or poisonous to agriculturally important animals.
- G. The organism can interfere with the delivery or supply of water for agricultural uses.

Economic Impact Score: 2

- Low (1) causes 0 or 1 of these impacts.
 - **Medium (2) causes 2 of these impacts.**
 - High (3) causes 3 or more of these impacts.
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- 5) Environmental Impact:** Environmental impact is expected to be limited mainly to ornamental landscapes or specialty plantings. Impacts are not expected outside managed systems.

Evaluate the environmental impact of the pest on California using the criteria below.

Environmental Impact: E

- A. The pest could have a significant environmental impact, such as lowering biodiversity, disrupting natural communities, or changing ecosystem processes.
- B. The pest could directly affect threatened or endangered species.
- C. The pest could impact threatened or endangered species by disrupting critical habitats.
- D. The pest could trigger additional official or private treatment programs.
- E. The pest significantly impacts cultural practices, home/urban gardening, or ornamental plantings.**

Environmental Impact Score: 2

- Low (1) causes none of the above to occur.
- **Medium (2) causes one of the above to occur.**
- High (3) causes two or more of the above to occur.

Consequences of Introduction to California for *Neofusicoccum protearum*: Medium

Add up the total score and include it here. **11**

- Low = 5-8 points
- Medium = 9-12 points
- High = 13-15 points

- 6) Post-Entry Distribution and Survey Information:** Evaluate the known distribution in California. Only official records identified by a taxonomic expert and supported by voucher specimens deposited in natural history collections should be considered. Pest incursions that have been eradicated, are under eradication, or have been delimited with no further detections should not be included.

Evaluation is 'medium'.

Score: -2

- Not established (0) Pest never detected in California or known only from incursions.
- Low (-1) Pest has a localized distribution in California or is established in one suitable climate/host area (region).
- Medium (-2) Pest is widespread in California but not fully established in the endangered area, or pest is established in two contiguous suitable climate/host areas.**
- High (-3) Pest has fully established in the endangered area, or pest is reported in more than two contiguous or non-contiguous suitable climate/host areas.

- 7) The final score is the consequence of the introduction score minus the post-entry distribution and survey information score: (Score)**
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Final Score: *Score of Consequences of Introduction – Score of Post Entry Distribution and Survey Information = 9*

Uncertainty:

none

Conclusion and Rating Justification:

Based on the evidence provided above, the proposed rating for *Neofusicoccum protearum* is C.

References:

California Department of Food and Agriculture, Pest and Damage Record Database. 2026. *Neofusicoccum protearum* records. California Department of Food and Agriculture, Sacramento, California. Accessed 30 June 2026.

Crous, P.W., Denman, S., Taylor, J.E., Swart, L. and Palm, M.E. 2004. Cultivation and Diseases of Proteaceae: *Leucadendron*, *Leucospermum* and *Protea*. CBS Biodiversity Series 2:1-228.

Crous, P.W., Slippers, B., Wingfield, M.J., Rheeder, J., Marasas, W.F.O., Phillips, A.J.L., Alves, A., Burgess, T., Barber, P. and Groenewald, J.Z. 2006. Phylogenetic lineages in the Botryosphaeriaceae. *Studies in Mycology* 55:235-253. DOI: 10.3114/sim.55.1.235.

Denman, S., Crous, P.W., Groenewald, J.Z., Slippers, B., Wingfield, B.D. and Wingfield, M.J. 2003. Circumscription of Botryosphaeria species associated with Proteaceae based on morphology and DNA sequence data. *Mycologia* 95:294-307. DOI: 10.2307/3762040.

Denman, S., Crous, P.W., Sadie, A. and Wingfield, M.J. 2004. Evaluation of fungicides for the control of *Botryosphaeria protearum* on *Protea magnifica* in the Western Cape Province of South Africa. *Australasian Plant Pathology* 33:97-102. DOI: 10.1071/AP03080.

EPPO. 2026. *Neofusicoccum protearum* (BOTSPR). EPPO Global Database. European and Mediterranean Plant Protection Organization, Paris. Accessed 30 June 2026.

Farr, D.F., Rossman, A.Y. and Castlebury, L.A. 2026. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. United States Department of Agriculture, Agricultural Research Service. Accessed 30 June 2026.

Index Fungorum. 2026. *Neofusicoccum protearum* (Denman & Crous) Crous, Slippers & A.J.L. Phillips. Index Fungorum, Royal Botanic Gardens, Kew. Accessed 30 June 2026.

Marincowitz, S., Groenewald, J.Z., Wingfield, M.J. and Crous, P.W. 2008. Species of Botryosphaeriaceae occurring on Proteaceae. *Persoonia* 21:111-118. DOI: 10.3767/003158508X372387.

Mehl, J.W.M., Slippers, B., Roux, J. and Wingfield, M.J. 2013. Cankers and other diseases caused by the Botryosphaeriaceae. In Gonthier, P. and Nicolotti, G. eds. *Infectious Forest Diseases*. CAB International, Wallingford, United Kingdom.

Slippers, B. and Wingfield, M.J. 2007. Botryosphaeriaceae as endophytes and latent pathogens of woody plants: diversity, ecology and impact. *Fungal Biology Reviews* 21:90-106.

Taylor, K., Barber, P.A., Hardy, G.E.St.J. and Burgess, T.I. 2009. Botryosphaeriaceae from tuart (*Eucalyptus gomphocephala*) woodland, including descriptions of four new species. *Mycological Research* 113:337-353. DOI: 10.1016/j.mycres.2008.11.002.

USDA APHIS. 2026. U.S. Regulated Plant Pest Table. United States Department of Agriculture, Animal and Plant Health Inspection Service. Last modified 13 January 2026. Accessed 30 June 2026.

Responsible Party:

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***Comment Period: 07/21/2026 through 09/04/2026**

***NOTE:**

You must be registered and logged in to post a comment. If you have registered and have not received the registration confirmation, please contact us at [permits\[@\]cdfa.ca.gov](mailto:permits[@]cdfa.ca.gov).

Comment Format:

- ❖ Comments should refer to the appropriate California Pest Rating Proposal Form subsection(s) being commented on, as shown below.

Example Comment:

Consequences of Introduction: 1. Climate/Host Interaction: [Your comment that relates to "Climate/Host Interaction" here.]

- ❖ Posted comments will not be able to be viewed immediately.
- ❖ Comments may not be posted if they:

Contain inappropriate language which is not germane to the pest rating proposal;

Contains defamatory, false, inaccurate, abusive, obscene, pornographic, sexually oriented, threatening, racially offensive, discriminatory or illegal material;

Violates agency regulations prohibiting sexual harassment or other forms of discrimination;

Violates agency regulations prohibiting workplace violence, including threats.

- ❖ Comments may be edited prior to posting to ensure they are entirely germane.
- ❖ Posted comments shall be those which have been approved in content and posted to the website to be viewed, not just submitted.

Pest Rating: C
