

BerriesZA; 28 May 2026



Stellenbosch

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Management and characterisation of stem blight and dieback of blueberry plants

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Department of Plant Pathology, SU

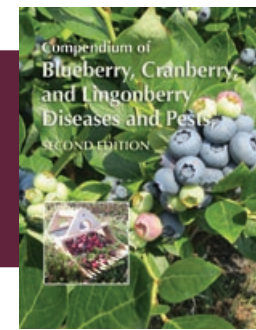
Minette Havenga, Beatrix Coetzee

Infruitec-Nietvoorbij ARC

Francois Halleen, Villa Crop



Compendium of Blueberry Diseases



- Botryosphaeria stem blight/dieback - *Botryosphaeria dothidea*, *Neofusicoccum ribis*, *Lasiodiplodia theobromae*



- Botryosphaeria stem canker - *Botryosphaeria corticis*



FIGURE 7. BOTRYOSPHAERIA STEM CANKERS APPEAR RED WITH A ROUGH BLISTERED APPEARANCE.

- Fusicoccum canker (Godronia canker) - *Godronia cassandrae*
(*Fusicoccum putrefaciens*)





Botryosphaeria stem blight

Economic impact

New Zealand, losses of NZ\$500 000 annually, due to reduced yield and replanting (Sammonds et al. 2009).

Growers in Florida, USA voted it as the most important disease on blueberry (Wright and Harmon, 2010).

Occurrence of dieback/blight/canker

NZ 18%

Chile 15-45%

Serbia 2-5%

California 5%

Ru et al. 2023. A review of Botryosphaeria stem blight disease



Figure 1. Symptoms of Botryosphaeria stem blight, pictures taken from blueberry farms in Alabama, USA in 2022.



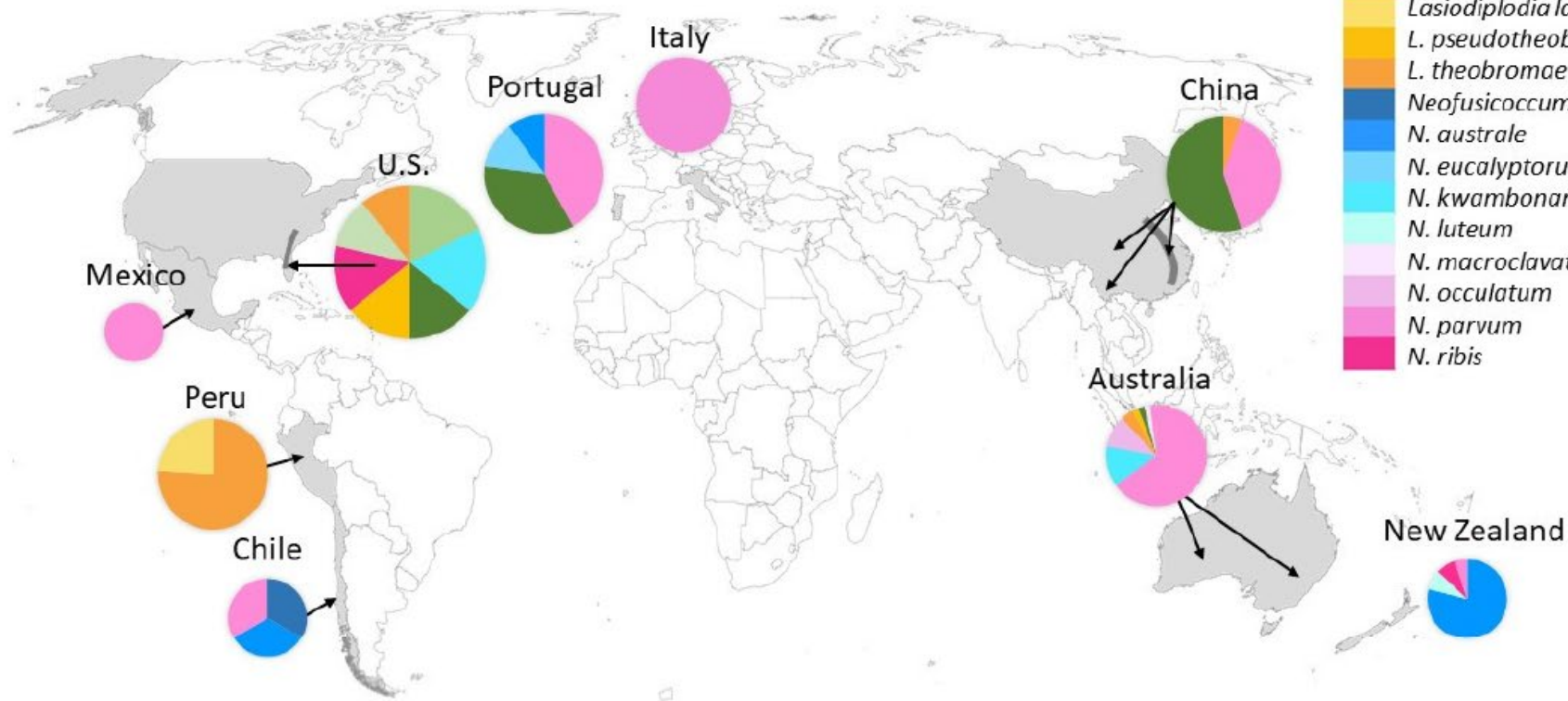
PDC

Botryosphaeria stem blight



15 Botryosphaeriaceae species

- Botryosphaeria dothidea*
- B. corticis*
- Diplodia seriata*
- Lasiodiplodia laeliocattleyae*
- L. pseudotheobromae*
- L. theobromae*
- Neofusicoccum arbuti*
- N. australe*
- N. eucalyptorum*
- N. kwambonambiense*
- N. luteum*
- N. macroclavatum*
- N. occulatum*
- N. parvum*
- N. ribis*



Worldwide distribution of causal pathogens of Botryosphaeria stem blight

Botryosphaeria stem blight - China



Stem blight and dieback incidence of 15-30% in southern China

Neofusicoccum vaccinii: novel species causing stem blight and dieback in China

8 Botryosphaeriaceae species on blueberry in China

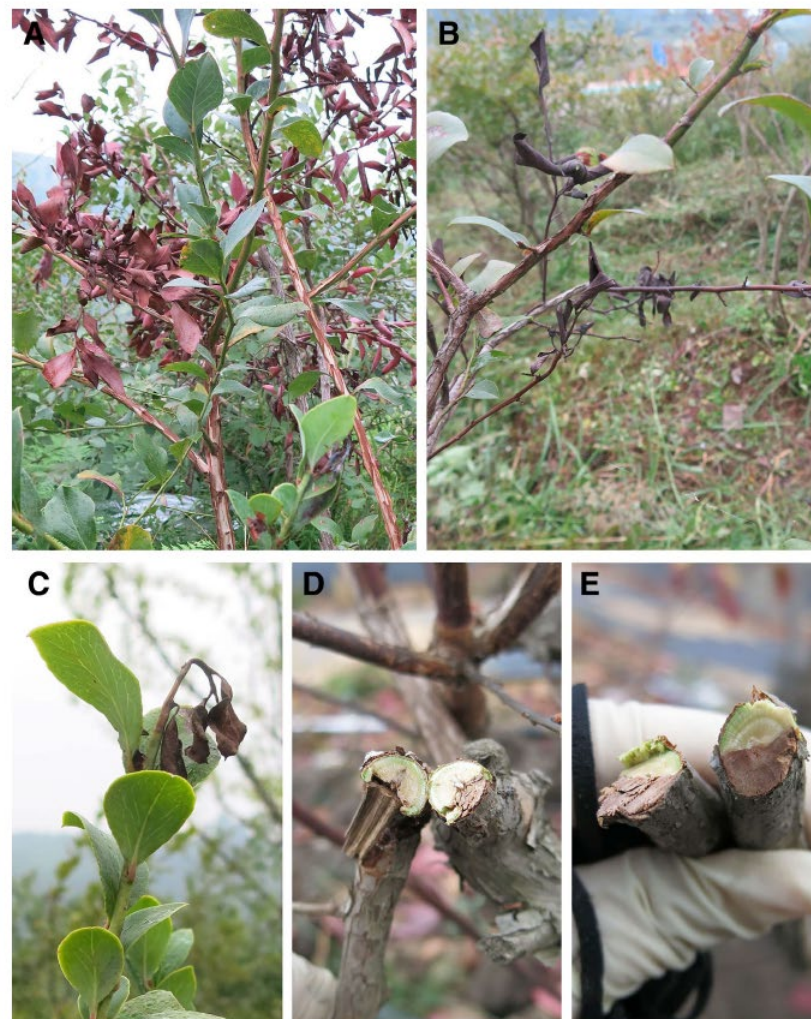
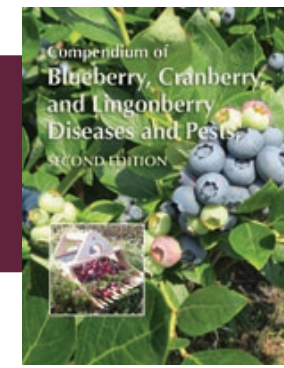


Fig. 1. Typical symptoms of blueberry stem dieback and blight caused by the novel *Neofusicoccum* species. **A and B**, Death of the branches caused by *Neofusicoccum vaccinii*. **C**, Apical necrosis observed in the blueberry plants caused by *N. vaccinii*. **D and E**, Internal stem necrosis caused by *N. vaccinii*.

Compendium of Blueberry Diseases



- Phomopsis twig blight and fruit rot – *Diaporthe vaccinii*
- Phomopsis canker - *Diaporthe vaccinii*

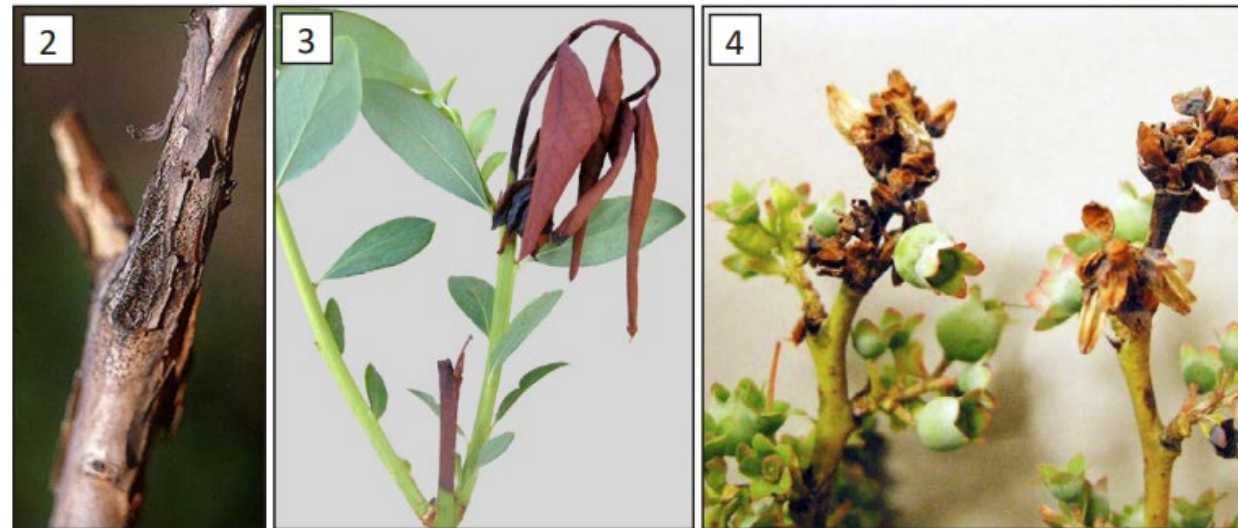


FIGURE 2. PHOMOPSIS CANKER CAUSES GIRDLING OF TWIGS AND BRANCHES; DARK PYCNIDIA ARE OFTEN VISIBLE IN LESION CENTERS.

FIGURE 3. THE PHOMOPSIS PATHOGEN CAN INFECT NEW BRANCHES AND OLDER WOOD CAUSING RAPID DIEBACK.

FIGURE 4. PHOMOPSIS FLOWER AND BUD BLIGHT RESULTS IN RAPID DIEBACK AND LOSS OF FLOWERS AND FRUIT.

Phomopsis twig blight and fruit rot



Dieback symptoms of twig blight

Bill Cline, NCSU

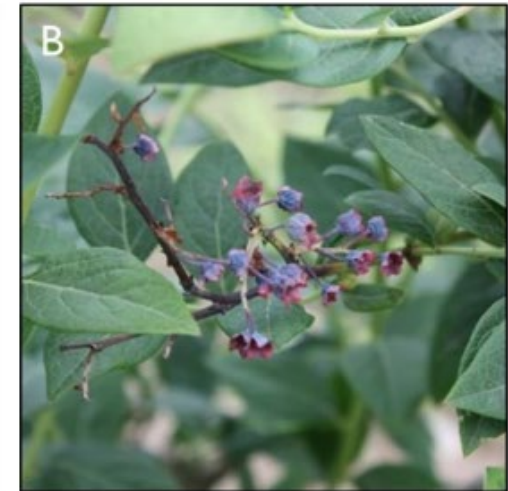


Figure 1. Blighting of blossom of cultivar 'Draper' (A) and blighting of twigs and premature colouring of green fruit and fruit drop of cultivar 'Aurora', infected with *Phomopsis vacinii*.

Siva Sabaratnam, Plant Pathologist, British Columbia Ministry of Agriculture, Food and Fisheries

***Diaporthe* species (10):**

- | | |
|---------------------------|-----------------------|
| <i>D. vaccinii</i> | <i>D. passiflorae</i> |
| <i>D. eres</i> | <i>D. ascheicola</i> |
| <i>D. rudis</i> | <i>D. baccae</i> |
| <i>D. ambigua</i> | <i>D. sterilis</i> |
| <i>D. australafricana</i> | |
| <i>D. foeniculina</i> | |

Stem blight and dieback, Northern Italy

Neofusicoccum parvum

Diaporthe rudis

Cadophora luteo-olivacea

Peroneutypa scoparia

Guarnaccia et al. (2020) Fungal pathogens associated with stem blight and dieback of blueberry in Italy



Figure 1. Natural dieback (A) and stem blight (B) of *Vaccinium corymbosum* 'Blue Ribbon' in the field, and a stem showing internal necrosis in the wood of a cultivated plant of 'Top Shelf' (C, D). Wilting and internal discoloration caused by inoculation of *Diaporthe rudis* (E, G), and death of leaves and stems caused by *Neofusicoccum parvum* inoculation (F, H).

Botryosphaeriaceae - Plant Disease Clinic

Shoot blight
Dieback
Internal discolouration



Phomopsis dieback - PDC

- *Diaporthe (Phomopsis)* sp.
- *Fomitiporia* sp. was also present in stem

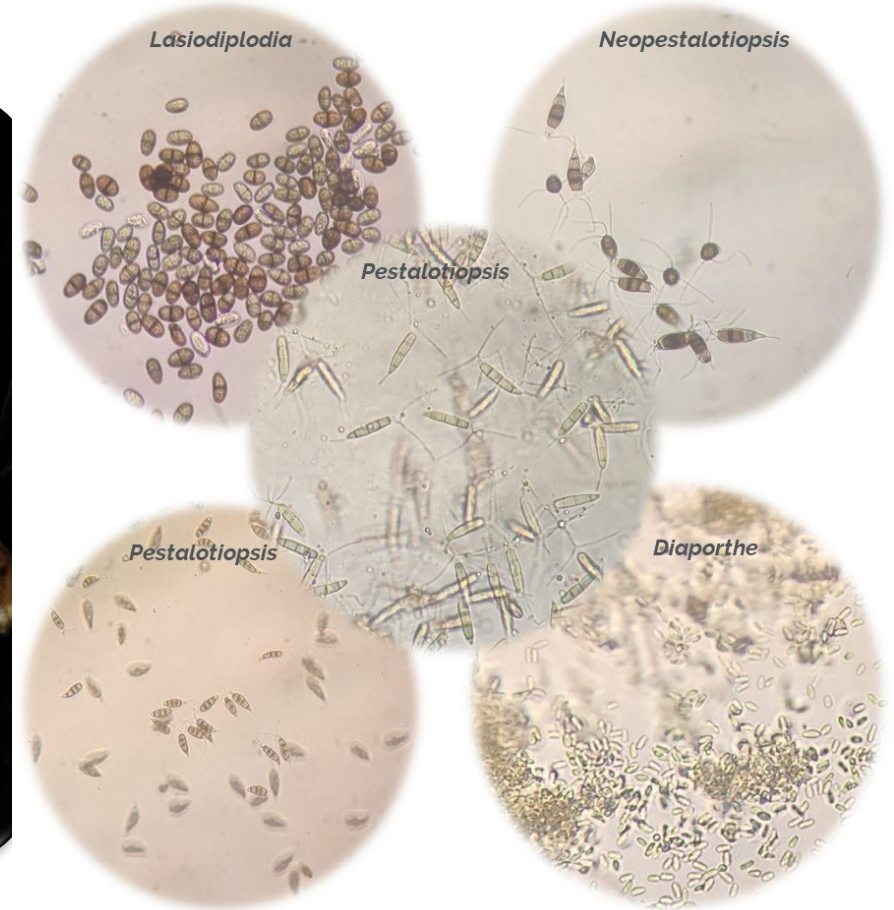


Dieback / shoot blight - PDC



Fruit bodies and spores of:

- *Lasiodiplodia theobromae*
- *Diaporthe*
- *Pestalotia*
- *Neopestalotiopsis*

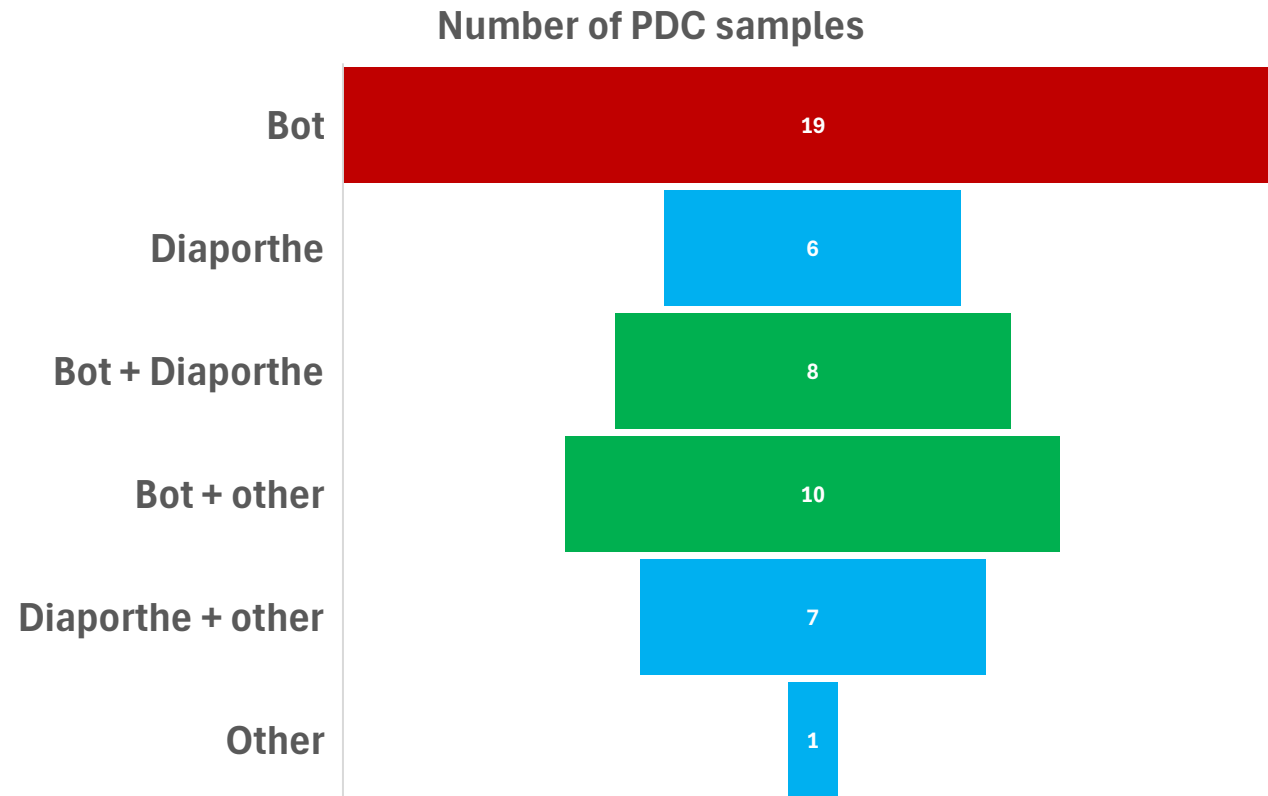


PDC blueberry blight/dieback samples 2020-2024



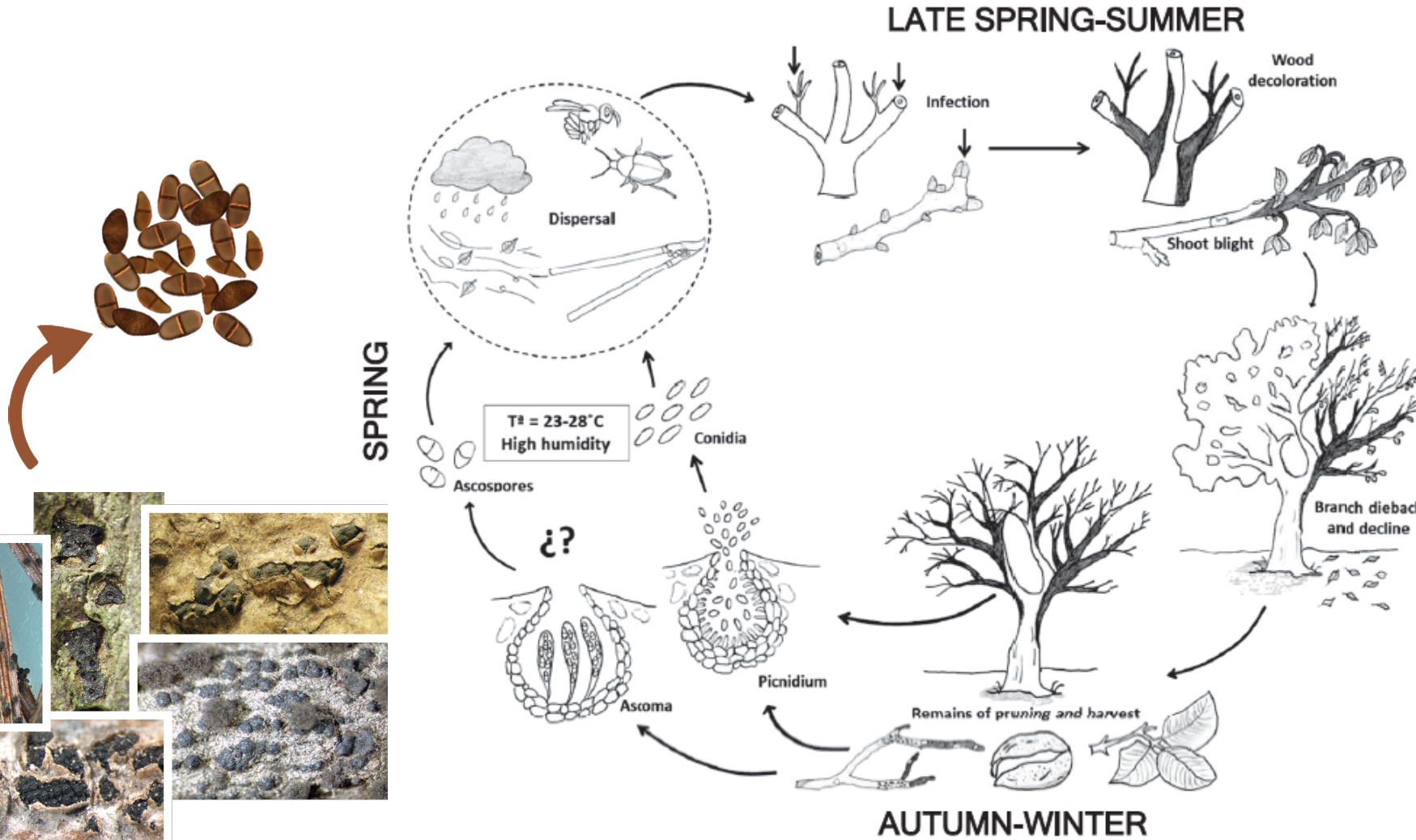
51 PDC samples processed, and reports provided

73% of samples Bot/ Bot+Diaporthe/ Bot+other

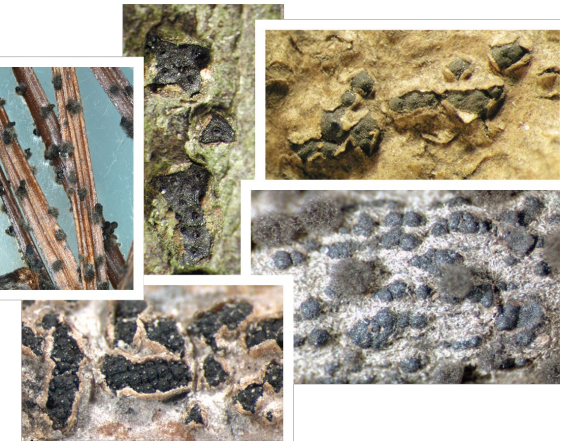


Bot = Botryosphaeriaceae (*Neofusicoccum*, *Lasiodiplodia*, *Diplodia*)

Botryosphaeria dieback on walnut - Lifecycle



Infection can also occur directly through lenticels, stomata or other openings



Ihan du Plessis

Fig. 9. The biological cycle of branch dieback and shoot blight of the English walnut adapted to the environmental conditions in southern Spain.

(Lopez-Moral et al., 2020)

Infection sites

2022

ORIGINAL ARTICLE



Influence of blueberry tissue type, wounding and cultivar on susceptibility to infection by *Neofusicoccum* species

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Funding information

Blueberry New Zealand

Abstract

Aim: Botryosphaeriaceae causing stem blight and dieback of blueberry are important pathogens limiting economic production worldwide. This study investigated the pathogenicity and relative virulence of isolates from the *Neofusicoccum* species commonly associated with blueberries in New Zealand on different tissues and cultivars of blueberries.

Methods and Results: Both wounded and non-wounded fruit and flower buds and wounded attached soft green and hard green shoots were susceptible to infection by conidia of *Neofusicoccum australe*, *Neofusicoccum parvum* and *Neofusicoccum ribis*. *N. ribis* was generally most virulent, followed by *N. parvum* and then *N. australe*. Inoculation of potting mixture with *N. australe* or *N. ribis* conidia showed that potting mixtures were not a source of inoculum for infection of blueberry roots. Wounded and non-wounded leaf buds, fruit and wounded soft green shoots and hard green shoots of the different cultivars tested were susceptible to infection by *N. parvum* and *N. ribis*. Whilst the fruit of all cultivars were similarly infected, infection incidence in inoculated leaf buds was lowest in “Blue Bayou” and “Ocean Blue”. Cultivar susceptibility differed when tested on soft green shoots compared with hard green shoots, with shortest lesions developed on “Maru” on soft green shoots, and “Centra Blue” and “Ocean Blue” on hard green shoots.

Neofusicoccum spp. can infect non-wounded fruit, flower buds and leaf buds

Conclusion:

The potential for non-wounded tissue to become infected indicate that fungicides may need to be applied to protect all tissue, not just wounds.



Epidemiology - Spore dispersal

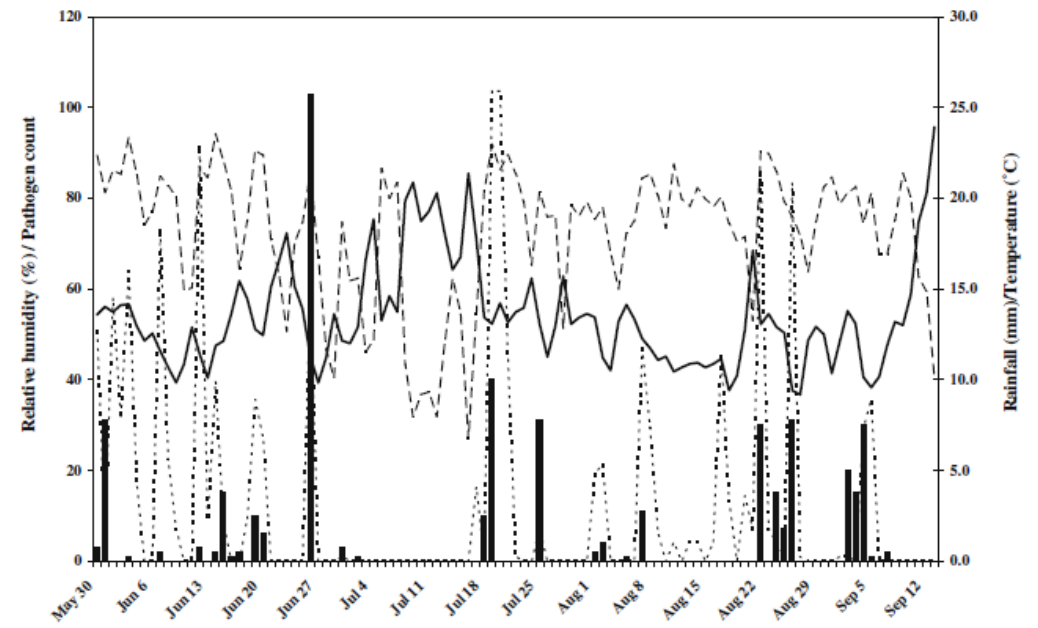
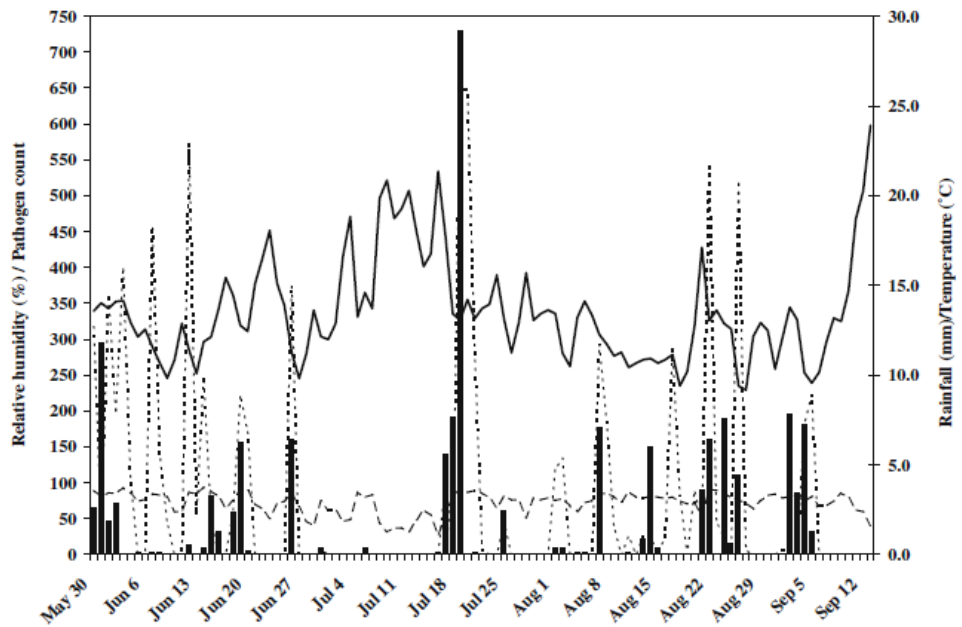


SA vineyards 2005
(Van Niekerk et al., 2010)

Botryosphaeriaceae

Phomopsis/Diaportha

Fig. 2 Spore events and counts (■) recorded for species in Botryosphaeriaceae during 2005 plotted against daily average relative humidity (---), temperature (—) and daily rainfall (---)



Distance of dispersal:

N. luteum and *N. parvum* resulting in rain splash dispersing of conidia up to 2 m (Baskarathevan et al., 2013).

N. parvum could travel up to 10 m in the wind direction (Shafi et al., 2015).

Spore dispersal

Blueberry wound infection of *Botryosphaeria dothidea*

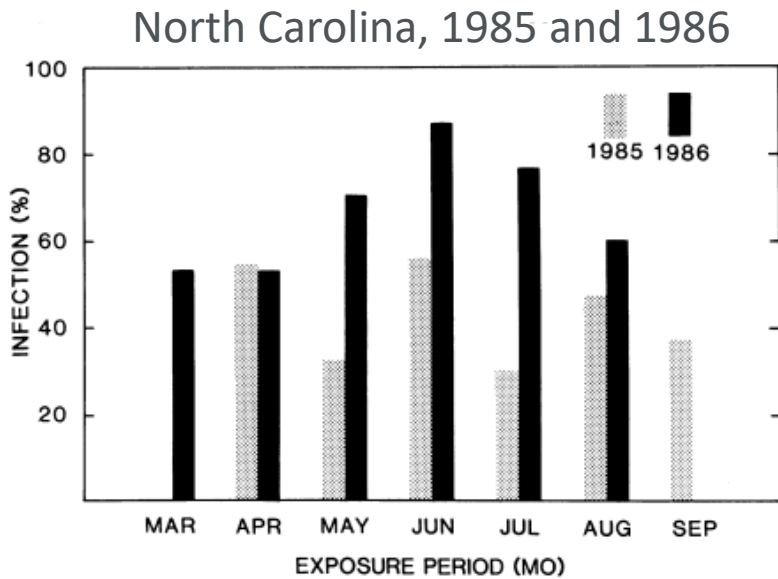
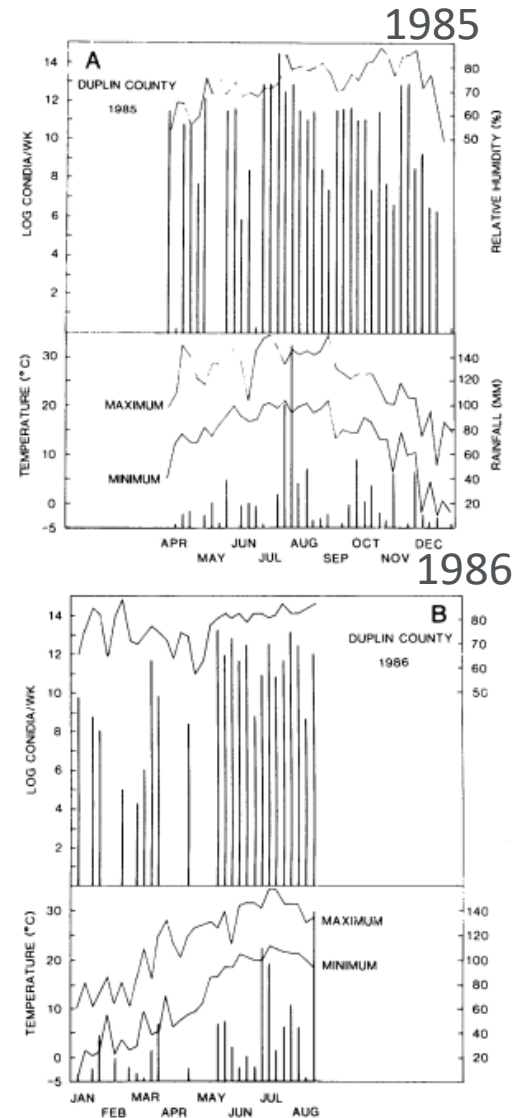


Fig. 1. Infection of blueberry exposed to natural inoculum of *Botryosphaeria dothidea* for 2-wk periods during 1985 and 1986.

Creswell and Milholland 1988, Plant Disease



Significantly positive correlation of all **temperature** variables to **spore concentration** and log of total spore count in both years.

Log of total **spore count** in 1986 was also correlated to **RAIN** and three **RH** variables.

Inoculum sources - grapevines, fruit and olive trees



Influence of temperature on disease development



Blueberry plants assessed after 2 weeks

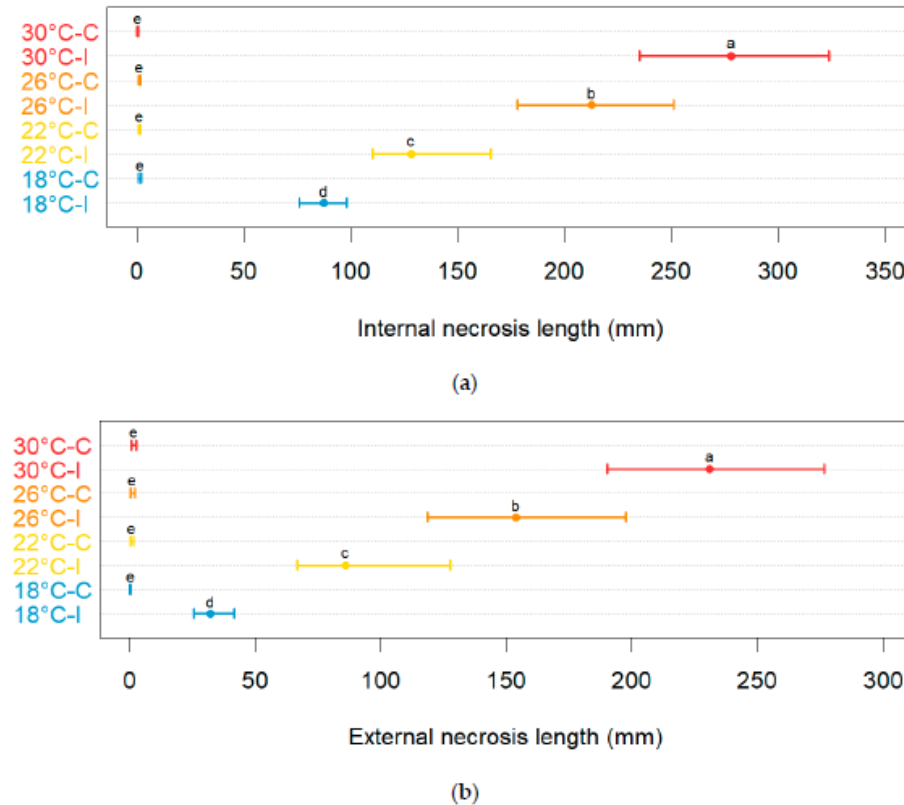


Figure 6. Comparisons of the average lengths of internal (a) and external (b) necrosis (in mm, on the x-axis) among the blueberry plants inoculated with *Neofusicoccum parvum* (I) and the control plants (C) that were mock-inoculated with plugs of sterile agar medium at different temperature levels (in °C, on the y-axis). Different letters in the dot chart indicate that the associated averages are significantly different ($p < 0.05$). The error whiskers refer to the 95% bias-corrected and accelerated confidence interval bounds.



Article

Modeling the Effect of Temperature on the Severity of Blueberry Stem Blight and Dieback with a Focus on *Neofusicoccum parvum* and Cultivar Susceptibility

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Abstract: Stem blight and dieback rank among the most relevant diseases affecting blueberry production worldwide. In Northern Italy, *Neofusicoccum parvum*, *Diaporthe rudis*, *Cadophora luteo-olivacea* and *Peroneutypa scoparia* have been reported to cause stem blight and dieback in blueberry. Considering that the incidence and severity of these diseases are on the rise in Northern Italy, two of the main aims of the present study were a—to compare the in vitro growth rate of the four fungi at different temperatures and b—to assess the aggressiveness of the same fungi on four commercial blueberry cultivars. *Neofusicoccum parvum* had the fastest growth rate and was the most aggressive pathogen. A possible effect of temperature on host colonization by *N. parvum* and disease expression was postulated and tested as a third aim. In planta trials were performed to model and predict the influence of temperature on the severity of blueberry stem blight and dieback caused by *N. parvum*. Increasing temperatures boosted the aggressiveness of the pathogen, causing higher disease severity and host mortality. Our findings suggest that temperature plays a relevant role in the severity of blueberry stem blight and dieback caused by *N. parvum*. Given the predictions of a warmer climate, this disease may become increasingly more significant and should be actively managed.

Keywords: epidemiology; generalized analytis beta model; global warming; *Vaccinium corymbosum*



Citation: Martino, I.; Lione, G.; Garbelotto, M.; Gonthier, P.; Guarnaccia, V. Modeling the Effect of Temperature on the Severity of Blueberry Stem Blight and Dieback with a Focus on *Neofusicoccum parvum* and Cultivar Susceptibility. *Horticulturae* **2024**, *10*, 363. <https://doi.org/10.3390/horticulturae10040363>

1. Introduction

Management - cultural practices



- Remove infected twigs during dormancy and blighted twigs that develop during the growing season by cutting at least 15 cm below infected tissue.
- Sterilise pruning shears regularly.
- Destroy prunings (practical implications).
- Prune plants that have a dense canopy to improve air circulation and sunlight penetration.
- Don't prune before or after rain events.
- Water plants regularly during dry periods to reduce stress.

Fungicides registered on blueberry



AgrIntel database

Active	Product, Company	Disease	Application	Country
Cyprodinil and fludioxinil	Switch, Syngenta	Phomopsis/ Diaporthe (Alternaria, anthracnose, Botrytis, fruit rot)	foliar application	Namibia Botswana
Azoxystrobin	Ortiva, Syngenta	Botryosphaeria canker (fruit rot, powdery mildew, anthracnose)	aerial and ground application	South Africa



Management - fungicides (grapevine case study)



Treatment	Trade name	Active ingredient	Application method
Paint/paste	Acrylic paint	n/a	Paint brush
	Greenseal™	Tebuconazole	Bottle top applicator
	Garrison Rapid®	Cyproconazole + Iodocarb	Bottle top applicator
Fungicide	Emblem®	Fluazinam	Sprayer
	Sprayseal®	Tebuconazole	Sprayer
Biological	Vinevax™ Wound Dressing	<i>Trichoderma atroviride</i>	Paint brush / hand trigger or backpack sprayer

Table 1. Treatments registered for use as a wound treatment. Follow instructions on label when using registered products. Sprayseal® is registered for use as a wound treatment to control ED and BD. Other treatments are registered for control of ED. Research has confirmed that these treatments are also effective for control of BD.

Figure 18. Applying wound treatments to large reworking wounds with paint brush (a) and bottle top applicator (b), and to annual pruning wounds with a knapsack (c) and canopy sprayer (d).

Management - fungicides



Cien. Inv. Agr. 40(3):537-545. 2013
www.rcia.uc.cl
CROP PROTECTION

RESEARCH PAPER

Evaluation of the use of wound-protectant fungicides and biological control agents against stem canker (*Neofusicoccum parvum*) of blueberry

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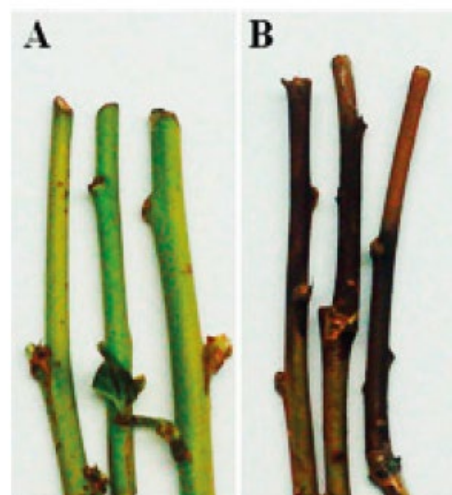


Figure 2. Control of stem canker (*Neofusicoccum parvum*) on inoculated stems of blueberry (*Vaccinium corymbosum*) cv. Duke. A. Inoculated pruning wounds protected with benomyl. B. Non-protected pruning wounds that developed reddish-brown lesions after 36 days under field conditions.

Wound protection

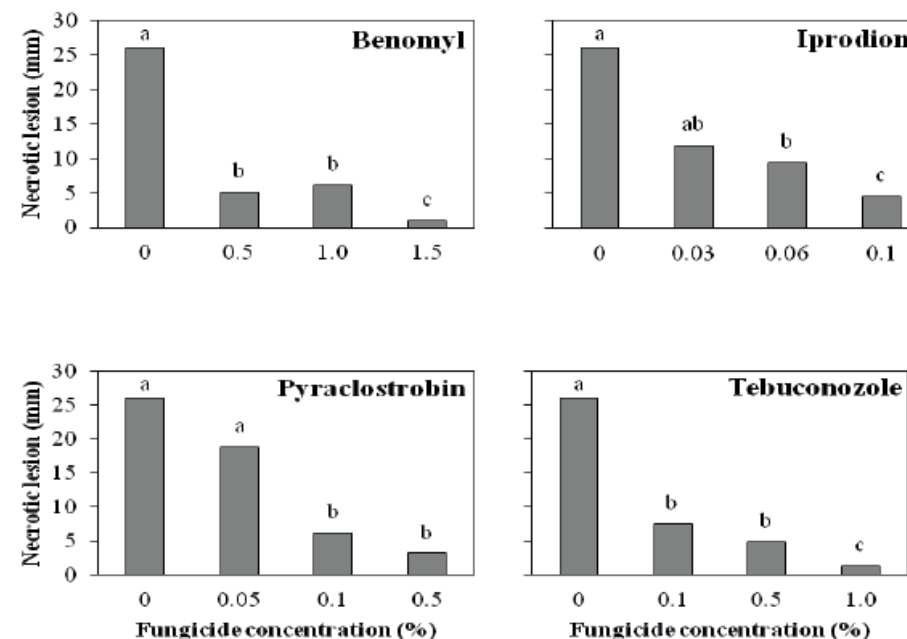


Figure 1. Effectiveness of fungicide spray applications as wound protectants against *Neofusicoccum parvum* infection in detached actively growing shoots of blueberry 'O'Neal'. The bars followed by the same letters are not significantly different according to Tukey's test ($P = 0.05$).

New project: Stem blight/dieback



Aim: To improve the management of stem blight of blueberries in South Africa

Objectives

- Survey blueberry orchards in the Western Cape, North West and Limpopo provinces and identify stem blight pathogens.
- Efficacy of fungicides and GRAS products *in vitro* and on pruning wounds against major fungal species.
- Investigate possible inoculum sources and the correlation of weather data with aerial inoculum.
- Evaluation of pruning practices that could minimise infection.

Outcomes of the project



- Identify major **pathogens** associated with stem blight and dieback.
- Identify effective **pruning wound protectants** and products that should be motivated for registration trials.
- Obtain a better understanding of the **inoculum ecology** of major pathogens.
- Improve **pruning practices**.
- Develop an **SOP** to minimise stem blight and dieback.

- BerriesZA
- Producers where sampling was done
- Hannes Laubscher – United Export
- Jean Kotzé – Fall Creek

Photo by Stefan Els

thank you | enkosi | dankie