



Diversity of Fungal Pathogens Causing Pine Cankers and Dieback in Southern California

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Identification of pine cankers and dieback (2018-2023)

“Detection and management of new pests and diseases in urban forests in Orange County”

UC University of California Cooperative Extension
CE Eskalen Lab



Eldarica pine
(*Pinus eldarica*)



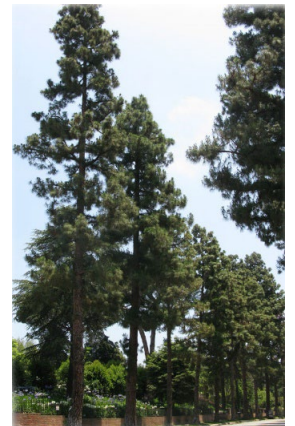
Aleppo pine
(*Pinus halepensis*)



Monterey pine
(*Pinus radiata*)



Black pine
(*Pinus nigra*)



Canary Island Pine
(*Pinus canariensis*)

Importance of Monterey pine (*Pinus radiata*)

1. Native populations

- Restricted distribution.
- Source of genetic diversity.

2. Extensively planted for timber in other countries

- Australia
- Chile
- New Zealand
- Spain



Symptoms



Ghost cankers



Why “ghost” cankers?



Grapevine



Apple



Pear



Oak



Citrus



Grapevine

Common wood canker symptoms plants
(grapevine and other fruit crops)

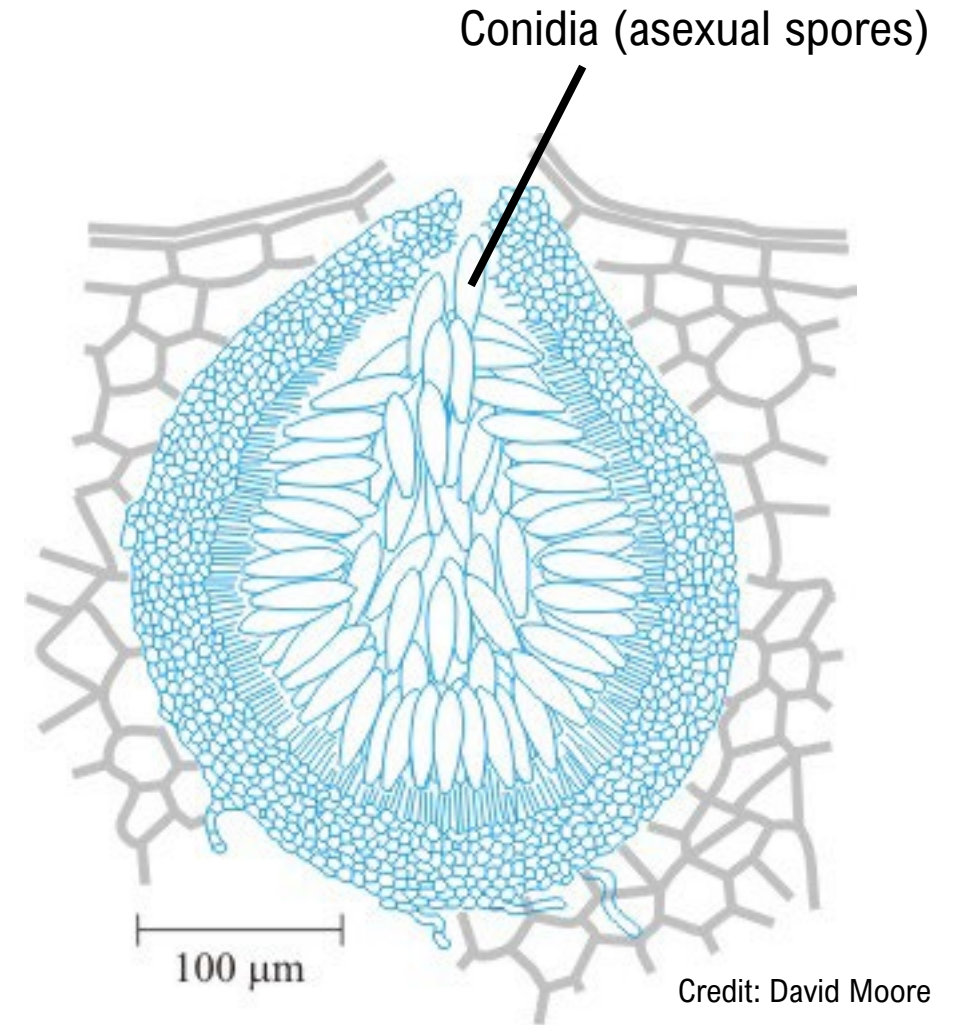


Pine ghost canker





Fungal fruiting bodies over the bark



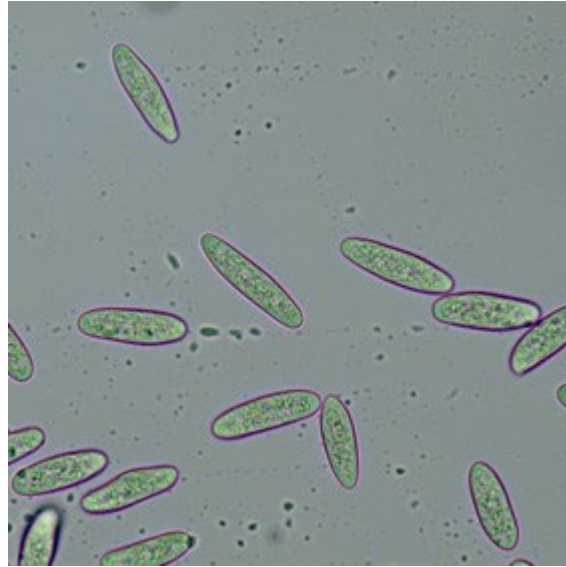
Pycnidium (pl. pycnidia)

Spores obtained from pycnidia

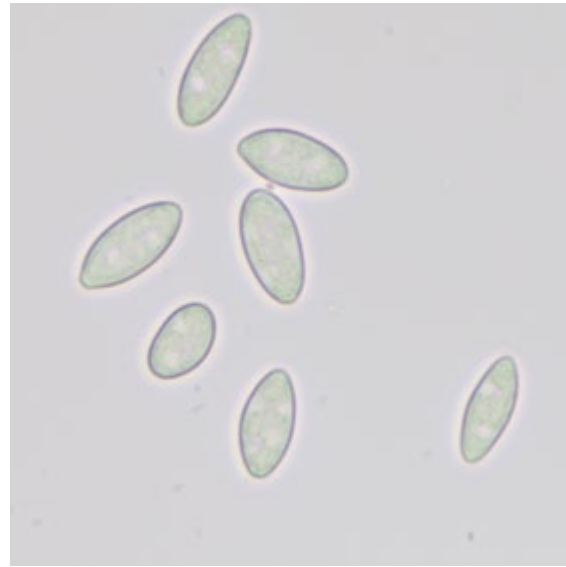
2 morphotypes



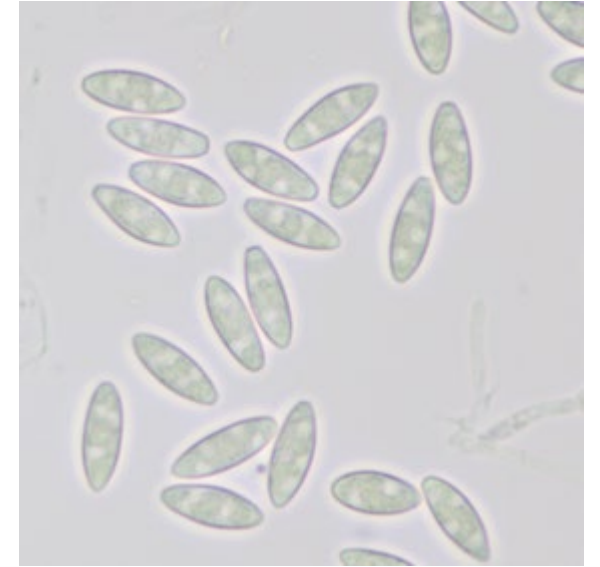
Isolate UCD9433



UCD10439



UCD9161



UCD9434

Isolation of fungal pathogens

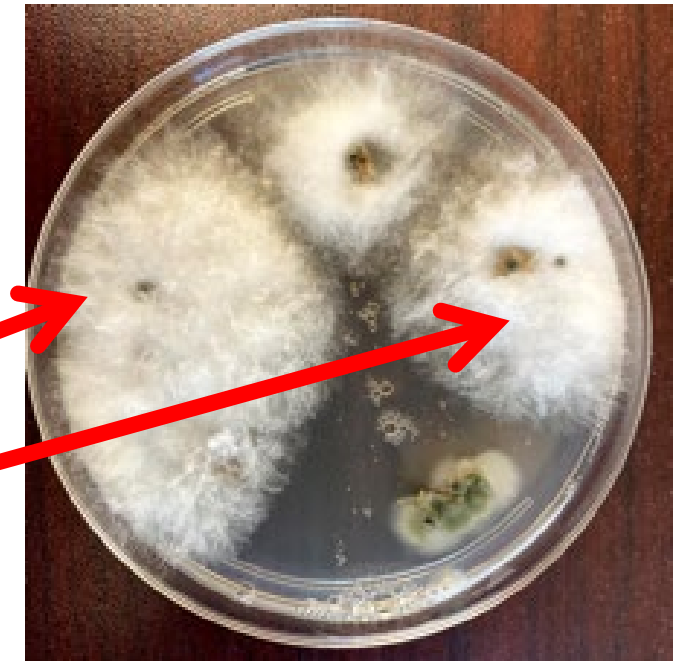
Isolation on potato dextrose agar (PDA)



Incubation of plates for 7d



Morphological observations



Result: Colonies of botryosphaeriaceous fungi

What are Botryosphaeriaceae fungi?

Taxonomy

Kingdom: **Fungi**

Division: **Ascomycota**

Class: **Dothideomycetes**

Family: **Botryosphaeriaceae**

Genus: *Botryosphaeria*

Neofusicoccum

Diplodia

Lasiodiplodia (and many others...)



Ecologically...

- **Endophytes** 😊 – **Parasites** 💀 – Saprophytes 😐
- **Affect multiple plant hosts**
 - Perennial crops 🍇 🍏 🥑 🍷
 - Ornamental plants 🌳 🌴
 - Native and introduced forest trees 🌲 🌲
- **Cause different diseases**
 - Cankers and dieback (wood)
 - Fruit rots
- **Worldwide distributed** 🌍 🌍 🌍

Molecular identification of the pathogens

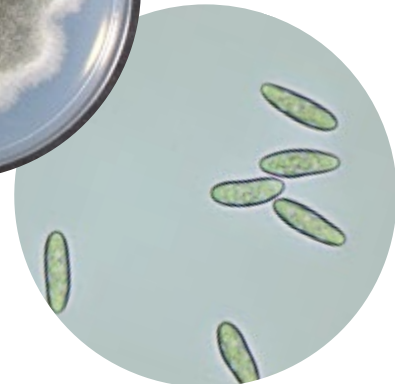
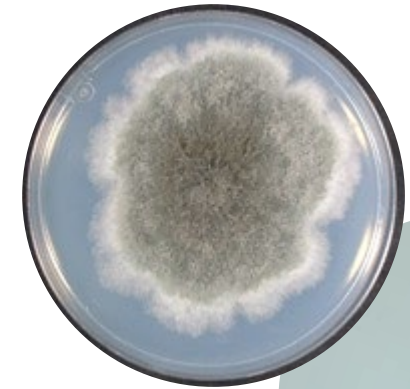
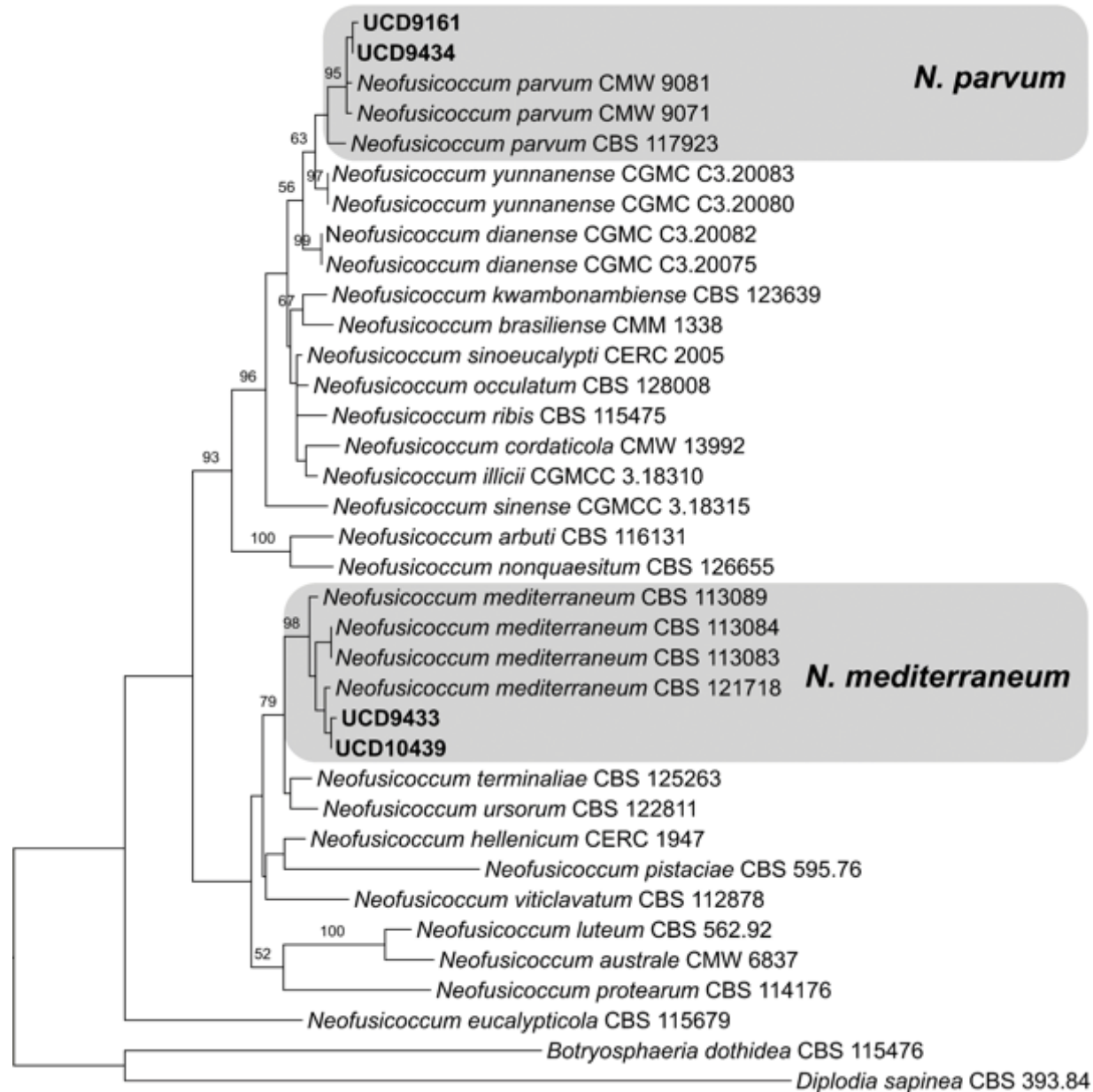
DNA extraction



PCR and Sequencing of ITS, *tef1*, *tub2*



Phylogenetic analysis



Pathogenicity tests *Koch's Postulates*

Inoculation of healthy branches with mycelium



Incubation of 3 months



Lesion length measurement



Re-isolation of resulting lesions

Pinus radiata

Pinus eldarica

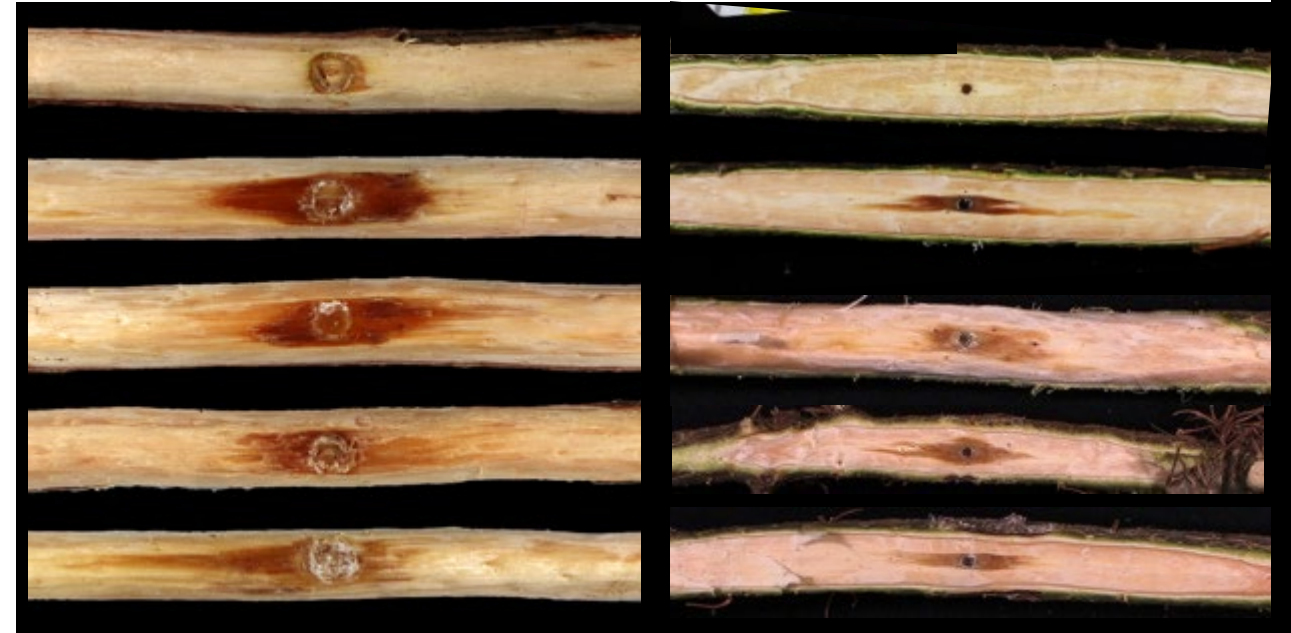
Control

UCD9443, *N. med.*

UCD10439, *N. med.*

UCD9161, *N. parvum*

UCD9434, *N. parvum*




100% recovery of both pathogens → Koch's postulates complete ✓

DISEASE NOTE




 Details

 Figures

 Literature Cited

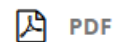
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
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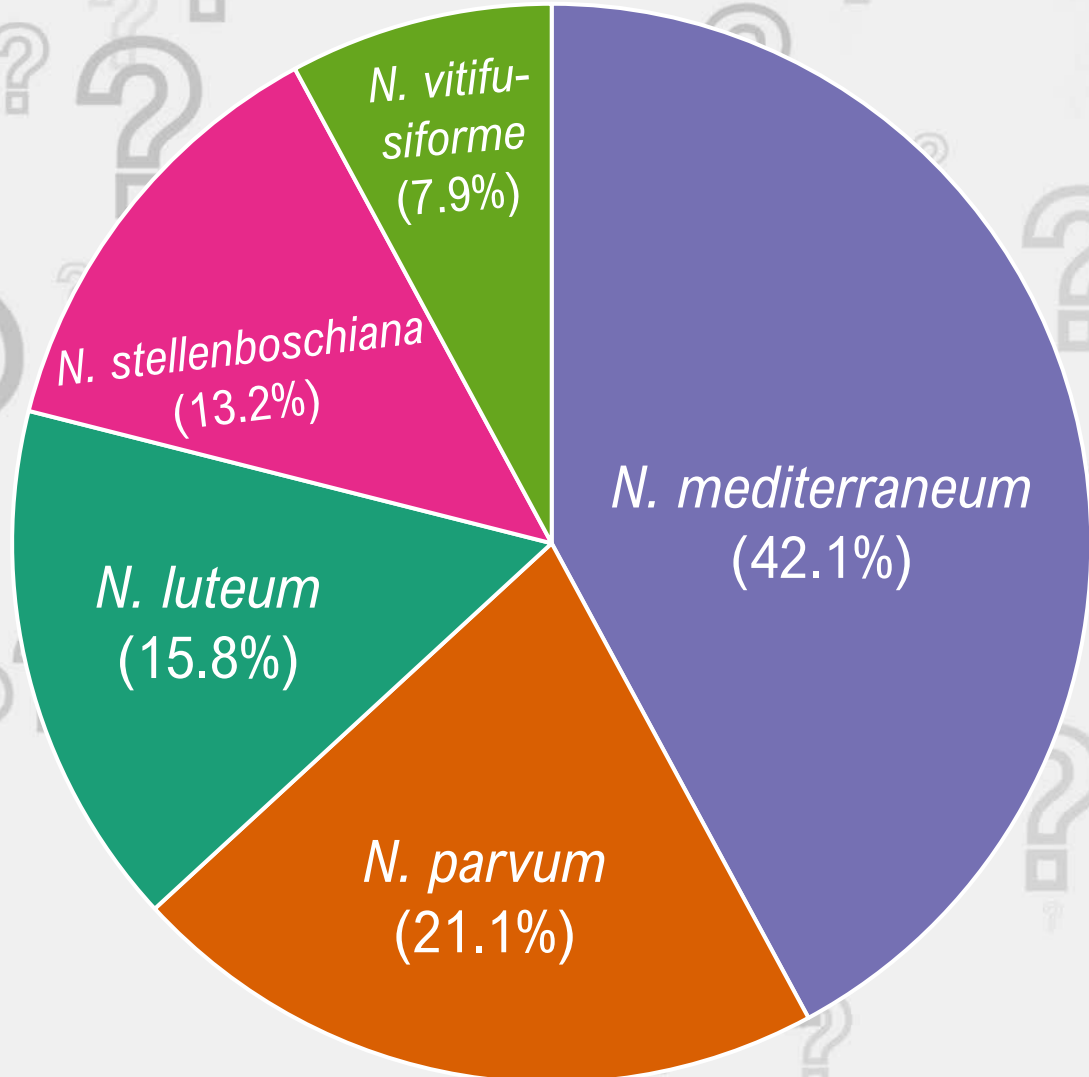
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Pinus eldarica, *P. halepensis*, and *P. radiata* are important conifer species native to

Current Project



Are there...

1. Other *Neofusicoccum* species involved?
2. Differences in virulence?
3. Other pathogens? e.g. *Diplodia*, *Diaporthe*, *Neopestalotiopsis* spp.

Preliminary Results

	<u>Lesion length (mm)</u>	<u>Recovery freq. (%)</u>
Control	7.8 a	0
UCD9262, <i>N. luteum</i>	30.5 b	40-75
UCD9428, <i>N. luteum</i>	32.0 b	17-100
UCD9433, <i>N. mediterraneum</i>	40.7 b	33-100
UCD10439, <i>N. mediterraneum</i>	29.5 b	60-67
UCD9161, <i>N. parvum</i>	35.8 b	17-50
UCD9434, <i>N. parvum</i>	34.3 b	40-80
UCD10568, <i>N. stellenboschiana</i>	19.2 a b	33
UCD10840, <i>N. stellenboschiana</i>	27.7 b	75
UCD9258, <i>N. vitifusiforme</i>	41.0 b	0-100
UCD9240, <i>N. vitifusiforme</i>	33.6 b	20-80



Conclusions

1. Pine 'Ghost Canker' is a new disease detected in Southern California affecting multiple pine species in urban forests and parks.
2. Multiple *Neofusicoccum* spp. were **consistently isolated** from symptomatic trees.
3. All *Neofusicoccum* spp. were **pathogenic** on Monterey pine branches.
4. Drought + higher temperatures conditions may be **predisposing** the pines to this disease.



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