Fungi associated with cankers and wounds of olive and wild olive trees in the Western Cape

Chris F.J. Spies\textsuperscript{1,2}, W.J. van Jaarsveld\textsuperscript{2}, L. Mostert\textsuperscript{2} & F. Halleen\textsuperscript{1,2}

\textsuperscript{1}ARC Infruitec-Nietvoorbij, Stellenbosch
\textsuperscript{2}Departement of Plant Pathology, Stellenbosch University, Stellenbosch

SA Olive AGM, 16 February 2016, Klein Joostenberg, Muldersvlei
“Trunk disease” is a broad term for a variety of symptoms associated with branches and trunks of woody crops.

- Canker, dieback, wilting, stunting, etc.

- Gradual decline of trees over several years
  - Negative impact on yield
  - Premature replacement of dead/dying trees

- Various woody crops are affected
  - Grapevines, stone and pome fruit, guavas, others
• "Trunk disease" is a broad term for a variety of symptoms associated with branches and trunks of woody crops.
  • Canker, dieback, wilting, stunting, etc.
  • Gradual decline of trees over several years
  • Negative impact on yield
  • Premature replacement of dead/dying trees

• Various woody crops are affected
  • Grapevines, stone and pome fruit, guavas, others

**Estimated losses of >€1 billion in France in 2014**
Complex diseases – more than one causal agent:

- Phaeos
- Phaeomoniellales
- Basidios
- Diatrypes
- Bots
- Phomopsis
- Other pathogens

In grapevines some fungi are associated with specific symptom types.
Complex diseases – more than one causal agent:

- Phaeos
- Phaeomoniellales
- Basidios
- Diatrypes
- Bots
- *Phomopsis*
- Other pathogens

In grapevines some fungi are associated with specific symptom types.
Complex diseases – more than one causal agent:
- Phaeos
- Phaeomoniellales
- Basidios
- Diatrypes
- Bots
- Phomopsis
- Other pathogens

In grapevines some fungi are associated with specific symptom types
TRUNK DISEASE PATHOGENS

- Complex diseases – more than one causal agent:
  - Phaeos
  - Phaeomoniellales
  - Basidios
  - Diatrypes
  - Bots
  - *Phomopsis*
  - Other pathogens

- In grapevines some fungi are associated with specific symptom types
Complex diseases – more than one causal agent:

- Phaeos
- Phaeomoniellales
- Basidios
- Diatrypes
- Bots
- Phomopsis
- Other pathogens

In grapevines some fungi are associated with specific symptom types
TRUNK DISEASES OF OLIVE TREES

• Not as much data available as for eg. grapevine
• Increased research globally in last couple of years

RESEARCH PAPERS

Pleurostomophora richardsiae, Neofusicoccum parvum and Phaeoacremonium aleophilum associated with a decline of olives in southern Italy

Antonia Carlucci1, Maria Luisa Raimondo2, Francesca Cibelli3, Alan J.L. Phillips4 and Francesco Lops5

Olive Twig and Branch Dieback: Etiology, Incidence, and Distribution in California

J. R. Úrbez-Torres, Pacific Agri-Food Research Centre, Agriculture and Agri-Food Canada, 4200 Highway 97, Box 5000, Summerland, British Columbia V0H1Z0, Canada, F. Peduto, Department of Plant Pathology, University of California Davis, Davis, CA 95616, USA; P. M. Vossen, University of California Cooperative Extension Sonoma County, Santa Rosa, CA 95403, USA; W. H. Krueger, University of California Cooperative Extension Glenn County, Orland, CA 95963, USA; and W. D. Gubler, Department of Plant Pathology, University of California Davis, Davis, CA 95616, USA

Abstract


Characterization and Pathogenicity of Botryosphaeriaceae Species Collected from Olive and Other Hosts in Spain and California

Juan Moral, Concepción Muñoz-Díez, Nazaret González, Antonio Trapero, and Themis J. Michailides

Disease Note

Fungal species associated with a severe decline of olive in southern Italy

F. Nigro1, D. Boscia2, I. Antelmi3 and A. Ippolito1

Phaeoacremonium species associated with olive wilt and decline in southern Italy

Antonia Carlucci • F. Lops • F. Cibelli • M. L. Raimondo

Phytopathologia Mediterranea (2013) 52, 3, 517–527

DOI 10.1007/s10658-014-0573-8

ARC • LNR
Excellence in Research and Development
TRUNK DISEASES OF OLIVE TREES

Carlucci et al. 2015

Úrbez-Torrez et al. 2013

Carlucci et al. 2015

Carlucci et al. 2013

Carlucci et al. 2013
TRUNK DISEASES OF OLIVE TREES

Carlucci et al. 2015
Úrbez-Torrez et al. 2013

Carlucci et al. 2015
OLIVE TRUNK DISEASE PATHOGENS

• Globally:
  • Australia
  • Croatia
  • Greece
  • Italy
  • New Zealand
  • Spain
  • USA

• Phaeos
• Phaeomoniellales
• Basidios
• Diatrypes
• Bots
• Phomopsis

• Other pathogens:
  • *Pleurostomophorophora*
  • *Cytospora*
  • *Phoma*
OLIVE TRUNK DISEASE PATHOGENS

• Globally:
  • Australia
  • Croatia
  • Greece
  • Italy
  • New Zealand
  • Spain
  • USA

• Phaeos
• Phaeomoniellales
• Basidios
• Diatrypes
• Bots
• Phomopsis
• Other pathogens:
  • Pleurostomophora
  • Cytospora
  • Phoma

• In South Africa…
  • Very little research done
AIM

Identify fungi associated with wounds and trunk and branch cankers on olive and wild olive trees in the Western Cape
SAMPLING

• Olives (★): 130 samples from 9 districts
• Wild Olives (●): 27 samples from 8 districts
  (Districts according to Wine of Origin scheme)

• Calitzdorp (2)
• Ceres Plateau (3)
• Lutzville Valley (8)
• Paarl (21)
• Red Stone (WO only)
• Robertson (2)
• Stellenbosch (31)
• Swartland (11)
• Tygerberg (14)
• Walker Bay (38)
• Wellington (WO only)

• Commercially producing orchards
• Non-commercial trees (gardens, neglected orchards)
• Target older trees regardless of cultivar
CULTIVARS

- Coratina (19)
- Frantoio (18)
- Kalamata (12)
- Leccino (8)
- Manzanilla (1)
- Mission (19)
- Nabali (1)
- Picual (1)
- 177 (6)
- Unknown (45)
SYMPTOMS
INTERNAL SYMPTOM TYPES

- Dark brown/black necrotic margin
- Internal black necrosis
- Dark brown/black necrosis
- Light brown/pink necrosis
- Streaking
- Soft/white rot
- Twig dieback
Fungi Identified

- Basidios (6 species)
- Bots (4 species)
- *Phomopsis* (2 species)
- Diatrypes (1 species)
- Phaeos (4 species)
- Phaeomoniellales (5 species)
- Other
  - *Cytospora* (2 species)
  - *Phoma* (1 species)
  - *Pleurostomophora* (1 species)
First reports on olive trees

- **Basidios** (6 species) – 4 species
- **Bots** (4 species) – 1 species
- **Phomopsis** (2 species) – 2 species
- Diatrypes (1 species)
- **Phaeos** (4 species) – 2 species
- **Phaeomoniellales** (5 species) – 5 species
- Other
  - **Cytospora** (2 species) – 1 species
  - **Phoma** (1 species) – 1 species
  - **Pleurostomophorona** (1 species)
INCIDENCE

% infected samples

Basidios  Bots  Cytospora  Phomopsis  Diatrypes  Phaeos  Phaeomoniellales  Phoma  Pleurostomophora

Wild Olive
Olive

ARC ● LNR
Excellence in Research and Development
Phaeomoniellales

All cultivars
All districts

% infected samples

Wild Olive
Olive

ARC • LNR
Excellence in Research and Development
INCIDENCE

Bots

All cultivars > 1 sample
All districts > 10 samples

% infected samples

Wild Olive
Olive

Basidios  Bots  Cytospora  Phomopsis  Diatrypes  Phaeos  Phaeomoniellaes  Phoma  Pleurostomophora
Higher incidences in wild olives
Older trees accumulate more infections?
“Unmanaged” trees?
SYMPTOM ASSOCIATIONS
SYMPTOM ASSOCIATIONS

Phaeomoniellales

Incidences of phytopathogens

Symptom types:
- Light brown to pink necrosis (n=52)
- Dark brown to black necrosis (n=130)
- Internal black necrosis (n=52)
- Dark brown to black necrotic margin (n=59)
- Streaking (n=14)
- White or soft rot (n=6)
- Twig dieback (n=32)

Phytopathogens:
- Basidiomycetes
- Botryosphaeriaceae
- Diatrypaceae
- Togniniaeae
- Phaeomoniellales
- Diaporthales
- Pleurostomataceae
SYMPTOM ASSOCIATIONS

Bots

Incidence of phytopathogens

- Light brown to pink necrosis (n=52)
- Dark brown to black necrosis (n=130)
- Internal black necrosis (n=52)
- Dark brown to black necrotic margin (n=59)
- Streaking (n=14)
- White or soft rot (n=6)
- Twig dieback (n=32)

Symptom types

- Basidiomycetes
- Botryosphaeriaceae
- Diatrypaceae
- Togniinaceae
- Phaeomoniellales
- Diaporthales
- Pleurostomataceae
• In our study: >95% of identified Phaeomoniellales isolates are of a single new species
  • ubiquitous in olive producing areas of the Western Cape
  • very high incidence in symptomatic wood

• Closely related to two new species discovered on olive trees in Italy
  • Causal agents of extensive wood discoloration in olives
NEW SPECIES ON OLIVES IN ITALY

Crous et al. 2015
IMPACT ON OLIVE PRODUCTION IN SA

• Some of the fungi identified are known as olive pathogens
  • eg. several species of the Bots

• The majority of species have not been reported from olives
  • Uncertain interaction with olives
  • New species in Phaeomoniellales an important pathogen?
    • High incidence
    • Wide distribution
    • Present in all symptom types
SA vs. REST OF THE WORLD

- NB olive trunk disease pathogens in Italy, USA, and Spain:
  - Phaeos
  - *Pleurostomophora*
  - Bots
  - Diatrype
  - *Phomopsis*
  - Phaeomonioniellales (not published)
- Low incidence on olive trees in SA
  - Perhaps related to the age of the trees?
  - Our samples were mainly “young” (~20 yrs)
  - Infections accumulate over time
OPTIONS FOR MANAGEMENT (grapevine)

• Pruning wound protectants
  • Chemical sealants with fungicides: eg. Steriseal, Neocil-Plus, Prune Wound Seal, Prunetect, and Agriwax
  • Biological control: BioTricho® and Eco-77®

• Sanitation
  • Remove and burn symptomatic wood (also from wild olive trees in the vicinity…?)

• Prune before or during warm, dry weather
  • Lower chance of infection through wounds
  • Wounds heal quicker
ACKNOWLEDGEMENTS

• NRF
• Nietvoorbij Plant Protection technical team
  • Bongiwe Sokwaliwa
  • Carine Vermeulen
  • Danie Marais
  • Julia Marais
  • Palesa Lesuthu
• USPP
  • Ihan du Plessis
  • Providence Moyo
  • Michael Bester
• Olive producers – sampling
• John Scrimager