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BOOK OF ABSTRACTS

ISPP INTERNATIONAL SOCIETY FOR PLANT PATHOLOGY

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SFP Société Française de Phytopathologie

The International Society for Plant Pathology & the French Phytopathological Society

national stakeholders. Our first objective is to provide candidate priority locations for epidemic surveillance based on global risk analysis of wheat cropland and trade networks. For example, locations with high cropland connectivity in Kansas, Nebraska and North Dakota in the USA, and in each wheat production region, are identified as likely important for pathogen spread. Pathogen introduction risk via wheat trade networks, if there is inadequate phytosanitary testing, is higher in countries such as the United Arab Emirates, the Netherlands, and the USA. Our second objective is to provide a global biogeographic analysis of 100 economically important wheat pathogens based on their reported geographic distribution. Although pathogen richness peaks in countries with high wheat cropland extent, early epidemic emergence events have been more frequent in the native range of wheat than elsewhere. These findings provide starting points for building global epidemic surveillance and mitigation systems to support sustainable wheat production.

P5.1-042

EXPLORING THE DIVERSITY AND PREVALENCE OF PSEUDOMONAS SYRINGAE IN SWEET CHERRY ORCHARDS OF NEW ZEALAND

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Text

Bacterial canker of cherry, caused by *Pseudomonas syringae* pathovars, is a major constraint to cherry growing in New Zealand and particularly in Central Otago, the primary growing area for cherries. To gain a better understanding of the disease's epidemiology, *Pseudomonas* spp. isolates were collected from symptomatic and asymptomatic cherry tissue from 23 commercial Central Otago cherry orchards in 2015. Isolates were classified into different taxonomic groups using phylogeny based on the *gltA* gene sequence for all strains (250) and Multi Locus Sequence Analysis (MLSA) of four housekeeping genes for 35 strains. The two main taxonomic groups were *P. syringae* pv. *syringae* (Pss) and *P. syringae* pv. *morsprunorum* race 1 (Psm1), in Phylogroup 2 (PG2) and Phylogroup 3 (PG3), respectively. The third group comprised non-pathogenic strains classified as *Pseudomonas* spp. Strains of Psm1 formed a monophyletic group, representing an almost clonal population. There was more variation detected within strains of Pss, although they were restricted to group PG2b. Non-pathogenic P. spp. and pathogenic Pss and Psm1 strains coexisted in the same orchard. It was concluded that Pss is the predominant pathovar in Central Otago. This is the first detailed study of the *P. syringae* species complex in cherry orchards in New Zealand and provides the basis for future epidemiology studies.

P5.1-043

COMPLEMENTARY APPROACHES TO QUANTIFY AND CHARACTERIZE INOCULA DYNAMICS AND LEAF INFECTION AT PLOT LEVEL: CASE OF BLACK LEAF STREAK DISEASE

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Text

Black Leaf Streak Disease is a major leaf disease of banana caused by the airborne ascomycete Pseudocercospora fijiensis. A better understanding of the disease epidemiology would help to find alternatives to fungicides. According to empirical knowledge, plant infection is mainly due to the inoculum from outside the plot (external inoculum, supposedly ascospores) whereas the inoculum within the plot (internal inoculum, supposedly mainly conidia) plays a minor role. We propose to implement two complementary and original experimental approaches to (i) characterize and quantify the external and internal inocula of a plot, and (ii) to identify which leaves are infected by each inoculum. The study is carried out in Guadeloupe, on two experimental plots planted either with a susceptible or a partially resistant cultivar to reduce ascospore production. For the first aim, we install six Burkard multi-vial cyclone samplers above and under canopy to catch respectively the external and internal inocula. Then, we quantify conidia by microscopy and ascospores with quantitative PCR. For the second aim, we describe the leaf infection due to the external and internal inocula by comparing with image analysis the number of lesions produced on leaves, protected or not from the inocula with spore proof nets. The inocula and infection dynamics will be related to the cultivar and the microclimate. This study is the first contribution to understand the role of each inoculum in the leaves' infection.

P5.1-044

GRAPEVINE TRUNK DISEASE PATHOGENS IN ROOTSTOCK MOTHER VINES: A POTENTIAL THREAT TO THE SOUTH AFRICAN GRAPEVINE INDUSTRY

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Text

Rootstock mother vines are known as sources of grapevine trunk disease (GTD) pathogen inoculum. Vines become infected through pruning wounds and spread to canes which are used as propagation material. The risks associated with ageing mother plants are unknown as most of these infected canes appear visually healthy. The aim of the study was to characterize GTD pathogens from mother vines and one-year-old canes harvested from these vines. Fungal isolations were made from 1900 mother vines of different ages and 2050 one-year-old canes. Isolates were identified based on morphology, species-specific PCRs and amplifying and sequencing relevant gene regions of representative isolates. From mother vines, *Phaeomoniella chlamydospora* occurred at the highest incidence (25.9%), followed by Botryosphaeriaceae spp. (18.6%; predominantly D*iplodia seriata*), Basidiomycetes (12.4%; predominantly *Fomitiporia* sp.) and *Phaeoacremonium* (5.9%; predominantly *P. minimum*). All major GTD pathogens occurred in mother vines as young as 4-years-old, including wood rotting Basidiomycetes. This is of great concern since wood rotting fungi could drastically reduce the productive lifespan of mother vines. A total of 4.0%

Complementary approaches to quantify and characterize inocula dynamics and leaf infection at plot level: case of Black Leaf Streak Disease

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Context

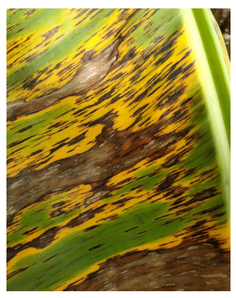
Black Leaf Streak Disease (BLSD) is a major leaf disease of banana, caused by the ascomycete ***Pseudocercospora fijiensis,*** inducing major losses for banana industry and requiring **frequent fungicides applications** worldwide.

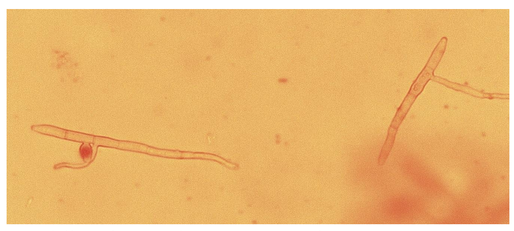
P. fijiensis produces two types of airborne spores, **conidia** and **ascospores**. According to empirical knowledge, plant infection is mainly due to the inoculum from outside the plot (**external inoculum**, supposedly ascospores) whereas the inoculum within the plot (**internal inoculum**, supposedly mainly conidia) plays a minor role.

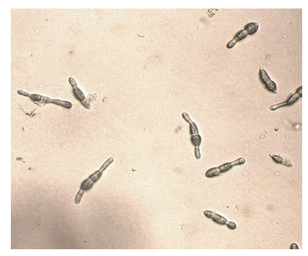
A better understanding of the disease epidemiology, especially on inocula dynamics will allow to **find alternatives** excluding pesticides and optimize current practices.

Main objective

The study aims (i) to **characterize and quantify**, with the proportion of conidia and ascospores, the **external and internal inocula** of a plot, and (ii) to identify which **leaves are infected** by each inoculum, depending on the cultivar and the microclimatic conditions.


Symptoms of BLSD


Conidia of *Pseudocercospora fijiensis*


Ascospores of *Pseudocercospora fijiensis*

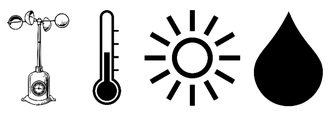
Methodology

The study takes place in Capesterre-Belle-Eau, **Guadeloupe**, FWI in two experimental plots, from **July 2023 to June 2024** : one cultivated with a hybrid **partially resistant** to BLSD (Pointe d'Or), and one cultivated with a cultivar **susceptible** to BLSD (Williams).

(i) Characterization and quantification of the external and internal inocula

(a) Air sampling

Microclimatic conditions




Burkard multi-vial cyclone sampler

Multi-vial volumetric **cyclone samplers** (Burkard) are installed above and under canopy to catch daily respectively the external and internal inocula, sampling 16,5 litres of air per minute, into 1,5 mL Eppendorf vials.

There are two in each cultivar and two in plots without banana as control.

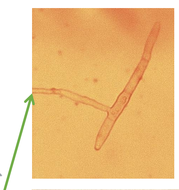
Comparison of the mean number of cells per conidia produced *in vivo* and *in vitro.* The strain GLP 701 has been used to set up the standard curve.

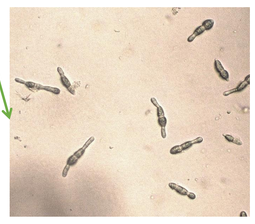
Cultivar/Strain	Type	Number of cells per conidia	
Pointe d'Or	*In vivo*	4,76	b
Williams	*In vivo*	5,22	a
GLP 701	*In vitro*	5,06	ab

(b) Quantifying weekly spores concentration per m^3 of air

2 types of inocula sampled


Inside of the multi-vial cyclone sampler





Microscopy with a hematimeter

Quantification of airborne conidia concentration

Quantitative PCR


ß-tubuline primers

Set up of a standard curve

Concentration of conidia per mL

10^1 10^2 10^3 10^4 10^5 10^6 10^7

30 replicates 10 replicates

$$Asc = \frac{Cell_{qPCR} - (C_\mu \times Cell_{in\ vivo})}{2}$$

With,
Asc, the number of ascospores
$Cell_{qPCR}$, the number of cells found with the qPCR
C_μ, the number of conidia counted with the microscope
$Cell_{in\ vivo}$, the number of cells per conidia in vivo

Quantification of airborne ascospores concentration

(ii) Highlight leaf infection by external and internal inocula

With sporeproof bags

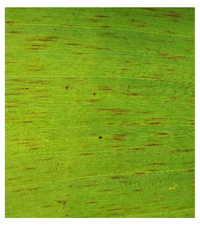

Unfurled leaf and first leaf protected, avoiding the external inoculum


Youngest Leaf Spotted protected, avoiding the internal inoculum

Without sporeproof bags


Control unprotected, exposed to both inocula


Sporeproof bags


First symptoms of BLSD


Photographing the infected leaf

Quantification lesions number between protected and unprotected leaves by image analysis

Quantification of each inoculum within the leaf infection

7 days

37 to 42 days

40 to 45 days

Expected results and perspectives

We expect to quantify the **concentration** of airborne **conidia and ascospores within external and internal inocula**, and to establish the **ratio between the external and the internal inocula** infecting the leaves, both analysed in relation with microclimatic factors. Due to contrasted resistance level of the 2 cultivars, we expect to have a **different ratio** for each one.

This knowledge will allow to **optimize** control methods and to **provide information for epidemiological models** parametrized for BLSD.

Pictures have been taken by Marine SEIDEL, Cirad

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