



# **CASE STUDY:** **CAB Abstracts on CAB Direct** Panama disease of bananas

**CAB Abstracts** is the most complete applied life sciences literature database in the world. Its coverage includes agriculture, environment, veterinary sciences, applied economics, food science and nutrition.

CABI's online database platform, **CAB Direct**, has been built specifically for researchers working in the applied life sciences to help them use CAB Abstracts to research complex problems quickly and with precision.

## Panama disease of bananas

In the 1950s, Panama disease virtually destroyed the banana crop worldwide. Plantations were replanted with Cavendish bananas which were resistant to the disease. A new strain of Panama disease, Tropical Race 4 or TR4, has emerged which Cavendish bananas are susceptible to. TR4 is destroying banana plantations in Southeast Asia and has spread to Northern Australia, the Middle East and Africa.

No single method of controlling TR4 has been identified and the global supply of bananas is once again under threat.

**CAB Abstracts** is the most comprehensive database of applied life sciences literature in the world. CAB Direct is the only online platform built specifically to help researchers maximise the potential of CAB Abstracts.

On **CAB Direct**, CAB Abstracts can help researchers understand the scale of the problem and identify potential methods or combinations of methods for managing Panama disease, particularly strain TR4.

**The screenshots in this case study show CAB Abstracts in use on the CAB Direct platform.**



Panama disease of bananas, leaf symptoms




Panama disease of bananas, internal stem close-up



**CAB Abstracts contains over 8.4 million records providing access to the world's applied life sciences literature.**

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 **CAB Abstracts**

Search: [Keyword](#) [Advanced](#) [Browse all content](#) [Thesaurus](#)

[clear search](#) [Search](#)

[Search results](#) [Selected records](#) [Search history](#) [My CABI](#) [My Projects](#)





You are searching CAB ABSTRACTS. Click here to search all subscribed products.

Refined by: [Clear all](#)

[Save search](#) [Edit Search](#)

Search Results: 8,424,086 results (approx.)

Actions

☐ All Sort by: [Relevance](#) Show: [25](#) Page: [1](#) of 336964

☐ 1. **Maritimes regional meeting, 2015.**  
Publisher : Taylor & Francis, Abingdon, UK  
Journal article; Conference paper : [Canadian Journal of Plant Pathology](#) 2016 Vol.38 No.1 pp.141-147

☐ 2. **Special Feature: Demography beyond the population.**  
Publisher : Wiley-Blackwell, Oxford, UK  
Journal issue : [Functional Ecology](#) 2016 Vol.30 No.2 pp.157-180

☐ 3. **Veterinary happiness.**  
Author(s) : [Stoewen, D. L.](#)  
Publisher : Canadian Veterinary Medical Association, Ottawa, Canada  
Journal article : [Canadian Veterinary Journal](#) 2016 Vol.57 No.5 pp.539-541 ref.32

☐ 4. **Soil education practical course in school and society. 6. Radiochemical education in soil education.**  
Author(s) : [Tamura, K.](#); [Takahashi, J.](#)  
Publisher : Japanese Society of Soil Science and Plant Nutrition, Tokyo, Japan  
Journal article : [Japanese Journal of Soil Science and Plant Nutrition](#) 2016 Vol.87 No.1 pp.49-53 ref.16


☐ 5. **Effects of application time of single basal fertilization on rice growth and nitrogen availability.**  
Author(s) : [Matsumori, M.](#); [Kaida, W.](#)  
Publisher : Japanese Society of Soil Science and Plant Nutrition, Tokyo, Japan  
Journal article : [Japanese Journal of Soil Science and Plant Nutrition](#) 2016 Vol.87 No.2 pp.136-139 ref.4

☐ 6. **Relation between mitochondria and low-alcohol containing sake.**  
Author(s) : [Kazuoka, T.](#)  
Publisher : Society for Biotechnology, Osaka, Japan  
Journal article : [Seibutsu-kogaku Kaishi](#) 2016 Vol.94 No.2 pp.85 ref.6

☐ 7. **Special Feature: Ecosystems, evolution and plant-soil feedbacks.**  
Author(s) : [Bailey, J.](#); [Schweitzer, J.](#)  
Publisher : Wiley-Blackwell, Oxford, UK

Results by Year:

Use the slider to define a range of years.  
From 1880 To 2016



[Update results](#)

Refine by: [?](#)

[Topics](#)

[Organism Descriptors](#)

[Broader terms](#)

[Document type](#)

[Year](#)

[Publication title](#)

[Author](#)

[Geographic Location](#)

[Language](#)

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➡ Searching CAB Abstracts for the phrase “Panama disease” gives us some results, and the information you require to develop the search.

On CAB Direct, the results page has been designed to make searching for relevance fast and simple.

Search: **Keyword** [Advanced](#) [Browse all content](#) [Thesaurus](#) [?](#)

[clear search](#)

Search

Search results

Selected records

Search history

My CAB

My Projects

You are searching CAB ABSTRACTS . Click here to search all subscribed products.

Refined by :

Clear all ✕

Save search

Edit Search [?](#)

Search Results: 194 results (approx.)

Actions

☐ All

Sort by : 

Relevance ▾

Show: 

25 ▾

Page : 

1 ▾

 of 8 

◀

▶

☐ 1. Genetic diversity, growth and production of genotypes of banana 'Prata-Anã' in area with Panama disease.

In the irrigated area of Jaíba in Northern Minas Gerais, there are reports on the presence of some genotypes of banana cv. Prata-Anã supposedly tolerant to the **Panama disease**, where the disease was not established after 15 years of cultivation even in the presence of the pathogen. Therefore this...

**Foreign Title :** Diversidade genética, crescimento e produção de genótipos de bananeira 'Prata-Anã' em área com mal do Panamá.

**Author(s) :** [Lopes, O. P.](#); [Maia, V. M.](#); [Xavier, A. A.](#); [Costa, M. R. da](#); [Rodrigues, M. G. V.](#)

**Publisher :** Sociedade Brasileira de Fruticultura, Jaboticabal, Brazil

**Journal article :** [Revista Brasileira de Fruticultura](#) 2014 Vol.36 No.4 pp.924-939 ref.29

☐ 2. Tropical race 4 of Panama disease in the Middle East.

**Panama disease** (aka *Fusarium wilt*) of banana (*Musa* spp.) has been a destructive problem for well over a century. Race 1 of the pathogen, *Fusarium oxysporum* f. sp. *cubense* (Foc), was responsible for the demise of the first export trades of banana that were based on the cultivar 'Gros Michel'...

**Author(s) :** [Ploetz, R.](#); [Freeman, S.](#); [Konkol, J.](#); [Al-Abed, A.](#); [Naser, Z.](#); [Shalan, K.](#); [Barakat, R.](#); [Israeli, Y.](#)

**Publisher :** Springer, Dordrecht, Netherlands

**Journal article :** [Phytoparasitica](#) 2015 Vol.43 No.3 pp.283-293 ref.51

☐ 3. Evaluation of different banana genotypes for resistance to Panama disease.

**Panama disease**, or fusarium wilt disease, caused by the fungus *Fusarium oxysporum* f.sp. *cubense* is a disease causing great losses in banana production worldwide, hindering production in certain areas of the world. In Brazil, banana crop has suffered great losses due to favorable soil and climate...

**Author(s) :** [Garcez, M.](#); [Martins, J. A. S.](#); [Rodrigues, E. J. R.](#)

**Publisher :** Universidade Federal de Uberlândia, Uberlândia, Brazil

**Journal article :** [Bioscience Journal](#) 2016 Vol.32 No.2 pp.431-435 ref.10

☐ 4. Control of Panama disease of banana by rotating and intercropping with Chinese chive (*Allium tuberosum* Rottler): role of plant volatiles.

Intercropping and rotating banana (*Musa* spp.) with Chinese chive (*Allium tuberosum* Rottler) has been used as an effective method to control **Panama disease** (Fusarium wilt) of banana in

Results by Year:

Use the slider to define a range of years.

From 

1970

 To 

2016

≡

Update results

Refine by :

Topics

Organism Descriptors

Broader terms

Document type

Year

Publication title

Author

Geographic Location

Language

Your Products



To make searching really powerful, CAB Abstracts is indexed using the CAB Thesaurus, the largest and most comprehensive controlled vocabulary in the applied life sciences.

CAB Direct uses a new visual interface so we can quickly see which terms are most commonly used, and easily identify and refine by the correct organism descriptions for Panama disease.

Author(s) : Ploetz, R.; Freeman, S.; Konkol, J.; Al-Abed, A.; Naser, Z.; Shalan, K.; Barakat, R.; Israeli, Y.  
Publisher : Springer. Dordrecht. Netherlands.

Select one or more to refine your search: Close

Organism Descriptors: Fusarium oxysporum f.sp. cubense  
OR Fusarium oxysporum Refine results Clear all

☒ OR ☐ AND ☐ NOT  
Please note, by default selecting one item will result in an "AND", unless you select "NOT".

Show list

Musa

fungi

Fusarium oxysporum f.sp. cubense

Fusarium oxysporum

Fusarium

Musa paradisiaca

Mycosphaerella fijiensis

Mycosphaerella musicola

plants

Show list

Organism Descriptors: Fusarium oxysporum f.sp. cubense  
OR Fusarium oxysporum Refine results Clear all

Topics

Organism Descriptors

Broader terms

Document type

Year

Publication title

Author

Geographic Location

Language

Your Products

CABI Hosted Full Text

Evidence Based Research

Open Access Journals

Find results from other sites : ?

Search on AGRIS

Search on PubMed

Search on USDA

Search on europeana

Search on DPLA

Search on OECD

☐ 6. First report of *Fusarium oxysporum* f. sp. *cubense* tropical race 4 causing Panama disease in cavendish bananas in Pakistan and Lebanon.

Now that we have a search strategy developing and a set of results to work with, we can use the 'My Projects' feature on CAB Direct to save and organise our searches and results.

It's quick and simple to sign-up for a 'My CABI' account and with this we can save searches and records, create and work on projects, highlight records and add annotations as well.

The screenshot shows the 'My Projects' section of the CAB Direct website. At the top, there is a search bar with tabs for 'Keyword', 'Advanced', 'Browse all content', and 'Thesaurus'. Below the search bar is a navigation menu with tabs for 'Search', 'My records', 'My searches', 'My CABI', and 'My Projects'. Under 'My Projects', there are sub-tabs for 'All projects', 'Active', and 'Completed'. A toolbar shows 'Actions' with icons for delete, share, and print, a 'Change view' button, and a 'Create new project' button. The main area displays two project cards: 'Aedes - the mosquito vector behind Zika' (ACTIVE) and 'Banyan tree review' (ARCHIVED). Each card shows the last updated date, creation date, number of records, and number of searches.

Search: Keyword Advanced Browse all content Thesaurus

Enter keyword search

Search

Search My records My searches My CABI My Projects

All projects Active Completed

Actions Change view Create new project

**Projects**

- ☐ **Aedes - the mosquito vector behind Zika**  
**ACTIVE**  
Last updated: 4/1/2016 3:48:36 PM  
Created: 3/18/2016 10:30:52 AM  
Records: 5  
searches: 0
- ☐ **Banyan tree review**  
**ARCHIVED**  
Last updated: 3/18/2016 6:15:05 PM  
Created: 4/6/2016 5:29:32 PM  
Records: 8  
searches: 0

The screenshot shows the 'Create a project' dialog box overlaid on the 'My Projects' page. The dialog box has a title bar with a close button. It contains two main sections: 'Name your project' with a text input field containing 'Panama disease of bananas', and 'Project description' with a text area containing 'A review of the literature to identify possible control strategies for TR4'. At the bottom of the dialog box are 'Cancel' and 'Create project' buttons.

Search: Keyword Advanced Browse all content Thesaurus

Enter keyword search

Search

Search My records My searches My CABI My Projects

All projects Active Completed

Actions Change view Create new project

**Projects**

- ☐ **Aedes - the mosquito vector behind Zika**  
**ACTIVE**  
Last updated: 4/1/2016 3:48:36 PM  
Created: 3/18/2016 10:30:52 AM  
Records: 5  
searches: 0
- ☐ **Banyan tree review**  
**ARCHIVED**  
Last updated: 3/18/2016 6:15:05 PM  
Created: 4/6/2016 5:29:32 PM  
Records: 8  
searches: 0

**Create a project**

Name your project

Panama disease of bananas

Project description


A review of the literature to identify possible control strategies for TR4

Cancel Create project

➡ We can now go back to the search results, develop the search strategy and save searches to the project.

The screenshot shows a web interface for searching and managing projects. A modal dialog box titled "Confirm action" is centered on the screen. The dialog contains the following text: "You have elected to save 1 search.", "You can also add the selected searches to a project.", and "Select a project to add searches to:". Below this text is a dropdown menu showing "Panama disease of bananas". There are two options: "or" followed by a red "Create new project" button, and "Cancel" and "OK" buttons at the bottom right of the dialog.

The background interface includes a search bar with the text "Panama disease", a "Search" button, and a "My records" tab. Below the search bar, there are filters for "Refined by" and "Your Products". The search results section shows "Search Results: 173 results". The first result is titled "1. Genetic diversity, growth and production of genotypes of banana 'Prata-Anã' in area with Panama disease." and includes a brief description, a "Foreign Title", and "Author(s)".


 The Edit Search function is an easy way to remove the informal search phrase “Panama disease”, so that we use only the correct organism names. This gives us many more results to work with.

Search: **Keyword** [Advanced](#) [Browse all content](#) [Thesaurus](#) [?](#)

[clear search](#) [Search](#)

[Search results](#) [Selected records](#) [Search history](#) [My CABI](#) [My Projects](#)

You are searching CAB ABSTRACTS. Click here to search all subscribed products.

Refined by: **Organism Descriptors:** *Fusarium oxysporum* f.sp. *cubense* ✖  
 OR *Fusarium oxysporum* ✖ [Clear all](#) ✖

[Save search](#) [Edit Search](#) [?](#)

View and edit the search syntax including all refining terms

[Cancel](#) [Re-submit query](#)

[clear search](#) [Search](#)






[Search results](#) [Selected records](#) [Search history](#) [My CABI](#) [My Projects](#)

You are searching CAB ABSTRACTS. Click here to search all subscribed products.

[Save search](#) [Edit Search](#) [?](#)

Refined by: [Clear all](#) ✖

**Search Results:** 12,925 results (approx.)

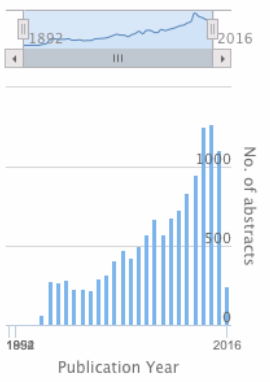
**Actions**     

☐ **All** **Sort by:** [Relevance](#) **Show:** [25](#) **Page:** [1](#) of 517 [◀](#) [▶](#)

☐ **1. Post-transcriptional silencing of the *SGE1* gene induced by a dsRNA hairpin in *Fusarium oxysporum* f. sp. *cubense*, the causal agent of Panama disease.**  
*Fusarium oxysporum* f. sp. *cubense* (*Foc*), the causal agent of Panama disease, is responsible for economic losses in banana crops worldwide. The identification of genes that effectively act on pathogenicity and/or virulence may contribute to the development of different strategies for disease control ...  
**Author(s):** [Fernandes, J. S.](#); [Angelo, P. C. S.](#); [Cruz, J. C.](#); [Santos, J. M. M.](#); [Sousa, N. R.](#); [Silva, G. F.](#)  
**Publisher:** FUNPEC, Brazil  
**Journal article:** [Genetics and Molecular Research](#) 2016 Vol.15 No.2 pp.15027941 ref.many

☐ **2. Evaluation of bioactive compounds of *Ophiocordyceps sinensis* [Berk.] Sacc. against *Fusarium* spp.**  
 Studies were undertaken to extract and evaluate the bioactive compounds of Chinese caterpillar fungus, *Ophiocordyceps sinensis* against the wilt pathogen, *Fusarium* spp. Ethyl acetate fraction of the culture filtrate condensate (CFC) at 1500 ppm concentration showed the maximum mycelial inhibition of ...  
**Author(s):** [Sangeetha, C.](#); [Krishnamoorthy, A. S.](#); [Nakkeeran, S.](#); [Ramakrishnan, S.](#); [Amirtham, D.](#)  
**Publisher:** Dr P. R. Yadav, Muzaffarnagar, India  
**Journal article:** [Biochemical and Cellular Archives](#) 2015 Vol.15 No.2 pp.431-435 ref.19

**Results by Year:**  
 Use the slider to define a range of years.  
 From [1892](#) To [2016](#)



[Update results](#)

**Refine by:** [?](#)

[Topics](#)

[Organism Descriptors](#)



➡ We can use the interactive date chart to restrict the results to recently published articles, in this case articles published in 2015.

The screenshot shows a search interface with a date chart and a refinement panel. The date chart on the left allows users to select a range of years from 1892 to 2016. Below the chart is a bar graph showing the number of abstracts published per year. The refinement panel on the right allows users to select one or more years to refine their search. The year 2015 is selected, and the number of abstracts for 2015 is 531.

**Use the slider to define the range of years to view.**

From 1892 To 2016

**Select one or more to refine your search:**

Year: 2015 ✕ Clear all ✕

**Refine results**

☒ OR ☐ AND ☐ NOT

Please note, by default selecting one item will result in an "AND", unless you select "NOT".

|                                     |  |
|-------------------------------------|--|
| <input type="checkbox"/> 2016 (250) | <input checked="" type="checkbox"/> 2015 (531) |
| <input type="checkbox"/> 2014 (576) | <input type="checkbox"/> 2013 (620)            |
| <input type="checkbox"/> 2012 (651) | <input type="checkbox"/> 2011 (723)            |
| <input type="checkbox"/> 2010 (534) | <input type="checkbox"/> 2009 (499)            |
| <input type="checkbox"/> 2008 (450) | <input type="checkbox"/> 2007 (438)            |
| <input type="checkbox"/> 2006 (400) | <input type="checkbox"/> 2005 (375)            |
| <input type="checkbox"/> 2004 (353) | <input type="checkbox"/> 2003 (328)            |
| <input type="checkbox"/> 2002 (356) |  |

**Show more +**

Year: 2015 ✕ Clear all ✕

**Refine results**

**Select years**

➡ And we can select interesting records and save them to the project too.

The screenshot shows a search interface with a list of results and an 'Add to project' dialog. The dialog allows users to select a project to add record(s) to, or create a new project. The project 'Panama disease of bananas' is selected. The background shows a list of search results, including a record about the evaluation of bioactive compounds of *Ophiocordyceps sinensis* against *Fusarium* spp.

**Add to project**

Select a project to add record(s) to:

Panama disease of bananas

or **Create new project**

**Cancel** **Add to project**

**Search Results: 510 results**

**1. Evaluation of bioactive compounds of *Ophiocordyceps sinensis* [Berk.] Sacc. against *Fusarium* spp.**

Studies were undertaken to extract and evaluate the bioactive compounds of Chinese caterpillar fungus, *Ophiocordyceps sinensis* against the wilt pathogen, *Fusarium* spp. Ethyl acetate fraction of the culture filtrate condensate (CFC) at 1500 ppm concentration showed the maximum mycelial inhibition of ...

**Author(s):** Sangeetha, C., Krishnamoorthy, A. S., Nakkeeran, S., Ramakrishnan, S., Amirham, D.

**Publisher:** Dr P. R. Yadav, Muzaffarnagar, India


**Journal article:** *Biochemical and Cellular Archives* 2015 Vol 15 No 2 pp 431-435 ref 19

**2. Effects of bio-organic fertilizers produced by four *Bacillus amyloliquefaciens* strains on banana fusarium wilt disease.**

Continuous planting of banana disrupts the micro-ecological balance, resulting in severe

 In CAB Abstracts on CAB Direct, we can highlight significant passages of text.

Here we see that CAB Abstracts covers research that examines the scale of the problem, its potential economic impact and methods for detecting it.

Search: **Keyword** [Advanced](#) [Browse all content](#) [Thesaurus](#) 

clear search

Enter keyword search

Search

Search results






My records








My searches

My CABI

My Projects

[Back to results page](#)

Actions     

Choose a colour       

☐ **Management of Fusarium wilt of banana: a review with special reference to tropical race 4.**

**Author(s) :** [Ploetz, R. C.](#)  
**Author Affiliation :** University of Florida, 18905 SW 280th Street, Homestead, FL 33031-3314, USA.  
**Author Email :** [kelly12@ufl.edu](mailto:kelly12@ufl.edu)  
**Editors :** [Elmer, W.](#)  
**Journal article :** [Crop Protection](#) 2015 Vol.73 pp.7-15 ref.many  
**ISSN :** [0261-2194](#)  
**DOI :** [10.1016/j.cropro.2015.01.007](#)  
**URL :** <http://www.sciencedirect.com/science/...>  
**Record Number :** 20153216710

**Abstract :**  
Banana (*Musa* spp.) is an important cash and food crop in the tropics and subtropics. Fusarium wilt, which is also known as Panama disease, is caused by *Fusarium oxysporum* f. sp. *cubense* (Foc). It is one of the most destructive diseases of this crop, and has a relatively wide host range. Its greatest impact was on the early 'Gros Michel'-based export trades. Resistant cultivars of the Cavendish subgroup were used to replace 'Gros Michel', but are now succumbing to a new variant of the pathogen, tropical race 4 (TR4). Although TR4 is only found in the Eastern Hemisphere, it threatens global export and small-holder production of the Cavendish cultivars. Management of this disease is largely restricted to excluding the pathogen from non-infested areas and the use of resistant cultivars where Foc is established. The perennial production of this crop and the polycyclic nature of this disease hinder the development of other management strategies. Measures that are effective against annual or short-lived hosts of these diseases are usually ineffective against Fusarium wilt of banana. Effective biological, chemical and cultural measures are not available, despite a substantial, positive literature on these topics. Critical evaluations of, and realistic expectations for, these measures are needed. Better resistance is needed to this disease, especially that is caused by TR4.

**Publisher :** [Elsevier Ltd](#)

Explore similar records

[Fusarium wilt of banana.](#)

[Brown rot strikes Prunus fruit: an ancient...](#)


[Molecular breeding strategy and challenges...](#)

[Recent advances and current status of the...](#)

[Host to a stranger: Arabidopsis and Fusarium...](#)

[Fusarium wilts of ornamental crops and their...](#)

Show all similar records

Indexing terms for this record : 


[Organism Descriptors : \(3\)](#)

[Descriptors : \(15\)](#)


[Identifiers : \(7\)](#)

[Broad Terms : \(16\)](#)

Other sources of full text :

[Search for this title in CCC RightFind](#) 

 In CAB Direct we can organise our data by using different colours to highlight different parts of the abstract, for example the research objective and the results.

Search: **Keyword** [Advanced](#) [Browse all content](#) [Thesaurus](#) 

clear search

Search

Search results

My records






My searches

My CABI




My Projects

[Back to results page](#)

Actions

Choose a colour

☐

**Potential economic impact of Panama disease (tropical race 4) on the Australian banana industry.**

**Author(s)** : [Cook, D. C.](#); [Taylor, A. S.](#); [Meldrum, R. A.](#); [Drenth, A.](#)

**Author Affiliation** : Department of Agriculture and Food Western Australia, Bunbury WA 6231, Australia.

**Author Email** : [david.cook@agric.wa.gov.au](mailto:david.cook@agric.wa.gov.au)

**Journal article** : [Journal of Plant Diseases and Protection](#) 2015 Vol.122 No.5/6 pp.229-237 ref.36

**ISSN** : 1861-3829

**URL** : <http://www.jpdp-online.com>

**Record Number** : 20163017915

**Abstract :**

Panama disease, caused by *Fusarium oxysporum* f.sp. *cubense* tropical race 4, is considered to be one of the most severe threats facing the banana industry worldwide. Tropical race 4 has rapidly spread throughout Southeast Asia since first being reported from Taiwan in 1990 and Indonesia in 1992. It was first discovered in Australia in 1997 where strict quarantine management contained its distribution to the Northern Territory for almost two decades until March 2015 when it was detected in Tully, North Queensland. The spread of this disease to the major banana production areas in Queensland could have a severe impact on the Australian banana industry as no effective chemical control options exist and no resistance has as yet been identified in agronomically acceptable banana varieties. However, given its successful containment in the Northern Territory there is uncertainty about future losses, and consequently what resources should be expended on its continued control. In this paper, we construct a dynamic model to estimate potential financial consequences for the Australia banana industry over time if the disease spreads beyond its current distribution. Scenarios modelled account for the possibility of spread via natural means described by a diffusion-like process, and also by large jumps mediated by human activities. Aggregating results of likely spread over time, we predict the disease will cause industry losses exceeding \$138 million per year despite a slow rate of spread.

**Publisher** : [Eugen Ulmer KG](#)

**Location of publication** : [Stuttgart](#)

Explore similar records

Post-transcriptional silencing of the SGE1...

Chitosan and oligochitosan enhance ginger...


Potential of *Trichoderma harzianum* for...

Rhizosphere microbial communities from...

Evaluation of chlorothalonil and paraffinic...

Automatic detection of diseased tomato...

Show all similar records

Indexing terms for this record : 

Organism Descriptors : (3)


Descriptors : (11)

Identifiers : (6)

Broad Terms : (23)

GeographicLocation : (3)

Other sources of full text :

Search for this title in CCC  
[RightFind](#) 

➡ The abstract below describes a sensitive, specific and rapid detection method (real time PCR) for determining infection – the first step for preventing disease spread and implementing control measures.

With CAB Direct we can create our own notes, by annotating records, to add context and meaning.

Search: **Keyword** [Advanced](#) [Browse all content](#) [Thesaurus](#) [?](#)

clear search

Enter keyword search

Search

Search results

My records

My searches

My CABI

My Projects

[Back to results page](#)

Actions

Choose a colour

☐

**Development of a single-tube duplex real-time fluorescence method for the rapid quantitative detection of *Fusarium oxysporum* f. sp. *cubense* race 1 (FOC1) and race 4 (FOC4) using TaqMan probes.**

**Author(s)** : [Yang LeiLiang](#); [Sun LiXia](#); [Ruan XiaoLei](#); [Qiu DeYi](#); [Chen DingHu](#); [Cai XianQuan](#); [Li HuaPing](#)

**Author Affiliation** : State Key Laboratory of Conservation and Utilization of Subtropical Agro-bioresources, South China Agricultural University, Guangzhou, Guangdong 510642, China.

**Author Email** : [huaping@scau.edu.cn](mailto:huaping@scau.edu.cn)

**Journal article** : [Crop Protection](#) 2015 Vol.68 pp.27-35 ref.38

**ISSN** : 0261-2194

**DOI** : [10.1016/j.cropro.2014.11.004](https://doi.org/10.1016/j.cropro.2014.11.004)

**URL** : <http://www.sciencedirect.com/science/...>

**Record Number** : 20153051809

**Abstract :**

Banana fusarium wilt caused by *Fusarium oxysporum* f. sp. *cubense* race 1 (FOC1) and race 4 (FOC4) is a destructive disease that affects bananas in tropical and subtropical areas worldwide. A sensitive and specific detection method is the primary step to preventing spread of the disease. In this study, a real-time fluorescence PCR method was developed based on specific conserved primers from the markers of sequence characterized amplified region (SCAR) and TaqMan probes for detecting FOC1 and FOC4. The results showed that real-time fluorescence PCR could be used to detect FOC1 and FOC4 accurately and effectively within 90 min (not including DNA extraction). The developed method had high specificity and could therefore be used to distinguish *F. oxysporum* f. sp. *cubense* from other allied species and forma, such as *Fusarium verticillioides*, *Fusarium oxysporum* f. sp. *melonis*, *Fusarium oxysporum* f. sp. *momodicae*, *Fusarium oxysporum* f. sp. *benincasae*, and *Fusarium oxysporum* f. sp. *opuntiarum*, and other plant pathogens, such as *Penicillium*. This detection system also demonstrated high sensitivity, yielding a total copy number of 91,258, which was 100 times higher than that of endpoint PCR. We found that FOC1 had approximately 36 times higher abundance in banana 'Guangfen #1' pseudostem than FOC4 at 14 days after infection. In addition, banana 'Guangfen #1' root tissues showed an approximately 23 times higher abundance of FOC1 than corm tissues in field samples. In conclusion, the developed single-tube duplex real-time PCR method can sensitively distinguish FOC1 and FOC4 with high specificity. This method can be utilized to assist in the implementation of quarantine measures for the prevention and control of banana fusarium wilt caused by *F. oxysporum* f. sp. *cubense*.

**Publisher** : [Elsevier Ltd](#)

**Location of publication** : [Oxford](#)

**Country of publication** : [UK](#)

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**Real time PCR - detection**

This is a sensitive, specific and rapid detection method for determining infection, the first step in preventing disease and implementing control.

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 The results show that an endophyte is one of the methods of control in the research literature.

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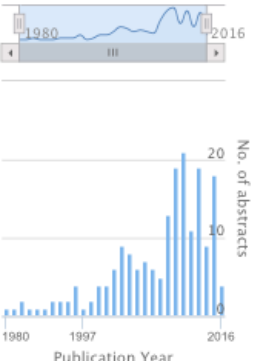
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☐ **1. Biological control of Panama disease (*Fusarium oxysporum* f. sp. *cubense*) using endophytic fungi.**  
The objective of this study was to evaluate the effect of three isolates of endophytic fungi of *Trichoderma atroviride*, Endo 1, Endo 2 and Endo 3, for the biocontrol of the Panama disease in banana cultivar Gros Michel (AAA), caused by *Fusarium oxysporum* f. sp. *cubense* (Foc). Six week old...  
**Foreign Title :**Control biológico del mal de panamá (  
**Author(s) :** Ortiz, R.; Pocasangre, L. E.  
**Publisher :** Universidad EARTH, Guácimo, Costa Rica  
**Journal article :** *Tierra Tropical: Sostenibilidad, Ambiente y Sociedad* 2012 Vol.8 No.2 pp.221-228 ref.19

☐ **2. Evaluation of nonpathogenic *Fusarium oxysporum* and *Pseudomonas fluorescens* for Panama disease control.**  
Nonpathogenic *Fusarium oxysporum* endophytes from healthy banana roots were evaluated for their ability to reduce Fusarium wilt of banana (Panama disease). Isolates were identified morphologically and by using species-specific primers. Pathogenicity was confirmed by inoculating banana plantlets in...  
**Author(s) :** Belgrove, A.; Steinberg, C.; Viljoen, A.  
**Publisher :** American Phytopathological Society (APS Press), St. Paul, USA  
**Journal article :** *Plant Disease* 2011 Vol.95 No.8 pp.951-959 ref.60

☐ **3. Biocontrol of *Fusarium oxysporum* f.sp. *cubense* tropical race 4 by formulated cells and cell-free extracts of *Streptomyces griseus* in sterile soil environment.**  
The biocontrol activities of cells and cell-free extracts of *Streptomyces griseus* was tested against *Fusarium oxysporum* f.sp. *cubense* tropical race 4 (FOC race 4) in a sterile soil environment. They were first formulated in sodium alginate, kaolin clay and in alginate-kaolin combination, prior to...  
**Author(s) :** Zacky, F. A.; Ting SuYien [Ting, S. Y. A.]  
**Publisher :** Taylor & Francis, Abingdon, UK  
**Journal article :** *Biocontrol Science and Technology* 2015 Vol.25 No.6 pp.685-696 ref.44

☐ **4. Field suppression of Fusarium wilt disease in banana by the combined application of native endophytic and rhizospheric bacterial isolates possessing multiple functions.**  
To develop effective biological control methods for management of Fusarium wilt of banana, 71 endophytic bacteria were isolated from root and corm tissues and 37 bacteria were isolated from the rhizospheres of 21 different banana accessions. The *in vitro* screening of these microbes against *Fusarium* ...  
**Author(s) :** Raman Thangavelu; Muthukathan Gopi  
**Publisher :** Mediterranean Phytopathological Union, Firenze, Italy  
**Journal article :** *Phytopathologia Mediterranea* 2015 Vol.54 No.2 pp.241-252 ref.48

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Results include an article suggesting that the endophytes have shown positive results.

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### *In planta* biocontrol of soilborne Fusarium wilt of banana through a plant endophytic bacterium, *Burkholderia cenocepacia* 869T2.

**Author(s)** : [Ho YingNing](#); [Chiang HsingMei](#); [Chao ChihPing](#); [Su ChingChung](#); [Hsu HuiFang](#); [Guo ChenTong](#); [Hsieh JuLiang](#); [Huang ChiehChen](#)  
**Author Affiliation** : Department of Life Sciences, College of Life Sciences, National Chung Hsing University, 250, Kuo Kuang Rd., Taichung, 402, Taiwan.  
**Author Email** : [silentboyryan0109@gmail.com](mailto:silentboyryan0109@gmail.com) , [katie04154@gmail.com](mailto:katie04154@gmail.com) , [cpchao.tbri@yahoo.com.tw](mailto:cpchao.tbri@yahoo.com.tw) , [succccc@yahoo.com.tw](mailto:succccc@yahoo.com.tw) , [on1305@yahoo.com.tw](mailto:on1305@yahoo.com.tw) , [chentong79621@gmail.com](mailto:chentong79621@gmail.com) , [bio1gene@yahoo.com.tw](mailto:bio1gene@yahoo.com.tw) , [cchuang@dragon.nchu.edu.tw](mailto:cchuang@dragon.nchu.edu.tw)  
**Journal article** : *Plant and Soil* 2015 Vol.387 No.1/2 pp.295-306 ref.42  
**ISSN** : 0032-079X  
**URL** : <http://rd.springer.com/journal/11104>  
**Record Number** : 20153068874

**Abstract :**  
Aim: Fusarium wilt (Panama disease) caused by *Fusarium oxysporum* f. sp. *cubense* tropical race 4 (Foc TR4) is a soilborne disease that severely devastates the banana industry worldwide. We aimed to isolate beneficial endophytic bacterial strains against Panama disease. Methods: From different plant species, including reeds (*Phragmites australis*), vetiver grass (*Chrysopogon zizanioides*), and banana plants (Cavendish cv. Pei-Chiao, Cavendish cv. Formosana, and Musa sapientum cv. Rose), endophytes were screened and characterized. The diversity and community of endophytes within banana plants were analyzed by PCR-denaturing gradient gel electrophoresis (DGGE). The banana tissue culture plantlets were inoculated with the candidate endophyte, *Burkholderia cenocepacia* 869T2, and effects of *in planta* biocontrol were observed. Results: Endophytic *B. cenocepacia* 869T2 decreased the disease incidence of Fusarium wilt on treated banana plants to 3.4%, comparing to 24.5% of non-inoculated plants infected in the field test within a 7-month period. Furthermore, significant growth promoting of 869T2 inoculated banana plants was observed in field experiments. Conclusions: In addition to 869T2 genomic sequence data, our results suggest that the pyrrolnitrin and pyrroloquinoline quinone potential producer, *B. cenocepacia* 869T2, is a good biological control agent (BCA) for use in the biocontrol of Fusarium wilt and plant promotion.

**Publisher** : [Springer](#)  
**Location of publication** : [Dordrecht](#)  
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**Language of text** : [English](#)  
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➡ We can use CAB Direct to create a new search based on the index terms from the previous record.

The screenshot shows a modal window titled "Select to search for the following term(s):" with a "Close" button. Inside the modal, there is a text input field containing "Descriptors: biological control ✗ OR endophytes ✗ OR biological control agents ✗". Below this, there are two radio buttons for "Or" (selected) and "And". A grid of checkboxes lists various terms: bananas, effects, field tests, molecular genetics, plant pathogens, biological control, endophytes, fruits, natural enemies, species, biological control agents, field experimentation, genomics, plant pathogenic fungi, and tissue culture. Some terms like "biological control", "endophytes", and "biological control agents" are checked. At the bottom of the modal, there are "Search" and "Clear all ✗" buttons. To the right of the modal, a sidebar shows search statistics: Descriptors: (16), Identifiers: (14), Broad Terms: (33), Geographic Location: (1), and Other sources of full text:.

➡ By simply adding an additional keyword (via Edit Search), CAB Abstracts can be used to look for other relevant research into endophytes that could provide additional insights, in this case, mycotoxins.

The screenshot shows the CAB Abstracts search results page. The search query is "(de:('biological control' or 'endophytes' or 'biological control agents')) AND mycotoxin". The page shows 27 results (approx.). The first result is titled "1. Integrated approach of the prevention of mould spoilage risks and mycotoxin contamination of stored grain - a European perspective." by Fleurat-Lessard, F. The second result is titled "2. In vitro efficacy of selected LAB strains against aflatoxigenic fungi." The page also features a "Results by Year" bar chart showing the number of abstracts for the years 2014 and 2015. The chart shows a significant increase in 2015. The page includes navigation buttons like "Search", "Save search", "Edit Search", and "Update results".



 We find evidence that mycotoxin accumulation can be inhibited when used against a different *Fusarium* species.

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Actions

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☐ **Bacterial endophytes from wild maize suppress *Fusarium graminearum* in modern maize and inhibit mycotoxin accumulation.**

**Author(s)** : Mousa, W. K.; Shearer, C. R.; Limay-Rios, V.; Zhou Ting; Raizada, M. N.  
**Author Affiliation** : Department of Plant Agriculture, University of Guelph, Guelph, ON, Canada.  
**Author Email** : [raizada@uoguelph.ca](mailto:raizada@uoguelph.ca)  
**Journal article** : *Frontiers in Plant Science* 2015 Vol.6 No.October pp.805 ref.many  
**ISSN** : 1664-462X  
**URL** : <http://journal.frontiersin.org/articl...>  
**Record Number** : 20153421453

**Abstract :**  
Wild maize (teosinte) has been reported to be less susceptible to pests than their modern maize (corn) relatives. Endophytes, defined as microbes that inhabit plants without causing disease, are known for their ability to antagonize plant pests and pathogens. We hypothesized that the wild relatives of modern maize may host endophytes that combat pathogens. *Fusarium graminearum* is the fungus that causes Gibberella Ear Rot (GER) in modern maize and produces the mycotoxin, deoxynivalenol (DON). In this study, 215 bacterial endophytes, previously isolated from diverse maize genotypes including wild teosintes, traditional landraces and modern varieties, were tested for their ability to antagonize *F. graminearum* *in vitro*. Candidate endophytes were then tested for their ability to suppress GER in modern maize in independent greenhouse trials. The results revealed that three candidate endophytes derived from wild teosintes were most potent in suppressing *F. graminearum* *in vitro* and GER in a modern maize hybrid. These wild teosinte endophytes could suppress a broad spectrum of fungal pathogens of modern crops *in vitro*. The teosinte endophytes also suppressed DON mycotoxin during storage to below acceptable safety threshold levels. A fourth, less robust anti-fungal strain was isolated from a modern maize hybrid. Three of the anti-fungal endophytes were predicted to be *Paenibacillus polymyxa*, along with one strain of *Citrobacter*. Microscopy studies suggested a fungicidal mode of action by all four strains. Molecular and biochemical studies showed that the *P. polymyxa* strains produced the previously characterized anti-*Fusarium* compound, fusaricidin. Our results suggest that the wild relatives of modern crops may serve as a valuable reservoir for endophytes in the ongoing fight against serious threats to modern agriculture. We discuss the possible impact of crop evolution and domestication on endophytes in the context of plant defense.

**Publisher** : [Frontiers Editorial Office](#)  
**Location of publication** : [Lausanne](#)  
**Country of publication** : [Switzerland](#)  
**Language of text** : [English](#)  
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However, the research shows that there may be potential risks, and CAB Abstracts covers research that examines the risks of introducing invasive endophytes too.

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☐ **What can possibly go wrong? The risks of introducing soil microorganisms from Antarctica into South America.**

**Author(s)** : [Nuñez, M. A.](#); [Dimarco, R. D.](#); [Dickie, I. A.](#); [Pauchard, A.](#)  
**Author Affiliation** : Universidad Nacional del Comahue, INIBIOMA, CONICET, Grupo de Ecología de Invasiones, Quintral 1250, C.P. 8400, Bariloche, Argentina.  
**Author Email** : [nunezm@gmail.com](mailto:nunezm@gmail.com)  
**Journal article** : [Bosque](#) 2015 Vol.36 No.3 pp.343-346 ref.31  
**ISSN** : [0304-8799](#)  
**DOI** : [10.4067/S0717-92002015000300001](#)  
**URL** : <http://mingaonline.uach.cl/scielo.php...>  
**Record Number** : 20163061918

**Abstract :**  
Endophytic fungi form mutualistic associations with plant roots which can increase plant survival and resistance to stress. Recently, it has been proposed that endophytic fungi from Antarctica should be used to facilitate reintroduction and establishment of native plants in xeric environments of northern Chile. In this note, we suggest this is a risky proposition and may lead to biological invasions. **It is difficult to predict which endophytic fungi will become invasive, where they will invade, or what their impacts will be. Organisms that move across continents may or may not become invasive depending on the interaction between the species and the invaded community; unexpected outcomes may occur due to adaptation and novel interactions of the introduced species in the new environment.** The fact that these endophytes are mutualistic does not imply that they will not have negative effects on the recipient community, since they might promote invasion of other non-native species or may change the competitive relationships among native species. Further, taxonomically uncharacterized fungal isolates from plant roots are likely to contain non-beneficial species. The fact that these endophytic fungi species are from Antarctica does not ensure that they cannot invade elsewhere. It should be recognized that invasive microorganisms are extremely difficult to control. **We strongly suggest that the further translocation, use and spread of endophytes from Antarctica should be halted until a risk assessment is undertaken. Biosecurity measures must be taken when considering transcontinental experiments. Based on previous experiences, it is likely that the risk and potential costs of introducing these new species significantly exceed any potential benefits of their introductions.**

**Publisher** : [Facultad de Ciencias Forestales y Recursos Naturales, Universidad Austral de Chile](#)  
**Location of publication** : [Valdivia](#)  
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**Language of text** : [English](#)  
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