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Antifungal susceptibilities within the *Fusarium* genus and use of MALDI-TOF MS

Presentation for the 'Belgische Vereniging voor Menselijke en Dierlijke Mycologie'
14th November 2013

Background

- David Triest
- PhD at the Scientific Institute of Public Health Brussels
- Department of Mycology & Aerobiology
- Belgian fungal collection BCCM/IHEM
- *Fusarium*

BCCM/IHEM collection

BELGIAN CO-ORDINATED COLLECTIONS OF MICRO-ORGANISMS

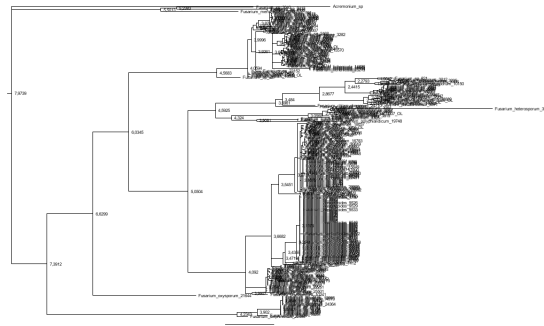


- <http://bccm.belspo.be/about/ihem.php>
- Gathered 'clinical' strains over the last 30 years
- Many *Fusarium* strains
- Lots of taxonomical changes
- Profound re-identification at species level

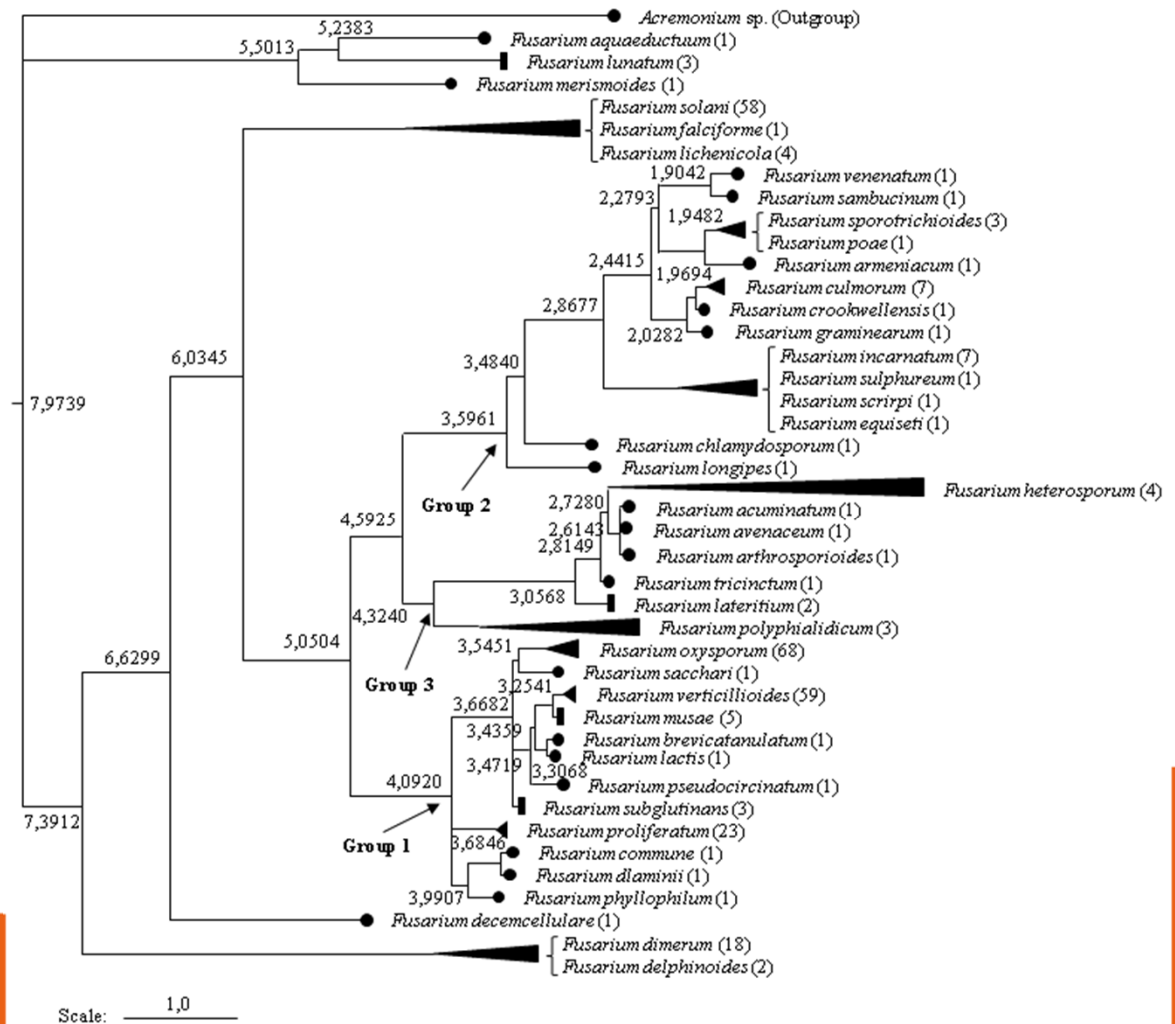
Re-identification

- Sequence analysis
 - ITS-5.8S, BT, TEF1 α , LSU
 - Position in a Bayesian phylogenetic tree
 - Morphological examination
- Dataset of 295 validated *Fusarium* strains

A valuable dataset

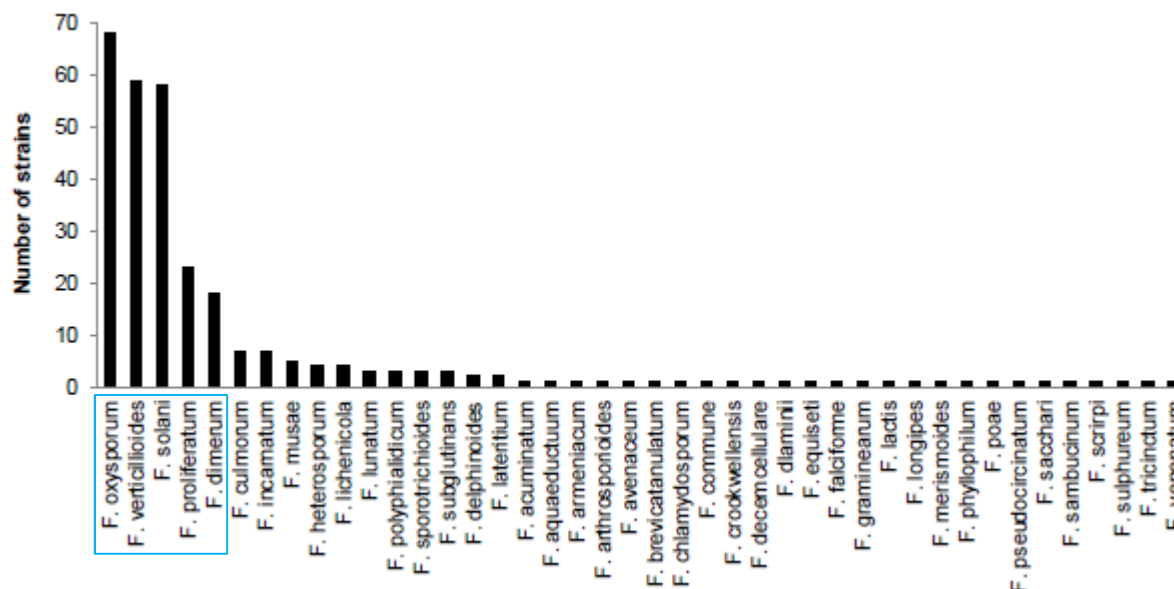


- 42 ≠ species
- 16 with more than 1 strain



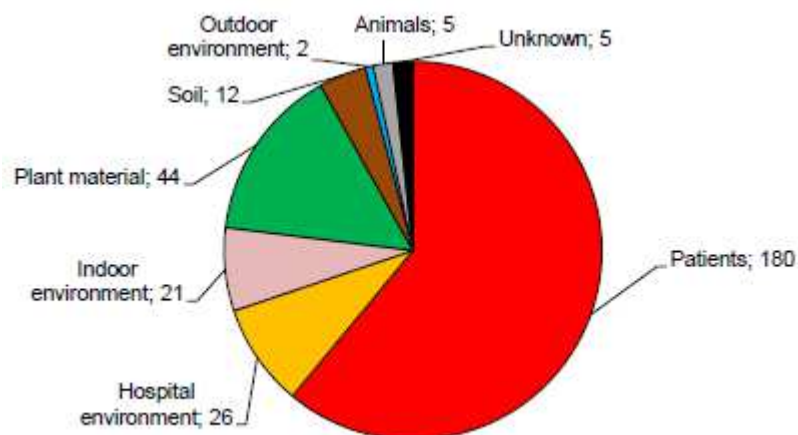
Epidemiological information

- All clinically important species represented



- Source and date of strain's isolation available

Antifungal susceptibilities



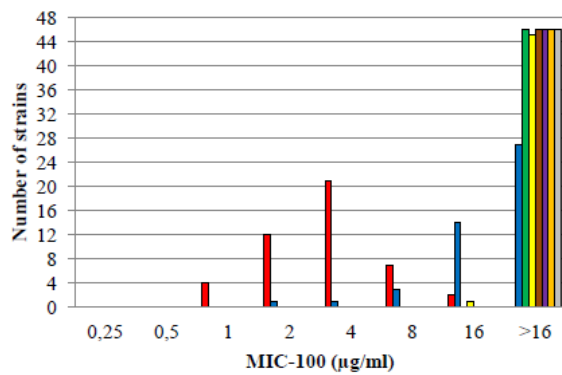
- Strains isolated from patients
- EUCAST E.DEF 9.1 broth microdilution method
- FLC, ITR, KTZ, POS, VOR, 5FC, TER, AMB

Need to identify *Fusarium* sp. ?

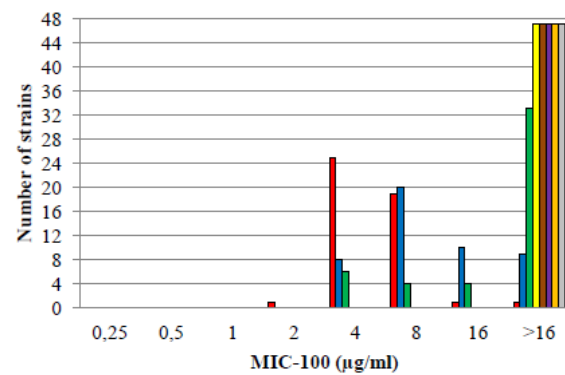
- One of most antifungal drug-resistant fungi
- Azole-resistance, especially *F. solani*
- Recommended treatment is amphotericin B, as it has activity against all *Fusarium* species
- Species identification by morphology is difficult, molecular techniques require time
- Bother about the ID of a *Fusarium* infection ?

Variable susceptibility profiles

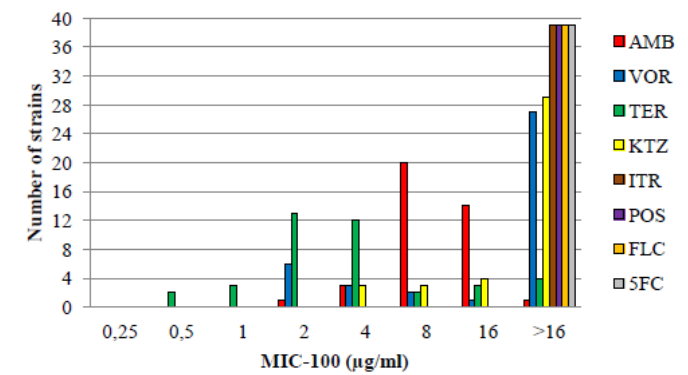
Fusarium solani



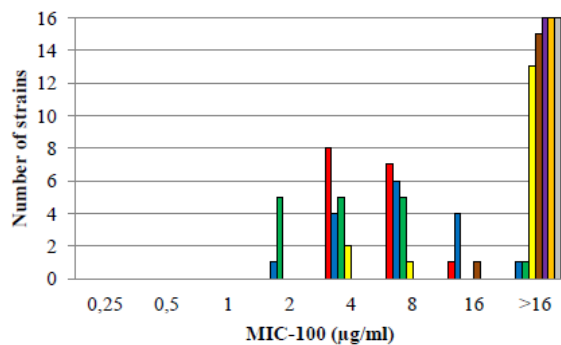
Fusarium oxysporum



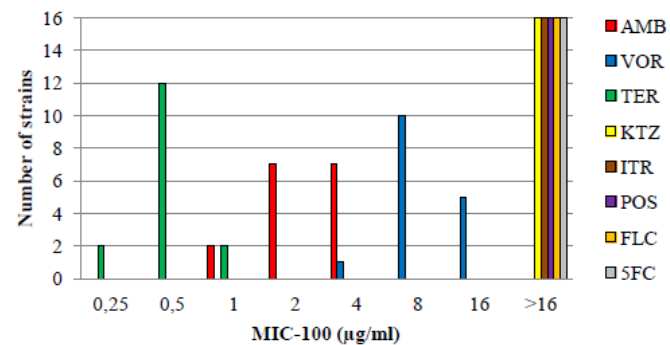
Fusarium verticillioides



Fusarium proliferatum



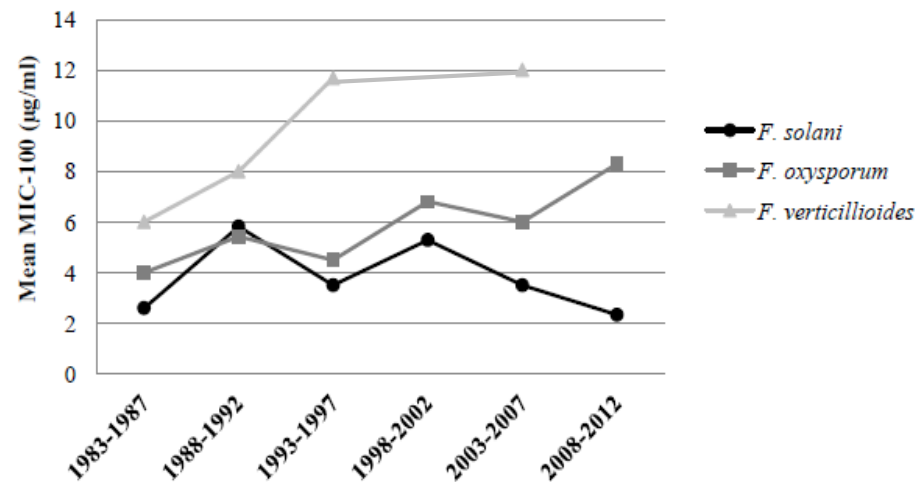
Fusarium dimerum



Yes, ID is important !!!

- AMB is drug of choice when ID of the fusariosis is unknown, but not always most effective

**Evolution of the amphotericin B
MIC-values over 30 years**

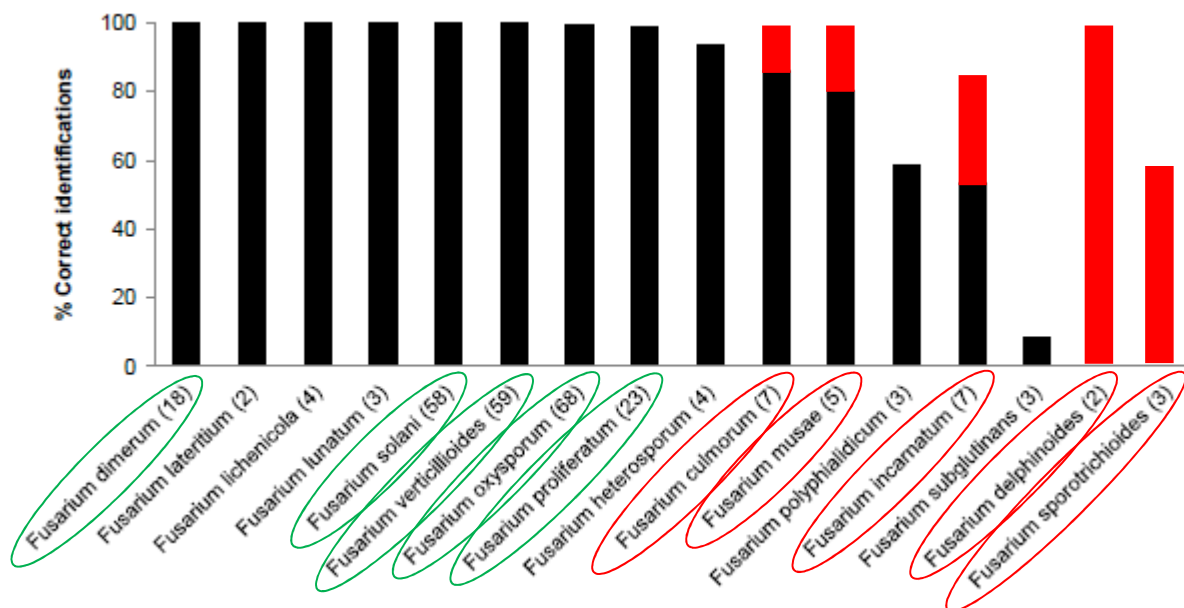


Identity by MALDI-TOF MS ?

- Blood/Biopsy cultures often + (Nucci et al., 2007)
- Morphology = difficult, sequencing = time, costs
- MALDI-TOF as ID-tool: generates strain specific proteomic spectrum, compared with database
- All validated strains in own database and screen
- Protein extraction (Cassagne et al., 2011)
- Previous studies lack in-depth analysis

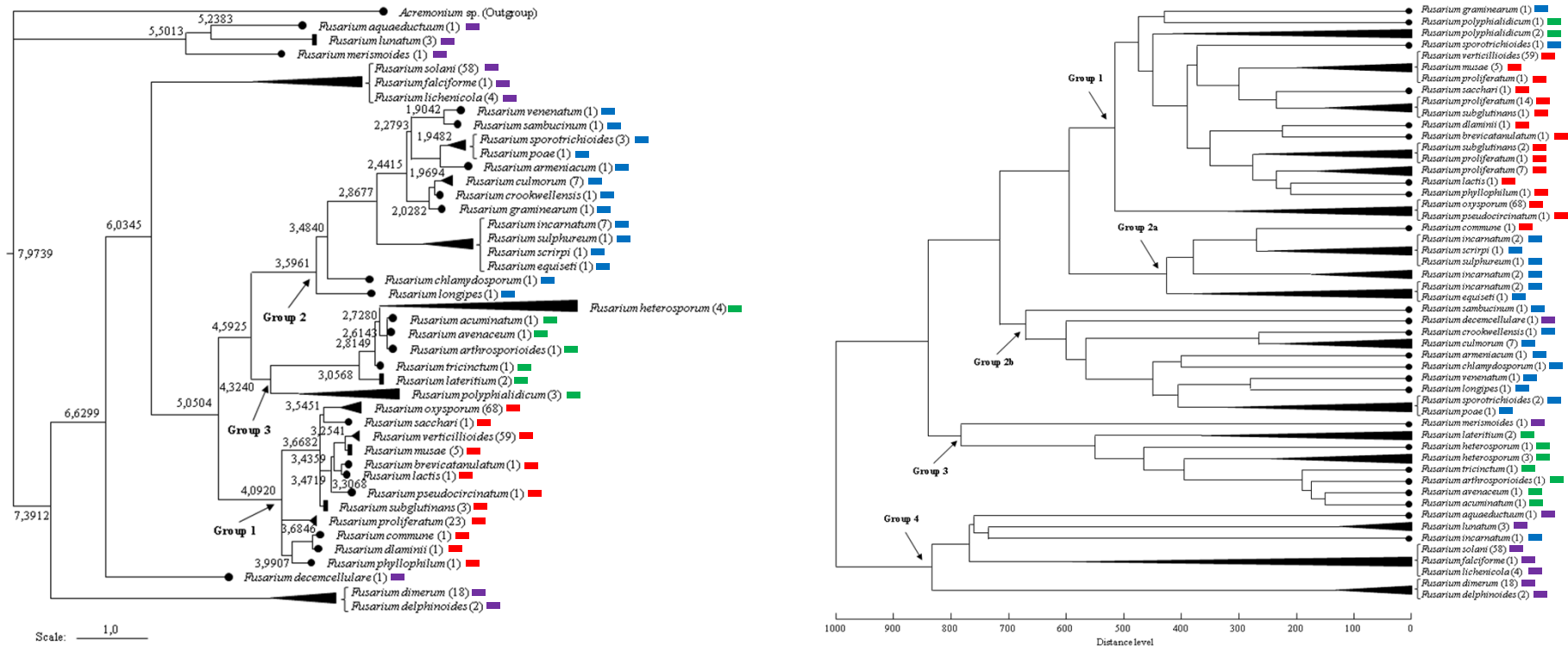
94,4% correct identifications

- Spectra construction succeeded for 295 strains



- POP database with new isolates = good quality

Interesting similarity



- Phylogenetic tree versus spectral distance matrix
- 57,5% single-strain sp. identified as related sp.

Conclusion

- ID is important for therapy of *Fusarium* infections
- MALDI-TOF MS has the capacity as ID-tool

Acknowledgments



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Dr. Koen De Cremer
- Promoter: Prof. Dr. Denis Piérard
- All the members of our mycology lab

