

# New Phytophthora populations:

## A shift from indirect to direct sporangial germination?

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# Materials and Methods indirect germination

- Contrast before and after 1990 (introduction of Fluazinam)
  - *P. infestans* isolates grown on potato leaflets cv Bintje
    - 15 isolates before 1990, 20 isolates after 2000
  - Sporangial suspension in water
  - Add potato extract
  - Incubate at 10°C for 3 hours
  - Quantify zoospore formation under microscope
    - % empty sporangia
    - Density of zoospores under microscope
      - Scale 0 – 4  
(0 = no zoospores, 4 = microscope field is swarming with zoospores)

# Materials and Methods: indirect & direct germination

*P.infestans* strain –  
6 days old at 16°C



Sporangia collect  
in water and PDB  
Calibrated at  
40 000 sporangia/  
ml



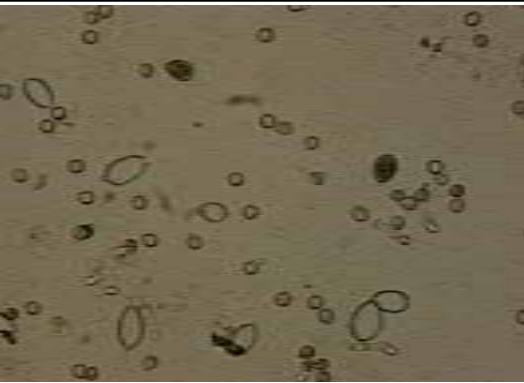
Incubation 18 h  
in dark at 16-18°C



Assessment with  
microscope



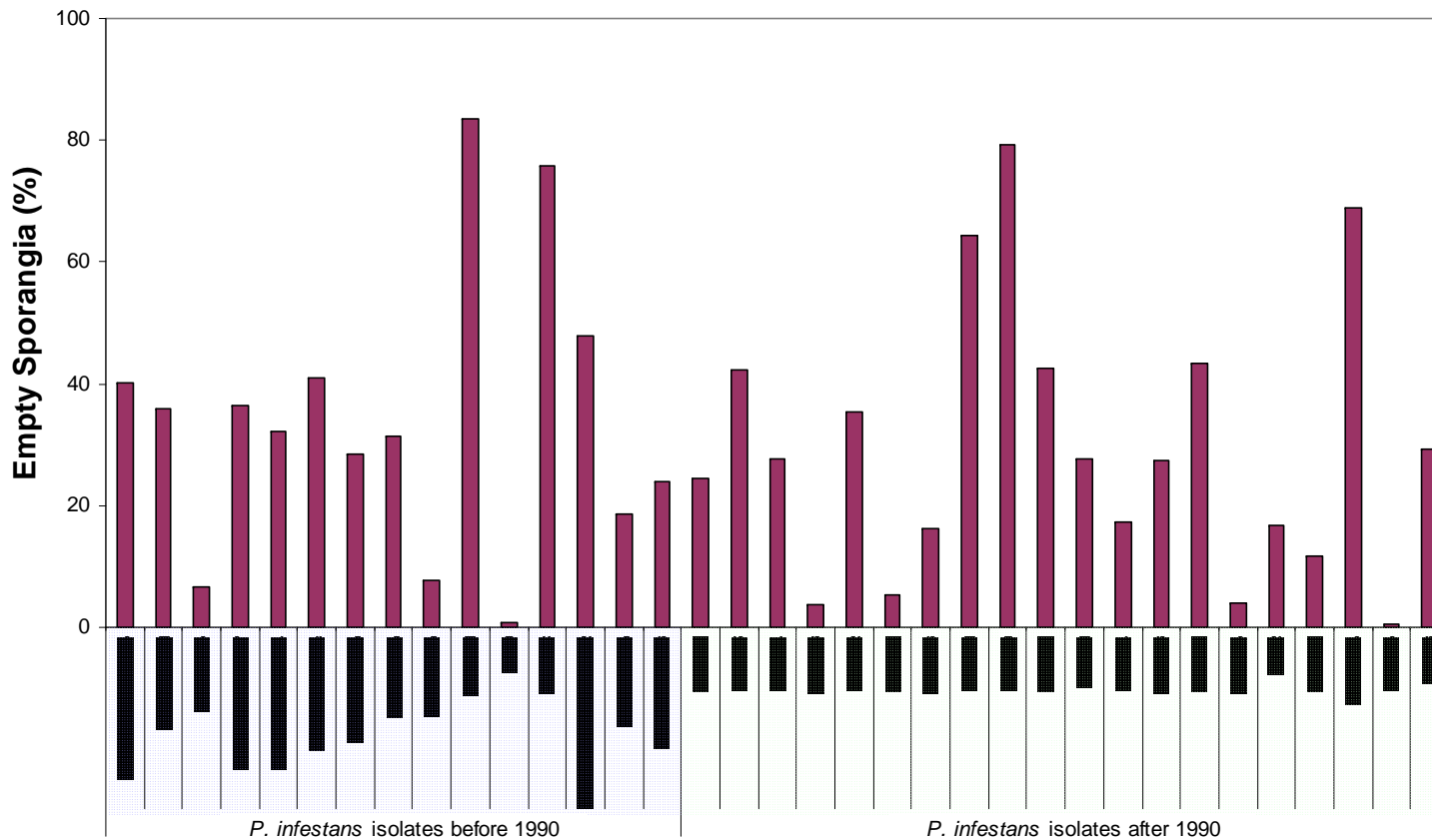
% empty sporangia in water  
Indirect germination



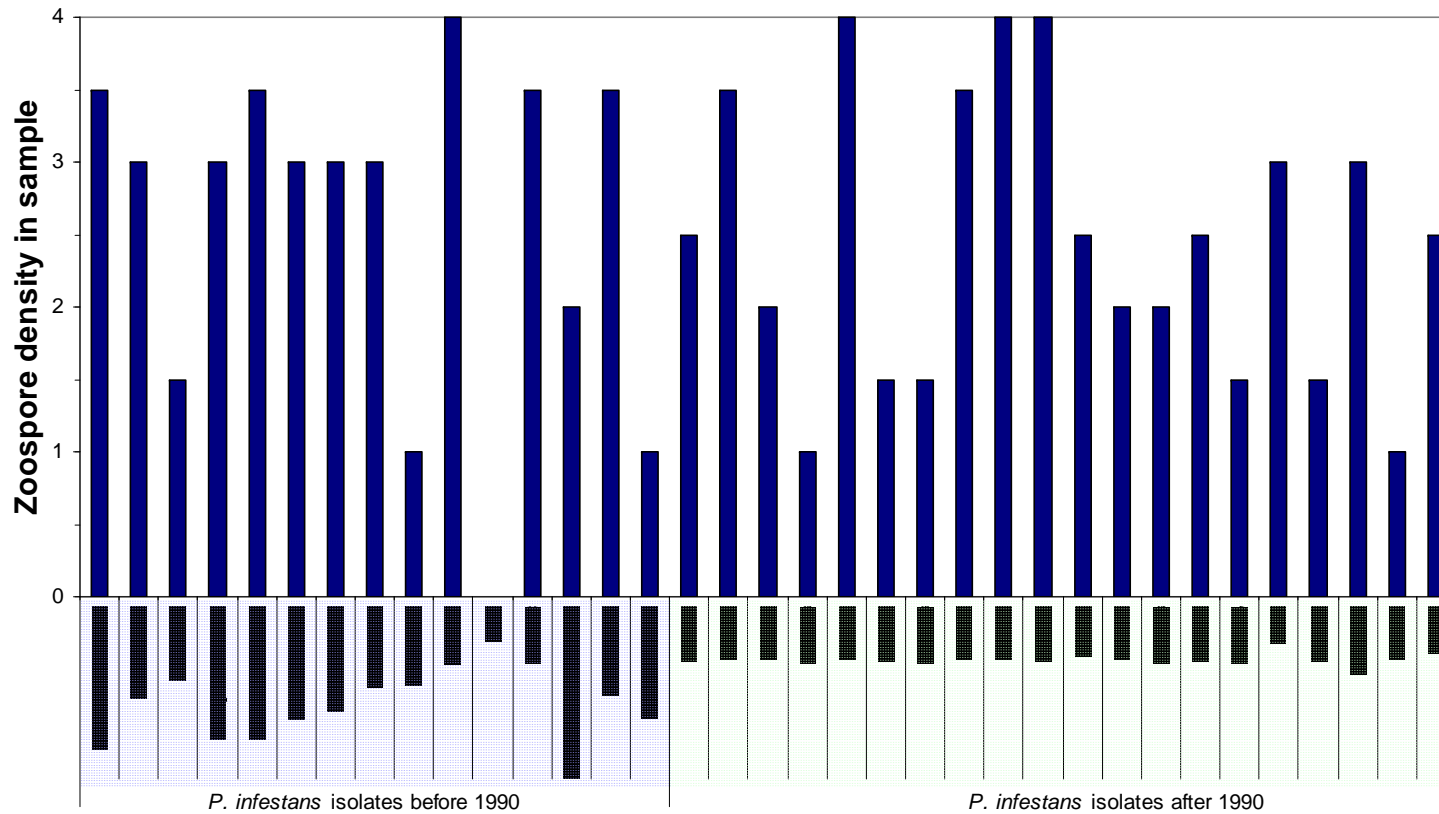
% direct germinated sporangia  
in PDB



# Empty sporangia



# Zoospore density

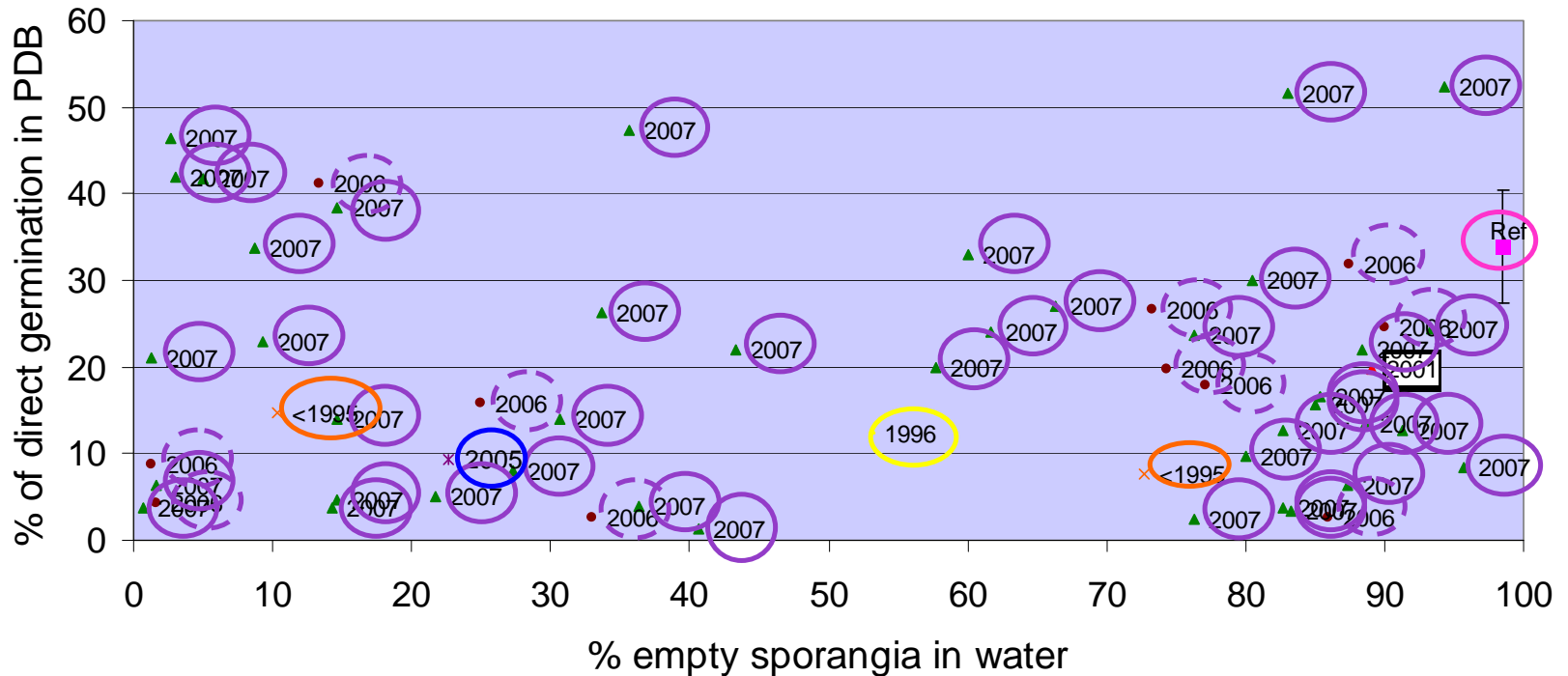


# PRI conclusions

- No shift between indirect and direct germination
  - As related to year of origin

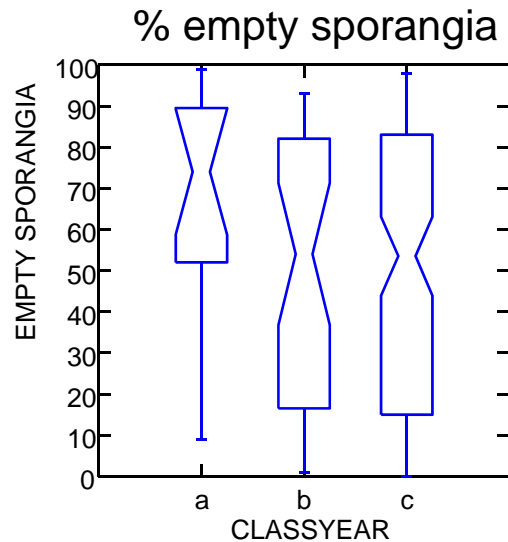
# Germination type vs year of origin

5 isolates before 2001, 1 isolate in 2005, 12 isolates in 2006, all from potato, and 42 isolates in 2007 (12 from tomato and 30 from Pt)

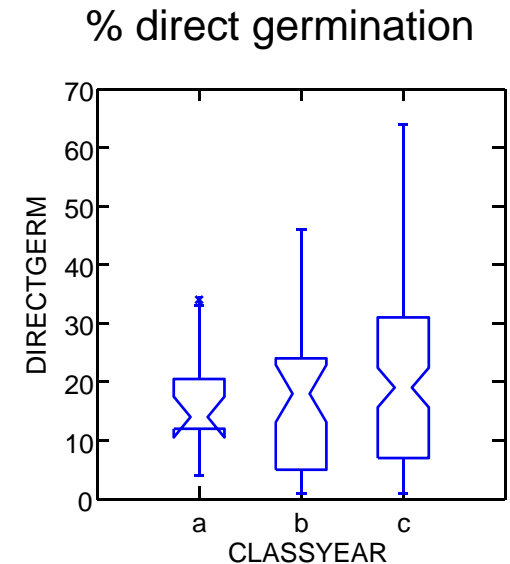


▶ % of direct germination don't exceed 50% when indirect germination could reach 100%

# Statistical analysis : influence of year of origin



- a isolates before 2001
- b isolates in 2005 & 2006
- c isolates in 2007



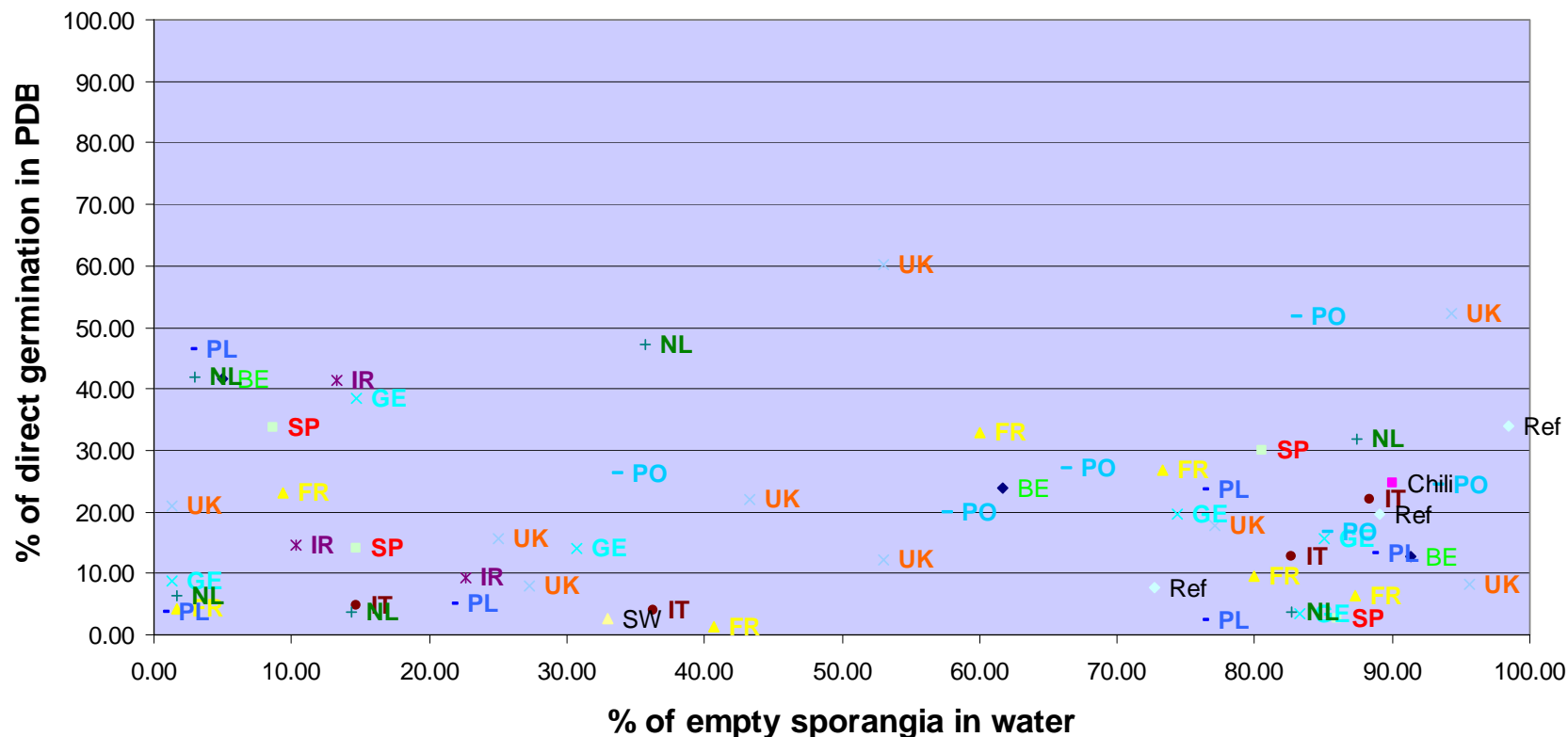
+ Kolmogorov-Smirnov two samples test



**No significant difference for direct or indirect germination of the isolates tested related to the year of origin ( but only 5 strains collected before 2001)**

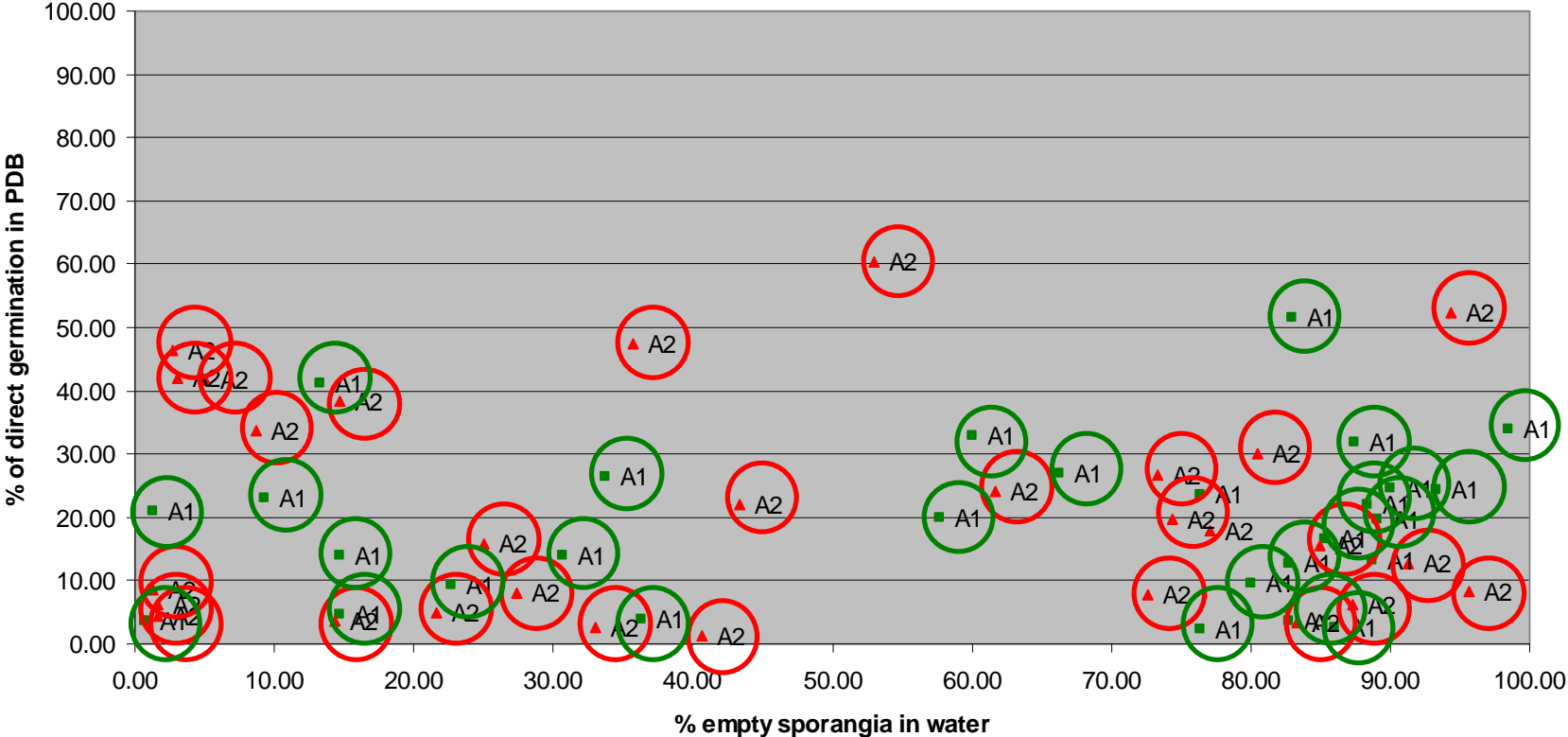


# Germination type vs country



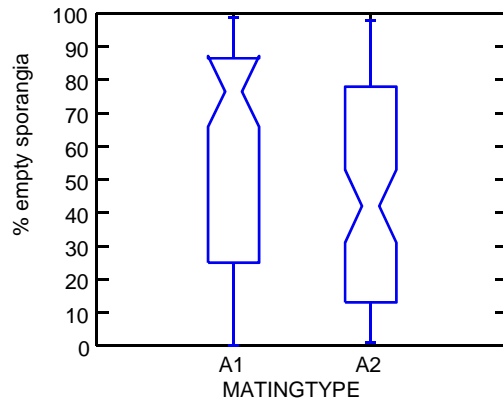
No significant difference for direct or indirect germination of the isolates tested related to the country of origin

# Germination type vs Mating type



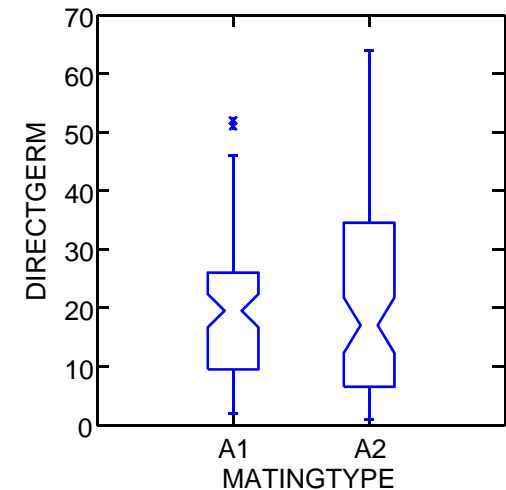
# Statistic analysis : influence of the Mating type

% empty sporangia



- 21 isolates A1
- 21 isolates A2

% direct germination



+ Kolmogorov-Smirnov two samples test



the % of empty sporangia in water is significantly different according to A1 or A2 mating type but the % of direct germination in PDB is not significantly different according to A1 or A2 mating type .

# General conclusions

- No shift between indirect and direct germination:
  - As related to year of origin (PRI & BCS)
  - Mating type (BCS)
  - Country (BCS)

# Thank you for your attention

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