



Composting bioaerosols : identification of new indicators using molecular tools

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Jean-Jacques Godon

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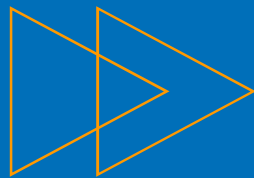
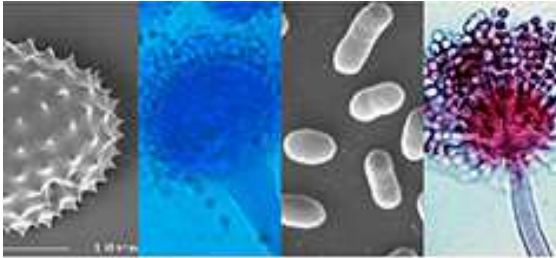
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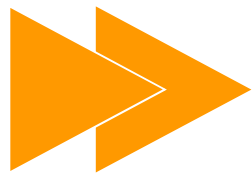
AEROBIOLOGY SYMPOSIUM

March 27th 2013



Composting bioaerosols : identification of new indicators using molecular tools

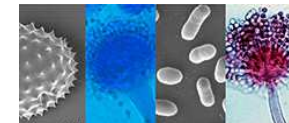
Nathalie WERY, Research Scientist, INRA



Summary

- ▶ Laboratory of Environmental Biotechnology
- ▶ Research on pathogens
- ▶ Collecting composting bioaerosols
- ▶ Development of specific indicators using molecular tools
- ▶ Dispersal of composting bioaerosols
- ▶ Conclusion
- ▶ Acknowledgements

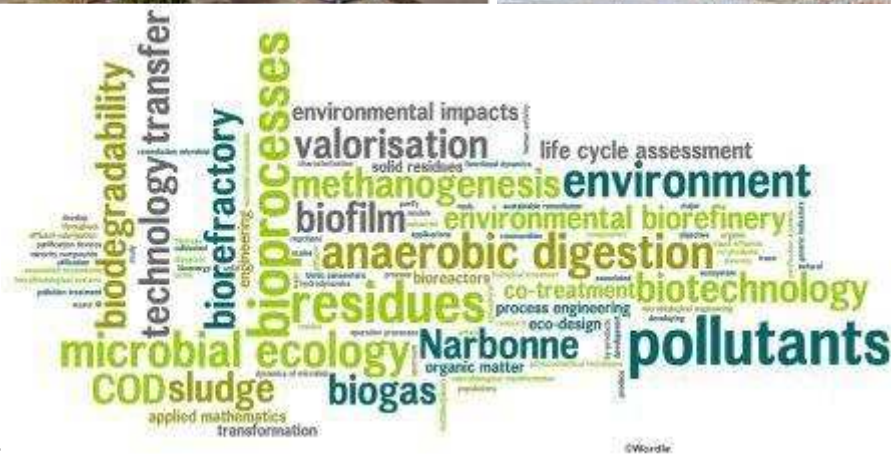
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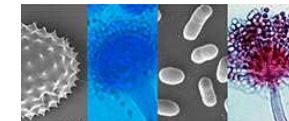


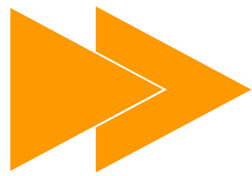
Laboratory of Environmental Biotechnology

<http://www.montpellier.inra.fr/narbonne>

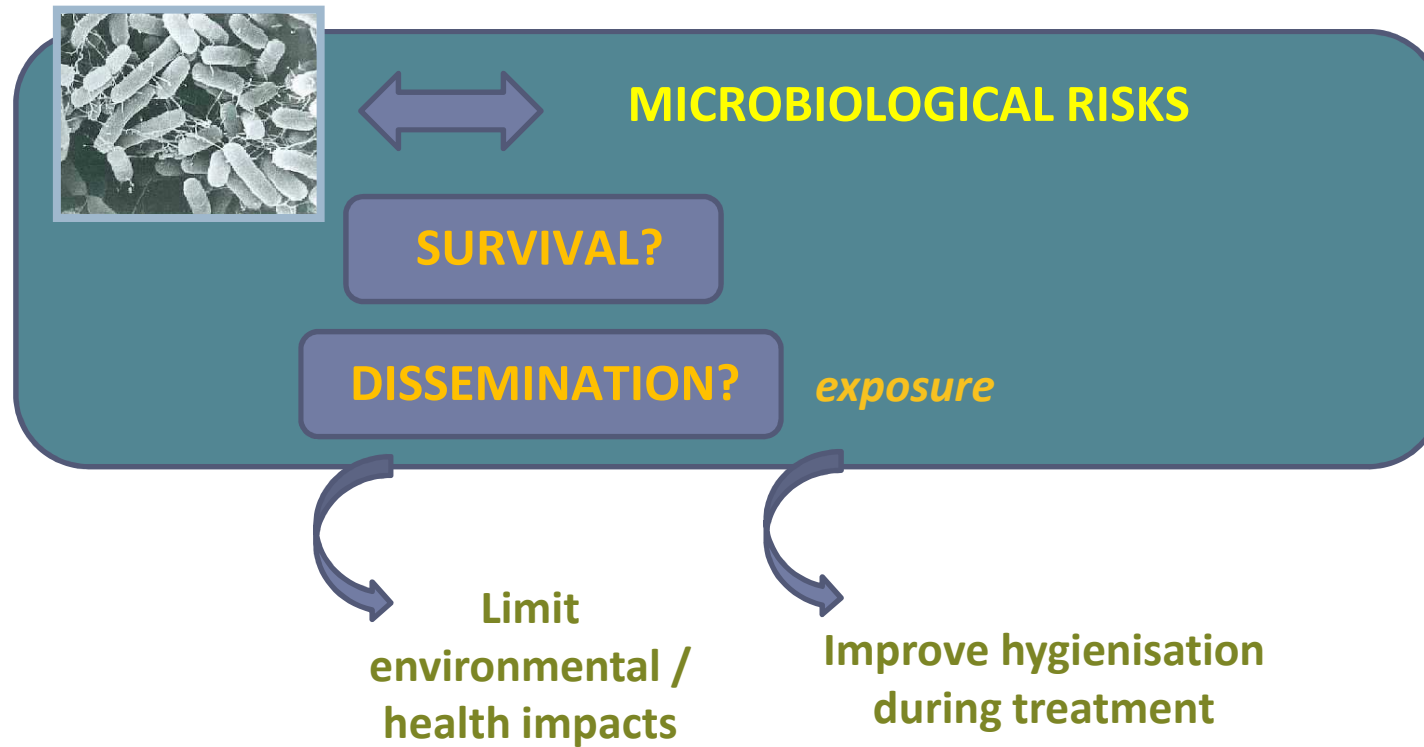


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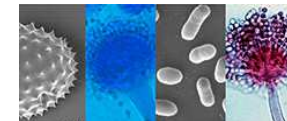




Research on pathogens

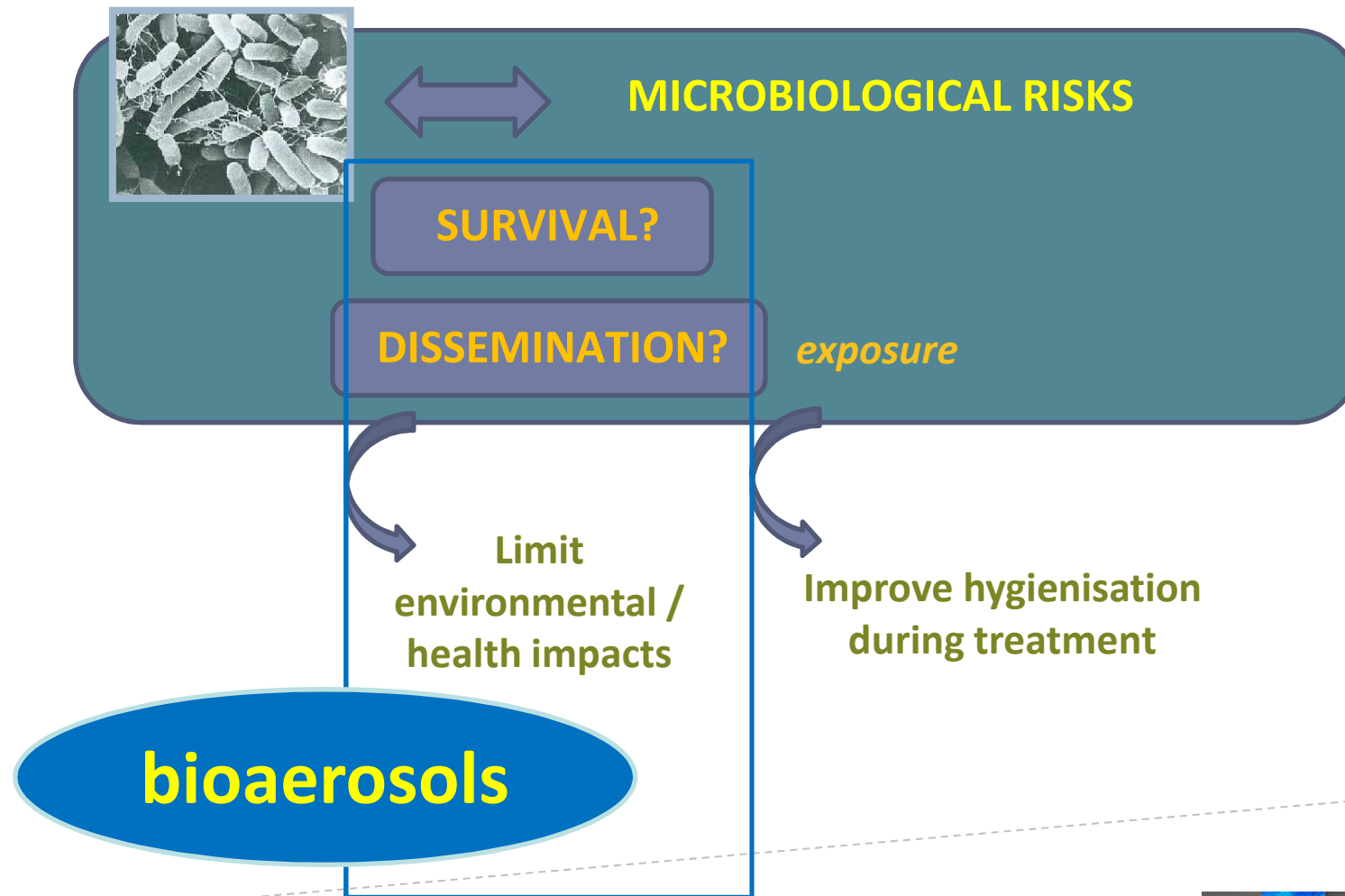


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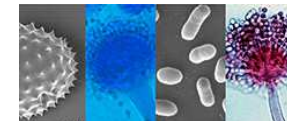


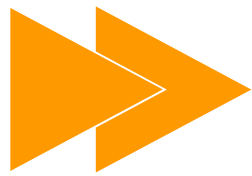


Research on pathogens



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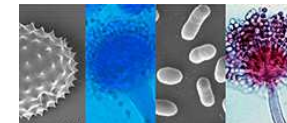


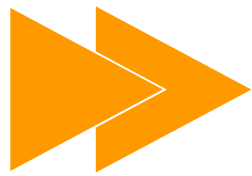
Composting bioaerosols



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- ▶ Bioaerosols generated at composting plants are released during various activities : shredding, screening, turning...
- ▶ Potential health impacts on workers and the public living in close proximity





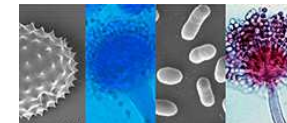
Composting bioaerosols



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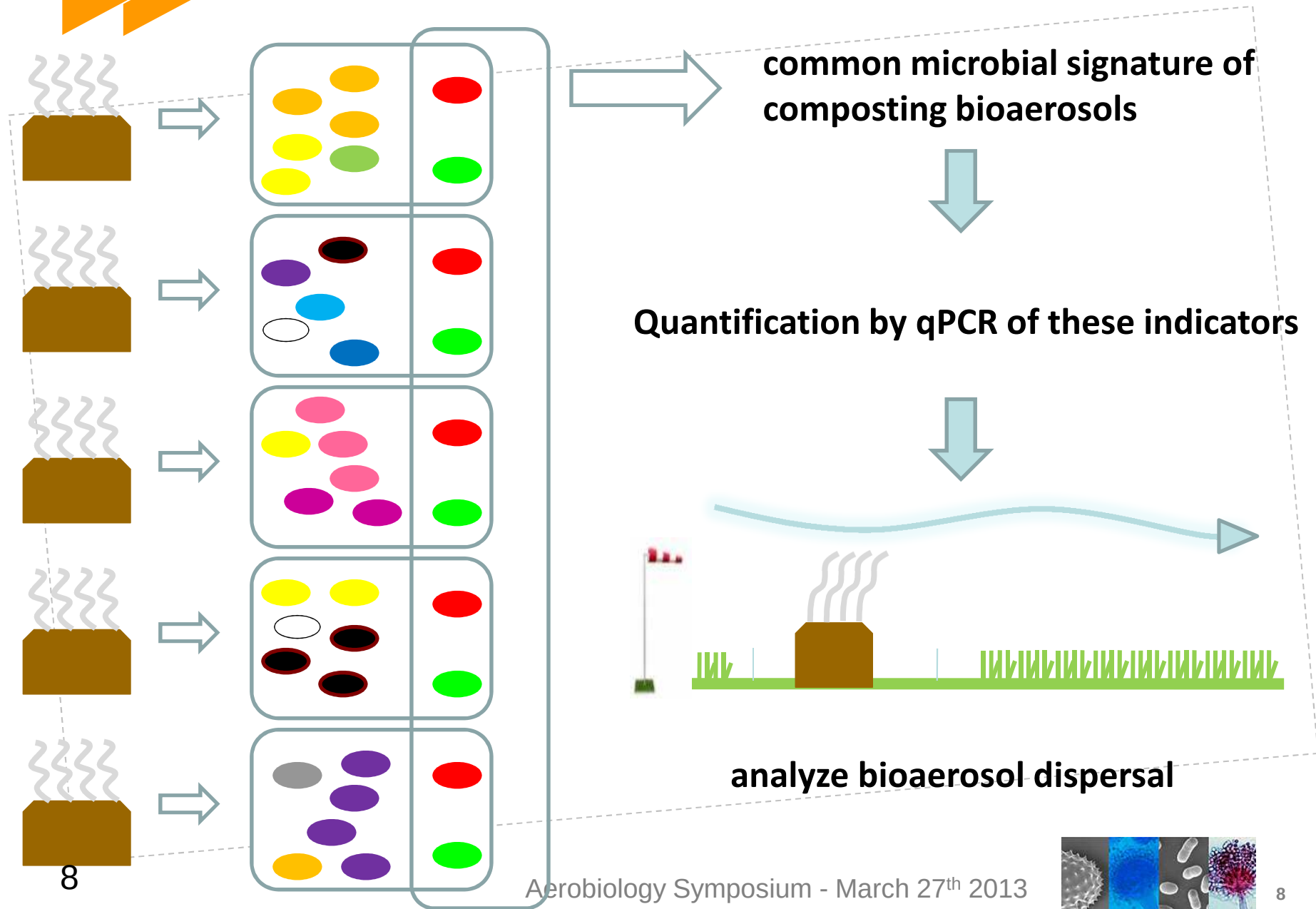
Objectives

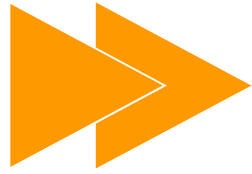
- ▶ Analyze the microbial diversity in composting bioaerosols
- ▶ Identify specific indicators of composting bioaerosols
- ▶ Measure aerosol dispersal





Composting bioaerosols



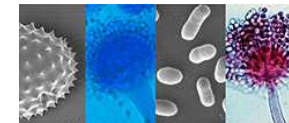


Collecting bioaerosols

- ▶ High quantity of material necessary for molecular analysis
- ▶ Collect outdoor on industrial platforms



- ▶ Coriolis at 300 L/min during 30 min
- ▶ Collecting liquid : Tween 20 at 0,005% in distilled water
- ▶ Additional module for injection (0,5 to 0,7 ml/min)
- ▶ Filtration and storage of filters at -20°C until DNA extraction

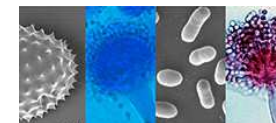
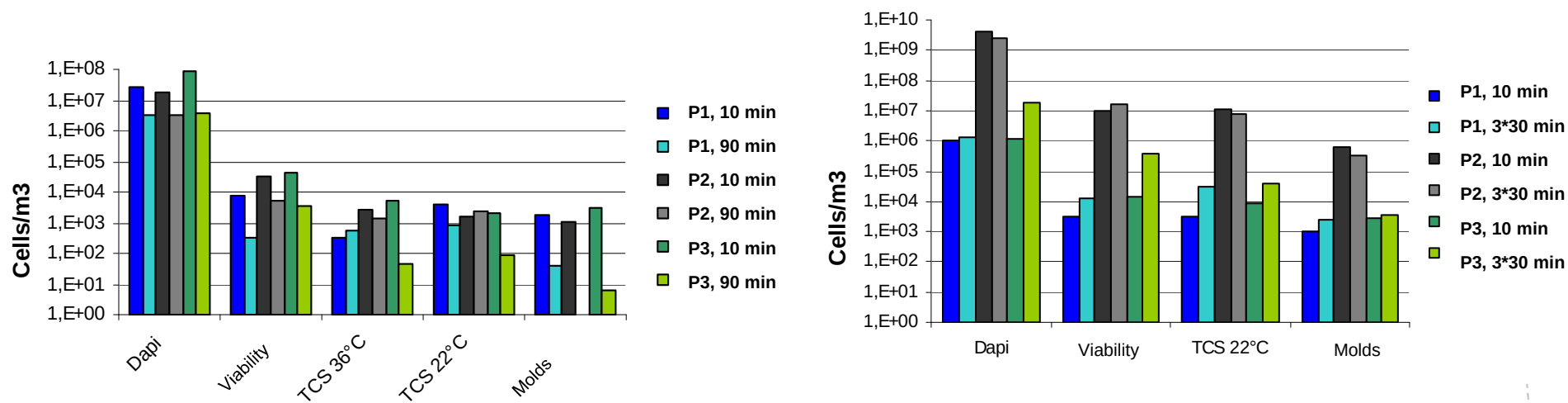




Collecting bioaerosols

► 90 min or 3x30 min?

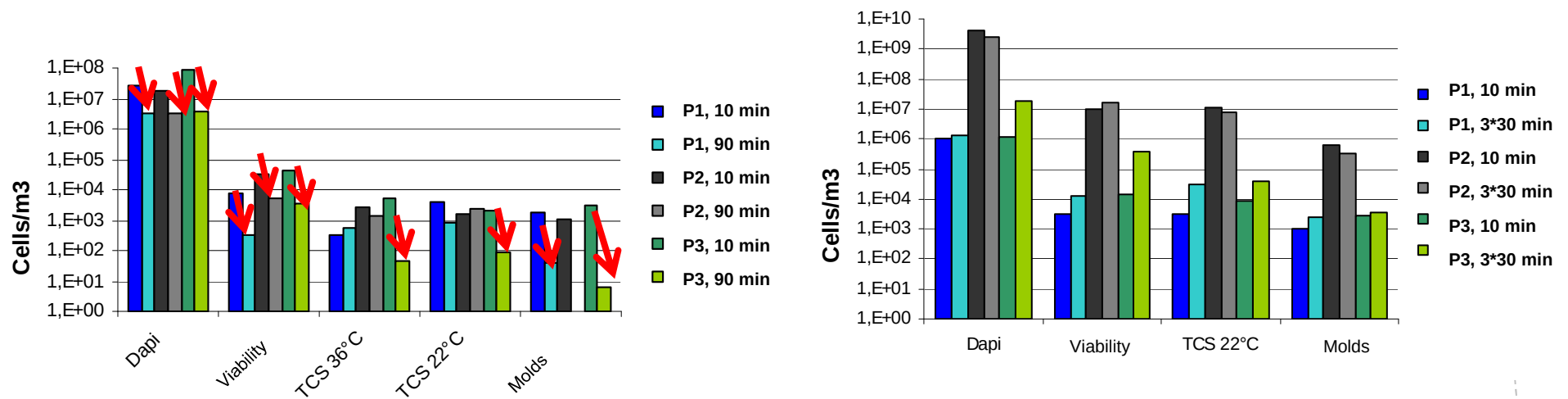
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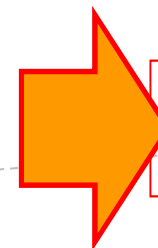


Collecting bioaerosols

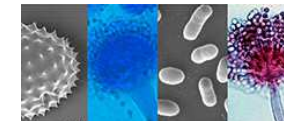
► 90 min or 3x30 min?



Re-aerosolisation?

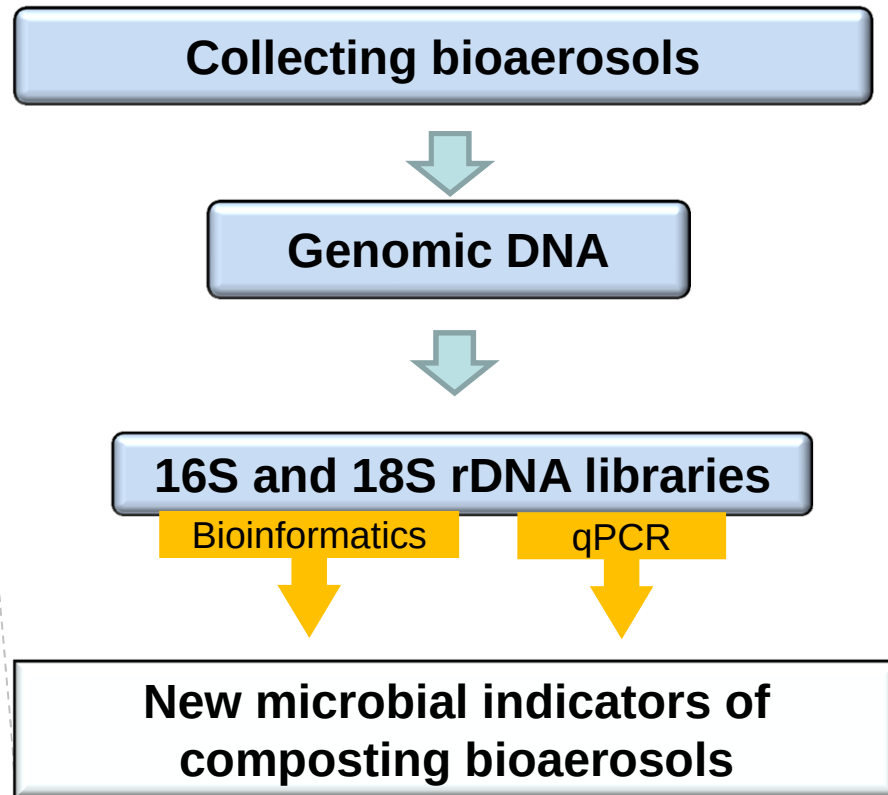


3 samples of 30 min gathered

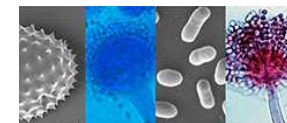




Development of specific indicators



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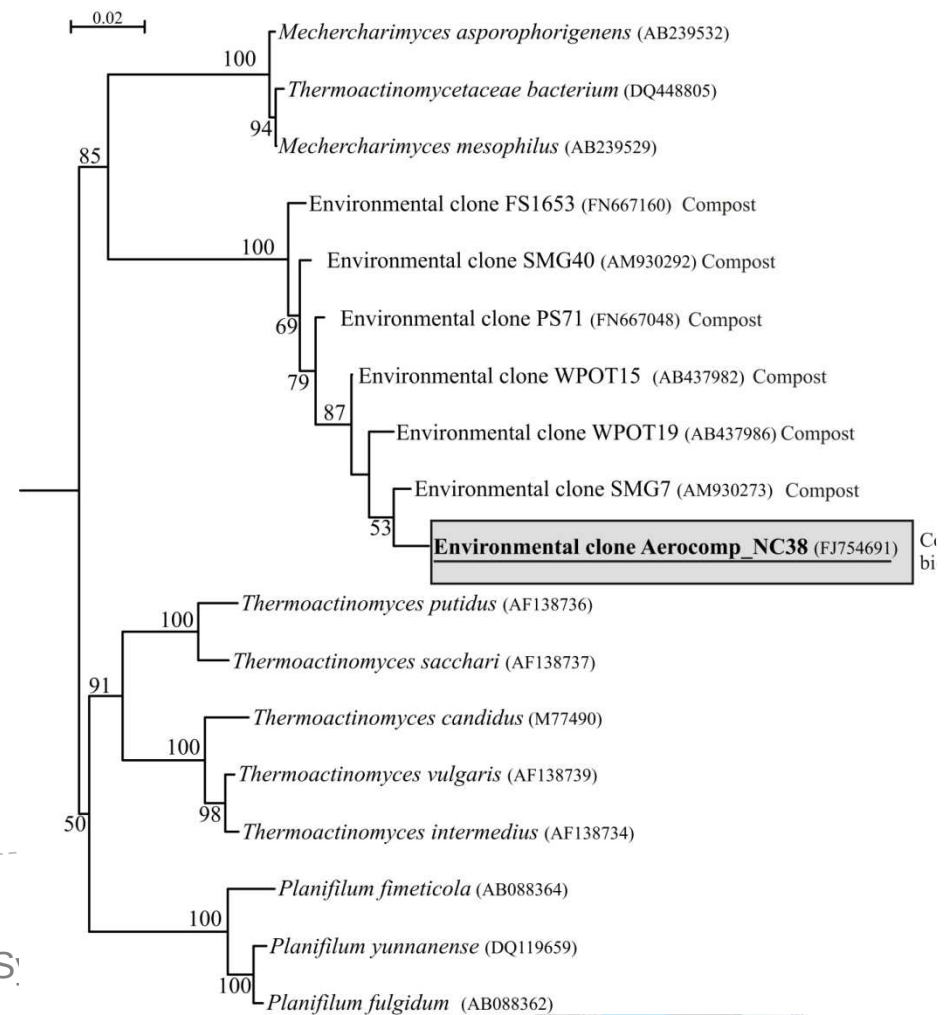
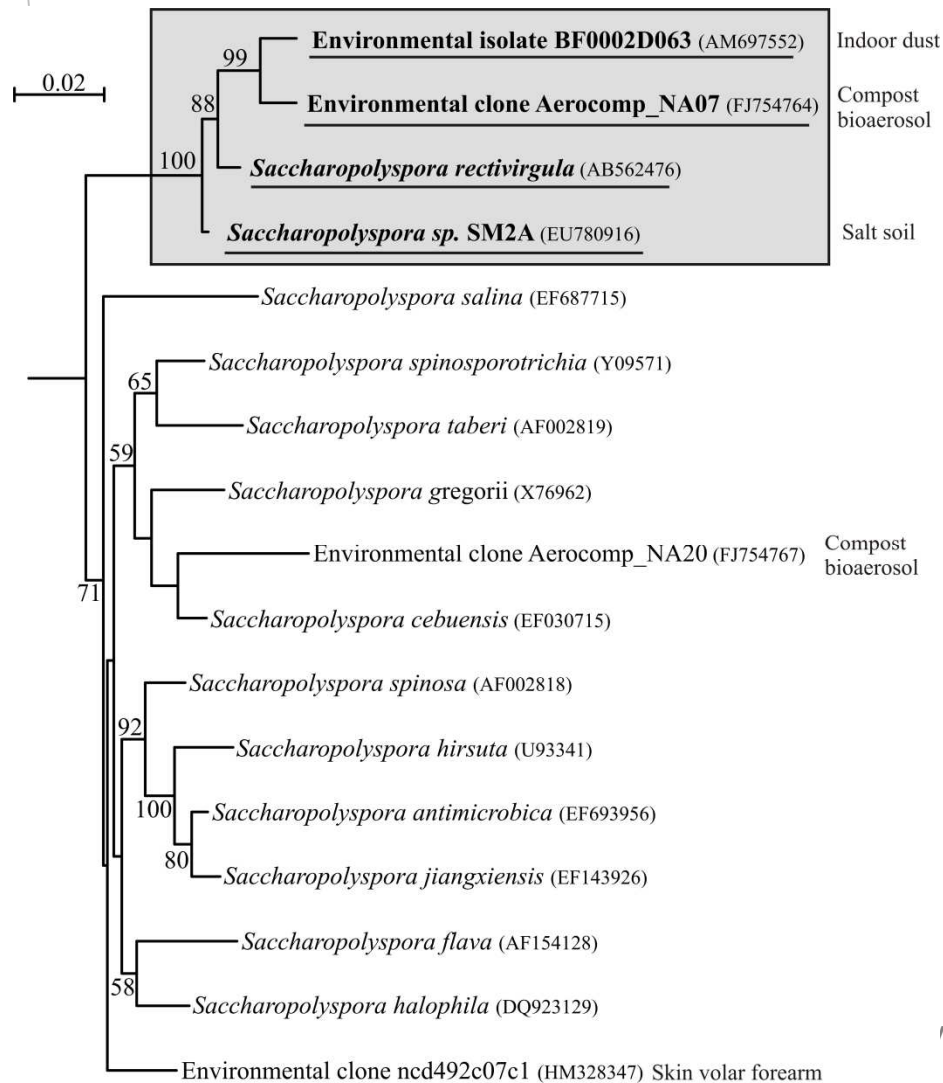




Development of specific indicators

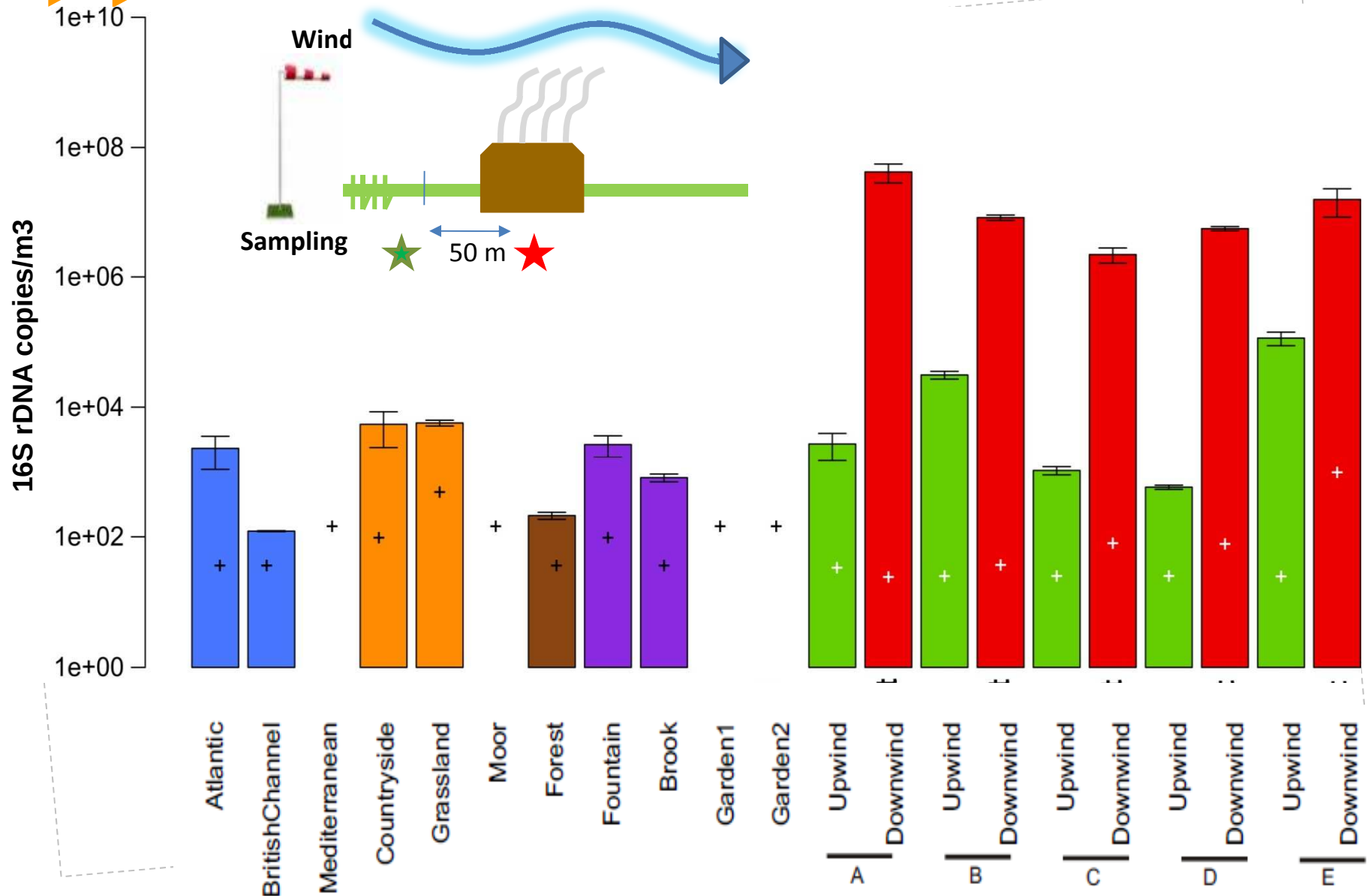
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Development of specific indicators



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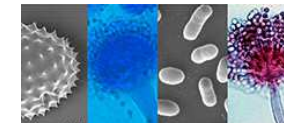
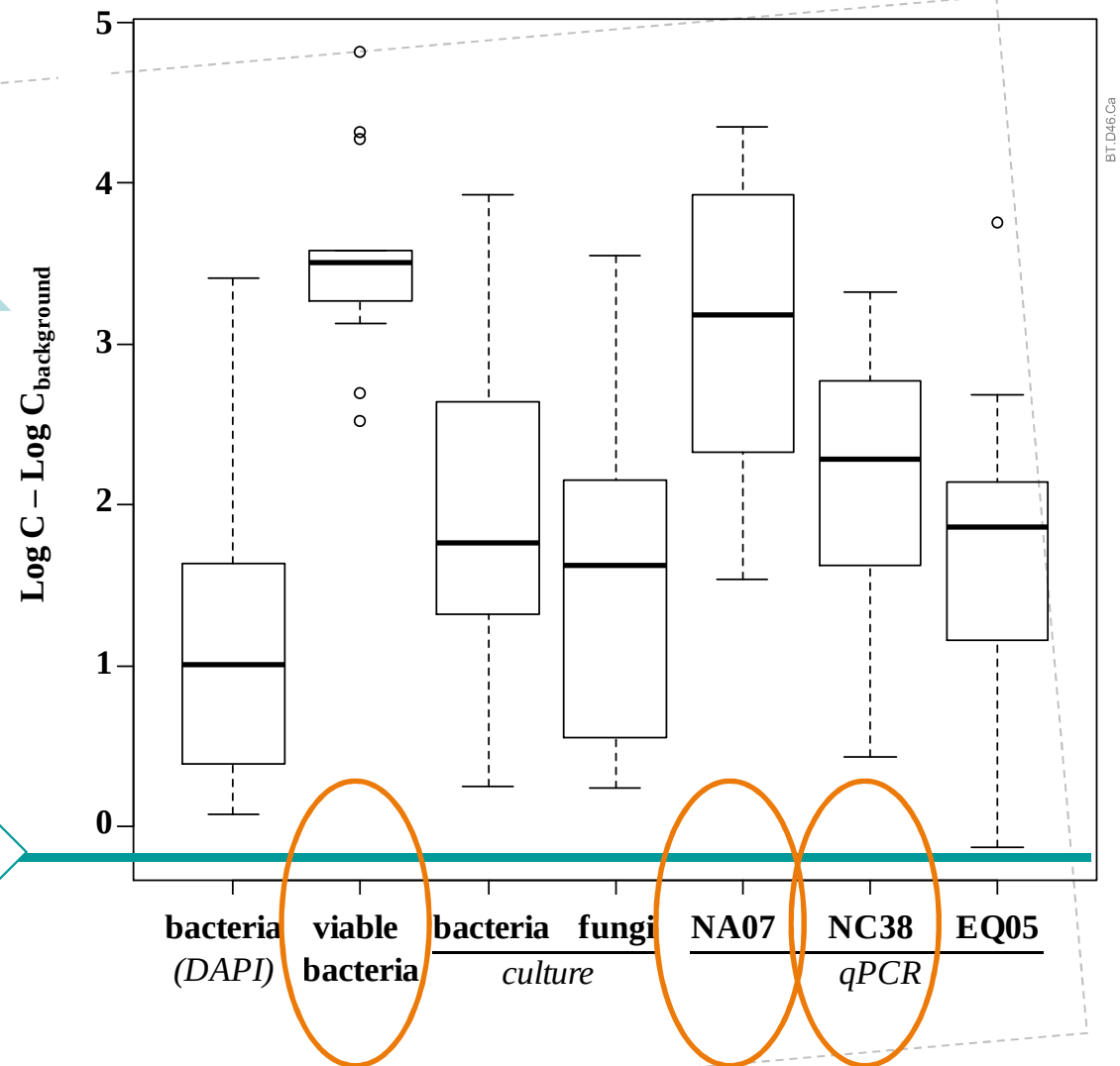
+ : quantification limits



Development of specific indicators

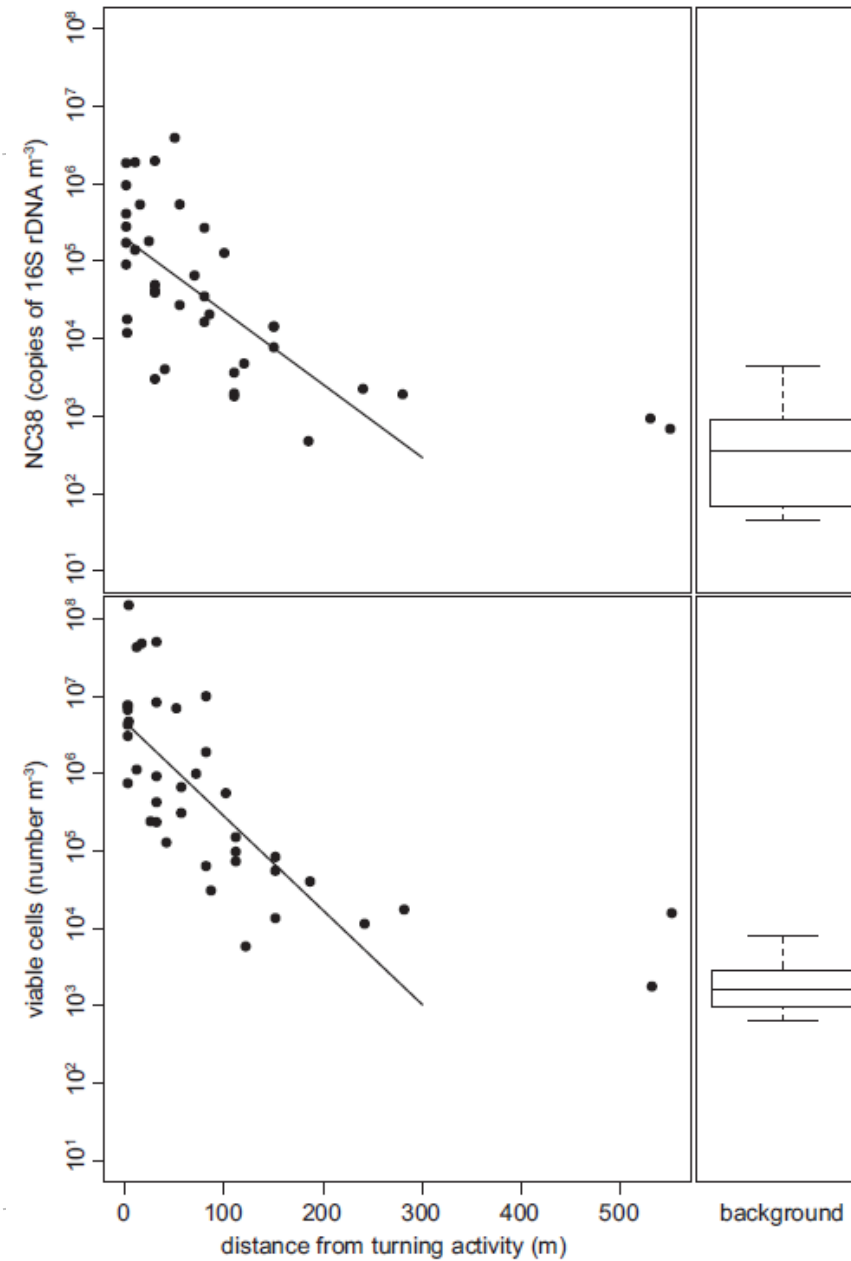
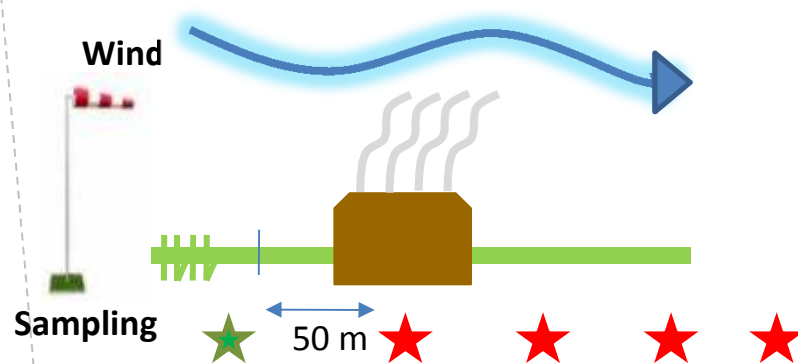
Emission of bioaerosols during composting activities

Background concentrations

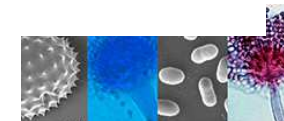




Dispersal of composting bioaerosols



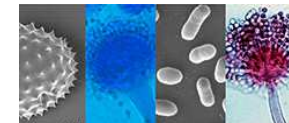
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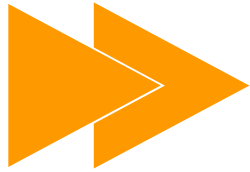




Conclusion

- ▶ The bioaerosol emission during composting activities was quantified
- ▶ The microbial diversity in bioaerosols was analysed using molecular techniques
- ▶ Bacterial indicators of composting bioaerosol were defined (qPCR)
- ▶ These tools are now available for analyzing bioaerosol dispersal
- ▶ First results showed that the signal returns to background concentration at distances above 200m



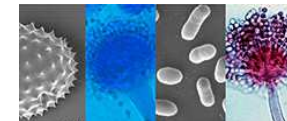


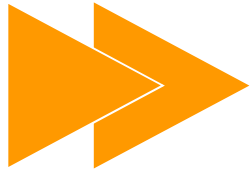
Scientific papers

Le Goff, O. et al. (2010) The microbial signature of aerosols produced during the thermophilic phase of composting. *Journal of Applied Microbiology*, 108:325-340.

Le Goff, O. et al. (2011) New specific indicators for qPCR monitoring of airborne microorganisms emitted by composting plants. *Atmospheric Environment*, 45: 5342-5350.

Le Goff, O. et al. (2012) A new combination of microbial indicators for monitoring composting bioaerosols. *Atmospheric Environment*, 61 :428-433





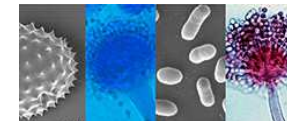
Acknowledgements

2 partners :



We are grateful to Veolia Propreté for helping us in sampling on composting plants.

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Colloque National "Microbiologie des Aérosols"

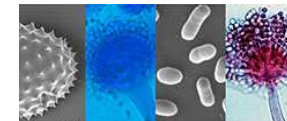
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<http://microbaero2013.sciencesconf.org/>

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**Thank you for your attention
Feel free to ask question!**

For more information: nathalie.wery@supagro.inra.fr
or contact Coriolis Team - coriolis@bertin.fr

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