Microbial biodiversity in the field is related to fruit and vegetable health and linked to postharvest quality

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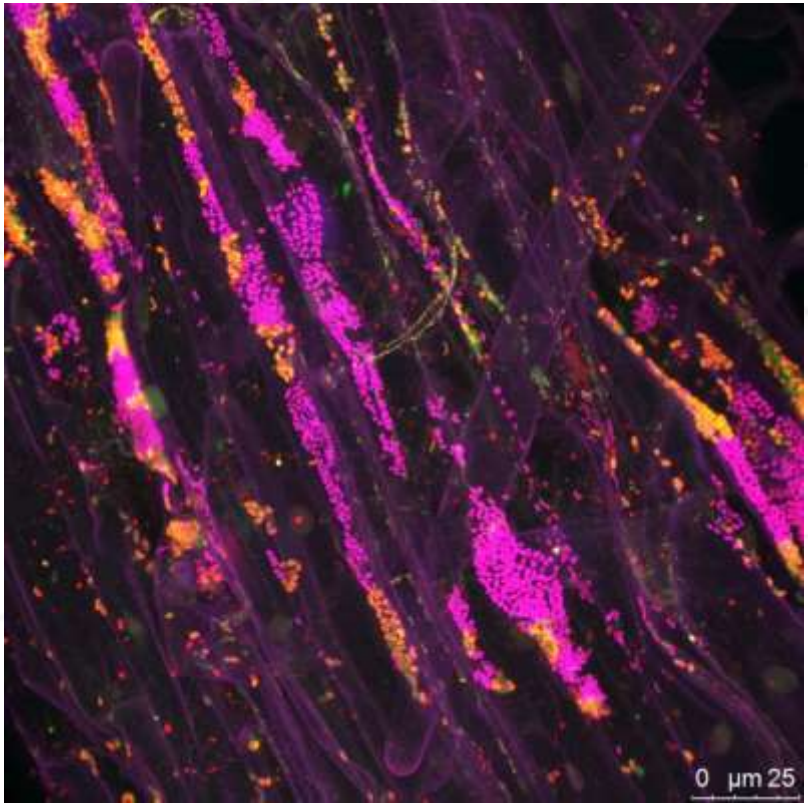
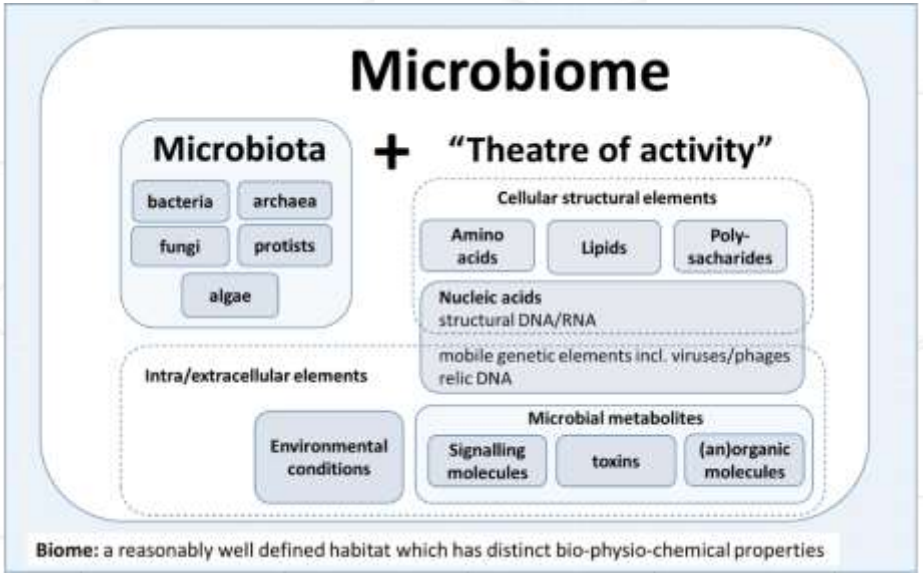
#SoilBiodiversity

@Peter_Cue

Introduction I



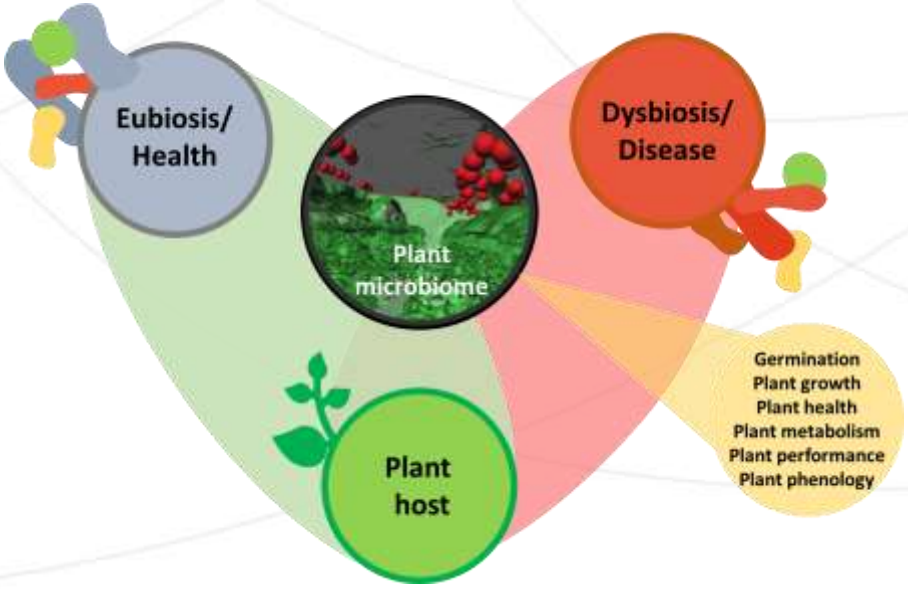
Berg, G. et al., (2020) *Microbiome*



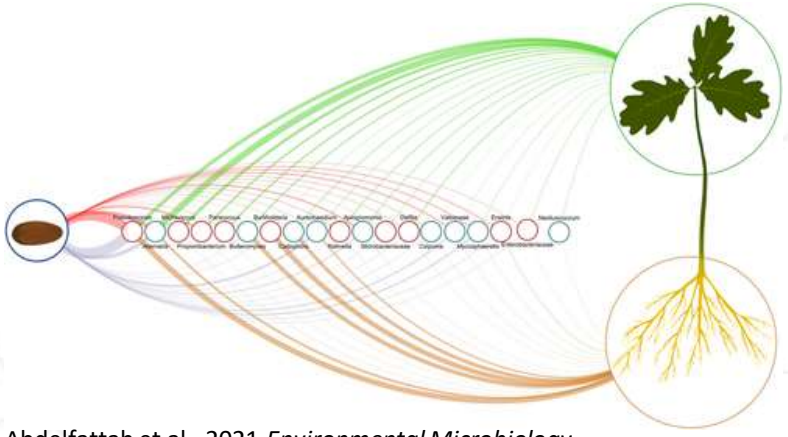
MICROBIOME = microbial community occupying a reasonably well defined habitat which has distinct physio-chemical properties. The term thus not only refers to the microorganisms involved but also encompasses their theatre of activity.

JM Whipps et al. 1988

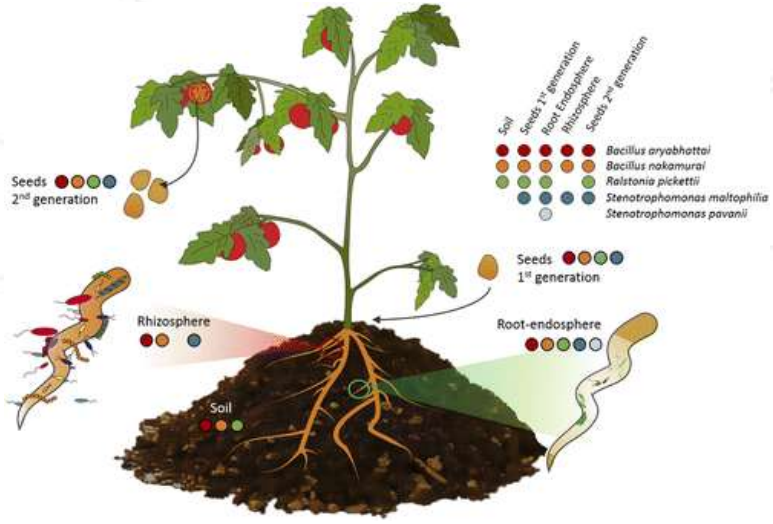
Introduction II



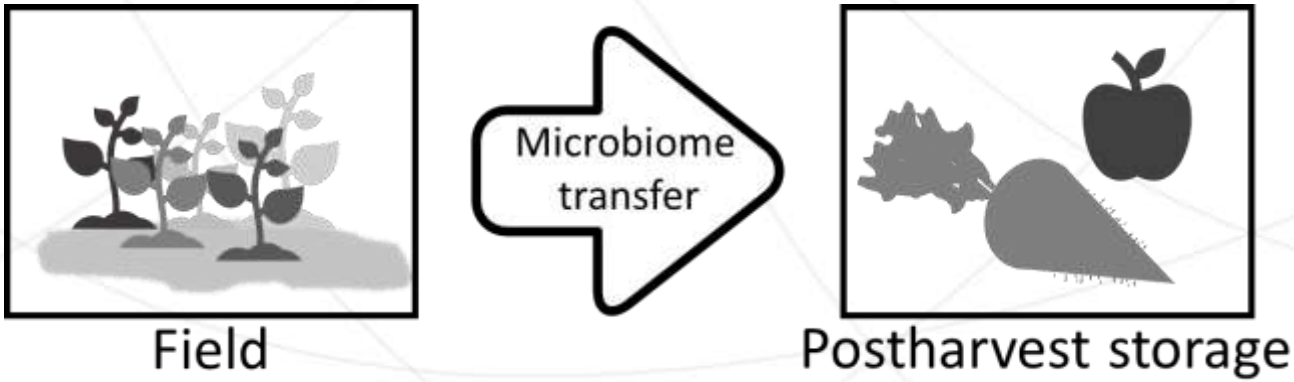
Berg, G. et al., (2016) *Journal of Experimental Botany*



Abdelfattah et al., 2021 *Environmental Microbiology*



Bergna, A. et al., (2018) *Phytobiomes Journal*



? How does field management effect fruit/vegetable microbiome?

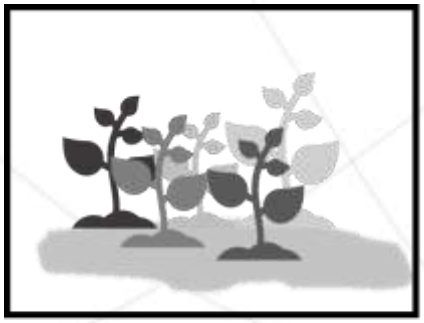
? How does postharvest quality loss change the microbiome?

? What is transferred from the field into the postharvest storage?

High throughput sequencing study

DNA extraction → Amplicon PCR → Illumina Sequencing → DATA evaluation

- **Bacteria: 16S**
- **Fungi: ITS1**



Field

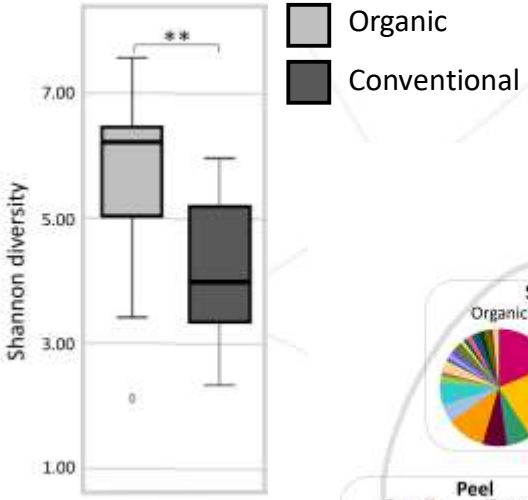
Managing practice

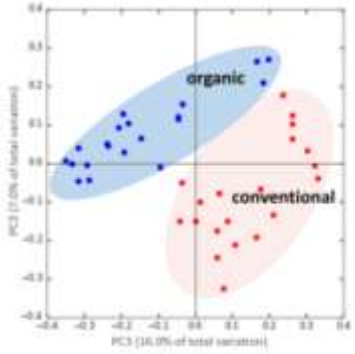
- organic
- conventional

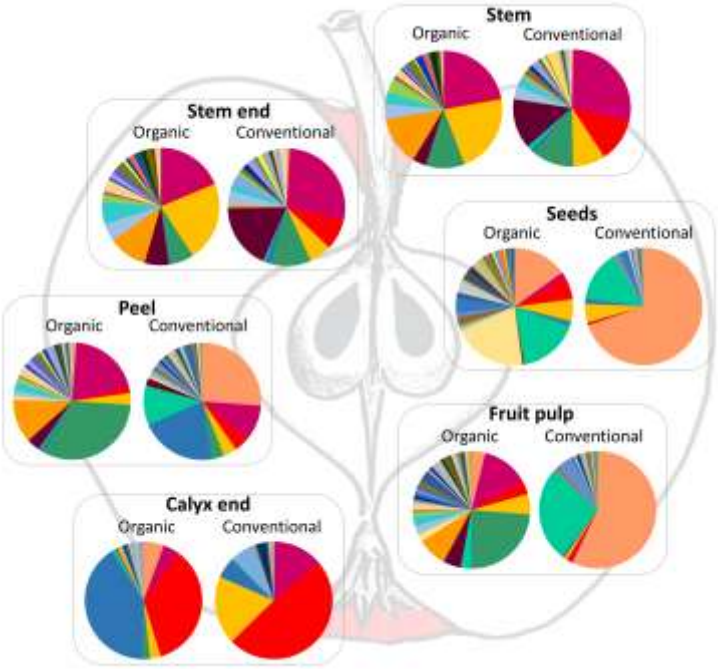
- Induced microbial differences
- Differences in tissues
- Postharvest treatment

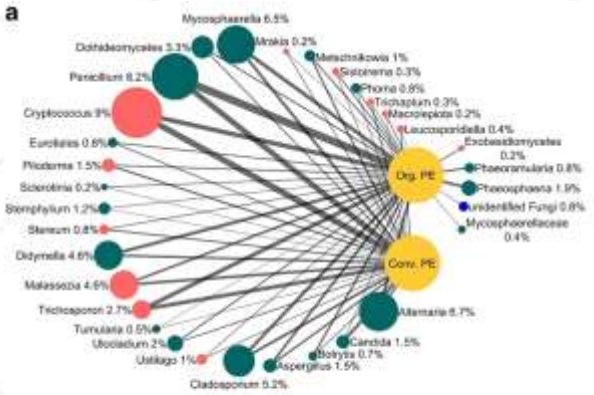
Bacteria

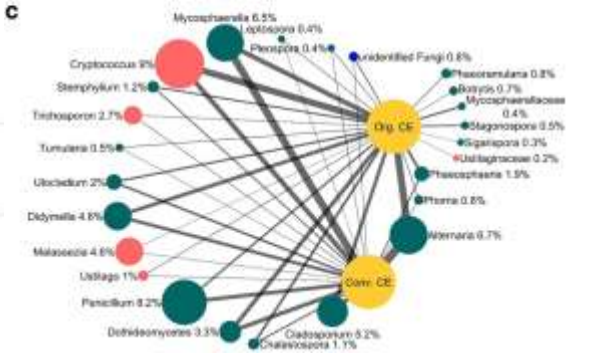
Fungi







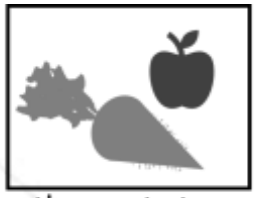




Wassermann, B. et al., (2019a) *Frontiers in microbiology*

Abdelfattah et al., (2016) *Horticulture research*

Significant difference in the microbiome of organic and conventional apples



Postharvest storage

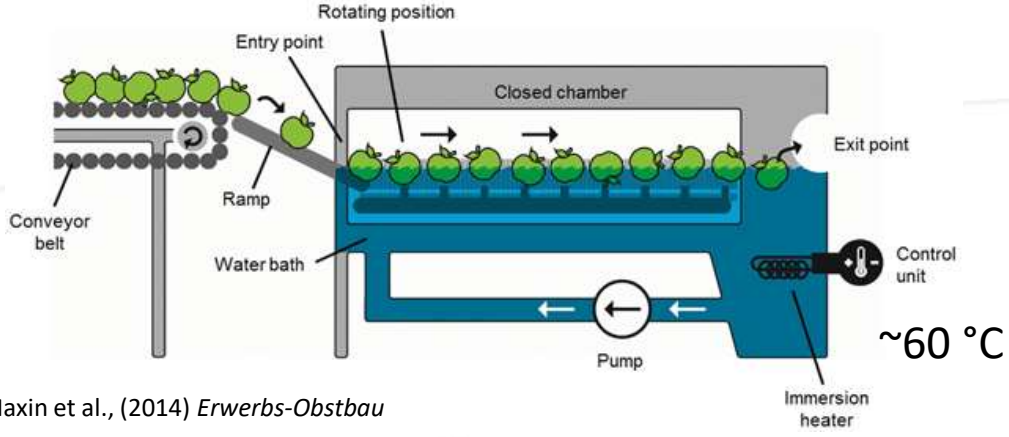
HWT Treated

Untreated

6 months storage

healthy

diseased

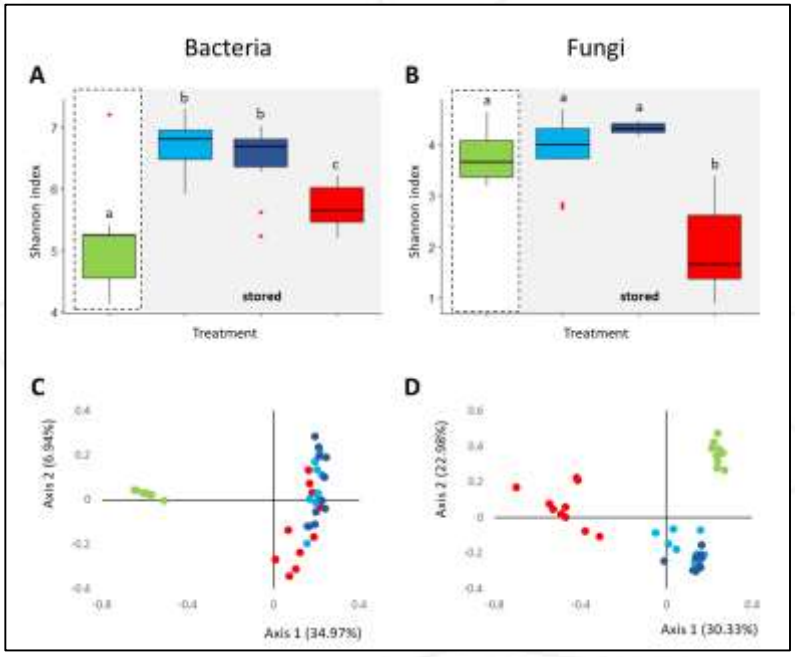


~60 °C

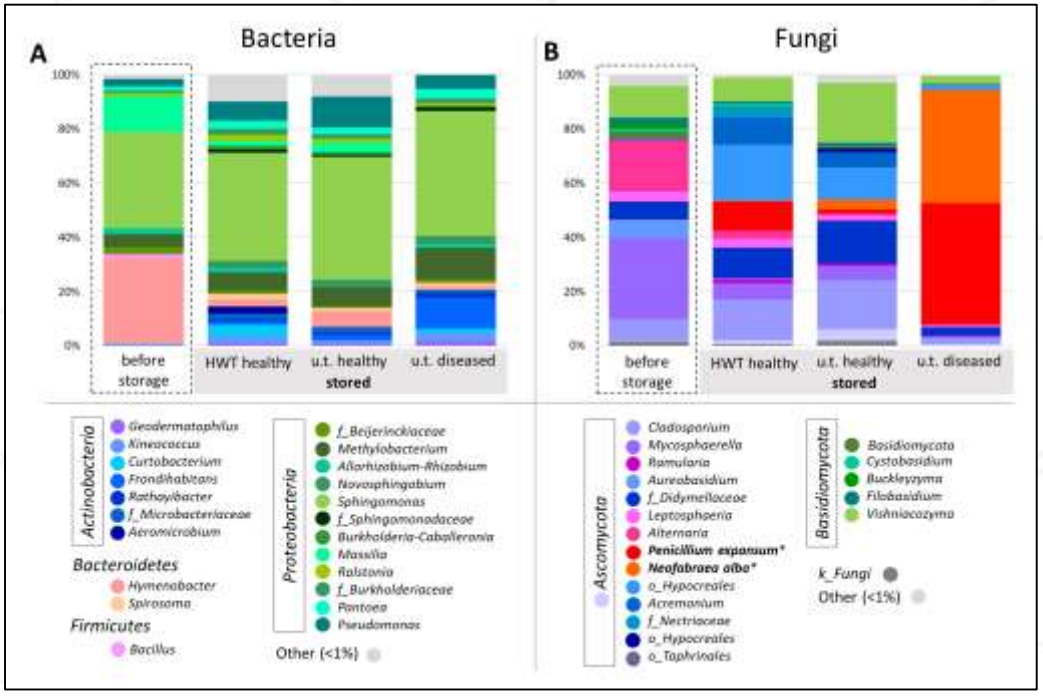
Maxin et al., (2014) *Erwerbs-Obstbau*

Wassermann, B. et al., (2019b) *Frontiers in microbiology*

Diversity



Taxonomic compostition



Wassermann, B. et al., (2019b) *Frontiers in microbiology*

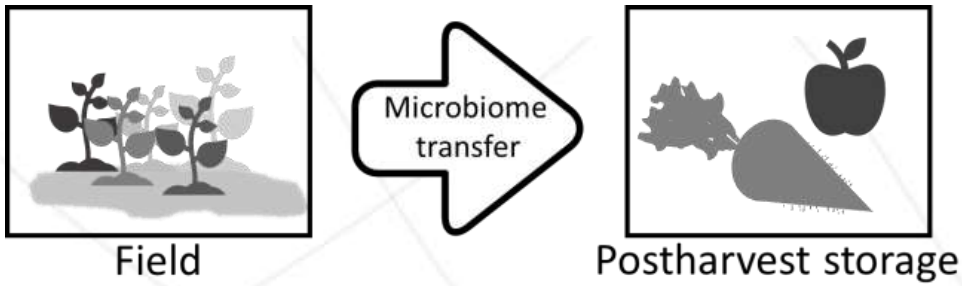
Treatment

- before storage
- HWT
- untreated healthy
- untreated diseased

stored

No huge effect of HWT on apple community

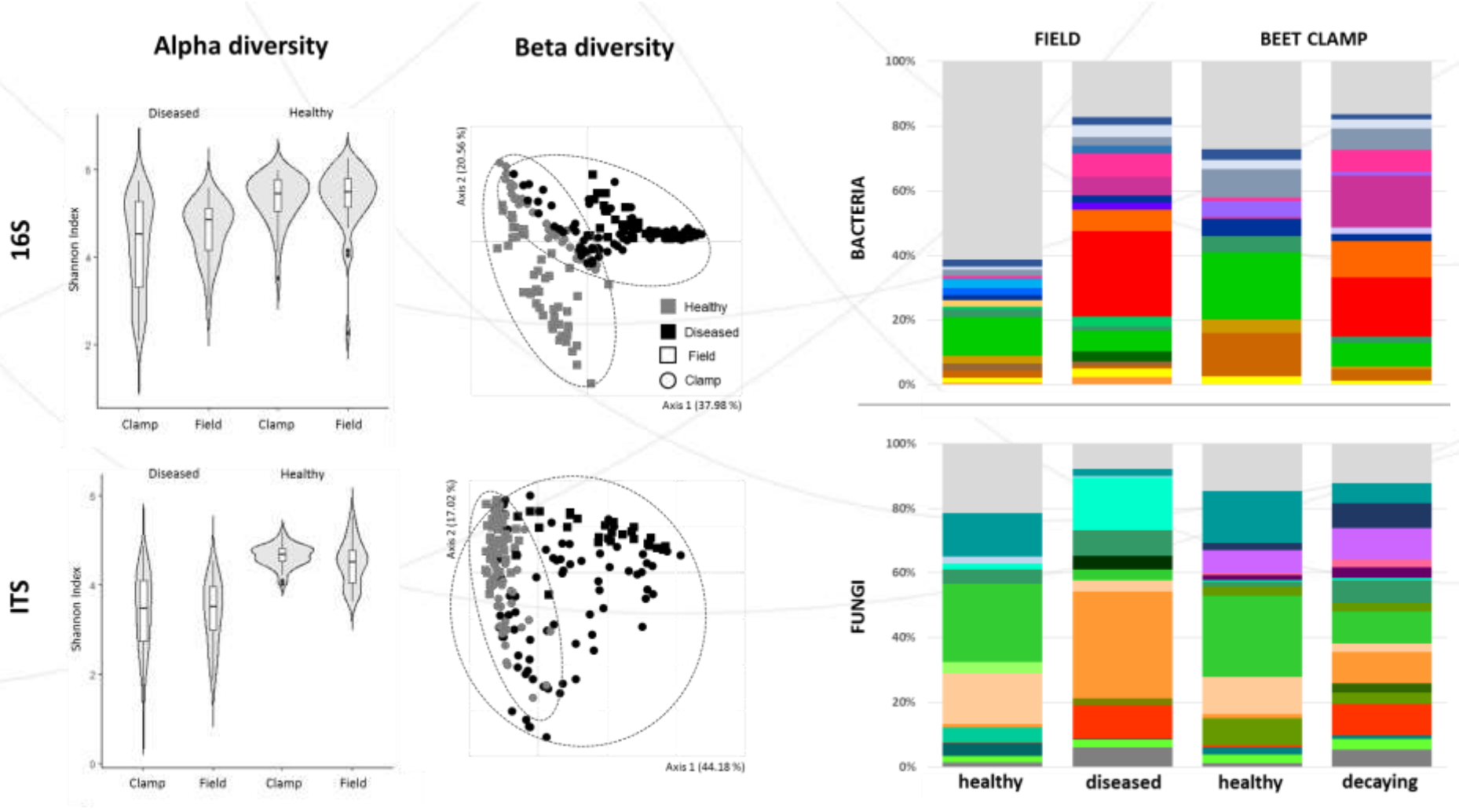
Severe shift in the community with postharvest quality loss



Microbiome-driven identification of microbial indicators for postharvest diseases of sugar beets
Kusstatscher et al., 2019
Microbiome

Disease incidence in sugar beet fields is correlated with microbial diversity and distinct biological markers
Kusstatscher et al., 2019
Phytobiomes

On-field microbial community influences postharvest root rot in sugar beets
Kusstatscher et al.,
under review



Kusstatscher, P. et al., *under review*

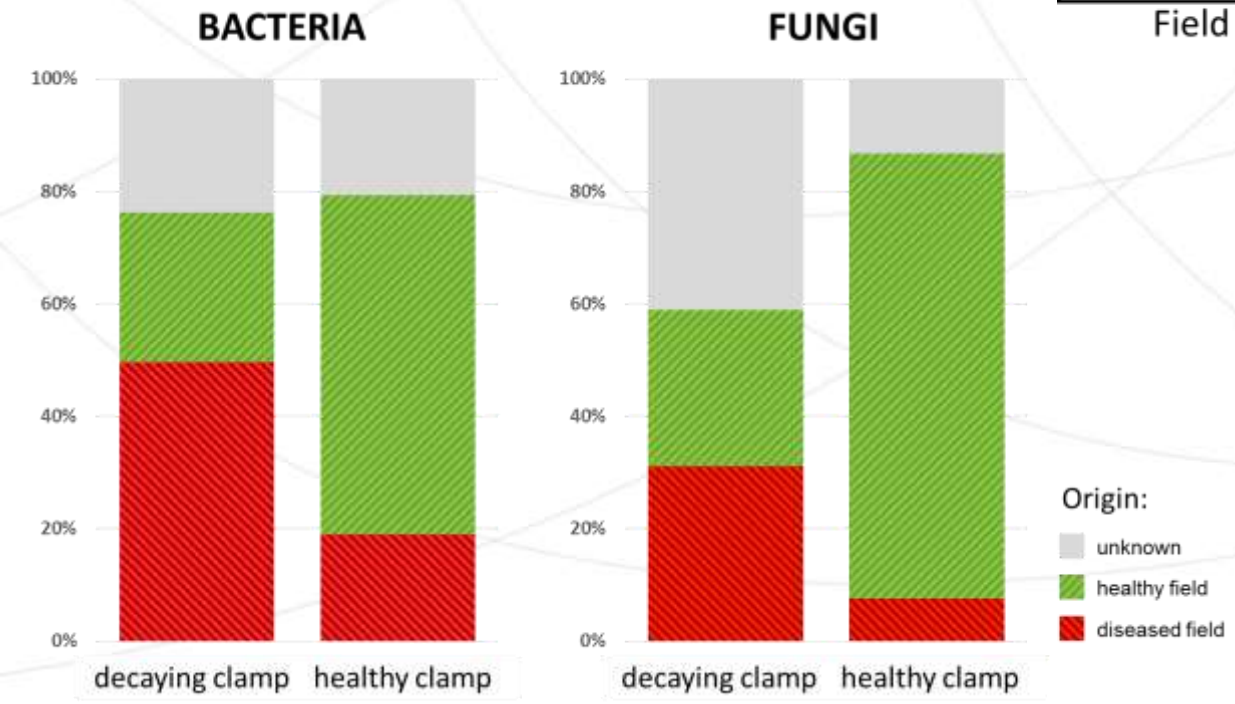
Disease is associated with diversity loss

Disease is associated with a distinct microbial shift

Field

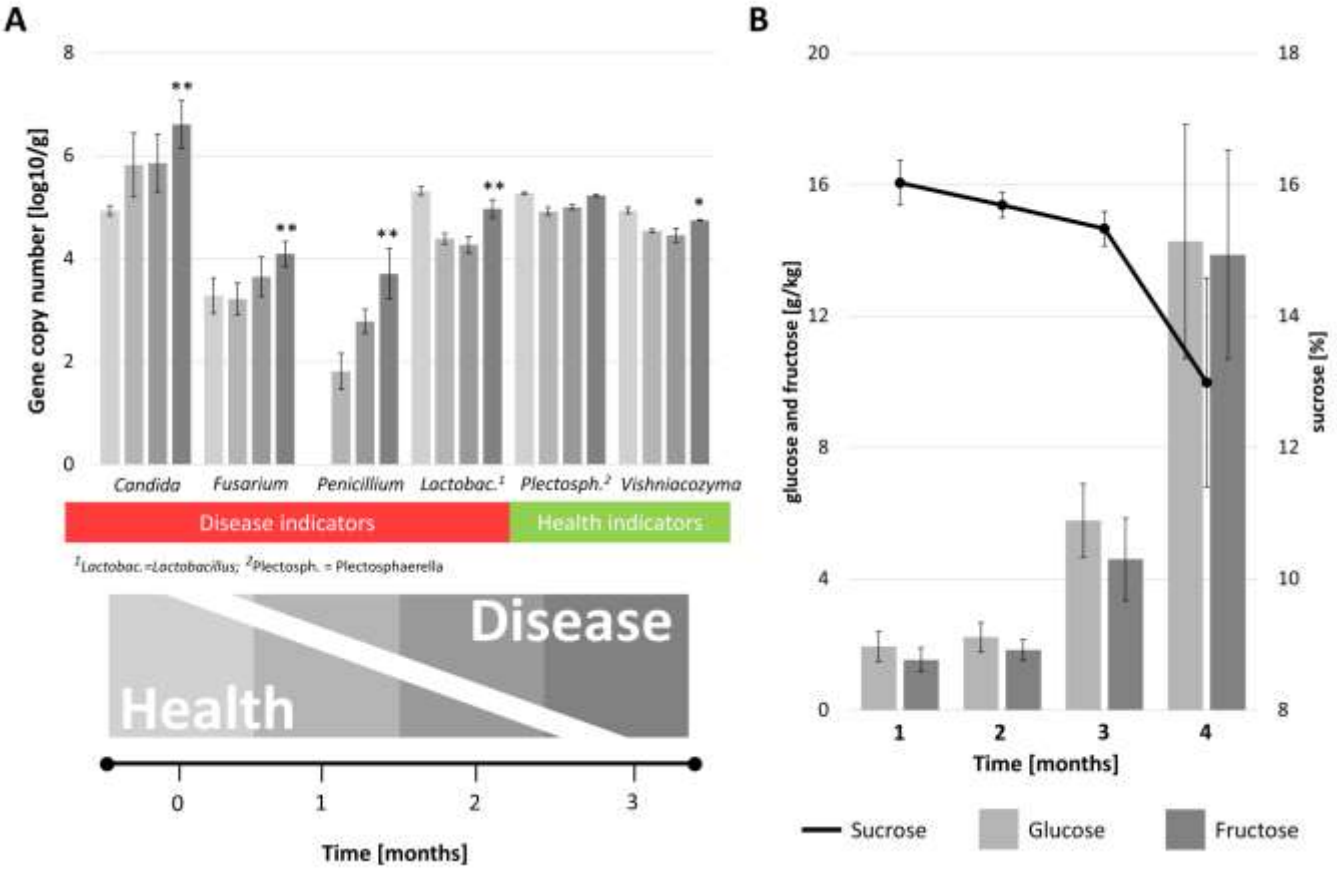
Microbiome transfer

Postharvest storage



Field microbiome is transferred into the storage

Kusstatscher, P. et al., *under review*

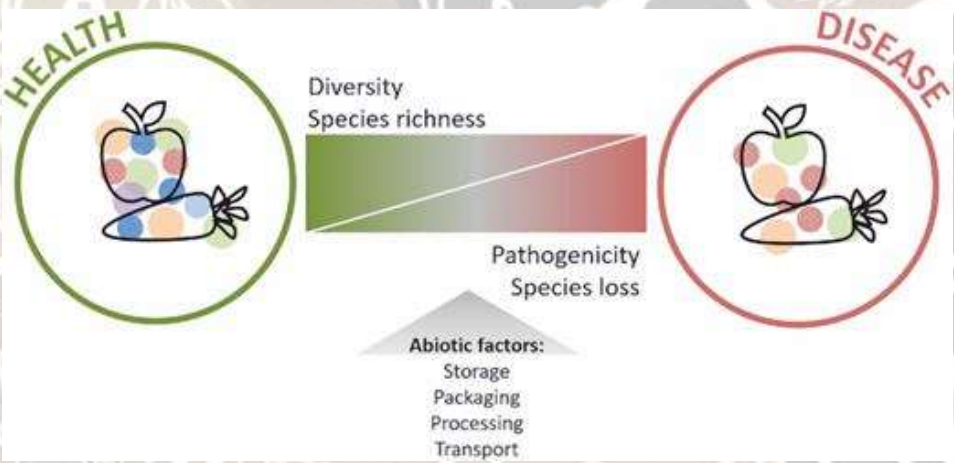


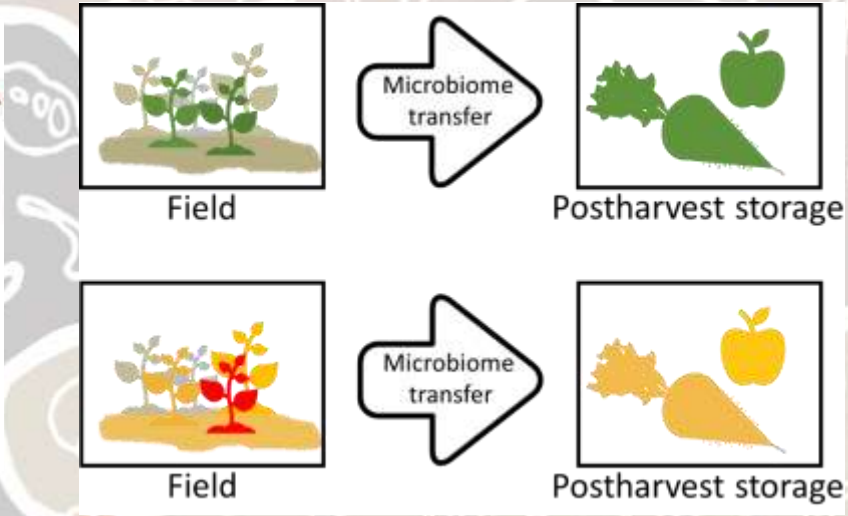
Storage quality loss is associated with occurrence of taxonomic indicators

Kusstatscher, P. et al., (2019) *Microbiome*

Conclusions

- Field management practice effects fruit and vegetable microbiome
- Plant colonizing bacteria and fungi are crucial for fruit and vegetable quality
- Field microbiomes are transferred into the postharvest storage
- Microbial signatures are associated with postharvest quality loss





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