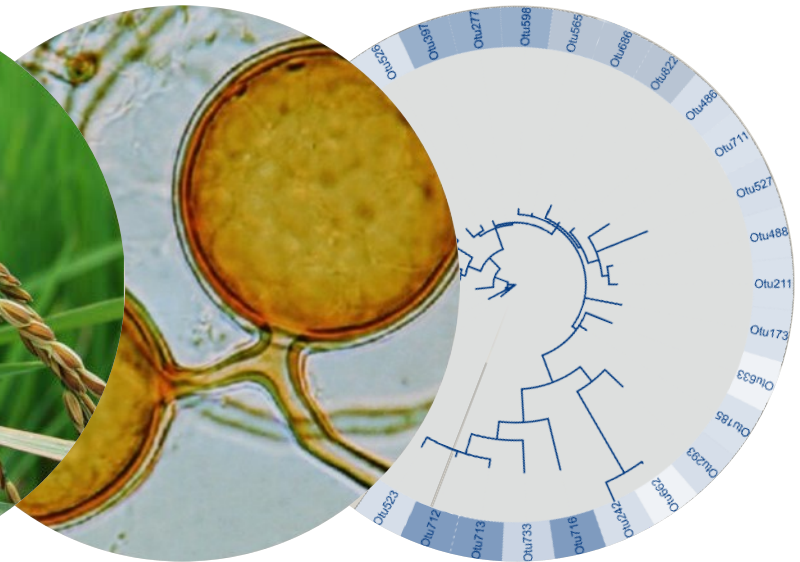
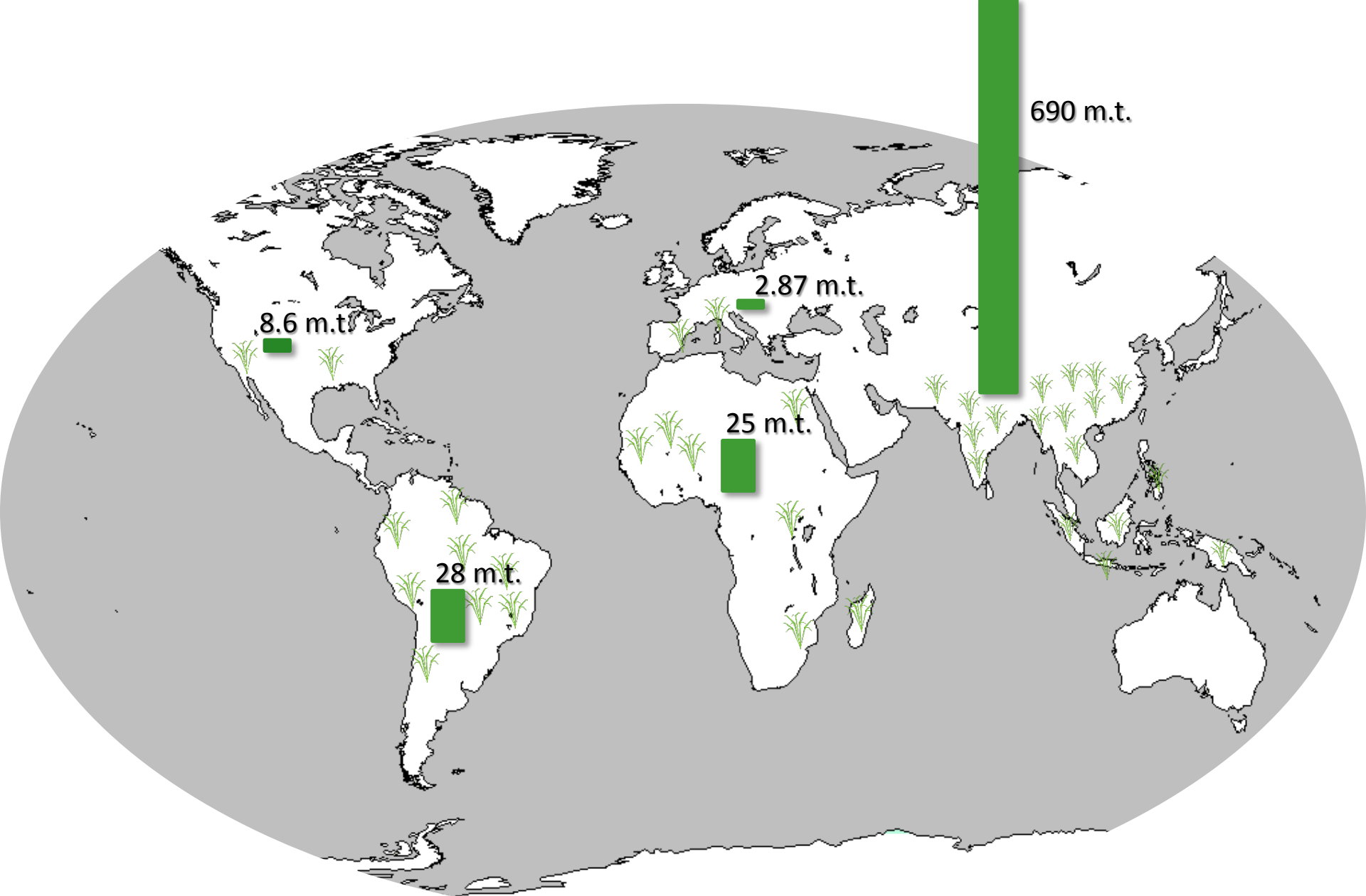


Plant host and drought shape the root associated fungal microbiome in rice

Beatriz Andreo Jimenez

KNPV meeting, Ede 2nd November 2017







Lowland rice



Upland rice



Aerobic rice





Lowland rice



How can we keep rice **production** while reducing **water use**?



↑**productivity**: 75 % total (> 10 t / ha)



↑**CH₄**: 40 t / year (6 %)

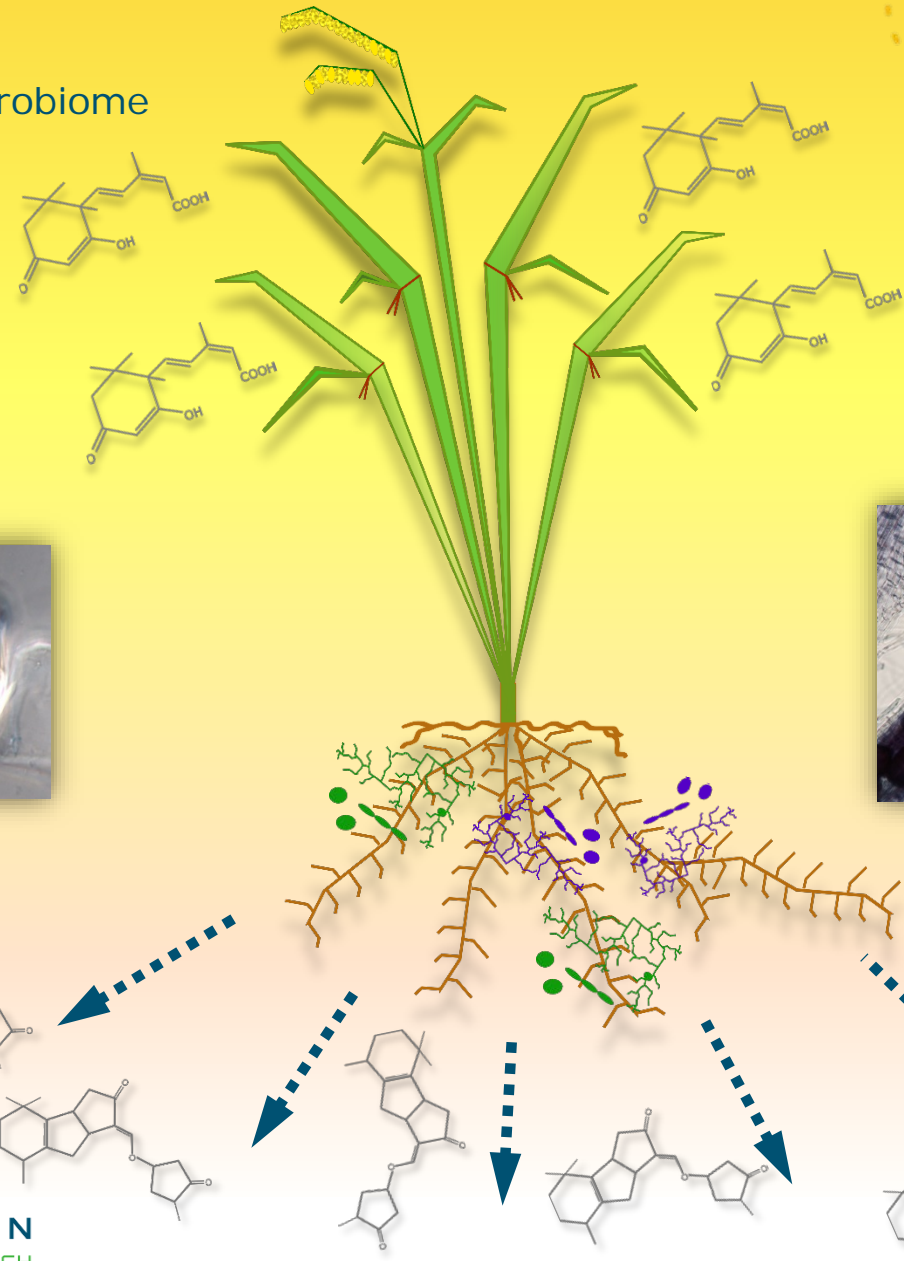
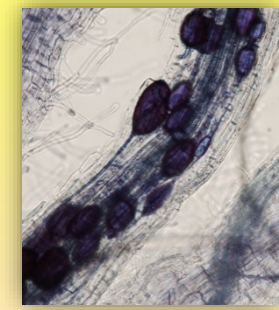
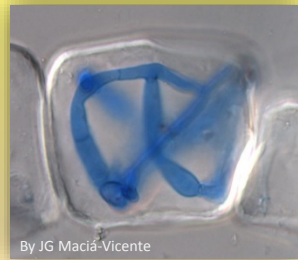


↑ **water use**: 24-30 % total world's fresh water

How drought affect microbiome?

Are plants affecting microbiome selection?

What fungi affect plant performance?



Experiment set up



IRRI, Los Baños
The Philippines



15 cultivars

NGS platform



PCR fungal primers (SSU rDNA)



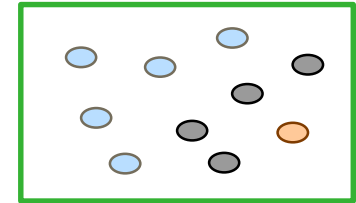
Root sampling



RICHNESS

Number of different sps. in a population

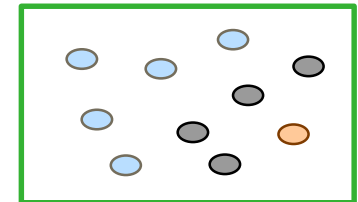
Richness = 3



ABUNDANCE

Number of individuals in a population

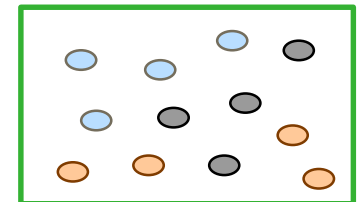
Abundance = 10

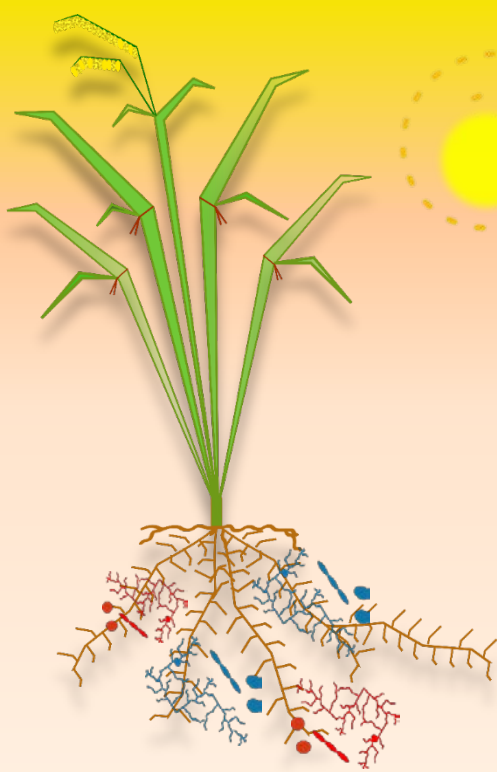


SHANNON

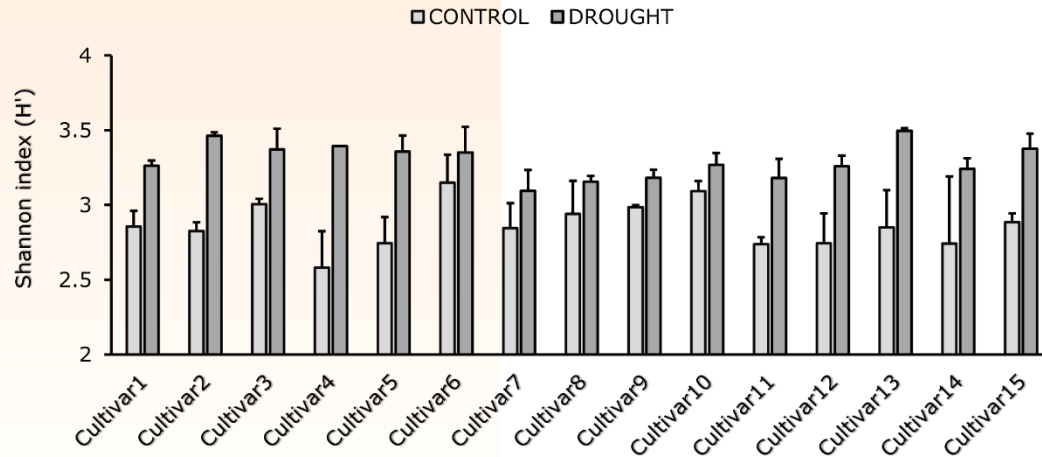
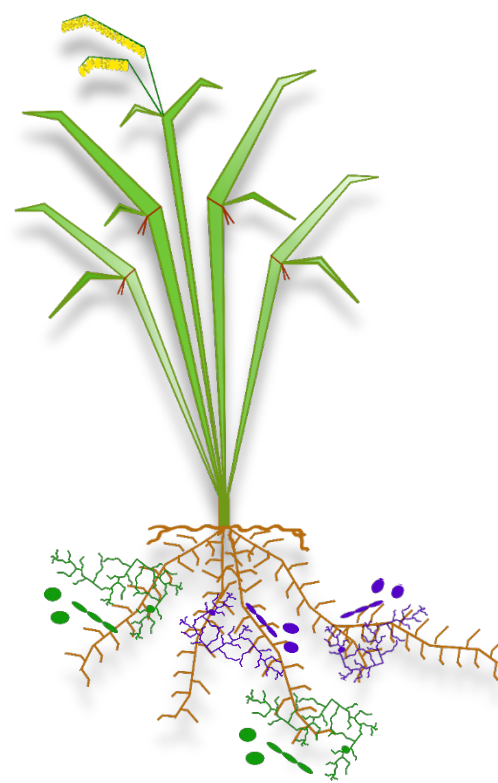
Diversity index (H'). Number of sps. and how even are distributed.
Range: 0-4

$H' = 1.1$

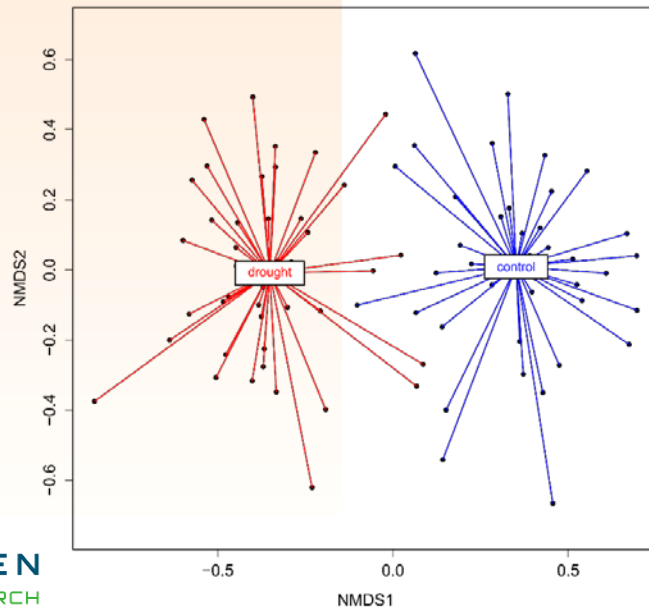
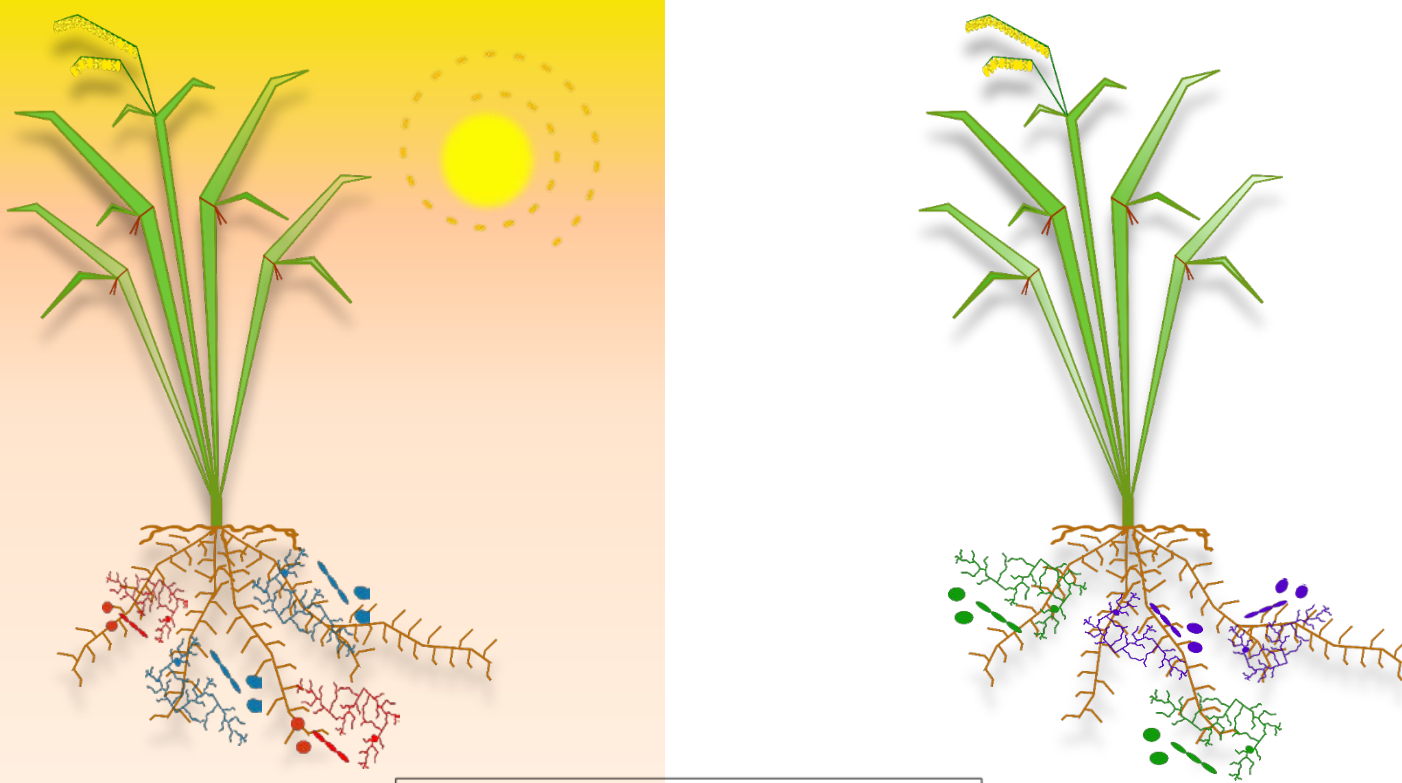




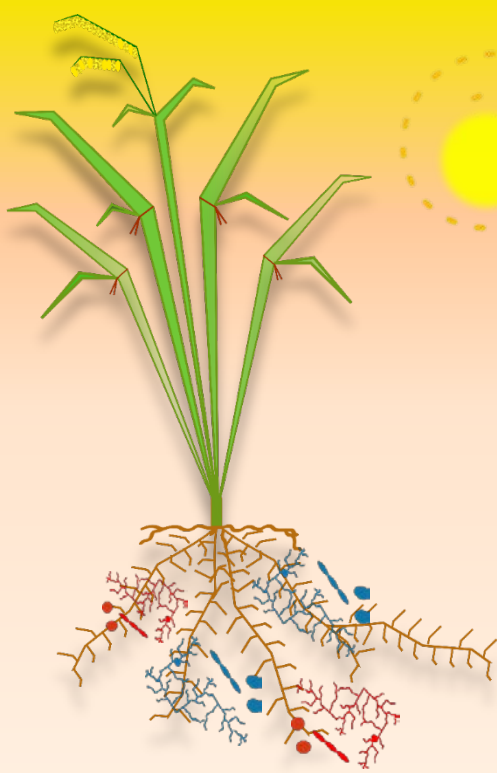
902
OTUs
11
Classes



“There is more biodiversity under drought”



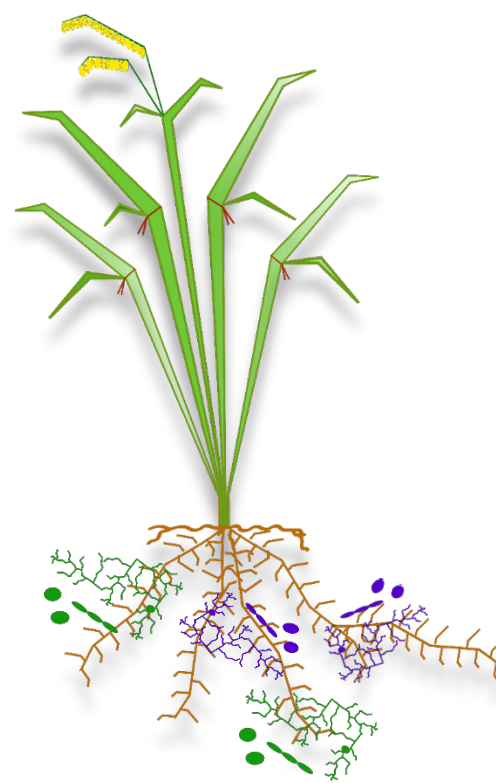
“The community is shaped by drought”



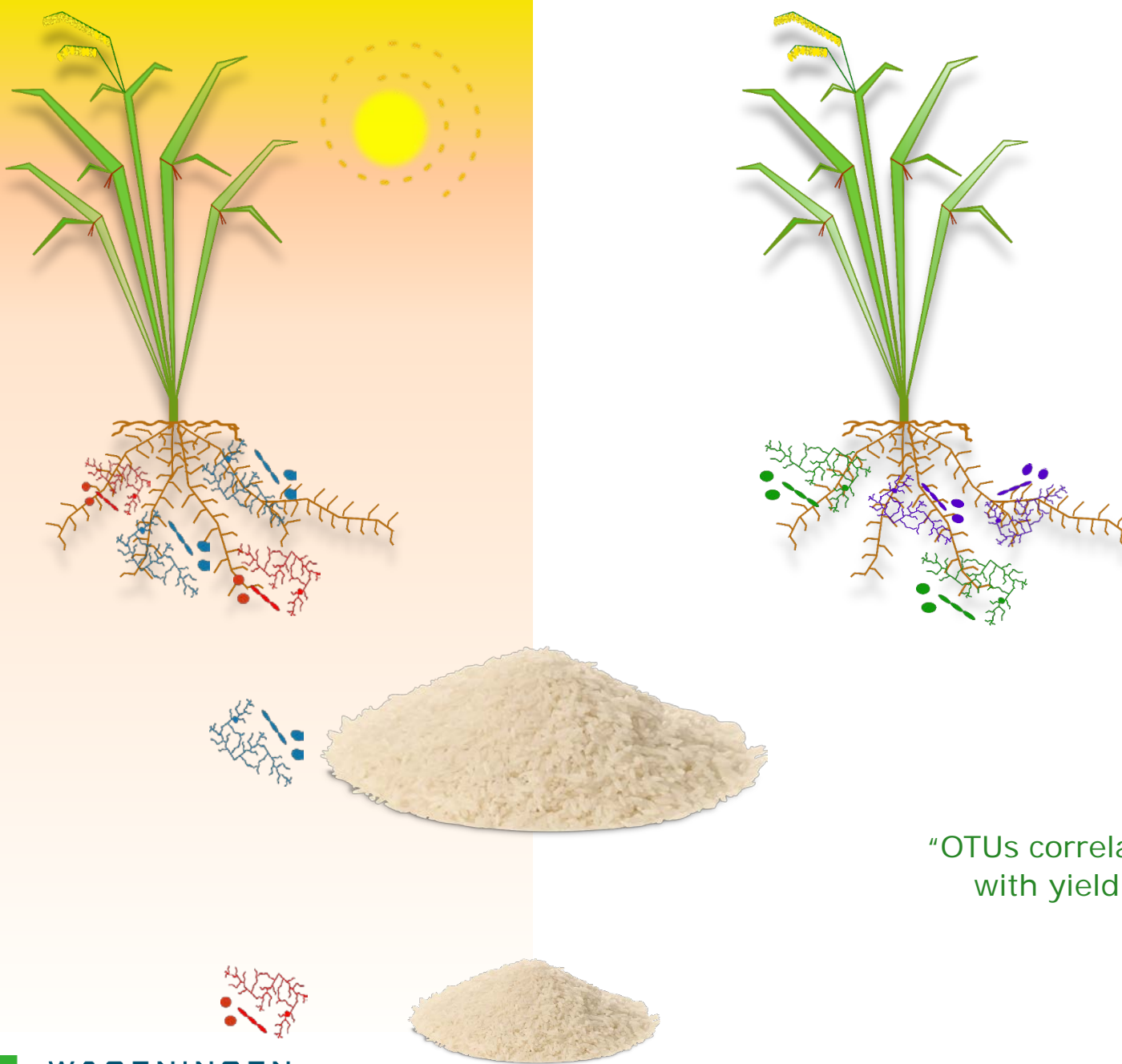
Drought



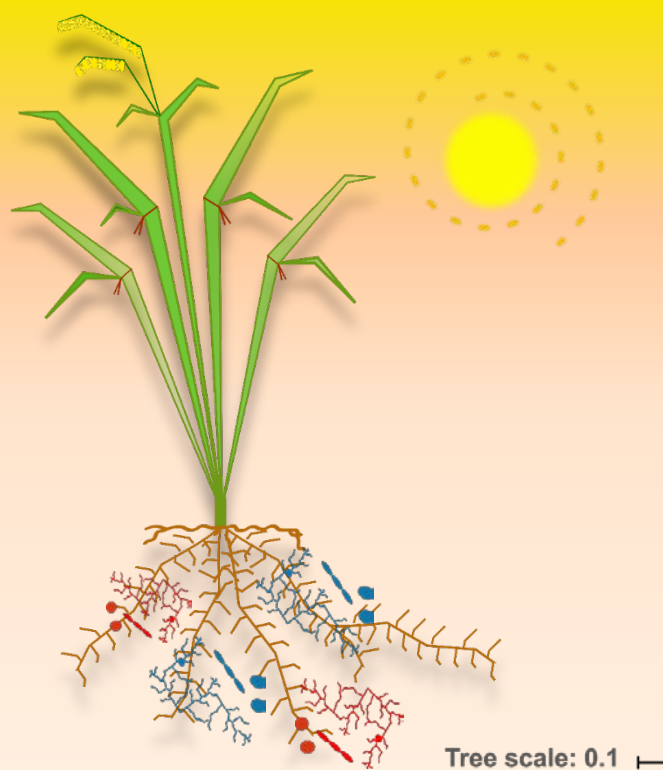
Host



“ Host explains 13% variation”



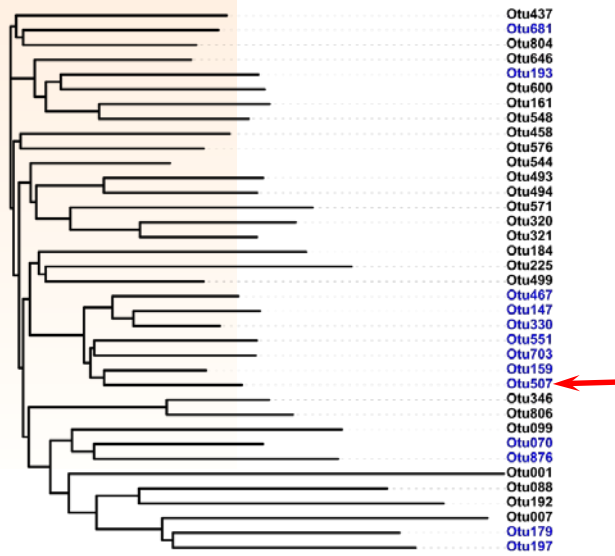
"OTUs correlated with yield"



Tree scale: 0.1

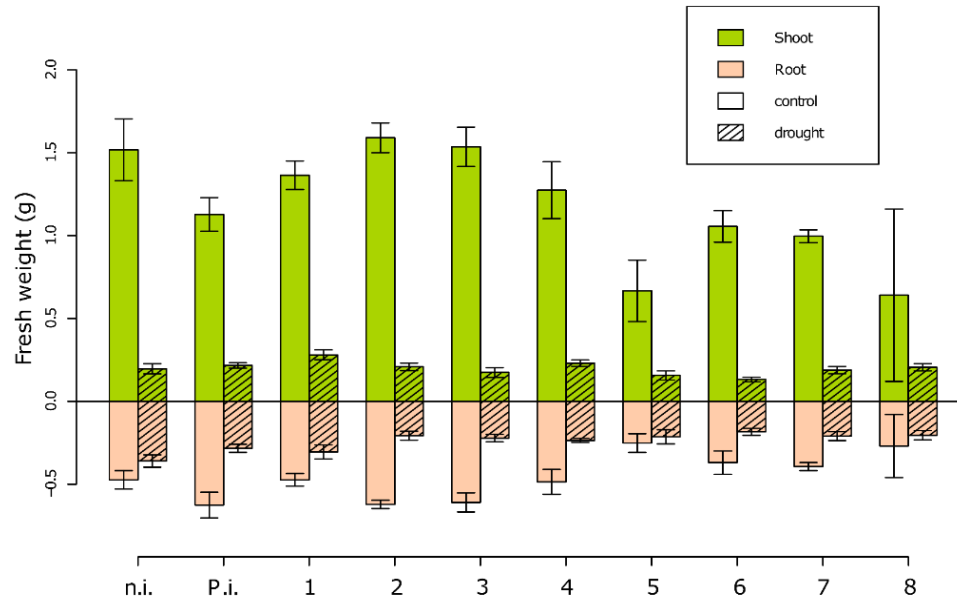
Subphyla:
Pezizomycotina
Unclassified

"The majority belongs to *Pezizomycotina*"



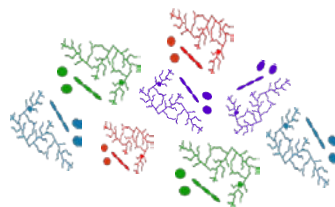


Arthrinium phaeospermum

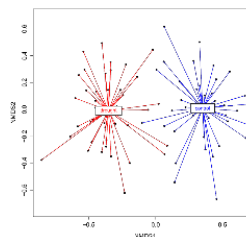


“No clear positive effect on plant biomass”

- Stress boost biodiversity



- Stress and host affect fungal microbiome composition



- OTUs correlated with yield are closely related

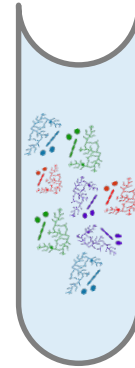


- Testing individual strains is condition-dependent
- Unable to cultivate all species
- Fungal interactions

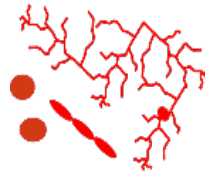
How we can apply this knowledge to solve practical problems?



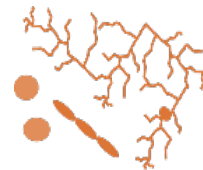
- We have to think holistically
- Synthetic communities ("vaccines")
- Tailor-made application



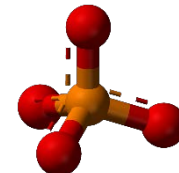
drought



Pathogen 1



Pathogen 2



Low Pi

Etc.

- Breeding microbiomes

Thank you

Bedankt

Laboratory of Plant
Physiology, WUR



IRRI, Philippines



Rennes University, France



Biointeractions & Plant health,
WUR

