Stress-Responsive and Beneficial Microbes in Turfgrass Roots

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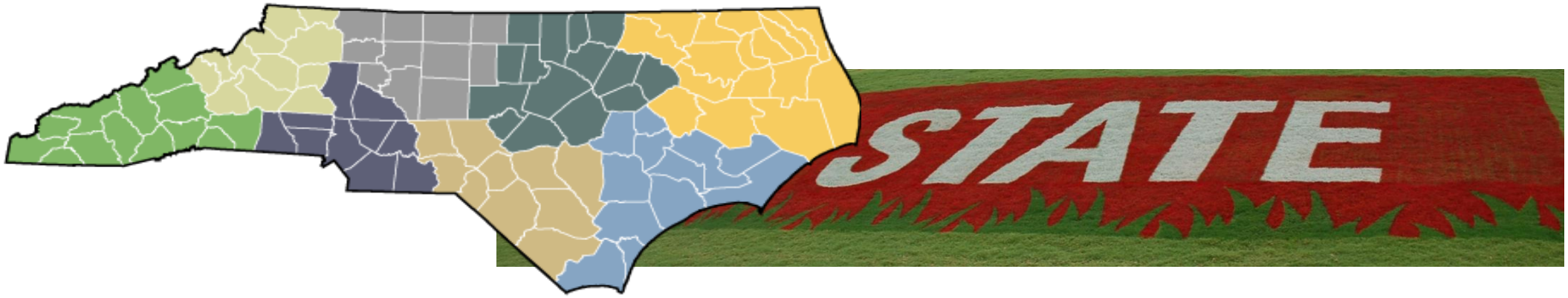
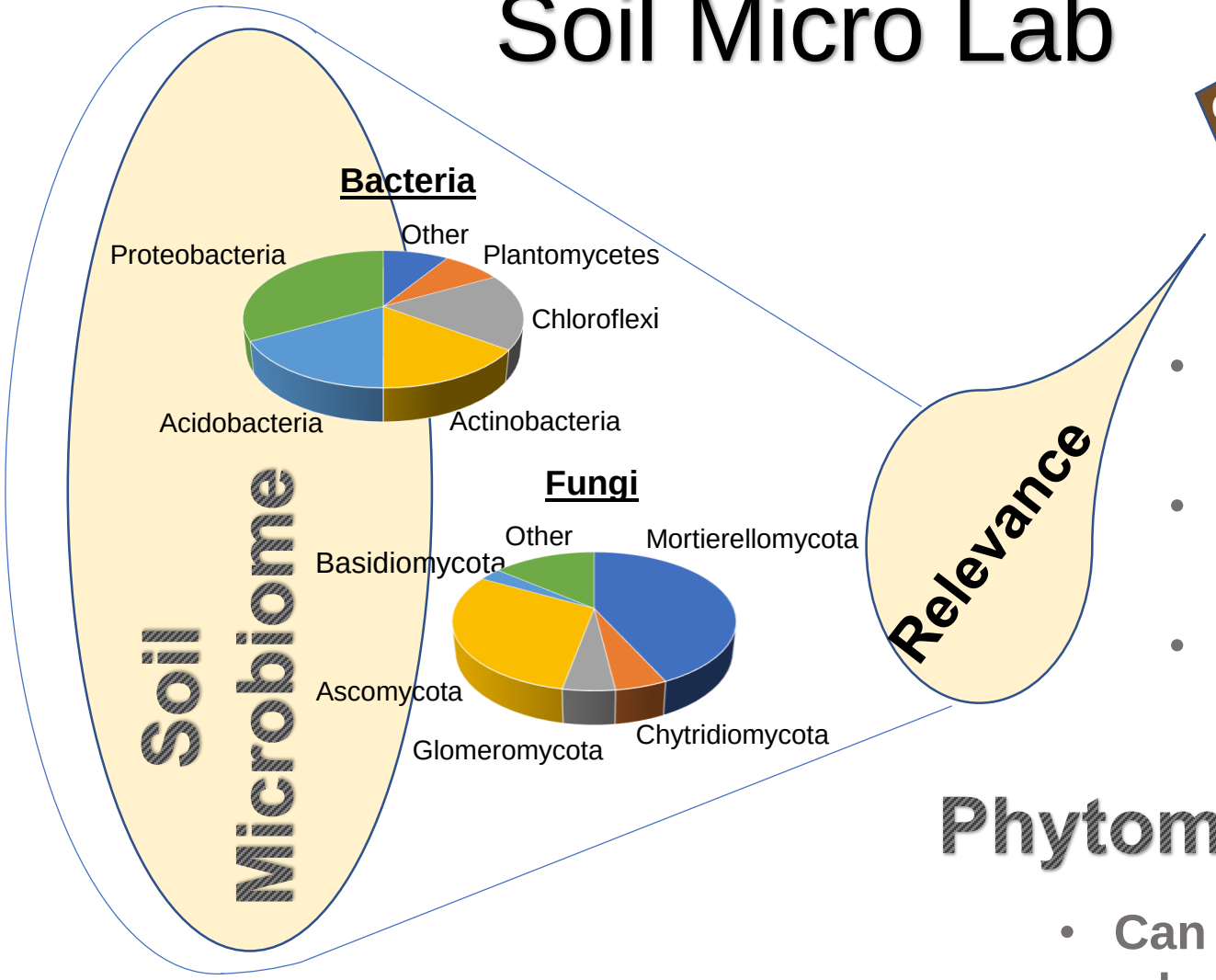
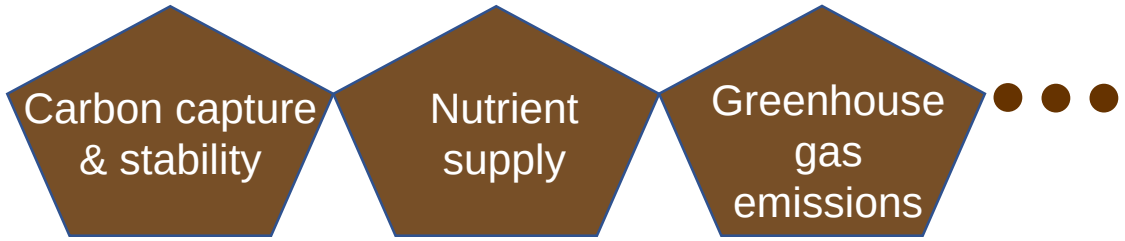
Crop and Soil Sciences



Soil Micro Lab



Distribution in the Environment

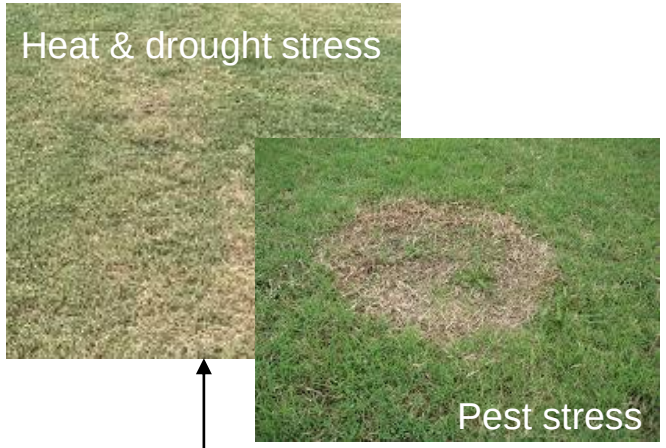


Soil Health

- How do soil physicochemical environments modulate the microbiome?
- How do microbes respond to agricultural practices?
- How do microbial traits control soil carbon and nitrogen transformations?

Phytomicrobiome

- Can we harness microbes to improve plant adaptation to environmental stresses?



- Among the top irrigated single crops
- ~ 92 million pounds of pesticides in non-agricultural land
- ~ 88 million households using pesticides

Water conservation
Pest management practices

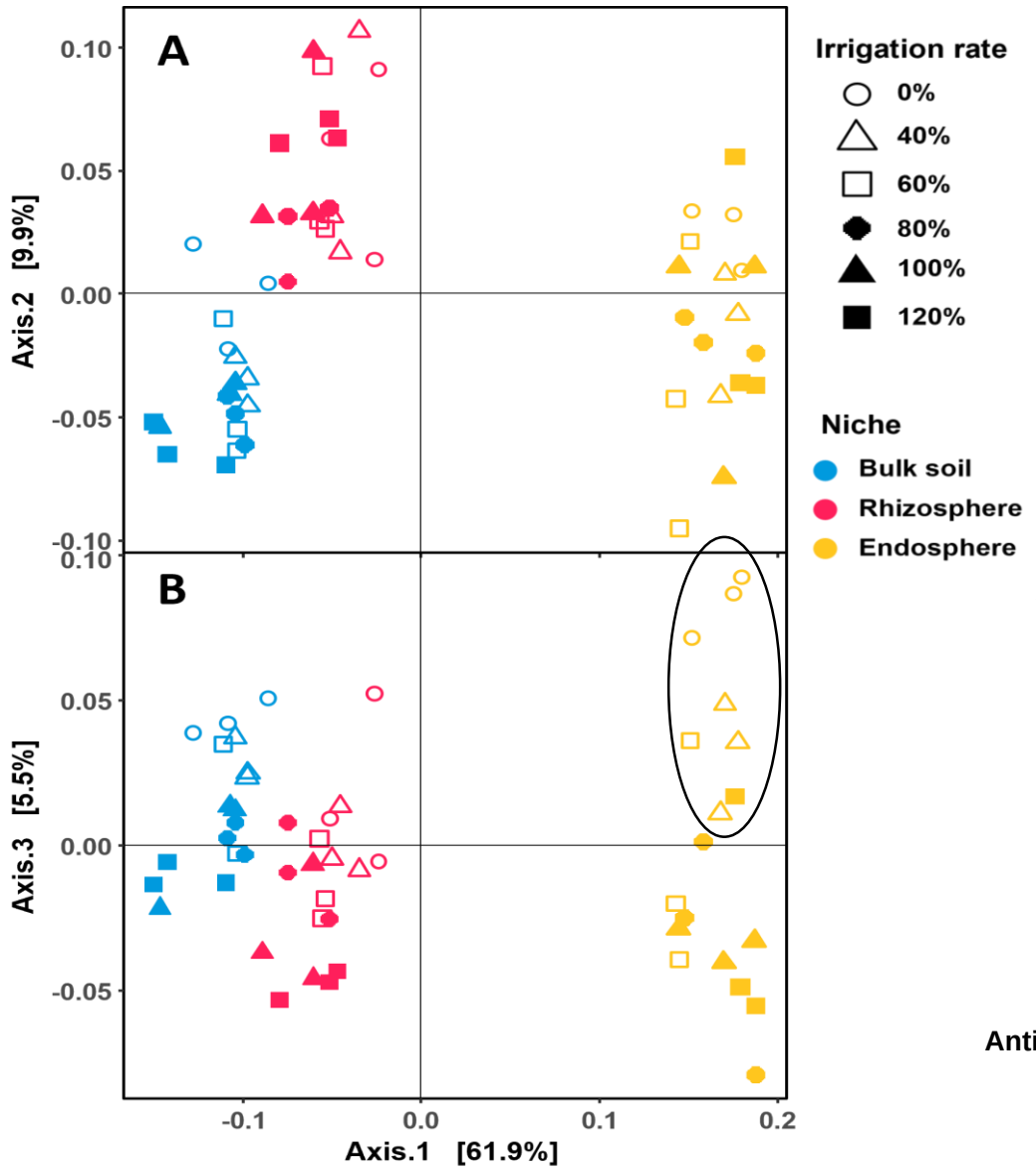
Phytomicrobiome

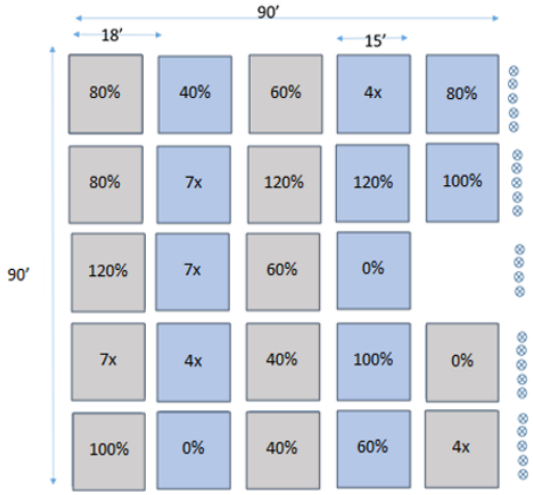
- Phytohormone production
- ROS scavenge
- Nutrient acquisition
- Defense against pathogens

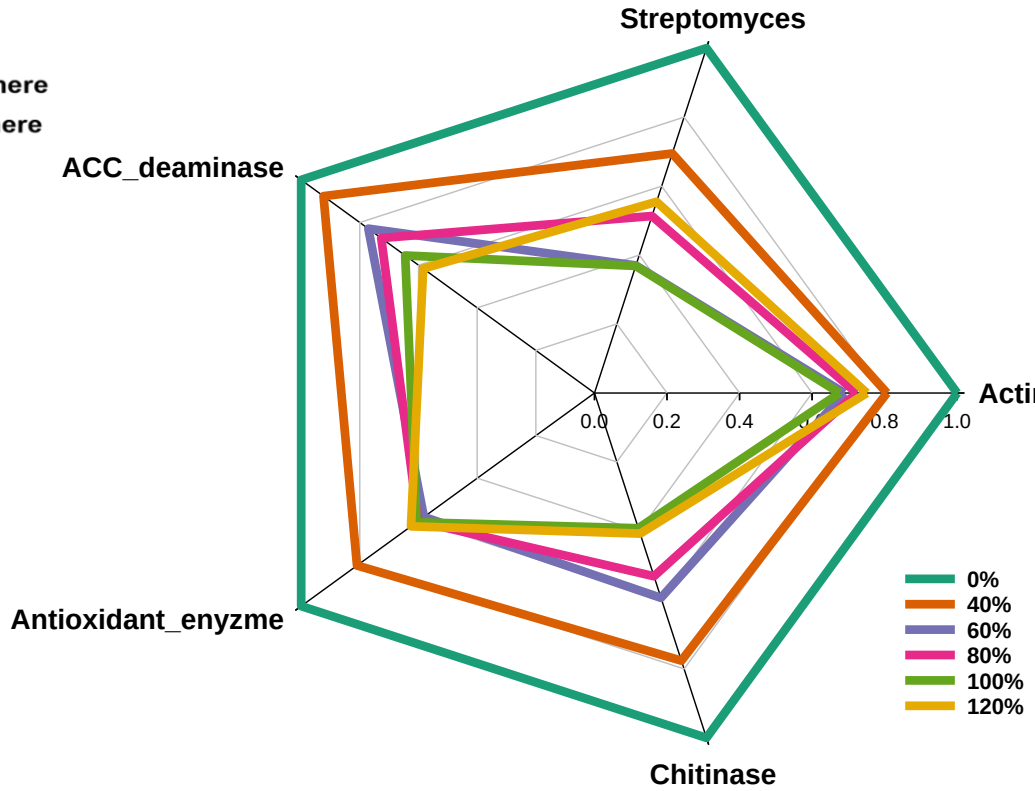
- Stress tolerance
- Benefits

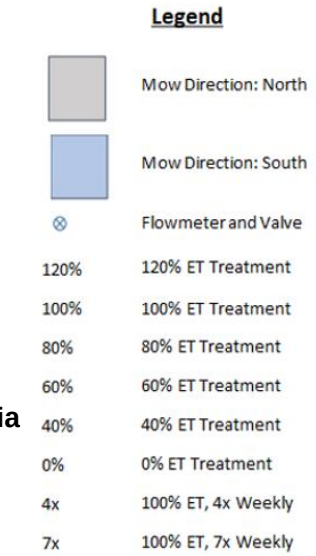
Metagenomic survey of microbiota in turfgrass roots under various abiotic and biotic stresses

Case Study I – Abiotic Stress: Drought

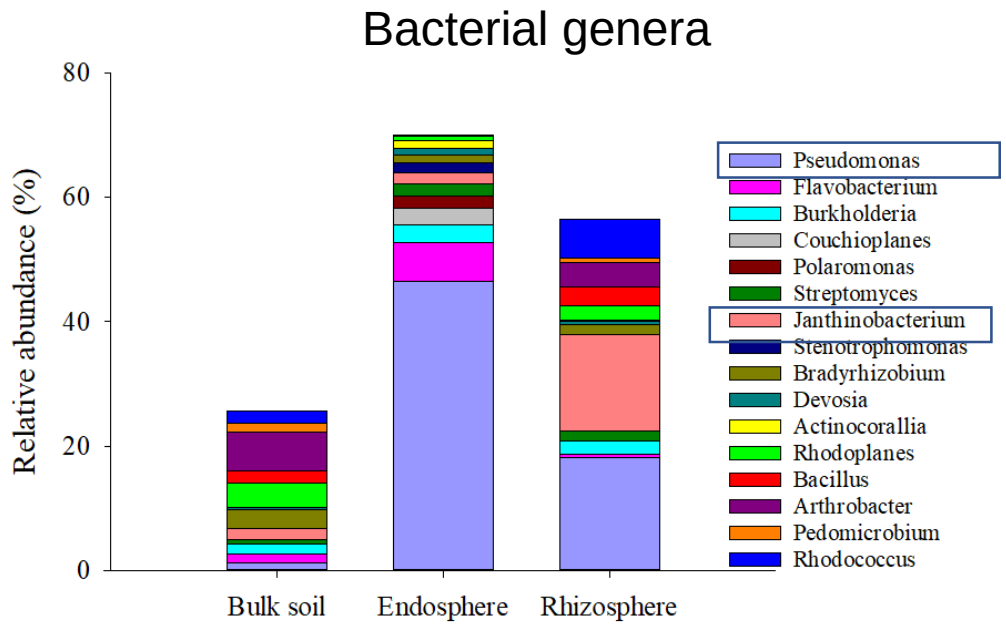




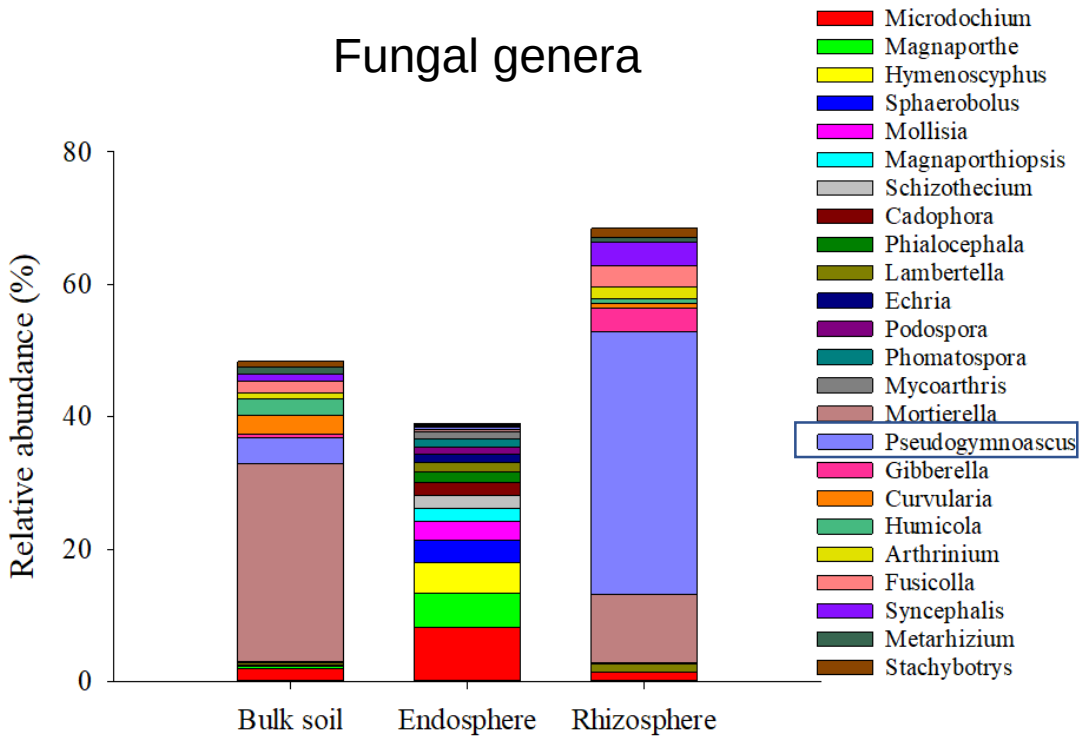




Case Study II – Possible Biotic Stress



- A few bacterial genera dominated in root endosphere
- Pseudomonas in root endosphere (~ 46%)
- Pseudomonas (~18%) and Janthinobacterium (~18%) in rhizosphere.



- Pseudogymnoacus dominated in rhizosphere (~ 40%)
- No apparent dominant fungal genera in grass root endosphere

Harnessing microbes to improve turfgrass stress adaptation: **Promising yet more information required**

- Elite beneficial microbes that are **specific to stressors of different nature and intensity** (pathogens, pests, heat wave, drought, soil compaction…)
- Environmental and **chemical triggers** for promoting beneficial microbes
- Pathways by which **beneficial microbes** improve turfgrass health under biotic and abiotic stresses