

Producing better sports turf through soil microbial management

Dr Andy Owen



Dr Andy Owen

International Technical Manager
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FACTS Qualified Advisers

Potential Opportunities for Improved Turf through Microbial Management



- Supply nutrients to the plant
- Improve rooting and plant structure
- Improve access to water
- Reduce disease through antagonism and defence regulation
- Breakdown thatch



Potential Opportunities for Improved Turf through Microbial Management

POTENTIALLY
Make Turf Management More Sustainable

“A better understanding of the structure and function of turfgrass microbiomes and biotic and abiotic factors that shape them will lead to increase and more targeted usage to improve turfgrass performance on golf courses ”



agronomy

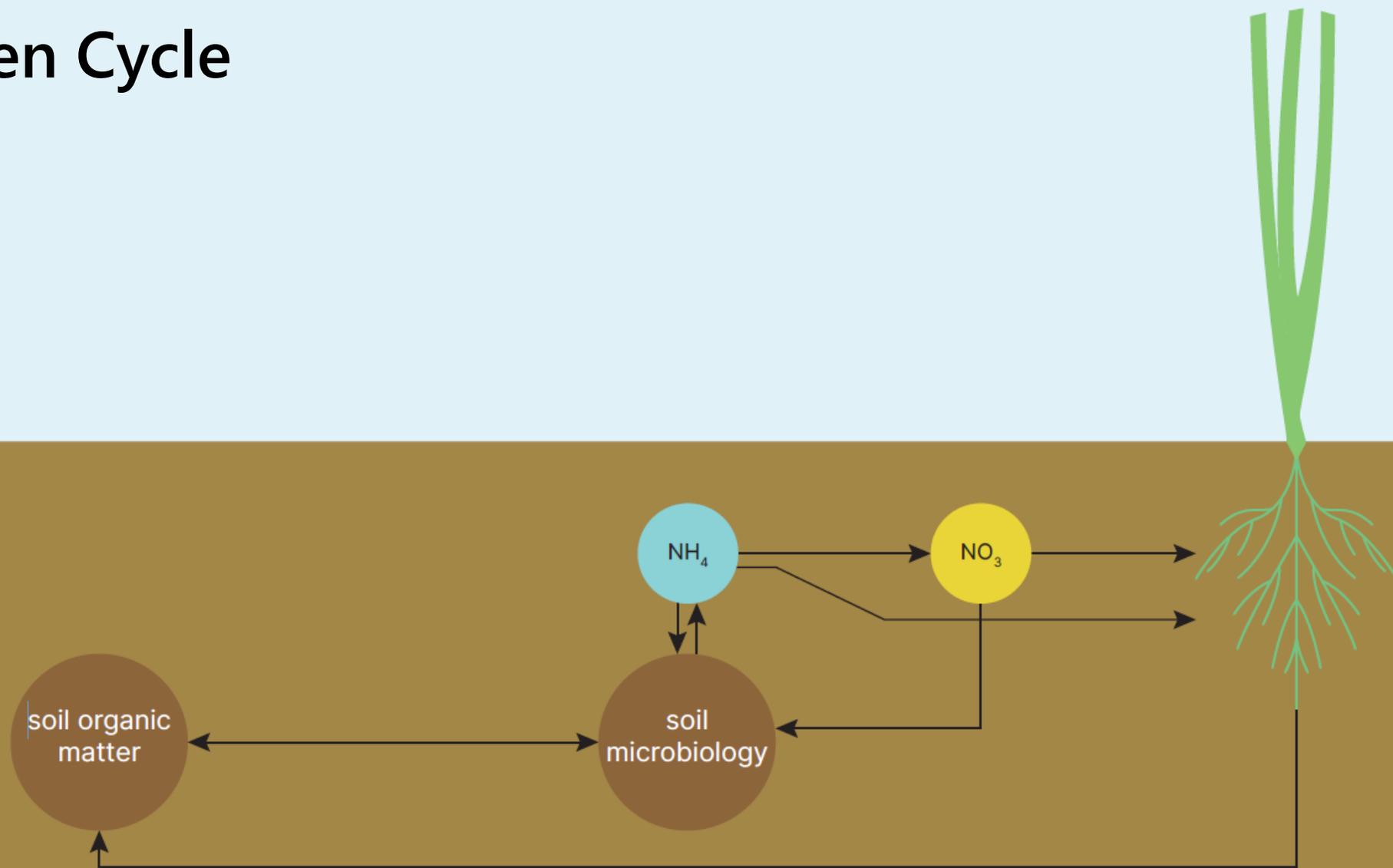


Review

The Lack of Knowledge on the Microbiome of Golf Turfgrasses Impedes the Development of Successful Microbial Products

Uli Stingl ^{1,*}, Chang Jae Choi ¹, Braham Dhillon ² and Marco Schiavon ³ 

The Nitrogen Cycle





Idea courtesy of Professor Alan Gange, BTME presentation 2019

Hidden circles – Tribute Jackson Pollock, Juan Jose Garay,



Producing better sports turf through soil microbial management



A thesis submitted to the University of London for the degree of Doctor of
Philosophy

Francesca Baylis



Can Beneficial Microbes Be Used to Combat Turfgrass Pests and Diseases?

*Alan Gange, Professor of Microbial Ecology, Francesca Baylis and Tamsin Williams, PhD
Students, Royal Holloway, University of London*

BTME Continue to Learn: 2019

What microbes are present in golf green soils ?





How do current practices change microbial populations

Benefits gained from using microbial inoculants in sports turf





Mycorrhizal Fungi

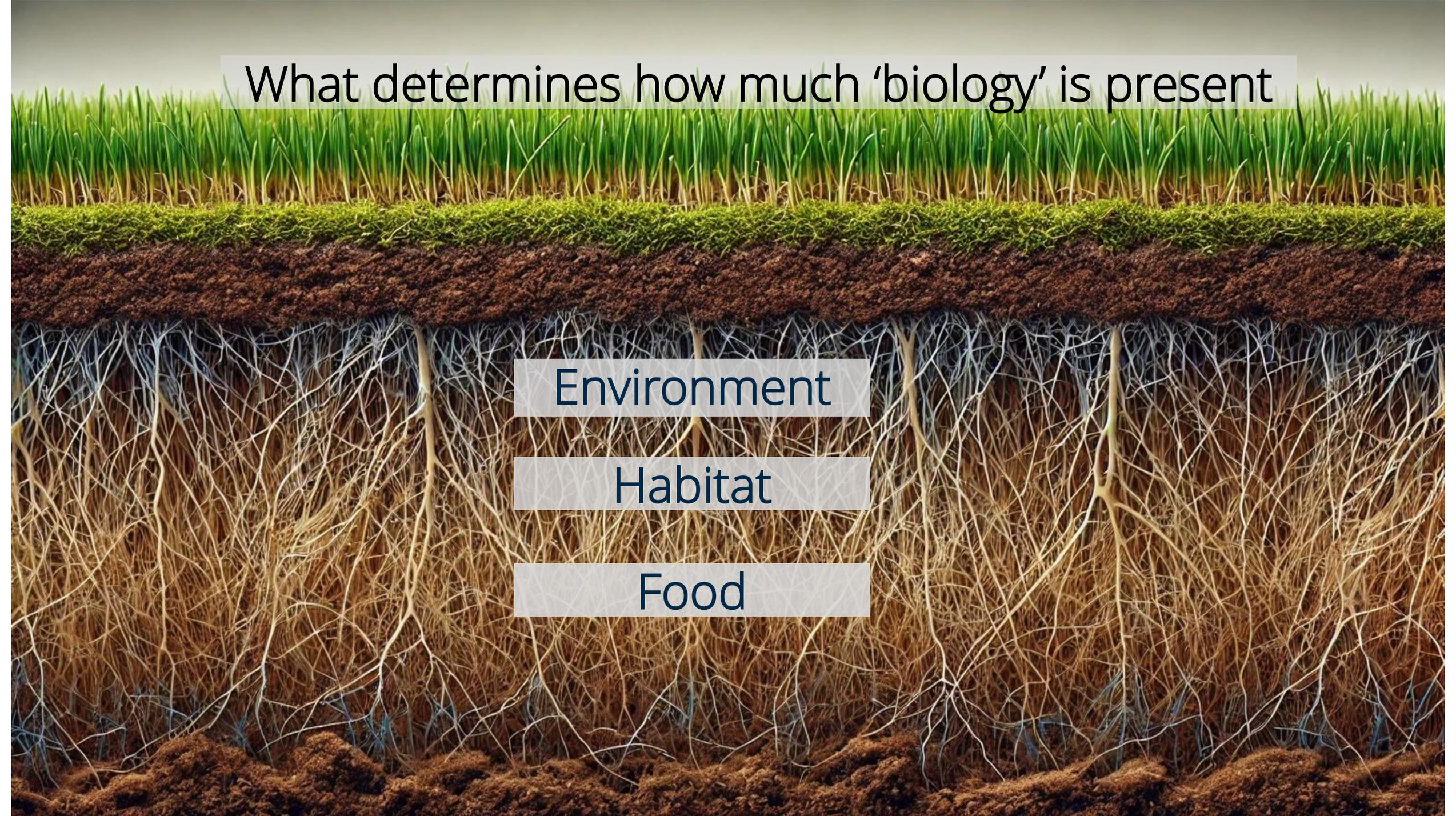


What determines how much 'biology' is present

Environment

Habitat

Food



What is a healthy soil?



Is it important?

What microbes are present in golf green soils ?



Methodology

- 21 golf courses across UK&I
- 3 samples from all 18 greens
- Samples analysed by PLFA (profiles soil community at individual bacteria fungi and actinomycete level).



Data developed is very complex to compare and analyse

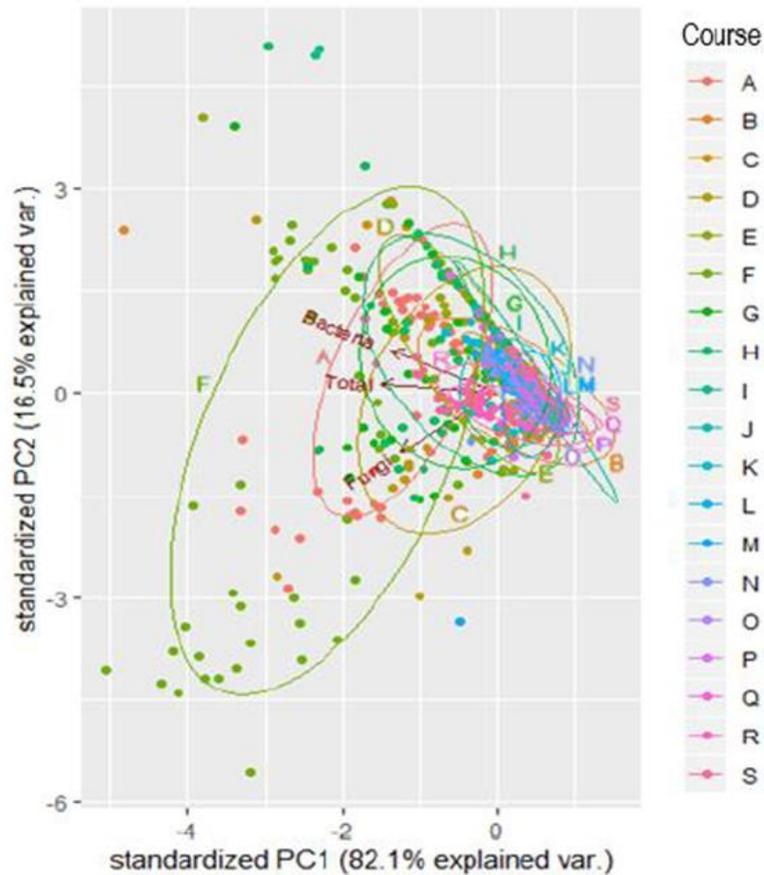


Figure 7: PCA ordination plot of microbial PLFAs across 19 golf courses, grouped by golf course (A-S).

Presented as a series of Principle Component Analysis Plots:



Data developed is very complex to compare and analyse

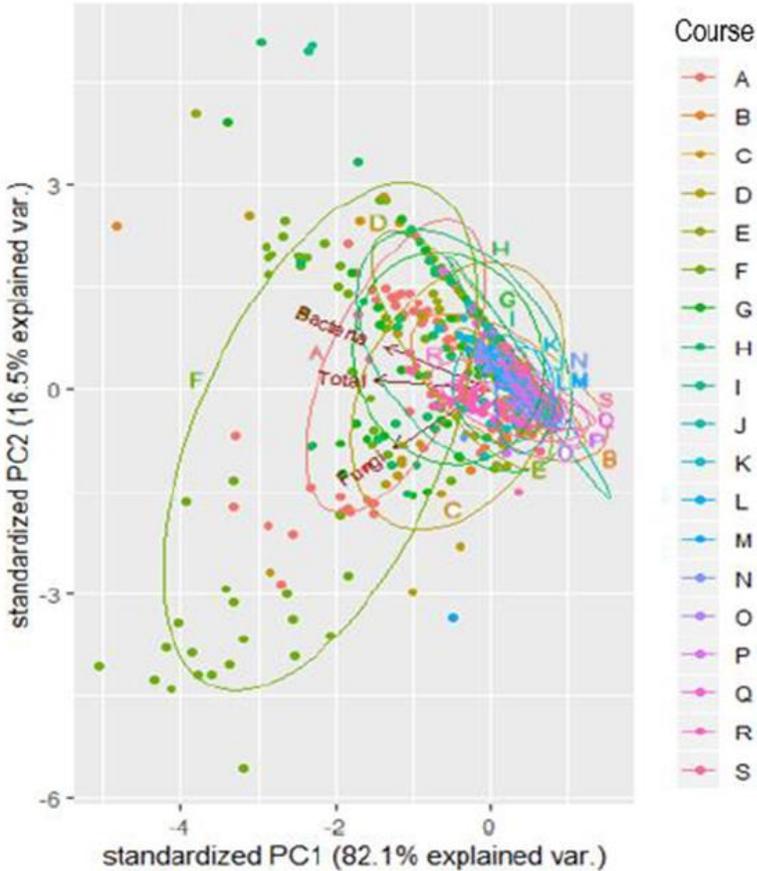
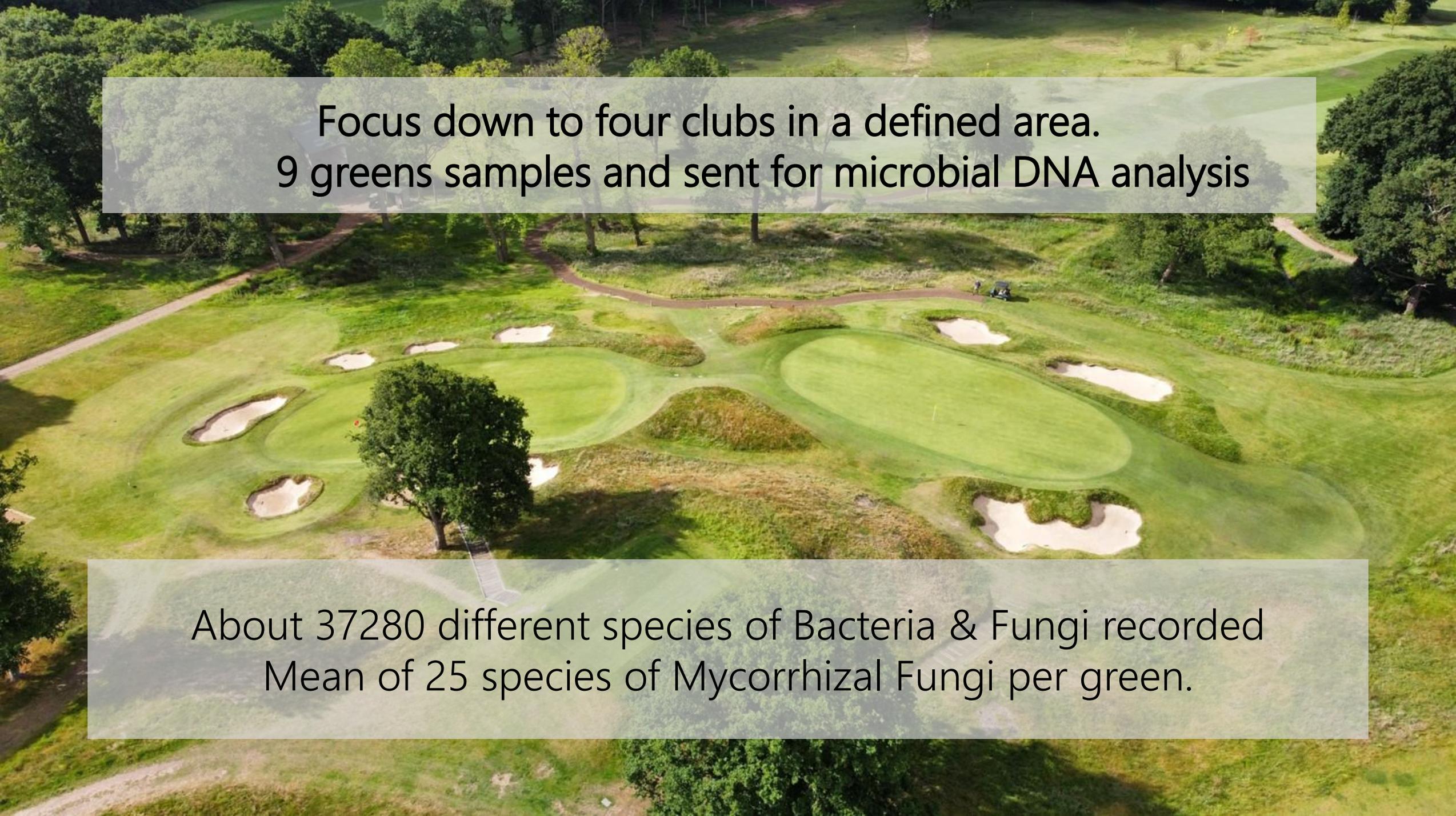


Figure 7: PCA ordination plot of microbial PLFAs across 19 golf courses, grouped by golf course (A-S).

Sand based vs soil based
Coastal vs Non-coastal
Old construction vs new construction
Geographic location in UK
Rated by inputs



An aerial photograph of a golf course green. The green is a vibrant green, surrounded by several sand traps. A large, leafy tree stands in the center-left of the green. A path or fairway leads to the green from the top. The background shows more of the golf course and dense trees.

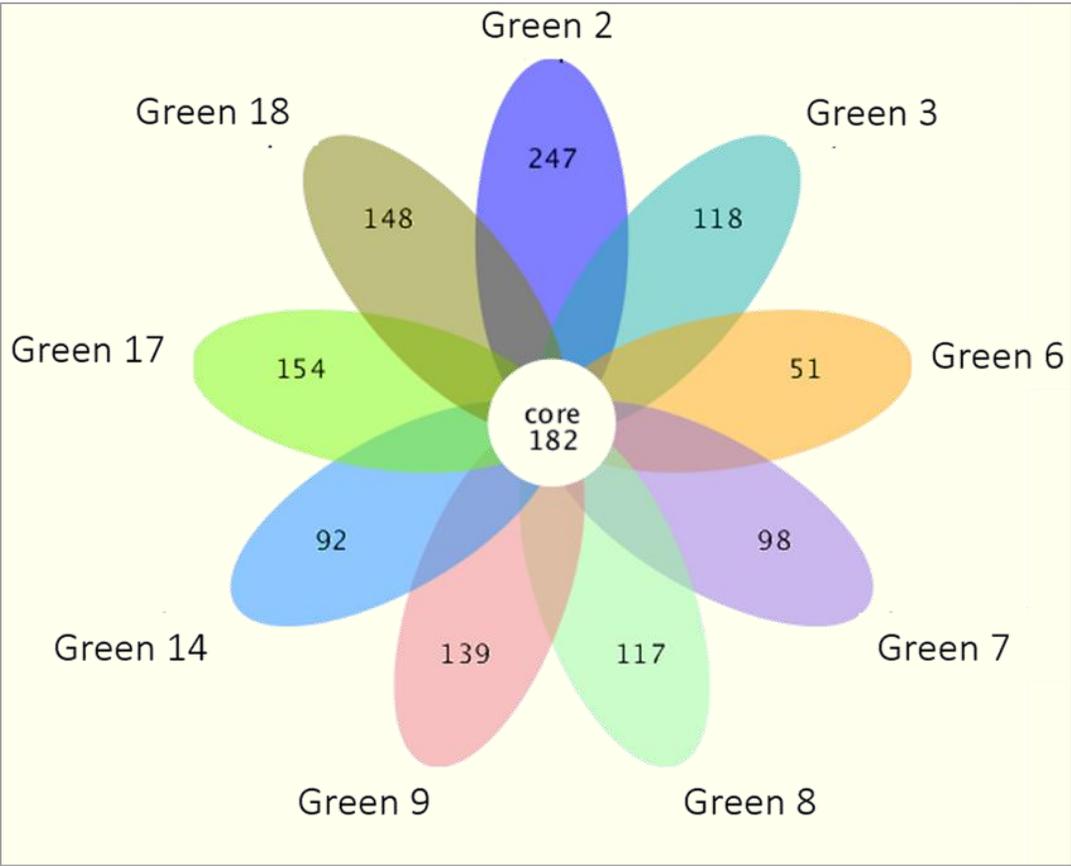
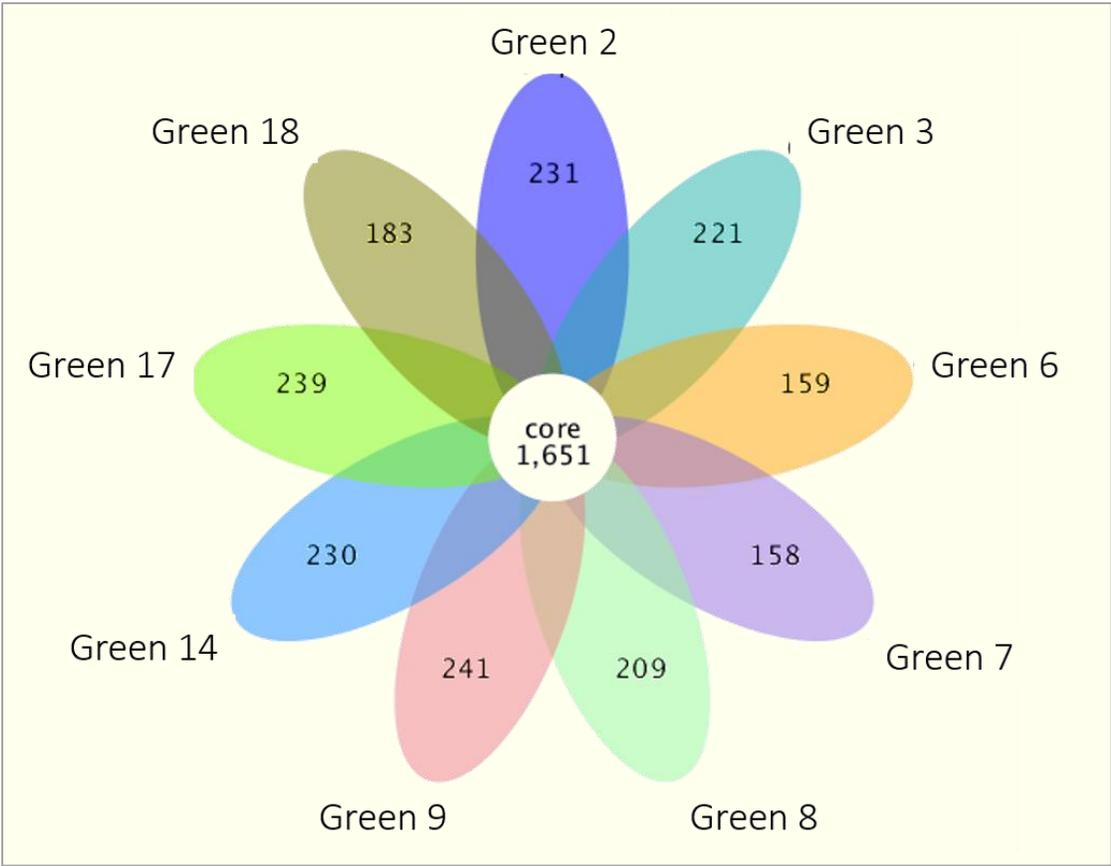
Focus down to four clubs in a defined area.
9 greens samples and sent for microbial DNA analysis

About 37280 different species of Bacteria & Fungi recorded
Mean of 25 species of Mycorrhizal Fungi per green.

High level of complexity and uniqueness

Bacterial Population

Fungal Population



nine greens, one golf course



How do current practices change microbial populations

Methodology

- Field trial at STRI
- A season (APR-OCT) of applications
 - Fungicides
 - Biostimulants
- Microbial communities present analysed by PLFA (profiles soil community at individual bacteria & fungi level).



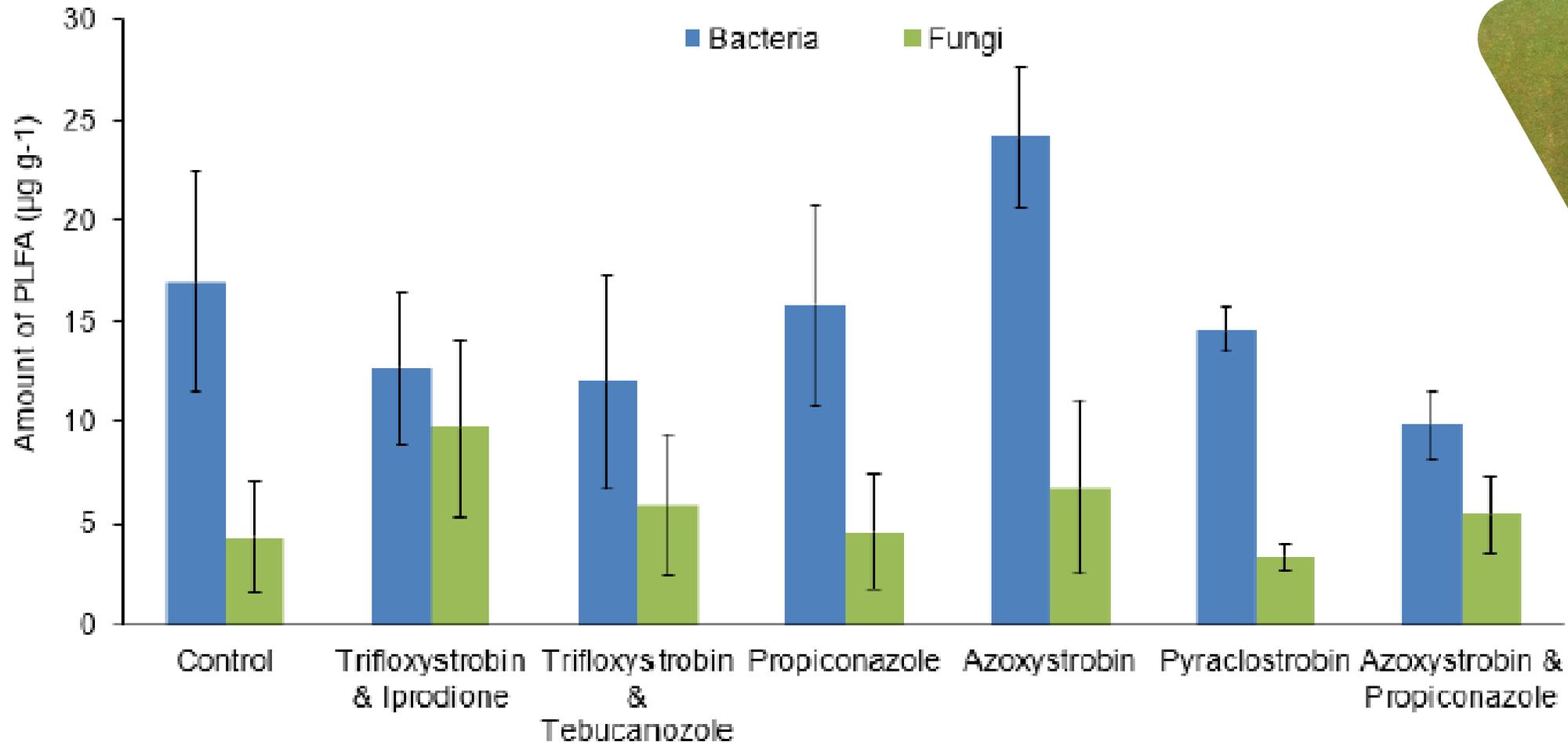
Treatment applications

- | | |
|-----------------------------------|------------------|
| 1. Trifloxystrobin & Iprodione | x 6 applications |
| 2. Trifloxystrobin & Tebucanozole | x 4 applications |
| 3. Propiconazole | x 4 applications |
| 4. Azoxystrobin | x 4 applications |
| 5. Pyraclostrobin | x 2 applications |
| 6. Azoxystrobin & Propiconazole | x 4 applications |



Results

No statistically significant differences



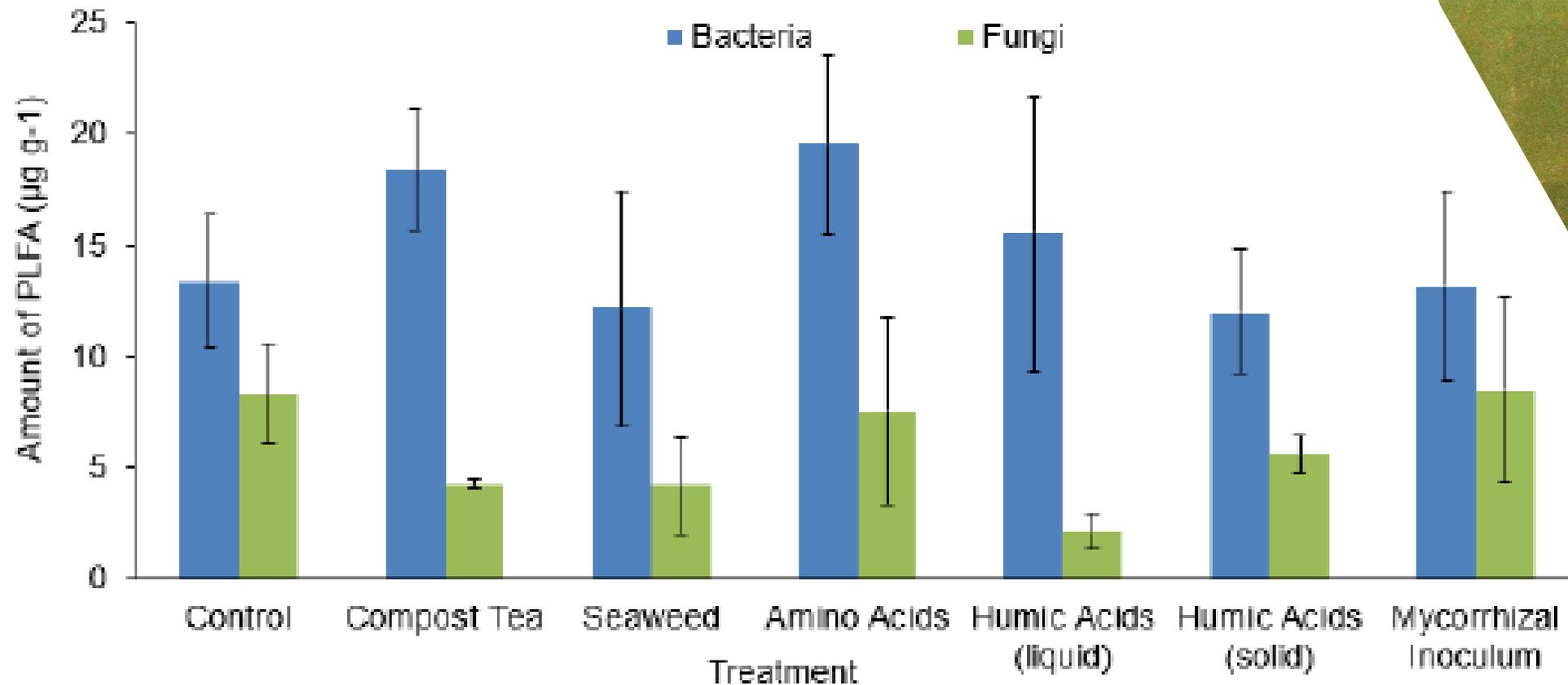
Biostimulant trial treatments

1. Compost tea (12 apps bi-weekly)
2. Seaweed (12 apps biweekly)
3. Amino Acid (6 apps monthly)
4. Liquid Humic Acid (12 apps biweekly)
5. Soluble Humic Acid (2 apps 12 weekly)
6. Mycorrhizal inoculum (2 apps 12 weeks)

[NOT ICL products]

Results

No statistically significant differences



Benefits gained from using microbial inoculants in sports turf



Methodology: STRI field trial

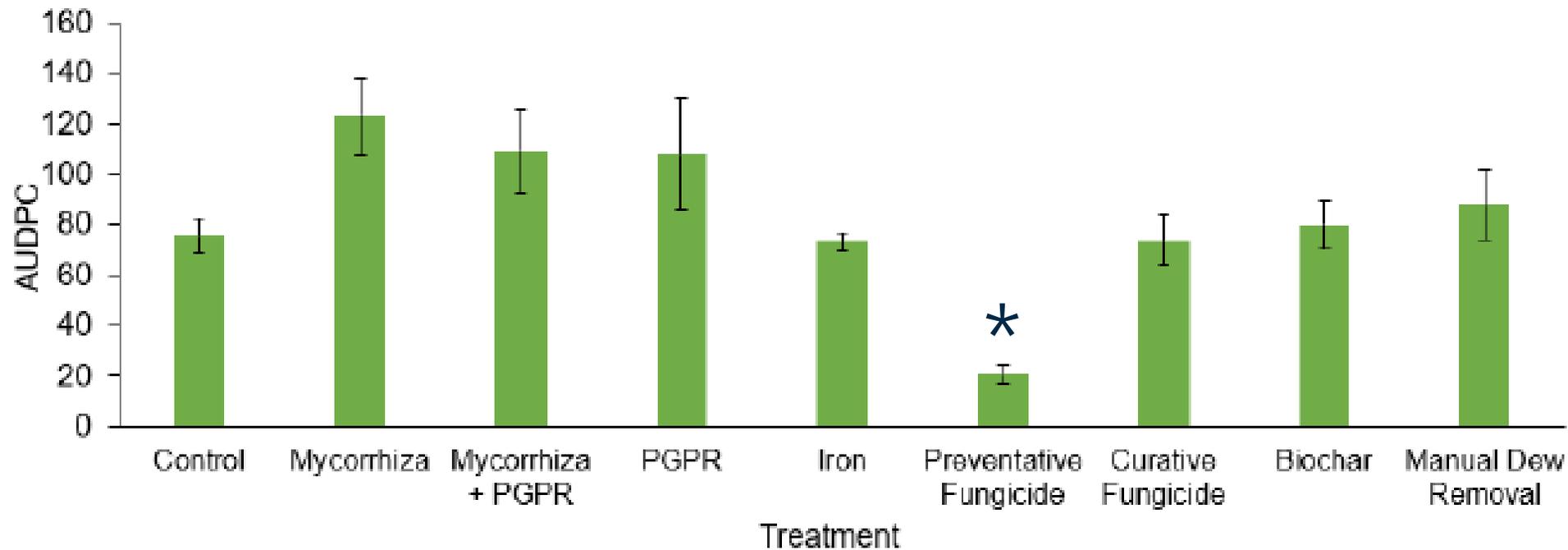
- a. Management of disease trial
(inoculants, biochar, iron)

POT Trials

- a. Drought stress relief (using mycorrhizae)



Management of disease trial (inoculants, biochar, iron) STRI Field trial

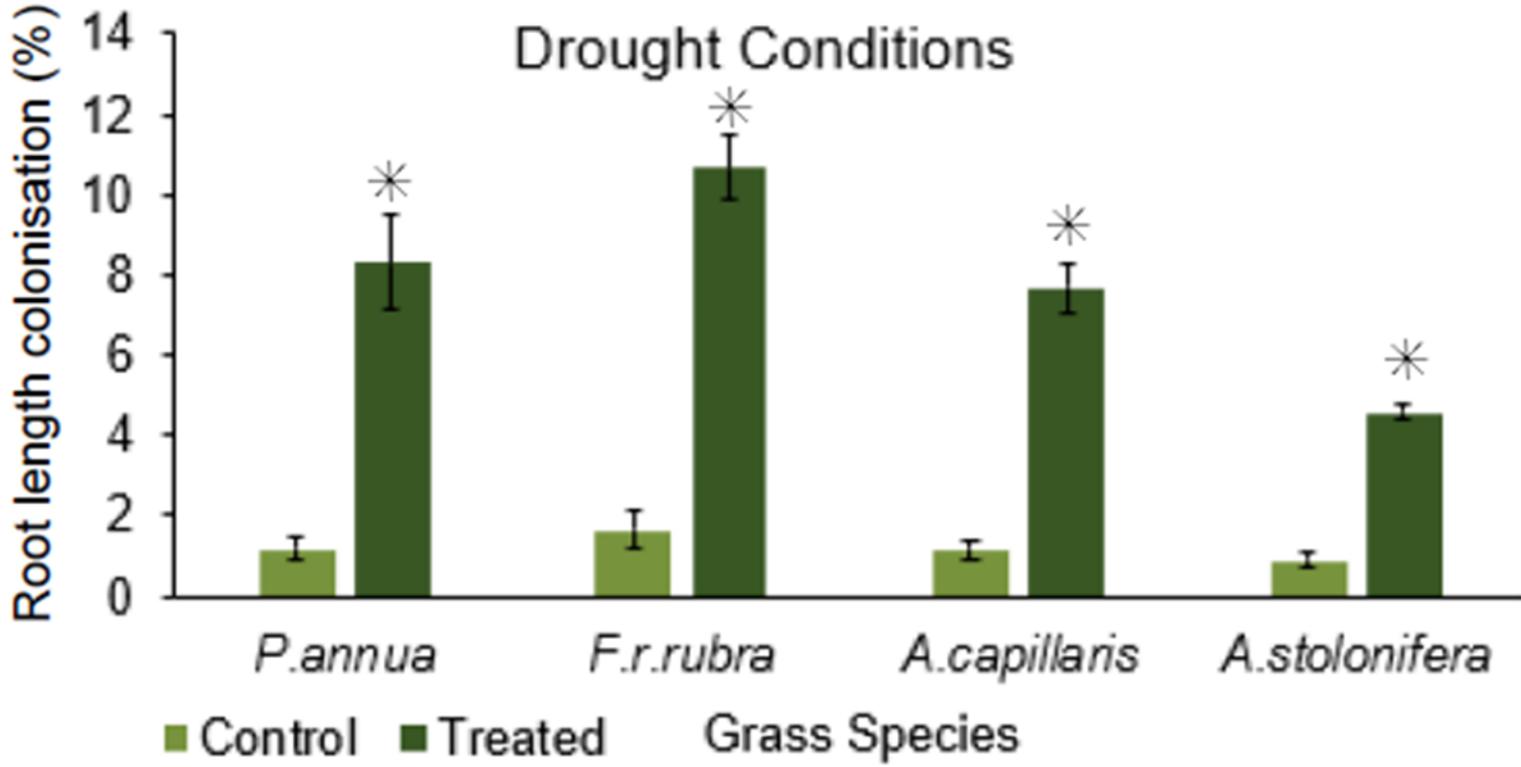


Preventative Fungicide only statistically significant difference

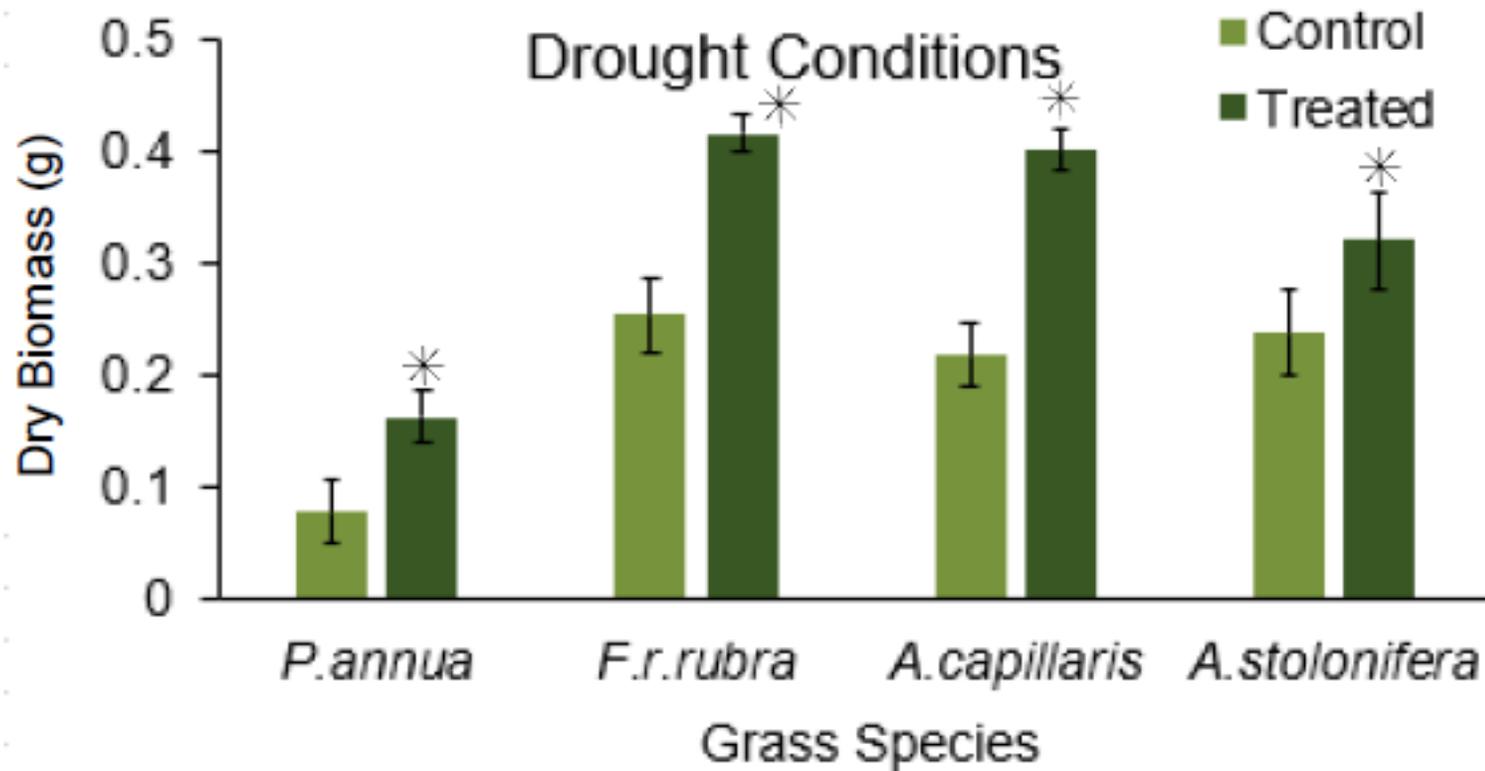
Drought stress trial
(using mycorrhizae).

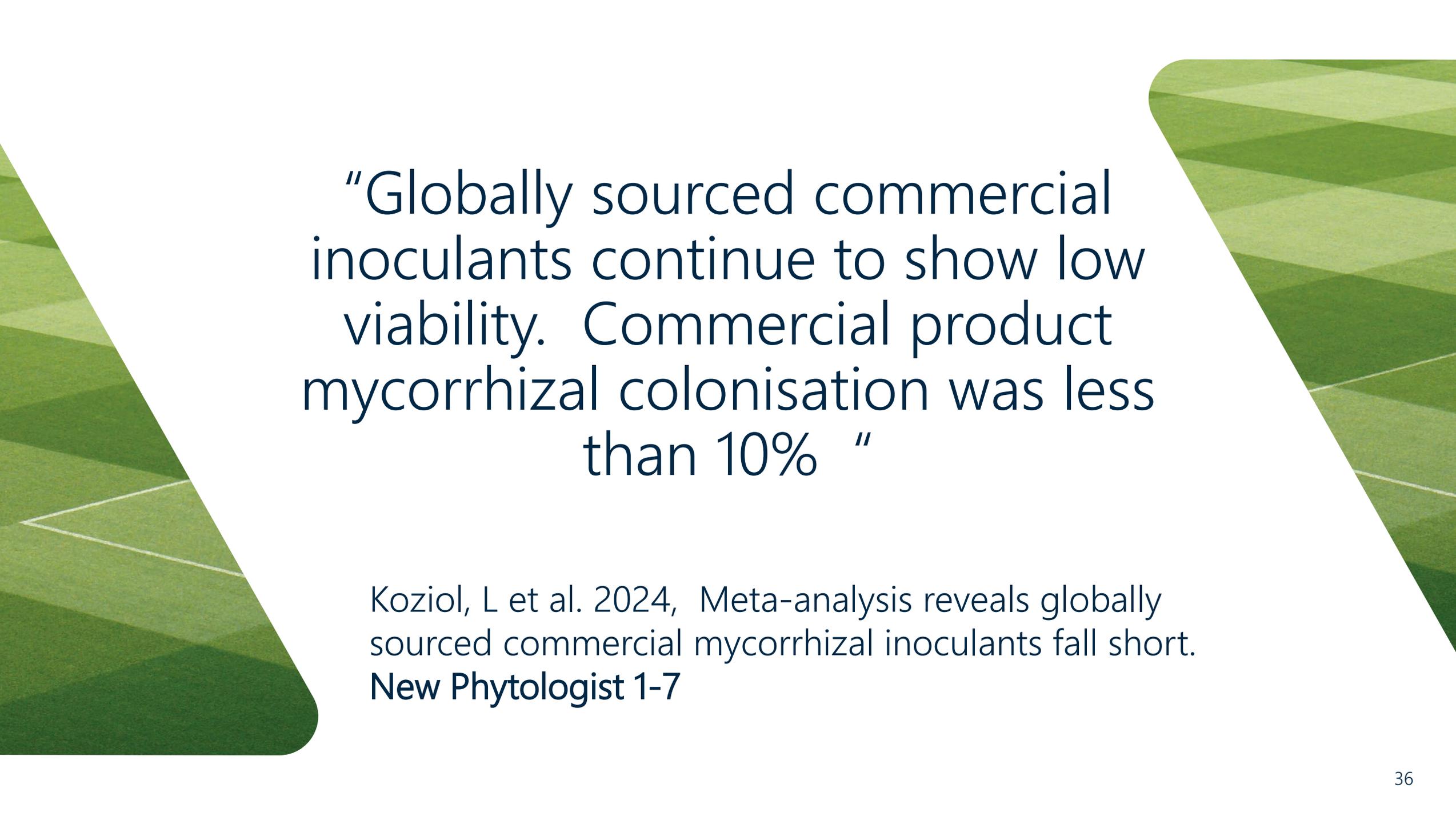


Drought stress trial (using mycorrhizae)



Drought stress trial (using mycorrhizae)





“Globally sourced commercial inoculants continue to show low viability. Commercial product mycorrhizal colonisation was less than 10% ”

Koziol, L et al. 2024, Meta-analysis reveals globally sourced commercial mycorrhizal inoculants fall short. *New Phytologist* 1-7



Establishing Turf vs Established Turf

EFFECTS OF NITROGEN, PHOSPHORUS, MOWING HEIGHT AND MYCORRHIZA INOCULATION ON PURE RED FESCUE AND MIXED FESCUES / BENTGRASS GOLF GREENS

Sara Calvache¹, Tatsiana Espevig¹, Erik Joner², Tina E. Andersen¹, Agnar Kvalbein¹,
Trond Pettersen¹, and Trygve S. Aamlid¹

¹Norwegian Institute for Bioeconomy Research, Landvik, Norway

²Norwegian Institute for Bioeconomy Research, Ås, Norway

Applications of AMF (SYMBIVIT®) did not increase mycorrhiza colonization of grass roots, and neither P rate nor SYMBIVIT® influenced the competition against AB. By the end of the trial, the content of plant available P (P-AL) in the soil was, however, 10% lower after inoculation with SYMBIVIT®.

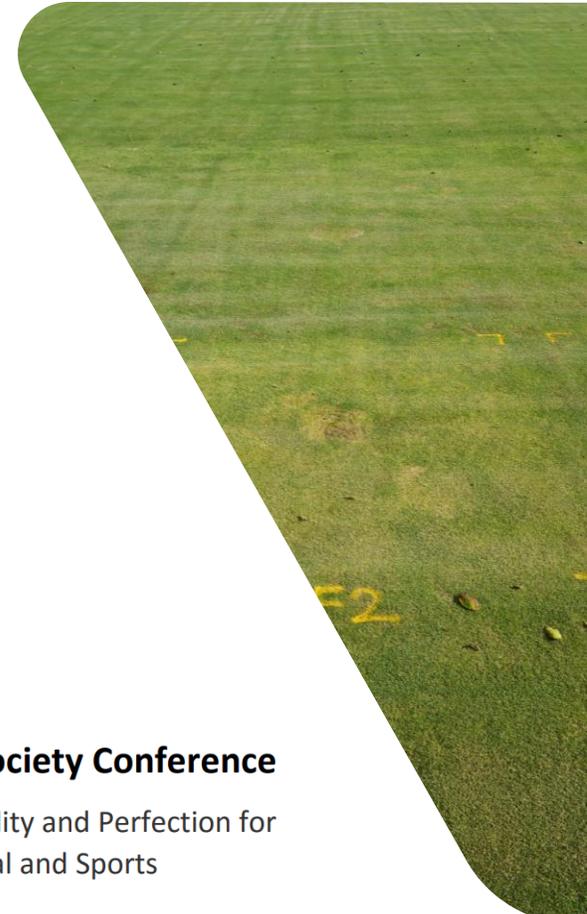
In conclusion, green characteristics were more influenced by species composition and N level than by mowing height and P-rate. Our results showed that the inoculation with AMF to the established green through top dressing after hollow coring had no effect. Regarding seed mixture, the control of AB will be easier on RF+bentgrasses than pure RF greens, but a mixture of RF+VG is likely to become dominated by VB even under low input management. This leaves RF+CB and low N input as the best choice regarding visual quality and competition against AB. The backside of this mixture is that CB will reduce the green speed compared to pure red fescue.

5th European Turfgrass Society Conference

Turfgrass – Towards Sustainability and Perfection for
Aesthetic, Recreational and Sports

Salgados | Albufeira | Portugal

JUNE 5 > 8th 2016



An aerial photograph of a golf course. The image shows several green fairways with distinct mowed stripes, interspersed with several sand traps. The course is surrounded by a dense line of trees, and in the far distance, a city skyline is visible under a sky filled with large, grey clouds. The overall scene is a well-maintained and scenic golf course.

Almost the first time in Europe – robust, replicated
glasshouse and field trials on golf turf and
microbiology.

It is a complex system

An aerial photograph of a golf course. The course is lush green with several sand traps scattered across it. A large, leafless tree stands on the left side of the frame. In the background, a city skyline is visible under a cloudy sky.

Almost the first time in Europe – robust, replicated
glasshouse and field trials on golf turf and
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Natural variability vs significance

An aerial photograph of a golf course. The image shows several green fairways with distinct mowed stripes, interspersed with several sand traps. The course is surrounded by a dense line of trees, and in the far distance, a city skyline is visible under a sky filled with large, grey clouds. The overall scene is a lush, well-maintained golf course.

Almost the first time in Europe – robust, replicated
glasshouse and field trials on golf turf and
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Mycorrhizae can improve turf response to drought
stress



Our understanding, led by science is developing

“Hold your opinions loosely”



Idea courtesy of Professor Alan Gange, BTME presentation 2019

Hidden circles – Tribute Jackson Pollock, Juan Jose Garay,



Thank You. Any Questions?

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