Compost Tea Workshop

Cranfield
Environment
and Agrifood

- Dr Mark Pawlett

- 19th July 2017

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Dr Mark Pawlett C.Env

Senior Research Fellow of Soil Biology

Research Focus:

develop innovative and sustainable land management practices to improve soil biological and functional diversity

Expertise:

- **Soil microbial ecology**
- **Manipulation of the soil biological system**
- **Organic fertilisers**
- **Soil conservation**

Outline

1. Methodology
    1. Field Trial
    2. Laboratory

2. Trial Results

3. Conclusions

Experimental Design: Hemsworth Farm

- **Two Trials**: Fern Hill and Maltfarm
  - Two Treatments: with and without compost tea
  - Three replicates (arranged randomly)
  - Plot size: 50 x 18 m

- **Compost Tea applications**
  - Final: 24/05 (how many others?)

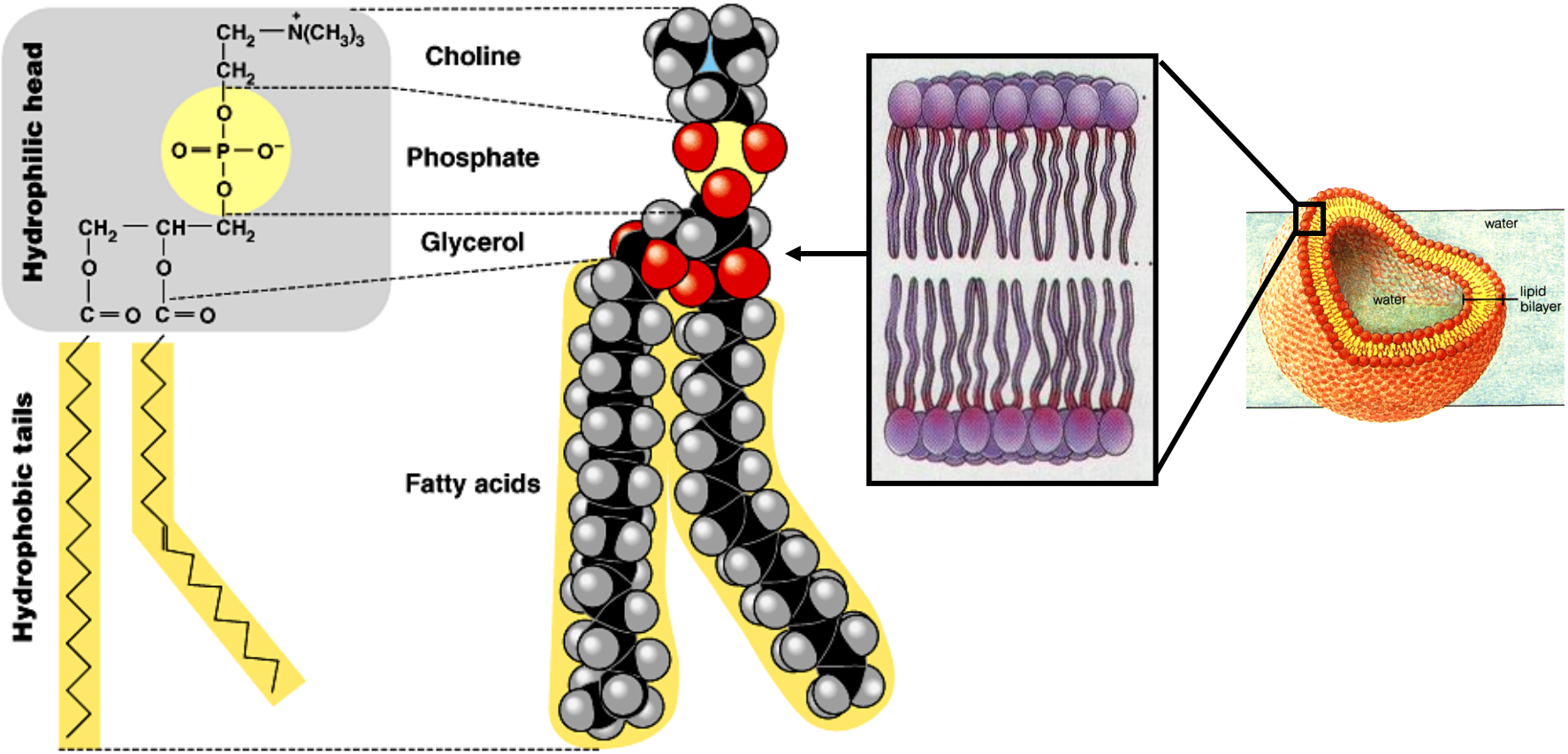
- **Soil Sampling (SoilBioLab protocol)**
  - Sample Depth: 10cm
  - 13th June: to coincide with SoilLab analysis
  - "W" shape for soil sample locations within plots
  - 7 sub-samples within each plot: bulked for analysis

H_1: Application of compost tea alters soil microbiology

Microbial methods

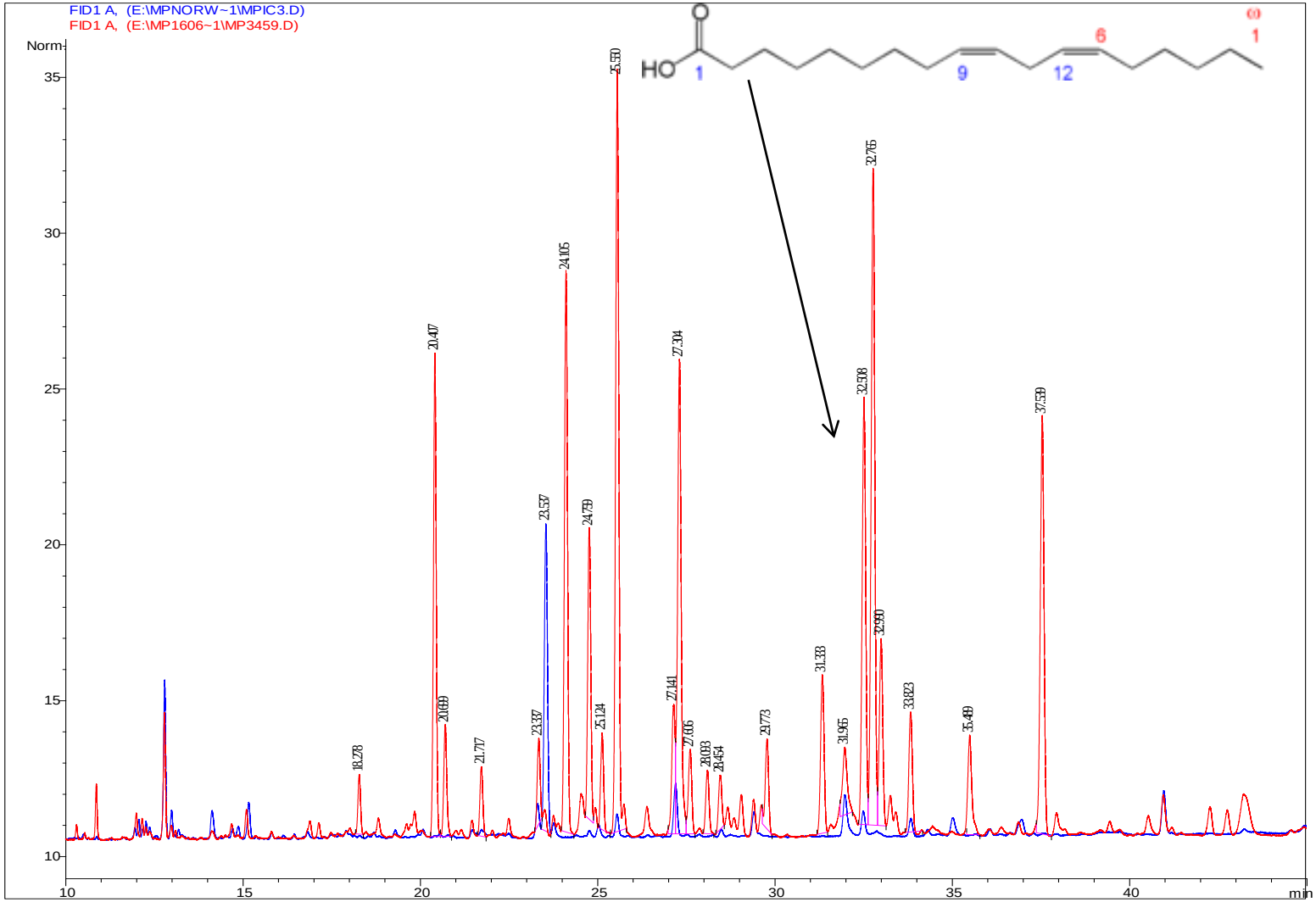
- **Microbial Biomass:** Fumigation extraction
- **Basal Metabolic Rate (Respiration)**
- **Substrate (glucose) induced respiration**
- **Phospholipid fatty acid analysis**
  - Phenotypic profile
  - Fungi, bacteria (and Fungal/bacterial ratio)
- **Statistics**:
  - Randomised field trial
  - Analysis of Variance (ANOVA):
    - Field (2) x Treatment (2) x Replicates (3)
  - Principal Component Analysis (PCA)

PHENOTYPIC PROFILE
(Phospholipid Fatty Acid analysis)



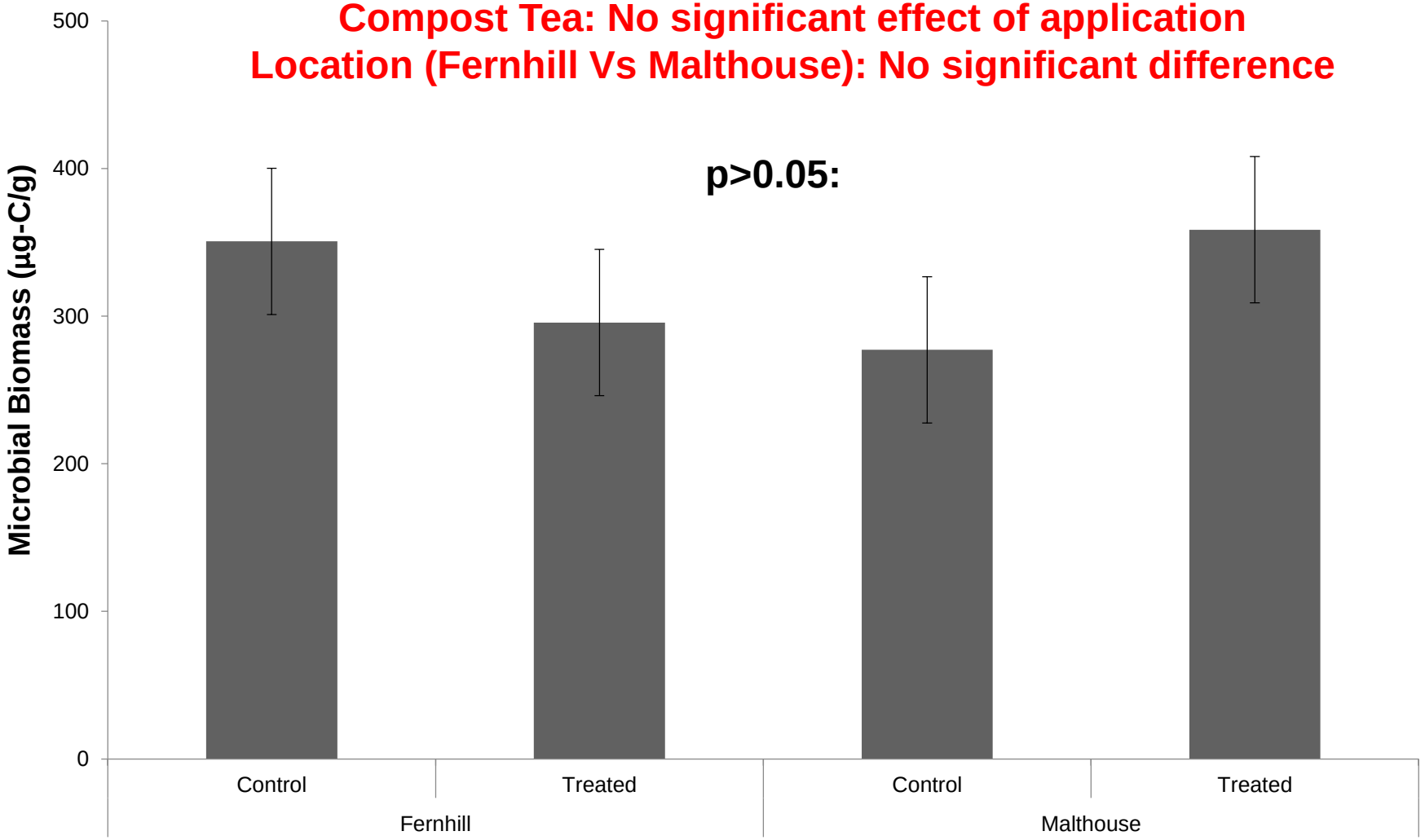
Soil PLFA: Chromatography output

Peak Area data analysed by Principal Component Analysis



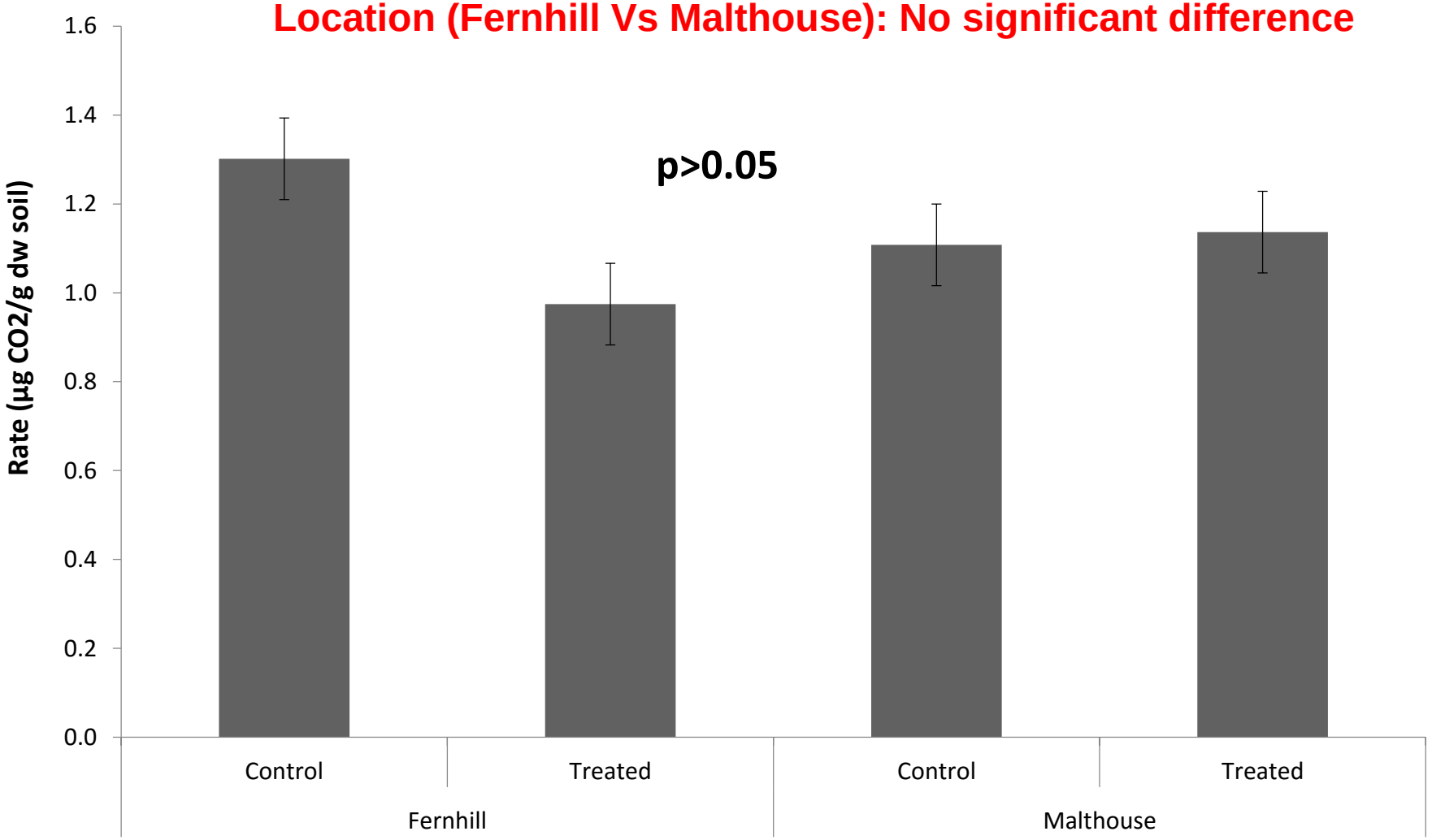
Microbial Biomass

Compost Tea: No significant effect of application
Location (Fernhill Vs Malthouse): No significant difference



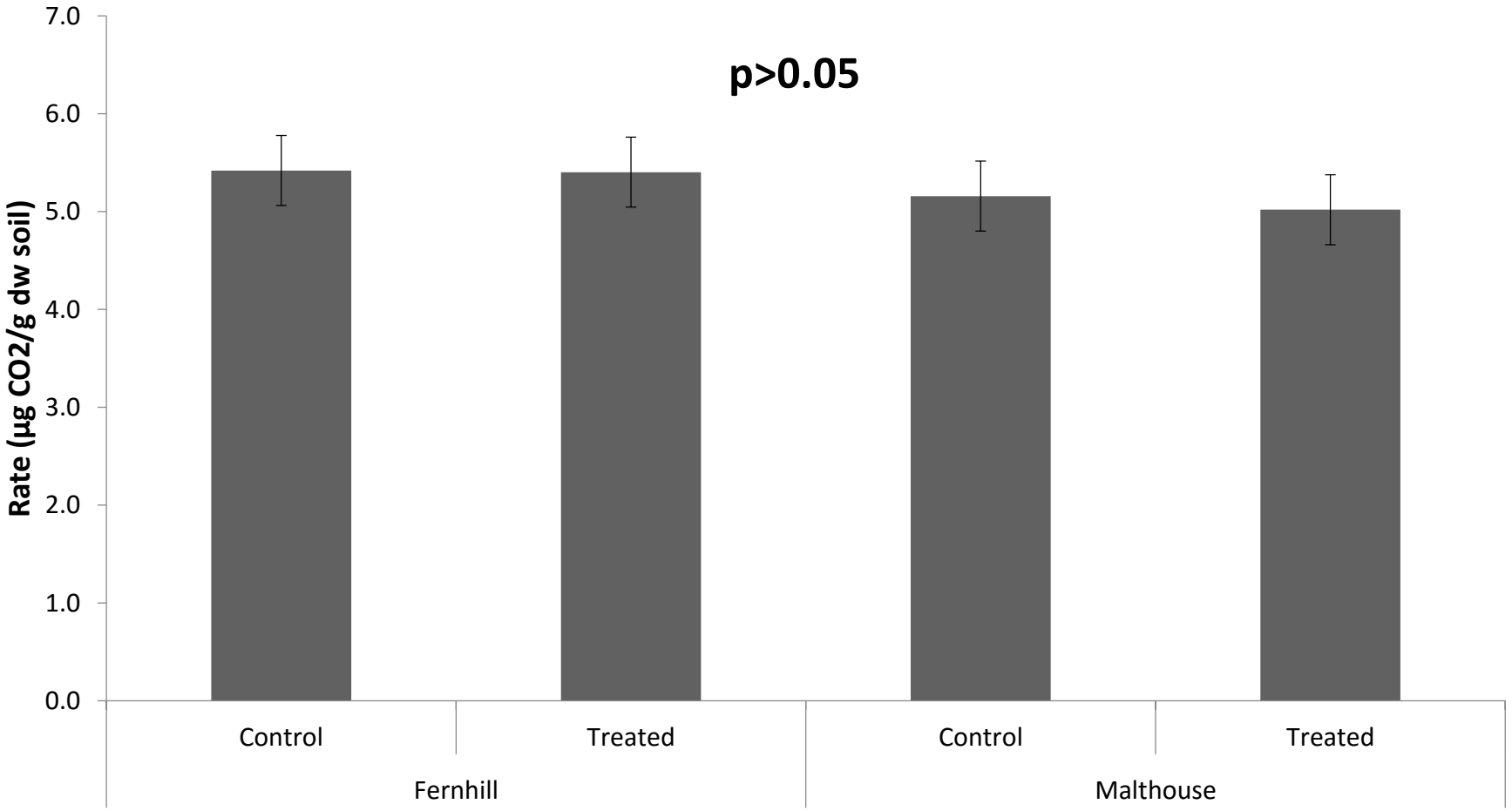
Basal Metabolic Rate

Compost Tea: No significant effect of application
Location (Fernhill Vs Malthouse): No significant difference



Substrate (Glucose) Induced Respiration

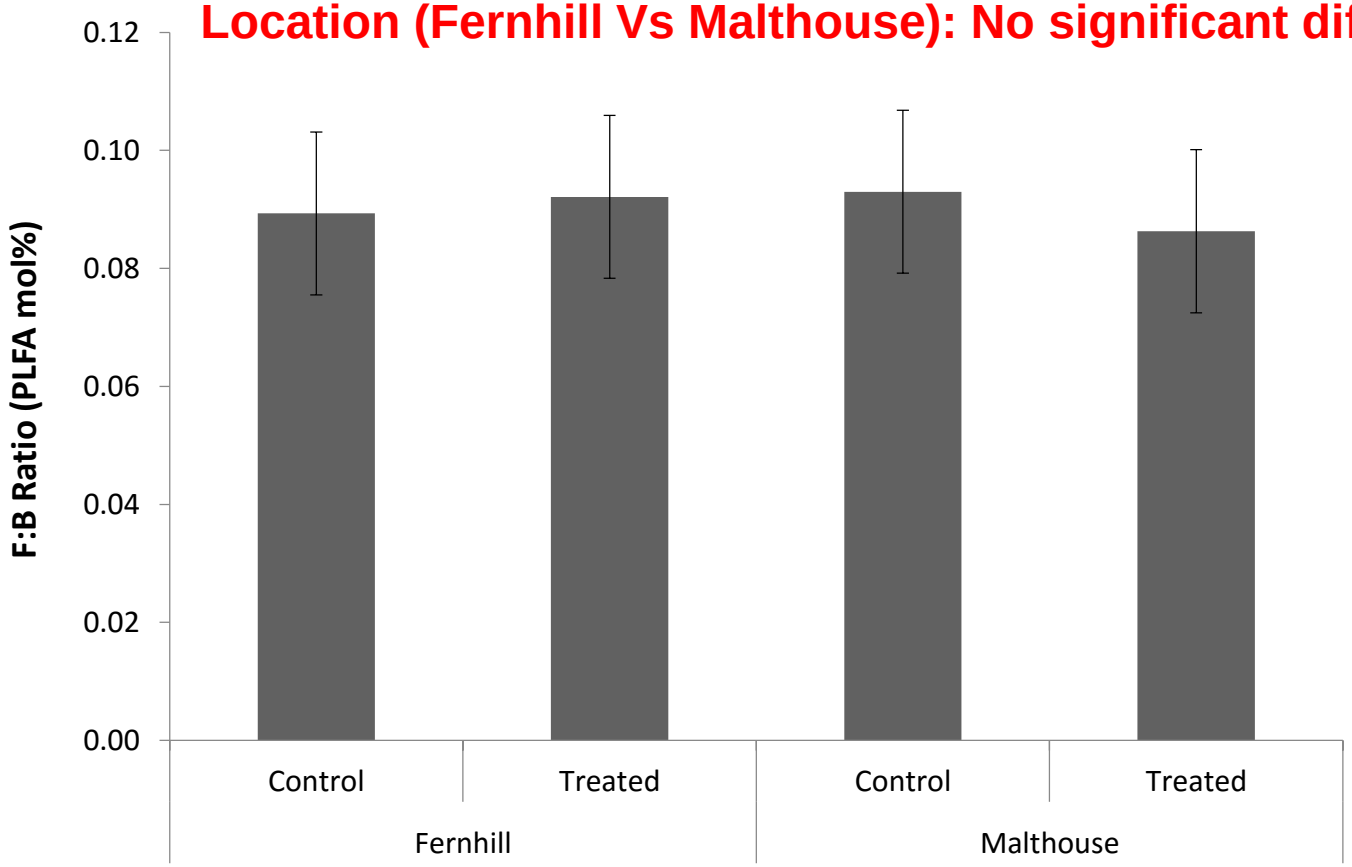
Compost Tea: No significant effect of application
Location (Fernhill Vs Malthouse): No significant difference



PLFA Biomarkers

	p value		
	Fungi	Bacteria	F/B ratio
Field	>0.05	>0.05	>0.05
Treatment	>0.05	>0.05	>0.05
Field*Treatment	>0.05	>0.05	>0.05

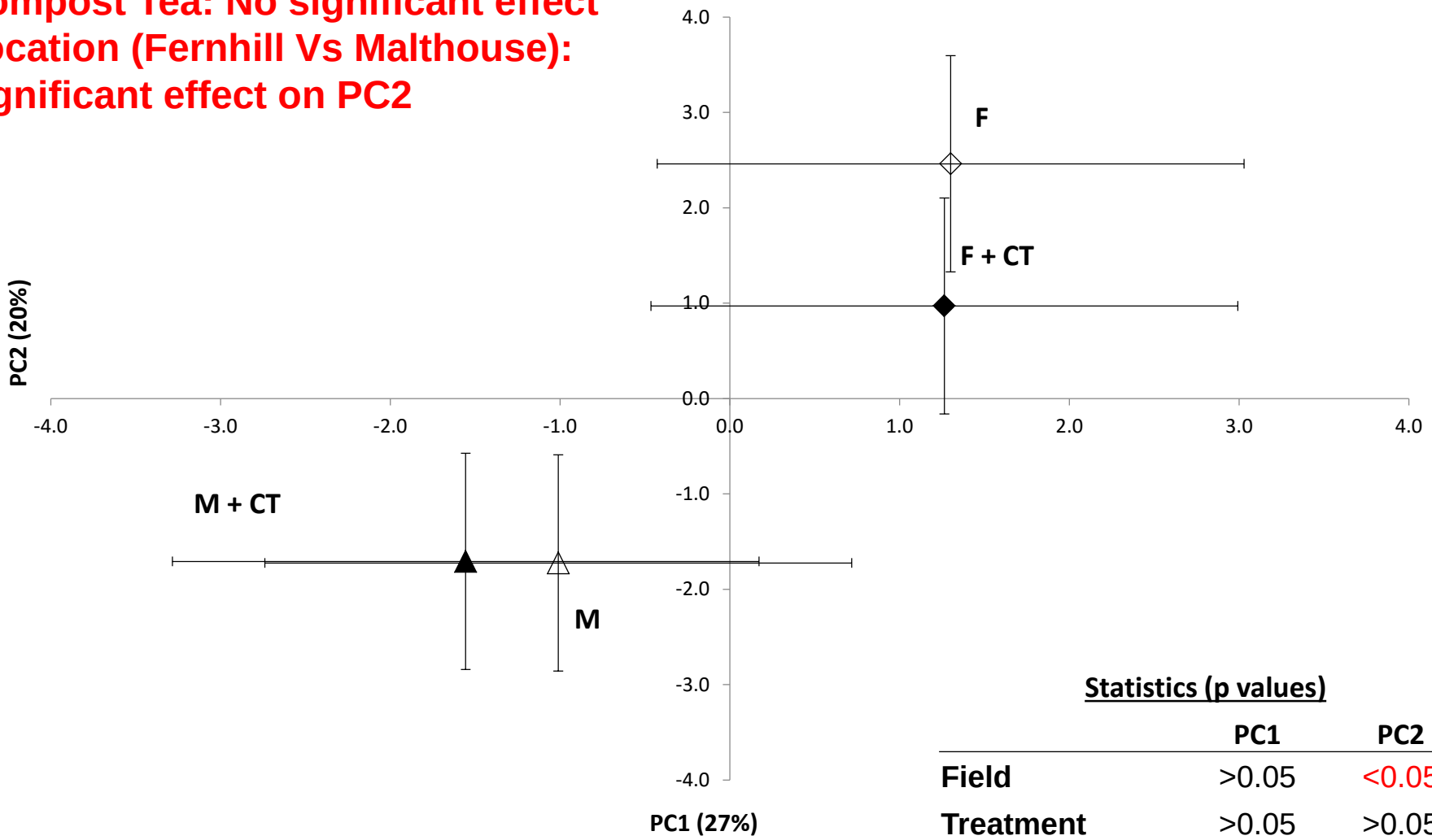
Compost Tea: No significant effect of application
Location (Fernhill Vs Malthouse): No significant difference



Phenotypic Profile (PLFA)

Key:
F=Fernhill (diamonds)
M=Malthouse (triangles)
CT=compost tea (filled)

Compost Tea: No significant effect
Location (Fernhill Vs Malthouse): significant effect on PC2



Statistics (p values)

	PC1	PC2
Field	>0.05	<0.05
Treatment	>0.05	>0.05
Field*Treatment	>0.05	>0.05

Trial Soil Microbiology Conclusions

- No evidence that compost tea affected the soil microbial community

- Different soil microbial community (PLFA composition between trials (Fernhill Vs Malthouse)

- No effect could be due to:
  - Time:
    - short length of time for the trial
    - Application time
  - Compost tea? Problems of brewing?
  - Method of application?
  - Dosage not high enough
  - Indigenous soil biology unresponsive?
  - Soil sampling depth?

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