UNIVERSITY OF CAMBRIDGE

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PhD Studentship in Soil Microbial Interactions and Molecular Genetics Soil CADRE

Fostering Beneficial Soil Microbial Communities Through Cover Crop Choices and Soil Management

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Motivation

Cover crops are grown for the purpose of 'protecting or improving' between periods of regular crop production[1]. The importance of cover crops on farm is becoming widely accepted, and amongst other soil health benefits, can enhance microbial communities, including arbuscular mycorrhizal fungi (AMF). AMF convey a range of benefits, including nutrient uptake, pest and pathogen resistance, and drought tolerance, in exchange for plant derived carbon. Wider research has shown positive impacts of cover crops on AMF, and some demonstrate quantitative yield benefits in the following cash crop[2].

1.

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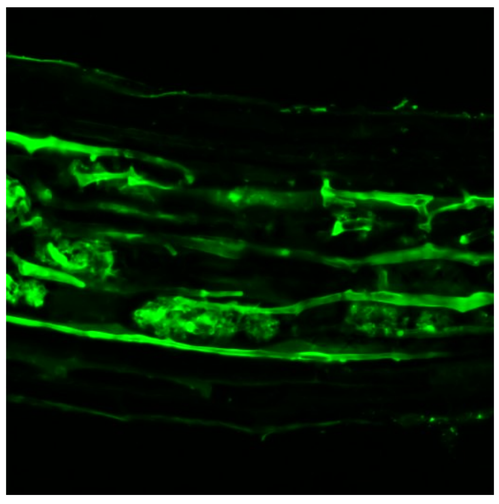

Fig 1. Cover crop of fodder radish, black oat, and vetch.
Fig 2. WGA stained image of AMF within a root

Experimental Design

This experiment makes use of the ongoing Innovative Farmers (IF) Field Lab 'Increasing Nutrient Efficiency From Anaerobic Digestate'. This field lab looks at the interaction between cover crops and application of nutrient rich anaerobic digestate (AD), a by-product of the anaerobic digestion process. Field scale plots were split into the following four treatments at seven sites:

- Fallow
- Cover crop only
- Anaerobic digestate only
- Cover crop + anaerobic digestate

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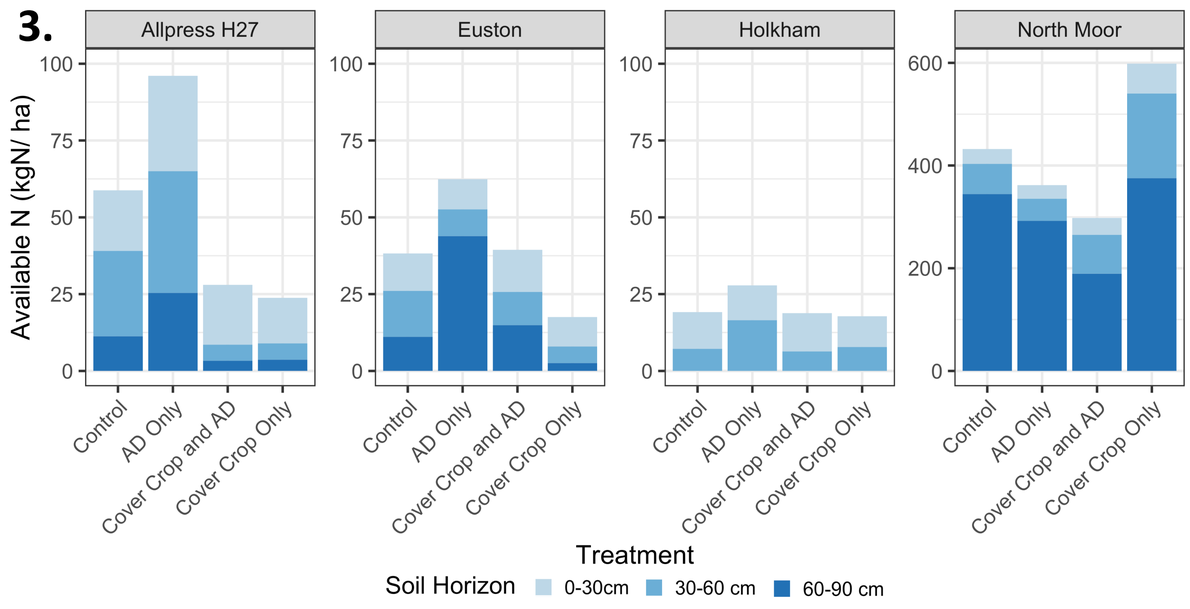

Fig 3. Soil available nitrogen (N) at three depths

Results

This poster will include data from four of the seven IF sites which drilled maize as the cash crop. Cover crops were effective at the uptake of available nitrogen, particularly in the deepest (60-90cm) soil horizon (Fig 3). This may reduce pollution from nitrification and leaching.

Neither cover crops nor application of AD influenced AMF colonisation (Fig 4) or biomass of the following maize crop (not shown).

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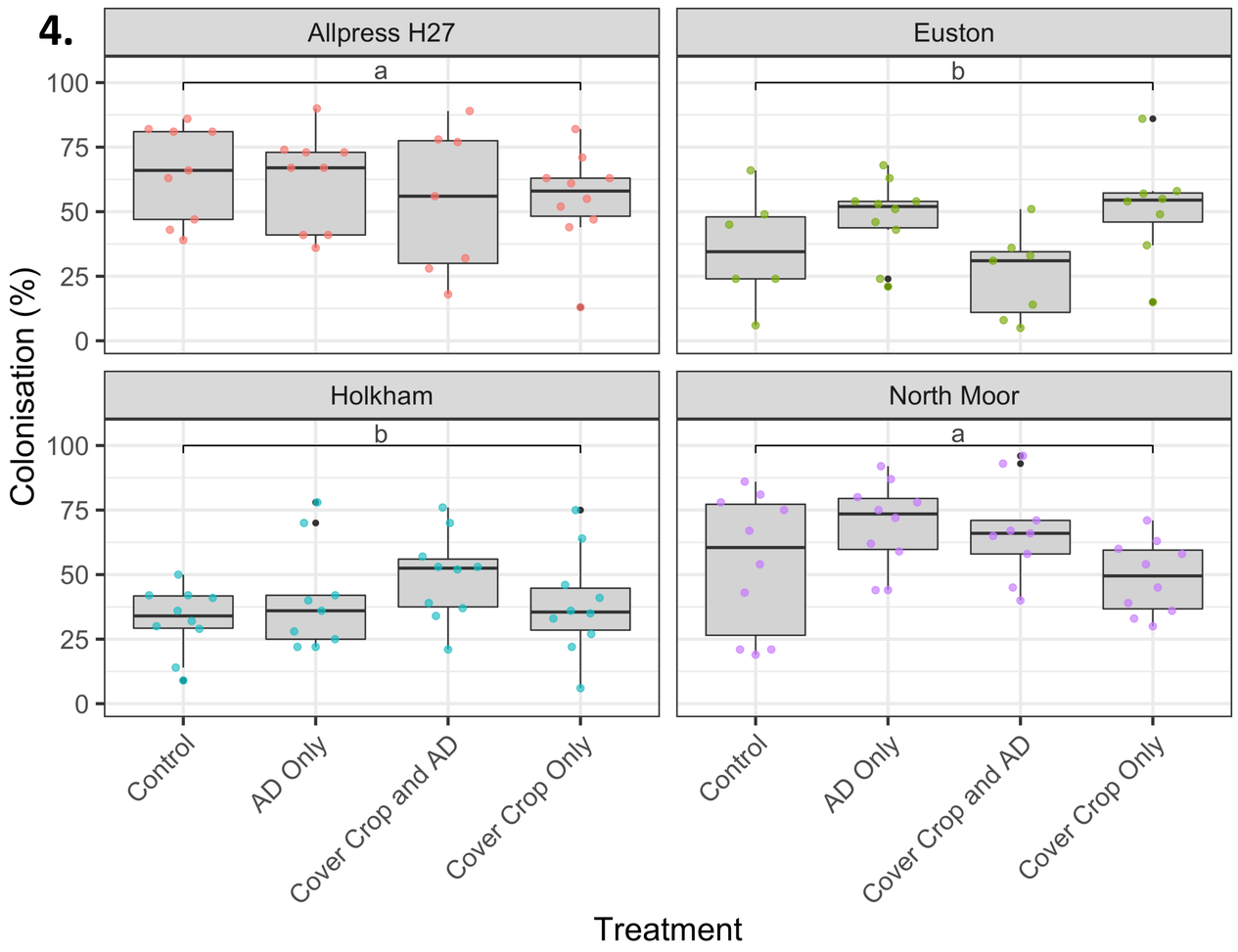

Fig 4. Colonisation of maize by AMF (%).

Conclusions

Cover crops were effective at the uptake and stabilisation of N, and had some positive influence on other aspects of soil health such as increased organic matter content. Neither cover crops nor colonisation by AMF increased maize biomass. This may have been due to an unusually hot and dry summer, which had a detrimental effect on maize yields at all study sites.

References

1. Stobart, R., & Gosling, P. (2015). Opportunities for cover crops in conventional arable rotations. Agriculture and Horticulture Development Board - Information Sheet 41, Summer, 1–4. Retrieved from https://cereals.ahdb.org.uk/media/655816/is41-opportunities-for-cover-crops-in-conventional-arable-rotations.pdf. 2. Boswell, E. P., Koide, R. T., Shumway, D. L., & Addy, H. D. (1998). Winter wheat cover cropping, VA mycorrhizal fungi and maize growth and yield. Agriculture, Ecosystems and Environment.

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