UNIVERSITY OF LIVERPOOL

Department of Evolution, Ecology and Behaviour

CABBAGE STEM FLEA BEETLE ABUNDANCE IS INFLUENCED BY THE AGRICULTURAL LANDSCAPE

CAN THE LANDSCAPE INFLUENCE THE MICROBIOME?

Dr Daniel Leybourne
1851 Research Fellow

September 2023

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INTRODUCTION

THE AGRICULTURAL LANDSCAPE: WHY IS IT IMPORTANT

ECOLOGY LETTERS

Letter | Full Access

The interplay of landscape composition and configuration: new pathways to manage functional biodiversity and agroecosystem services across Europe

Emily A. Martin, Matteo Dainese, Yann Clough, András Báldi, Riccardo Bommarco, Vesna Gagic, Michael P.D. Garratt, Andrea Holzschuh, David Kleijn, Anikó Kovács-Hostyánszki ... See all authors

First published: 07 April 2019 |

Entomologia Experimentalis et Applicata

Original Article | Full Access

Cabbage whiteflies colonise *Brassica* vegetables primarily from distant, upwind source habitats

Martin Ludwig, Hella Ludwig, Christopher Conrad, Thorsten Dahms, Rainer Meyhöfer

First published: 22 August 201

ELSEVIER

Agriculture, Ecosystems & E

Volume 301, 1 October 2020, 107051

Spatiotemporal changes in landscape crop composition differently affect density and seasonal variability of pests, parasitoids and biological pest control in cabbage

Christine Scheiner [a], Emily A. Martin [a b]

ELSEVIER

Basic and Applied Ecology

Volume 9, Issue 6, 6 October 2008, Pages 682-690

Insect pests in winter oilseed rape affected by field and landscape characteristics

Johann G. Zaller, Dietmar Moser, Thomas Drapela, Claudia Schmöger, Thomas Frank

Ecology and Evolution Open Access

RESEARCH ARTICLE | Open Access

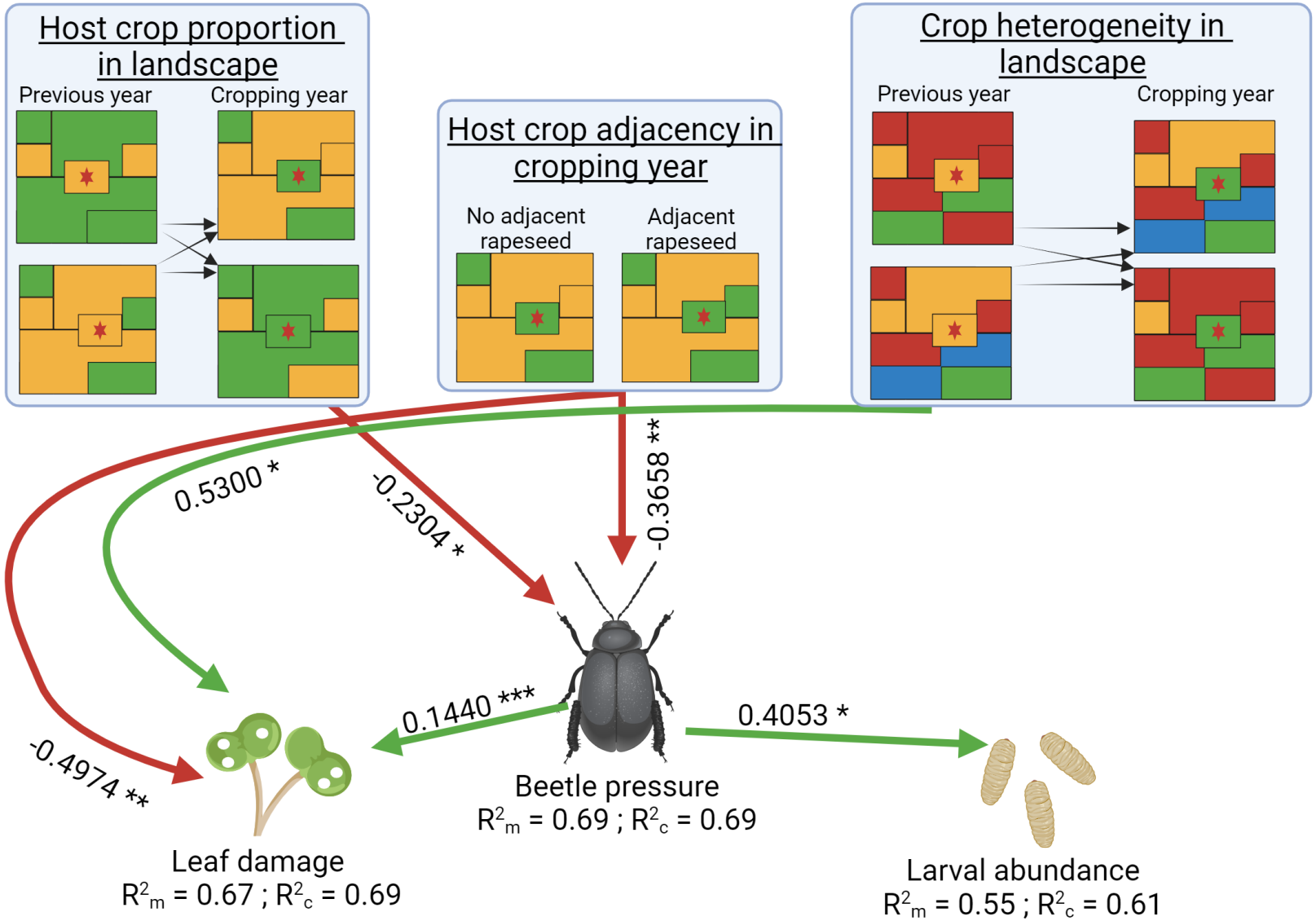
Continent-wide evidence that landscape context can mediate the effects of local habitats on in-field abundance of pests and natural enemies

Salma Akter, Syed Z. M. Rizvi, Ahsanul Haque, Olivia L. Reynolds, Michael J. Furlong, Maria C. Melo, Terry Osborne, Jianhua Mo, Simon McDonald, Anne C. Johnson, Geoff M. Gurr

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INTRODUCTION

THE AGRICULTURAL LANDSCAPE: WHY IS IT IMPORTANT



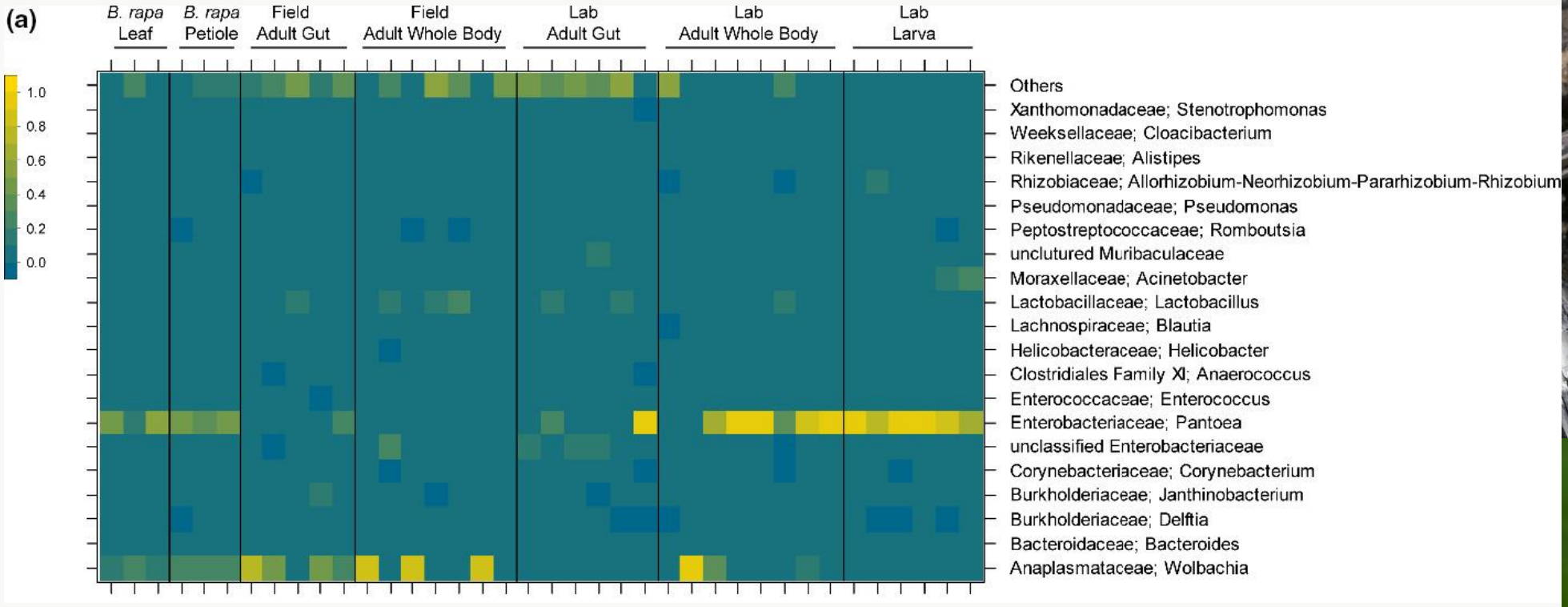




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INTRODUCTION

INSECT MICROBES: WHY ARE THEY IMPORTANT







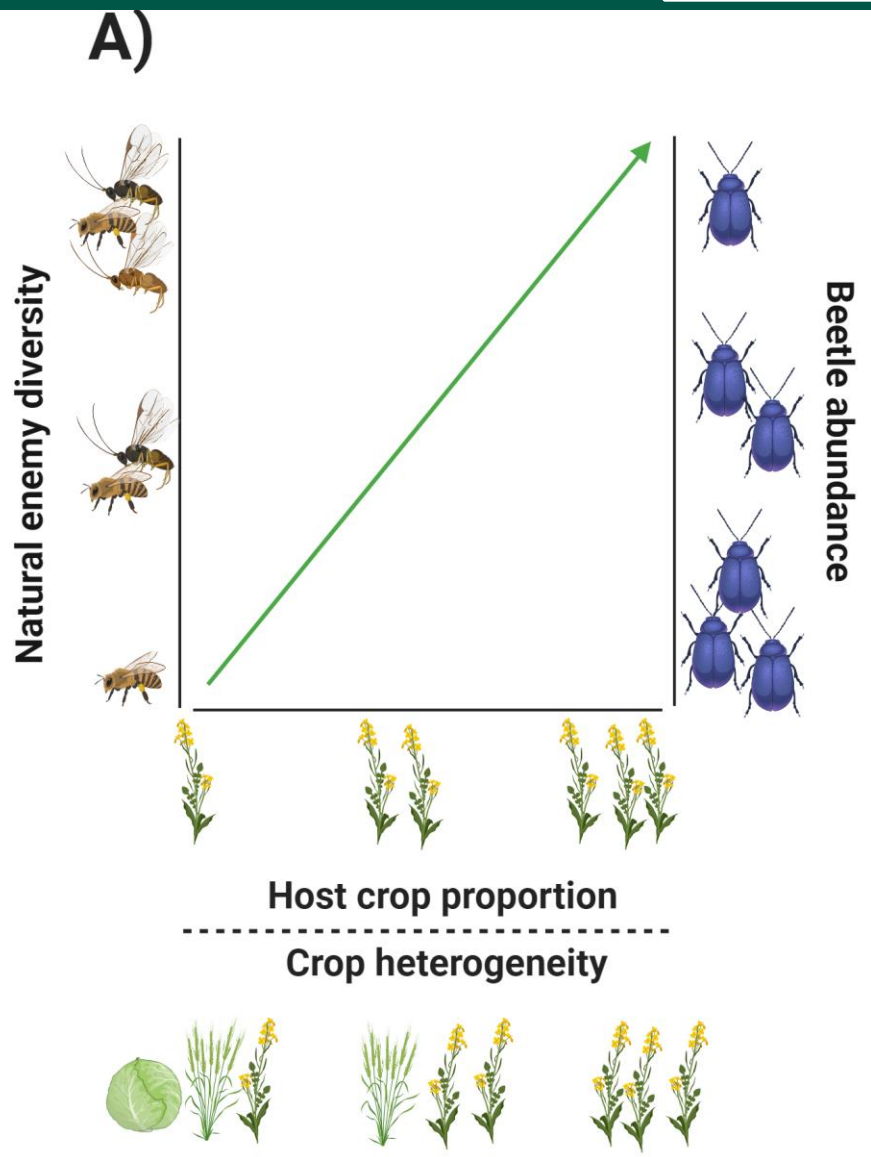


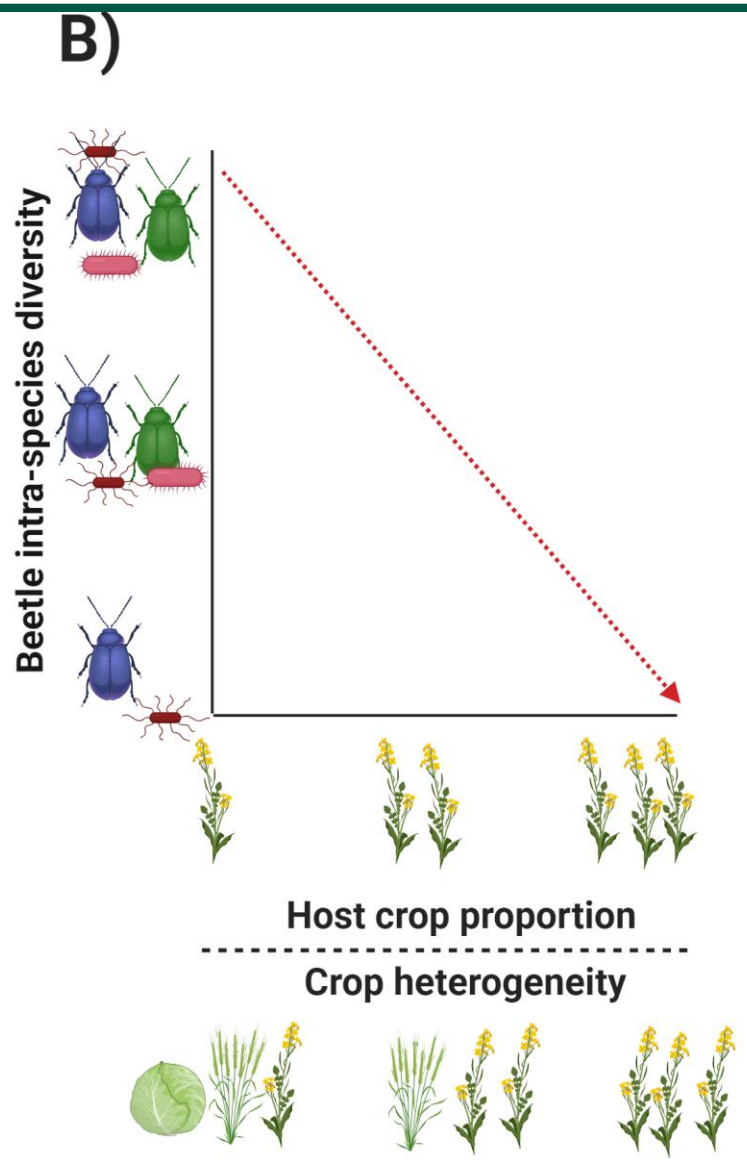
Shukla & Beran, 2020, *Mol. Eco.*

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INTRODUCTION

THE AGRICULTURAL LANDSCAPE AND THE MICROBIOME



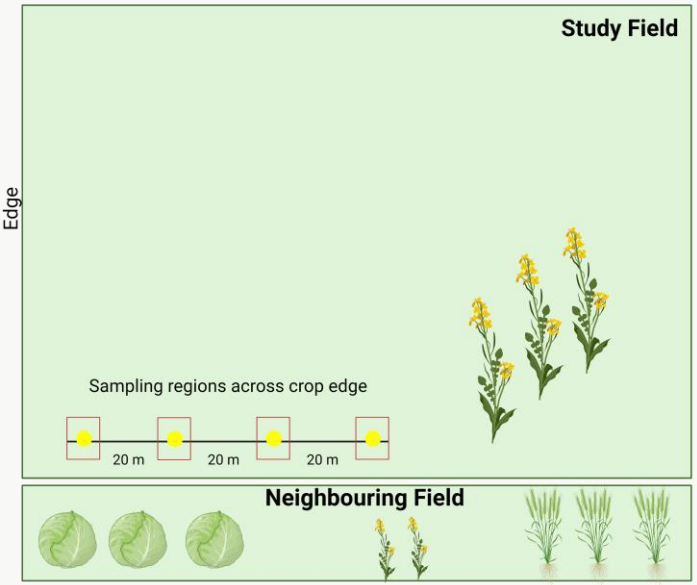


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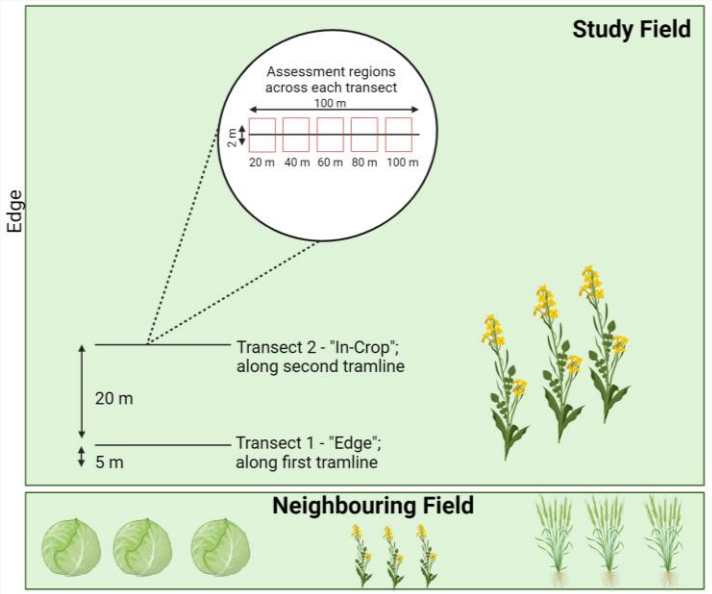
THE EXPERIMENT

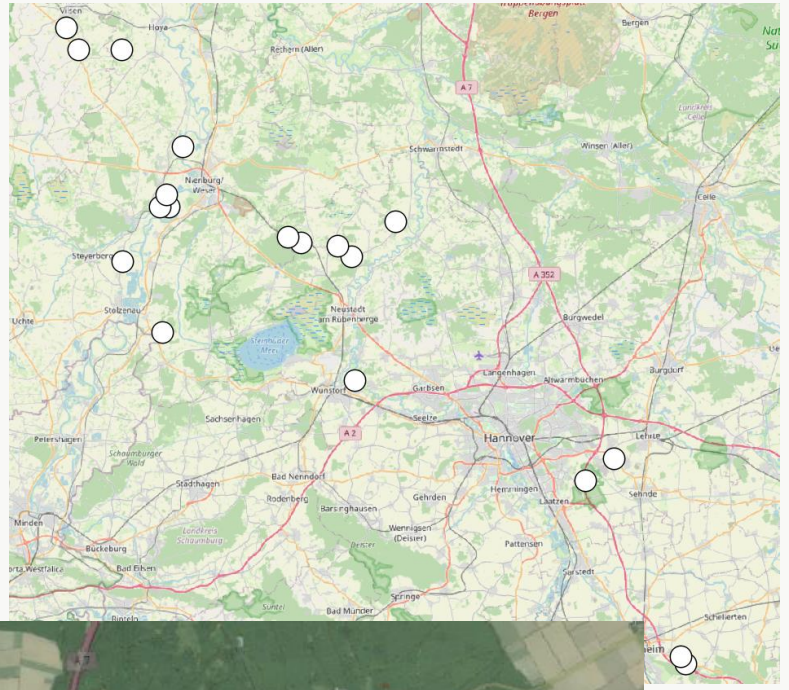
THE EXPERIMENT

Summer: 4 fields



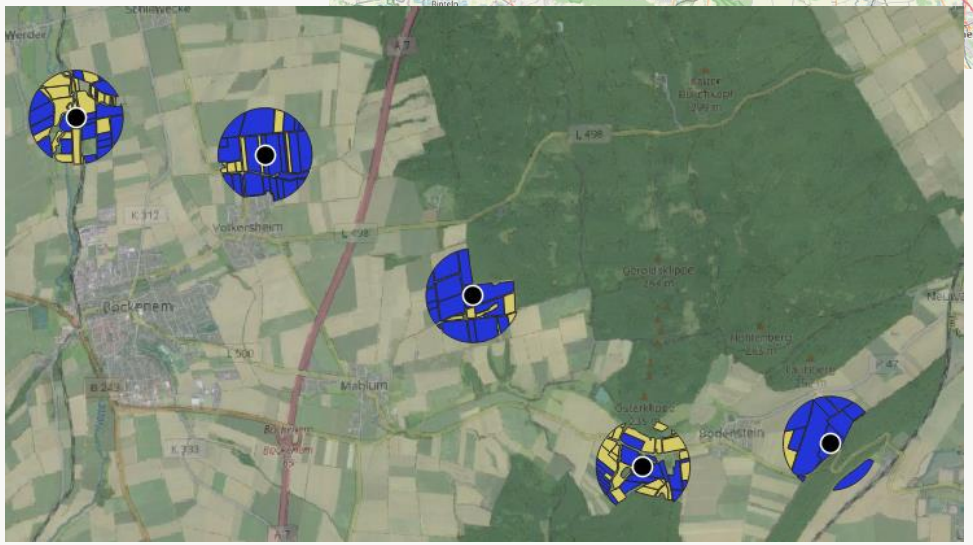
Autumn: 14 fields





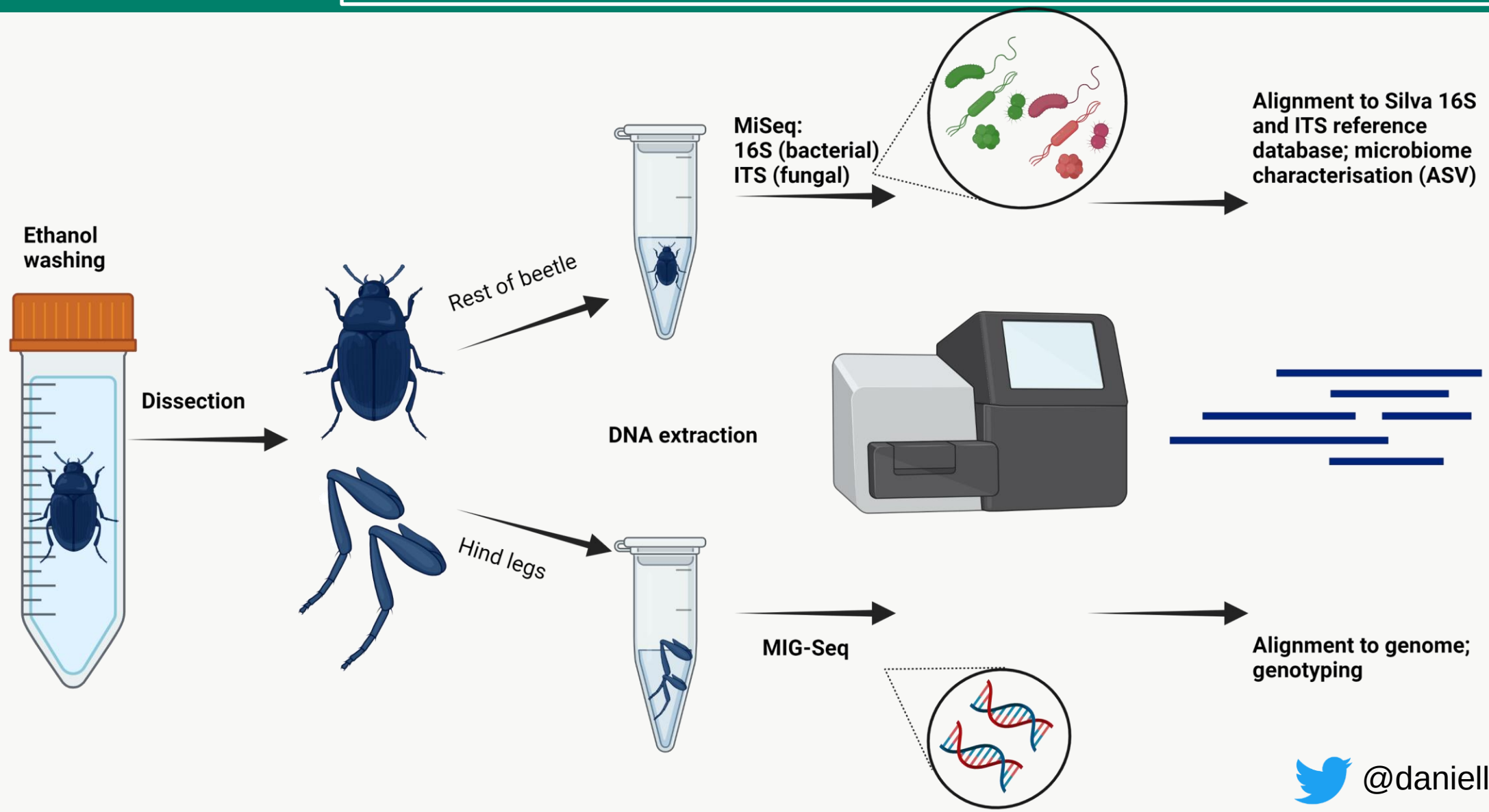






THE EXPERIMENT

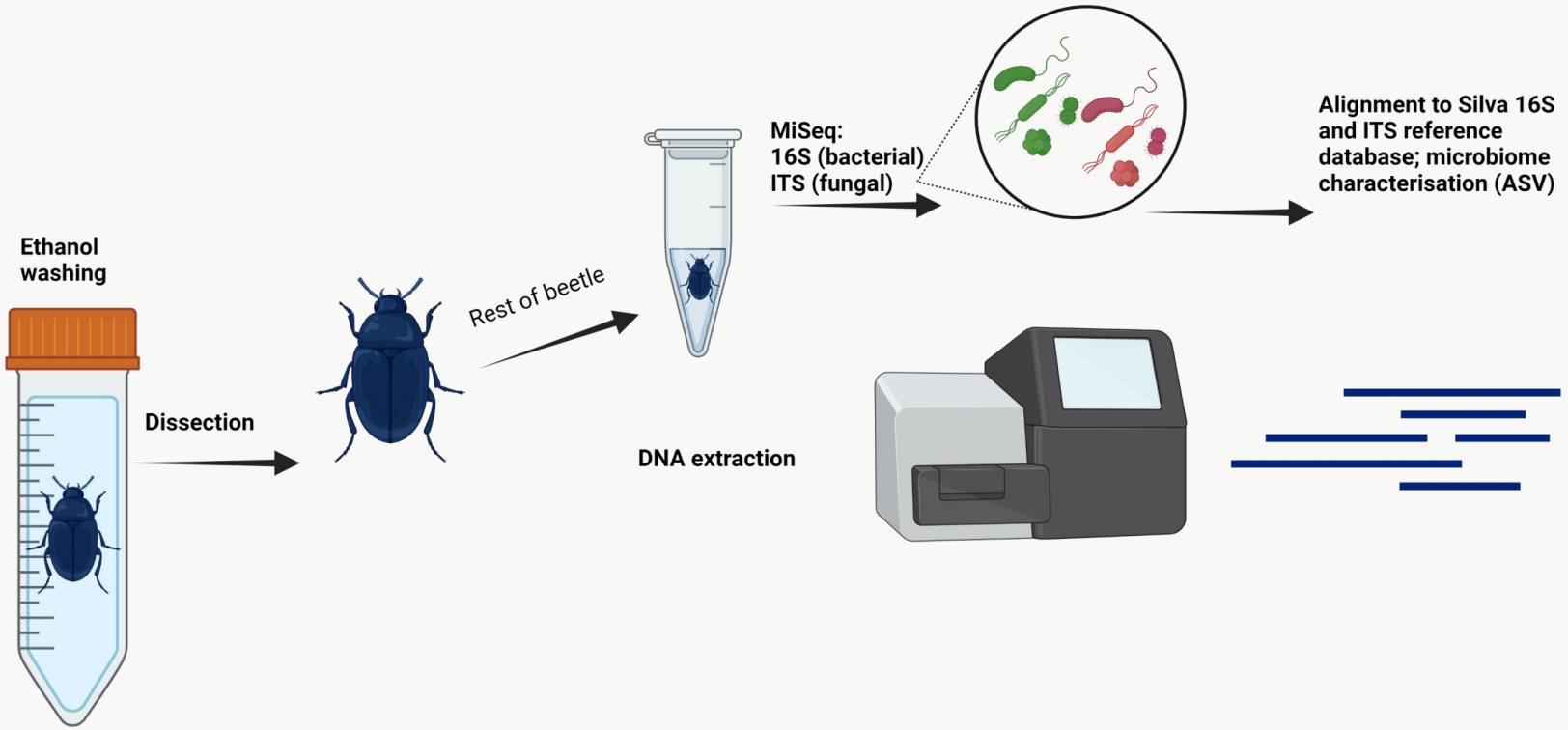
THE EXPERIMENT



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RESULTS

BEETLE MICROBIOME

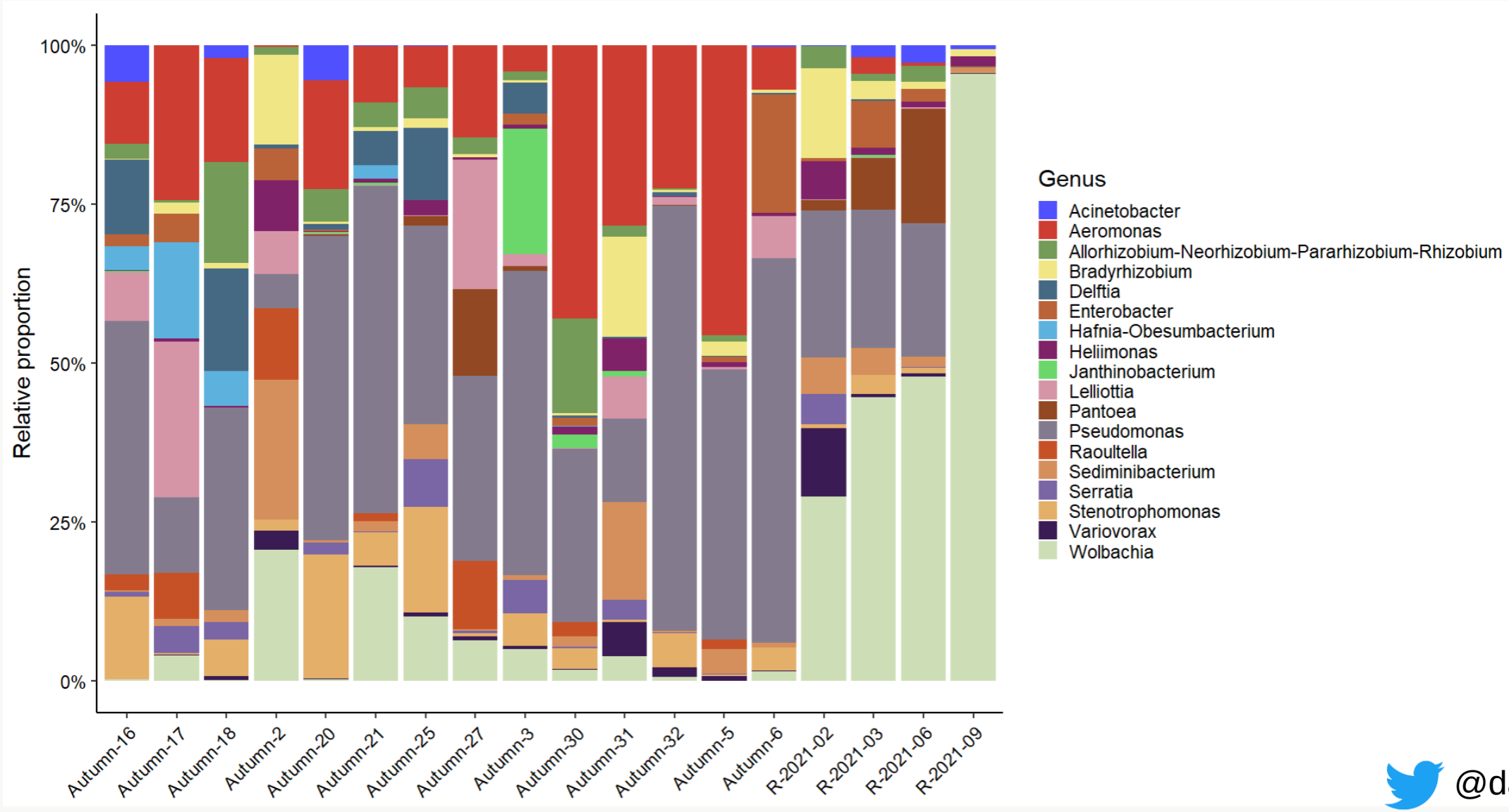


- 18 fields;
- 4 beetle populations per field;
- 72 beetle microbiomes

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RESULTS

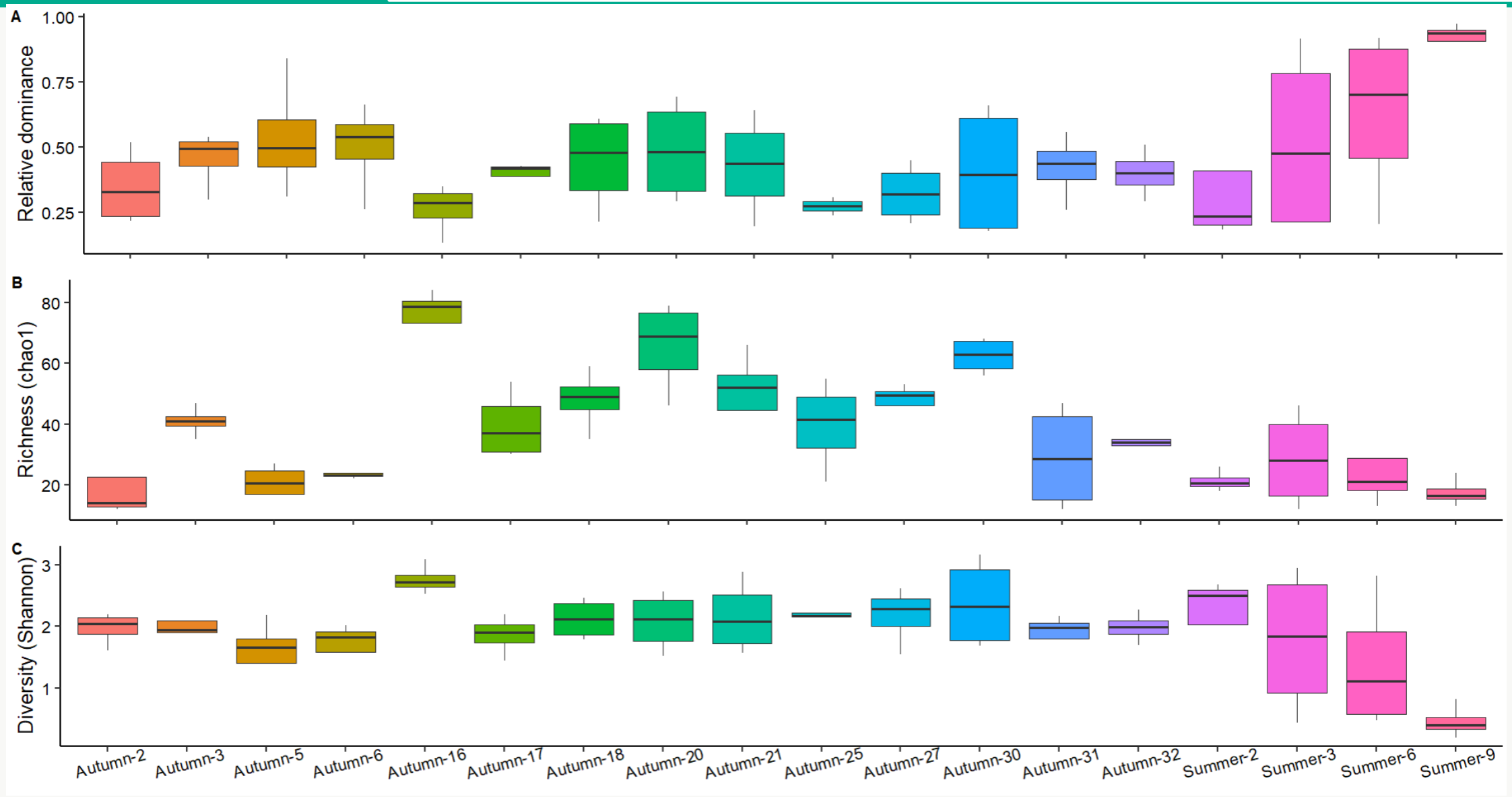
BEETLE MICROBIOME



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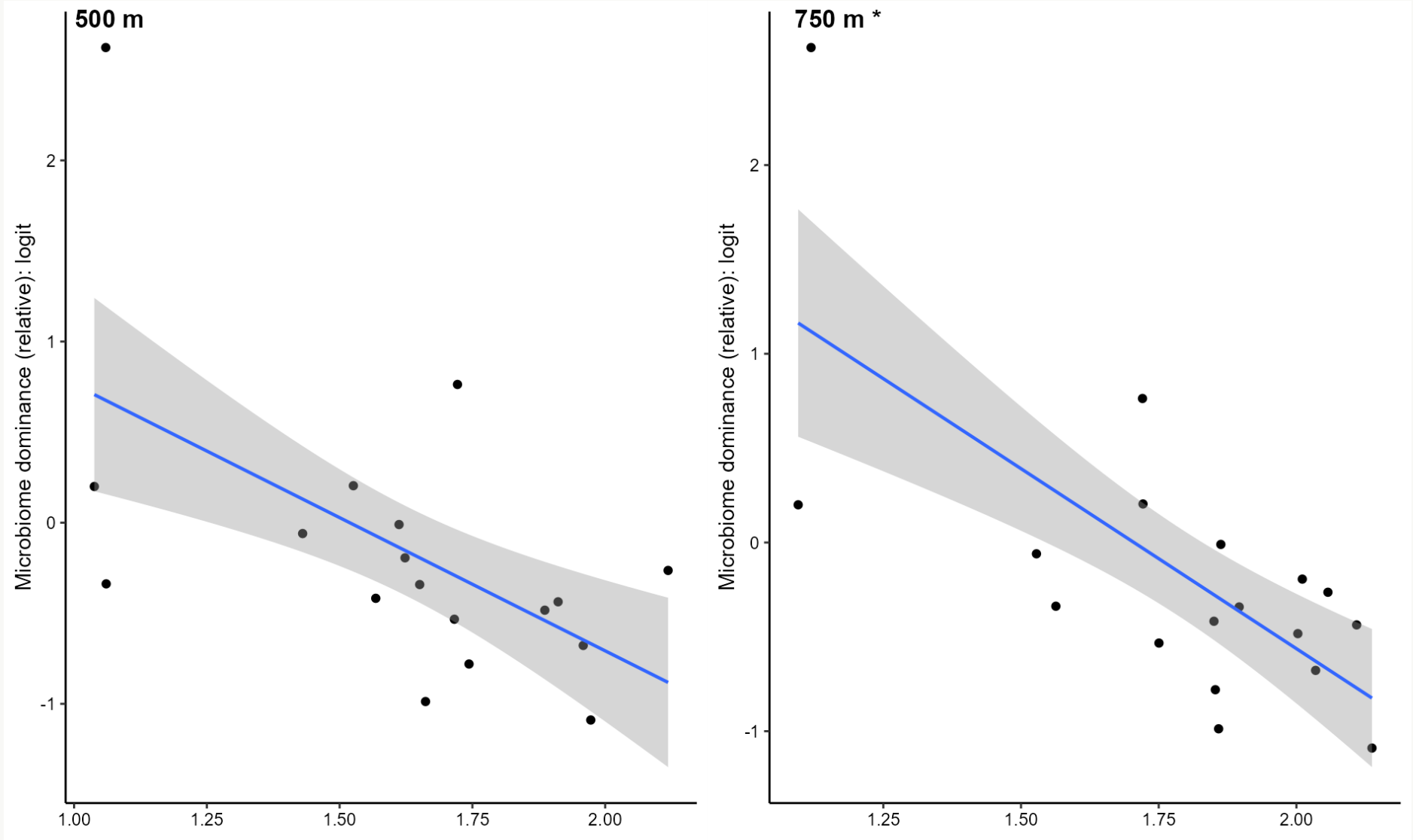
RESULTS

MICROBIOME VARIATION



RESULTS

MICROBIOME AND THE LANDSCAPE: DOMINANCE

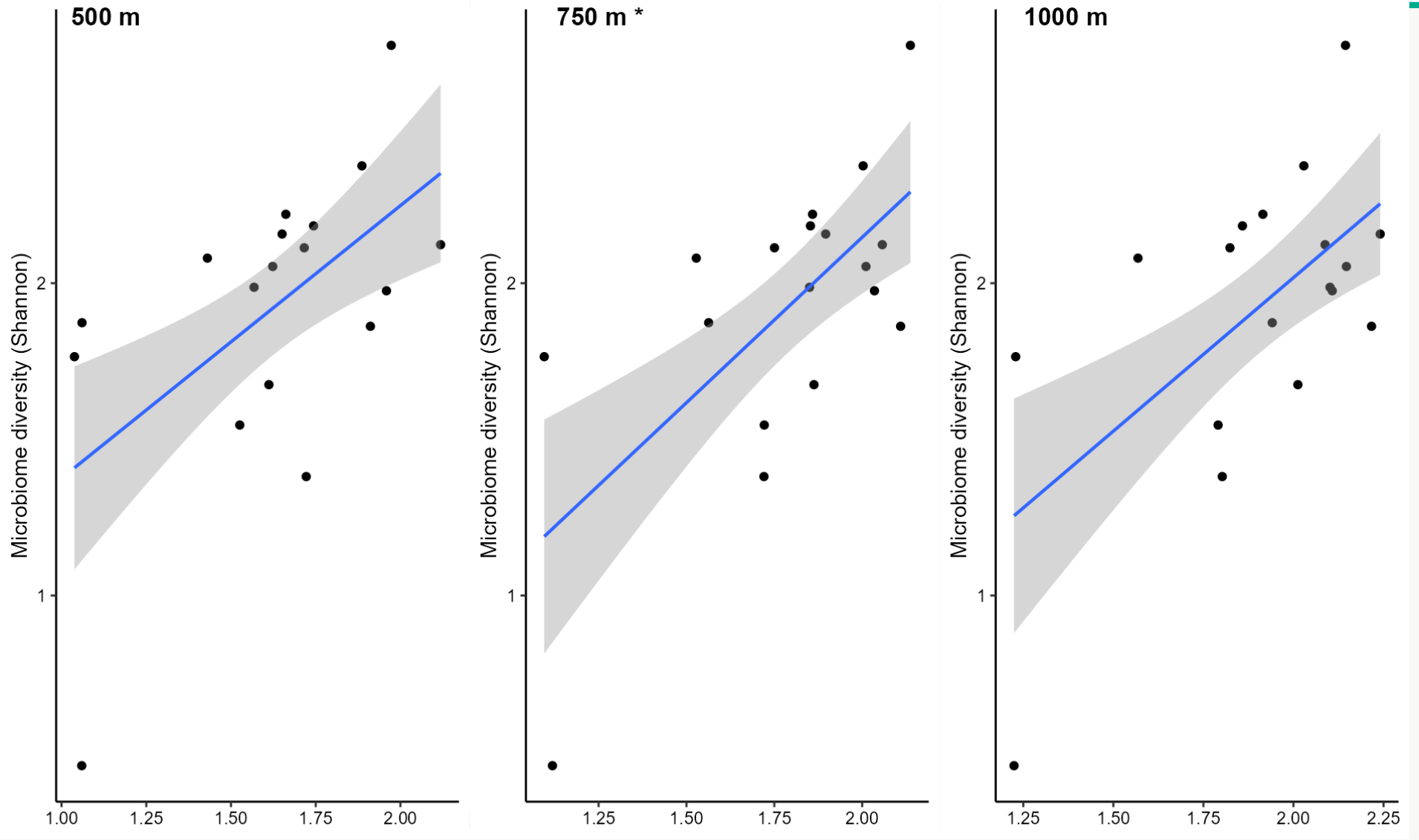




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RESULTS

MICROBIOME AND THE LANDSCAPE: DIVERSITY



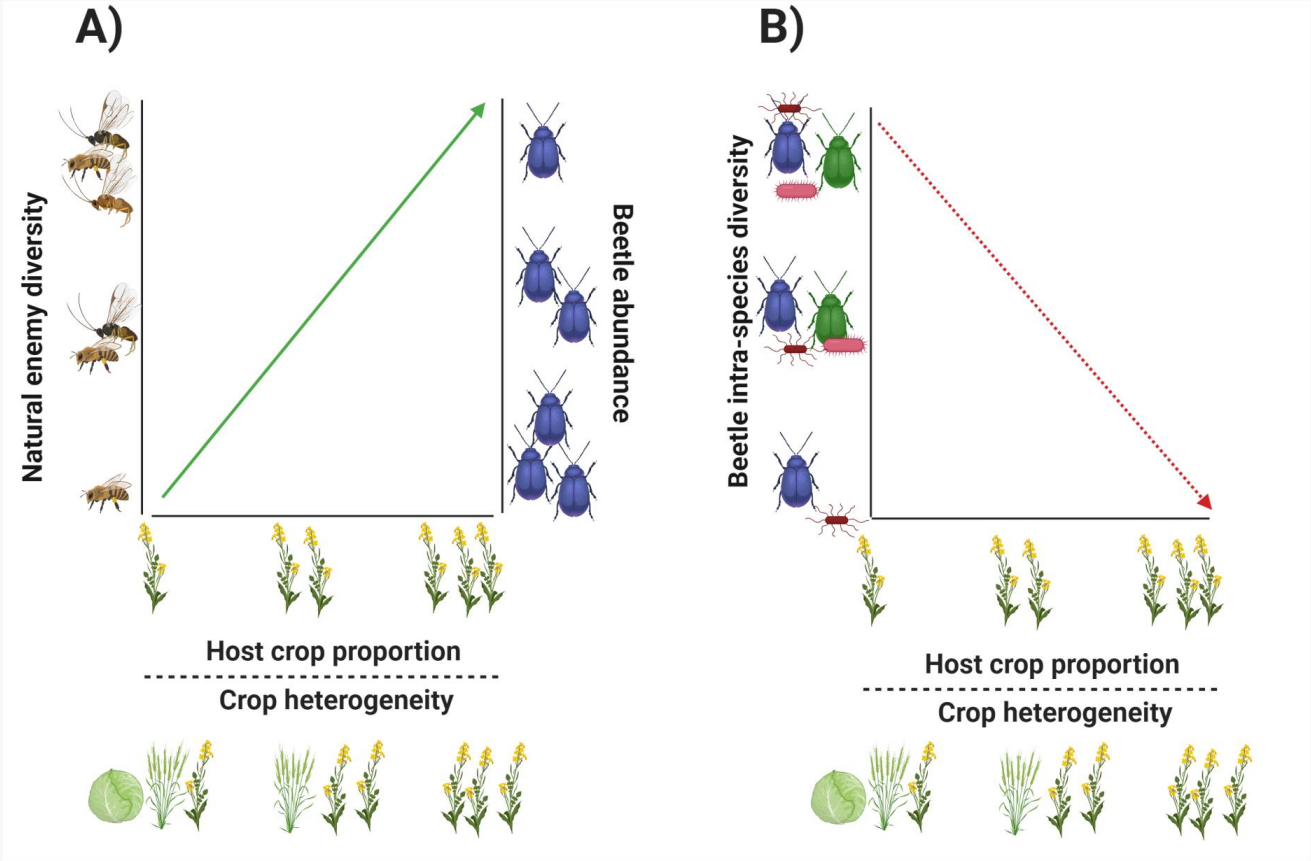


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CONCLUSION & FUTURE

SUMMARY

- Microbiome composition differs between sample sites
- Agricultural landscape appears to influence beetle microbiome:
  - Same-season crop heterogeneity
- Next steps: Finalise landscape analysis, add in natural enemy data, SEM
- Ongoing work will look at relationship between beetle genetic diversity and microbiome diversity



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CONCLUSION & FUTURE

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Eric Muehlnikel (MSc, Hannover University, Germany)

Zoological Biodiversity Group

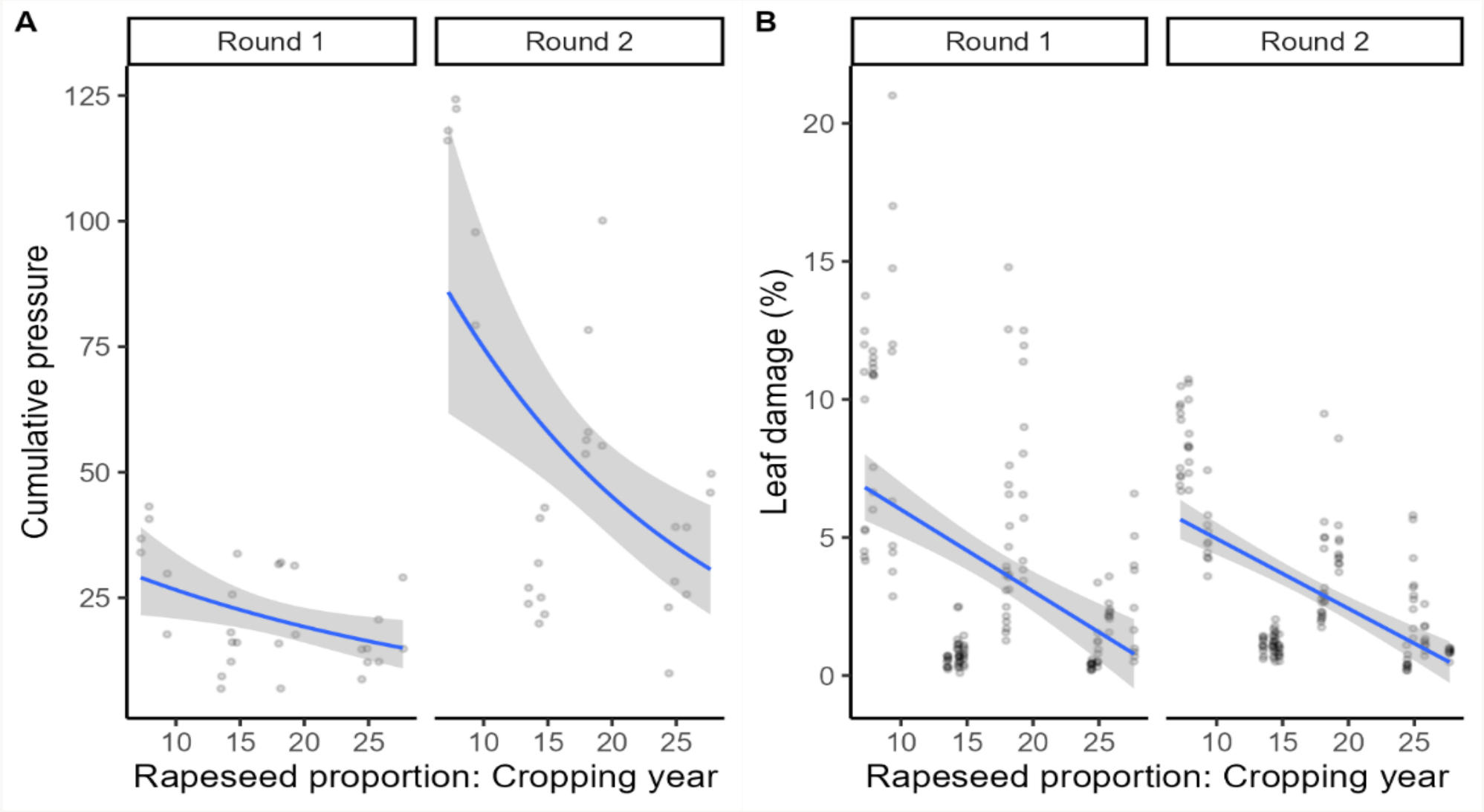
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ANY QUESTIONS?

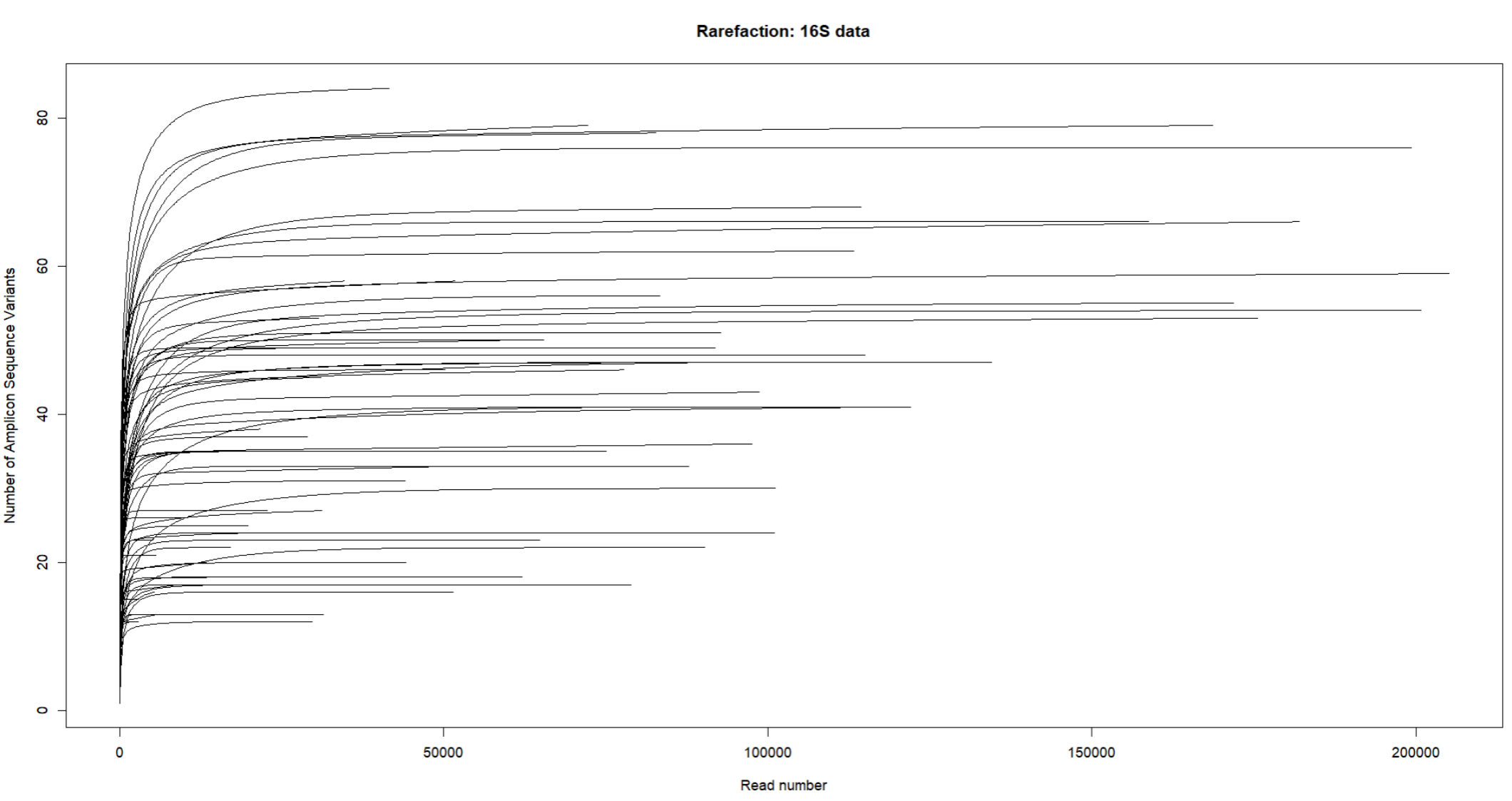
SECRET GRAPHS

LANDSCAPE AND PEST PRESSURE



SECRET GRAPHS

RAREFACTION: 16S



SECRET GRAPHS

BRAY-CURTIS: 16S

