Biological agents to invigorate the health of established coffee trees by managing plant parasitic nematodes.

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S. Njoroge, R. Murunde, & D. Coyne

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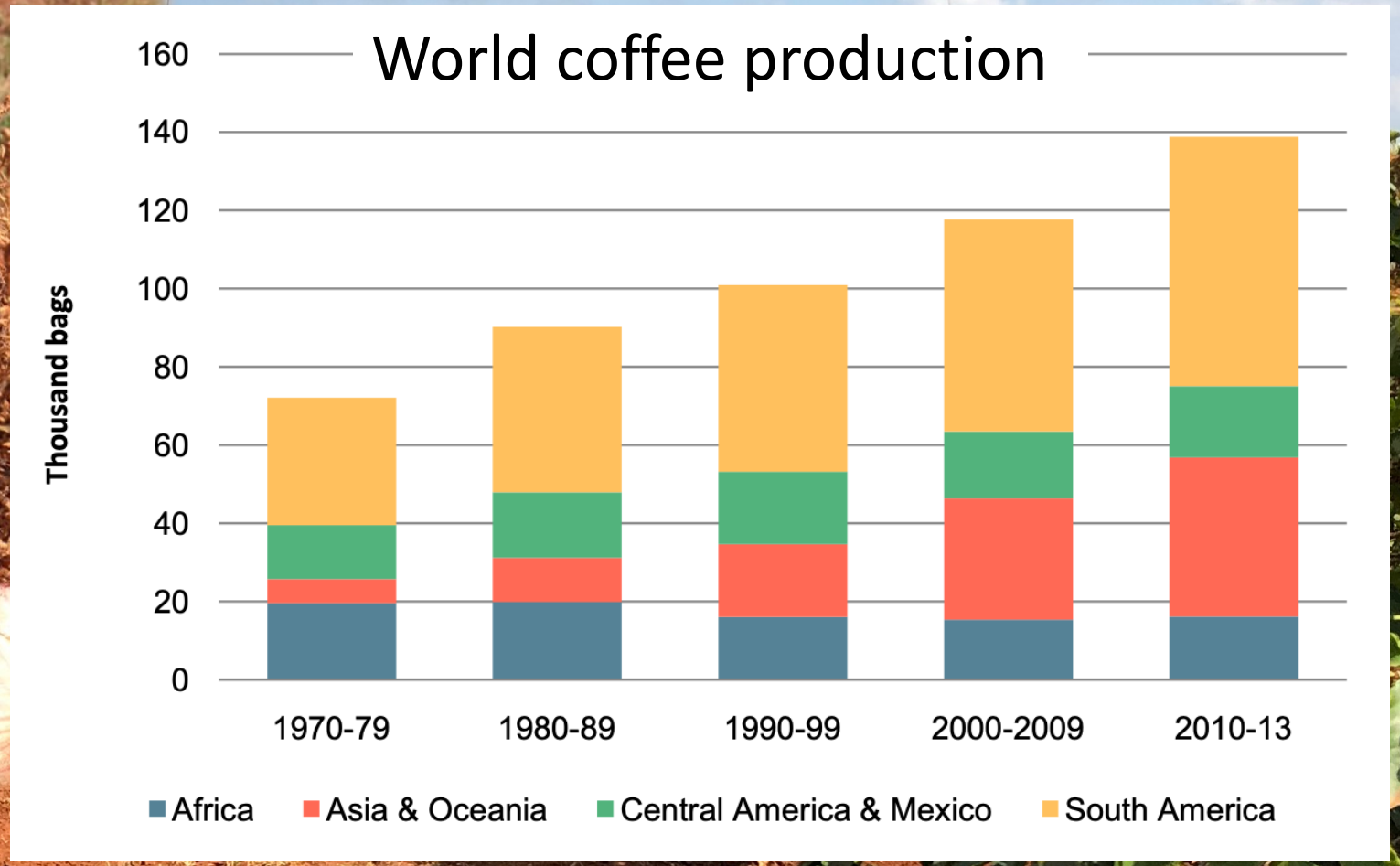
Looking healthy?
They are under the threat from nematodes.



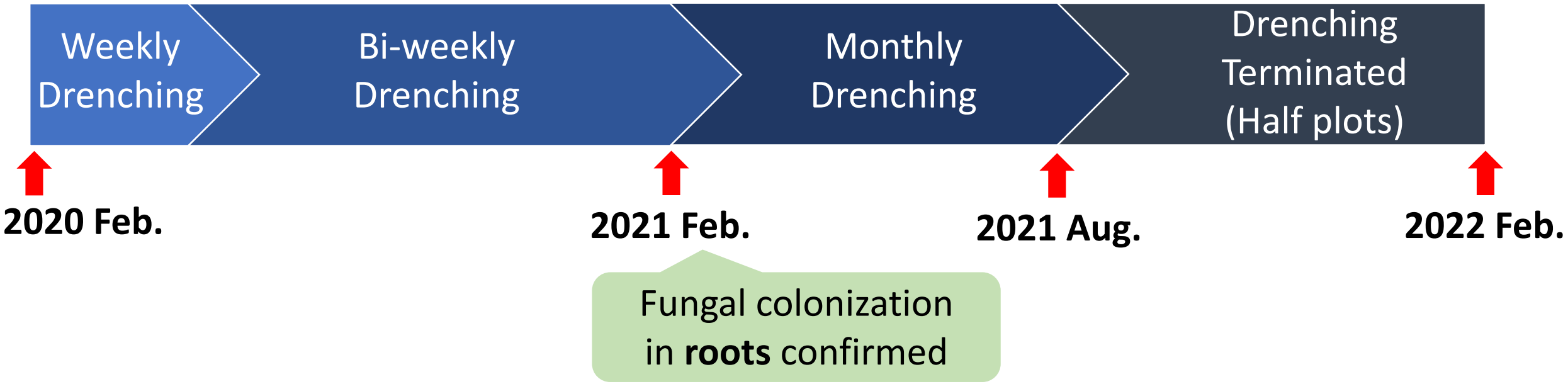
Citation: International Coffee Organization. 2015.

Can we use biological agents to manage nematode pests on established, heavily infested fields?

Trichoderma asperellum and *Purpureocillium lilacinum* were evaluated on 7 coffee fields.

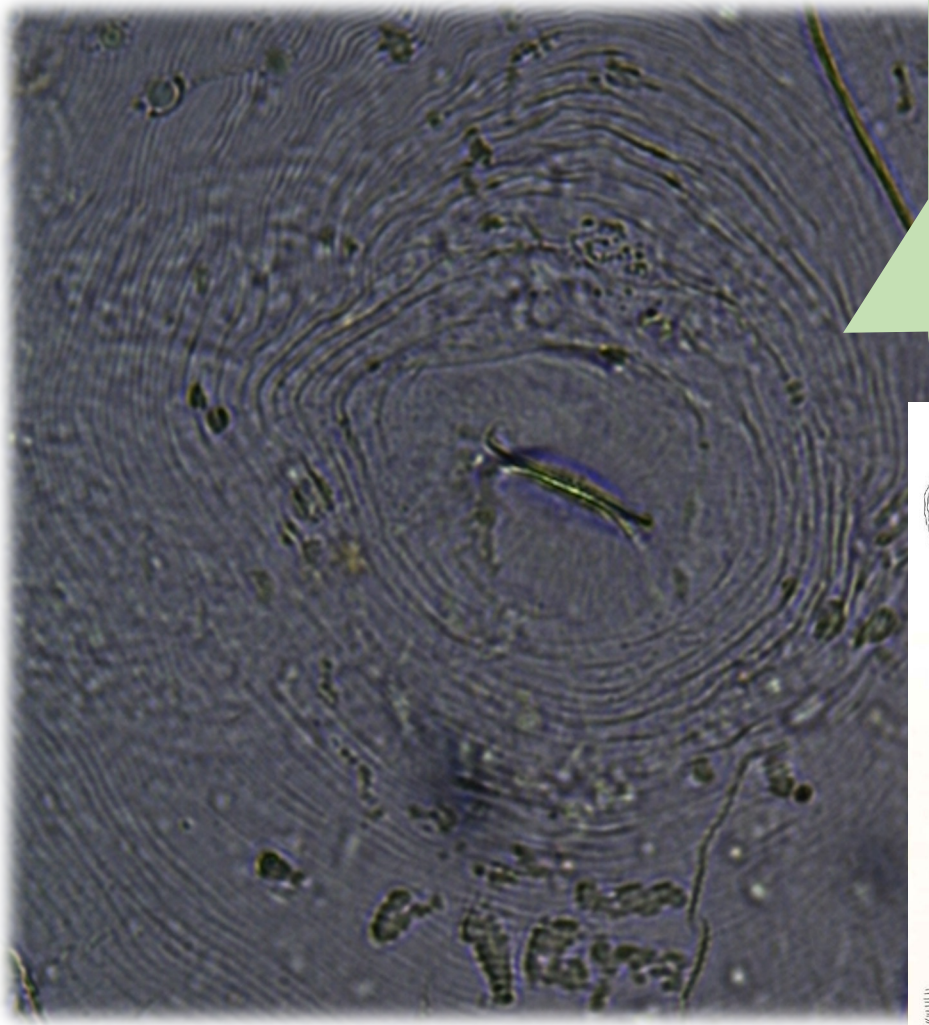
Drenching:
4 X 10^8 spores/ 20L *T. asperellum*
4 X 10^8 spores/ 20L *P. lilacinus*
20L water

Sampling:
Soil = Every month
Root = Every 6 months

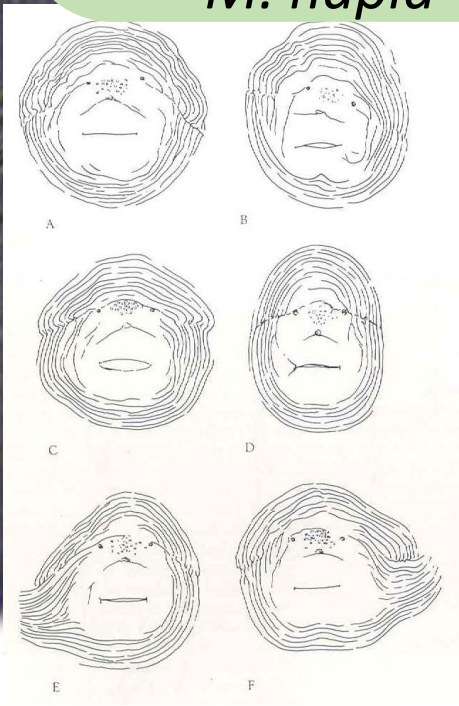


Most abundant nematode was *Meloidogyne hapla*.

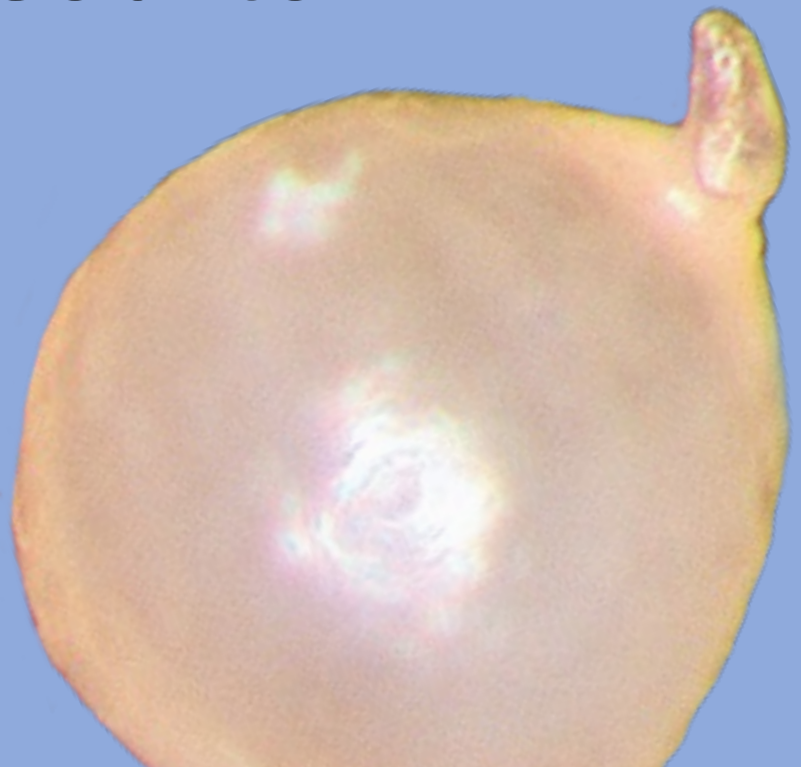
Small galls on coffee roots



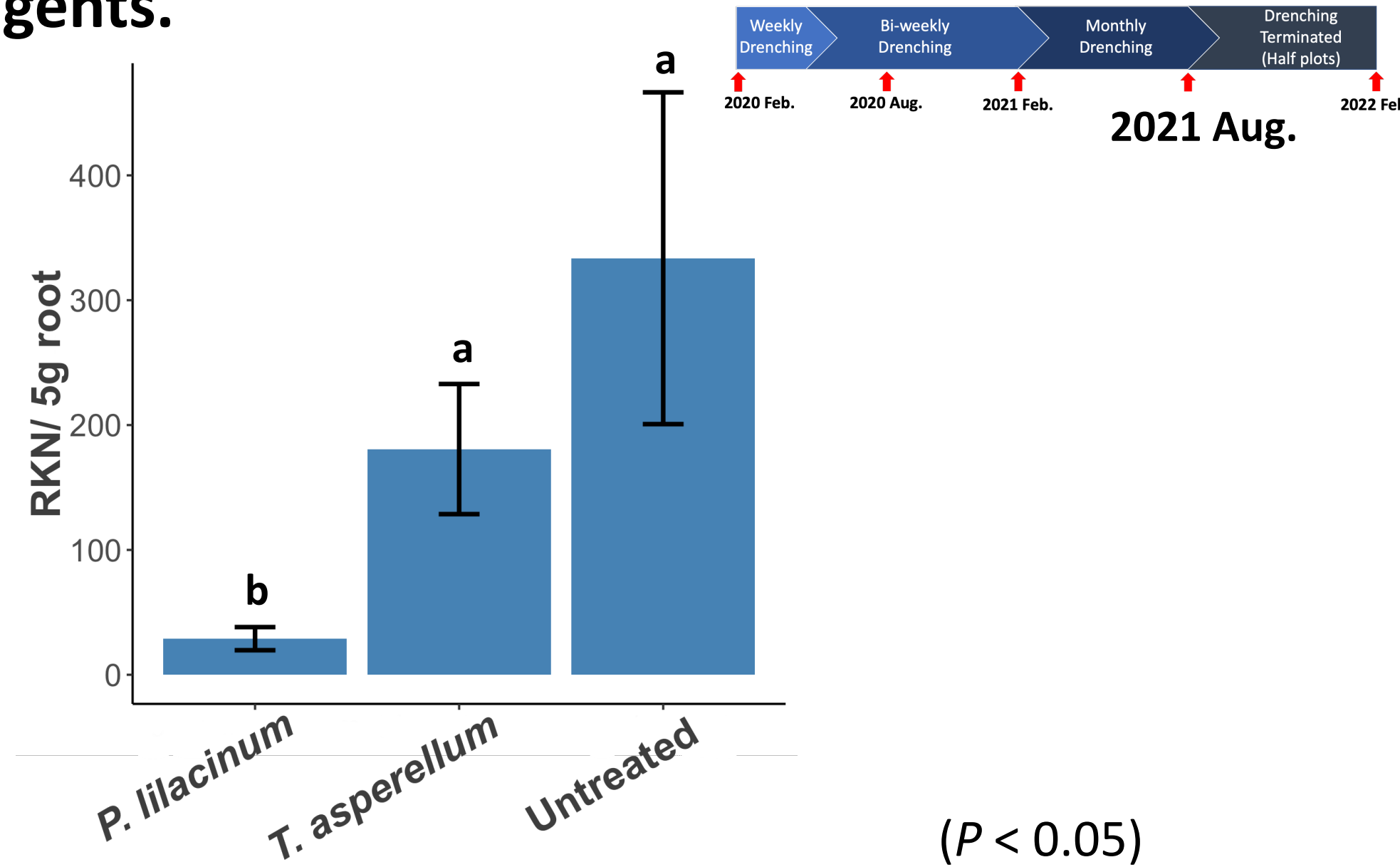
Morphologically (Perineal pattern) & Molecularly (28S and COI) identified as *M. hapla*



Results



Number of *M. hapla* in roots was significantly reduced by both bioagents.



($P < 0.05$)

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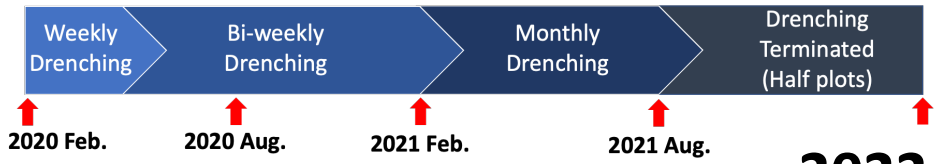
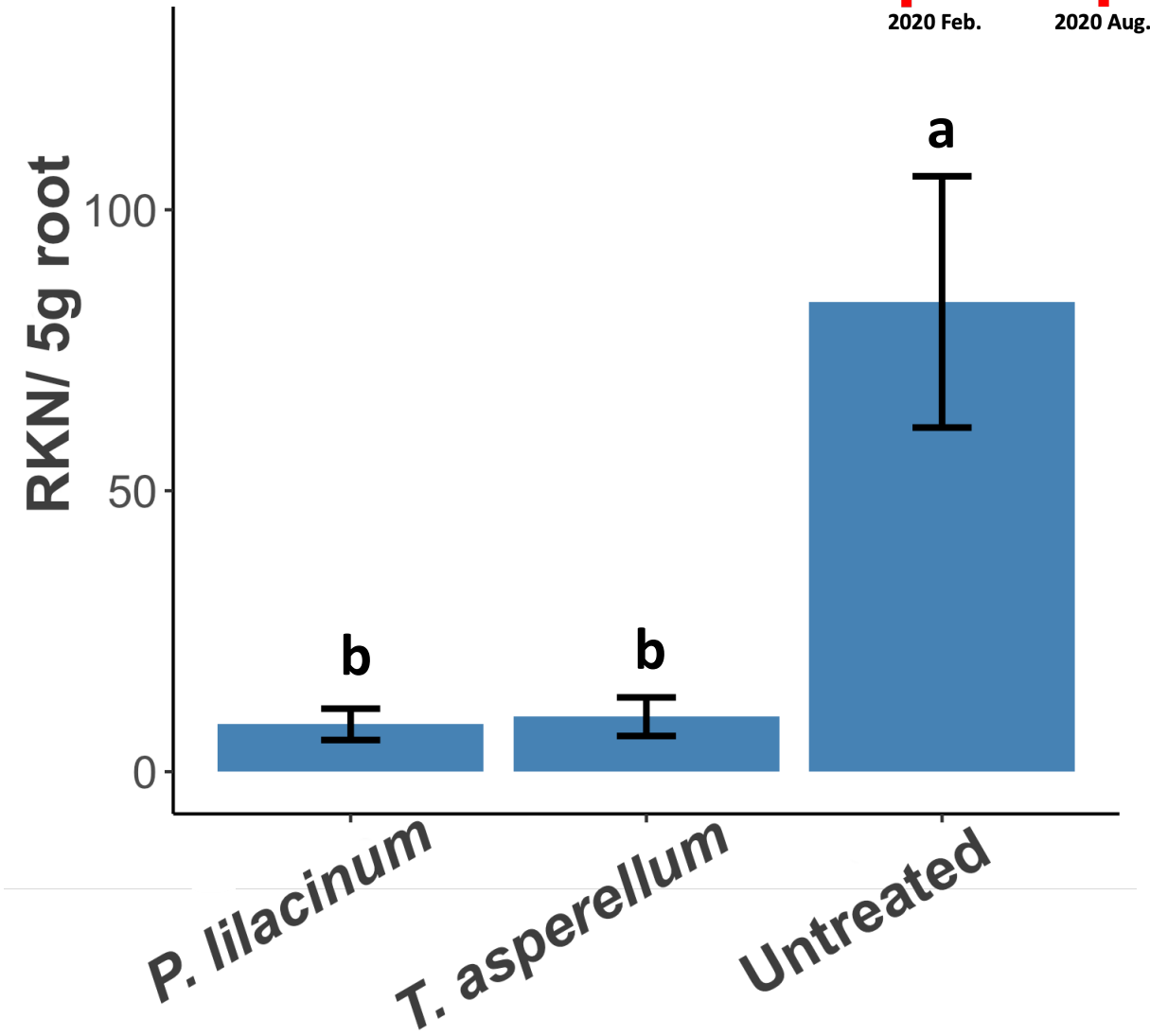
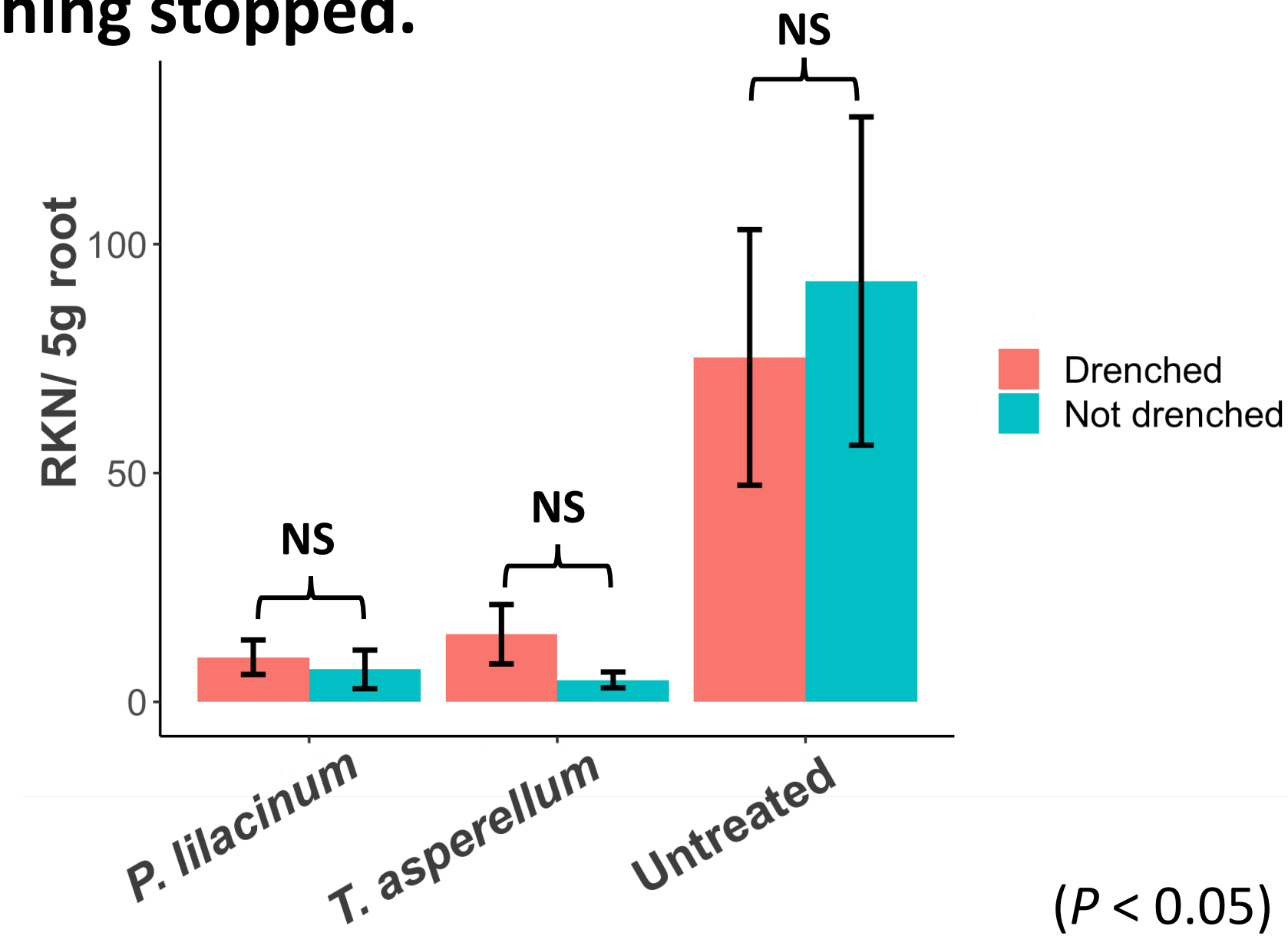




($P < 0.05$)

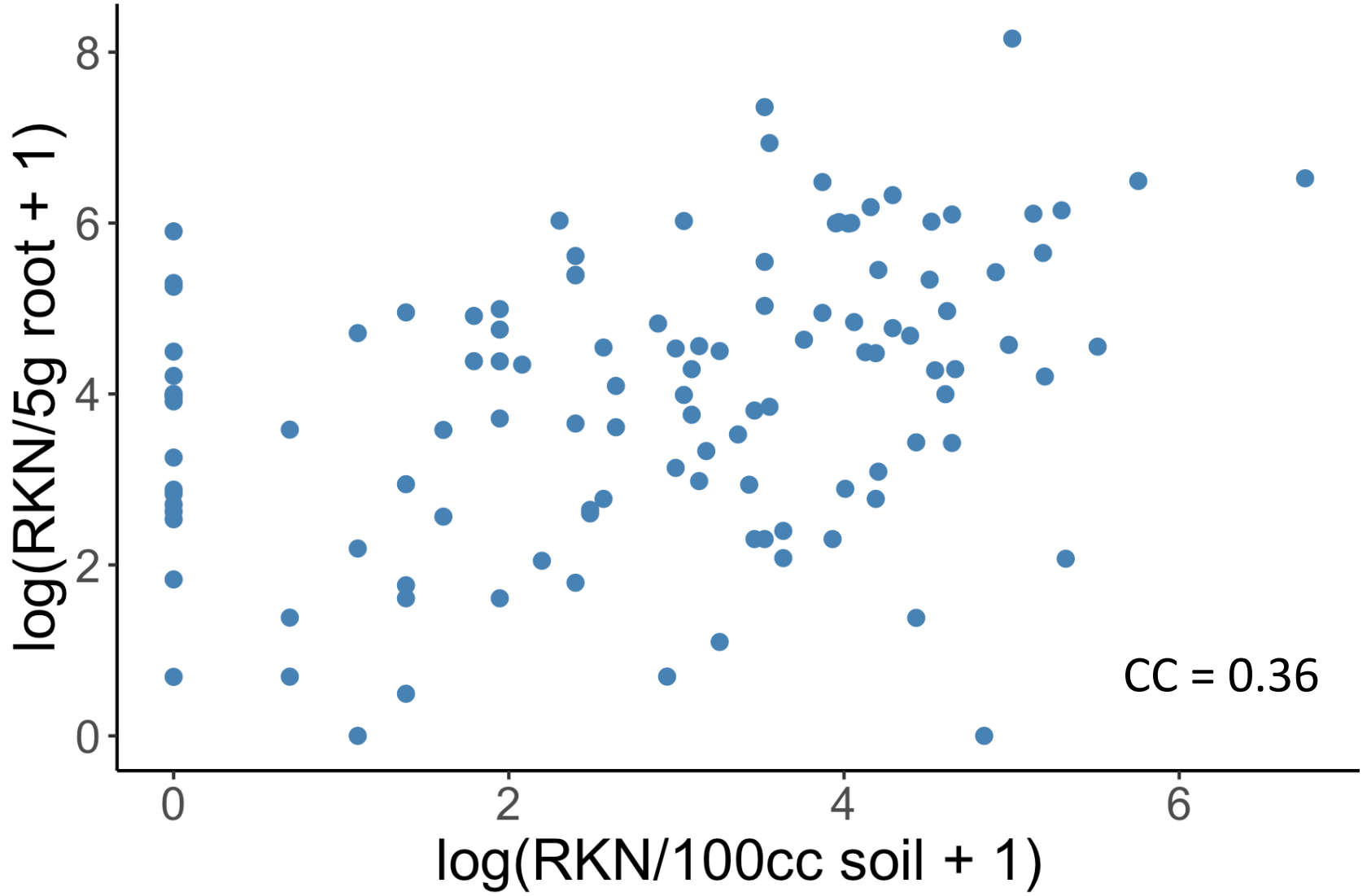
The suppression of bioagents persisted for 6 months after drenching stopped.



($P < 0.05$)

No effect of bioagents on RKN in soil.

Weak correlation between RKN in soil and RKN in roots.

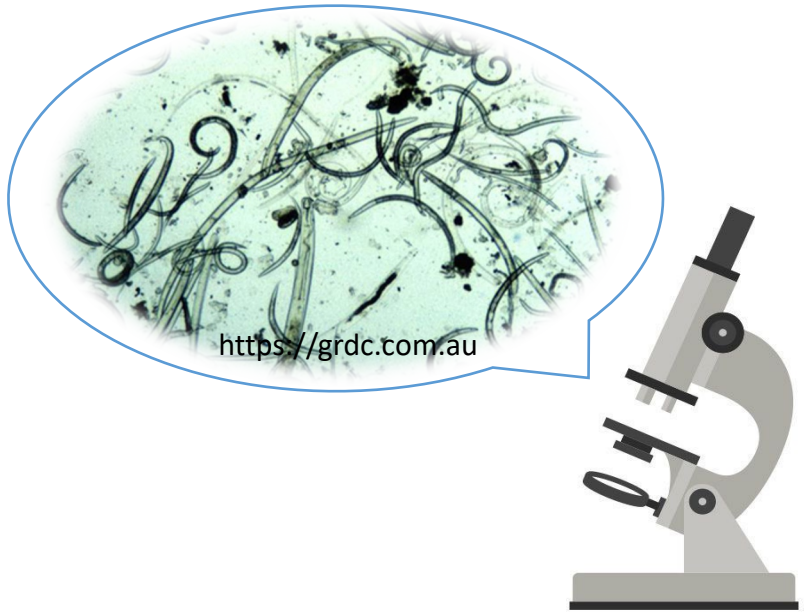


What are the effects of the biological agents on soil health?

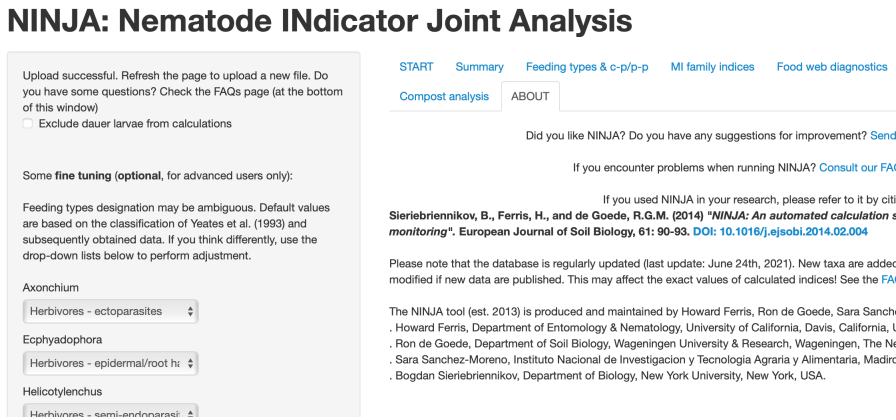
Nematode community was assessed every two months.

Soil samples from coffee fields.

The first 100 encountered nematodes identified to genus level.

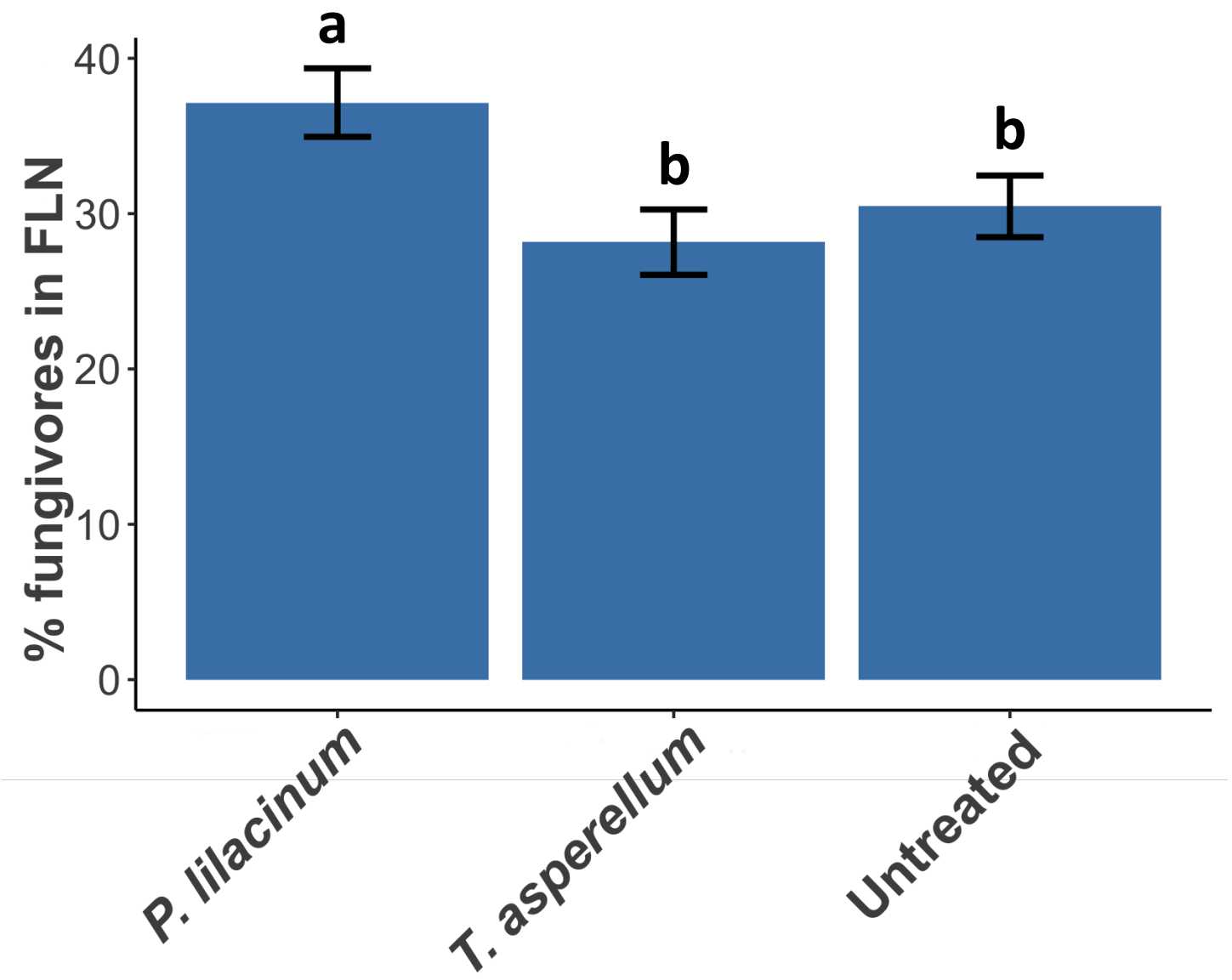


Data analyzed using NINJA

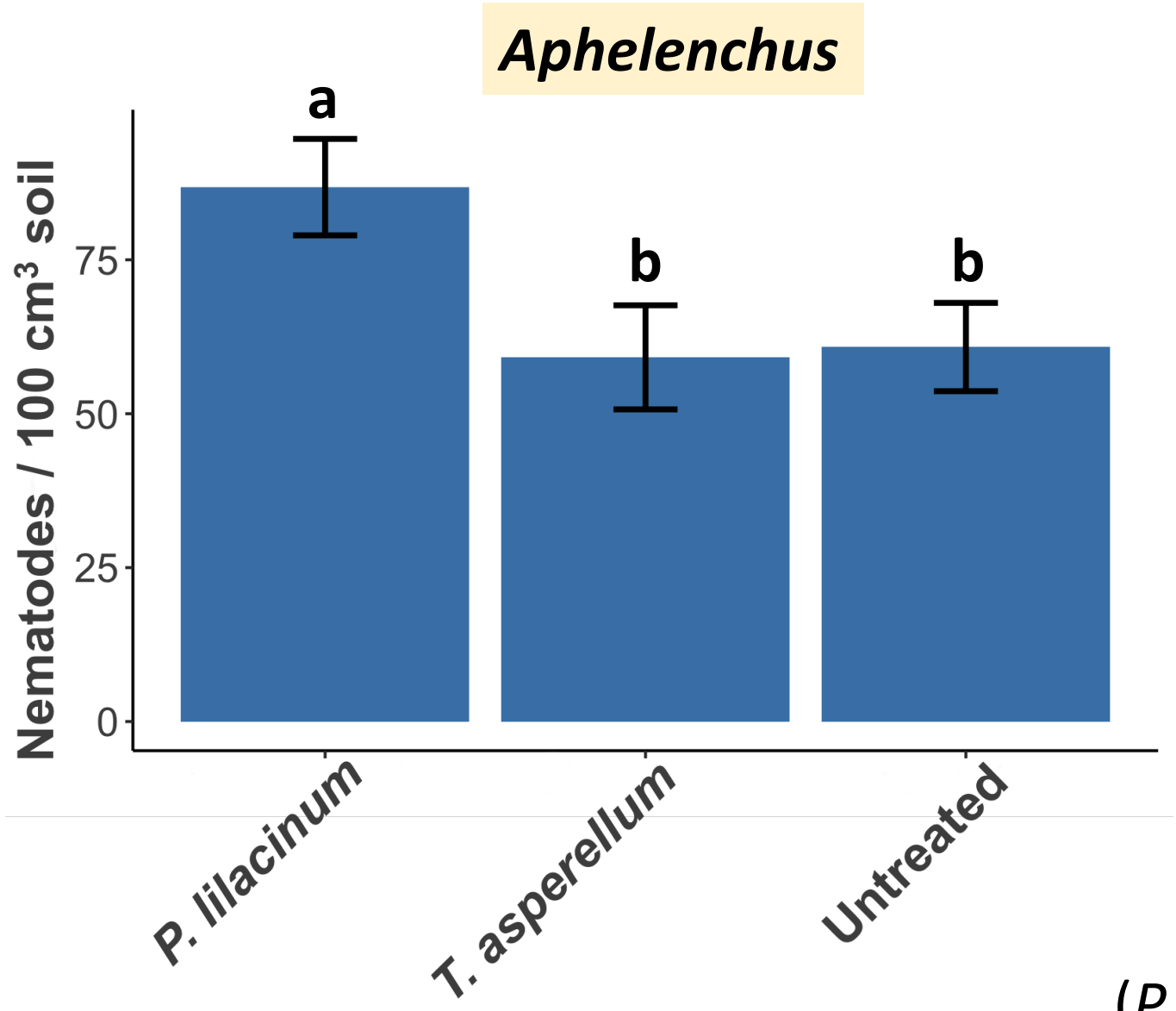


Results

More fungivores with *P. lilacinum*.

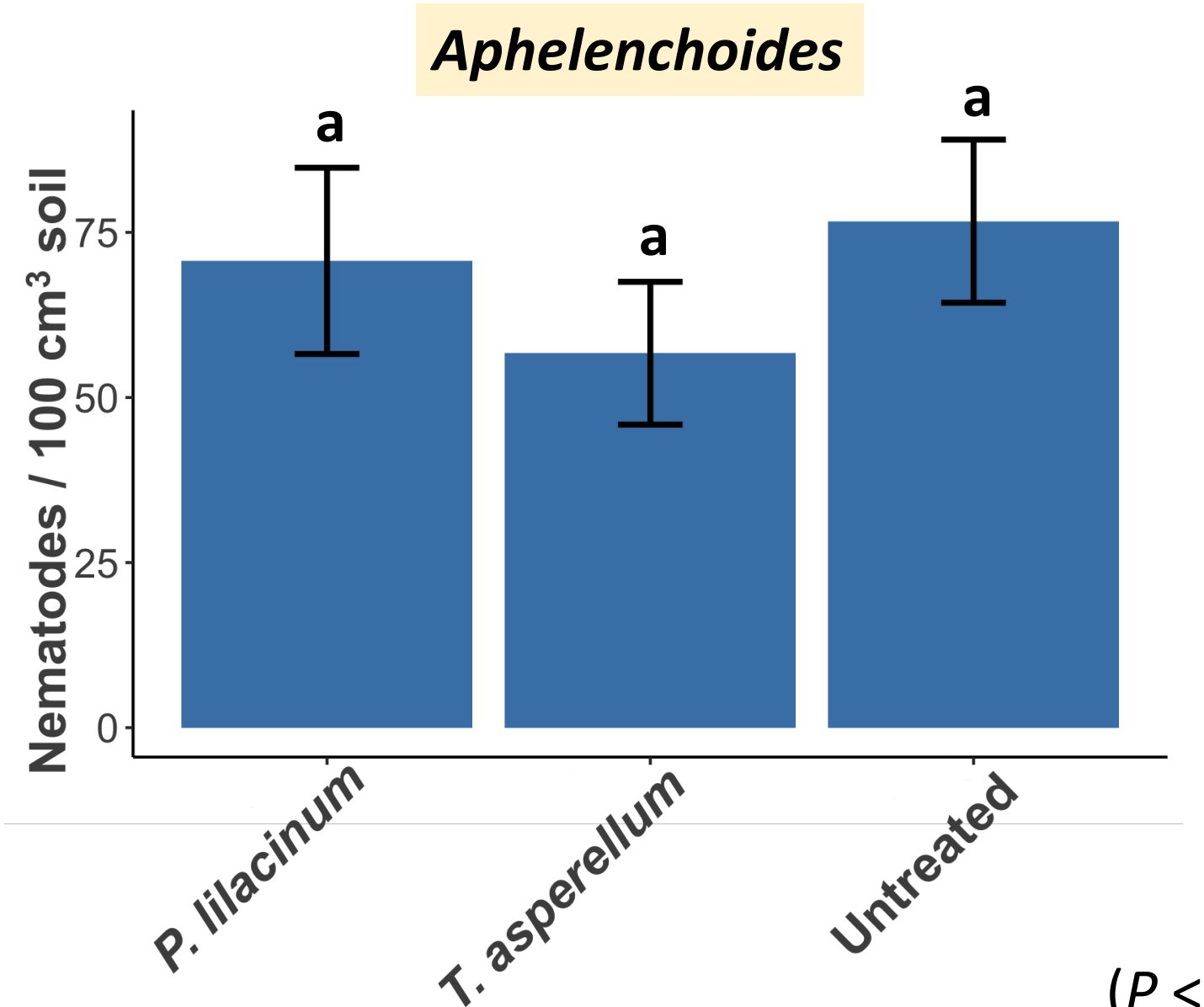


Greater number of *Aphelenchus* for *P. lilacinum.*



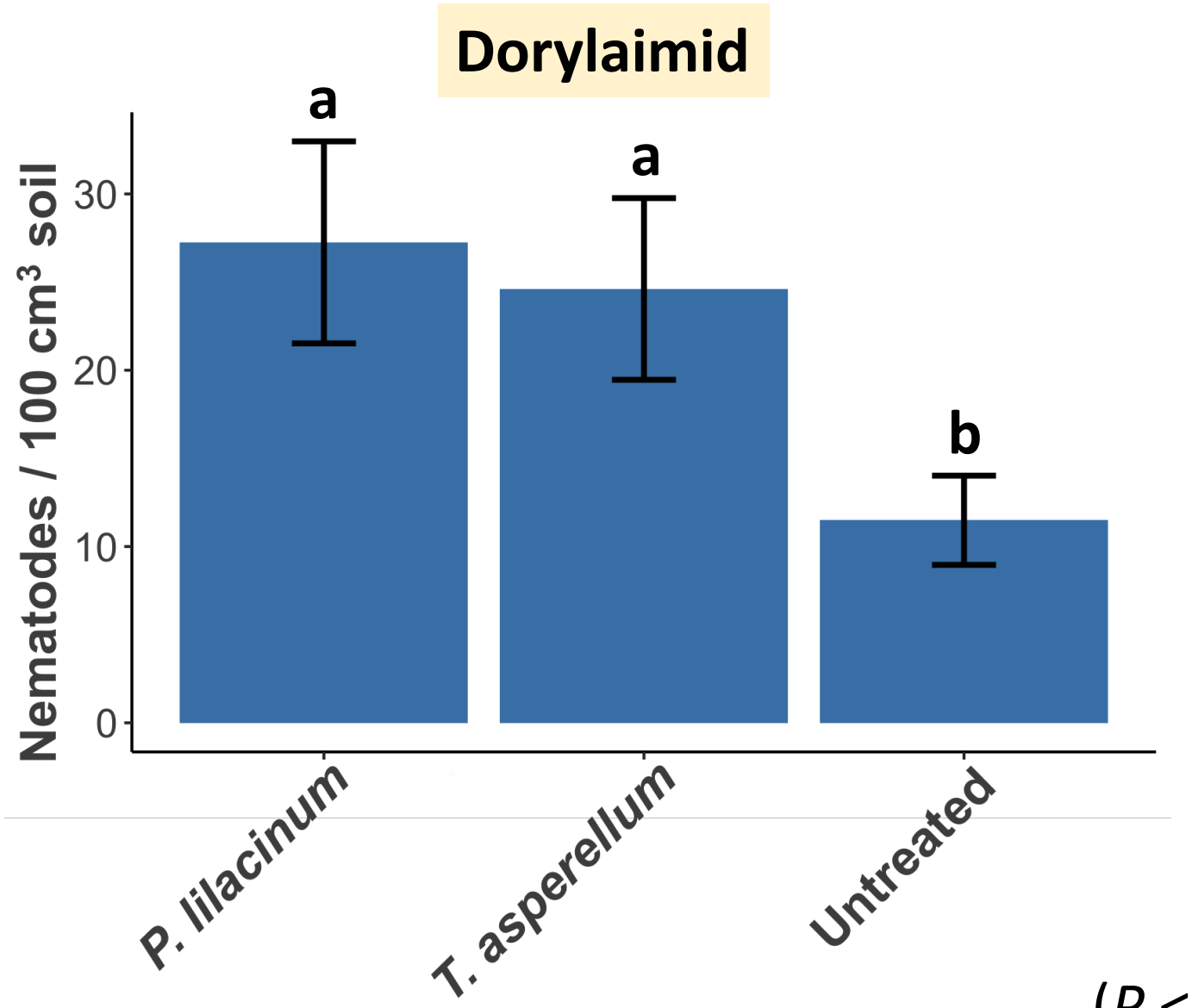
($P < 0.05$)

But *Aphelenchoides* was not affected by bioagents.



($P < 0.05$)

More Dorylaimid with both bioagents.



($P < 0.05$)

Some positive changes with bioagents on soil health conditions.

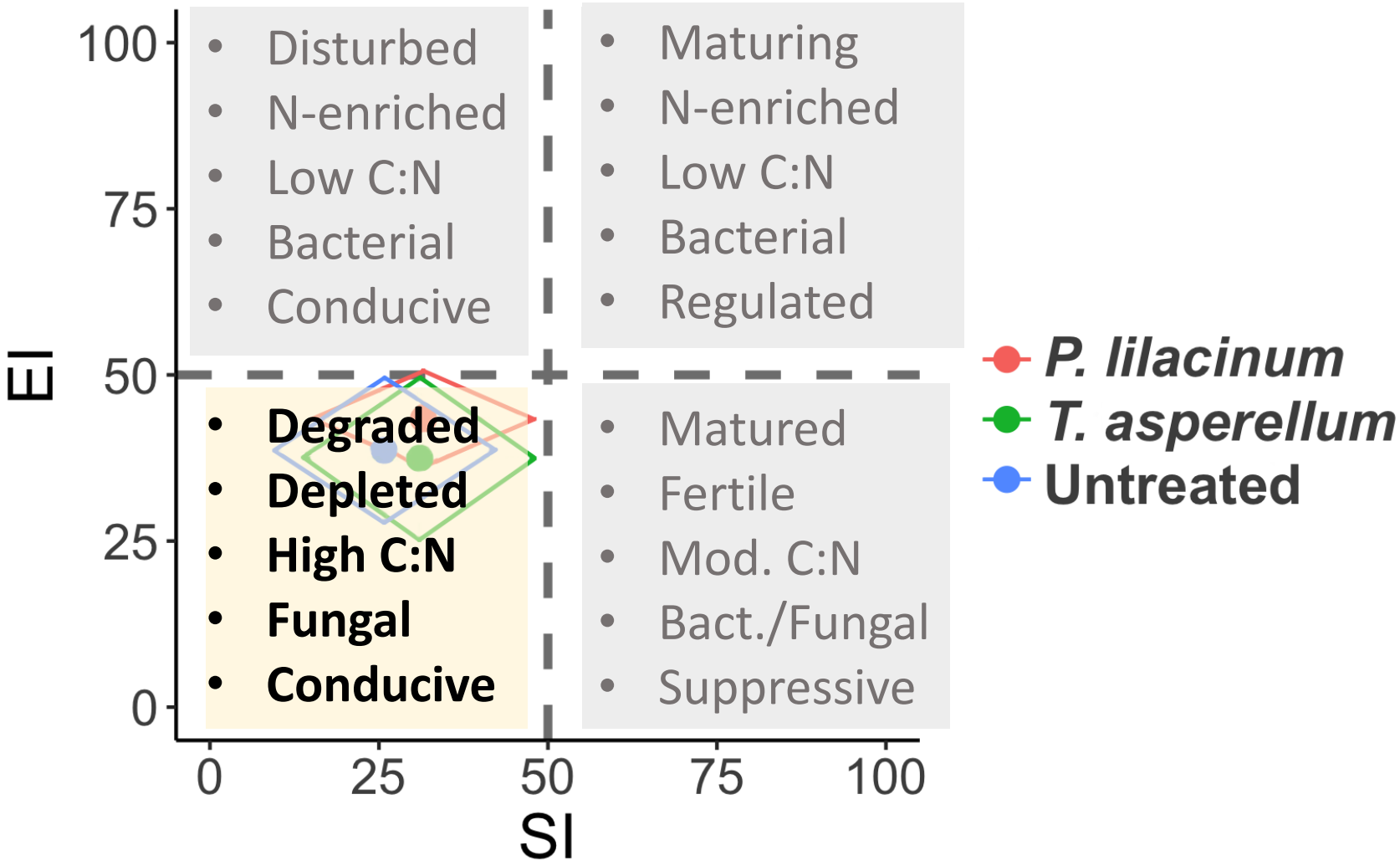
	P-value	*P. lilacinum*	*T. asperellum*
Maturity Index	0.23	-	-
Maturity Index 2-5	0.06	↑	↑
Channel Index	0.99	-	-
Enrichment Index	0.06	↑	→
Structure Index	0.06	↑	↑

Less stressed environement for both bioagents.

N-enriched for *P. lilacinus.*

More fertile and stable for both bioagents.

Functional metabolic footprints of nematodes showed no difference by treatments.



Our study demonstrates both bioagents

1. Suppress RKN,
2. Positively impact soil health.

Acknowledgement

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- Ruth Murunde
- Boyce Harries

Thank you! Any questions?

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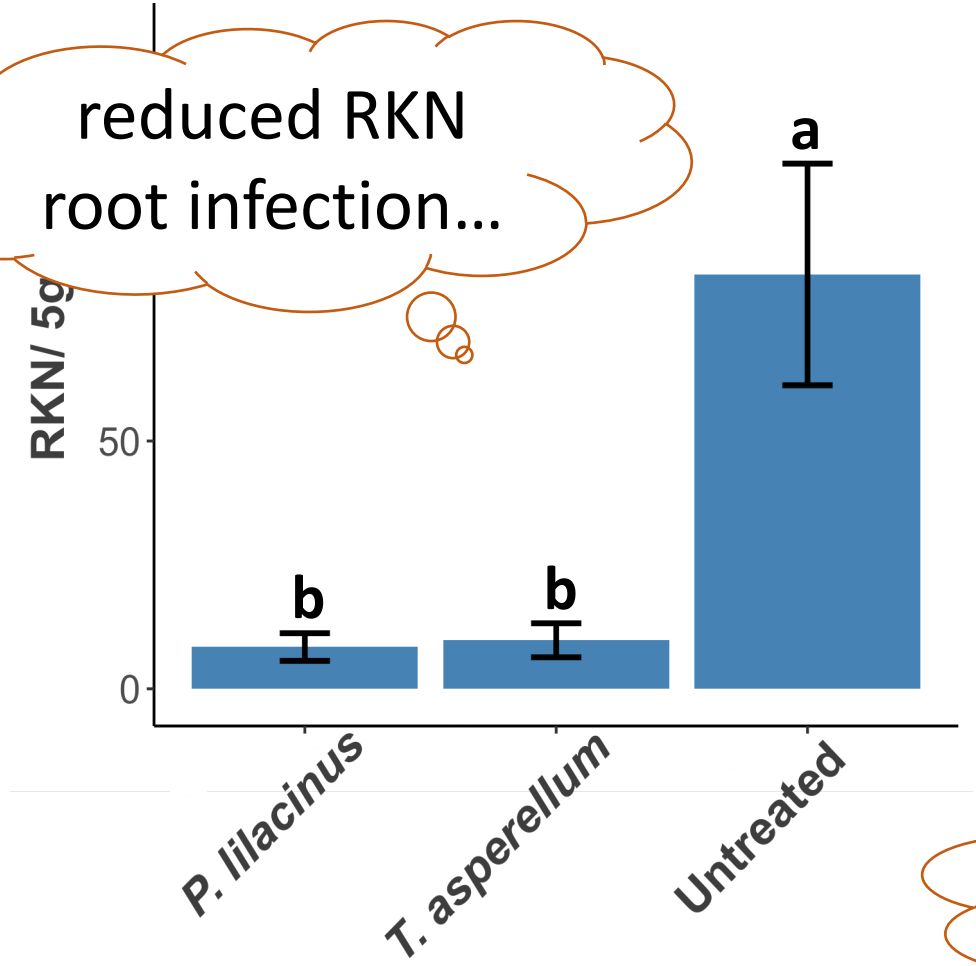
Drenching of bioagents…

reduced RKN root infection…



with some positive effects in soil health!