

Impacts of rainfall erosion on soil fauna

Using nematodes as a model organism

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Introduction

- Intensifying agriculture may increase erosion risk, threatening soil quality and the environment.
- Understanding the links between land use, erosion and ecosystem services is important.
- Few studies have investigated the loss of biota to erosion.
- Nematodes are ubiquitous in soil ecosystems and are a useful model organism for investigating biological impacts of erosion.

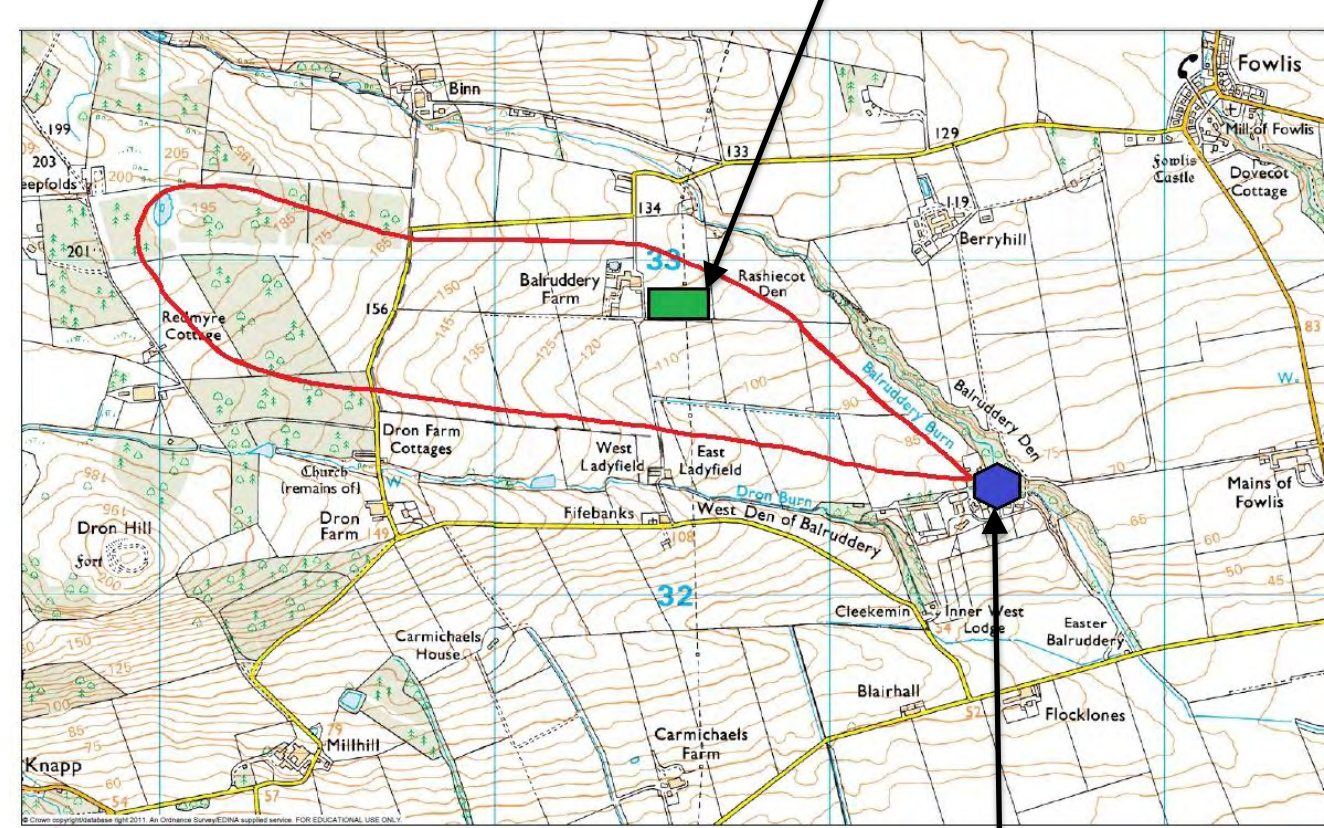


Plant parasitic nematode, genus *Trichodorus*

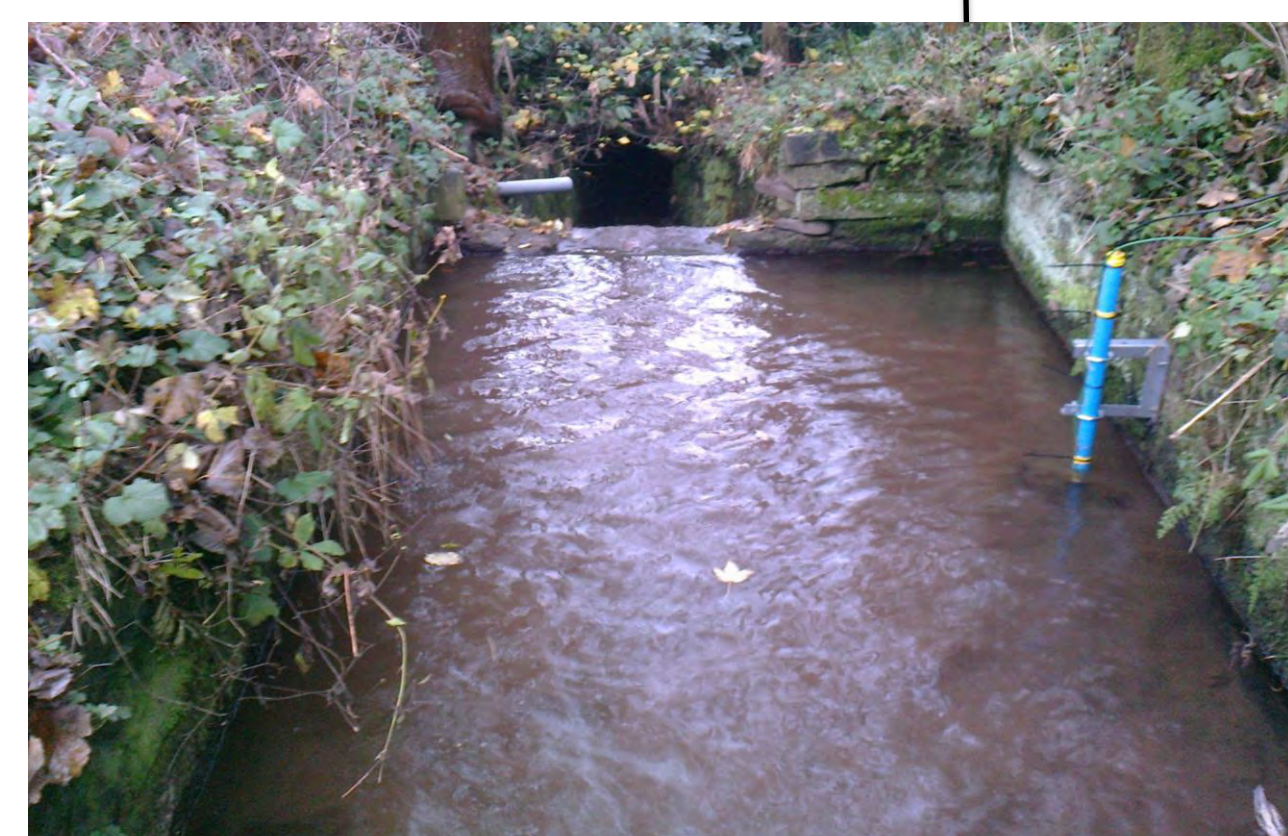
Methods



Balruddery Farm tramlines experiment



Approximate watershed at Balruddery Farm



Balruddery Gauging Station

Field study: tramlines experiment

- Rainfall runoff from four tramline treatments flowed to tanks through Gerlach troughs
- Four replicates of four tractor tyre treatments were laid out in a randomised block design
- A sub-sample of runoff was collected, nematodes extracted, quantified and characterised for functional grouping



Gerlach trough installed across tramline

Catchment study: Balruddery gauging station

- Weekly samples collected
- Automatic samplers programmed to operate during rainfall events
- Data on turbidity and water height recorded on loggers
- Nematodes extracted, quantified and characterised for functional grouping



Teledyne ISCO 6712 automatic samplers at gauging station



Sieve used to trap nematodes in water flow

Results

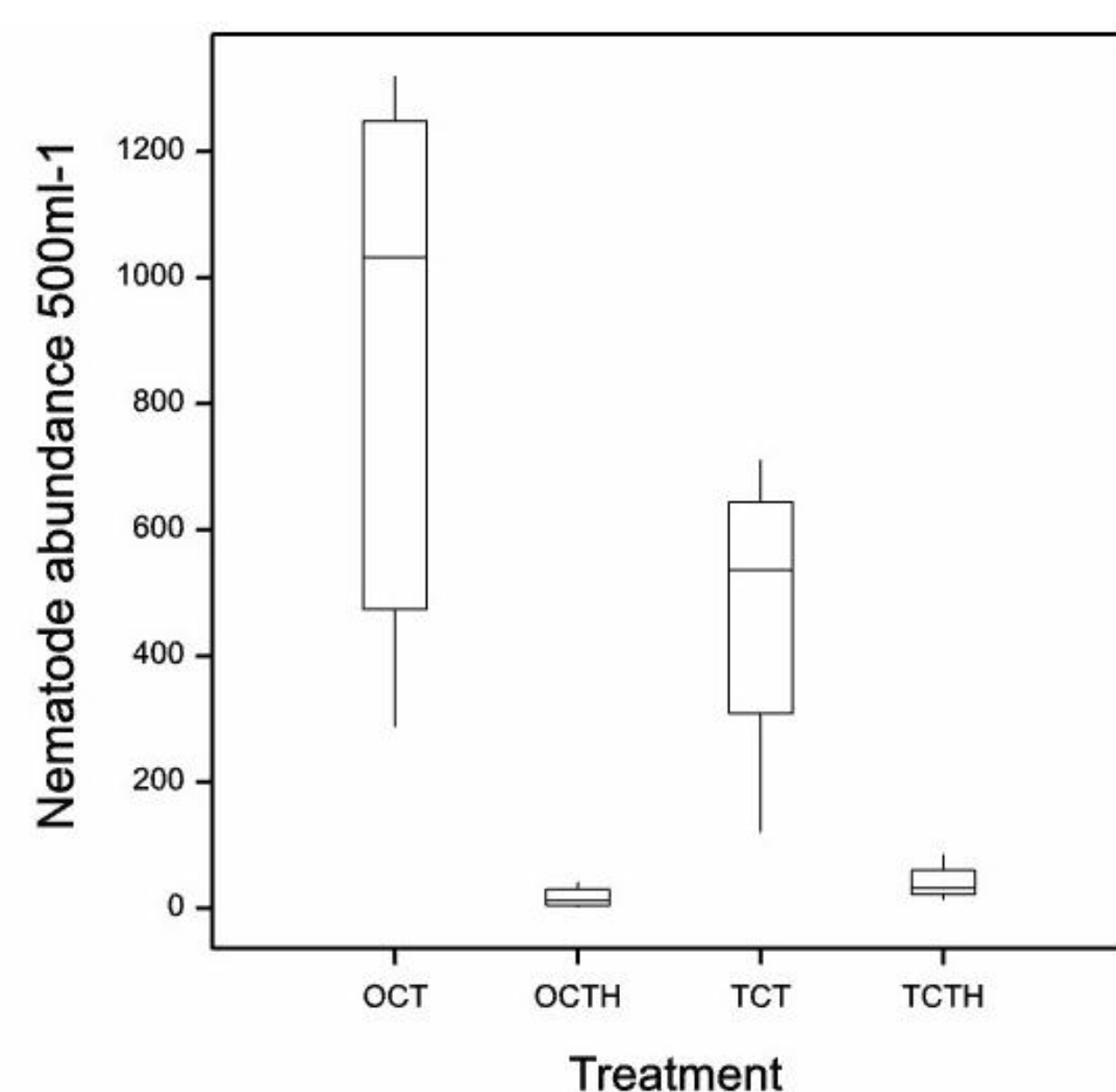


Figure 1 : Box plot showing erosion of nematodes in tramline wheeling runoff (OCT= optimal configuration tyres; OCTH= optimal configuration tyres with harrow; TCT= typical configuration tyres; TCTH= typical configuration tyres with spiked harrow)

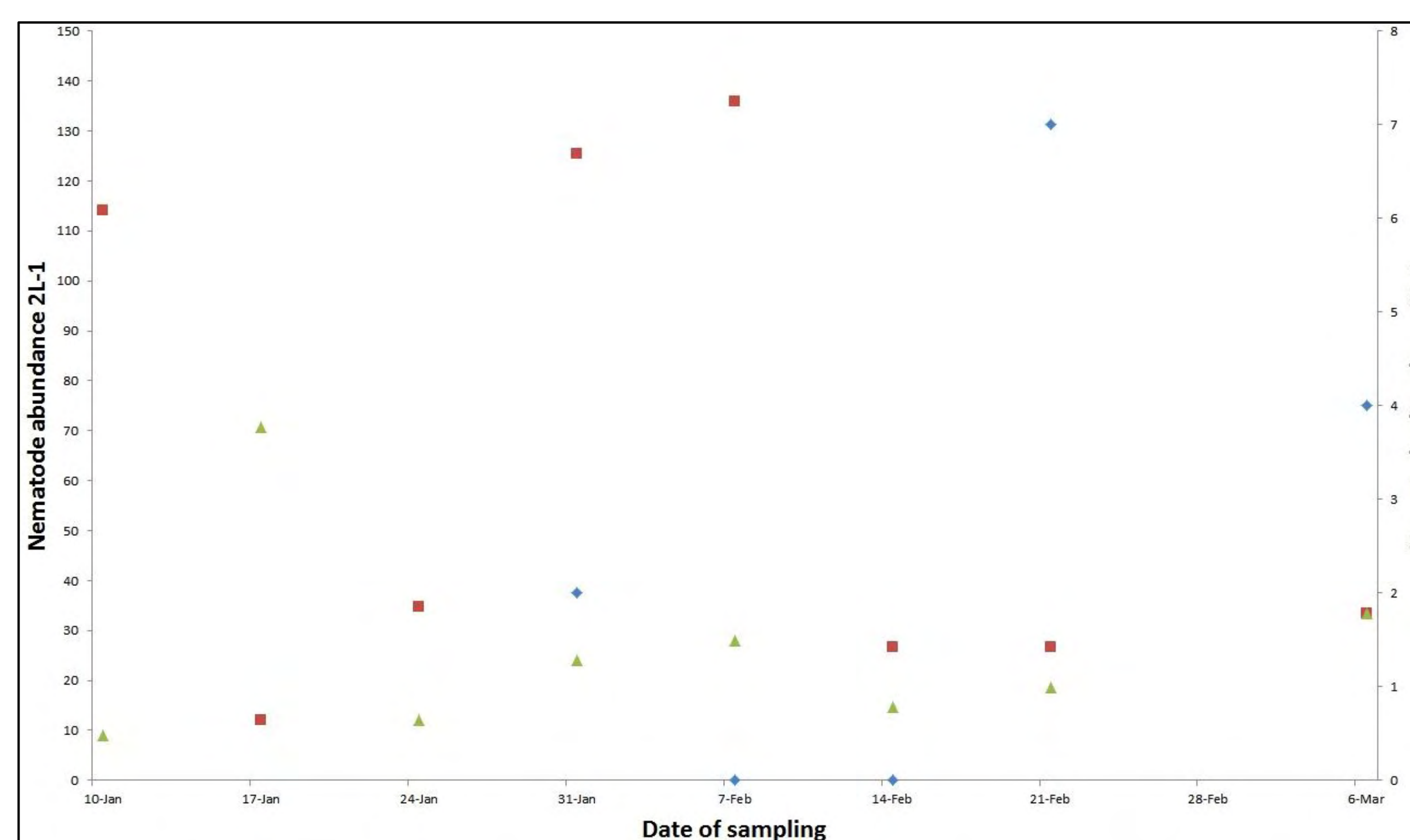


Figure 2: Nematode abundance collected in surface waters at Balruddery Farm catchment (■ = weekly sieve sample; ▲ = weekly tray sample; ◆ = 20L bulk sample (a secondary axis for bulk samples is provided to clarify low numbers observed))



An omnivorous nematode (40x magnification).



Predatory *Anatonchus tridentatus* with two free-living nematodes (25x magnification)

Conclusions and further work

- Initial results confirm soil nematode presence in rainfall runoff at the field and catchment scale.
- Based on comparison of sieve and tray samples, gauging station data suggests more nematodes are present in water flow than in tray samples. Entrainment may decrease nematode abundance, possibly through greater mortality.
- More work is planned to quantify and characterise erosion of nematodes by rainfall.
- Using a rainfall simulator we are generating data that is exploring the effects of soil type and slope angle on the erosion of nematodes.

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