The influence of sociality on locomotor activity and avoidance behaviour of Porcellio scaber in a polluted environment

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The Influence of Sociality on Locomotor Activity and Avoidance Behaviour of *Porcellio scaber* in a Polluted Environment

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INTRODUCTION

Avoidance behaviour enables woodlice to escape suboptimal environmental conditions and also to mitigate harmful effects of diverse pollutants. However, several studies have shown that at least in some woodlice species the tendency to aggregate can lead to suboptimal decisions as the attraction between conspecifics can outweigh the aversive stimuli of pollution.

The present study aimed to evaluate the social component on decision making of individuals in a heterogeneously polluted environment. We hypothesized that the tendency for aggregation will outweigh the tendency for exploratory activity, therefore animals in a group will be less locomotory active. Consequently, this will affect their avoidance of the polluted environmental patches.

VIDEO TRACKING

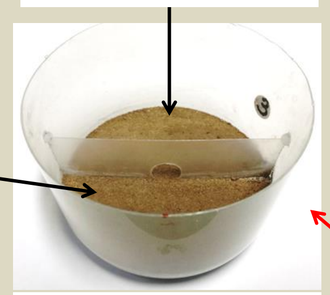
Isolated individuals or individuals accompanied by a conspecific were recorded for 3 hours in darkness using infrared light. Animals could select between uncontaminated and pyrethrin-contaminated soils.

8-12 animals were used per insecticide concentration. Videos were captured in VirtualDub at 5 frames per second and a Full HD resolution and further analysed in Bonsai software.

(pyrethrins - 0.2%)

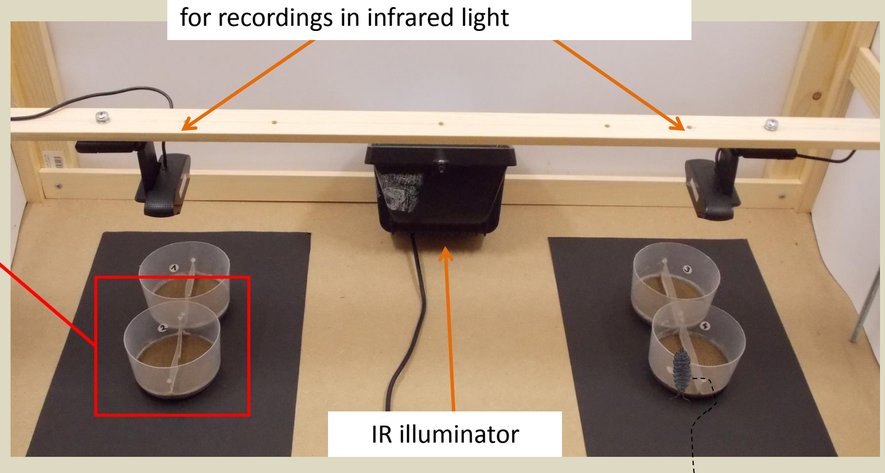
Soil contaminated with insecticide formulation (0, 2.5, 5, 7.5 or 10 mL/kg dry soil)

Uncontaminated soil

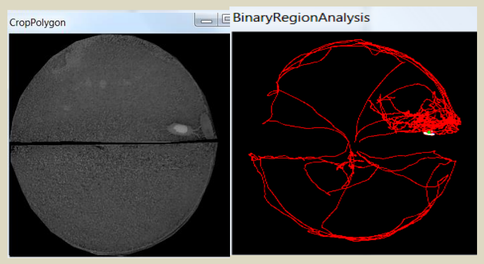


Videotracking arena: plastic (PP) pot, divided by a barrier with a small passage

Webcam - modified to improve video quality for recordings in infrared light



Video analyses in Bonsai

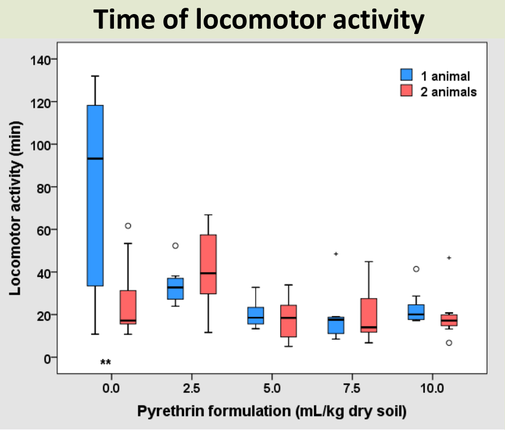


Tracking of marked animal

RESULTS

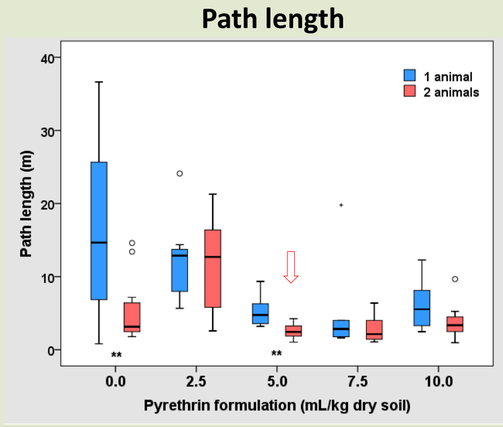
Animals activity

Time of locomotor activity



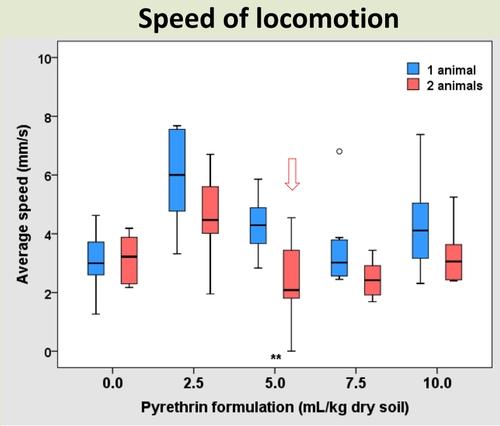
- locomotor activity of isolated animals did not differ (Mann-Whitney test) from paired animals except in the control

Path length



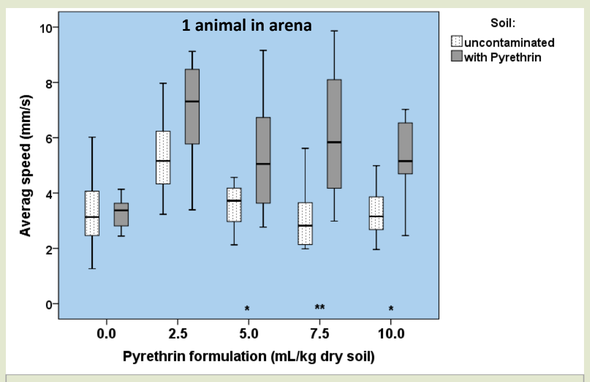
- path length of isolated animals was higher in control and at 5 mL/kg

Speed of locomotion

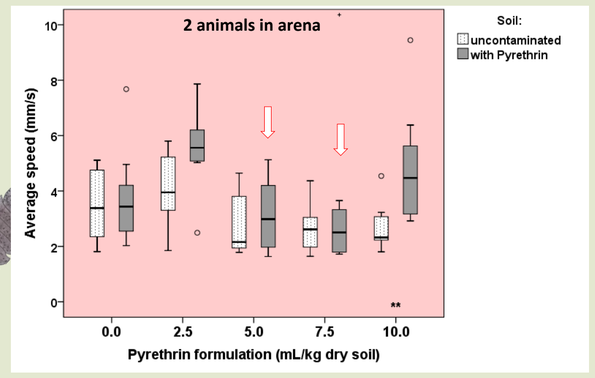


- average speed of isolated animals was higher at 5 mL/kg

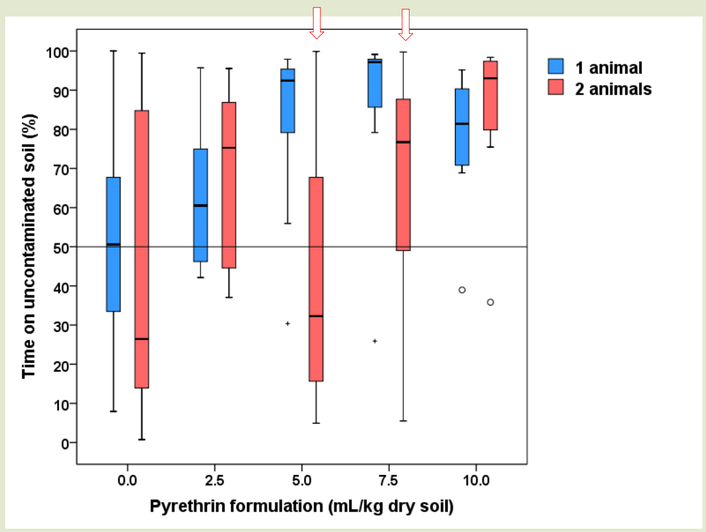
Speed on uncontaminated and contaminated soil



- isolated animals generally move faster on contaminated soil



Avoidance response

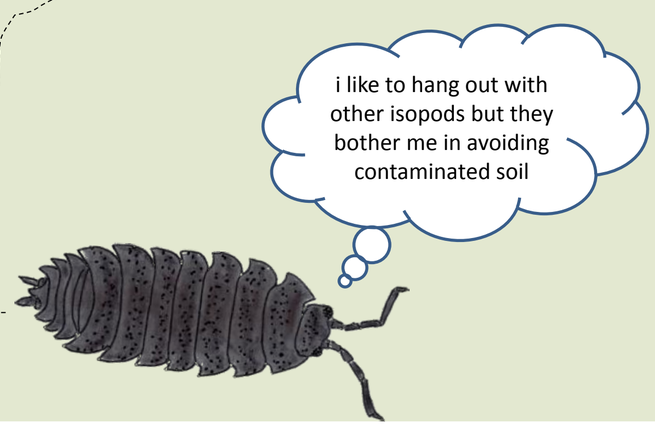


Isolated animals:

- clearly avoided soil contaminated with insecticide;
- most time spent on uncontaminated soil.

Paired animals:

- avoidance was less prominent (high variability), evident only at the highest concentration used



CONCLUSIONS

- **lower activity of animals leads to a less successful avoidance of moderately contaminated soil** (folow arrows ⇩)
- **adverse stimuli from pollution force animals to move faster on contaminated soil if not suppressed by aggregation behavior**
- **the social stimuli might outweigh the adverse stimuli from pollution leading to longer exposure to pollutant**
- **the aggregation behaviour should be accounted for when interpreting results of avoidance tests with groups of social animals, which may underestimate the effect of pollutant**