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## 1. Context

Olfaction is a key sensory modality by which animals, and many other organisms, acquire information about their surrounding world. Earthworms olfaction is still poorly studied whereas chemoreceptors have been identified on earthworms' prostonium and buccal epithelium, and have been shown to detect sucrose, glucose and quinine. However, previous studies exploring the feeding strategies of various earthworm species suggest that these animals exhibit orientation and movement toward particular food sources. Perception of volatiles emitted by food sources could be at the origin of earthworm preference.

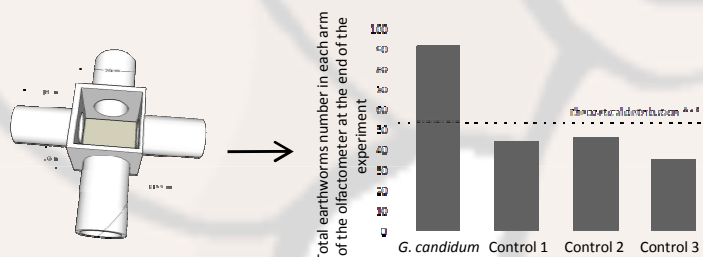
## 2. Objectives

We explored the hypothesis that earthworms, *Eisenia fetida*, use volatile chemicals associated with the soil fungus *Geotrichum candidum*, one of their important food source, during their foraging behaviour.

## 3. Results

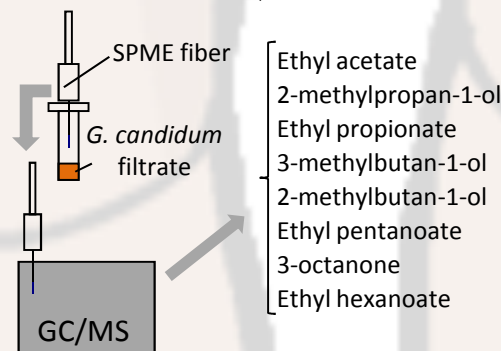
### 3.1. Food perception

In a four-arm olfactometer we have placed 20 earthworms in the central chamber and exposed them to *G. candidum* filtrate (three remaining arms were controls). *G. candidum* filtrate strongly attracted earthworms ( $\chi^2_3 = 34.44$ ,  $p < 0.001$ )



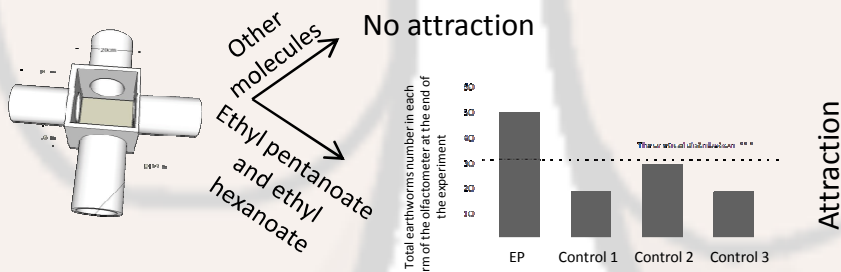
### 3.2. Volatile analyses

Eight volatile compounds emitted by *G. candidum* filtrate were sampled with SPME, analysed and identified by GC-MC.



### 3.3. Volatile perception

Authentic standards of eight molecules were tested separately in the four-arm olfactometer. Two esters exhibited significant attraction to *E. fetida*: ethyl pentanoate ( $\chi^2_3 = 0.3105$ ,  $p < 0.001$ ) and ethyl hexanoate ( $\chi^2_3 = 0.2173$ ,  $p < 0.001$ )



## 4. Conclusion

Our results clearly demonstrate that *E. fetida* are attracted by olfactory cues associated with *G. candidum*, and thus complement previous reports that earthworms are able to actively search for food sources. To the best of our knowledge, no previous studies have identified specific olfactory cues used by earthworms.