

Anecic and Epigeic Earthworms as Potential Biocontrol Agents of *Fusarium graminearum*, Causal Agent of Fusarium Head Blight on Wheat

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Abstract : *Fusarium* Head Blight (FHB) is one of the most important *Fusarium*-caused diseases, which affects cereals with serious detrimental effects on yield and grain quality worldwide. Earthworms have been suggested as an alternative to control this disease, which requires a combination of preventive methods to reduce level of damage, although it has been proven that their effect is species dependent. Our objective was to evaluate the effect of the earthworms *Aporrectodea longa* and *Lumbricus rubellus*, on the inoculum of *Fusarium graminearum* on wheat straw. To test this we kept earthworms in vessels with soil, and *F. graminearum*-inoculated straw covering the surface, under controlled conditions for 6 weeks. Two factors were evaluated with a complete factorial design: earthworms (three levels: without earthworms, *A. longa*, and *L. rubellus*), and straw (two levels: inoculated with the pathogen, and sterile). The presence of *L. rubellus* significantly ($P<0.05$) reduced the amount of inoculated straw at the soil surface 31% after 6 weeks, while the presence of *A. longa*, most found in quiescence, did not have any significant effect on the amount of straw when compared to the control. After incubation, *F. graminearum* was detected by qPCR, only in the surface straw in those treatments inoculated with the pathogen but without earthworms. None of the treatments showed presence of *Fusarium* in the buried straw, soil or earthworm casts. Both earthworm species decreased in body weight during incubation, most likely due to the decrease in soil water content during the experiment, from 25% to 20%, and/or inadequate food supply, since no other source of food was added. However, this reduction in weight occurred indistinctly of the presence or not of *Fusarium* ($P<0.05$). This indicates that both species, of different ecological groups, anecic and epigeic, can reduce *F. graminearum* inoculum present in wheat straw, while their growth is not negatively affected by this pathogen. These promising results place *A. longa*, and *L. rubellus* as potential biocontrol agents of this fungal plant pathogen responsible for *Fusarium* Head Blight disease in wheat, although further ongoing experiments are needed to confirm the repeatability of these results.

Keywords : *Aporrectodea longa*, biological control, fungal plant pathogen, *Lumbricus rubellus*, qPCR, wheat straw

Conference Title : ICSBB 2017 : International Conference on Soil Biology and Biochemistry

Conference Location : London, United Kingdom

Conference Dates : March 14-15, 2017