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Abundant and diverse fungal microbiota inhabit the white female and brown cyst of cereal cyst nematode

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Purpose: Cereal cyst nematode (CCN) is major plant-parasites of agronomic crops worldwide. Hitherto, several fungal species have come to fore diminishing cyst nematode in field soils. However, the information on detailed characterisation of fungal microbiota inhabiting the cyst nematode stages (female and brown cyst) and microbial succession from female to cyst is still limited.

Methods: The CCN white females that were attached on the wheat root and mature brown cysts present in the soil were collected from wheat grown fields located at four different locations in central China and their associated fungal communities were investigated using high-throughput sequencing.

Results: The results showed that there were no significant differences in observed species and Shannon diversity index of fungal communities in the white females and cysts across four locations. However, the fungal microbiota composition was different between white females and cysts. The phylum Mortierellomycota was more abundant in the white female than that in cyst, while Ascomycota had higher relative abundance in the cyst compared to white females. An operational taxonomic unit (OTU) enrichment analysis using combined samples for the white females as well as for the cyst from four locations revealed that only a small subset of OTUs were significantly enriched in white females and cysts. These OTUs were belonging to genera such as Mortierella, Fusarium, Alternaria, Aphroditeola, Cladosporium, Cryptococcus, Olpidium, Penicillium, Periconia and Moleospora. However, the relative abundance of previously well-documented nematode egg-parasites such as Pochonia chlamydosporia, Purpureocillium and other potent taxa were not significantly different between white female and cyst.

Conclusions: Our results indicated that the white females and cysts harbor diverse mycobiota and the majority of fungal taxa remain in steady-state composition from the white females to mature brown cysts.