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## 麦地土壤线虫群落结构对有机肥和秸秆还田的响应

Response of soil nematode community to application of organic manure and incorporation of straw in wheat field

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中文摘要:

通过猪粪有机肥的施用和秸秆还田, 研究其对农田土壤线虫数量、属的种类及群落结构的影响。田间试验处理为CK(不施肥对照)、HF(施化肥)、ZH(猪粪堆肥+化肥)、JHB(秸秆+化肥+秸秆伴侣)、ZHJ(猪粪堆肥+化肥+秸秆)、ZDH(猪粪堆肥有机无机复合肥+化肥)6个处理。结果表明: 在6个施肥处理中共鉴定出4目11科22属线虫, 其中食细菌线虫9属, 食真菌线虫5属, 植食线虫4属, 杂食-捕食线虫4属。JHB、ZHJ和ZDH处理的土壤线虫数量显著高于CK和HF处理, 而HF与CK处理之间没有显著差异; 化肥、有机肥和秸秆配施可以增加食细菌线虫的丰度, 抑制植食线虫垫刃属和螺旋属的繁殖; 除了ZDH外, 其他4个处理的植食线虫丰度明显低于CK。JHB、ZHJ和ZDH的线虫通路比值(MCR)显著高于CK, 表明有机管理的农田土壤腐屑食物网的分解途径主要依靠细菌分解途径。CK、JHB、ZHJ和ZDH的成熟指数(MI)显著高于HF, 表明单施化肥对土壤环境干扰较大。多样性指数( $H'$ )、优势度指数( $\lambda$ )、均匀度指数( $J$ )和瓦斯乐斯卡指数(WI)在6个处理中均没有显著差异。在6个施肥处理中, 均以c-p 2类群的土壤线虫比例最高, 其次是c-p 3-5, c-p 1类群比例最低。通过线虫营养类群、群落结构及生态指数综合分析得出, JHB和ZHJ为最佳施肥方式。

English Summary:

A field experiment, designed to have six treatments, i.e. CK (no fertilizer and/or manure applied); HF (chemical fertilizer); ZH (composted pig manure and chemical fertilizer); JHB (straw, chemical fertilizer and straw mate); ZHJ (composted pig manure, chemical fertilizer and straw); ZDH (composted pig manure based organic-inorganic complex fertilizer and fertilizer) was conducted to explore effects of application of composted pig manure and straw on population, genera and structure of the soil nematode community in the field. Results show that a total of 22 genera of nematodes of 11 families under 4 orders were found and identified in the six treatments, including 9 genera of bacterivores, 5 genera of fungivores, 4 genera of plant-parasites, 4 genera of omnivores-predators. The total number of nematodes was significantly higher in JHB, ZHJ and ZDH than in CK and HF, while no significant difference between HF and CK. Treatment ZHJ increased the abundance of bacterivores, but inhibited reproduction of phytophagous *Tylenchus* and *Helicotylenchus*. All the five treatments, except ZDH, were significantly lower than CK in abundance of plant-parasites. JHB, ZHJ and ZDH were significantly higher than CK in Nematode Channel Ratio (NCR), indicating that in the fields under organic farming, decomposition of the soil detritus food web relies mainly on bacteria. CK, JHB, ZHJ and ZDH was significantly higher than HF in Mature index (MI), indicating that the application of chemical fertilizer only brings about greater disturbance to the soil environment. No significant difference was found between the six treatments in Shannon-Wiener index ( $H'$ ), Dominance index ( $\lambda$ ), Evenness index ( $J$ ) and Wasilewska index (WI). In all the five fertilized treatments, the c-p 2 group of soil nematodes was the highest in proportion, and was followed by the c-p 3-5 group,

and the c-p 1 group the lowest. Comprehensive analysis of nematode trophic groups, community structure and ecological index indicates that JHB and ZHJ were the optimal fertilization modes.

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