

研究报告

镉污染对水稻土微生物量、酶活性及水稻生理指标的影响

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摘要

水稻盆栽条件下,研究了外源Cd不同处理对土壤微生物学指标、土壤酶活性及部分水稻生理指标的影响.结果表明,土壤微生物量C和N开始随Cd浓度增加而上升,到一定浓度时则随Cd浓度增加而下降,其转折点因土壤性质有所差异.同时土壤酶活性变化规律与土壤微生物量C、N变化规律相似,但其转折点浓度因土壤类型及土壤酶种类不同而有差异.Cd污染后的变异系数依次为:脱氢酶>酸性磷酸酶>脲酶.土壤呼吸作用强度和代谢熵都随Cd浓度增大而缓慢增加.水稻叶绿素含量随Cd处理浓度增加表现出先上升后下降,其转折点受供试土壤性质不同而不同;脯氨酸含量与过氧化物酶活性随着Cd处理浓度增大而增加.Cd污染后水稻生理指标的变异系数在黄松田水稻土中依次为过氧化物酶活性>叶绿素含量>脯氨酸含量;黄红壤性水稻土中依次为过氧化物酶活性>脯氨酸含量>叶绿素含量.相关分析表明,种植水稻条件下Cd污染对土壤微生物量、酶活性及水稻生理指标的影响是相辅相成的.

关键词 [水稻土,Cd污染,土壤微生物量,土壤酶活性,水稻生理指标](#)

分类号

Effects of Cd contamination on paddy soil microbial biomass and enzyme activities and rice physiological indices

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Abstract

A pot experiment with rice under submerged condition showed that with the increase of Cd concentration, soil microbial biomass carbon (C_{mic}) and nitrogen (N_{mic}) increased initially but decreased at a certain concentration, and the turning points varied with different soil types. Soil enzyme activities had the similar variation trend with soil C_{mic} and N_{mic}, and the turning points varied with different soil types and soil enzymes. The variation coefficients were in order of dehydrogenase activity > acid phosphatase activity > urease activity. Soil respiration rate and metabolic quotient increased tardily with increasing cadmium concentration. The chlorophyll content of rice increased initially but decreased then with the increase of Cd contamination, and the turning points differed with different soil types. Rice proline content and peroxidase activity were enhanced gradually with increasing cadmium concentration. The variation coefficients of rice physiological indices on paddy soils derived from silty loam and clayed red earth were in order of peroxidase activity > chlorophyll content > proline content, and peroxidase activity > proline content > chlorophyll content, respectively. Correlation

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analysis indicated that there was a close correlation between the variations of soil microbial biomass and enzymatic activities and rice physiological indices under Cd contamination.

Key words [Paddy soil](#) [Cd contamination](#) [Soil microbial biomass](#) [Soil enzymatic activity](#) [Rice physiological indices](#)

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