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不同种植模式下菜地土壤腐殖质组分特性的动态变化

Dynamic changes in humus composition in vegetable soils different in cultivation mode

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中文摘要:

通过在南京普朗克有机农场开展的9年长期定位监测,研究了有机(露地和大棚)和常规种植模式下蔬菜地耕层土壤有机碳和土壤腐殖质组分特性的动态变化。结果表明,有机露地、有机大棚和常规露地种植土壤有机碳含量分别从11.41、9.29、9.00 g kg⁻¹提高至15.35、20.90、10.00 g kg⁻¹;胡敏酸碳(C_{HA})分别从1.79、1.23、1.14 g kg⁻¹提高至2.11、3.11、1.31 g kg⁻¹;富里酸碳(C_{FA})分别从2.19、1.88、1.73 g kg⁻¹提高至2.44、2.68、1.91 g kg⁻¹。两种有机种植模式的土壤有机碳及腐殖质组分含量增加达到显著水平,而常规种植模式下的变化不显著。两种有机种植模式下表征土壤腐殖质品质的胡/富比(C_{HA}/C_{FA})、胡敏酸占总腐殖物质的比例(PQ值)均高于常规种植模式,土壤富里酸的光学密度值E₄/E₆、色调系数(ΔlogK)值随着种植时间增加的幅度较常规种植模式更大,土壤胡敏酸芳化度呈现先降低后增高的趋势,但在常规种植下变化不明显。说明土壤在长期有机种植模式下不仅更有利于土壤有机碳的积累,而且能促进土壤腐殖化进程。

Abstract:

A long-term (9 years) field observation was carried out in the Plank Organic Farm in Nanjing to study dynamic changes in soil organic carbon and soil humus composition in vegetable soils different in cultivation mode (organic field, organic greenhouse and conventional field). Results show that the 9 years of vegetable cultivation increased soil organic carbon (SOC) from 11.41 to 15.35 g kg⁻¹, from 9.29 to 20.90 g kg⁻¹ and from 9.00 to 10.00 g kg⁻¹, humic acid carbon(C_{HA}) from 1.79 to 2.11 g kg⁻¹, from 1.23 to 3.11 g kg⁻¹ and from 1.14 to 1.31 g kg⁻¹, and fulvic acid carbon(C_{FA}) from 2.19 to 2.44 g kg⁻¹, from 1.88 to 2.68 g kg⁻¹ and from 1.73 to 1.91 g kg⁻¹, in the organic field, organic greenhouse and conventional field, respectively. The increases in the soils under organic cultivation either in open field or in greenhouse were significant, but not so in the soil under conventional cultivation. C_{HA}/C_{FA} ratio and PQ value are two important indicators characterizing quality of soil humus, and were both higher in the soils under organic cultivation than in the soil under conventional cultivation. E₄/E₆ ratio and ΔlogK value of soil fulvic acid increased, too, in all the soils, but the increase grew more significant with age of the vegetable cultivation in the former than in the latter. Aromaticity of the soil humic acid displayed a trend of declining first and then rising, which was not so significant in the soil under conventional cultivation. All the findings indicate that long-term organic cultivation may not only be conducive to SOC accumulation, but also promote the process of soil humification.

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