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滩涂土壤有机碳空间分布与围垦年限相关性分析

Spatial distribution of organic carbon in coastal saline soil and its correlation with reclamation age

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英文关键词: [soils](#) [organic carbon](#) [spatial variables measurement](#) [coastal saline soil](#) [reclamation ages](#)

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中文摘要:

中国具有治理和修复潜力的滨海滩涂盐土面积约为2 000 hm²。滨海滩涂盐土作为新成土壤, 土体发育不明显、理化性状差、肥力水平低下。该文通过对东台境内表壤有机碳的采样分析, 在ArcGIS地理信息系统及SPSS16.0系统平台上, 利用地统计分析模块中的克里格法分析东台市表层土壤有机碳的空间变异规律, 并分析不同滩涂年限下表层土壤有机碳、总氮、pH值、EC1:5的变化特征及其相关关系, 结果显示滨海表层土壤有机碳含量与总氮、围垦年限呈极显著正相关, 相关系数r分别为0.959和0.749, 与pH值、电导率EC1:5呈极显著负相关, 相关系数r分别为-0.478和-0.649。围垦3 a以上表层土壤有机碳可增加0.24%左右, 总氮质量分数增加0.02%左右; 围垦时间大于2 a, 有机碳质量分数自0.1%增加到1.6%, 全氮质量分数自0.03%增加到0.12%, 养分等级也相应从6级增加到3级。该文研究表明, 滨海盐土随着围垦年限的增长, 土壤碳量与总氮含量随之增加、pH值与EC1:5随之降低, 耕地质量也相应提高。

英文摘要:

With the impact of global climate change, the concern with ecosystem carbon sources and sinks has been growing. Soil carbon pool is the largest terrestrial ecosystem and the turnaround time is the slowest, which is the important factors controlling the size of the CO₂ concentration in the atmosphere. Coastal saline soils is a kind of neoformative soils with poor soil physical and chemical properties and low level fertility. There are approximately 2,000 hectares in China, which means a large potential soil carbon pool. In this study surface soil organic carbon content (SOC) was analyzed through soil samplings within the Dongtai county, which is located in the middle and lower reaches of the Yangtze River with beach area of 156 hm². There are different seawalls of ages from ancient times. With the geographic information system (GIS) method and SPSS 16.0 system, the spatial variation of surface SOC were investigated, which turned out a strong relationship with the seawall innning line, the lowest near the sea, and increasing from the beach to the inland. The correlations of the surface SOC, total nitrogen content (TN), pH value, EC1:5 values under different beach reclamation ages were analyzed. The results showed that there was a significant positive correlation ($P < 0.01$) between SOC and TN, reclamation ages, and the correlation coefficients (r) are 0.959 and 0.749, respectively. Meanwhile, a significant negative correlation ($P < 0.01$) was presented between SOC and EC1:5, pH value, the correlation coefficients were -0.478 and -0.649, respectively. High EC1:5 and pH value were significant features of coastal saline soils, which limited the growth and reproduction of soil microorganism, fauna and flora, as well as the accumulation of organic matters. With more than 3 years of reclamation, under natural vegetation succession or human agricultural use, especially after irrigation and other agricultural production activity, the soil salinity reduced greatly, and the surface SOC and TN can increased about 0.24% and 0.02% respectively, comparing with the values before reclamation. After 52 years reclamation, the surface SOC increased from 0.1% to 1.6%, the TN increased from 0.03% to 0.12%. While the nutrient level increased from six class to three class accordingly. This study indicated that the EC1:5, pH value decreased with the increasing reclamation period, and soil carbon storage and total nitrogen content increased with the increasing reclamation period. Therefore, the quality of coastal saline soils was improved through reclamation process.

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