

研究论文

四川盆地稻田多熟高效保护性耕作模式的生态系统服务价值评估

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摘要 运用生态系统服务功能价值评估方法, 对四川盆地稻田保护性耕作条件下多熟高效保护性种植模式进行生态经济评价。结果表明, 油-稻-芋模式比油-稻传统耕作种植模式的农产品服务价值高32.42%, 固定CO₂和释放O₂的价值高17.03%; 麦-稻保护性耕作模式比麦-稻传统种植模式农产品服务价值高55.21%, 固定CO₂和释放O₂的价值高9.40%。油-稻秸秆还田双免耕模式比油-稻传统耕作种植模式土壤积累有机质的价值高0.23%, 农田生态系统维持营养物质循环的价值高12.35%; 麦-稻保护性耕作种植模式比麦-稻传统耕作种植模式土壤积累有机质的价值高0.39%, 农田生态系统维持营养物质循环的价值高12.81%; 稻草覆盖还田后油菜田的农田涵养水分价值增加11.66%, 小麦田农田涵养水分价值增加32.63%。

关键词 稻田; 保护性耕作; 生态系统服务; 价值评估

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Evaluation of the multi-cropping ecosystem services under conservation tillage paddy field in Sichuan basin

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Abstract Environmental protection is of prime importance for the sustainable development of the society. With the development of rural economy, ecosystem service is attracting the attention of many scientists. Conservation tillage has been widely adopted in the rice grown region in southern China. The key technique in a conservation tillage system of paddy field integrates different practices like minimum tillage, no-tillage, residue mulching, and multi-cropping to protect soil and water erosion and to maintain soil health. Our objective was to evaluate the value of ecosystem service of paddy field under the multi-cropping model in Sichuan basin of southwest of China. The 'Market Value' method was applied for analyzing the data. In this method the net increase in value of produce is considered as the produce service value. The results indicated that the ecosystem service value of the conservation tillage increased significantly compared to the conventional tillage. The value of primary products and adjacent air by the ecosystem in rape-rice-potato conservation tillage model increased by 32.42% and 17.03%, respectively, compared to the rape-rice model. In wheat-rice conservation tillage model, the corresponding increase in the same parameters was 55.21% and 9.40% compared to the traditional model. The increase in ecosystem service value of soil organic matter accumulation was 0.23% and 0.39% and the value of nutrition cycle maintaining was 12.35% and 12.81% in conservation tillage rape-rice and wheat-rice cropping systems, respectively over traditional tillage models. The influence of rice residue mulch on soil water conservation was significant as well in rape and wheat fields. The increased values in water conservation were 11.66% and 32.63% in rapeseed and wheat field, respectively. Besides the improvement in the value of produce service, the greatest contribution of ecosystem service in conservation tillage is

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s the nutrient cycle maintenance followed by the soil water conservation. The air quality had also been improved by the conservation tillage systems. However, conservation tillage had some negative influence on the soil texture. The plough layer is getting hard and the soil borne diseases are increasing with the increase in the duration of conservation tillage. In general, there is tremendous increase in the value produced by the conservation tillage of the paddy field ecosystem.

Key words paddy field conservation tillage ecosystem service evaluation

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