

# 五節芒與培地茅對土壤碳庫影響之研究

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## 摘 要

土壤有機碳庫是全球碳循環的重要組成部分，並且直接影響全球的碳素平衡。本研究利用五節芒與培地茅為試驗材料，探討模擬自然環境生長下五節芒與培地茅對土壤碳庫之影響。結果顯示：自展開葉所測得之光合作用速率，五節芒較培地茅高，且地上部乾物重累積可達 $1966\text{g pot}^{-1}\text{year}^{-1}$ ，為培地茅之3.67倍。而種植五節芒之不同土層土壤的有機碳（SOC）含量、 $\delta^{13}\text{C}$ 值及C %均顯著高於培地茅，顯示五節芒根圈衍生碳素釋入土壤碳庫能力較培地茅高。

五節芒與培地茅種植一年後，由地上部測得之 $\delta^{13}\text{C}$ 值分別為-13.75‰與-13.4‰，顯示兩者皆屬C4途徑具高光合效率。另自其土壤測得總碳含量(C%)比慣行法栽培之水稻、玉米、狼尾草田區之土壤C%含量均較多。因此以上各項優點使五節芒與培地茅成為土壤保育、生物質原料、生態環境改良與土壤碳庫蓄積功能之優良草種。

關鍵詞：五節芒、培地茅、碳庫、穩定性同位素

# Effects of Silver-grass and Vetiver on soil carbon pools

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## Abstract

Soil organic carbon(SOC) is an important component of the global carbon cycle and has direct effects on the global carbon balance . The objectives of this study were to determine the effects of Silver-grass and Vetiver grass on soil carbon pool in natural environmental conditions. The results showed that :

The photosynthetic rate of Vetiver grass was lower than Silver-grass. The biomass of Silver-grass was larger than Vetiver, and the maximum dry weight was  $1966\text{g}\cdot\text{pot}^{-1}\cdot\text{year}^{-1}$  3.67 times higher than Vetiver grass. The values of SOC,  $\delta^{13}\text{C}$  and C % in different depth of the soil from Silver- grass-planted were significantly higher than that from Vetiver-planted soil. Which indicated that the ability of Silver-grass root-derived carbon (C) input into the soil was better than Vetiver grass. The  $\delta^{13}\text{C}$  values in shoot of Silver-grass and Vetiver grass were  $-13.75\text{‰}$  and  $-13.4\text{‰}$  , indicated that Silver-grass and Vetiver grass were both high in photosynthetic efficiency. The C % values of soil planted Silver-grass and Vetiver grass were higher than rice, corn and elephant-grass in traditional cultivation system.

Hence, silver-grass and vetiver grass have been proved to be the ultimate grass species for soil and water conservation, Biomass Feedstock, ecologic environment improvement and SOC storage.

Keywords: Silver-grass, vetiver, carbon pool, stable isotope