Stoichiometric Ratios of Cotton Soils Under Different Land Management Practices

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Cotton farming throughout Australia is thought to have an effect on the stoichiometric ratios of carbon, nitrogen and phosphorous within the soil under different crop rotation and soil management practices. These practices are hypothesised to create an imbalance within the nutrients which may inhibit carbon sequestration. Present knowledge indicates a steady fall in sequestered carbon rates since sampling began in 1993 due to the intensification of rotational cotton cropping. The initial change in land use from natural open woodland to an intensive cropping system is thought to have been the trigger releasing carbon stored within the soil into the atmosphere, which is yet to be returned. The main objective of this research was to analyse dryland and irrigated cotton cropping sites for their stoichiometric ratios to see if the different treatments were having an effect these ratios. The nitrogen to carbon and phosphorous to carbon ratios were compared to the optimal ratios as suggested in the literature, to discern where within the system carbon storage is low due to an undersupply of nitrogen and or phosphorus. Results indicate that the addition of nitrogen to dryland cropping systems is not providing a beneficial response in increasing carbon storage. This contrasts irrigated systems in which the addition of nitrogen resulted in a significant increase to soil carbon stores, when corrected for varied crop management strategies. This discovery has the potential to alter recommended fertilizer addition ratios over cotton cropping systems.