

Mulch and biochar provide plant and soil health benefits in a climatically changing Vietnamese Mekong River Delta dry season

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Biography: After growing up in southwest Victoria and working three gap years on a station near Hamilton post school. It was during this time where i developed the love for agriculture and which propelled me to eventually driving myself through the front gates of university. It was last year when i completed my final year of my bachelors of Agriculture science at Charles Sturt University (CSU) in Wagga Wagga. As apart of my final year i was fortunate to go over to the Mekong Delta (Vietnam) to complete my Honours year. I spent four months living in Can Tho where I conducted a glasshouse trial while spending time on field trials. My area of research for this project was looking at growing cowpea as a productive alternative to rice grown in the dry season within the 3 crop rice system maintained in the Delta. I looked at cowpea optimisation through phosphorus and the interaction with salinity. It was over here where i discovered my love for overseas research and research more broadly. I can't now imagine a life without Vietnam in it. I'm currently working as a technical officer at CSU but i feel there is something more for me around the corner. What exactly that is, I'm not sure but I'm optimistic nonetheless.

Climatic changes to the Vietnamese Mekong River Delta dry season are driving the need for alternative crops and management practices to rice. Finding suitable alternative crops is further complicated by spatial differences across the Delta where some provinces are affected by land subsidence and waterlogging early in the growing season, some provinces by sustained high temperatures during reproductive stages of growth, and some provinces affected by saline intrusion and freshwater shortages. Optimising the growth of alternative crops with the use of rice straw mulching and rice husk biochar utilises a readily available waste product whilst potentially providing plant and soil health benefits. A range of field trials across the Mekong River Delta have examined the use of mulching rates (ranging from 0-10 t/ha) and biochar additions (5 t/ha) on plant growth and soil health factors. Measurements of plant yield, water use, and soil microbial biomass and diversity, have been recorded across multiple growing seasons in conjunction with alternative crops including redbeet, maize, cowpea and quinoa. Mulching rates of 7.5 t/ha continuously grew the highest plant yields whilst decreasing the quantity of applied irrigation water by over 50%. Mulching significantly reduced the soil electrical conductivity and increased soil microbial biomass and diversity. Rice straw mulch and biochar reduce evapotranspiration and retain soil moisture which enables plants to effectively utilise applied irrigation water. Mulch and biochar are also rich in carbon and play a pivotal role in nutrient cycling in soil microbial systems which increases microbial activity. Whilst matching alternative crops tolerance of various abiotic stresses to different provinces is proving successful, the associated management practices of rice straw mulching and biochar additions are proving to be consistently beneficial management practices to implement across the Delta regardless of spatial variations in abiotic stresses.