

## Green solution to clean up pollutants: A scope for sustainability and soil productivity

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Land treatment of wastewater is providing economic and environmental benefits to both wastewater treatment industries and farming community. Australian abattoirs discharge 7225 ML of wastewater annually to the environment with high concentration of nitrogen (N - 250 mg/L) and phosphorus (P - 150 mg/L), thereby causing environmental degradation. These surplus nutrients can be effectively recaptured by growing energy crops; eventually leading to cleaner energy production. In this study, a calcareous soil was irrigated with abattoir wastewater and four plant species were grown. Pennisetum purpureum (125g) and Helianthus annuus (115g) showed high biomass yields, followed by Sinapis alba (70g) and Medicago sativa (25g). The plants grown under tap water showed about 30% lower yields compared to the abattoir wastewater irrigation. A significant variation in root structure has been observed in between treatments and within the species used. In particular, the root length and number of root tips showed marked differences between wastewater and tap water treated. The root length of Pennisetum purpureum grown in wastewater was 267 cm plant<sup>-1</sup>, which was comparatively lower than tap water irrigated plant 376 cm plant<sup>-1</sup>. Wastewater irrigation to the plants grown on calcareous soil improved the fertility of soil by adding essential plant nutrients and hence the root structure was not diversified as seen in tap water irrigation. This can be attributed to the readily available nature of the nutrients from the wastewater compared to tap water, where there is a limitation in nutrient supply. The biomass produced can be used as a fodder and/or for energy production. A mass balance calculation on the overall nutrients over a few cropping periods will help us in understanding the nutrient cycling processes involved in the abattoir irrigated land treatment sites, which will serve as an effective tool for the environmental management .