

Effect of manure quality on nitrate leaching and groundwater pollution in wetland soil under field tomato (*Lycopersicon esculentum*, Mill var. Heinz) rape (*Brassica napus*, L var. Giant)

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Abstract

Social media in its various forms drew international attention to Zimbabwe during the Recent decades have seen an increase in groundwater pollution thought to be a consequence of increasing intensity of land use, primarily through greater use of high N analysis materials as fertilizers. A two-season lysimeter experiment was carried out in a wetland in central Zimbabwe in order to determine the effect of cattle manure quality on (1) NO₃-N concentration in leachate and nitrate leaching (2) dry matter accumulation and uptake of N by tomato and rape crops grown in wetland conditions. Two cattle manure quality types based on N content were used in the experiment. The manure collected from a kraal of the smallholder wetland community was classified as high quality manure (high N, 1.36 % N) while that collected from the adjacent commercial farming area was classified as low quality manure (low N, 0.51 % N). The two manure types were applied in rates of 0, 15, 30 Mg ha⁻¹. The treatments were arranged in a randomized complete block design with four replicates. When 15 and 30 Mg high and low N manure ha⁻¹ were applied, the concentration of NO₃-N in leachate exceeded the recommended 10 mg L⁻¹ concentration in portable water by 15–104 and 53–174 % respectively. The substitution of 15 and 30 Mg of high N manure with 15 and 30 Mg ha⁻¹ of low N manure reduced total N lost through leaching by 10–43 and 22–69 % respectively. Ground water contamination by nitrate overload can be considerably reduced by application of low N manure to vegetable crops.