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Long term effect of wastewater irrigation of forage crops on soil and plant quality parameters

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Abstract: In this study, sites irrigated with wastewater for 10, 5, and 2 years and site not irrigated were sampled for soil and plant chemical analysis to evaluate its long term effect. Long term wastewater irrigation increased salts, organic matter and plant nutrients in the soil. Soil pH was not consistently affected. Soil Cu was not affected by wastewater application while Zn, Fe and Mn was not consistently affected. Wastewater irrigation had no significant effect on soil heavy metals (Pb and Cd) regardless of duration of wastewater irrigation. The barley biomass increased with added wastewater and nutrients provided with the wastewater. However, longer period of wastewater application (10 years) resulted in lower biomass production but remained higher than that of the control plants. Plant essential nutrients (Total-N, NO₃, P, and K) were higher in plants grown in soils irrigated with wastewater. Plant Cu, Zn, Fe, Mn increased with 2 years of wastewater irrigation, then reduced with longer period. Plant Pb and Cd increased with wastewater irrigation and their levels were higher the longer the period of wastewater irrigation. Based on these results, it can be concluded that proper management of wastewater irrigation and periodic monitoring of soil and plant quality parameters are required to ensure successful, safe, long-term wastewater irrigation