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“Bridging the gap between increasing knowledge and decreasing resources”

Subsurface Irrigation as a Promising Approach to Reduce Pathogenic Impact When Using Wastewater

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Abstract

In developing countries irrigated agriculture consumes up to 90 % of available water. Increasing pressures on the scarce resource force farmers and stakeholders to manage their water in an efficient way in order to sustain their livelihood. The ComASI project - A Comprehensive Analysis of Subsurface Irrigation in SSA for an optimisation and adaption of an environmental friendly irrigation practice - bundles results of different research projects dealing with subsurface irrigation techniques. Subsurface irrigation (SSI) means water supply beneath the soil surface directly in the plant rooting zone with dry plant foliage (preventing plant diseases) and dry soil surface (minimising evaporation). The project comprises 4 existing subsurface irrigation techniques in 5 different countries: subsurface drip irrigation (SDI - Côte d'Ivoire, Turkey), porous hose (porous pipe/ Namibia) and auto regulative subsurface irrigation technology (ARSIT/ Algeria, Kenya). Within the framework each project is conducting analysis of SSI methods in field trials under local conditions with respect to water productivity, use of low quality water, salinity effects, and socio economic aspects. Results from Kenya and Turkey where wastewater was applied show an adequate use of wastewater in irrigated agriculture. In Turkey the research was conducted at the International Agricultural Research and Training Centre Menemen-Izmir (IARTC) in 2013. In this research, lettuce was irrigated by 3 different irrigation methods, drip irrigation, subsurface drip irrigation and furrow irrigation, with treated domestic waste water. In Kenya the research was conducted at the Egerton University. In this experiment ARSIT and drip irrigation irrigated french beans with wastewater effluent from the University pond. Anion-cation, pollution analyses and fecal coliform tests were run. Further soil samples were taken and analysed in order to monitor the status of the pathogens in soil. To investigate the impact on the crops, parameters like height, yield, and leaf area index were checked. As a conclusion with higher yields and reduced pathogenic contamination, subsurface irrigation is an optimum technique to substitute scarce natural water resources. Furthermore there is a reduced risk for farmers as they don't get in contact with waste/-water due to the water application directly in the plant rooting zone.

Keywords: Irrigation, subsurface irrigation, wastewater, water saving