



Tropentag, September 19-21, 2012, Göttingen -
Kassel/Witzenhausen

“Resilience of agricultural systems against crises”

Subsurface Irrigation by Auto-regulative Working Porous Pipes Tested in Field Trials

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Abstract

According to Food and Agriculture Organisation of the United Nations (FAO) irrigation consumes 70 % of surface and groundwater resources of the world. In developing countries this value may attain 95 %. Due to irrigation, climate change and population growth, in many countries water consumption exceeds the renewable water resources, leading to widespread groundwater depletion and water scarcity. It can be assumed that current irrigation methods use only a minor portion of the applied water, and that losses up to 60 % due to percolation, evaporation and water management are common.

The authors present a BMBF joint research project dealing with an innovative approach to water-saving irrigation, based on porous irrigation pipes as an upgrade of both subsurface and traditional pot irrigation. Clay pot (pitcher) irrigation is a type of subsurface irrigation. The unglazed porous clay pot is embedded in the ground and filled with water, which eventually drains through the porous pot wall. Savings of up to 70 % compared with conventional irrigation methods were observed, as well as a significant reduction of fertiliser requirements.

In the BMBF joint research project (partners comprise both Algerian , Kenyan and German Universities, GIZ, DITSL, C.R.S.T.R.A - Research Center for Science and Technologies in Arid regions, German industry companies) which investigates in an effective subsurface irrigation technology following the pot-irrigation principle. Due to the specific material properties, the irrigation pipes are auto regulative, i.e. they release water depending on soil moisture and thus the plants' water demand. This innovative irrigation technology will be field-tested in Algeria and Kenya from 2012 through 2013.

The irrigation method offers an easy-to-use low-tech system. Compared with existing irrigation methods, the system owns a high saving potential in terms of water consumption as well as operating costs. It is easy to handle and to maintain and environmentally sustainable.

Preliminary research works on the method of operation, laboratory tests and first results of the field-trials will be presented.

Keywords: Auto-regulative, intelligent irrigation, irrigation, subsurface irrigation, water saving