

CROP PRODUCTION AND WATER USE EFFICIENCY UNDER SUBSURFACE POROUS CLAY PIPE IRRIGATION

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ABSTRACT

Subsurface irrigation is considered well suited for arid regions due to minimal surface evaporative and deep percolation water losses because with this method required amount of water is directly applied to the root zone. However, people are reluctant to adopt subsurface drip and leaky pipe irrigation methods as they are not only expensive but are also difficult to install, operate and maintain. Therefore, there is a dire need to introduce and practice traditional irrigation methods in water scarce regions with arid climate. One of these methods is porous clay pipe irrigation method. To assess viability of the porous clay pipe irrigation as a water conservation technique under arid climate, an experimental study was conducted on an area of about 500 m² of a sandy loam at Sindh Agriculture University, Tandojam, Pakistan. Clay pipe segments, each of length 40 cm, were joined together and then buried in 25 trenches (laterals), each of 20 m length and 0.43 m depth. Water was supplied from an overhead tank to all the laterals via main line. When soil above laterals became visibly wet, soil moisture distribution within root zone was determined and simulated with HYDRUS-2D. Okra, Eggplant and turnip were then sown separately on moist soil above laterals. These vegetables were irrigated until harvest through buried clay pipe laterals. The experimental results revealed that with this method water savings up to 80% were achieved compared to that of surface irrigation methods. Also yield of vegetables irrigated with this system was 5 to 16% more than the normal production obtained with surface irrigation methods.

Keywords: Clay pipe, irrigation, hydrus-2D, moisture, root zone, subsurface