



Potentials and problems of sustainable irrigation with water high in salts

Alon Ben-Gal

Soil Water and Environmental Sciences, Agricultural Research Organization, Gilat Research Center, Israel

Water scarcity and need to expand agricultural productivity have led to ever growing utilization of poor quality water for irrigation of crops. Almost in all cases, marginal or alternative water sources for irrigation contain relatively high concentrations of dissolved salts. When salts are present, irrigation water management, especially in the dry regions where water requirements are highest, must consider leaching in addition to crop evapotranspiration requirements. Leaching requirements for agronomic success are calculable and functions of climate, soil, and very critically, of crop sensitivity and the actual salinity of the irrigation water. The more sensitive the crop and more saline the water, the higher the agronomic cost and the greater the quantitative need for leaching.

Israel is a forerunner in large-scale utilization of poor quality water for irrigation and can be used as a case study looking at long term repercussions of policy alternatively encouraging irrigation with recycled water or brackish groundwater. In cases studied in desert conditions of Israel, as much of half of the water applied to crops including bell peppers in greenhouses and date palms is actually used to leach salts from the root zone.

The excess water used to leach salts and maintain agronomic and economic success when irrigating with water containing salts can become an environmental hazard, especially in dry areas where natural drainage is non-existent. The leachate often contains not only salts but also agrochemicals including nutrients, and natural contaminants can be picked up and transported as well. This leachate passes beyond the root zone and eventually reaches ground or surface water resources. This, together with evidence of ongoing increases in sodium content of fresh produce and increased SAR levels of soils, suggest that the current policy and practice in Israel of utilization of high amounts of low quality irrigation water is inherently non-sustainable. Current trends and technologies allowing economically feasible desalination at large scales present a sustainable alternative where salts are removed from water prior to irrigation.