

Irrigation and Drainage: Irrigation and Drainage

A comparative analysis of yield gaps and water productivity on smallholder farms in Ethiopia, South Africa and Tunisia

Jovanovic, Nebojsa
Musvoto, Constansia D
De Clercq W
Pienaar C
Petja B
Zairi A
Hanafi S
Ajmi T
Mailhol JC
Cheviron B

ABSTRACT:

Agriculture in developing countries will have to transform and increase production by an estimated 70% in order to meet demands by 2050. Although well-managed commercial farms offer little manoeuvring space for increasing agricultural water productivity, smallholder farms usually operate at low input costs and therefore provide ample opportunities to reduce the potential yield gap through agricultural intensification. The aim of this paper is to analyse and compare yields and water productivities obtained in field and modelling experiments in Ethiopia (maize, garlic, onion), South Africa (tomato) and Tunisia (tomato, potato, wheat). Innovative agricultural practices were introduced on smallholder farms: irrigation scheduling and NPS Zn fertilization in Ethiopia; high-yielding cultivar, drip irrigation, mulching and organic amendments in South Africa; and crop water modelling in Tunisia. In general, crop yields increased up to eight times with innovative practices compared to current conventional farming practices. Crop water productivities were fairly stable within the same experiments, but increased with innovations, indicating that intensive farming can be more environmentally sustainable than conventional farming. Intensive farming systems in a resource-rich environment (high radiation levels, relatively fertile, deep and well-drained soils), combined with technology transfer and capacity building could be seen as viable strategies to secure food for smallholders and communities in African rural areas, as well as to improve water utilization in water-scarce catchments.