Annals of Arid Zone 55(3&4): 63-66, 2016

Editorial: Improving Water Productivity in Dry Areas

V. Nangia[1]* and N.D. Yadava[2]

[1] *International Center for Agricultural Research in the Dry Areas (ICARDA), Rabat, Morocco*

[2] *ICAR-Central Arid Zone Research Institute, Regional Research Station-Bikaner, Rajasthan, India*

Introduction

About 41% of the Earth's land area is classified as dryland wherein the farming system is characterized by approximately 300-500 mm of annual rainfall. The low rainfall, which is not only insufficient but irregular, constitutes a major challenge to profitable farming in dry areas. Nevertheless, local populations depend on these lands for producing food and drylands are inhabited by more than two billion people worldwide.

With a growing and more affluent global population, food demand is projected to nearly double by 2050. Without increases in water productivity, crop water requirements may increase by 70-110% with potentially serious implications for the environment. There is an urgent need to reduce the amount of water abstracted for agriculture by producing more food, income, livelihoods, and ecological benefits at less social and environmental costs per unit of water used. Water productivity, defined in physical terms, is the ratio of the mass of agricultural output to the amount of water used. In an economic sense, water productivity reflects the value derived per unit of water used. Improving physical water productivity in irrigated and rainfed agriculture reduces the need for additional water and is thus a critical response to increasing water scarcity.

Fortunately, there is substantial scope for improving physical water productivity in both rainfed and irrigated agriculture, particularly in dry areas of Africa and Asia where yields are low because of sub-optimal nutrient and water supply.

There is great interest in learning from success stories from research in drylands around the world which this Special Issue aims to capture. A total of twelve articles are included in this Issue which report on studies carried out in rainfed as well as irrigated drylands of India and Pakistan in South Asia, irrigated drylands from Uzbekistan in Central Asia, hyper-arid drylands of Saudi Arabia, Egypt and Morocco and semi-arid drylands of Lebanon in West Asia and North Africa.

Dhehibi *et al.* (2016) report on the impacts of primary production factors on the total production of the main crops produced in Egypt. Findings show increasing returns to scale for berseem and cotton, but decreasing returns to scale for wheat, rice and maize production. Except for berseem and wheat, the irrigation water productivity for rice, cotton and maize were relatively low compared to the global average levels reported by the FAO (1.09, 0.65 and 1.80 kg m^{-3} for rice, cotton and maize, respectively). Overall, marginal productivity of irrigation water for the studied crops, especially for cotton, was low. Farmers have scope for increasing the production of these crops by applying water more efficiently. This, according to authors, highlights the need for improving irrigation performance through improved water management practices.

Karam and Nangia (2016) report of a twelve-year experiment conducted in Lebanon to determine the effects of deficit irrigation on yield and water productivity in six annual crops; maize, soybean, cotton, sunflower, bell pepper and eggplants. Results show that deficit irrigation caused in all crops lowering of yields but resulted in higher water productivity compared to the well-irrigated control. For soybean, deficit irrigation at mature seeds was more profitable compared to full bloom and seed enlargement. Moreover, flowering was most critical growth stage for sunflower and therefore deficit irrigation should be avoided at this stage, while it is acceptable at seed formation. For cotton, timing deficit irrigation at first open boll provided the highest lint yield with maximum water productivity, in comparison to deficit irrigation at early- and mid-boll loading. For maize, deficit

*E-mail: V.Nangia@cgiar.org