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Implementation of water-saving agro-technologies and irrigation methods in agriculture of Uzbekistan on a large scale as an urgent issue

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Abstract

Usable water resource is limited, even though 71% of world is covered by water. Therefore, enough conflicts to the usable water can be found throughout the world. Usable water for irrigation is a top priority, probably it would be seconding only to the drink water supply. However, prioritizing one usage over another is challenging to many stakeholders. Therefore, sustainable water usage is essential to avoid any conflicts among the stakeholders; nevertheless, highly challenging in the developing world. Therefore, this paper discusses the water saving irrigation practices and ways to use agriculture around the world, including Uzbekistan. Relying on the ancient irrigation technologies used by ancestors and also modern irrigation methods, different irrigation water management technologies are presented to apply for various weather conditions and water availability situations. Suitable irrigation practices are discussed based on the water needs especially the arid countries, such as Uzbekistan. The results of an experiment conducted for hilly areas of Uzbekistan using “mulching” agro-technology is presented along with its suitability for Uzbekistan. Therefore, the expectations of sustainable water usage for irrigation is proposed.

Keywords Micro irrigation · Mulching agro-technology · Surface irrigation · Water saving agro-technologies · Water scarcity

Introduction

The highest quantity of water in the world is used for irrigation with respect to water withdrawals, which is considered 70% and it was reported that in some countries more than 90% of water consumption is used for irrigation purposes (Raximov et al. 2020). An annual average of 2,664 Billion m³ (BCM) of water are used for irrigation from the available fresh water sources in the world. The misuses and wastages of water can be considered one of the main reasons for

water scarcity (Zhou et al. 2016). Therefore, many countries tend to use advanced technologies for irrigation to get maximum food production from minimum amount of supplied water (Kemp and Hafi, 2001). The demand for food have been increased with time due to the increment of population (Hoffman et al. 2007; Feng et al. 2020). In addition, the main reason for decrement of water level in most of the rivers is extracting water for various needs, including irrigation. This can be often seen in arid and semi-arid countries. The impact of decreased amount of water levels in major rivers directly affect the water availability to the agricultural purposes. This problem keeps growing because of the climate change and climate variability. Water conservation challenges and trends were in depth presented by Schaible and Aillery (2012). They have discussed the importance of irrigation in the United States agriculture. This is the similar scenario for most of the other countries. Hence, water saving practices and measures are much needed for irrigation with high amount of water. These have to be implemented for the large-scale farming lands effectively as soon as possible (Kulkarni 2011). Studies using technological advances

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