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Water Productivity of Tree Wind Break Systems in Central Asia – Example Bazarkorgon, Kyrgyzstan

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Abstract

Most of the agriculture in Central Asia depends on irrigation, e.g. agriculture in such areas like the Ferghana Valley or along other rivers in Central Asia. The major source of irrigation water are rivers. Glacier melt, snow melt, and rain fall in the mountains generate the runoff of those rivers. In the course of climate change, glaciers melt down so that a decrease in runoff by 20%-50% is expected by 2050.

Against this background it is of crucial importance to increase water productivity of irrigated agriculture and build resilience against water shortages. One method to achieve this goal might be introducing agroforestry, in particular shelterbelts. Literature suggests that crop evapotranspiration is reduced and crop yields are increased inside such shelterbelt systems compared to outside such systems. Though, changes of water consumption and income are unknown when farmers change add shelterbelts to their farm systems.

In order to understand those changes from a cropping system without shelterbelts to a agroforestry system with shelterbelts, water consumption of crops and trees as well as costs and benefits of crops and shelterbelt trees were assessed during the growing season 2017. The study area was a group of villages in the Ferghana Valley, Jalalabad Region, in Kyrgyzstan. Micro climate data were used in order to calculate crop water consumption. Tree water consumption was measured through sap-flow measurements. Costs and benefits attributed to crops and trees were revealed through farm interviews.

Results indicate that wind speed is significantly reduced by shelterbelts, which reduces crop water consumption inside a shelterbelt system. The overall water consumption of shelterbelt system was found to be lower by 5–15 % compared to non-shelterbelt systems. Income from shelterbelt trees added substantially to farm income so that the overall income from the crop-shelterbelt system was higher than income from the crop alone. This allows the conclusion that introduction of shelterbelts increases water productivity.

Keywords: Agroforestry, cotton, crop water consumption, fast growing trees, water productivity, wind breaks

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