Scientific Research
Open Access

OPEN ACCESS

Search Keywords,Title,Author,ISBN,ISSN

Home   Journals   Books   Conferences   News   About Us   Jobs

Indexing   View Papers   Aims & Scope   Editorial Board   Guideline   Article Processing Charges

OPEN ACCESS

Analysis of cotton water productivity in Fergana Valley of Central Asia

Author(s)

J. Mohan Reddy, Shukhrat Muhammedjanov, Kahramon Jumaboev, Davron Eshmuratov

ABSTRACT

Cotton water productivity was studied in Fergana Valley of Central Asia during the years of 2009, 2010 and 2011. Data was collected from 18 demonstration fields (13 in Uzbekistan, 5 in Tajikistan). The demonstration field farmers implemented several improved agronomic and irrigation water management practices. The average values of crop yield, estimated crop consumptive use (ET_a) and total water applied (TWA) for the demonstration sites were, respectively, 3700 kg/ha, 6360 m^3/ha, and 8120 m^3/ha. The range of values for TWA and ET_a were, respectively, 5000 m^3/ha to 12,000 m^3/ha and 4500 m^3/ha to 8000 m^3/ha. A quadratic relationship was found between TWA and ET_a. The average yield of the adjacent fields was 3300 kg/ha, whereas the average yield of cotton in Fergana Valley as a whole was 2900 kg/ha, indicating 28% and 14% increase in crop yield, respectively, from, demonstration fields and adjacent fields. There was no significant difference in crop yields between the wet years (2009 and 2010) and the dry year (2011), which is explained by the quadratic relationship between TWA and ET_a. The water productivity values ranged from 0.35 kg/m^3 to 0.89 kg/m^3, indicating a significant potential for improving water productivity through agronomic and irrigation management interventions. The ratio of average ET_a divided by average TWA gave an average application efficiency of 78% (some fields under-irrigated and some fields over-irrigated), the remaining 22% of water applied leaving the field. Since more than 60% of the water used for irrigation in Tajikistan and Uzbekistan is pumped from, even if all this 22% of water returns to the stream, substantial energy savings would accrue from improving the average application efficiency at field level. The range of values for TWA indicates the inequity in water distribution/accessibility. Addressing this inequity would also increase water productivity at field and project level.

KEYWORDS

Cite this paper

References

[1]   Abdullaev, I., and Molden, D. 2004. Spatial and temporal variability of water productivity in the Syr Darya basin, Central Asia. Water Resources Research, 40(1):1-6.

[2]   Allen, R., Pereira, L.S., Raes, D., and Smith, M. 2000. Crop Evapotranspiration. FAO Irrigation and Drainage Paper 56, Rome, Italy.

[3]   Evett, S.R. 2002. Water and energy balances at soil-plant-atmosphere interfaces. In: Warrick, A.A. (Ed), the Soil Physics Companion, CRC Press LLC, Boca Raton, Florida.

[4]   Food and Agriculture Organization, 1979. Yield Response to Water. FAO Irrigation and Drainage Paper 33, Rome, Italy.

[5]   Food and Agriculture Organization, 1984. Crop Water Requirements. FAO Irrigation and Drainage Paper 24, Rome, Italy.

[6]   Gleick, P.H., Christian-Smith, J., and Cooley, H. 2011. Water use efficiency and productivity: rethinking

---

- Open Special Issues
- Published Special Issues
- Special Issues Guideline

AS Subscription

Most popular papers in AS

About AS News

Frequently Asked Questions

Recommend to Peers

Recommend to Library

Contact Us

Sponsors, Associates, and Links >>

- 2013 Spring International Conference on Agriculture and Food Engineering(AFE-S)

the basin approach. Water International, 36(7):784-798.

[7]   Ibragimov, N., Evett, S.R., Esanbekov, Y., Kamilov, B.S., Mirzaev, L., and Lamers, J.P.A. 2007. Water use efficiency of irrigated cotton in Uzbekistan under drip irrigation and furrow irrigation. Agricultural Water Management, 90:112-120.

[8]   Kranz, W., Eisenhauer, D., and Retka, M. 1992. Water and energy conservation using irrigation scheduling with center-pivot irrigation systems. Agricultural Water Management, 22:325– 334.

[9]   Luquet, D., Vidal,A., Smith, M., and Dauzat, J. 2005. ' More crop per drop' : how to make it acceptable for farmers? Agricultural Water Management, 76:108– 119.

[10]   Molden, D.J., Murray-Rust, H., Sakthivadivel, R., and Makin, I.2003. A water productivity framework for understanding and action. In: Water Productivity in Agriculture: Limits and Opportunities for Improvement, by Kijne, J.W., Barker, R., and Molden, D.J. (Editors), CABI Publishing, CAB International, Wallingford, Oxon, United Kingdom.