



Tropentag, September 20-22, 2017, Bonn

“Future Agriculture:  
Socio-ecological transitions and bio-cultural shifts”

## Evapotranspiration-based Irrigation Scheduling for Cotton in the Aral Sea Basin, Central Asia

YULDUZOY DJUMANIYAZOVA<sup>1</sup>, MUROD SULTANOV<sup>2</sup>, VINAY NANGIA<sup>3</sup>, JOHN LAMERS<sup>4</sup>

<sup>1</sup>*Urgench State University, Biology, Uzbekistan*

<sup>2</sup>*Urgench State University, Geography,*

<sup>3</sup>*International Center for Agricultural Research in the Dry Areas,*

<sup>4</sup>*University of Bonn, Center for Development Research (ZEF), Germany*

### Abstract

The Aral Sea Basin (ASB) in Central Asia is particularly known for its present and predicted deficiencies in available water which may even lead to increased conflicts. This necessitates a re-thinking of the irrigated production practices that consume virtually 90 % of all water resources and in turn on the social and ecological consequences of such changes. The development of sustainable intensified production practices in ASB should focus with priority on the crop water demand for winter wheat and cotton since these predominate by far the cropping portfolios. Yet, the general lack of research resources limits the necessary field experiments, which can be compensated in part by modelling. Therefore, the DSSAT cotton-module was successfully calibrated and evaluated and next used for scenario assessments considering different levels of water availability. The developed key crop coefficient of 1.16 (Kc mid) matched extremely well with the previously, empirically measured 1.2 (Kc mid). When scheduling irrigation based on evapotranspiration (ET), results of scenario analyses indicated that up to 34 % of water could be saved in the ASB without any changes in yields. The assessment of an ET-based irrigation scheduling according to existing soil types showed that up to 54.000 ha (ca 20 % of the total irrigated area) could benefit from such water savings on loamy soils. When taking into account the temporal dynamics of ground water during the growing period water savings can be expected on ca. 63.000 ha (ca. 24 % of the total irrigated areas. Against the background of predicted demand under business-as-usual it is argued that the potential for water saving is huge, but this necessitates in-depth change in cultivating practices, which in turn needs a highly needed institutional and legal backing.

**Keywords:** Cotton, crop coefficient, DSSAT modelling, water saving