**Tropentag, September 14-16, 2010, Zurich**

"World Food System —
A Contribution from Europe"

# Water Use and Yield of Wheat Genotypes as Affected by Water and N-supply

Helmut Herzog, Marco Grabe, Klaus-Peter Goetz

*Humboldt-Universität zu Berlin, Department of Crop Science in the Tropics and Subtropics, Germany*

**Abstract**

Water resources are a constraint in agriculture not only in semiarid, but also in subhumid climates. Hence, we investigated water use of 4 wheat genotypes from mediterranean (cvs. Golia & Gönen) and temperate climate (cvs. Monsun & Taifun) and their response to water deficit after heading and to late N-application.

All plants were raised in pots under a rain shelter from April to August 2007 receiving the same optimum-treatment apart from late N-application before heading (N: approx. 30 vs. 60 kg $ha^{-1}$) and water supply during 3 weeks after heading (W: soil moisture was either maintained at field capacity or was lowered and kept at half of available FC by deficit irrigation).

VA3 of the 3-factorial experiment (cvs $\times$ N $\times$ W, n = 5) revealed many significant interactions, particularly of water supply with late N-application and genotypes. High compared to low N-doses increased biomass, grain yield, protein content of grains, water use efficiency (WUE) and evapotranspiration efficiency (ETE) at well-watered conditions, but failed to do so at deficit irrigation. Grain yield and WUE of well-watered plants declined from Monsun over Taifun and Golia to Gönen with significant differences between each of the genotypes; and deficit irrigation reduced yield in 3 genotypes, but not in Taifun. WUE was improved by deficit irrigation in Taifun, but lowered in Gönen and did not respond in the other 2 genotypes.

There were several interactions cvs $\times$ N $\times$ W; *e.g.*: high N-Dosis induced yield inreases in well-watered plants and low ones under deficit irrigation in 3 geno-types, whereas Golia did not respond to high dosis, irrespective of water supply.

It is concluded that increasing the late N-application, which favours yield protein content and WUE under well-watered conditions, is less or not effective under deficit irrigation after heading. The 2 genotypes from mediterranean climate (Golia and Gönen) produced less biomass and yield than those from temperate climate (Monsun and Taifun) and displayed a similar or even higher yield reduction under deficit irrigation; since their WUE, ETE and HI was also lower, they appeared even less adapted to lack of water after heading.

**Keywords:** Drought adaptation, N-side-dressing, spring wheat genotypes, water use efficiency

**Contact Address:** Helmut Herzog, Humboldt-Universität zu Berlin, Department of Crop Science in the Tropics and Subtropics, Albrecht-Thaer-Weg 5, 14195 Berlin, Germany, e-mail: helmut.herzog@agrar.hu-berlin.de