UNIVERSITY OF HOHENHEIM
Department of Plant Production and Agroecology in the Tropics and Subtropics, Prof. Dr. Joachim Sauerborn

Optimising Canopy Light Interception and Nitrogen Distribution for Improved Adaptation of Wheat Crops to Drought

Submitted by

Alexandra Kipp
Schnaithof
72172 Sulz a. N.

Supervised by

Dr. Carina Moeller
Faculty of Agriculture, Food and Natural Resources, University of Sydney

This work was financially supported by the Foundation Fiat panis and the Australian Grains Research and Development Cooperation.

Hohenheim, March 2012

Optimising Canopy Light Interception and Nitrogen Distribution for Improved Adaptation of Wheat Crops (Triticum aestivum, L.) to Drought

Kipp, A. (2012). Department for Plant Production and Agroecology in the Tropics and Subtropics, Prof. Dr. Joachim Sauerborn, University of Hohenheim, Garbenstr. 13, 70593 Stuttgart, Germany.

ABSTRACT

This study is to investigate if it is possible to increased light exploitation and hence ameliorate nitrogen distribution in wheat with aid of a tiller inhibition gene (Tin). This gene is depressing tiller formation in early growing stages. Different tiller intensities were implicated by pairs of wheat lines which are genetically similar (near-isogenic) except for either presence or absences of the Tin. The lines came from commercial relevant Australian wheat varieties and have contrasting genetic backgrounds. The lines and their near-isogenic counterpart have been established in 2011 in Narrabri (New South Wales, Australia) in two different sowing densities (100 plant m^{-2} and 200 plant m^{-2}), with and without irrigation. Leaf photosynthesis, light reflection and light interception were observed several times during the growing season until anthesis. Additionally chlorophyll content, leaf area per plant and specific leaf area per leaf were measured several times in different leaf levels (lower and upper). Although the Tin had no significant influence on yield, other impacts could have been observed. Lines containing the tin produced obviously less tillers in certain background, and hence enabled a demonstrable higher light interception in lower canopy regions. The Tin significantly influenced NDVI (Normalized Differenced Vegetation Index) and PVR (Plant Vigor Ratio) in rainfed plots. Also higher TKW and higher LA m^{-2} have been observed.

Keywords: tiller inhibition gene, photosynthesis, light reflection, light interception