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“Development on the margin”

Yield Performance and Quality of Mediterranean and Mid-european Wheat Cultivars Grown under Different Ecological Field Conditions

OSMAN EREKUL¹, INES BRAESEMANN², KLAUS-PETER GOETZ², HELMUT HERZOG²

¹*Adnan Menderes University, Turkey*

²*Humboldt-Universität zu Berlin, Dept. of Crop Science in the Tropics and Subtropics, Germany*

Abstract

Cultivation of wheat in the Mediterranean climate frequently suffers from high temperatures and water deficits at the end of growing seasons. This holds true particularly for Turkey which has applied for EU-membership, but still faces problems of lacking quality standards for bread wheat. Future crop production in Mid-Europe, especially with spring wheats, will be confronted with increasing temperatures and at least more irregular rainfall in summer.

Hence, we studied yield structure and grain quality of 2 Mediterranean wheat cultivars (Golia and Gönen) and 2 Mid-European ones (Monsun and Taifun) under Turkish and German field conditions. The former ones were widely used in Turkey, but their quality was not classified, whereas the latter ones were classified as A- and E-standard. Two trials were conducted near Aydin/Turkey on a sandy loam from December to June in 2006/07 and 2007/08, and a third one in Berlin/Germany on a loamy sand (March to July 2010).

In spite of extraordinary high temperatures in Berlin and unusually low rainfall during the reproductive period, average yield surpassed those at Aydin by 20 and 30%. Cultivars displayed significant differences in yields in all trials, contrasting in varietal rankings at Aydin (Golia \geq Gönen \geq Monsun \geq Taifun) and in Berlin (Golia \sim Monsun \geq Gönen \geq Taifun).

Both sites differed markedly with respect to yield components of ear density (ears/m²), number of grains/ear and single grain weight (SGW) and showed contrasting varietal rankings of the ears/m² and SGW.

With respect to quality crude protein content (CP) of grains was highest in Taifun (E-wheat) followed by Golia, while Monsun (A-wheat) and Gönen displayed the lowest CP in Aydin. In Berlin, on the other hand, Gönen had the highest CP closely followed by Taifun and Golia, while lowest content was observed in Monsun. Nevertheless, wet gluten content and sedimentation values displayed a ranking as expected (Taifun \geq Monsun \geq Golia \sim Gönen), irrespective of years and sites.

Mid-European compared to Mediterranean cultivars maintained the relevant quality traits under both climates, but not crude protein content under Turkish climate. On the other hand, the Mediterranean cultivars which performed excellently in Turkey, did not outyield Mid-European ones in Berlin.

Keywords: Adaptation to climate change, stability of quality, varieties, wheat, yield