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"Solidarity in a competing world — fair use of resources"

Effects of High Temperature and Drought Stress Around Anthesis on Wheat

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Abstract

High temperature and drought stress are projected to reduce crop yields and threaten food security. While effects of heat and drought on crop growth and yield have been studied separately, little is known about the combined effect of these stressors. Thus pot experiments were laid out to study the effects of high temperature, drought stress and combined heat and drought stress around anthesis on yield and its components for three wheat cultivars originating from Germany and Iran in 2014 and 2015. We found that effects of combined heat and drought on the studied physiological and yield traits were considerably stronger than those of the individual stress factors alone but the magnitude of the effects varied for the specific traits. All stress treatments in this study significantly reduced grain number, single grain weight and grain yield while heat stress did not significantly decrease single grain weight across cultivars in both years. In 2014 single grain weight was reduced for the three varieties under drought stress by 13–27 % and under combined heat and drought stress by 43–83 % while in year 2015 single grain weights were reduced by 11–34 % for drought and 27–41 % under combined heat and drought stress. Heat stress significantly decreased grain number by 14–28 %, 10–22 % and grain yield by 16–25 %, 6–20 % in 2014 and 2015 respectively. We conclude that heat and drought stress affect different processes and sink-source relationships resulting in distinct impacts on yield components and that the magnitude of the responses to heat and drought is cultivar specific.

Keywords: Combined heat and drought stress, drought stress, high temperate, wheat, yield

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