【Workshop 2】Crop Production under Heat Stress

Has the Impact of Temperature on Wheat Production from Global Warming Been Underestimated?

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With current annual production at over 600 million tonnes, wheat is the third largest crop in the world behind corn and rice, and an essential source of carbohydrates for millions of people. While wheat is grown over a wide range of environments, it is common in the major wheat-producing countries for grain-filling to occur when soil moisture is declining and temperature is increasing. Average global temperatures have increased over the last few decades and are predicted to continue rising, along with a greater frequency of extremely hot days. Such events have already been reported for major wheat growing regions in the world. Attributing changes in observed yield to a single factor such as temperature is not possible due to the confounding effects of other climatic factors such as rainfall and radiation, and changes in non-climatic factors such as improved cultivars, increased nutrition and new cropping technologies. By using simulation modelling, we separated the temperature impact from other yield factors. This showed that we might have underestimated the impact of temperature on wheat production. Surprisingly, temperature can be a major source of wheat yield variability and small observed changes in mean temperature can cause large reductions in grain production. With average temperatures and the frequency of heat events projected to increase with global warming, yield reductions due to higher temperatures during the important grain filling stage alone will substantially undermine global food security.