PROJECT: Wheat Circadian Clock

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PROJECT TITLE

Investigating the effect of a compromised circadian clock on the physiology of wheat

CONSORTIUM

P 1	Alex Webb		
P 2	Laura Taylor		

SUMMARY OF THE REPORT

Plants are subject to daily changes in light, dark and temperature that have profound effects on their growth and development. As an adaptation to living on a rotating planet, plants, like other multicellular organisms, have developed circadian clocks that provide temporal regulation to biology across the daily cycle. Over the last twenty years, it has been shown that the circadian clock regulates many agriculturally relevant traits such as biomass, photosynthesis, flowering time and stress responses. There is growing evidence to suggest that circadian alleles underlie important flowering time and yield trait *loci* in wheat demonstrating the potential for improving crop performance through modification of the circadian oscillator.

As part of a programme aimed at identifying useful genetic targets for wheat breeding, we proposed a transnational access agreement to measure the effect of loss-of-function mutations of circadian clock genes on agriculturally-relevant traits in wheat. This agreement provided the Webb laboratory, who have generated novel circadian mutants of wheat, access to the APPP-C at IPK, to allow automated imaging of the regulation of photosynthesis, growth and development across the day and night cycle in wild type and circadian mutant lines. This experiment provided the first quantification of the effects of the circadian oscillator on these traits in Europe's most important crop. The data will be incorporated into a wider study by the Webb laboratory concerning the mechanisms and function of the circadian oscillator in wheat. This Transnational Access agreement combined world-leading investigation of circadian biology with state-of-the-art phenotyping performed at IPK to quantify the role of the circadian oscillator in regulating agriculturally important traits.