



A Genetic Diversity Toolkit to Maximise Harvest Index by Controlling the Duration of Developmental Phases

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Abstract

A comprehensive range of genetic and genomic resources have been brought together in this work having been specifically designed to maximise grain yields by optimizing plant and crop phenology to capitalise on enhanced carbon capture and biomass achieved elsewhere (IWYP Area C). The genetic architecture of adaptive traits for wheat will be defined with marker tagged variability available for the timing and duration of developmental phases, from the vegetative to reproductive transition (double ridge) until anthesis. The yield implications of variation in each of these steps will be validated using Near Isogenic Lines and modelling of adaptation will inform

fine tuning of best phenology trait combinations as well as coarse tuning of heading date for stress avoidance and agronomic fit. New molecular targets, acting downstream of *Ppd-1* and *Vrn-1* in the phenology genetic network will be targeted to minimise pleiotropy and trade off. Novel molecular markers will be used to introgress new alleles into high biomass backgrounds to establish the use of these innovations in experimental breeding. A model of full community accessibility to knowledge and resources will ensure high agricultural impact and the long -term goal of harvest index consistently reaching 60% in high yield potential environments.