



## Improving Yield by Optimising Energy Use Efficiency

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### Abstract

Greater than 85-90% of the energy captured by plants is used in 'futile cycles' and high-cost cellular processes, such as transport of nutrients and respiration, meaning about only 10-15% is allocated to yield. Thus, any small gain in energy redistribution and use for a costly process can have a marked positive impact on biomass accumulation and yield. Improvements in energy-use

efficiency (EUE) can be achieved at the cell, tissue and whole-plant levels, with respiration being a prime target. Our initial screening of 138 Australian commercial cultivars has revealed a two-fold variation in rates of leaf respiration (Fig. 1), three-fold variation in the ratio of respiration to growth rate (Eqn 1) during early development, and significant heritability of 35%; this demonstrates there is untapped genetic variation in EUE amenable to fine-tuning and optimisation of biomass accumulation in the lead-up to anthesis, with concomitant positive knock-on effects on yield.