Putting our finger on the pulse - improving mungbean productivity in the paddock

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Across Australia performance of pulse crops can be highly variable and risk of low yields leads growers to the perception that they are a high-risk crop. While high potential profits have encouraged many growers to persist the factors causing yield gaps and variability are poorly understood and a range of abiotic and biotic yield-reducing factors are likely to be important. In the northern grain region new higher yielding mungbean varieties in combination with high marketability have lead to a rapid increase the area planted across the region somewhat overcoming their tradition reputation as "mongrel beans". In this study we aimed to use a paddock survey approach across three main mungbean growing areas in the northern grain region to assess yield variability and the effects of paddock conditions on yield gaps. This was combined with simulation modelling approach to determine the water-limited yield potential and estimate yield gaps of mungbean crops across a diverse range of environments and growing conditions. The objective was to identify likely factors that may be related to poor mungbean crop performance.

Key findings include: low yields and high yield gaps were associated with low harvest index, not always low crop biomass; there was no regional differences in the frequency and size of yield gaps for mungbeans and management factors found to significantly increase yield were narrow row spacing (<50 cm and crops sown on a fallow rather than double cropped. Benchmark water use efficiency of approximately 7.5 kg/ha.mm of available water (rain + starting soil water) were found across the data collected. Differences in starting water at this WUE explained observed yield differences between fallow and double crop mungbeans. One third (35%) of crops achieved > 80% water limited yields but 36% yielded < 60% of the water-limited yield potential. Nearly half of all monitored crops had yield gaps > 500 kg/ha. No single biotic or abiotic factor was found to be associated with low mungbean observed crop yields or high yield gaps. However, rather a combination of factors led to farmers losing yield in the paddock. In the paddock, 88% of crops with a high yield gap (< 65% water limited yield) had either *P.thornei* > 3/g or maximum temperatures > 39°C during flowering or starting soil nitrate levels below 65 kg N/ha.