

## **Trait-based approaches to support genomic selection strategies in the Australian lentil breeding program**

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The Australian lentil breeding program focusses on delivering new lentil varieties that are better adapted for Australian environments. It had developed and released several high yielding lentil varieties that are disease resistant, herbicide tolerant and abiotic stress tolerant. The program has investigated the use of genomic selection (GS) methods which have the potential to significantly improve selection intensity and selection accuracy and dramatically reduce the length of the breeding cycle. Significant success has been achieved in developing GS prediction equations for yield and several biotic and abiotic stress tolerant traits with moderate to high accuracies. The next step is to derive genomic selection indices (GSI) to effectively select for multiple traits simultaneously. Analysis of selection indices versus predicted responses will be utilised to iteratively adjust trait weights to ensure that GSI matches specific breeding targets. Through correlation and regression analysis we identified traits that are significantly affecting yield in individual environments. Initial selection indices will be designed with knowledge of agronomic and economic importance of traits. This study will detail the progress made in defining economic values for these traits and the efforts to develop selection indices for independent traits to support GS based strategies in lentil.

**Keywords:** lentil breeding, economical traits, genomic selection, selection indices.