**Optimization of Tissue Culture and Genetic Transformation Protocol for Faba Bean (*Vicia faba* L.)**

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Faba beans (*Vicia faba* L.) are a valuable and economically important leguminous crop that contributes significantly to global food security. Nevertheless, their productivity is impeded by various impediments, such as vulnerability to diseases, unfavourable environmental conditions, sluggish growth, and restricted genetic variability. Furthermore, the existence of self-incompatibility presents an additional obstacle in the process of breeding. In order to fully maximise the capabilities of faba beans, it is imperative to improve the methods of tissue culture and genetic transformation.

The focus of our study was to enhance the techniques of tissue culture and genetic transformation for faba beans. In order to accomplish this objective, we utilised embryos as explants in our tissue culture experiments involving 37 distinct faba bean cultivars. Furthermore, we have devised genetic transformation procedures for the Tiffany and Hedin/2 faba bean cultivars by introducing a GFP construct into their embryos using particle bombardment. During the tissue culture process, we observed that the cultivars had a regeneration efficiency of around 95%. However, the transformation efficiencies of Tiffany and Hedin/2 were 75.5% and 66.66%, respectively. Our investigation focused on improving the rates of regeneration and transformation by analysing various parameters, with particular emphasis on Tiffany and Hedin/2.

The aim of this project was to offer plant breeders and researchers standardised methodologies to assist in the future advancement of faba bean cultivation. This study emphasises the importance of using strong tissue culture and genetic transformation methods to fully utilise the sustainable food production potential of faba beans.

***References:***

[1] Bangar et al., 2022, Springer, Cham, pp. 1-15.

[2] Lyu et al., 2021, Sci Rep, vol. 11, no. 21094.