

Project Title: Discovering reproductive frost (RFT) genes and creating novel RFT field pea plant material by utilising classical and molecular technologies

S 2/05 Final Report

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Executive Summary

A total of 108 diverse accessions or collections of field pea around the world were screened using an innovative frost-scoring key developed through this project. Two selections from 108 accessions, SARDI 1 and SARDI 2, had the greatest tolerance to radiant frost at the reproductive stages (flowering and podding) when tested under both artificial and natural radiant frost conditions. A natural frost test was conducted during the 2006/07 season at Mintaro near Clare. A total of 44 advanced genetic combinations were made with SARDI-1 and 42 with SARDI-2, using Kaspas as the other parent.

All 86 genetic combinations have been screened for reproductive frost tolerance at different generations and only five of these lines have been selected for the breeding program based on their superior tolerance to both parents under radiant frost conditions. Furthermore, three accessions (ATC 377, ATC 1211 and ATC 3976) showed reproductive frost tolerance under artificial but not natural frost conditions. Molecular techniques have shown that the genetic inheritance of reproductive frost tolerance in field pea is controlled by multiple genes and is a recessive trait. Four different mapping populations have been developed using both SARDI-1 and SARDI-2 as frost tolerant parent lines. Mapping population 1 consists of 119 individual recombinants, 2 consists of 204 individual recombinants, 3 consists of 143 individual recombinants and 4 consists of 134 individual recombinants. The newly developed frost tolerant germplasm is now included in the national field pea breeding program.