

Molecular confirmation of candidate Hsp70 gene associated with heat tolerance in BC3F2 advanced backcross lines and their phenotypic resemblance with recurrent chilli Kulai

ABSTRACT

Domestic production of chilli in Malaysia is insufficient which accounted for 52% self-sufficiency level. Poor performance of local varieties under high temperatures above 42°C is one of the major factors affecting chilli production. This study was conducted with the objective of introgress heat-tolerant gene (Hsps) from AVPP0702 donor into Kulai using marker-assisted backcrossing. A total of 68 SSR markers, including Hsp linked markers that showed polymorphism between the parents were used to assess the generation of backcrossing; BC1F1, BC2F1, BC3F1 and BC3F2 and the average RPG percentage of the recurrent parent was found to be 81, 90, 95 and 97%, respectively. The pattern of Hsp expression in the backcross generations was similar to the donor parent (upregulated with more than 4-fold increase). Twelve improved heat tolerant chilli lines were developed. Most of the morphological and agronomical traits were recovered in the selected improved heat-tolerant genotypes from Kulai such as plant height, number of days to 50% flowering, number of fruits, fruit length and total fruit yield per plant. Improved high-yielding heat-tolerant chilli lines showed tolerance to high temperature as well as did not express any negative effect on agronomic traits in comparison with Kulai variety.

Keyword: Backcrossing; Heat-tolerant lines; Heat shock proteins; Heat stress; Marker assisted selection; Simple sequence repeat markers