

Thesis Title Improving Shelf Life of Heat Tolerant
Tomato by Backcrossing Method

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ABSTRACT

Improving shelf life of heat tolerant tomato by backcrossing method consisted of two activities. The first activity was to identify and select +/-nor genotype in backcross populations. The second activity was to evaluate three backcrosses by comparing with donor parents, recurrent parents and F1 hybrids.

F1 hybrid seeds were produced by using nor₁ and nor₂ as paternal parents and four heat tolerant cultivars : #598, #605, #607 and L22 as maternal parents. The three backcrosses were produced by using +/-nor genotype as maternal plants.

Methods of selecting +/-nor genotype from the backcross

populations were studied. These methods were shelf life and relationship between ripening days after anthesis and a) level of internal ethylene b) level of enzyme polygalacturonase and c) shelf life.

It was found that the heterozygote $+/\text{nor}$ showed later ripening stage, longer shelf life, and lower internal ethylene than homozygote $+/+$. However, levels of enzyme polygalacturonase could not be used to differentiate between genotypes $+/\text{nor}$ and $+/+$.

The evaluation of three backcrosses was based on a number of characters, it was found that fruit setting of BC1F1, BC2F1 and BC3F1 were not different from maternal parents.

Plant height of BC1F1, BC2F1 and BC3F1 from parents #605 and #607 were similar to maternal height. Plant height of BC2F1 and BC3F1 from parent L22 were also not different from maternal height.

The yield evaluation showed that most of BC1F1 and BC2F1, and all of BC3F1 were not different from the maternal yields. However four populations gave higher yield than maternal yields, They were $\#607 \times \text{nor}_2 \text{BC1F1}$, $\#598 \times \text{nor}_2 \text{BC1F1}$, $\#598 \times \text{nor}_1 \text{BC2F1}$ and $\#598 \times \text{nor}_2 \text{BC2F1}$.

Fruit qualities after ripening stage showed that external color of BC1F1 did not develop into red color. Most of BC2F1 and all BC3F1 showed red fruit color. Other fruit quality characters such as pH, soluble solid, total acid and vitamin C of three backcrosses were acceptable as required by the processing tomato quality standard.

Fruits of three backcrosses which were harvested at pink stage and kept at room temperature for 30 days showed orange red color internally and externally. Most fruits of these backcrosses had fruit firmness more than 1 kg./cm.^2 , soluble solid less than 4.5 ° brix, vitamin C more than 20 mg./100 g. fresh weight, pH not

more than 4.5 and total acid more than 0.40 % .

Quality changes of fruit harvested at pink stage was determined at three day intervals and kept at room temperature showed that fruits of all three backcrosses did not develop red fruit color. The soluble solid was lower than 4.5°brix, vitamin C was reduced, pH of soft fruits was not more than 4.5 but pH of firm fruits with germinated seed was more than 4.5, and total acid was more than 0.40 % .

Most fruits of BC2F1 and BC3F1 populations had more than 50% good fruits when harvested at pink stage and kept more than 30 days. However, the exception were BC2F1 from parents #598xnor₂, BC2F1 and BC3F1 from parents L22xnor₁ and L22xnor₂.

According to the above quality analysis, it was found that five populations of BC2F1 namely: #598xnor₁BC2F1, #598xnor₂BC2F1, #605xnor₂BC2F1, #607xnor₂BC2F1 and L22xnor₁BC2F1 and all eight populations of BC3F1 showed acceptable characteristics while all BC1F1 did not.