Rattana Lasuk 2011: Use of Molecular Markers in Tomato Breeding to Increase Soluble Solid Content and Multiple Disease Resistances. Master of Science (Agricultural Biotechnology), Major Field: Agricultural Biotechnology, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Julapark Chunwongse, Ph.D. 87 pages.

Near isogenic lines (NILs) of tomato 'P502' and 'Seedathip 3' that contained high soluble solid content and multiple disease resistances were created using marker assisted backcrossing. The recurrent parents for four disease resistant genes were derived from crossing of the single resistant gene NILs i.e., *Mi*, *Ph-3, Tm-2*^{a} and *I2* and selected using DNA markers associated with disease resistant genes. The construction of recurrent tomato of 'P502' and 'Seedathip 3' containing four disease resistant genes were accomplished. After that, the cross between the recurrent parents and the backcross progenies to transfer genes *Brix9-2-5* responsible with the increase of SSC from *S. lycopersicum* IL9-1-3 or *S. pimpinellifolium* WVa700. After initial cross, selected hybrids in each generation were crossed back to the recurrent parents with the help of molecular markers linked to *Brix9-2-5* gene and disease resistant genes. The use of marker-assisted selection for tomato breeding to increase soluble solid content and multiple disease resistances resulted in the construction of tomato NILs of 'P502' and 'Seedathip 3' containing *Brix9-2-5* gene and four disease resistant genes. The SSC in tomato cultivars 'P502' and 'Seedathip 3' were increased by 20-41 % and 16-46 % respectively. In addition, the cross between 'Seedathip 3' and 'WVa700' were selected to return to the recurrent genotype by using the negative selection technique which allow the wild genomic content to be reduced in few backcross generations by scanning with 80 molecular markers distributed on 12 chromosomes. We found that the negative selection technique to be highly effective at increasing the recurrent genome content to 95-100 % in four backcross generations.

_____ _____ ___ / ___ / ___

Student's signature Thesis Advisor's signature