Breeding for tastier tomatoes: Introducing Favorable Alleles Affecting Flavor Volatiles into a Commercial Cultivar.

The cultivated tomato (*Solanum lycopersicum)* is one of the most abundant vegetables, grown and consumed in most parts of the world. Domestication and improvement have given rise to various tomato accessions including heirlooms and modern commercial varieties. The commercially produced modern tomatoes have many desirable agronomic traits like shelf life, disease resistance and yield; however, they are less flavorful than the locally produced heirloom varieties. This flavor deficiency is due to a cumulative loss of superior alleles affecting flavor volatiles while focusing on other traits. A previous study suggested that increasing the level of some of the desired volatile compounds like 6-methyl-5-heptene-2-one while decreasing the level of the undesired volatiles like methylsalycylate at different chromosomal regions could potentially improve tomato flavor. Here, we used a marker-assisted backcross (MABC) method to introgress the superior flavor alleles into a modern commercial parent (Fla8059). Eleven loci located on seven different chromosomes with potentially strong effects on tomato flavor volatiles were chosen for introgression. Four heirloom tomato varieties (Brandywine Sudduth, Maglia Rosa Cherry, Red Currant and Peacevine Cherry), whose favorable volatile contents were higher than those of Fla8059 provided the desirable alleles for quality flavor attributes. Six improved breeding groups were obtained after different levels of backcrossing to generate the F_2 population. This population was then genotyped using CAPS molecular markers and screened for homozygosity. Volatile analysis of the F_2 population showed increased levels of some desired positive volatiles and reduced levels of some undesired volatiles in the improved Fla. 8059 line. A sensory evaluation will be conducted to evaluate the flavor differences in the improved line. This marker assisted breeding program provides a foundation for breeders to produce high-quality tomato varieties.