Title Genetics of ethylene biosynthesis and restriction fragment length polymorphisms (RFLPs) of ACC oxidase and synthase genes in melon (*Cucumis melo* L.)

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Abstract

We investigated the genetics of ethylene biosynthesis and its linkage to the RFLPs of the ACC oxidase and synthase genes in melon (*Cucumis melo* L.). The results suggested that the A_0 and B_0 fragments of RFLP-MEL1 of the ACC oxidase gene were two alleles from a single locus, as were the B and C fragments of RFLP-MEACS1 of the ACC synthase gene. The B_0 allele seemed to be partially dominant over the A_0 allele, whereas B and C alleles appeared to map to quantitative trait loci (QTLs), which most likely contributed to ethylene production. Both RFLPs were linked to ethylene production rates, but they were not linked to each other. The interaction effects of the ACC oxidase and synthase genes on ethylene production were revealed by segregation of RFLP-MEL1 and RFLP-MEACS1. The results of single-copy-reconstruction assays suggested that the ACC oxidase gene is a single copy, whereas the ACC synthase gene is a component of a multigene family in the melon genome. The abscission phenotype appeared to be controlled by an independent locus, with the abscission (full-slip) allele dominant over the non-abscission (not full-slip) allele. These results may facilitate efforts toward mapping the quantitative trait loci (QTLs) of ethylene production. The RFLPs may be used in marker-assisted selection in developing melons with a more-desirable low ethylene production rate for enhancing postharvest storage life.