Title Development and evaluation of an antisense acc-oxidase (CMACO-1) 'Galia' F1 hybrid muskmelon (*Cucumis melo* L. var. reticulatus Ser.)

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Abstract

Recognized for its flavor, the Galia muskmelon (*Cucumis melo* L. var. *reticulatus* Ser.) is also known to have a short shelf-life. To address this concern, previous work transformed the 'Galia' male parental line with an antisense ACC oxidase (CMACO-1) gene. The gene inhibited the last step in ethylene biosynthesis, resulting in transgenic male parental lines that produced less ethylene and were firmer, subsequently possessing a longer shelf-life than the non-transgenic fruit. These lines were used to create antisense 'Galia' (ASG) hybrids (ASxWT, ASxAS, WTxAS).

During fall 2006, preliminary ASG lines were evaluated with the original 'Galia' muskmelon. Fruits were harvested at four stages: stage 1.) zero-slip, green (ZG); 2.) zero-slip, yellow-green (ZYG); 3.) half-slip (HS); and 4.) full-slip (FS). Data were recorded for days to harvest, fruit size, quality, ethylene evolution and respiration. At stage ZG, all ASG muskmelons were similar in size, quality, ethylene and respiration to 'Galia'. At stage ZYG, ASxAS and ASxWT muskmelons were significantly firmer than 'Galia' and produced less ethylene yet were similar in soluble solids content (SSC). On average, ASG melons remained on the vine six days longer than 'Galia' and were similar in quality to 'Galia' at stages HS and FS.

Aroma volatiles were identified in order to determine what sets 'Galia' flavor apart from look-a-like cultivars. The compounds considered important in 'Galia' muskmelons were benzyl acetate, ethyl-2-methyl butyrate, methyl 2-methyl butyrate, ethyl isobutyrate, 2-methylbutyl acetate, hexyl acetate, ethyl butyrate, ethyl caproate, cis- 3-hexenyl acetate, and isovaleronitrile.

ASG and 'Galia' muskmelon aroma was evaluated in 2006 and 2007. The greatest differences in aroma among ASG and 'Galia' were at stage ZYG, where volatiles were greatest in 'Galia'. After five-days storage at 20 C in fall 2007, line ASxAS fruit remained firmer, when harvested at stage ZYG. At stages ZG, HS and FS, aroma and quality differences were few. On average, ASG fruit remained on the vine four days longer than 'Galia', suggesting a wider harvest window. Even though there were some differences in volatiles at stage ZYG, in order to enhance shipping quality, it is recommended that line ASxAS be

harvested at stage ZYG, where SSC was acceptable and fruit firmness was greatest at harvest and after storage.