Expression patterns of ethylene biosynthesis genes from banana during fruit ripening and in relationship with finger drop

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INTRODUCTION

• Banana finger drop is a dislodgement of individual fruits from the hand at the pedicel rupture area.

• For some banana varieties, it is one of the main ripening-associated features together with ethylene production and starch degradation.

• The few studies devoted on the physiological and molecular basis associated with this process shown, i) a similarity with softening, ii) an early occurrence of related molecular event, between the 1st and 4th day after ripening induction, iii) a putative involvement of ethylene as regulatory factor.

OBJECTIVES

• This study was conducted in the prospect of identification, throughout candidate gene approach, of quality related-marker usable as tool for breeding program.

• We examined here the relationship between ripening ethylene biosynthesis and finger drop in order to get more insight into the upstream regulatory steps of banana finger drop process and identify putative related candidate genes.

MATERIAL AND METHODS

• Studies were performed on peel of Cavendish banana fruit ripen in air at 20°C after acetylene treatment (1000ppm /18 h/20°C).

• Four EB (ethylene biosynthesis) genes encoding for ACC synthase (*MaACS1-4*) and ACC oxydase (*MaACO1-2*) the key enzymes of EB pathway were tested.

• Specific primers of EB genes used in this study were designed from sequences published in the literature (Liu et al, 1999; Inaba et al., 2009).

• EB gene expression was performed throughout real-time quantitative PCR comparatively at CZ and DZ (Fig. 1) as described Mbéguié-A-Mbéguié et al., (2009.)

RESULTS

Banana finger drop occurs during ripening

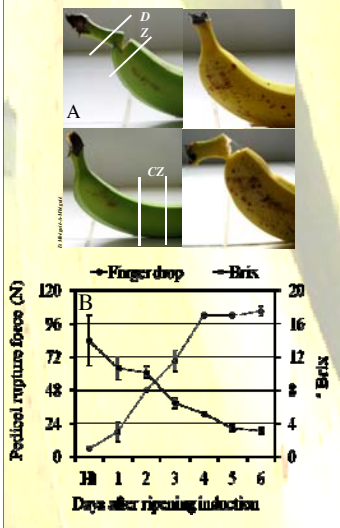
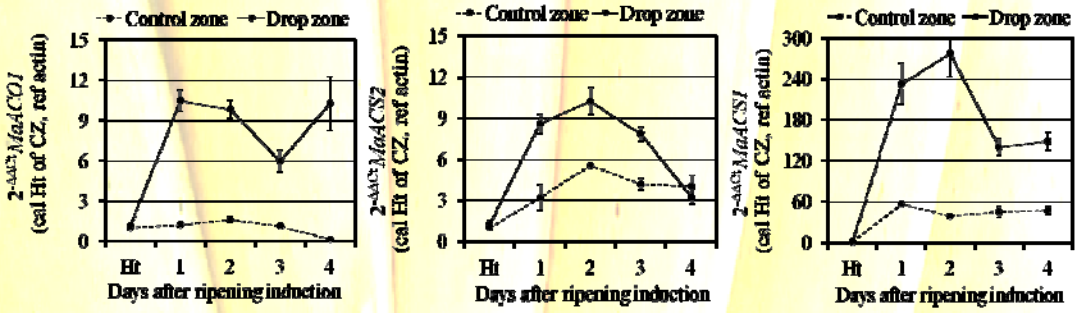
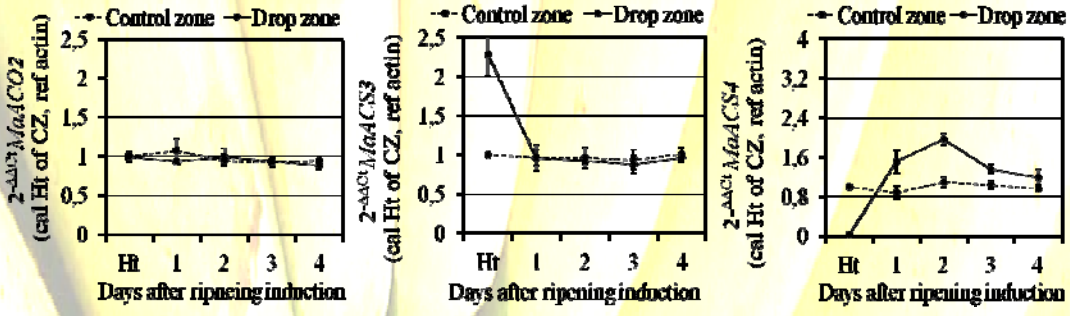


Fig 1: Cavendish banana fruit taken at green and ripe stages. Peel tissue of control (CZ) and drop (DZ) zones used in this study are illustrated (A). Typical evolution of finger drop observed during fruit ripening and measured throughout the pedicel rupture force (B)

Expression of wound- and ripening-induced EB genes is associated with finger drop



Finger drop also involved change of other EB gene expression



CONCLUSIONS

▪ Physiological and molecular mechanism underlying finger drop process involved ethylene biosynthesis elements including, developmental- and ripening-induced gene (*MaACO1*), specific ripening-induced gene (*MaACS1*) and wound-induced gene (*MaACS2*).

▪ Ripening ethylene together with other developmental cues regulate the upstream steps of this mechanism which is thus the result of a cross-talk between developmental, ripening and wound regulatory pathways.

▪ *MaACO1*, *MaACS1*, *MaACS2* and to lesser extent *MaACS4* gene, that are highly induced in DZ than in CZ, can be considered as putative candidates of finger drop process.

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