

MOLECULAR BIOLOGY AND GENE REGULATION

Ethylene and Wound-Induced Gene Expression in the Preclimacteric Phase of Ripening Avocado Fruit and Mesocarp Discs

D. A. Starrett and G. G. Laties

Department of Biology, University of California, Los Angeles, Los Angeles, California 90024

Whereas intact postharvest avocado (*Persea americana* Mill.) fruit may take 1 or more weeks to ripen, ripening is hastened by pulsing fruit for 24 h with ethylene or propylene and is initiated promptly by cutting slices, or discs, of mesocarp tissue. Because the preclimacteric lag period constitutes the extended and variable component of the ripening syndrome, we postulated that selective gene expression during the lag period leads to the triggering of the climacteric. Accordingly, we sought to identify genes that are expressed gradually in the course of the lag period in intact fruit, are turned on sooner in response to a pulse, and are induced promptly in response to wounding (i.e. slicing). To this end, a mixed cDNA library was constructed from mRNA from untreated fruit, pulsed fruit, and aged slices, and the library was screened for genes induced by wounding or by pulsing and/or wounding. The time course of induction of genes encoding selected clones was established by probing northern blots of mRNA from tissues variously treated over a period of time. Four previously identified ripening-associated genes encoding cellulase, polygalacturonase (PG), cytochrome P-450 oxidase (P-450), and ethylene-forming enzyme (EFE, or 1-aminocyclopropane-1-carboxylic acid synthase), respectively, were studied in the same way. Whereas cellulase, PG, and EFE were ruled out as having a role in the initiation of the climacteric, the time course of P-450 induction, as well as the response of same to pulsing and wounding met the criteria together with several clones from the mixed library for a gene potentially involved in preclimacteric events leading to the onset of the climacteric. Further, it was established that the continuous presence of ethylene is required for persisting induction, and it is suggested that in selected cases wounding may exert a synergistic effect on ethylene action.