REGULATION OF THE MAIZE ABA-RESPONSIVE GENE RAB 28 IN THE PLANT DEVELOPMENT AND WATER STRESS

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The plant hormone abscisic acid (ABA) mediates a number of important developmental and physiological processes in plants, such as embryo maturation and response of vegetative tissues to osmotic stress. A number of genes (rab) which are normally expressed during late embryogenesis are also precociously induced in young embryo on ABA treatment or in vegetative tissues submitted to dessication. Among these ABA responsive genes, the maïze rab 28 gene has been isolated and characterized. It encodes a protein of predicted mol. wt 27.7. Transcription levels of the rab 28 gene have been followed by Northern analysis during embryogenesis, seed germination, and in the wild type seedlings submitted to ABA treatment or water stress. The rab 28 gene expression has also been studied in two viviparous mutants of maïze : the ABA-deficient vp2 and the ABA-insensitive vp1 mutant.

The proximal promoter region of the maïze rab 28 gene contains the conserved ABA responsive element (ABRE), CACGTGG, reported in other plant genes as responsible for ABA induction. Transient expression assays in rice protoplasts indicate that a 134 base pair fragment of the maïze promoter (-194 to -60, containing the ABRE) fused to a truncated cauliflower mosaïc virus promoter (35S) is sufficient to confer ABA-responsiveness upon the GUS reporter gene. Gel retardation experiments show specific interactions of nuclear proteins from tissues in which the rab 28 gene is expressed, with this 134 DNA fragment. Nuclear extracts from embryo and water stressed leaves generate specific and highly stable complexes of different electrophoretic mobility. However, analysis of these protein-DNA complexes by methylation interference footprinting show the same guanine-specific contact to the ABRE sequence. These results suggest that distinct regulatory factors with apparent similar affinity for the ABRE sequence may be involved in the hormone action during embryo maturation and vegetative tissues submitted to water stress.