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In vitro Transcriptional Regulation of Maize *catalase2* gene through Cis-acting Elements Located Downstream a Transcription Start Site.

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Objectives

All aerobic organisms need a defense system to scavenge oxygen radicals. *Catalase* is one of antioxidant defense systems that catalyze the dismutation of H_2O_2 to H_2O and O_2. Interestingly, maize *catalase2* gene has 78 bp segment between a transcription start site and a start codon. In this segment, two cis-acting elements, ACGT core and ARE (antioxidant responsive element) located appear to be important in the regulation of the gene expression. It has been suggested that this part may be involved at translational level control. We have tested if above two elements may regulate gene expression at transcriptional level during maize seed development and germination.

Materials and Methods

1. Materials: Maize embryos were harvested from 18-20DAP and seedlings germinating 2-4 days, which nuclear proteins were extracted from.
2. Methods: In vitro transcription, Electrophoretic mobility shift assay and DNase I footprinting assay were used.

Results and Discussion

Transcriptional activity of *cat2* full promoter (*catA*) using nuclear proteins of germinating embryos is higher than that of *cat2* promoter removed a downstream segment (*catM*). This result indicate that cis-acting elements in the downstream segment may play important roles in *cat2* transcription. Transcripts amount in *in vitro* assay from *catA* promoter was increased by H_2O_2, but not changed by ABA which was known to respond to ACGT core. However, transcription from *catM* was not affected by H_2O_2 or ABA treatment.

Transcription with nuclear proteins from developing embryos (20DAP) was largely dependent upon the presence or absence of the downstream cis-acting elements. ABA treatment suppressed the *in vitro* transcription from *catA* promoter, but not from *catM* promoter, suggesting the transcriptional suppression via ACGT core element. But H_2O_2 treatment did not change the transcriptional activity of *catA*.

While nuclear proteins from developing embryos were confirmed to bind to ACGT element in EMSA and DNase I footprinting assay, nuclear proteins from germinating embryos bound to ARE.

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