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Analysis of promoters of microRNAs from a Glycine max degradome library

大豆降解组文库 microRNAs 的启动子分析

Key words: *Glycine max*, MicroRNA (miRNA), Promoter, Cis-acting element, Prediction

关键词：大豆；MicroRNA（miRNA）；启动子；顺式作用元件；预测

- MicroRNAs (miRNAs) are genome-encoded, small non-coding RNAs that play important functions in development, biotic and abiotic stress responses, and other processes.

- Most miRNAs exist as independent transcription units, which are transcribed into long primary transcripts (pri-miRNAs) by RNA polymerase II, then cleaved to miRNA precursors (pre-miRNAs). Although substantial work has examined the promoters of protein-coding genes, the nature of miRNA promoter elements is still one of the most interesting aspects of small RNA biology.

- In this study, the core promoters and *cis*-acting elements of *Glycine max* miRNAs were predicted by bioinformatics methods to reveal the features of the core promoters of soybean miRNAs. The miRNA expression regulation pathway was also analyzed. These studies provide insights into the regulation of soybean miRNA expression.



The prediction results showed that 83.86% of the 440 miRNAs contained promoters in their upstream sequences, and 8.64% (38 loci) in their downstream sequences. The distributions of two core promoter elements,
TATA-boxes and transcription start sites (TSSs), were similar.

Analyses of miRNA cis-elements and targets indicated a potential auxin response factor (ARF)- and gibberellin response factor (GARF)-mediated negative feedback loop for miRNA expression.

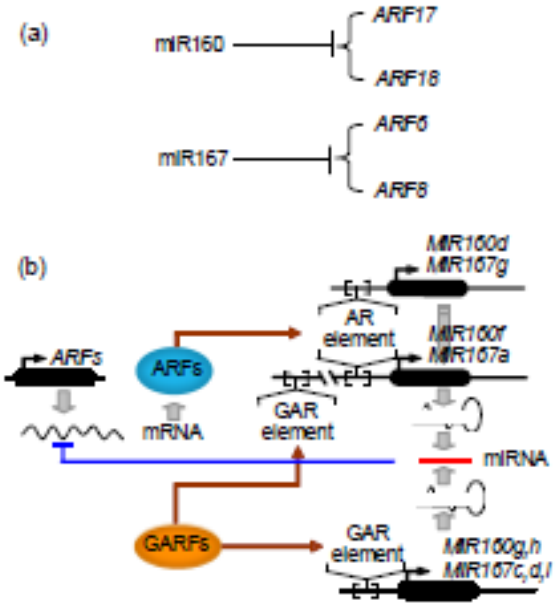

Fig. 3 An speculated miRNA expression regulation pathway related to hormone metabolism
(a) Certain auxin response factor (ARF) family members are directly regulated by miRNAs (miR160 and miR167); (b) A possible negative feedback regulatory loop involving miR160, miR167, and certain ARF family members. Numerous copies of the ARF recognition motif are found in the putative promoter regions of *MIR160d*, *MIR160f*, *MIR167a*, and *MIR167g*. Also, numerous copies of gibberellin (GA) response (GAR) elements are found in the putative promoter regions of *MIR160f*, *MIR160g*, *MIR160h*, *MIR167a*, *MIR167c*, *MIR167d*, and *MIR167i*. We speculate that GA regulates miRNAs to inhibit the formation of auxin