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Stress-responsive miRNAome of *Glycine max* (L.) Merrill: molecular insights and way forward

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Abstract

Main conclusion Analysis of stress-associated miRNAs of *Glycine max* (L.) Merrill reveals wider ramifications of small RNA-mediated (conserved and legume-specific miRNAs) gene regulatory foot prints in molecular adaptive responses.

MicroRNAs (miRNAs) are indispensable components of gene regulatory mechanism of plants. Soybean is a crop of immense commercial potential grown worldwide for its edible oil and soy meal. Intensive research efforts, using the next generation sequencing and bioinformatics techniques, have led to the identification and characterization of numerous small RNAs, especially microRNAs (miRNAs), in soybean. Furthermore, studies have unequivocally demonstrated the significance of miRNAs during the developmental processes and various stresses in soybean. In this review, we summarize the current state of understanding of miRNA-based abiotic and biotic stress responses in soybean. In addition, the molecular insights gained from the stress-related soybean miRNAs have been compared to the miRNAs of other crops, especially legumes, and the core commonalities have been highlighted, though differences among them were not ignored. Nature of response of soybean-derived conserved miRNAs during various stresses was also analyzed to gain deeper insights regarding sRNAome-based defense responses. This review further provides way forward in legume small RNA transcriptomics based on the adaptive responses of soybean and other legume-derived miRNAs.

Keywords Conserved miRNAs · Gene regulation · Legumes · miRNA evolution · Non-coding RNAs · Soybean · Stressors

Abbreviations

AGO	Argonaute	HESO1	HEN1 SUPPRESSOR1
AM	Arbuscular mycorrhiza	HST1	HASTY 1
AP2	APETALA 2	HYL1	HYPONASTIC LEAVES1
ARF	Auxin response factor	miRNAs	MicroRNAs
ASR	Asian soybean rust	nat-siRNAs	Natural antisense transcript siRNAs
DCL-1	Dicer-like-1	NGS	Next generation sequencing
DRE	Dehydration responsive element	PEGs	Protein encoding genes
ENOD93	Early nodulin 93	PTGS	Post transcriptional gene silencing
GSS	Genome survey sequence	RBPs	dsRNA-binding proteins
hc-siRNAs	Heterochromatic siRNAs	RdDM	RNA-dependent DNA methylation
HEN 1	HUA enhancer 1	RISC	RNA-induced silencing complex
		SCN	Soybean cyst nematode
		SE	SERRATE
		siRNAs	Small interfering RNAs
		SMV	Soybean mosaic virus
		sncRNAs	Small non-coding RNAs
		SNF	Symbiotic nitrogen fixation
		TFs	Transcriptional factors
		TGS	Transcriptional gene silencing

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