Abstract

Plants are constantly affected by various abiotic and biotic stresses, which cause a whole range of reactions. The result can be increased plant resistance to various stress factors such as herbivory attack or lack of water. Additionally, this resistance can also be passed on to subsequent generations through epigenetic mechanisms. Small RNAs serving as signaling molecules of the plant's rapid response to stress can play a large part in the formation of intergenerational and multigenerational stress memory. MiRNAs are mainly regulators of gene expression, through their inhibitory and degradative activities they control the transcription of genes and the translation of a large number of proteins. SiRNAs could participate in the transfer of transcriptional memory through the mechanism of RNA-directed DNA methylation (RdDM). DNA methylation and histone modifications together act as chromatin marks that can be epigenetically transferred to subsequent generations. Based on this, plants derived from stressed parent plants show large changes in gene expression compared to plants with non-stressed parents. These changes then persist for varying lengths of time, depending on whether gene expression is again induced by the stress factor or not. Interest in understanding the mechanisms of transgenerational stress memory has recently grown considerably, and this knowledge may soon allow for potential application in the breeding of plants resistant to environmental stresses.