Investigation on a Diverse Set of MicroRNAs and Their Targets in Cassava

Onsaya Patanun1*, Manassawe Lertpanyasampatha1, Punchapat Sojikul1, Unchera Viboonjun2, Jarunya Narangajavana1

1Department of Biotechnology, Faculty of Science, Mahidol University, Rama VI Rd, Bangkok 10400, Thailand
2Department of Plant Science, Faculty of Science, Mahidol University, Rama VI Rd, Bangkok 10400, Thailand
*Presenter, e-mail: chill-chill13@hotmail.com

Abstract

miRNAs are a newly discovered class of noncoding endogenous small RNAs involved in plant growth and development as well as response to environmental stresses. miRNAs have been extensively studied in various plant species, however only few information are available in cassava, which serves as one of the staple food crops, a biofuel crop, animal feed and industrial raw materials. In this study, the 169 potential cassava miRNAs belonging to 34 miRNA families were identified by computational approach. Interestingly, mes-miR319b was represented as the first putative mirtron demonstrated in cassava. A total of 15 miRNA clusters involving 7 miRNA families, and 12 pairs of sense and antisense strand cassava miRNAs belonging to 6 different miRNA families were discovered. The existence of some candidate miRNAs were preliminary confirmed by using experimental approaches. Prediction of potential miRNA-target genes revealed their functions involved in various important plant biological processes. Further analysis of relationship between miRNAs and their target gene expression should be studied to unraveling the role of miRNAs. The cis-regulatory elements relevant to drought stress and plant hormone response were identified in the promoter regions of those miRNA genes. The results provided a foundation for further investigation of the functional role of known transcription factors in the regulation of cassava miRNAs. The better understandings of the complexity of miRNA-mediated genes network in cassava would unravel cassava complex biology in storage root development and in coping with environmental stresses, thus providing more insights for future exploitation in cassava improvement.

Keyword: Cassava, Manihot esculenta Crantz, microRNAs, target gene, cis-regulatory elements

Acknowledgements

This work was partially supported by Mahidol University. Ms. Onsaya Patanun is supported Center of Excellence on Agricultural Biotechnology, Science and Technology Postgraduate Education and Research Development Office, Commission on Higher Education, Ministry of Education. (AG-BIO/PERDO-CHE).

References