DBT-RGCB study molecular mechanism of disease resistance in black pepper

New Delhi, March 02: Knowledge hidden in the genome determines the development and survival of an organism. Despite the universal genetic code composed from the alphabet of four letters such as Adenine, Guanine, Cytosine and Thymine, the innumerable combination of letters with proximity to certain regions in the genome determines the uniqueness and functionality of an organism. The multitude of living organisms present in the Earth is through the continuous evolution and adaptation in which nature selects the best suitable one for existence. Nature preserves the uniqueness of every individual through the distinct sequence pattern in the genome. As the information is safely recorded in the genome, it reveals not only the identity of an organism but also its deep evolutionary history.

Dr. E. V. Soniya and her research team at DBT-Rajiv Gandhi Centre for Biotechnology (DBT-RGCB), Thiruvananthapuram focuses on the molecular mechanism of disease resistance in black pepper plants, widely known as the King of Spices. Black pepper is one of the important economic crops of our nation. During the research on the black pepper, they studied the small RNA mediated gene regulation upon pathogen infection. The team could identify certain small RNAs that were precisely processed in the plant cell. In order to derive a clear picture on these diverse small RNAs, they used high throughput sequencing that generated millions of small RNA sequences present in the system. Subsequent in-depth analysis revealed enormous diversity of small RNAs in black pepper plants.

Along with several families of miRNAs, new classes of small RNAs derived from the transfer RNAs, ribosomal RNAs were detected from the plants. The tRNA and rRNA derived

small RNAs were previously regarded as sequence garbage and excluded from further analysis for more than three decades. Dr. Soniya and her team's analysis of millions of small RNAs revealed the very precise processing of certain small RNAs, especially derived from the 5' end of tRNAs and rRNAs in plants. The small RNAs derived from the 5' end of Alanine tRNAs were more prominent in the different tissues of black pepper plants. Disease resistant strategies in black pepper with wider application in the improvement of stress tolerance can be done by the evaluation of these candidate sRNAs during plant pathogen interaction.

Among the multitude of small RNAs present in the diverse plant lineages, Dr. Soniya's team could trace out a unique set of small RNAs derived from the 5.8SrRNAs that function as 'signature small RNAs'. These novel lineage specific sRNAs may have tremendous biological potential in the taxonomic profiling of plants. Their study (Asha and Soniya, 2016, Asha and Soniya, 2017) was probably the pioneer report stating the role of rRNA and tRNA derived sRNAs in plants. The results have challenged the previously accepted dogmas, and brought forwarded a lesson that the scientific mind should search for the answers in the most unexpected places.

References:

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