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A Comparative Analysis of Genetic Variations Using ISSR and SSR Markers in Pathogenic *Bipolaris oryzae* Associated with *Oryza sativa* L. in Sri Lanka

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Background: The pathogenic fungus *Bipolaris oryzae* poses a significant threat to rice cultivation worldwide due to its detrimental impact on crop yields and global food security. Despite rice being the staple food in Sri Lanka, brown spot disease and its causative agent remain among the least studied aspects of rice pathology in the country.

Objective: This study aims to analyse the genetic diversity of *Bipolaris oryzae* using inter-simple sequence repeats (ISSR) and simple sequence repeats (SSR) to investigate the genetic variability in Sri Lankan *Bipolaris oryzae* isolates in order to establish proper disease management within the country.

Methods: Paddy leaves with brown spots were collected from different geographical locations in Sri Lanka during the Maha season in 2024/2025. Eight (08) fresh isolates were obtained from field excursions, and three (03) isolates were from the University of Sri Jayewardenepura Culture Collection (USJCC). Sanger sequencing of internal transcribed spacers 1 and 2 with 5.8S (ITS) region, and glyceraldehyde-3-phosphate dehydrogenase (GAPDH) region were carried out following successful DNA extraction and gel electrophoresis, and the sequence reads were incorporated in a multi-locus phylogenetic analysis. Further, dendrograms were generated using the banding patterns of two ISSR markers, ISSR 1 and ISSR 8, and two SSR markers, BOSSR 368 and BOSSR 430.

Results: The resulted phylogram revealed that all the isolates were closely related to the neotype of *B. oryzae*. ISSR 1 and ISSR 8 produced clear, reproducible polymorphic banding patterns, indicating genetic variability among the isolates in the generated dendrogram. However, BOSSR 368 and BOSSR 430 resulted in monomorphic banding patterns.

Conclusion: It can be concluded that ISSR primers are more informative and reliable in investigating the genetic variability in Sri Lankan *Bipolaris oryzae* isolates. The findings may help to develop novel disease-resistant rice varieties through marker-assisted breeding.

Keywords: Dendrogram, GAPDH, Graminicolous fungi