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Promoting the DNA based identification of phytopathogenic fungi to ensure regional food security and sustainability in agriculture

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Plant pathogenic fungi are a diverse group of eukaryotes with a significant impact on crops, ornamentals and forest trees worldwide. Invasive fungal pathogens have caused severe epidemics historically, leading to major food security threats and even causing serious socio-economic impact. The accurate identification and precise naming of pathogenic fungi have a great impact on global plant health and food security and is considered to be crucial in the countries with lack of phytosanitary practices, including Sri Lanka. Although morphological characters of the fungi have conventionally been used in fungal identification, the past two decades have witnessed revolutionary changes with the implementation of DNA sequence data. The standard fungal DNA barcode, nuclear ribosomal internal transcribed spacer region (ITS) is extensively used for a quick and often approximate identification. However, due to limitations of single gene region in fungal species discrimination, Genealogical Concordance of Phylogenetic Species Recognition (GCPSR) which involved multiple gene regions has been the gold standard up to date. The identification of fungi in agricultural, biosecurity and quarantine practices are still widely based on morphology and tentative taxonomic assignments have increased the risk to regional and global food and fiber security. In order to overcome these challenges, we promote the need for (1) precise naming of pathogenic fungi in the era of one name for pleomorphic species; (2) the incorporation of molecular data in the identification of emerging phytopathogens; and (3) paradigm shifts in fungal identification practices in agriculture and food industry. We urge the relevant agencies of the countries lacking organized plant disease detection and surveillance practices, to recognize the need to confront the potential threats on their staple crops, fiber resources, export-crops and support appropriate research for DNA-based fungal identification and classification and application of accurate names to high priority phytopathogens and emerging species. This will enable effective management of plant diseases to ensure the food security and sustainability in agriculture both regionally and globally.

Keywords: DNA barcoding, molecular identification, invasive species, plant biosecurity, quartine

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