

Foreword

From its centre of origin in New Guinea some 10,000 years ago, sugarcane has spread across diverse geographical zones largely through manmade activities. Today, it is grown on approximately 26 million hectares in 120 countries. Among all the cultivated crops, sugarcane has the largest biomass and is regarded as one of the most efficient natural biofactories. It accounts for 80% of the world's annual sugar production of some 186 million tons and plays an increasing vital role in the production of bioelectricity, biofuel, bioplastics and a growing range of sucrochemicals. It has various attributes to address the societal issues such as food production, climate change, renewable energy, decarbonisation, etc.

If sugarcane has reached such an importance, it is mostly through the result of research and development, innovation and technological advancement. It is worth noting that sugarcane was among one of the first crops to have benefitted from organised research with the British and the Dutch in Barbados and Java in 1886, followed by the creation of research centres in Mauritius, in Hawaii and in Australia in the 1890s. The pioneering initiative stimulated similar activities in other sugarcane growing areas.

Early research efforts focused primarily on the creation of new high yielding varieties, resistant to diseases and pests with improved sucrose content. Disease identification, and disease management strategies ranked high as priorities on the agenda of the research centres. The creation of the International Society of Sugar Cane Technologists (ISSCT) in Hawaii in 1924 marked a turning point, federating global research impetus on sugarcane diseases. The ISSCT created various standing committees, including one devoted to sugarcane diseases. This committee contributed significantly to advancing knowledge on sugarcane pathology and quarantine (referred as biosecurity in the modern context). At each of the 32 ISSCT congresses held to date, sugarcane diseases have been an important component on the agenda.

It is to be recalled that sugarcane diseases have been a serious yield-reducing factor with ratoon stunt as an insidious disease, epidemics of mosaic in the 1920s in the USA, Fiji leaf gall in Australia and gumming in the Mascarenes in the 1960s, smut and brown rust in the Caribbean in the 1970s, yellow leaf in the 1990s, orange rust in Australia in year 2000, to name some occurrences. In addition, new pathogens such as sugarcane bacilliform virus and sugarcane yellow leaf virus have been identified, while several known ones including *Puccinia kuehnii* and sugarcane streak mosaic virus have spread to previously unaffected regions.

Over the years, the Proceedings of ISSCT congresses have served as a rich source of information on sugarcane diseases. To further disseminate knowledge, the ISSCT supported the publications of three books by Elsevier Publishing Co., Amsterdam, The Netherlands, written by sugarcane pathologists. They are *Sugar-Cane Diseases of the World, Volume I* (J.P. Martin, E.V. Abbott and C.G. Hughes, Eds., 1961), *Sugar-Cane Diseases of the World, Volume II* (C.G. Hughes, E.V. Abbott and C.A. Wismer, Eds., 1964) and *Diseases of Sugarcane – Major Diseases* (C. Ricaud, B.T. Egan, A.G. Gillespie Jr and C.G. Hughes, Eds., 1989).

In 1991, ISSCT in collaboration with the FAO and the International Board for Plant Genetic Resources (IBPGR) published *Technical Guidelines for the Safe Movement of Sugarcane Germplasm*. Additionally, from September 1968 to November 1982, the ISSCT published 29 issues of the Sugarcane Pathologists' Newsletter.

In 2000, a practical guide entitled *A Guide to Sugarcane Diseases*, under the helm of P. Rott, Chairman of the Editorial Committee, was published by CIRAD within its series REPERES. This guide provided a very useful resource for sugarcane pathologists in the identification, understanding and practical management of diseases.

Since then, new diseases have emerged in several sugarcane producing areas such as tawny rust caused by the fungus *Macruropyxis fulva* in Africa. In addition, the agents of long known diseases like chlorotic streak described in the 1920s and Ramu stunt in the 1980s have seen major advancement. The causal agent of chlorotic streak was identified as *Phytocercomonas venanans*, a cercozoan, while that of Ramu stunt is a virus, specifically a *Mechlorovirus*. In addition, novel viruses belonging to various genera such as *Mastrevirus*, *Polerovirus*, *Mechlorovirus*, and *Umbravirus* were identified. In parallel, the application of molecular biology has revolutionized disease diagnostics, with tools such as polymerase chain reaction (PCR), reverse transcriptase (RT)-PCR, nested-PCR, multiplex PCR, multiplex RT-PCR, and loop-mediated isothermal amplification (LAMP) now commonly used.

These new developments have prompted a new edition of the *Guide*, led by Philippe Rott, Jean-Claude Girard, and Jean Heinrich Daugrois of CIRAD together with a team of dedicated collaborators. It offers a comprehensive and updated description of some 80 diseases, their cause, geographical distribution, symptoms, diagnosis, strain variation, transmission, host range, epidemiology, economic importance, control, and essential references. The inclusion of photographs of symptoms, pathogens, and vectors enhances its practical value.

I commend the Editors and authors of the chapters for producing this new Edition which will undoubtedly become a vital resource for sugarcane pathologists, researchers and industry professionals worldwide.

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