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M. Swapna · Sangeeta Srivastava

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Foreword

As a C₄ plant, sugarcane has very efficient system for carbohydrate metabolism through photosynthesis and sugar accumulation. Crop improvement efforts have concentrated mainly on improving quality traits, mainly sugar content. This being a complex trait, involves a large number of target genes in the metabolic pathway. The complex polyploid nature of the crop makes it more difficult to pin point the key players in this complex pathway. Despite its importance, little is known about the exact mechanism of sucrose accumulation and its regulation in sugarcane. Many enzymes have been proposed to have a key role in determining the ultimate sucrose content in sugarcane. Especially in a crop like sugarcane where the classical techniques are of limited help in elucidating various genetic complexities, molecular techniques can be of help in throwing some light on the grey areas. Molecular marker strategies will help in understanding some aspects of sucrose metabolism and its regulation in this crop, thus complementing the ongoing crop improvement programmes.

The review seeks to look into the crop improvement programmes in brief, in this crop, gradually resulting in the biotechnological interventions. The initial studies on molecular markers with respect to quality attributes, mainly sugar content, like diversity studies, marker identification, mapping strategies and other applications leading to functional genomics and the impact of these techniques in improving the sugar content, directly or indirectly have been dealt with. The possibility of diverse roles being played by some of the genes calls for more detailed analyses to study their possible role in sugar accumulation. Comparative genomics, which has an important role in the genomic analysis in this crop is another aspect reviewed. The complexities associated with the crop make it a difficult candidate for molecular studies too, compared to other crops. The possible implications of the polyploidy and other peculiarities of this crop will help us to be cautious in our approach towards molecular marker applications in this crop, even

though the rapid advancements in this field may be of help in overcoming many of these difficulties. Thus this book will serve as a useful guide to researchers who are engaged in molecular genetic studies related to quality attributes in sugarcane.

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