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A CASE STUDY OF INJECTION CHANNEL/SPRAY POND OVERFLOW TREATMENT PLANT AT UPSCL

Eknath Alhat, Kapil Uphade, S.S. Chauhan* & Deepali Nimbalkar

ABSTRACT

Spray pond overflow is a major source of effluent from a sugar mill which was till recently discharged untreated. As per Ministry of Environment Forest and Climate Change (MoEFCC) notification in January 2016 restricted generation of such waste water up to 100 lit per ton of cane crushed and made its treatment mandatory. United Province Sugar Company Ltd, (UPSCL), Seorahi, UP has installed a treatment plant designed by Vasantdada Sugar Institute, Pune to treat the injection channel/ spray pond overflow. This paper presents the case study of this treatment plant regarding its performance in the crushing season 2018-19. The average reduction in COD 94.4%, BOD 98.7, TDS 65.2 and TSS is about 96.4%. The mill has recycled the treated effluent reducing its fresh water intake.

Keywords: Spray pond overflow, Anaerobic, Aerobic Treatment.

INTRODUCTION

The sugar industry is the second largest agro based industry in India. The country is the second largest producer of sugar in the world with more than 550 sugar mills producing around 25 to 30 million tonnes of sugar annually (Patil *et al*, 2016). One of the major environmental impacts of sugar production is the usage of large quantities of water in sugarcane agriculture along with the generation and discharge of large quantities of wastewater from sugar mills. The industry falls into the 'red category' of highly polluting industries as defined by the Ministry of Environment, Forest and Climate Change and zero effluent discharge in inland surface waters is mandatory. Sugar mill

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The Sugar Technologists' Association of India

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Chapter 11
Sugarcane (*Saccharum* spp.): Breeding and Genomics

Shriram J. Mirajkar, Rachayya M. Devarumath, Ashok A. Nikam, Kapil V. Sushir, Harinath Babu, and Penna Suprasanna

Abstract Sugarcane (*Saccharum* spp.) is cultivated and credited worldwide for its ability to synthesize and store exceptionally high concentration of sucrose. Since prehistoric times sugarcane cultivation has undergone many transformations into present-day noble cane. Initially, selection of desirable clones and interspecific hybrids brought many agronomically-useful traits into the cultivated species. Wild related species played a major role as the donor for most of the desirable traits through gene introgression. Pre-breeding strategies and intergeneric hybridization have played a crucial role in development of noble high-yielding canes. Cultivated sugarcane has been further enriched with other valuable traits such as high fiber, high fermentable sugar and biotic and abiotic stress tolerance. Despite its genomic complexity, crossability barriers within the genus, long breeding and selection cycles, etc., remarkable progress has been achieved to develop a wide range of cultivars, hybrids and mutants suitable for different agroclimatic conditions. Germplasm collections, preservation and their utilization for development of an ideotype bearing desirable traits has become a research priority. For this purpose, molecular-marker tools are acting as potential drivers during pre-breeding and selection of

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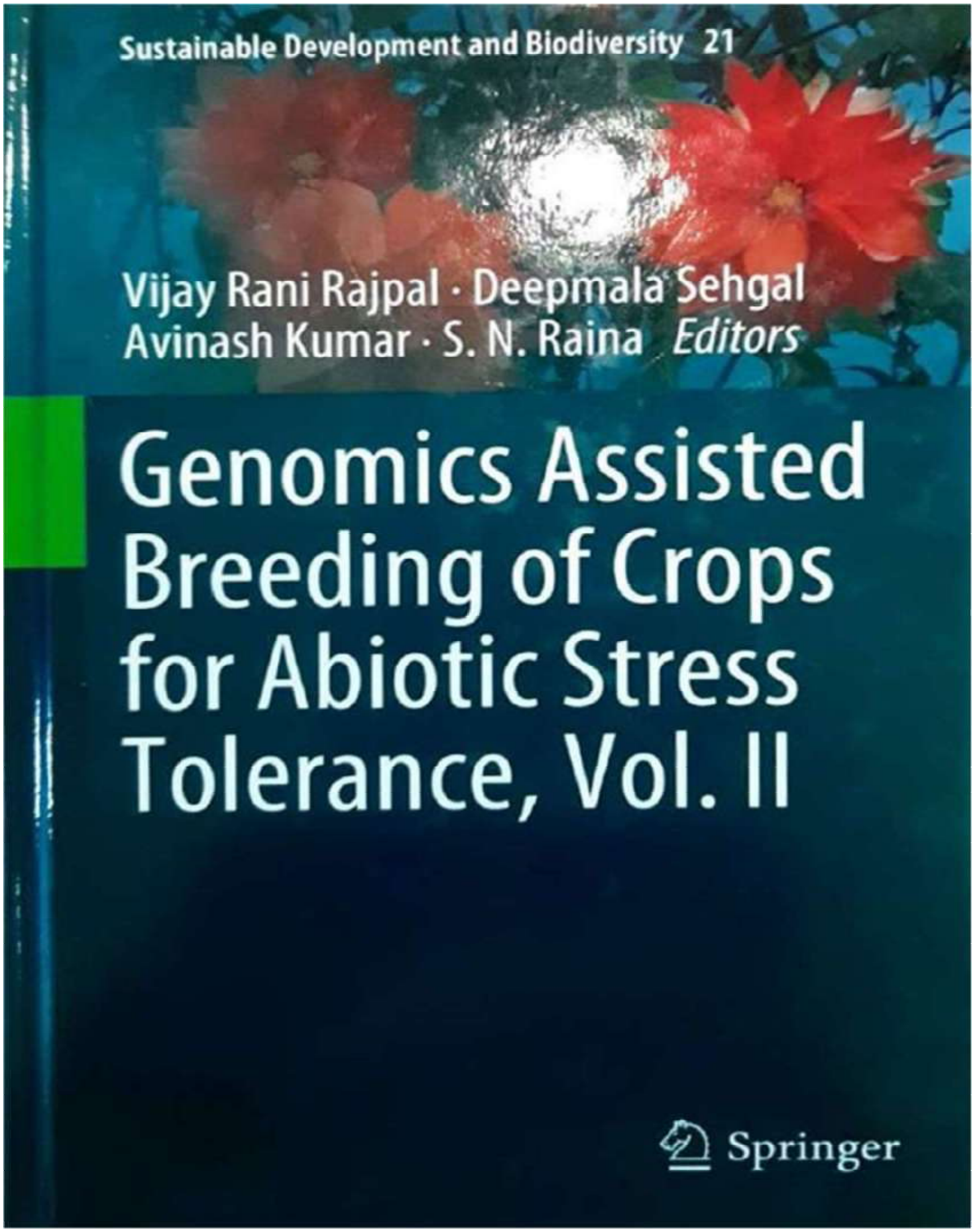
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Chapter 12
Genomic Landscapes of Abiotic Stress Responses in Sugarcane

R. M. Devarumath, S. J. Mirajkar, A. S. Thorat, F. J. Farsangi and P. Suprasanna

Abstract Occurrence of abiotic stresses imposes devastating threat to global food security by causing more than 50% loss in crop yield and productivity. Under the scenario of global climate change, these abiotic stresses pose a serious challenge to ensure sustainable food production for the rapidly escalating world population. Plants respond to a wide range of adverse environmental conditions by dynamic regulation of various physiological, developmental, and biochemical pathways in order to tolerate stress and/or to sustain growth. A thorough understanding of such responses to abiotic stresses is, therefore, imperative to design tolerant crop varieties. In sugarcane, genetic advancements have been made by adopting novel crop breeding strategies to obtain improved varieties for abiotic stresses using novel biotechnological approaches, combined with approaches involving genetics, molecular biology, breeding, and physiology. Lately, transgenic approaches have been emerged as versatile tools to combat the adverse impacts of abiotic stresses on crop production and have proven to be one of the prospective ways for the genetic enhancement. Utilization of current molecular biology tools to determine the regulatory mechanisms for abiotic stress tolerance and engineering stress tolerant crops depends on the expression of specific set of stress-related or responsive genes. As a result, several abiotic stress-responsive genes have been identified, isolated, cloned and utilized for building stress tolerance in susceptible genotypes. Transgenic sugarcane lines carrying genes for abiotic stress tolerance have been developed by using *Agrobacterium*-based method besides other methods of gene transfer. Extensive research has been carried out in these areas and several transgenic sugarcane plants with enriched

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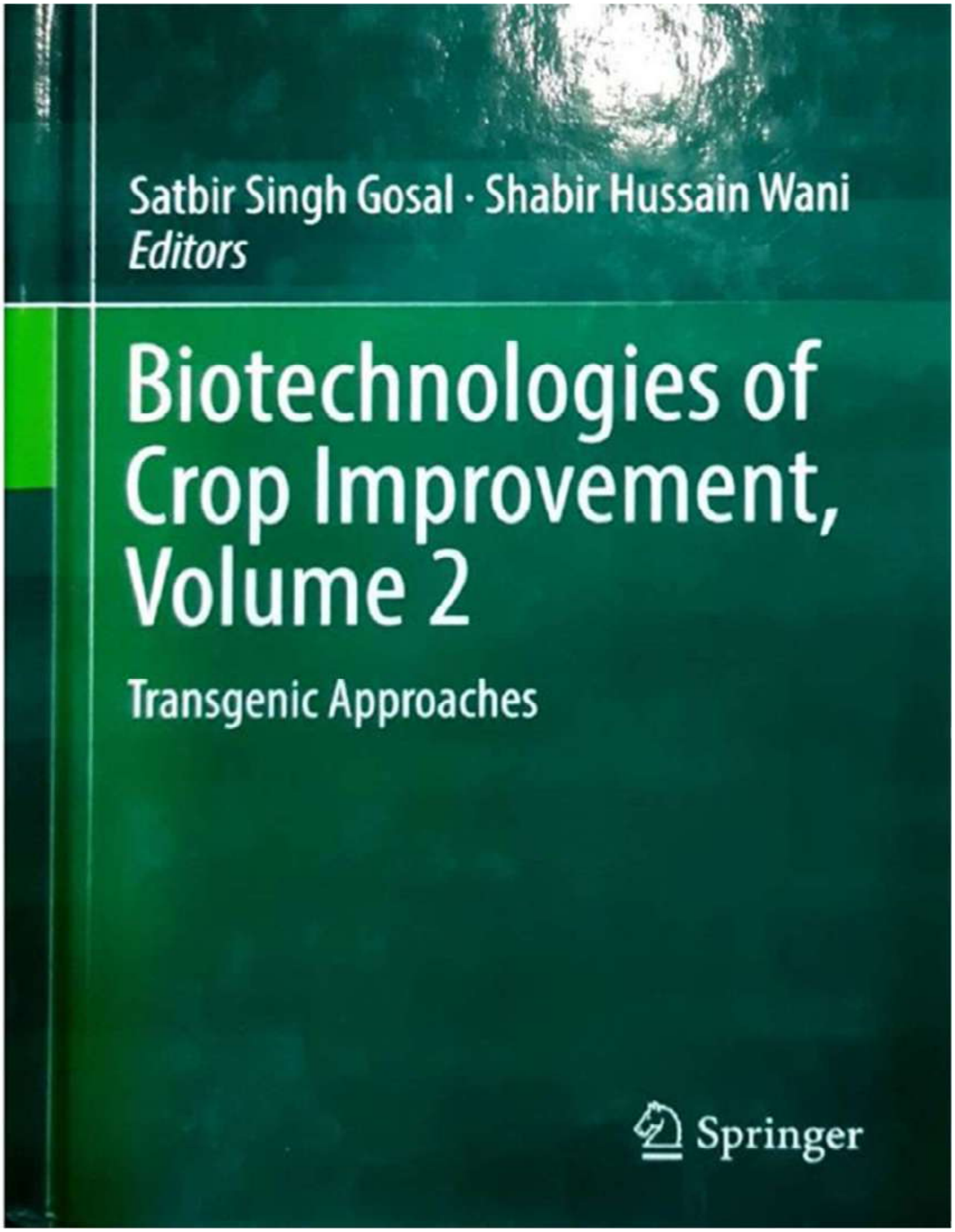
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Chapter 9

Genetic Transformation of Sugarcane and Field Performance of Transgenic Sugarcane

Gauri Nerkar, Avinash Thorat, Suman Sheelavantmath, Harinath Babu Kassa, and Rachayya Devarumath

Abstract Sugarcane is an important industrial cash crop contributing more than 70% of the sugar and 40% of biofuel production globally. The complex polyploid-aneuploid type of genome of sugarcane makes it difficult to generate hybrids through conventional breeding programs. Thus, genetic improvement of sugarcane through transgenic approaches has fascinated the attention of most biotechnologists around the world. Moreover, plant biotechnology has the potential to improve economically important traits in sugarcane as well as diversify sugarcane beyond traditional applications such as sucrose production. Although being a recalcitrant species for transformation, several advances have been made in the area of sugarcane transformation. Traits such as disease resistance, improved tolerance to salt and drought, and increased sucrose content through metabolic engineering and expression of recombinant proteins (biopharming) have been some of the areas which appear promising as far as the application of transgenic sugarcane is concerned. Stability of the transgene expression is another major bottleneck when transforming a polyploid crop like sugarcane. This chapter will help to focus on the efficient molecular tools and improved transgenic methodologies used during sugarcane transformation in addition to the field performance of transgenic sugarcane.

Keywords *Agrobacterium* · Biolistic · Field performance · Minimal gene cassettes · Promoters · Sugarcane · Transgenic

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chapter one

Biotechnological approach

A new dimension for sugarcane improvement

Gauri A. Nerkar, Madhavi V. Purankar, Suman Sheelavantmath and Rachayya M. Devarumath

Contents

Introduction

Sugarcane is the highest yielding crop worldwide and accounts for ~80% of the sugar (sucrose) production in the world (Nayak et al., 2014; Zhou et al., 2016). The genus falls in the tribe Andropogoneae in the grass family Poaceae. The tribe includes other tropical grasses such as *Sorghum* and *Zea* (maize). Very closely related to *Saccharum* are another four genera (*Erianthus* section Ripidium, *Miscanthus* section Diandra, *Narenga* and *Sclerostachya*)

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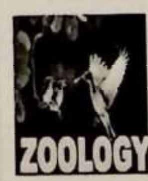

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