Proc. Natl. Acad. Sci., India, Sect. B Biol. Sci.
DOI 10.1007/s40011-015-0596-8

RESEARCH ARTICLE

Efficacy of Silicon Formulations on Sugarcane Stalk Borers, Quality Characteristics and Parasitism Rate on Five Commercial Varieties

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Received: 28 January 2015 / Revised: 11 April 2015 / Accepted: 17 June 2015

Abstract Sugarcane is an important cash crop in Iran and it is exclusively cultivated in more than one hundred hectares of Khuzestan province. One proven and ecologically sound best management practice in sugarcane is application of silicon to mitigate for both biotic and abiotic stresses. It has been proved that silicon can enhance resistance of sugarcane against stalk borers. Also, new hypothesis suggests that silicon may increase attraction of biological control agents to infested plants. Field trials were carried out at Salman-Farsi Agro-Industry Farms to determine the effects of three liquid formulations of silicon against infestations of stalk borer, *Sesamia* spp. and parasitism rates of egg parasitoid *Telenomus busseolae* Gahan using varieties CP57-614, CP48-103, CP69-1062, IRC99-01 and SP70-1143. The experiments were conducted as complete block design with three formulations of silicon. Prior to harvest twenty stalks were selected at random to determine percentage of stalk damage, percentage of bored internodes, length of borer tunnel, number of larvae + pupae per 100 stalks, number of exit holes as well as cane yield quality characteristics. In two consecutive years, the rate of parasitism on treated and untreated plots in each variety were recorded. The results from the present study showed that there were some significant differences between silicon treatments and control on borer's damage and quality sugarcane parameters but in some cases the differences were not significant. The present findings on the efficacy of silicon treatments on biological control suggested that silicon enhanced biological control attractions as shown by parasitism rate.

Keywords Biological control · Quality parameters · Resistance · Best management practice · Silicon

Introduction

Sugarcane (hybrids of *Saccharum*) is a strategically important crop that has a profound economic impact on social and governmental issues in many countries around the world [1]. The most important region for production of sugarcane in Iran is the province of Khuzestan where it is cultivated on more than one hundred thousand hectares per annum [2]. As a monoculture system, sugarcane is vulnerable to many abiotic and biotic stresses including insect herbivores and pathogens, and among them lepidopterous stalk-borers are the most detrimental and harmful insect pests of sugarcane in many sugar producing countries [3–7]. Two species of stalk borer are important in Khuzestan. Both are of the genus of *Sesamia* (Lepidoptera: Noctuidae). They are *Sesamia cretica* Led and *S. nonagrioides* Lef. [8]. *Sesamia* moth borers are capable to decrease the plant stands before young shoots form internodes and reduction in stalk gross weight and sugar quality after formation of internodes [9–11]. Infestations can reduce the amount and purity of sugarcane juice and entrance holes provide entrance of the red-rot pathogen [4, 12].

Management of moth borers in sugarcane ecosystem is complicated and several control options are used around

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Published online: 18 July 2015