Effect of stabilized ortho silicic acid on pre and post-harvest quality attributes of plant and ratoon sugarcane

Priyanka Singh, Neeru Jain, M. M. Singh and J. Singh

Silicon 13: 231–242. (2021)

Abstract

India is the second largest producer and consumer of sugar in the world. Lower cane yields coupled with post harvest losses are key factors limiting sustainability of Indian sugar industry. Silicon is a beneficial nutrient for plants and in some plants (silicon accumulators like sugarcane), it is absorbed in the range of essential primary nutrients viz. nitrogen, potassium or phosphorous. The present study was undertaken to explore the impact of stabilized ortho silicic acid (OSA, silixol 0.8%), when applied as foliar sprays on two contrasting sugarcane varieties: CoS 08279 (high yield and low sugar) and UP 05125 (low yield and high sugar) for three consecutive years (two plant and one ratoon crop). Impact of OSA was assessed on both plant and ratoon crop for yield attributes as well as pre and post-harvest quality parameters. Number of tillers per hectare for ratoon crop increased by 8% and number of millable canes (NMC) by 155 and 1312 canes per hectare in low yield/high sugar variety compared to 3% increase in tillers and 772 and 319 NMC per hectare in high yield/low sugar following the foliar application of OSA. The cane height was increased by 5.9 and 14 cm in plant and ratoon of UP 05125 and by 9.1 and 16 cm in plant and ratoon of CoS 08279 respectively,which ultimately leads to higher cane yield. Additionally other yield attributes like cane girth and cane weight increased in the treated areas compared to control ones. Commercial cane sugar (CCS %) increased by 13% and 7% in the plant and ratoon crop, respectively of high yield/ low sugar variety. Likewise, OSA application showed higher acid invertase activity during grand growth phase in both treated plant (0.95 and 1.25 units) and ratoon cane (0.46 and 1.38 units) of UP 05125 and CoS 08279,however, the activity was reduced during ripening stage as compared to control cane which resulted in higher accumulation of sucrose in treated canes. OSA treatment exhibited a profound impact on post-harvest quality losses. Almost 10% less decline in weight and 0.5 (plant canes) to 0.87(ratoon

canes) units low reduction in sucrose percentage were recorded after 240 h of harvest for both the varieties. Our findings of the present study indicates that application of ortho silicic acid not only helps in ameliorating yield and quality of sugarcane and juice but also helps in reducing the quality deterioration in harvested cane up to a significant level. The data also suggests that the use of OSA would increase remuneration of the crop for both the grower and the millers.