

Effect of Biological Insecticides on Three Harmful Sugarcane Pests

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ABSTRACT

Sugar cane crop developed in an enormous region in Egypt. It is a significant yield since it produces sugar. The harvest swarmed with numerous harmful creepy crawlies which caused a ruinous to the yield. Chitosan and nano chitosan assessed on their bothers which swarm the harvest. Results showed that, the yield expanded in the space treated with nano chitosan followed by region treated with chitosan. LC50 of chitosan and nano chitosan recorded that, *Chilo agamemnon* 110 and 87 ppm. The LC50 of *Sesamia cretica* recorded 134 and 100 ppm for chitosan and nano chitosan, separately. LC50 of *Saccharicoccus sacchari* give 100 ppm for chitosan medicines and 77ppm for nano chitosan medicines. In the field tests, the heaviness of sugarcane were huge expanded 1.3 crease and 1.5 overlap after treated with chitosan and nano chitosan during season 2018. During season 2019 the sugarcane weight huge expanded to 1.5 and 1.7 overlay treated with the relating microbes. End the nano-chitosan promisingly affect sugarcane bothers.

Keywords: Sugarcane bio agents, *Chilo agamemnon*, *Sesamia cretica*, chitosan, nano, Biological Insecticides

INTRODUCTION

Sugar cane (*Saccharum officinarum*) a significant financial harvest in Egypt, it produces sugar in the upper Egypt. Sugar stick is a monetary significant yield created sugar. Sugar can edit plagues with numerous nuisances which obliterate the developed harvest and diminished the yield Annual Report of Sugar Crops Council (2012). Bassyouny (1993). Among the genuine vermin, *Chilo agamemnon*, *Sesamia cretica*, and *Saccharicoccus sacchari*. *C. agamemnon* contamination: the butterflies lay eggs on the lower surface of the leaf cutting edges as cuts with 1520 eggs beginning from April, which bring forth following 4-7 days. This causes contaminations with parasites and microorganisms after disease, which makes the sticks simple to break at the site of disease, absence of yield, and low degree of sucrose, and may cause demise of the developing peak while tainting youthful plants El-Bagoury, 1978. *S. cretica* contamination by butterflies show up in

the long stretch of April to June and lay their eggs on the weeds, and subsequent to incubating the hatchlings move to the youthful reed plants and dive in the developing zenith (shrike) and cause their passing, decaying, and the dryness of the apical leaves (demise of the heart), just as the lower buds, so they develop new sticks. This scourge is considered to have minimal financial harm. The pink sugarcane mealybug scale bug *S. sacchari* (Cockerell) (Homoptera: Pseudococcidae) is the most perilous irritation that hurts the reed crop since it influences the leaves and replicates as microscopic organisms, where the female lays eggs at a pace of 150-250 eggs and the creepy crawly delivers 3-4 ages for every season with its various stages that cover the lower surface of the leaves, and when the contamination is serious, it covers the upper surface also, which prompts the presence of A honeydew coming about because of this current bug's retention of the cytosol of the leaves, and with the presence of residue and the development of dark form parasites, the leaves

win and consequently lose their capacity Serag, (1997). - Means of transmission of the scale creepy crawly pervasion: wind, transport of tainted plants, dress of laborers working in the field, water system water, creatures and mice that feed on contaminated sticks and their exchange to other sound fields and bugs, for example, the job of dates The sugar bothers constrained by bug sprays which prompts the pollutions in the conditions.

Chitosan structures are a wiry materials removed from the shell of marine creatures as crabs, lobster and shrimp which achieve to hinder the fat retention of and the cholesterol, When they applied on entry point, chitosan assists blood with coagulating. This work intends to assess the chitosan and nano chitosan on sugar stick bugs.

MATERIALS AND METHODS

Raising of irritations. Sugar can gathered from the Nag Hammadi fields, moved to National examination Center Laboratory. Then, at that point, the sugar can stalks cut into little areas 10 cm, then, at that point, moved to a glass box 40X50 Cm. Lab societies of the pink sugar stick mealybug *Saccharicoccus sacchari*, *Chilo agamemnon* and *Sesamia cretica*, raised on a cut segments of sugar stick tail. All examinations made at temperature of $26\pm 2^{\circ}\text{C}$ and 80 ± 5 Relative dampness inside National Research Center Laboratory. These bugs utilized for research center examinations.

Planning of Nano-Chitosan. Chitosan buy from Aldrich organization and ready for Experiments. Nano-chitosan plan as indicated by Anusha and Albin (2016).

Nano exemplification. Chitosan The Nano exemplification of chitosan arranged by Li-Ming Zhao et al (2011).

Adequacy of Chitosan Against the Target. Six focuses were ready from Chitosan and Nano chitosan and assessed on the objective bugs at convergences of : 6 ppm, 5ppm, 4ppm, 3ppm,

2ppm, 1ppm. The % mortality happen were determined by Abbott's recipe, while the LC50 esteems were assessed all through probit investigation (Abbott, 1925). The test was completed under research center conditions at $26\pm 2^{\circ}\text{C}$ and 60-70% RH.

Preliminaries in the Field. The preliminaries made in the field did at Aswan, in upper Egypt during the seasons 2018 and 2019 to concentrate on the gauge of the chitosan and their nano on sugar stick designated bothers. Sugar stick was developed at the fifteenth of September during the two sugar stick seasons in a space of 1.5 feddan. Chitosan were applied as single medicines in randomize plots. Normal agrarian practices were performed and no compound control was utilized during the review time frame. Ten plots were splashed with just water as untreated. Tests from every treatment were gathered week by week and moved to the research facility for examination. Rates of contamination were determined. Yield information in treated and untreated plots of sugar stick after the reap time during (2018 and 2019), addressed by kgs weight in the equivalent got by Sabbour and Shadia (2018) and Sabbour and Hussein (2018).

RESULTS

Table 1 show that LC50s of chitosan and nano chitosan on *C. agamemnon* which recorded 110 and 87 ppm. Table 2 show that LC50s of *S. cretica* which recorded 134 and 100 ppm for chitosan and nano chitosan , separately. Table 3 show the LC50 of *S. sacchari* which give 100 ppm for chitosan medicines and 77ppm for nano chitosan medicines. (Table3).

Table 4 show that the heaviness of sugarcane were critical expanded 1.3 overlap and 1.5 crease after treated with chitosan and nano chitosan during season 2018. During season 2019 the sugarcane weight huge expanded to 1.5 and 1.7 crease treated with the relating microorganisms (Table 4).

Table 1: chitosan and Nano chitosan effect on *Chilo agamemnon* under laboratory conditions

Treatments	LC ₅₀ ppm	S	V	95% Confidence limits
Chitosan	110	0.1	1.2	80-133

Nano chitosan	87	1.1	1.1	70-149
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Table 2 chitosan and Nano chitosan effect on *Sesamia cretica* under laboratory conditions

Treatments	LC ₅₀ ppm	S	V	95% Confidence limits
Chitosan	134	0.1	1.1	98-153
Nano chitosan	100	1.1	1.1	90-139

Table 3: chitosan and Nano chitosan effect on *Saccharicoccus sacchari* under laboratory conditions

Treatments	LC ₅₀ ppm	S	V	95% Confidence limits
Chitosan	100	0.1	1.4	81-143
Nano chitosan	77	1.1	1.1	65-129

Table 4: yield weight after treatment applied by the chitosan Nano chitosan

	Season 2018	Season 2019
Materials tested	Weight .Ton. of sugar cane (Ton/F) feddan)	Weight. Ton. of sugar cane (Ton/ F)
Chitosan	34.45±60.61	35.89±46.79
Nano chitosan	38.60±88.16	39.99±69.38
Control	24.70±35.13	23.46±87.79
F test	24.9	25.9
LSD 5%	22.4	22.9

Economic return from the sugarcane crops treating using both chitosan and nano-chitosan.

Table No. (5) show that the sugarcane crop treatment using both chitosan and nano-chitosan resulted in an increase in the productivity per Feddan by about 46.05% and 62.92%, and the costs of production per Feddan by about 7.09% and 8.18%, respectively, compared to the control, which amounted to about 24.08 Ton / Feddan, 18348 pounds / Feddan. It was also found that the sugarcane crop treating using both chitosan and nano-chitosan resulted in a decrease in the cost of producing a ton of sugarcane by about 26.68%, 33.67% in compared to control, which reached about 761.960 pounds / ton. The net return per ton as a

result of the transaction achieved about 161,342 pounds / ton, and about 214,607 pounds / ton, in compared to a loss per ton in control of (61.960) pounds / ton . In other words there is a loss in the amount of sugar per feddan of about 26,688 kg, and about 36.36 kg, which results in increasing the production of sugar cane in the case of generalizing the treatment of the area planted with sugar cane at the level of the Republic, which is reached about 327,412 thousand feddans , also about 27,503 thousand tons of sugar, and about 30,777 thousand tons of sugar. This contributes to reducing the amount and value of Egyptian imports of sugar crop with the same amount of increase in sugar production from sugar cane. The study recommends generalizing the treatment of the total cultivated

area of sugarcane crop across the country using by using the nano-chitosan . Accordingly, the production of a ton of sugarcane needs about 227.5 m³, and about 203.9 m³ of Irrigation water for each of them, respectively, in compared to 332.2 m³ per control. The sugarcane crop treatment using both chitosan and nonchitosan contributes to an increase in the production of sugar produced from the feddan by about 84,408 kg, and about 94,152 kg in compared to the

amount of sugar produced from the control, which is reached about 57,792 kg. The net yield of the feddan reached about 5674.4 pounds, and about 8397.6 pounds, respectively, in compared to a achieved loss in the control reached about (1010.4) pounds, while the invested pound return reached about 1.289 pounds, and about 1.423 pounds, respectively, in compared to realized a loss in the control which reached about (0.945) Pounds.

Table (5) Economic return from the sugarcane crops treating using both chitosan and nano-chitosan

Statement	control	Chitosan	Nano-chitosan
Feddan productivity / ton	24.08	35.17	39.23
% Increase in production	-	46.05	62.92
Total feddan costs	18348	19648	19848
The price of supplying per ton	720	720	720
Total feddan revenue	17337.6	25322.4	28245.6
Net yield per feddan	(1010.4)	5674.4	8397.6
Return of the pound invested	(0.945)	1.289	1.423
Cost per ton	761.960	558.658	505.393
Yield per ton	720	720	720
Net yield per ton	(61.960)	161.342	214.607

Source: Calculated and compiled from Table No. (4), Ministry of Agriculture and Land Reclamation - Annual Statistical Bulletin 2018-2019.

DISCUSSIONS

Consequences of this review concur with results artists by Sabbour and Nayera in year of 2014, they pointed that the growths utilized against bug which swarm the sugar beets cause a higher mortality in every conditions of the investigations in field ,the diseases rates altogether diminished after the organisms applications and research facility analyses of the parasites causing a critical lack in the sugar beets bothers numbers. Many creators have similar outcomes, Sabbour and Hussein (2016), Sabbour and Singer (2016), Sabbour and Abd El

Rahman (2007),stated that decline *Cassida vittata* diminished in its numbers after the medicines of growths application and the terperse applications diminished the sugar beet creepy crawlies. Sabbour and Abed-Elhakeim (2018), Hasssen et al (2012), Goodwin et al,(2007), noticed that, the eggs of *C. vaitta* not incubated after chitosan medicines, contortions happen between hatchlings, pupae and grown-ups, additionally the sugar beet organic product weight expanded. Sahab et al (2015) study dependent on the controlling the aphid through nano-chitosan applications and decrease their numbers by this applications. In light of the

aftereffects of the current review, showed that, Sabbour (2015a) pointed that uses of Imidacloprid and nano-Imidacloprid diminished olive natural product fly, Mediterranean organic product fly numbers in the field. Our outcomes concur with Sabbour (2015b) who found that the quantities of the potato tuber moth, diminished by the uses of , nano materials. Comparative discoveries were additionally accomplished by Sabbour (2013) against three olive bugs constrained by bacterial arrangements of spinosad. These outcomes are in consistence with those acquired by Sabbour (2015a) for olive trees treated with Imidacloprid and nano-Imidacloprid and invaded by *C. capitata* and *P. oleae*. Likewise, treatment of potato plants, invaded by *P. operculella*, with nano-organisms *I. fumosorosea* and *M. flavoviride* expanded the yield (Sabbour, 2015b). in this manner results concur with Sabbour and Singer (2015 a,b, c) , Matter and Sabbour (2013), Sabbour and Shadia (2015) Sabbour et al (20120, Sahabet al (20 2014,& 2015), Similar outcomes were acquired by Sabbour (2013) for spinosad-treated olive trees that were invaded by *B. oleae*, *C. capitata* and *P. oleae*. Sabbour 2017, observed that the olive weight expanded after bioinsecticid applications. Sabbour and Nayera 2017, detailed that nano-biopesticides application increment the efficiency of the olive organic products under field conditions. Additionally Sabbour and Shadia (2020), Sabbour , (2016 a,b), Sabbour and Nayera (2016), control *Tuta absoluta* by nano chitosan and results showed a decrease in the invasion numbers. Sabbour (2016) utilize the nano chitosan against *schistocerca*. The equivalent acquired by Magda Sabbour (2020), Sabbour et al, (2020) Sabbour and Nayera (2020, a&b) and, Magda Sabbour and Shoura b (2020) . The net yield of the feddan came to around 5674.4 pounds, and around 8397.6 pounds, individually, in contrasted with an accomplished deficit in the control came to around (1010.4) pounds, while the contributed pound return came to around 1.289 pounds, and around 1.423 pounds, separately, in contrasted with understood a shortfall in the control which came to around (0.945) Pounds (Nayera et al, 2020), Hashem et al (2019), Sabbour and Nayera (2019, a,b) . The sugarcane crop treating utilizing both chitosan and nonochitosan adds to expanding the proficiency of the water system water part of the harvest, as a feddan needs around 8,000 m³ of water system water (Nayera and Rania 2016). The equivalent acquired by

Sabbour and El-Sayed (2018 a,b), Sabbour and Nayera (2018), Sabbour and Shadia (2016& 2017), Nayera et al (2016 a, b,c). the bio-bug sprays control numerous agribusiness bothers, Sabbour (2016), Sabbour and Nayera (2016) Sabbour and Shadia (2016).

COONCLUSION

Sugar cane crop is a significant harvest in Egypt which pervaded with numerous bugs which causing a dangerous to the yield. Chitosan and nano chitosan assessed on there bothers which tracked down that. the yield expanded in the space treated with nano chitosan followed by region treated with chitosan.

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