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Sustainable Bio control Method Against Major Sucking Pest Mites, Pyrilla and Borers for Enhancing Sugar Cane (Saccharum officinarum) Yield and Quality

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ABSTRACT

Sugar cane is the cash crop in Pakistan. Crop usually affected by insect pests. Among these insect pests in sugarcane borers, pirylla and mites are very dangerous, where as Pyrilla and mites are very serious pests in sugar cane. crysopyrilla. (Hymenoptera: Pyralidae) is prominent egg parasitoid utilized for the purpose of pyrilla infestation in IPM. This research was carried-out for the purpose of success various issuance of crysopyrilla in case of sugarcane Pyrilla attacks and observe the decay rate of sugarcane pest and such as control issuance by crysopyrilla eggs cards. The pirylla ' generation emerges out after 27 days, crysopyrilla cards carnea and trichogramma cards were installed with the 15 card , 20 cards, days interval repeated and to check out infestation of sugar cane sucking insects and borers . The research shows that results of installed crop was excellent minimum pyrilla infestation and borers infestation as compared to less installed crysopyrilla card and trchogramma cards. More treated with crysopyrilla card about 2400 parasitoids eggs /acre and trichogramma cards 6000 parasitoids eggs/acre at interval after 20 days repeat 7-8 times from May to September. While pirylla complete their life cycle 27 days. To increase the quality about 0.2-0.5 in sugarcane recovery and more than 150 -200 mound per acre increases due to application of crysopyrilla cards. Whole minimum to high amount of crysopyrilla cards T3 4800 parasitoids eggs/acre growth was 42.07 note max high yield 35.51 ton/ha and more brix 20.1 were seen. The results showed that crysopirilla eggs card is successful and inexpensive and environmental safe recruitment for complete dominating over sugarcane Pyrilla.

Introduction

Agriculture is basic needs of human and strongly courage used in many departments (Praburaj, 2018).The contribution of agriculture about 3,4 trillion us dollar and source of job opportunity 1.3 billion worker in the world (Alston and Pardey, 2014). Agriculture gives more values in GDP (Freire, 2014).Indeed more farming of agriculture have many problems such as irrigation, natural resistances, pest and diseases,(Makal et al., 2017). Pest and disease loss the quality of food as decrease the production of crop. Fluctuation in weather pest are transfer to new suitable weather situation. (FAO, 2017). Mites have many group of insects which have been damaging and disastrous agriculture economic for various years. Recognize in class Arachnida, subclass Acari and families Tenuipalpidae, Tarsonemidae, Tetranychidae and Eriophyidae (Baker and Wharton, 1958). Mites extract acute from leaves cell with their mouthparts and stinging crop juice (Bensoussan et al., 2016). Identification mites attack normally yellow or whitish cloure appear on the leavers tissues and make tiny traps. (Jeppson et al., 1975).By spider mites results in decrease in production. (Arnemann et al., 2006). Identification of white and yellow patches appear on leaves surface and acute attack decrease in yield production(Dehghan et al., 2009). More than 70 percent decrease in yield due to red mites that is spread in in Martinique, Antilles islands and Trinidad (Rodrigues et al., 2020). Spider miters effects on production of crop about 50% href="#maina_2014">(Maina et al., 2014). Renkema et al., (2017). More attack of mites in large scale that is immediately stop the growth of crop whites and yellowing of each plot young leaves Yong-Heon (2002) .Research identified that due to repetition of pesticides were made more resistivity against all types of miticides. Mites control is not easy due to more fecundity rate and high growth rate of mites (Yong-Heon, 2002). Pest management is practice by pesticides which cause effect on climate; health .More effective method is biological control (Tudi et al., 2021; Gangwar, 2017).Chemical spray contaminate climate,air,water and soil as well as decrease the nitrogen fixation (Mahmood, 2016).About 98% spray insecticides and95% of herbicides effect on non targets organism (Miller, 2004; Follet and Duan, 2000; Robinson et al., 1999).

Materials and Methods

Trial area of 1.944 hectare sugar cane variety was cp 77400 sow 36 plots every plot has equal size 0.036 hectares in complete randomize block design (CRBD) implements in this experiment. Three treatments were taken on single plot T1, 4000 trichogramma eggs parasitoids per acre were installed four times and T2,6000 trichogramma parasitoids eggs per acre were installed six times and treated with Chrysoperla cards 720 parasitoids eggs per acre were installed four times and 1440 parasitoids eggs per acre were installed six times in same plot by evaluating less parasitoid eggs from month April to August 2025,therefore sugar cane production and brix was noted at the time of harvesting. All the agronomic practices recommended dose of fertilizer and irrigation were apply according to the condition of crop. The infestation level of sucking pest and borers were measure affected crop from month April to September after interval 20 days. Select 5 different places from one plot with in 10 squares meters note the damage plants and calculate the percentage of affected plants. To reduce the borers attack as well as sucking attack was rare on fictitious host on boiling wheat a little tiny moth citotroga cerelella in the laboratory of Hamaza sugar Mills Jeatha Bhutta Khan Pur below temperature 2 5±2°C and humidity 60-70%. Stored parasitoid cards available for grower installed in the sugar cane crop as bio control agent. Installation of trichogramm and Chrysoperla cards at different duration must raise generation to more amount of eggs parasitoids cards.

Results and Discussion

Sugar cane is long duration crop total expenses are more by the farmer on single highest expenses in the whole development. The installation of biological process is cheap, easy method and ninety percent save cost in trichogramma cards, not labors, 90-95% to decrease the borers attack. The grower of Pakistan is apply old method to decrease the borers infestation level and observation note that for getting more yield and recovery modern and innovative method must be installed.(Radadia et al., 2013). Therefore installation of trichogramma cards decrease the borers infestation (Sallaman and Allosopp, 2005).This study indicate the effect of trichogramma on growth yield and quality of sugar cane at duration 20 times. There was very important and most effective meted to control borers.

This research was organized to describe the impact of trichogramma cards and chrysopyrilla on growth, yield and quality of sugar cane at intervals 20 days. There was very important and most effective control of borers and sucking pest.

Decrease infestation of bores was installed rate of trichograma cards. It is very suitable and successful bio control against sugar cane borers. The highest and lowest installation was recorded in the minimum and maximum emerge out of trichogramma cards after 20 days duration as mentioned. There is a great difference were seen in borers attack as comparing to control and installed block. The decrease of borer's infestation was due to emerge out of trichogramma chilonis cards. There was a great dissimilarity of lower and more trichogramma cards and chrysopyrilla the highest cards were installed dose of 60000 parasitoids eggs /acre trichogramma cards and chrysopyrilla cards

There was a significant consequence of biological control agent against borer attack and sucking pest during whole study. The maximum and minimum release of trichogramma cards and chyeosopyrilla cards 15, 20 cards respectively. There was a significance difference was seen between lowest and highest trichogramma card treated.

Installed biological card four times after intervals of 20 days completed in the month of June all the bores infestation start from march to October (Radadia et al 2013) who reported that many borers of sugar cane such as shoot borer, top borer, stalk borer are damage the crop and decrease the production as well as recovery of sugar cane .Top borers infestation was seen in June, early shoot bores was seen about 60 days in May and stalk was seen after 100 at harvesting time (Jalili et al 2006c) who reported that at more temperature (32 - 40°C) gave their eggs inside host eggs and produce more generation for control long period of borers attack. Parasitism sugarcane stem borer 993 million hectare every years all over the world (Saroj and Jaipal, 2000). Table 2

More attack of mites in large scale that is immediately stop the growth of crop whites and yellowing of each plot young leaves Yong-Heon (2002) .Research identified that due to repetition of pesticides were made more resistivity against all types of miticides. Mites control is not easy due to more fecundity rate and high growth rate of mites (Yong-Heon, 2002).

Therefore in the treatment T1 growth was seen 24%, stem girth 2.47 and yield was noted 25.2.9 t/acre, brix was 10.51 was recorded at the less biological card were used 15 cards 4 times repeat in the same filed as shown in table 1. (Kumarasinghe and Wratten, 1996) describer that feeding by Pyrilla causes poor growth of sets which is very difficult in milling of process of sugar cane .

Thus in the treatment T3 growth was seen 34%, stem girth 3..47 and yield was noted 26 t/acre, brix was 10.67 was recorded at the highest biological card were used four times repeat (Kumar and Yadav, 2006). Sugar cane Pyrilla sucking pest nymph and adult eat from cell sap leaf of sugar cane and other pest decrease the production of sugar cane . (Puri and Siddharth, 2001). Explain that If attack in the early growth period to September which decrease quantity as well as quality of sugar cane .(Rodrigues et al., 2020). Described more than 70 percent decrease in yield due to red mites that is spread in in Martinique, Antilles islands and Trinidad.

Similarly in the treatment T5 growth was seen 25.74%, stem girth 2.03 and yield was noted 23.37 t/acre, brix was 9.54 was recorded at the highest biological card were used four times repeat in the same filed as shown in table 1. Yong-Heon (2002) More attack of mites in large scale that is immediately stop the growth of crop whites and yellowing of each plot young leaves.(Puri and Siddharth, 2001). If attack in the early growth period to September which decrease quantity as well as quality of sugar cane. (Routray et al., 2016; Bale et al., 2008) noted that Biological method is save, sustainable and very important method to control pests

Therefore in the treatment 20 cards T2 growth was seen 41.91%, stem girth 2.57 and yield was noted 29.90 t/acre, brix was 18.36 was recorded at the highest biological card were used six times repeat in the same filed as shown in table 2. (Ghosh, 2011) . explain with deep research that bio pesticides strongly control the mites attack. Many years research main biological method as scientist observation occurs balance among food quality and save biodiversity with in climate for current and future genesis. (Sharma, 2013; Waage and Greathead, 1988). Explain that Biological method is safe, cheep and not damage the non-target species, envornmently save, easy installation and bio pesticides that increase root and plant growth that enhance beneficial soil microflora .

Therefore in the treatment T4 growth was seen 42%, stem girth 3.57 and yield was noted 25.84 t/acre, brix was 20.15 was recorded at the highest biological card were used 20 cards six times repeat in the same filed as shown in table 2. (Madan, 2001) describe that Biological control of Pyrilla is great invention. (Carrillo et al., 2012). Afzal and Khan (1978) discovered that one Chrysoperla carnea Stephens larvae can consume up to 487 aphids and 511 whitefly pupae before pupation and has excellent searching capacity. Viteri Jumbo et al., (2019) assessed the potential of Ceraeochrysa caligata Banks, as a biological control agent of RPMs by conducting functional response bioassays. Three stages of RPMs (eggs, immature stages and adult females) were provided to less than 24 hrs old C. caligata in coconut leaf arenas. The amount of prey consumed was recorded six hours after releasing the lacewings. (Viteri Jumbo et al., 2019)They found that the ability of the lacewings to feed on the RPMs increased with larval development.

Therefore in the treatment T6 growth was seen 39.91%, stem girth 2.83 and yield was noted 31.09 t/acre, brix was 18.36 was recorded at the highest biological card were used 15 intervals six times repeat in the same filed as shown in table 2. (Kamal et al., 2015) described that Bio-agent characters are competitors, predators, parasitoids, and pathogen. Hoy (1986) outlined the criteria for successful predator release as the potential of the agent to manifest after release, survive spray routines and manipulate target pest populations (Arnemann et al., 2006). Identification of white and yellow patches appear on leaves surface and acute attack decrease in yield production(Dehghan et al., 2009). More than 70 percent decrease in yield due to red mites

that is spread in in Martinique, Antilles islands and Trinidad (Rodrigues et al., 2020). href="#maina_2014">(Maina et al., 2014). Renkema et al., (2017) note that Spider miters effects on production of crop about 50%

Maximum installation of cards gave more growth due to less attack of sugar cane, no symptoms of borers attack were seen sugar cane get more growth, yield as well as quality. (Vengopal S. et al., 1968) describe that Bio agent get protein from insects and laid their eggs on sugar cane crop at rate 7-55%

Temperature resistant biological agent about 10000/ha release out after 7 days interval that decrease the top borers and control the 3rd generation top borers attack(Anonymous 2004).

Bio agents has strong character to hun at less temperature (Jalali Sk and Singh SP 2006 b).

Various borers of sugar cane such as shoot,top,stalk borers are attack on sugar cane and decrease production as well as quality. Top borers attack was appear in june,early shoot borer was noted about 60 days in may and stalk borers apper in after 100 days at cutting time (Radadia et al 2013)

Ina ballot shape either on the top of sugar cane (Faqir Gull et al., 2010).

Shoot borers damage is much more on sugar cane about 66-73% 3-4 generation apperar annually (Rehman and walayati 2023).

Table 1: Trichograma cards treatments with 15 cards and chrysopa cards to control sucking pest and borers.

Treatments	Growth	Stem Girth	Yields	BRIX
T1 Trichograma cards +chrysopa cards for mites T15 M15	24	2.47	25.29	10.51
T2 1M20 Trichograma+ chrysopa cards for mites	34.50	2.83	33.56	13.23
T3 Trichograma+ chrysopa cards for pyrilla T15 P15	30.61	2.47	26.	10.67
T4 Trichograma+ chrysopa cards for pyrilla T15P20	34.74	3.57	33.65	14.50
T5 Trichograma+ chrysopa cards for White fly T15W15	25.74	2.03	23.37	9.54
T6 Trichograma+ chrysopa cards for White fly T15P20	34.40	2.57	32.85	11.38

Graph 1: Trichograma cards treatments with 15 cards and chrysopa cards to control sucking pest and borers.

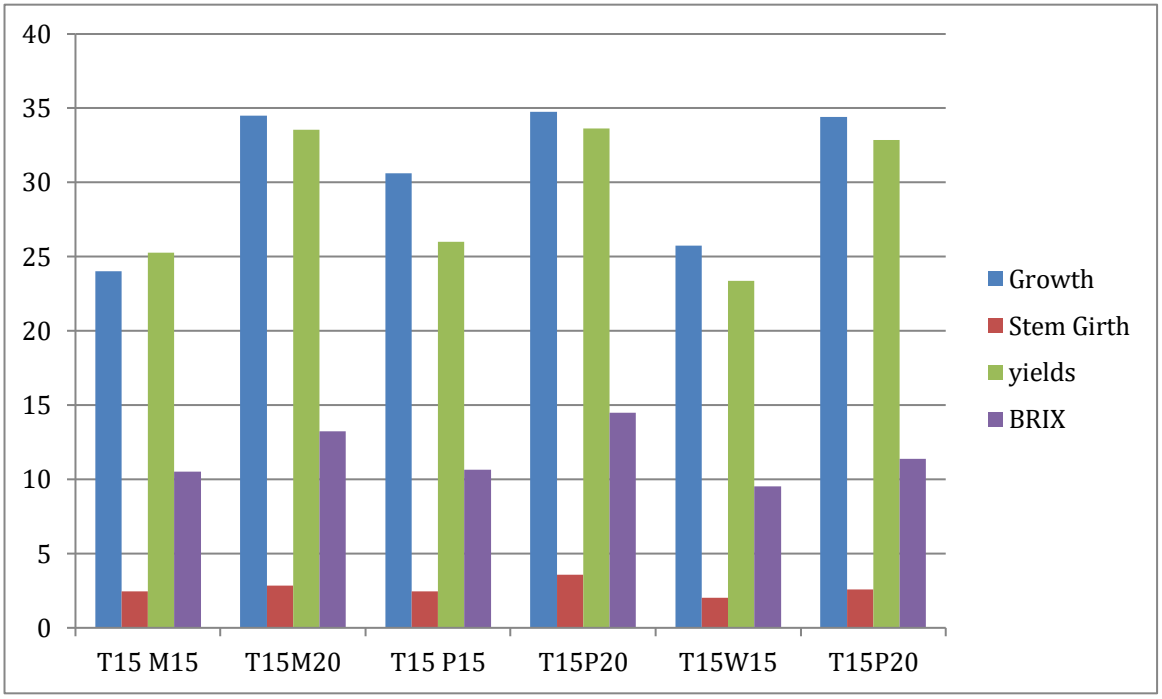
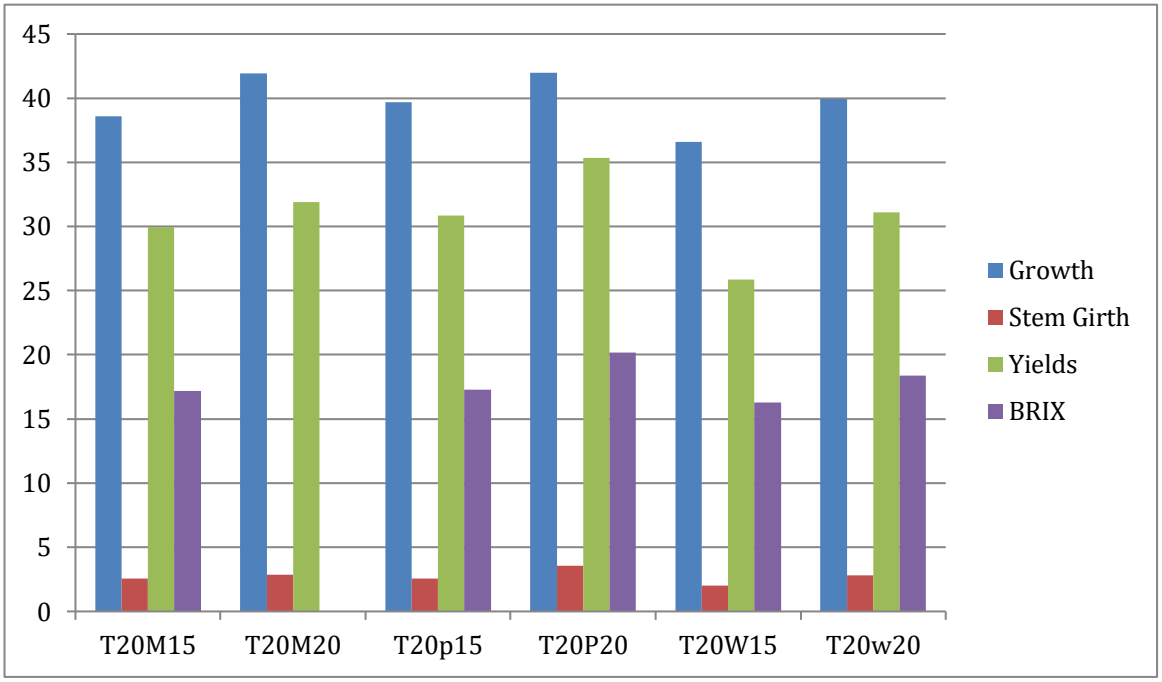


Table 2: Trichograma cards treatments with 20 cards and chrysopa cards to control sucking pest and borers attack.

Treatments	Growth	Stem Girth	Yields	BRIX
T1 Trichograma cards +chrysopa cards for mites T20M15	38.60	2.57	29.96	17.20
T2 Trichograma+ chrysopa cards for mites T20M20	41.91	2.84	31.90	18..36
T3 Trichograma+ chrysopa cards for pyrilla T20p15	39.67	2.57	30.84	17.27
T4 Trichograma+ chrysopa cards for pyrilla T20P20	42	3.57	35.32	20.15
T5 Trichograma+ chrysopa cards for White fly T20W15	36.58	2.03	25.84	16.27
T6 Trichograma+ chrysopa cards for White fly T20w20	39.91	2.83	31.09	18.36

Graph 2: Trichogramma cards treatments with 20 cards and Chrysoperla cards to control sucking pest and borers attack.



Conclusion

This is a very paramount method to decrease harmful insects by biological method.

Very less expensive and suitable techniques to damage insets from plants. Beneficial insects or bio agent's remains live for a long duration in the agriculture field. The seasonal crops natural envornmently favor bio pesticides and bring optimistic climate for beneficial bio control. The chief and basic techniques in biological control of sugarcane insect should be food of natural bio agents' method.

Application of T. chilonis eggs cards and Chrysopyrilla cards decrease infestation level of borers attack . This technological research is very successful and climate friendly which restrict recovery and production and deprived of sugarcane in case of borers . It is recommended that more application of trichogramma cards and chrysopyrilla cards will increase production as well recovery of sugarcane.

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Successful bio-control programs require adequate knowledge of population dynamics of pest/predators, endemic species, seasonality of species, generation time and the ability to be mass-reared, among other areas of knowledge surrounding pest biology and ecology. Analysis of the publications identified the following key concepts: (i) predators, (ii) pathogens and (iii) parasitoids as biological control agents. Further, Hoy (1986) outlined the criteria for successful predator release as the potential of the agent to manifest after release, survive spray routines and manipulate target pest populations. Al-Atawi (2011) identified the four families of phytophagous mites that cause economic damage to crops: Tetranychidae Tenuipalpidae, Tarsonemidae and Eriophyidae as shown in Table 2.