Management Of Tomato Fruit Borer (*Helicoverpa Armigera*) (Hubner) (Lepidoptera: Noctudiae) By Using Different Chemicals

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Abstract: *Helicoverpa armigera* tomato fruit borer is a serious insect pest of tomato crop. Tomato fruit borer is responsible to cause low tomato yield production. The main method to reduce the population of tomato fruit borer is chemical control. The present study was done to explore the chemicals insecticides for the management of *Helicoverpa armigera.* Tomato crop were grown in Randomized complete Block design with four replications and five treatment. Different chemicals were used in trial like Fipronil, Trichlorofon, Deltamethrin and Thiamethoxam every Fifteen days of interval and compare with untreated control. The result revealed that maximum Infestation occur in T5 (control one) plot while minimum Infestation in T1 (Deltamethrin) plot. Forward by T4 (Thiamethoxam) while the minimum yield in T5 (control one) plot and maximum yield in T4 (Thiamethoxam) treatment. Efficacy of data showed that number of healthy fruit is maximum in thiamethoxam 462.52 while minimum healthy fruit in control one plot is 237.55 where no application of spray and minimum Infestation on T1 (Deltamethrin) is 15.59 while maximum Infestation in Tomato in T5 (control one) plot is 65.59. Result also revealed that control of tomato fruit borer Deltamehtrin first after Thiamethoxam were effective and least effective were Fipronil. at the end the maximum yield occur in T4 (Thiamethoxam) For the management of *Helicoverpa armigera* Deltamethrin and Thiamethoxam were most effective.

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Key words: tomato, chemical, fruit borer

1. Introduction

Tomato is most important fruit plant which is used in every dish. It is used in various forms either in fresh or possessed (Anonymous, 2014). Tomato through extended list of vegetables, is the most collective and profitable vegetable enough favorable for the environment of Pakistan. The average production of tomato in Pakistan is approximately 10.1 each ha (FAO, 2014) which is largely less as compared to main Tomato growing Countries of all world. In Punjab district Nankana and Gujranwala produce 22% tomato while 9.2% tomato produce by Faisalabad, and Muzaffargarrh is 3rd highest tomato producing area of Punjab. Multan is the vast center for tomato yield. The share of two district Muzafargarrh and Multan is 7.2% (Anonymous, 2008). Current study shows that the people who consume tomato in large quantity are at less risk of diseases like rectal, cancer, stomach colon lungs cancer, and prostate cancer as compared to those people who consume tomato less in quantity (Giovannucci *et al*., 2002). The uncooked fresh tomato increase the power of heart and other organ of body the lycopene present in tomato defense against harmful UV rays. one pound of fresh tomato contain thiamine 0.24mg, iron 2.4mg, niacin 2.5 mg, food energy 91 calories and riboflavin 0.16mg (Thompson and Kelly, 1985).

The tomato fruit borer is pest which feeds or utilize many kind of food which is harmful pest and its severe threat to numerous major commercial crop (Wakil *et al*., 2012). The harvest loss in Pakistan during 2009-2010 which is almost 14.7 to 32.6% (Wakil *et al*., 2010). The tomato fruit borer widespread everywhere Australia, Africa, Asia and Mediterranean Europe (Sharma, 2005). In different nature *Helicoverpa armigera* is attacked on more the n 200 types of Fruit Trees, Cash crop and Vegetable (Fitt, 1991). The host of Tomato fruit borer is different so name of this pest is different like pod borer tomato fruit worm bollworm American bollworm cotton bollworm (Nasreen and Mustafa, 2000). The major pest of Tomato crop is *Helicoverpa armigera* which is present in large extent on cotton, fodder and Horticultural crop (Reena *et al.,* 2006). The characteristics of *Helicoverpa armigera* is verstatile, polyphagous and high fecundity to achieve the adaptable, feeding on many kind of foods, and high reproduction rate of tomato fruit achieve the status of major pest borer (Mehrvar, 2009). *Helicoverpa armigera* is major factor to decrease the weight and

number of fruit in tomato crop from 18 to 55% (Yankanchi and Patil, 2009). The tomato fruit is act as a devastating pest for tomato crop. (Barrientos *et al.,* 1998).

Helicoverpa armigera is major pest of tomato crop it is stated that Indexocarb has been used against tomato fruit borrer and showed significant result so tomato fruit borer has been controlled by Indexocarb (Singh *et al.,* 2005). It is stated that in tomato crop high rate of mortality of tomato fruit borer has been seen when bifenthrin is used so bifenthrin cause high mortality rate of tomato fruit borer in tomato crop (Rushtapakoractr and petchwichit, 1996). The tomato fruit borer is major factor to destroy the tomato crop In pakistan many pests such as cutworms hornworms red spider mite flea beetles and aphid. The tomato fruit borer is polyphagous in nature and cause high profitable losses to farmer and extreme level of pesticide is consume for manage of this pest (Sharma, 2005). The complete damage occur by fungi and bacteria but the main start from caterpillar. the caterpillar feed on fruit content of tomato and insert one side of its body into fruit and start the initation of damage then slowly slowly complete damage occur (Lukefahr *et al.,*1971). The losses of tomato crop by *Helicoverpa armigera* in Pakistan is 35% (Latif *et al.,* 1997).

The incidence in field through daily spraying chemical insecticide from 10% to 20% and at same time tomato fruit borrer cause 40% yield loss (Tiwari and Krishna Moorthy, 1984). Tomato fruit borrer has also been controlled by using synthetic pyrethroid sometime farmer become excess dependent on insecticide for the control of tomato fruit borer (Srinivasan and Krishna Moorthy, 1992). The primary method to control the tomato fruit borer is synthetic chemicals. with the use of synthetic chemical it can be control but insecticide cost is too high (Campbell *et al*., 1991).

(Wakil *et al*., 2009) work out at management of tomato fruit borrer in Pakistan they showed different method to control the tomato fruit borer like hand picking larvae, integration of weeding, or synthetic chemicals indexocarb. The study revealed that in all of these method the synthetic chemical indexocarb showed most effective result against tomato fruit Also, in (Cameroon, Brévault *et al*., 2008) also studied that the synthetic chemical indexocarb showed best control of larval population of tomato fruit borer (Wing *et al.*, 2000) Stated that synthetic chemical indexocarb is most effective against tomato fruit borrer. the indexocarb cause effect to tomato fruit borrer by the passage of ingestion. the indexocarb stop the flow of Na ion into nerve cell then insect showed feeding cessation paralysis and death.

The environment required for tomato relatively cool or dry climate for better quality and peak high yield (Nicola *et al*., 2009). Tomato also cause to reduce the cancer as it contain antioxidants and lycopene (Miller *et al.,* 2002). The farmers of southern india used to spray synthetic chemical insecticide more than fifty times during whole season of sowing of crop (Nagaraju *et al*., 2002). Current research was carried out for the evaluation of effectiveness of different chemicals against *Helicoverpa armigera.*

2. Materials and Methods

A variety of Tomato were cultivated in Research area of Entomological, entomology Department, University of Agriculture Faisalabad, to evaluated the effectiveness of selected chemicals against (*Helicoverpa armigera*) tomato fruit borer. The experiment was carried out in Randomized complete Block design (RCBD) with 4 Replications and R to R and P to P distance was maintained at 0.98 ft and 2.13 ft, respectively. There were five treatment and four replication. the treatment size of each plant was 26m. A standard practices of Agronomy was given to crop whole growing season a broadcast method was used for the fertilization after three week of plantation Removal weed was necessary when need.

2.1 Treatments of the Experiment

The experiment consisted of five treatments. The broadcasting information about treatment were given below T1: Deltamethrin 45 % SC (3 days interval), T2: Fipronil 5 % SC (7 days interval), T3: Trichlorofon 45 % SC (3 days interval), T4: Thiamethoxam 14.5 % SC (7 days interval), T5: Untreated control. The spray was applied after 15 days .

2.2 Application of chemicals

To evaluate the effectiveness of selected chemicals Chemical spray was used against (*Helicoverpa armigera*) tomato fruit borer. the interval of spray was 15 days and spray with help of Hand operated Knap sack sprayer. For data collection plants were selected randomly from each plot and tagged them and population of tomato fruit borer were calculated after and before 15 days after application of selected chemicals. The Data was subjected to ANOVA analysis variance and compare with LSD test.

3. Results and discussion

Result shows that the population mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 60.454. The less Infestation were observed the T1 (Deltamethrin) 18.163. Whole results are shows below figure. Result

shows that the Infestation mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) Infestation were observed in the T5 (control one) where no chemicals apply is 71.893. The less Infestation were observed the T1 (Deltamethrin) 10.653. Whole results are shows below figure. Result shows that the Infestation mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 64. The less Infestation were observed the T1 (Deltamethrin) 11.25. Whole results are shows below figure. Result shows that the Infestation mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 71.882. The less Infestation were observed the T1 (Deltamethrin) 9.52. Whole results are shows below figure.

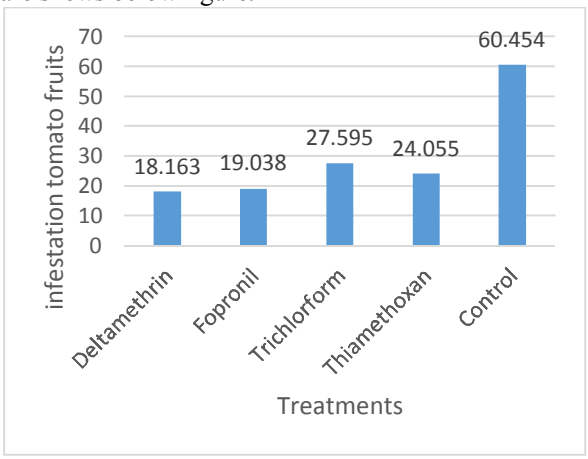


Figure: 4.1.2 Individual comparison of treatment means

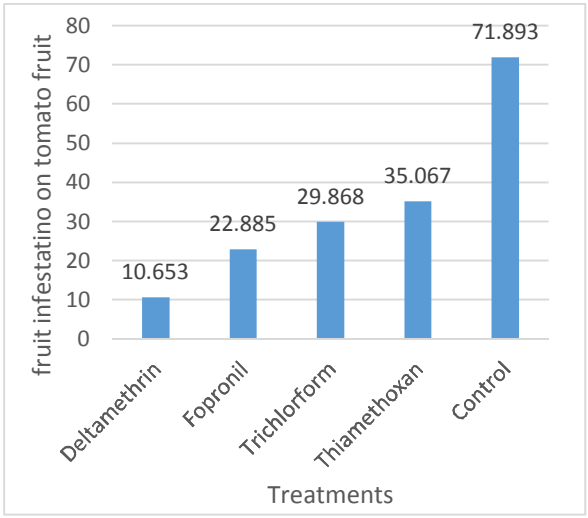


Figure: 4.2.2 Individual comparison of treatment means

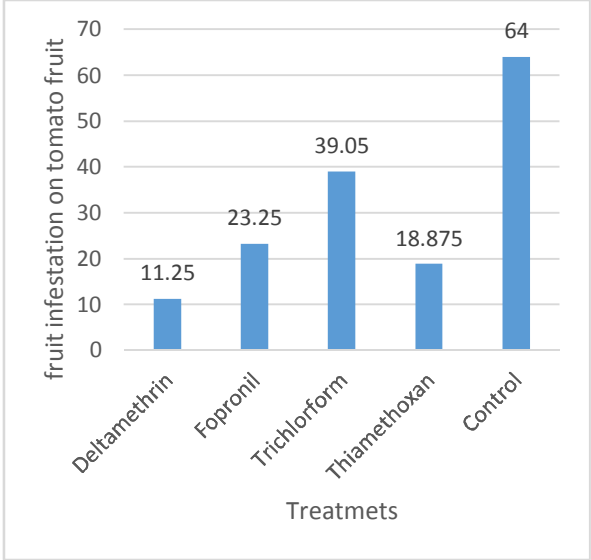


Figure: 4.3.2 Individual comparison of treatment means

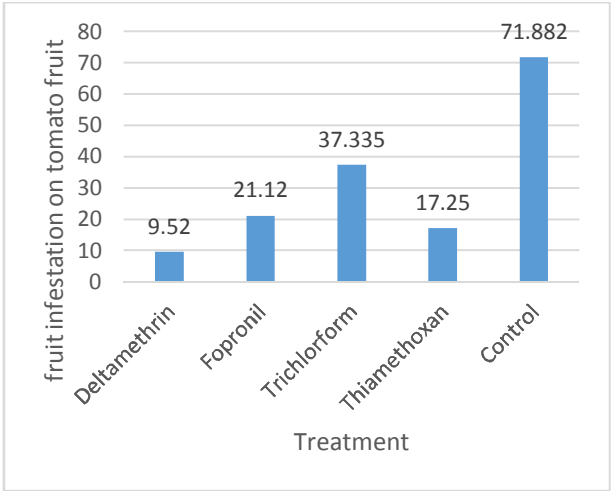
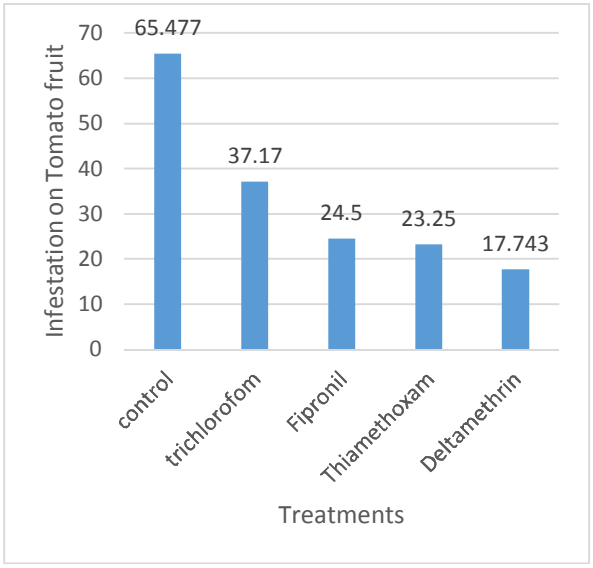


Figure: 4.4.2 Individual comparison of treatment means

Result shows that the Infestation mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 65.477. The less Infestation were observed the T1 (Deltamethrin) 17.743. Whole results are shows below figure. Result shows that the Infestation mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 62.99. The less Infestation were observed the T1 (Deltamethrin) 12.5. Whole results are shows below figure. Result shows that the Infestation mean of different treatment were change

after the application of different chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 65.825. The less Infestation were observed the T1 (Deltamethrin) 12.454. Whole results are shows below figure. Result shows that the Infestation mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 66.625. The less Infestation were observed the T1 (Deltamethrin) 18.322. Whole results are shows below figure.



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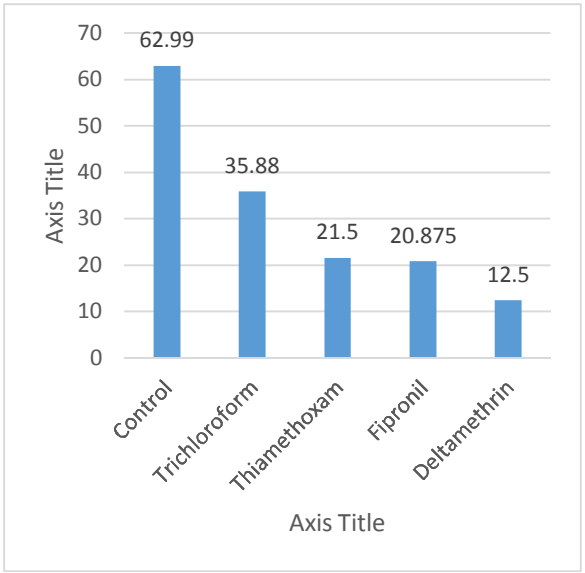


Figure: 4.6.2 Individual comparison of treatment means

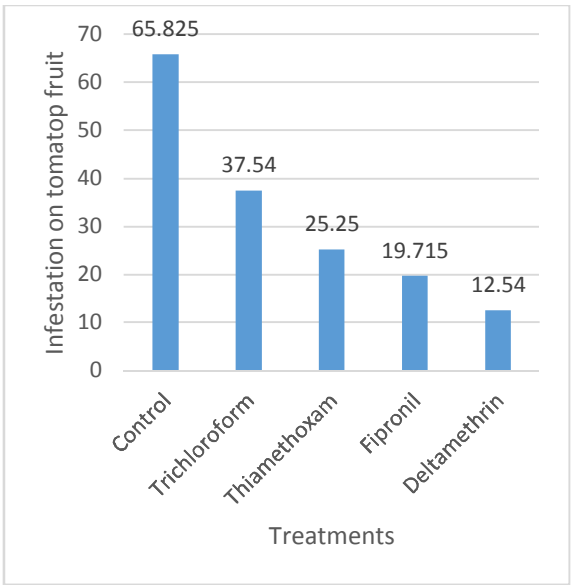


Figure: 4.7.2 Individual comparison of treatment means

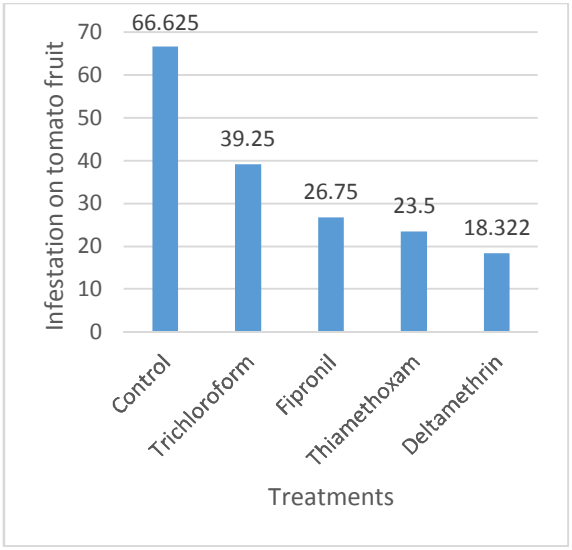


Figure: 4.8.2 Individual comparison of treatment means

Result shows that the Infestation mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 68.875. The less Infestation were observed the T1 (Deltamethrin) 21.02. Whole results are shows below figure**.** Result shows that the Infestation mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 61.5. The less Infestation were observed the T1 (Deltamethrin) 11.895. Whole results

are shows below figure**.** Result shows that the Infestation mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 59.5. The less Infestation were observed the T1 (Deltamethrin) 19.55. Whole results are shows below figure**.** Result shows that the population mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More population were observed in the T5 (control one) where no Chemicals apply is 66. The less population were observed the T1 (Deltamethrin) 16.873. Whole results are shows below figure.

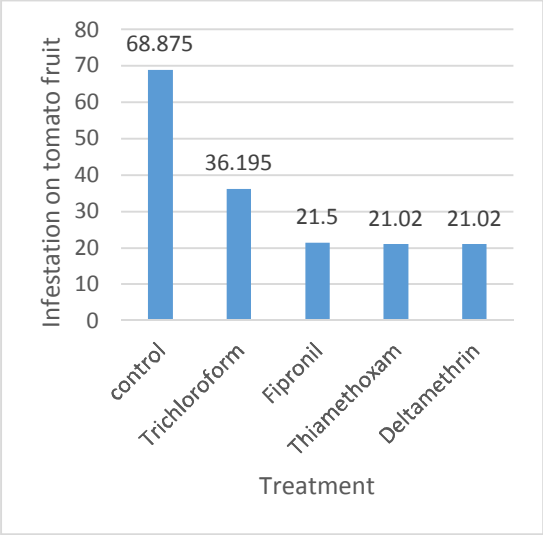


Figure: 4.9.2 Individual comparison of treatment means

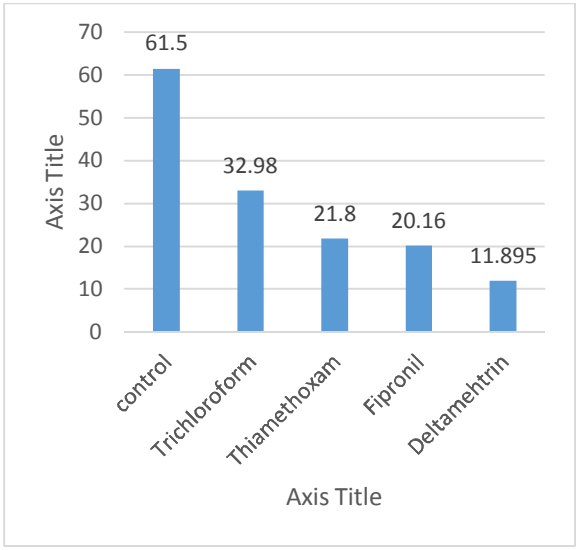


Figure: 4.10.2 Individual comparison of treatment means

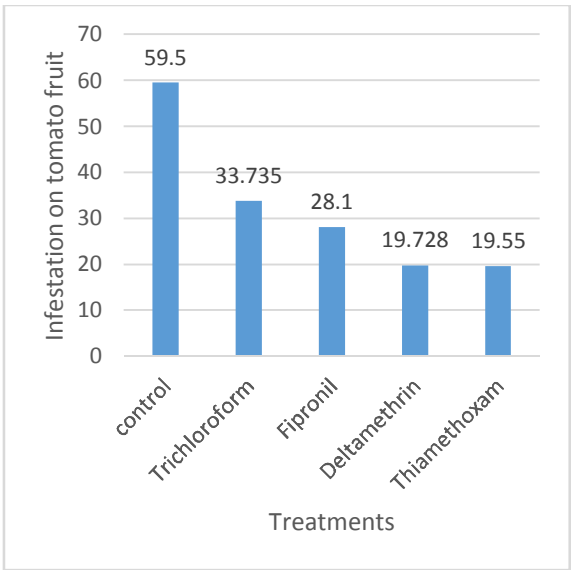


Figure: 4.11.2 Individual comparison of treatment means

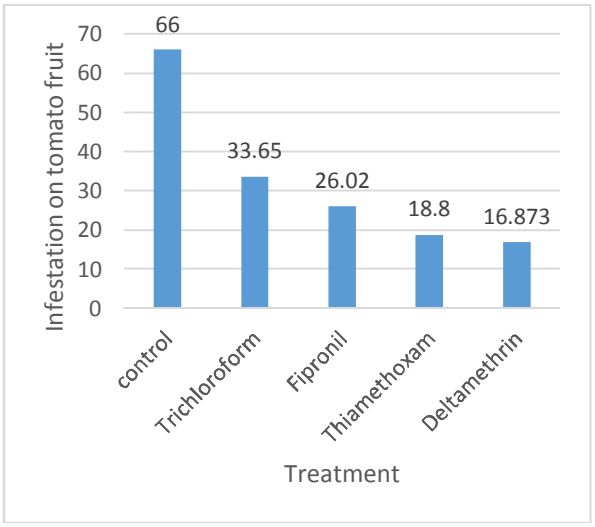


Figure: 4.12.2 Individual comparison of treatment means

Result shows that the population mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More population were observed in the T5 (control one) where no Chemicals apply is 65. The less population were observed the T1 (Deltamethrin) 13.755. Whole results are shows below figure**.** Result shows that the Infestation mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 68. The less Infestation were observed the T1 (Deltamethrin) 19.775. Whole results are shows below figure**.** Result shows that the Infestation mean of different treatment were change after the application of different

chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 67.688. The less Infestation were observed the T1 (Deltamethrin) 18.9. Whole results are shows below figure**.** Result shows that the population mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More population were observed in the T5 (control one) where no Chemicals apply is 67. The less population were observed the T1 (Deltamethrin) 17. Whole results are shows below figure**.**

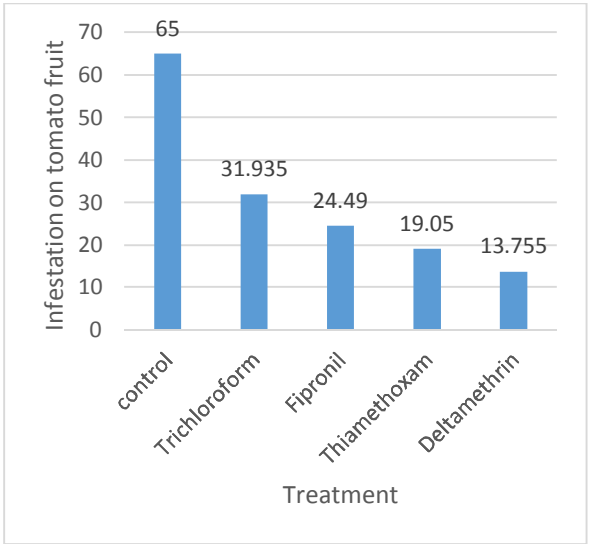


Figure: 4.13.2 Individual comparison of treatment means

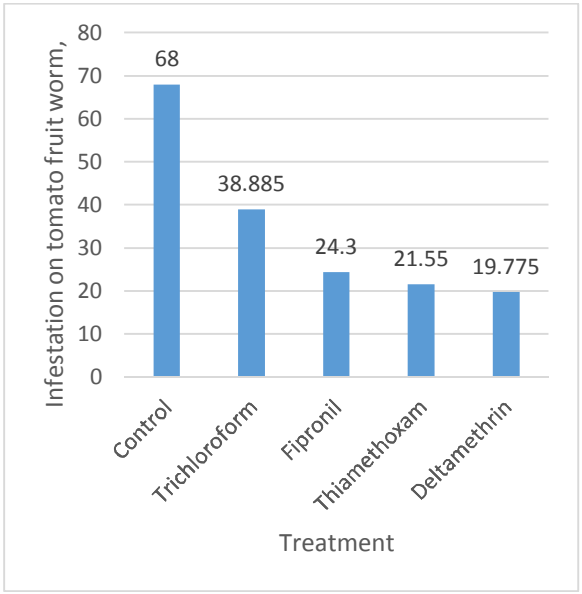


Figure: 4.14.2 Individual comparison of treatment means

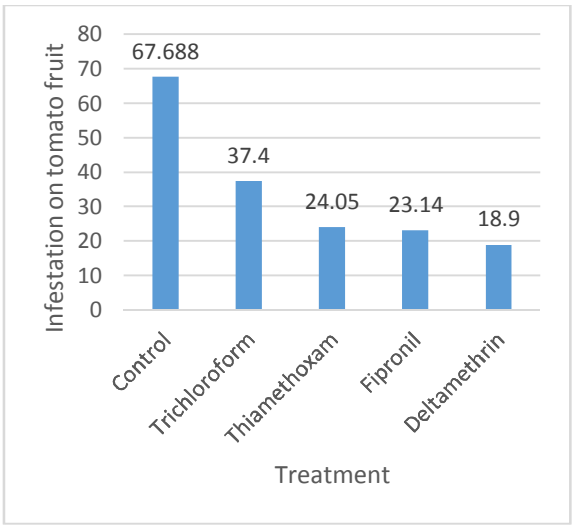


Figure: 4.15.2 Individual comparison of treatment means

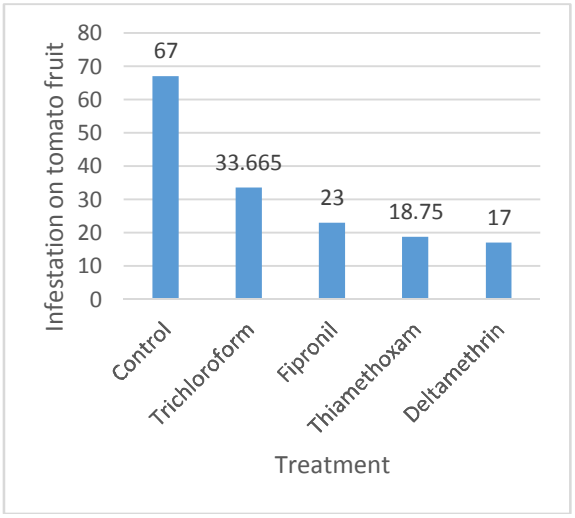


Figure: 4.16.2 Individual comparison of treatment means

Result shows that the population mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More population were observed in the T5 (control one) where no Chemicals apply is 68.77. The less population were observed the T1 (Deltamethrin) 21.5. Whole results are shows below figure. Result shows that the Infestation mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 69. The less Infestation were observed the T1 (Deltamethrin) 19.95. Whole results are shows below figure**.** Result shows that the Infestation mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More

Infestation were observed in the T5 (control one) where no Chemicals apply is 70.5 The less Infestation were observed the T1 (Deltamethrin) 16.69. Whole results are shows below figure**.** Result shows that the Infestation mean of different treatment were change after the application of different chemicals show in (Figure 4.14.2.) More Infestation were observed in the T5 (control one) where no Chemicals apply is 58.625 The less Infestation were observed the T1 (Deltamethrin) 14.75. Whole results are shows below figure

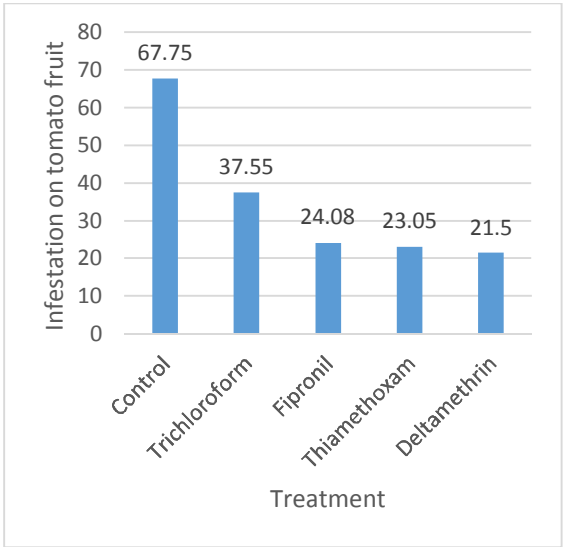
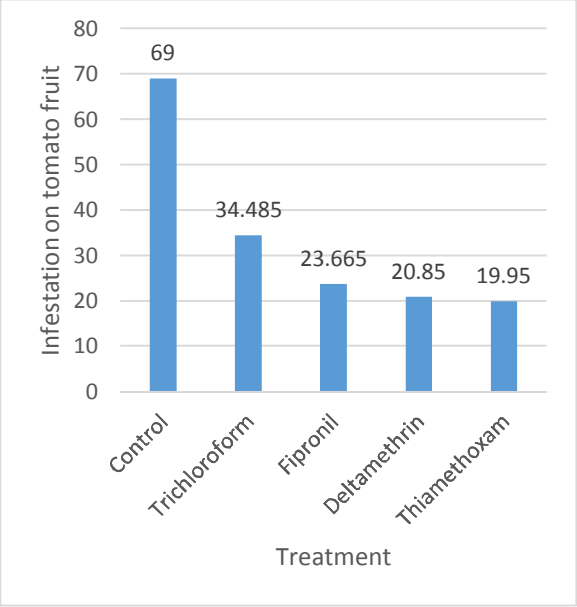


Figure: 4.17.2 Individual comparison of treatment means



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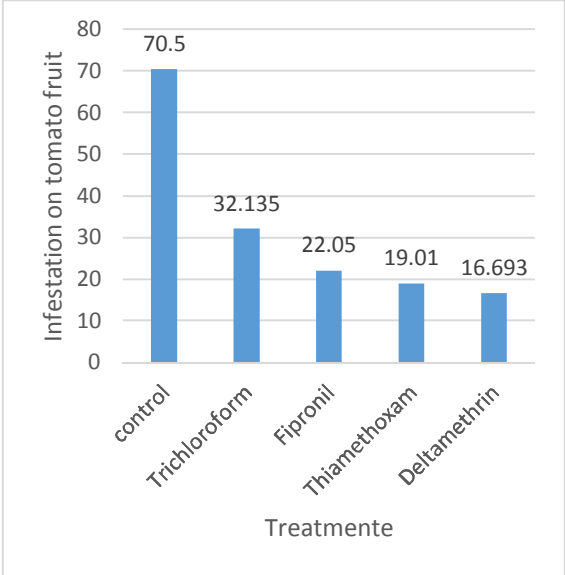

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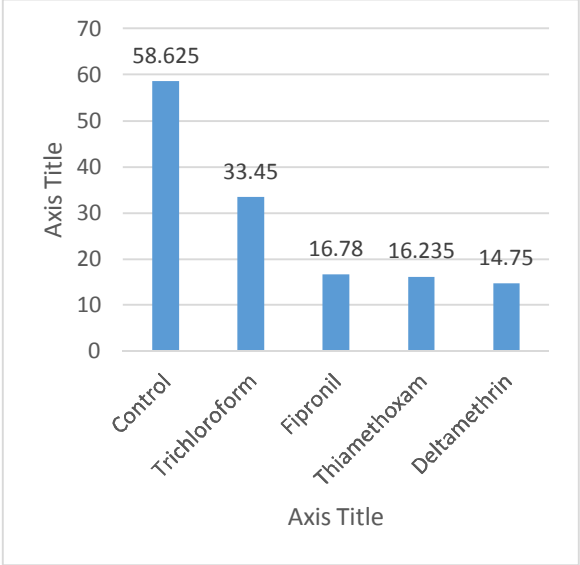

Figure: 4.20.2 Individual comparison of treatment means

4. Conclusion

Result revealed that control of tomato fruit borer Deltamehtrin first after Thiamethoxam were effective and least effective were Fipronil. At the end the maximum yield occur in T4 (Thiamethoxam) For the management of *Helicoverpa armigera* Deltamethrin and Thiamethoxam were most effective.

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