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Original Research ArticleDOI: <http://dx.doi.org/10.22192/ijcrbm.2018.03.03.008>**Efficacy of different concentrations of Imidachloprid,
Acetameprid, Thiomethoxam and Spirotetramat for controlling
Oxycarenus laetus in Laboratory conditions****Sana ullah Saqi¹, Muhammad Ameen², Riaz Hussain³, Khuram Zia⁴,
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Mazher Farid Iqbal⁶ and Khalil Ur Rehman⁷**Pest Warning and Quality Control of Pesticides, ¹Sahiwal, ²Sialkot, ³Lahore, ⁷Minchinabad⁴Department of Entomology, University of Agriculture, Faisalabad, Punjab-Pakistan⁵Regional Agricultural Economic Development Centre, Vehari⁶PhD, Scholar, Shenyang Agricultural University, Liaoning-Province, P. R. China⁷Department of Agriculture (Extension) Pasrur

Abstract

The experiment was conducted to evaluate efficacy of some different concentrations of newly introduced insecticides for controlling dusky cotton bug (*Oxycarenus laetus*) in laboratory conditions. The adult was collected from the cotton field and carried out in the cage in the laboratory. Fresh leaves and bolls were provided as feed for these insects. Significantly ($P < 0.05$) high mortality (%) was recorded by T-1 (23.333) which was non-significant to T-2 (13.333). But T-3 (3.3333) showed statistically non significant ($P > 0.05$) mortality with T-5 (3.3333) and T-6 (3.3333) after 12 after acetameprid application. After 24 hours of application of insecticide, T-1 (36.667) showed high mortality followed by T-2 (23.333) and T-3 (20) but showed non-significant $P < 0.05$ to all other rest of the treatments. Significant result was recorded by T-1 (50%) to the other treatments but showed non-significant result with T-4 (20%), T-6 (13.333%), T-7 (10), T-8 (3.3333%) and T-9 (3.3333%) after 48 hours. T-1 (40%), T-2 (40%), T-4 (40) and T-7 (33.333) showed statistically non-significant result with each other after 96 hours. Significantly ($P < 0.05$) high mortality (%) of dusky cotton bug was recorded by T-1 (3.3333) compared to all rest of the treatments having 0% mortality after 12 hours of application of Thiomethoxam. After 24 hours of application of insecticides T-1 (16.667%), T-2 (6.667%), T-3 (10%), T-4 (10%), T-5 (13.333%), T-6 (6.6667%), T-7 (6.6667%) were statistically non-significant $P > 0.05$ to each other. Highly significant result was recorded by T-1 (33.333%) with all rest of the treatments after 48 hours of pesticide application. T-2 (36.667%) showed statistically high significant effect compared to rest of the treatments after 96 hours of pesticide applications. Significantly ($P > 0.05$) high mortality (%) of dusky cotton bug was recorded by T-4 (3.3333%) and T-5 (3.3333%) compared to all rest of the treatments having 0% mortality after 12 hours of application of Spirotetramat. After 24 hours of application of insecticide T-1 (10%), T-2 (3.3333%), T-3 (13.333%), T-4 (3.3333%), T-5 (13.333%), T-6 (13.333%), T-7 (3.3333%) were statistically non-significant $P < 0.05$ to each other but 0% mortality was recorded by all other rest of the treatments. Highly significant result was recorded by T-5 (43.333%) which is statistically non significant with T-3 (36.667%) and T-6 (36.667%) compared to all rest of the treatments after 48 hours. High mortality was recorded by T-5 (80%) followed by T-3 (76.667%), T-1 and T-6 (73.333) after 96 hours of pesticide applications. Significantly ($P < 0.05$) high mortality (%) was recorded by T-1 (23.333%) with each other but showed non-significant effect with T-2 (3.3333%), T-3 (3.3333%) and T-4 (3.3333%) compared to all rest of the treatments having 0% mortality after 12 hours of application of Imidachloprid. After 24 hours of application of insecticide T-1 (36.667%) showed highly significant result compared to all rest of the treatments.

However T-1 (60%) showed statistically highly significant effect (60%) compared to all rest of the treatments used after 48 hours. T-1 (80%) showed statistically non significant result with T-9 (53.33%) but recorded non-significant with each other after 96 hours.

Keywords: Dusky cotton bug; concentration, insecticides, cotton, crop, Punjab; Pakistan.

Introduction

Gossypium hirsutum L. is an important fiber, cash crop and also a white gold in Pakistan (Hakim, et al., 2011). It is a dual purpose crop that provides fiber, vegetable oil. The cotton crop is considered fourth largest producer and third biggest consumer in the world and Pakistan (Mallah, et al., 1997; Zeeshan et al., 2010). It contributes a reasonable allocate in overseas trade in the form of earnings in Pakistan. The yield of cotton crop is still low to the other countries (Bakhsh et al., 2005). However there is pest complex attack in the cotton crop was recorded however among these pests sucking insect pest *Oxycarenus laetus* have the main importance by lowering the yield of cotton and deteriorating lint quality. Maximum pesticides were sprayed to control insects, so that yield was reduced upto 30-40% (Huque, 1972; Kannan et al., 2004; Haque, 1991). Some insecticides are recorded which are more effective against pest complex than conventional insecticides (Razaq, 2005). Insecticides shows quick action, comparatively cheap from conventionally used insecticides, proved less persistence and toxic (Anjan et al., 2009). Dusky cotton bug is a serious sucking pest which feed on cotton seeds. It is also known as cotton seed bug which was described first time in Italy by Costa in 1847. Slater and Baranowski (1994) reported that it belongs to Turkish and Caicos, Bahamas; Cayman Island and Hispaniola. Kirkpatrick (1923) stated that dusky cotton bug (*Oxycarenus laetus*) visited to green leaves and epicalyces for getting moisture contents. Leaves, epicalyces, lint, unopened bolls, seed of open balls, flowers and flowers buds provided to the insect for feeding purposes. However the bug first preferred to green leaves of epicalyces then at last seeds Saxena and Krishna (1958). Therefore the study had been planned to evaluate the efficacy of different concentrations (ppm) of insecticides viz. Spirotetramate, Thiamethoxam, Imidachloprid and acetameprid for controlling dusky cotton bug at Ecotoxicological laboratory of Entomology Department, University of Agriculture, Faisalabad, Punjab-Pakistan.

Materials and Methods

The study was laid out to evaluate the effectiveness of different concentrations of insecticides against *Oxycarenus laetus*. The adult was collected directly from cotton field, carried out in the cage in laboratory, fresh leaves and bolls were provided as feed for insects. After that the petri dishes were washed carefully and air dried. A stock solution of the highest dose was prepared for each pesticides, the serial solution was prepared by taking half of the stock solution and diluting it to make the original volume in another measuring cylinder. Successive dilutions were prepared by this criteria until nine dilution of each of the pesticides in different concentrations were prepared. The aqueous solution of each pesticide was applied on to the filter paper by dipping the filter paper in aqueous solution of pesticides. After the application, the filter papers were air dried, placed in petri plates and ten dusky cotton bugs were released in each plate at 25+2°C and 65+5% relative humidity. The adult mortality was recorded 12, 24, 48 and 96 hours after inductions of each concentration. The adults did not move on disturbance after ten seconds recorded as dead (Mgocheki and Addison, 2009). Four insecticides were used i.e. Sirotetramat 240SC @ 312.5 mlha⁻¹; Imidachloprid 200SL @ 625 mlha⁻¹; Thiamethoxam 25WG @ 62.5 gha⁻¹ and acetameprid @ 312.5 mlha⁻¹ as bioassay with insecticides in laboratory for toxicity analysis. The experiment was conducted in lab with Randomized Complete Block Design (RCBD) with three replications. The data was analyzed by Turkeys HSD, All-Pairwise Comparisons Test with probability level of 0.05%.

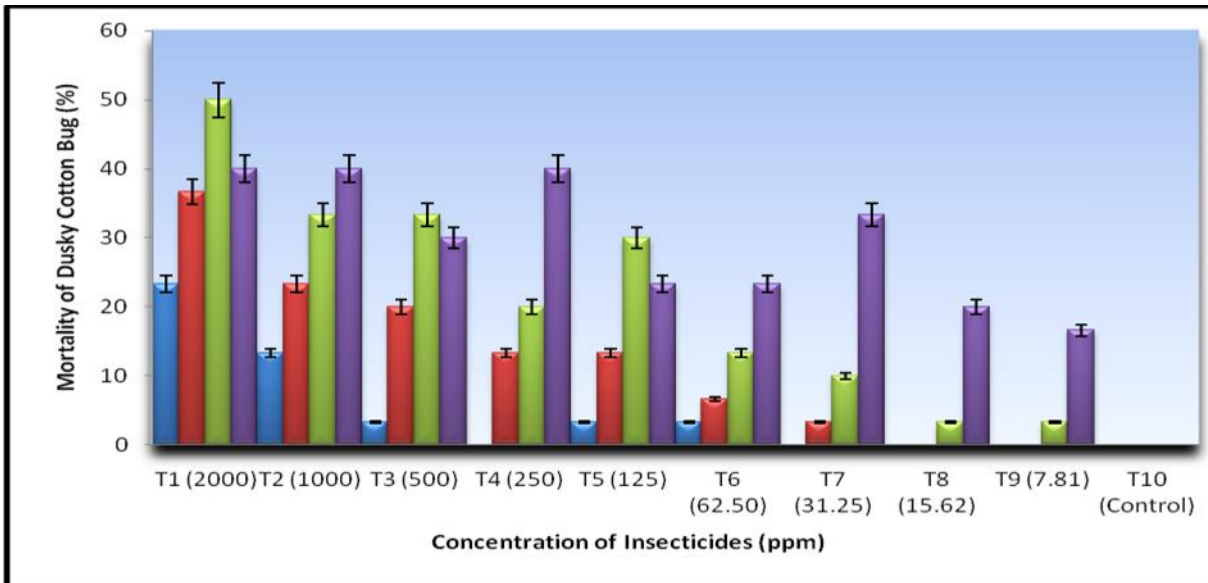
Results and Discussion

From Figure-1 significantly (P<0.05) high mortality (%) of dusky cotton bug was recorded by T-1 (23.333) which was non-significant to T-2 (13.333). But T-3 (3.3333) statistically non significant (P>0.05) with T-5 (3.3333) and T-6 (3.3333) compared to all other treatments after 12 hours after using of acetameprid. After 24 hours of application of insecticide T-1 (36.667) showed high mortality followed by T-2 (23.333) and T-3 (20) respectively but showed non-significant P>0.05 result to all other treatments.

Highly significant result was recorded by T-1 (50%) to the other treatments showed non-significant result with T-4 (20%), T-6 (13.333%), T-7 (10), T-8 (3.3333%) and T-9 (3.3333%) after 48 hours. T-1 (40%), T-2 (40%), T-4 (40) and T-7 (33.333) showed statistically non-significant with each other after 96

hours. These results are not agreed with Aslam et. al., (2004) who reported that thrips was effectively controlled by acetameprid and Amjad et. al., (2009) reported that this insecticide is most effective against whitefly.

Figure-1 showing mortality of dusky cotton bug at different intervals using different concentrations of Acetameprid



From Figure-2 showed that significantly ($P < 0.05$) high mortality (%) of dusky cotton bug was recorded by T-1 (3.3333) compared to all rest of the treatments having 0% mortality after 12 hours of application of Thiomethoxam. After 24 hours of application of insecticide T-1 (16.667%), T-2 (6.667%), T-3 (10%), T-4 (10%), T-5 (13.333%), T-6 (6.6667%), T-7 (6.6667%) were statistically non-significant $P > 0.05$ to

each other. Highly significant result was recorded by T-1 (33.333%) with all rest of the treatments after 48 hours of pesticide application. T-2 (36.667%) differed statistically with rest of the treatments after 96 hours of pesticide applications. Thiamethoxam showed good results than other insecticides, however our results contradictory to Amjad et. al., (2009) and Razzaq et. al., (2005).

Figure-2 showing mortality of dusky cotton bug at different intervals using different concentrations of Thiomethoxam

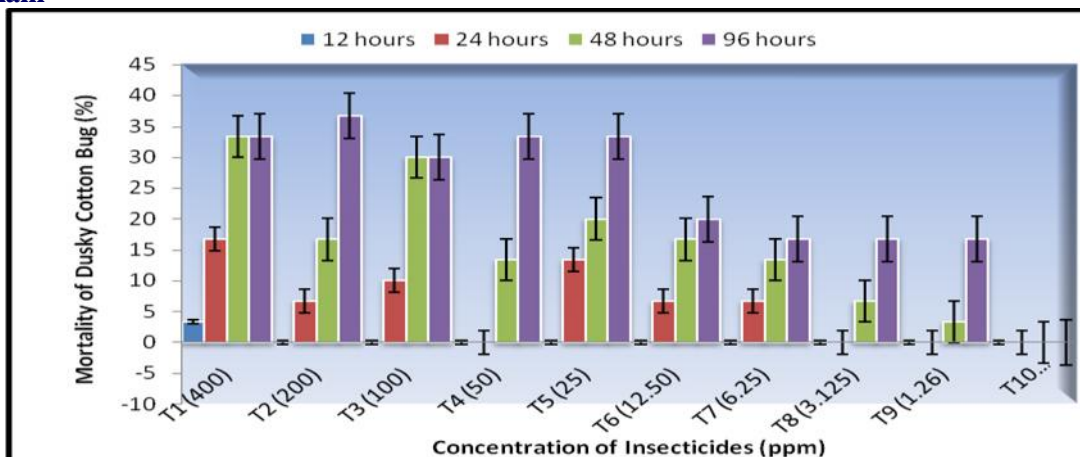
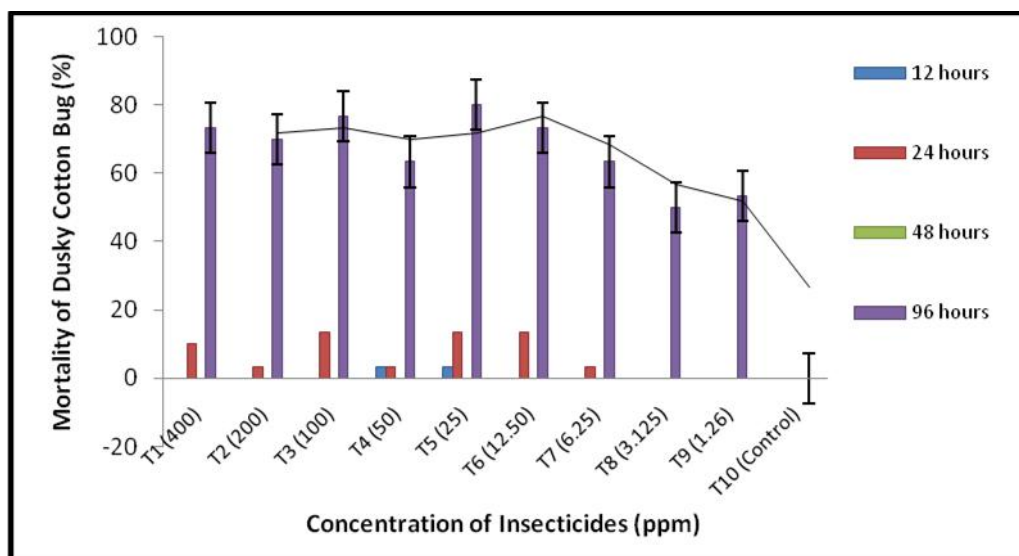


Figure-3 showed that significant ($P < 0.05$) mortality (%) of dusky cotton bug was recorded by T-4 (3.3333%) and T-5 (3.3333%) compared to all rest of the treatments having 0% mortality after 12 hours of application of Spirotetramat. After 24 hours of application of insecticide T-1 (10%), T-2 (3.3333%), T-3 (13.3333%), T-4 (3.3333%), T-5 (13.3333%), T-6 (13.3333%), T-7 (3.3333%) were statistically non-significant $P > 0.05$ to each other but 0% mortality was

recorded by all other rest of the treatments. Highly significant result was recorded by T-5 (43.3333%) which was statistically non-significant with T-3 (36.667%) and T-6 (36.667%) compared to all rest of the treatments after 48 hours. High mortality was recorded by T-5 (80%) followed by T-3 (76.667%), T-1 and T-6 (73.333) after 96 hours. Spirotetramat was most effective and excellent after 96 hours of applications with LC50 value of 22.20 ppm.

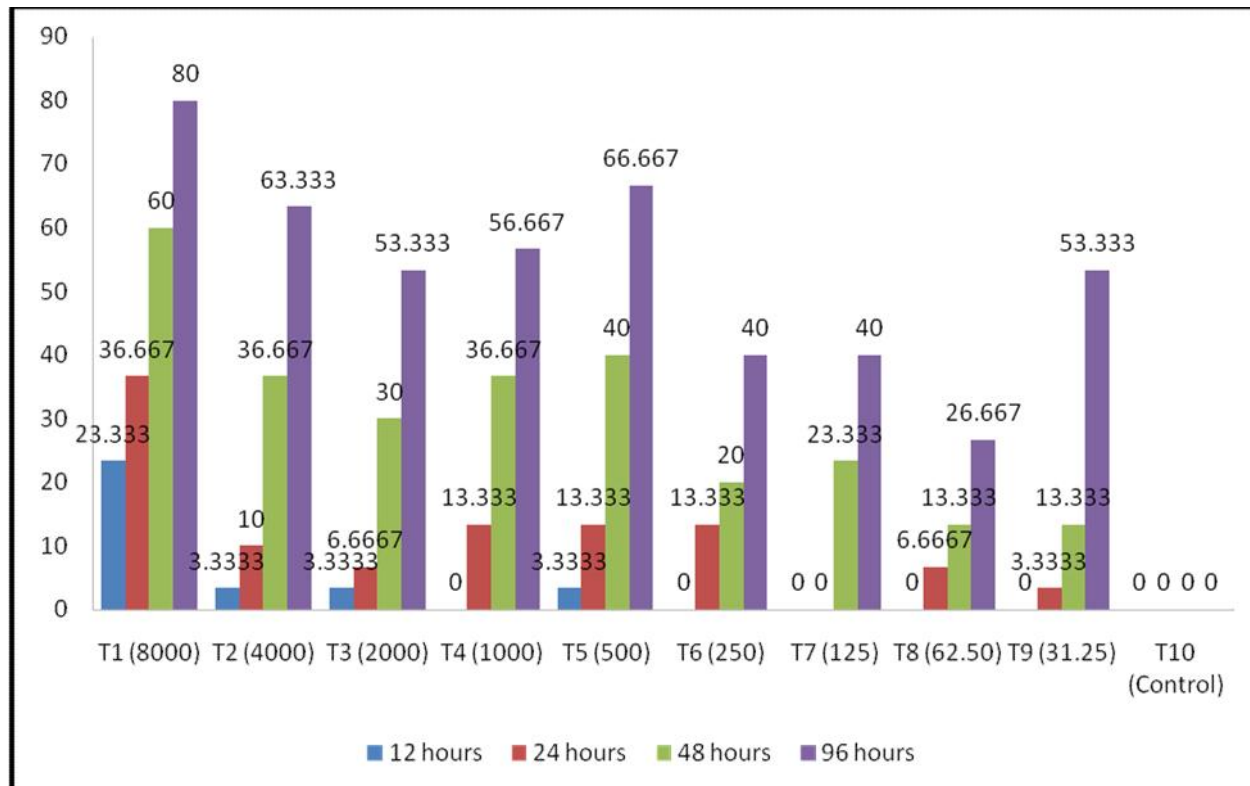
Figure-3 showing mortality of dusky cotton bug at different intervals using different concentrations of Spirotetramat



From Figure-4 showed that significantly ($P < 0.05$) high mortality (%) of dusky cotton bug was recorded by T-1 (23.333%) and showed non-significant effect ($P > 0.05$) with T-2 (3.3333%), T-3 (3.3333%) and T-4 (3.3333%) compared to all rest of the treatments having 0% mortality after 12 hours of application of Imidachloprid. After 24 hours of application of insecticide T-1 (36.667%) showed highly significant result compared to all rest of the treatments. However T-1 (60%) showed statistically highly significant effect (60%) compared to all rest of the treatments used after 48 hours. T-1 (80%) showed statistically non significant result with T-9 (53.33%) but recorded

non-significant with each other after 96 hours of pesticide applications. Imidachloprid was most effective with LC 50 values of 499.73ppm after 96 hours of exposure. Shivana et. al., 2011 reported on bio-efficacy of sucking insect pest of cotton. However Ali, et. al., (2005) reported that imidachloprid and acetameprid were most effective against adults of *Bemesia tabaci* and dusky cotton bug. Our results were confined with Tayyib et. al., (2005) who reported that Confidor (Imidachloprid) proved to be the most effective for the control of sucking pests and mites on cotton.

Figure-4 showing mortality of dusky cotton bug at different intervals using different concentrations of Imidachloprid 200SL



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