Effect of the Bio-Insecticide; (Xan-Tari, Bacillus thuringiensis) on Two of Stored Product Insects (Oryzaephilus surinamensis and Sitophilus granarius) and Determination its Toxicity in Male albino rat

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Abstract

The was aimed to evaluate the efficacy of commercial product, Xan-Tari (Bacillus thuringiensis) at different concentrations against O. surinamensis and S. granaries adults showed that mortality increased by increasing the Xan-Tari concentration, period exposure and temperature for both insect species. Highest mortality took place at 25 and 30°C for O. surinamensis. The highest mortality recorded against S. granaries occurred when treatments took place at 25°C

The results indicated that S. granarius was more susceptible to Xan-Tari treatment than O. surinamensis. The safety of Xan-Tari (Bacillus thuringiensis) on mammals was investigated by determining the toxicological effects on liver and kidney enzyme activities and its oxidative stress in male albino rats. In this study, 20 male albino rats (western strain) were divided into 2 groups, each of one 10 rats. First group kept was control, while the second was fed on diet of 400 g of wheat mixed well with Xan-Tari. It was administrated one time per day to the rats for 3 successive weeks quantity of food consumed rat averaged from 25 - 30 gm. The obtained results showed significant increase in ALT, AST, creatinine, urea, uric acid, CAT, MDA and GSH in treated rats.

Key words: Oryzaephilus surinamensis, Sitophilus granarius, Bacillus thuringiensis, Oxidative stress, Nephrotoxicity, bio-insecticide, Xan-Tari.

INTRODUCTION

Stored product insect pests cause serious losses in weight and quality of the stored products during storage (Evans 1987). Among the stored-product beetles, Oryzaephilus surinamensis and Sitophilus granarius can be considered as major pest in storage of grain-based products (Campbell and Runnion 2003). These pests are major pests of stored grains and grain products in the tropics (Howe 1965, Agarwal et al. 1979; Daglish et al. 1996).

Pesticides include hundreds of chemical substances distributed across broad chemical and functional classes, which are widely used in agriculture as plant protection products and in public health for prevention and control of vector-borne diseases. The worldwide use of these chemicals implies that humans are continuously exposed to single pesticides or to combination of various pesticides, often in low concentrations that may elicit similar effects despite belonging to different chemical families. (Rizzati et al. 2016).

Natural insecticides contain chemical, mineral, and biological materials and some products are available commercially, e.g., pyrethrum, neem, spinosad, rotenone, abamectin, Bacillus thuringiensis (Bt), garlic, cinnamon, pepper, and essential oil products. The selectivity and safety of natural insecticides are not absolute and some natural compounds are toxic (Mohamed 2016). O. surinamensis and S. granarius, are well-known store - grain pest (Bagci et al. 2014). These insects have a nearly cosmopolitan distribution, occurring throughout all warm and tropical parts of the world (Hong et al. 2018).

These are store pests are found in various products and habitats, particularly in mills, fodder storages, and shops (Sinha and Watters 1985; Trematerra and Scairretta 2004; Laszczak-Dawid et al. 2008).

The worldwide need to produce inexpensive and abundant food supply for a growing population it is a great challenge that is further complicated by concerns about risks to environmental stability and human health triggered by the use of pesticides (Huang et al., 2002). The aim of this study was to evaluate the efficacy of Xan-Tari biopesticide depending Bacillus thuringiensis against adult of O. surinamensis and S. granarius at three different temperatures under laboratory conditions and evaluate the toxic effect of bio-pesticide on albion rats.

Materials and Methods

• Experimental insects:

Experiments took place on two species of stored product insect species, namely the saw-toothed grain beetle, Oryzaephilus surinamensis (L) (Silvanidae, Coleoptera) and the granary weevil, Sitophilus granarius (Coleoptera: Curculionidae) were used in this study. Tests were performed in the stored product
insect laboratory at the Plant Protection Department, Faculty of Agriculture, Benha University.

- **Rearing technique of stock culture:**
  Insects of the two species were reared in glass jars (approx. 500 ml) containing about 200 g of sterilized and conditioned crushed wheat grains for *O. surinamensis* and whole wheat grains to *S. granarius*. The glass jars were covered with muslin. Insect cultures were kept under controlled conditions of 28 ± 2°C and 65 ± 5% RH at the rearing room of the laboratory. Wheat grains were treated by freezing at -18°C for 2 weeks before application to eliminate any possible infestation by any insect species. Around 1000 adults of each insect species (1-2 weeks old) were introduced into the jars for egg laying and then kept at 28 ± 2°C and 65 ± 5% RH, three days later. All insects were separated from the food, and the jars were kept again at the controlled conditions in the rearing room. This procedure was repeated several times in order to obtain large numbers of the adults (1-2 weeks old) needed to carry out the experiments during this study. The foods in the jars were renewed when ever necessary.

- **The tested stage:**
  Adults of *O. surinamensis* and *S. granarius* (1-2 weeks old) were taken for the experiment.

- **Preparation of the tested insects:**
  Groups of 20 adults each from, *O. surinamensis* and *S. granarius* were used in all experiments of the bio-insecticide.

- **Tested temperature and humidity:**
  All experiments were conducted under constant temperatures 20, 25 or 30 °C and 65 ± 5% RH.

- **Xan-Tari, (Bacillus thuringiensis) on *O. surinamensis* and *S. granarius*:—
  Twenty adults of each insect species, (1-2 weeks old) were placed in wire guaze cages (14 mm diam. and 45 mm long), filled with about 10 gm crushed wheat grains for *O. surinamensis* and 10 g wheat whole seeds for *S. granarius* and the cages were closed by rubber stoppers. The cages were then, introduced into the 0.55 l gasight Dreshel exposure flasks. Insects in the flasks were treated for different exposure periods at 20 ± 1, 25 ± 1 or/and 30 ± 1°C and 65 ± 5% RH. The tested insects were allowed to feed on food treated at five concentrations of Xan-Tari (0.625, 1.25, 2.5, 5.0 and 10.0 g / 100ml distilled water). Each concentration was assayed on 4 insects with 5 replications, thus twenty insects were treated with each concentrations. Another 20 insects divided into 5 replicates, received distilled water treatments as control. After treatment, the insects were, daily, examined for 25 days and the dead insects were counted and consequently percentages were calculated.

**Evaluation of the safety of the tested product:**

The present study was carried out on a total number of 20 white Albino male rats weighing 150-200 g / rat. Rats were obtained from Center of Experimental Laboratory Animal, Faculty of Veterinary Medicine, Benha University, Egypt. All rats were acclimatized for one week prior to the experiment. All rats received standard laboratory balanced commercial diet and water.

**Tested substance:**

**Xan-Tari 54 % DF**

XanTari is the world’s only biological insecticide containing a natural, potent strain (ABTS-1857) of the microorganism *Bacillus thuringiensis* subspecies aizawai (Bta) State. This product obtained from Valet BioScience LLC. USA. The recommended dose of xanTari was 1 g / L of water.

**Experimental design:**

In the present study male albino rats were randomly assigned into 2 equal groups 10 rats each.

- **Group I:** kept as control.
- **Group II:** received Xan-Tari as rat consumed once daily on diet for 3 weeks.

**Sampling:**

**Serum samples:** - Blood samples collected in 7, 14 and 21 day. Whole blood collected in clean dry centrifuge tubes, allowed to stand for one hour at room temperature till clotted and centrifuged at 3000rpm for 15 minutes for serum separation, and kept at -20°C till biochemical analysis.

**Biochemical analysis:**

Serum ALT and AST were performed according to *Ellman (1959)*. Serum creatinine was detected according to *Husdan and Rapaport (1968)* and serum urea was detected according to *Tietz (1995)*.

**Evaluation of serum oxidative stress markers**

Serum used for assessment of MDA to levels calorimetrically according to *Ohkawa et al. (1979)*, CAT to levels calorimetrically according to *Aebi (1984)* and GSH to levels calorimetrically according to *Ellman (1959)*.

**Statistical analysis:**

A probit computer program of *Noack and Reichnuth (1978)* and *Finney (1971)*. Cumulative mortality at the end of the experiment was analyzed by ANOVA. The concentrations causing 50 and 90%
mortalities, (LC50 & LC90) and time needed for causing 50 and 90% cumulative mortalities (LT50 & LT90) were determined using the probit analysis program LPD-line (Bakr 2005).

**Results and Discussion**

1- Effect and toxicity of different concentrations of the commercial product, Bacillus thuringiensis (Xan - Tari) against the two species of stored product insects, *O. surinamensis* and *S. granarius*.

a- **Against *O. surinamensis***:

The effect of *Bacillus thuringiensis* (Xan-Tari) on the adult mortality of *O. surinamensis* at 20, 25 and 30°C was presented in Table (1). The results showed that the mortality increased by increasing the Xan-Tari concentration and exposure period under the three temperature values. At 20°C, the adult mortality of *O. surinamensis* after 5 days exposure period was 3.33% at concentration 0.0625 g / 100 ml concentration, this percentage increased after 21 days post treatment to reach 62.22% at 10.0 g / 100 ml concentration. At 25°C, the mortality was 2.22% after 5 days exposure period with 0.0625 g / 100 ml concentration and increased after 21 days to 61.11% with 10.0 g / 100 ml concentration. At 30°C, the mortality was 3.33% after 5 days exposure period at 0.0625 g / 100 ml concentration and increased after 21 days post treatment to 70.00% at 10.0 g / 100 ml concentration. Only at 25 °C some control larvae died after 5, 7, 10 and 14 days exposure period. Highest mortality rates were recorded when treatments took place at 25 and 30°C. It is clear from Table, that mortality % increased with increasing the applied concentration and prolongation of the period after treatment under 20, 25 and 30°C.

**Table 1.** Mean cumulative mortality percentages among *O. surinamensis adults* treated at 20, 25 and 30°C with commercial product of *Bacillus thuringiensis* (Xan-Tari) at different concentrations.

<table>
<thead>
<tr>
<th>Concentration (mg/100 ml)</th>
<th>Exposure (day)</th>
<th>Mean of period</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>(0.625)</td>
<td>3.33±0.00ad</td>
<td>5.56±1.11bc</td>
</tr>
<tr>
<td>(1.25)</td>
<td>5.56±1.11bc</td>
<td>10.00±1.92ad</td>
</tr>
<tr>
<td>(2.50)</td>
<td>7.78±1.11bc</td>
<td>12.22±1.11bd</td>
</tr>
<tr>
<td>(5.0)</td>
<td>9.88±1.11bc</td>
<td>15.56±1.11bd</td>
</tr>
<tr>
<td>(10.0)</td>
<td>11.11±1.11bc</td>
<td>22.22±1.11bd</td>
</tr>
<tr>
<td>Mean</td>
<td>5.56±0.89bc</td>
<td>10.93±1.76bc</td>
</tr>
</tbody>
</table>

**LSD at 0.05 for**

<table>
<thead>
<tr>
<th>Concentration (C)</th>
<th>Period (P)</th>
<th>C*P</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>2.12</td>
<td>1.93</td>
<td>4.73</td>
</tr>
<tr>
<td>(0.625)</td>
<td>(1.25)</td>
<td>(2.50)</td>
</tr>
<tr>
<td>2.22±1.11bc</td>
<td>5.56±1.11bc</td>
<td>8.89±1.11bc</td>
</tr>
<tr>
<td>11.11±1.11bc</td>
<td>22.22±1.11bd</td>
<td>22.22±1.11bd</td>
</tr>
<tr>
<td>30.00±1.92ac</td>
<td>40.00±1.92ac</td>
<td>50.00±1.92ac</td>
</tr>
<tr>
<td>61.11±2.94ac</td>
<td>35.33±4.78ac</td>
<td>35.33±4.78ac</td>
</tr>
</tbody>
</table>

**LSD at 0.05 for**

<table>
<thead>
<tr>
<th>Concentration (C)</th>
<th>Period (P)</th>
<th>C*P</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.73</td>
<td>0.67</td>
<td>1.63</td>
</tr>
<tr>
<td>(0.625)</td>
<td>(1.25)</td>
<td>(2.50)</td>
</tr>
<tr>
<td>3.33±0.00ad</td>
<td>5.56±1.11bc</td>
<td>8.89±1.11bc</td>
</tr>
<tr>
<td>12.22±1.11bd</td>
<td>14.44±1.11ac</td>
<td>14.44±1.11ac</td>
</tr>
<tr>
<td>35.56±3.33ac</td>
<td>35.56±3.33ac</td>
<td>35.56±3.33ac</td>
</tr>
<tr>
<td>35.33±4.78ac</td>
<td>35.33±4.78ac</td>
<td>35.33±4.78ac</td>
</tr>
</tbody>
</table>

a, b & c: There is no significant difference (P>0.05) between any two means, within the same column have the same superscript letter. A, B & C: There is no significant difference (P>0.05) between any two means, within the same row have the same superscript letter.

b- **Against *S. granarius***:

Results in Table (2) showed the cumulative mortality percentages of *Sitophilus granarius* after 5, 7, 10, 14 and 21 days as well as at 20, 25 and 30 °C. Where at 20 °C, the adult mortality of *S. granarius* after 5 days exposure period was 3.33% at 0.0625 g / 100 ml concentration, while the mortality increased after 21 days post treatment to reach 81.11% at 10.0 g / 100 ml concentration. At 25°C, the mortality was 4.44% after 5 days exposure period with 0.0625 g / 100 ml concentration and increased after 21 days to 86.67% with 10.0 g / 100 ml concentration.

At 30°C, the mortality was 4.44% after 5 days exposure period at 0.0625 g / 100 ml concentration and increased after 21 days post treatment to 85.56% at 10.0 g / 100 ml concentration. Most control larvae died at 20, 25 and 30 °C after 5, 7, 10 and 14 days exposure period. Highest mortality rates were recorded when treatments took place at 25 °C. It is clear from Table, that mortality % increased with increasing the applied concentration and prolongation of the period after treatment under 20, 25 and 30°C.

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Table 2. Mean cumulative mortality percentages of *S. granarius* treated at 20, 25 and 30 °C with commercial product of *Bacillus thuringiensis* (Xan-Tari) at different concentrations.

<table>
<thead>
<tr>
<th>Concentration (mg/100 ml)</th>
<th>Exposure (day) at 20°C</th>
<th>Mean of Period</th>
<th>LSD at 0.05 for Concentration (C)</th>
<th>LSD at 0.05 for Period (P)</th>
<th>LSD at 0.05 for C*P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>(0.625)</td>
<td>3.3±0.00</td>
<td>5.56±1.11</td>
<td>8.89±1.11</td>
<td>12.22±1.11</td>
<td>14.44±1.11</td>
</tr>
<tr>
<td>(1.25)</td>
<td>5.5±1.11</td>
<td>10.00±1.92</td>
<td>13.33±1.93</td>
<td>18.89±2.22</td>
<td>25.55±2.22</td>
</tr>
<tr>
<td>(2.50)</td>
<td>8.8±1.11</td>
<td>17.78±1.11</td>
<td>23.33±3.33</td>
<td>30.00±3.85</td>
<td>36.67±5.77</td>
</tr>
<tr>
<td>(5.0)</td>
<td>13.3±0.0</td>
<td>26.67±1.93</td>
<td>37.78±2.22</td>
<td>50.00±3.33</td>
<td>62.22±2.94</td>
</tr>
<tr>
<td>(10.0)</td>
<td>15.6±1.1</td>
<td>30.00±1.92</td>
<td>43.33±1.93</td>
<td>61.11±1.11</td>
<td>81.11±1.11</td>
</tr>
<tr>
<td>Mean</td>
<td>7.78±1.35</td>
<td>15.00±2.68</td>
<td>21.30±3.75</td>
<td>29.07±5.09</td>
<td>37.41±6.55</td>
</tr>
</tbody>
</table>

LSD at 0.05 for Concentration (C) at 25°C: | 2.62 | 2.39 | 5.85 |
LSD at 0.05 for Period (P) at 30°C: | 2.35 | 2.15 | 5.26 |
LSD at 0.05 for C*P at 30°C: | 2.28 | 2.08 | 5.10 |

a, b & c: There is no significant difference (P>0.05) between any two means, within the same column have the same superscript letter. A, B & C: There is no significant difference (P>0.05) between any two means, within the same row have the same superscript letter.

- **Lethal toxicity of the commercial product, Bacillus thuringiensis** (Xan-Tari) against, *O. surinamensis* and *S. granarius* at 20, 25 and 30 °C.
  
  **a. Against O. surinamensis:**
  The lethal concentrations of the tested commercial product (Xan-Tari) on the adult stage of *O. surinamensis* are shown in Table (3). As a general, the concentration 10 g/ml (higher concentration) caused the highest mortality and vice versa. The three tested temperature (20, 25 and 30°C) behaved different in their reaction. Tested commercial product (Xan-Tari) gave different mortalities to adults of *O. surinamensis* at the different levels of concentrations and different temperatures. At 30 °C, adults of *O. surinamensis* show the high susceptible and low LC₅₀ (24.042 g/100 ml). On contrary at 20°C, adults of *O. surinamensis* manifested least susceptibility as those showed the highest LC₅₀ (24.9424g/100ml). In this respect, at 25°C showed intermediate position in their susceptibility to *B. thuringiensis* treatments between the 20 and 30 °C (LC₅₀ was 22.857g/100ml).

  **b. Against S. granarius:**

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The lethal concentrations of the tested commercial product (Xan-Tari) on the adult stage of S. granarius are shown in Table (3). As a general, the concentration 10 g / 100ml highest concentration caused the highest mortality and vice versa. The tested temperatures (20, 25 and 30°C) behaved different in their reaction to B. thuringiensis treatment. Adults of S. granarius gave different mortalities effect to tested commercial product (Xan-Tari) at different levels of concentrations and different temperatures. At 30°C, adults of S. granarius were the highest susceptible, showing the lowest LC$_{50}$ (8.334 g / 100 ml).

Table 3. The lethal concentrations of the tested commercial product (Xan-Tari) against the adults of O. surinamensis and S. granarius at 20, 25 and 30°C.

<table>
<thead>
<tr>
<th>Temperature °C</th>
<th>Insect</th>
<th>LC$_{50}$</th>
<th>Slope</th>
<th>P-value</th>
<th>R (Tab. 878)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>O. surinamensis</td>
<td>24.0424 (14.2837-113.4244)</td>
<td>0.8941±0.1602</td>
<td>0.9685</td>
<td>0.9956</td>
</tr>
<tr>
<td>20</td>
<td>S. granarius</td>
<td>9.0950 (6.4586-15.5007)</td>
<td>1.044±0.1498</td>
<td>0.7788</td>
<td>0.9906</td>
</tr>
<tr>
<td></td>
<td>O. surinamensis</td>
<td>24.9424 (13.2336-89.4786)</td>
<td>0.8437±0.1574</td>
<td>0.6906</td>
<td>0.9792</td>
</tr>
<tr>
<td>25</td>
<td>S. granarius</td>
<td>10.2855 (7.3950-17.0417)</td>
<td>1.1725±0.1579</td>
<td>0.9530</td>
<td>0.9974</td>
</tr>
<tr>
<td></td>
<td>O. surinamensis</td>
<td>(12.0946-84.6158)</td>
<td>0.7938±0.1527</td>
<td>0.9991</td>
<td>0.9995</td>
</tr>
<tr>
<td>30</td>
<td>S. granarius</td>
<td>8.3341 (5.9810-13.8751)</td>
<td>1.0339±0.1481</td>
<td>0.9989</td>
<td>0.9998</td>
</tr>
</tbody>
</table>

On contrary at 20 and 25°C, adults of S. granarius manifested least susceptibility as those showed the highest LC$_{50}$. The results indicated that S. granarius was more sensitive to the Xan-Tari. All the tested concentrations of commercial product (Xan-Tari) significantly killed S. granarius and adversely affected the post treatment population build-up of the insect.

2- Effect of Xan-Tari on biochemical parameters of tested rats:

ALT, AST, Urea, Creatinine and Uric acid results showed a significant increase in exposed groups (receive XENTARI) in comparison to control. Level of ALT showed in Fig. (1), Level of AST showed in Fig. (2), Level of Urea showed in Fig. (3), Level of uric acid showed in Fig. (4) and level of creatinine showed in Fig. (5). There were highly significant increase in exposed groups and this increases gradually with prolong exposure if compare with the control group.

Fig. (1) showed ALT level (U/L) in rat’s serum at 1st, 2nd and 3rd weeks of the experiment.
Fig. (2) Showed AST level (U/L) in rat's serum at 1\textsuperscript{st}, 2\textsuperscript{nd} and 3\textsuperscript{rd} weeks of the experiment.

Fig. (3) Showed urea level (mg/dl) in rat’s serum at 1\textsuperscript{st}, 2\textsuperscript{nd} and 3\textsuperscript{rd} weeks of the experiment.
Effect of the bio-insecticide; (Xan-Tari, *Bacillus thuringiensis*) on two of the...

3- Effect of Xan-Tari on Antioxidant Level in serum of tested rats:
Catalase (CAT), Malondialdehyde (MDA) and Reduce glutathione (GSH), showed a significant increase in exposed groups (receive XENTARI) in comparison to control. Level of CAT showed in Fig. (6), Level of MDA showed in Fig. (7), and level of GSH showed in Fig. (8). There were highly significant increase in exposed groups and this increases gradually with prolong exposure if compare with the control group.

Fig. (4) Showed uric acid level (mg/dl) in rat's serum at 1st, 2nd and 3rd weeks of the experiment.

Fig. (5) Showed Creatinine level (mg/dl) in rat's serum at 1st, 2nd and 3rd weeks of the experiment.
Fig. (6) Showed CAT level (U/L) in rat's serum at 1st, 2nd and 3rd weeks of the experiment.

Fig. (7) Showed MDA level (nmol/ml) in rat's serum at 1st, 2nd and 3rd weeks of the experiment.
Effect of the bio-insecticide; (Xan-Tari, Bacillus thuringiensis) on two...

In the current study, we determine the safety of Xentari, it administrated to group of rat daily for 3 weeks. We determine change occur in serum biochemical which express liver and kidney function and measure change occur in activity of some antioxidant. Liver function as AST and ALT were determined to find out effect on hepatic system. Creatinine, Urea and Uric acid were estimated the effect on kidney function and excretory system. Antioxidant was performed as well to evaluate the degree of damage in body cell.

Liver is well known to have three main functions: storage, metabolism, and biosynthesis. Glucose was converted to glycogen and stored; when needed for energy, it is converted back to glucose. Numerous functional proteins such as, enzymes and blood-coagulating factors are also synthesized by the liver. In addition, the liver, which contains numerous xenobiotic metabolizing enzymes, is the main site of xenobiotic metabolism (Hodgson and Levi 2004). The more specific parameter to liver was ALT, and thus is a better parameter for examining the liver injury. AST mainly found in mitochondria of hepatocytes. Thus, to evaluate liver injury, AST and ALT are the most common biochemical markers (Girish and Pradhar 2008).

Aminotransferases (ALT and AST) are cytoplasmic enzymes which increase in serum levels are attributed to damaged structural integrity of the liver resulting from their released into the blood circulation after the rupture of the plasma membranes (Velmurugan et al. 2007). Our data revealed that Xentari caused moderate liver damage indicated by increases in serum ALT, AST, levels along with compared with the control confirming the data obtained by (Rizzati et al. 2016).

Kidney has important role in removing wastes like creatinine, uric acid and urea, regulating the balance of electrolytes and controlling the body’s fluid balance. For the kidneys to carry out their normal functions they have to be in good condition both functionally and structurally. Creatinine is formed from creatine which stores energy in muscles in the form of phosphocreatine. When physical activity of the body is normal, the creatinine in blood remains within normal range. In agreement with this result (Luo et al. 2014). The present study revealed a significant increase in serum creatinine, uric acid and urea concentrations in xentari treated group in compared to control group. High urea level indicates kidney dysfunction, but its values varies with liver metabolic capacity, protein intake and renal perfusion so it gives a poor indication for measuring the renal function, however, creatinine shows the excretion of waste products through urine (Khan et al. 1996).

ROS are naturally generated in all mammalian cells during normal cellular respiration. Since ROS are cytotoxic molecules even when produced during normal respiration, for cell survival, they are naturally neutralized by the endogenous antioxidant defense system, primarily GSH, MDA, and CAT (Irazusta et al. 2006). When there is an imbalance between ROS production and antioxidants, the cell becomes vulnerable to severe oxidative stress-induced damage. ROS can attack cell membranes and other cellular molecules, causing lipid peroxidation, protein oxidation, and DNA damage, which results in cell disruption and loss of function and can lead to diseases such as cancers, atherosclerosis, diabetes, and renal failure (Avery 2011). In the current study, MDA, CAT, GSH markers, were drastically increased this...
finding indicates cell membrane damage in cells, which is attributed to the increased production of OH. The injury may be because of the liberated free radicals cause membrane lipid peroxidation and denaturation of both DNA and proteins. This damage leads to enzymatic inactivation and mitochondrial dysfunction that enhances ROS production via the disruption of the respiratory chain Catalase enzyme is a thiol-containing enzyme. It is an important enzyme for the neutralization of ROS (Abdel Daim and El-Ghoneimey 2015).

References


Effect of the bio-insecticide; (Xan-Tari, Bacillus thuringiensis) on two of


تأثير المركب الحيوي زنتاري على حشرتي خنفساء السورينام وسوسة الحبوب (القمح) وإماته على فئران التجربة

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أجريت هذه الدراسة في معمل آفات الحبوب والمواقد المخزونة بقسم وقاية النبات بكلية الزراعة - جامعة بنها , وذلك بغرض دراسة فاعلية مبيد الزنتاري الحيوي على حشرتين من حشرات المواد المخزونة هما , خنفساء السورينام وسوسة الحبوب (القمح) عند ثلاث درجات حرارة (02 , 02, 02 درجة مئوية ) وفترات تعريض 30 يوم وفترة التعريض 7, 10, 14, 21 يوم . واظهرت النتائج ان نسبة الموت من سوسة القمح زادت بزيادة تركيز المبيد وكذلك فترة التعريض (5, 7, 10, 14, 21 يوم) وزيادة درجات الحرارة . وكانت أعلى نسب موت وصلت إلى 50% عند حرارة 02 درجة مئوية . بالنسبة لخنفساء السورينام زادت نسبة الموت مع زيادة تركيز المبيد وفترة التعريض وزيادة درجة الحرارة . واظهرت النتائج ان مبيد الزنتاري أثر بالسلب على تكاثر الحشرات بعد المعاملة لكل الحشرتين وان حشرة سوسة القمح كانت أكثر حساسية للالم من خنفساء السورينام حيث كانت نسب الموت لسوسة القمح أعلى .

وتم إجراء الجزء الخاص بتحديد آمان مبيد الزنتاري في مركز تربية حيوانات التجارب بكلية الطب البيطري واجراء الاختبارات على مصل الدم في معمل التميز العلمي بكلية الطب البيطري جامعة بنها . وذلك بغرض دراسة التأثير السمي ل مبيد الزنتاري الحيوي على المؤثرات الكيميائية الحيوية ومضادات الأكسدة وقد أجريت هذه الدراسة على 20 فأر من ذكور الفئة البالغة البضاء ولمدة 3 أسابيع وقد تم تسميتها إلى مجموعتين كل مجموعة عشر فأر ككلانوي مجموعة الأولى: المجموعة الضابطة المجموعة الثانية: المجموعة المستخدمة في التجربة بإعطائها مبيد الزنتاري المضاف إلى الاكل يوميا لمدة ثلاث أسابيع. وقد تم تجميع عينات الدم في نهاية الأسبوع الأول والثاني والثالث.

وقد أوضحت التجااال الكيميائية للسويوم جودة زيادة معينة في نشاط إندوكرينس الآلاتين أمينوتراستير والإسباريبتين أمينوتراستيرير والأكثيلوفوسفاتاز، وكما وجدر زيادة معينة في مستوي البروتين والورك اسـيد الكلورينات وانها ارتفاع موضات الأكسدة المتمثلة في كتاناز ومالاندريد وجلوتاتيون.