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# Effects of pyridalyl and emamectin benzoate on some biological and biochemical parameters of *Spodoptera littoralis* (Boisd.) and Albino rat.

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## ABSTRACT

The present investigation aimed to throw light on the efficiency of two novel insecticides, pyridalyl and emamectin benzoate(contact), a semi-synthetic insecticide on two different larval instars ($2^{nd}$ and $4^{th}$) of the cotton leafworm, *Spodoptera littoralis* (Lepidaptera: Noctuidae). Also to study their toxic affects on some biochemical parameters on albino rat. The results clearly showed that pyridalyl was more toxic than emamectin benzoate against the $2^{nd}$ and $4^{th}$ larval instar according to $LC_{50}$ values after all time post exposure (2, 3, 5 and 7 days). In addition the two tested compound decreased pupal weight, pupation and adult emergence percentages resulted from larvae treated with different concentrations of these insecticides as $2^{nd}$ and $4^{th}$ larval instars. The present study also animals were treated orally with (1/10 $LD_{50}$) of each compound done by using sixty male adult albino rats were divided into three groups .First group "control" was received distilled water daily, second group were received repeated oral administration of 0.07mg/animal/day of pyridalyl and third group were received repeated oral administration of 2.5 mg/animal / day of emamectin benzante for 28 consecutive days. The results showed that there were significant increases of ALT, AST, urea and creatinine in the treatment of Pyridalyl more than emamectin benzante and control. On the other hand there were significant decreases in protein content in the treatment of Pyridalyl more than E. benzante on comparison with control.

**Conclusion:** The results indicated the toxic nature of the insecticide pyridalyl is more than E. benzante on *Spodoptera littoralis* and albino rats so we suggest that usage of E. benzante although it less toxic to save environment.

**Keywords:** *Spodoptera littoralis*, albino rat, Emamectin benzoate, Pyridalyl Biological, Biochemical Parameters.

## INTRODUCTION

The cotton leafworm, *Spodoptera littoralis* (Boisd.) considered as one of the most series pest for many different crops in Asia, Africa and Europe (Horowitz *et al*., 1994) and (Smagghe and Degheele, 1997).Pesticides are estimated to be responsible for approximately 4% of all deaths from accidental poisoning, mainly in the developing world (Colosio and Moretto 2008) the use of substances toxic to man and to a variety of forms of life has become an overall health problem.

Toxicity studies of pyridalyl, including acute, chronic, oncogenicity, developmental, mutagenicity, and reproductive studies, have all been conducted previously with low acute toxicity, no oncogenicity and mutagenicity, and no teratogenicity observed (US Environmental Protection Agency, 2008).

Emamectin benzoate is applied for the control of chewing lepidopterous pests in vegetables and cotton (White *et al*., 1997). Treated plants cause target insects to stop feeding 1-4 h after application, rendering them immobile within 12–24 h and finally to die 2-4 day. By being safe to most predator groups and having a new mode of

action (Dunbar *et al*., 1998). Emamectin benzoate is being developed as a newer broad-spectrum insecticide for vegetables and has a very low application rate. The mechanism of action involves stimulation of high affinity GABA receptors and a consequent increase in membrane chloride ion permeability. (Yen &Lin 2004 and Andersch *et al* 2011). Emamectin benzoate is a novel macrocyclic lactone insecticide derived from naturally occurring avermectin molecules isolated by fermentation from the soil microorganism Streptomyces avermitilis (Ioriatti *et al* 2009).

## MATERIALS AND METHODS

**Insects:**

A laboratory strain of *Spodoptera littoralis* was obtained from Plant Protection Research Institute, A.R.C, and Giza, Egypt. This strain were reared on castor bean leaves under constant conditions at 25± 2°C and 65±5%RH using the method described by (El-Defrawi, *et al.,* 1964). The 2nd and 4th larval instars were used in all laboratory experiments.

**Insecticides used:**

**Pyridalyl** (Pleo 50%EC),2,6-dichloro-4(3,3-dichlorollyloxy) phenyl 3- [5-(trifluoromethyl)-2-pyridyloxy] Propyl ether, was produced by sumitomo chemical Co.Ltd. Japan.

**Emamectin benzoate**, (contact 50% WDG), it is a novel semi-synthetic avermectin derivative from the fermentation of soil microorganisms, *Streptomyces avermitilis,* produced by Modern for plants protection Co.

**Toxicological and biological studies**: the dipping technique was applied to examine the effect of pyridalyl and emamectin benzante on toxicological and some biological aspects of 2nd and 4th instar larvae of *S. littoralis.* Serial concentrations were prepared by dilution the formulated compound with distilled water. Castor bean leaves were dipped for 15 second in each concentration, then left to dry at room temperature and were offered to 2nd and 4th instar larvae, three replicates were carried out for each concentration, larvae were allowed to feed on the treated leaves for 48 hrs. and then removed, the fresh untreated leaves were provided to the larvae until pupation. Other three replicates were dipped in distilled water for the same period as check. The treated larvae were examined daily to determine the mortalities percentage and different biological aspects such as: pupation and adult emergence percentages and pupal weight.

**Laboratory animals:**

Sixty adult albino rats weighting (200 - 250 g) were obtained from the farm of General Organization of Serum and Vaccine (Helwan Farm). The animals were housed in plastic cages in an air conditioned room where regular alternate cycles of 12 hr light and darkness were maintained and supplied with pelleted diet and tap water. Animals were observed and signs of intoxication were recorded. The rats were equally divided into three groups each group containing twenty rats and orally treated as follows:

**Group (1):** 20 rats were administrated with normal diet and water daily for 28 adys

**Group (2):** 20 rats were received repeated oral administration of 0.07mg/animal/day of pyridalyl for 28 consecutive days

**Group (3):** 20 rats were given 2.5mg/animal / day of contact (emamactin) by oral gastric tube for 28 days**.**

**Biochemical studies**

**Blood sampling and analysis:**

Animals were sacrificed 24 hours after the last dose of tested materials. Blood samples were collected from hearts of rats in all groups on the last day (the 28th day). Samples were centrifuged at 3000 rounds for 10 minutes to separate the serum. The serum was analyzed for the biochemical analysis:

**Liver functions tests:-**

Aspartate Aminotransferase "AST" Assay of AST was performed by mixing the serum to buffered solution of L- aspartic acid and 2- ketoglutarate and then incubated for one hour at 37 °C. After incubation, 1 mm of DNPH and 0.4m of NaOH was added (Daniel and Marshall, 1999).

Alanine Aminotransferase "ALT" Assay of ALT was performed by mixing the serum to buffered solution of DL- alanine and 2- ketoglutarate, and then incubated for thirty minutes at 37 °C. After incubation, 1 mm of DNPH and 0.4m of NaOH was added (Daniel and Marshall, 1999).

Alkaline Phosphatase "ALP" Assay of ALP was performed by using p-nitrophenol phosphate as substrate, in al alkaline buffer with fresh unhemolysed serum for 45 min at 12°C (Daniel and Marshall, 1999).

Serum total protein: Colorimetric determination of total protein was performed based on the Biuret reaction (Harris, 1995).

**Renal function tests:-**

Serum creatinine: It was determined by Jaffe reaction (Wilding and kennedy, 1977).

Serum urea: Blood urea was determined according to the method mentioned by (Taylor and Vadgama, 1992).

**Statistical analysis**

The all average mortality percentages were corrected using Abbot's formula (1925). To obtain the $LC_{50}$ and $LC_{90}$ values for each tested compound, the corrected mortality percentage after 2, 3, 5 and 7 days post exposure were statistically computed according to Finney (1971), using software computer program.

## RESULTS AND DISCUSSION

**Efficacy of Pyridalyl and emamectin benzoate on toxicological and biological aspects of *S. littoralis*:**

The illustrated results in Table (1) and Table (2) summarized the toxicity and latent effect of pyridalyl 50% EC at different concentrations against the 2nd and 4th larval instars of *S. littoralis.* Data clearly showed that the larval mortality percentages had positive correlation with pyridaly concentrations and time after exposure. The mortalities were increased as concentration and time after treatment increase.

The corrected cumulative larval mortalities were 98.93, 98.21, 66.07 and 62.49% for the tested concentrations 5, 2.5, 1.25 and 0.625 ppm, respectively against 2nd larval instar after 12 days post treatment and were 98.89, 85.19, 81.48 and 62.97% for the tested concentrations 25, 12.5, 7.5 and 5 ppm, respectively against 4th larval instar after 9 days post exposure.

In addition pyridalyl showed latent effects against both 2nd and 4th larval instar of *S.littoralis* as shown in Table (1) and Table (2).

Table 1: Influences of different pyridalyl concentrations on some biological aspects of *S. littoralis* treated as 2nd larval instar

| Conc ppm | % Cumulative larval mortality at indicated days | | | | | | Corrected larval mortality % | Pupation % | Pupal weight (g) ±SE | Adult emergence % ± SE |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 5 | 7 | 9 | 12 | | | | |
| 5 | 66.67 | 75.00 | 83.33 | 91.67 | 100 | 100 | 98.93 | 0.0 | ---------- | 0.0 |
| 2.5 | 56.0 | 61.67 | 81.67 | 85.00 | 90.00 | 98.33 | 98.21 | 1.67 | 0.21±0.028 | 0.0 |
| 1.25 | 33.33 | 46.67 | 61.67 | 65.00 | 65.00 | 68.33 | 66.07 | 31.67 | 0.30±0.06 | 52.63 |
| 0.625 | 15.00 | 18.33 | 51.61 | 53.33 | 55.00 | 65.00 | 62.49 | 35.00 | 0.33±0.053 | 71.43 |
| Control | 0.0 | 0.0 | 0.0 | 0.0 | 3.33 | 6.67 | 0.0 | 93.33 | 0.38±0.047 | 98.21 |

Table 2: Influences of different pyridalyl concentrations on some biological aspects of *S. littoralis* treated as 4th larval instar.

| Conc ppm | % Cumulative larval mortality at indicated days | | | | | Corrected larval mortality % | Pupation % | Pupal weight (g) ±SE | Adult emergence % ± SE |
|---|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 5 | 7 | 9 | | | | |
| 25 | 90.00 | 96.67 | 100 | 100 | 100 | 98.89 | 0.0 | - | 0.0 |
| 12.5 | 64.67 | 63.33 | 70.00 | 80.00 | 86.67 | 85.19 | 13.33 | 0.29±0.11 | 25.00 |
| 7.5 | 30.00 | 43.33 | 53.33 | 66.67 | 83.33 | 81.48 | 16.67 | 0.30±0.06 | 40.00 |
| 5 | 16.67 | 30.00 | 50.00 | 56.67 | 66.67 | 62.97 | 33.33 | 0.28±0.065 | 60.00 |
| Control | 0.0 | 0.0 | 0.0 | 3.33 | 10.00 | 0.0 | 90.00 | 0.4±0.043 | 96.30 |

The percentage of pupation and adult emergence resulted from larvae treated as both 2nd and 4th instar with different concentrations of pyridalyl were highly reduced compared to untreated larvae. No pupation and adult emergence was observed when larvae treated as both instars with the highest concentration 5 and 25 ppm as comparison with untreated larvae 93.33, 90.00, 98.21 and 96.3%, respectively. On the other hand all the tested concentrations decreased pupal weight compared with control. The highest decrease was observed with the low concentrations 0.625 and 5ppm against both instars, respectively. Pyridaly have symptomatic difference from benzoyphenylurea, pyrethroid, organophosphate and carbamate insecticides. Pyridaly induced neither quick convulsion nor IGR –like molting disruption. In pervious studies Satio *et al.,* (2002) and 2005), reported that pyridalyl possesses excellent larvacidal activity against numerous lepidoterous pests, such as *Helicoverpa armigera, Spodoptera exigua* and caused 100% larval mortality against *S.litura* at concentration of 500mg/L.Also pyridalyl provided excellent control of the two bollworm species of cotton (Nair *et al*., 2008). Dahi, *et al*. (2011) reported that pyridalyl increased larval mortality of *S.littoralis* treated as 2nd, 4th and 6th instars, also this compound decrease the pupation percentages to 55, 22 and 34% compared with 92, 100 and 88% in untreated larvae respectively. Also El-Dewy, (2013) found that pyridalyl showed latent effect at low concentration against 4th instar larvae *S.littoralis,* it decreased pupal duration, pupal weight ,pupation and adult emergence percentages.

Larvicidal activity of Emamectin benzoate against different instars of *S. littoralis* is shown in Table (3) and Table (4). Results clearly indicated that the larval mortalities were increased as concentration and time after exposure increase. The corrected cumulative larval mortalities at the end of larval stage were 98.89, 98.11, 90.57, 84.91 and 54.72% for the tested concentrations 10, 5, 2.5, 1.25 and 0.625 ppm, respectively against 2nd instar after 12 days post exposure, and they were 98.89, 98.89, 98.89, 88.89 and 74.08% for the tested concentrations 50, 25, 12.5, 5 and 2.5 ppm, respectively against 4th instar after 9 days post treatment. Emamectin benzoate showed latent effect against two tested instars as shown in Table (3) and Table (4). The percentage of pupation and adult emergence resulted from larvae treated as both 2nd and 4th instar with different concentration of Emamectin benzoate were significantly decreased compared to control larvae. No pupation and adult emergence was observed when larvae treated as 4th instar with the concentration 50, 25 and 12.5

ppm, respectively. On the other hand pupal weight was also reduced as concentration increase. These findings are in harmony with that of Abou- Taleb, *et al*., (2009) who reported that the toxicity of Emamectin benzoate against the different larval instars of laboratory and field strains of *S.littoralis* was increased with increasing the concentration and exposure time and decreased by increasing the insect instar. Prasad *et al.,* (2007) demonestreated that emamectin was the most toxic insecticide against *S.litura.* Emamectin benzoate showed latent effect against 2nd and 4th instar larvae of *S.littoralis*, these are shown in previous studies with El-Zahi (2013), El-Naggar (2013) and El-Dewy (2013), they mentioned that the latent effects of emamectin benzoate against 4 th larval instar of *S .littoralis* were significantly decreased in pupal duration, pupal weight, pupation and adult emergence percentages.

Table 3: Influences of different E. benzoate concentrations on some biological aspects of *S.littoralis* treated as 2nd larval instar.

| Conc ppm | % Cumulative larval mortality at indicated days | | | | | | Corrected larval mortality % | Pupation % | Pupal weight (g) ±SE | Adult emergence % |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 5 | 7 | 9 | 12 | | | | |
| 10 | 68.33 | 83.33 | 100 | 100 | 100 | 100 | 98.89 | 0.0 | - | 0.0 |
| 5 | 33.33 | 41.67 | 75.00 | 96.67 | 98.33 | 98.33 | 98.11 | 1.67 | 0.21±0.033 | 0.0 |
| 2.5 | 25.00 | 36.66 | 70.00 | 83.33 | 91.67 | 91.67 | 90.57 | 8.33 | 0.20±0.034 | 40.0 |
| 1.25 | 19.67 | 30.00 | 61.67 | 81.67 | 86.67 | 86.67 | 84.91 | 13.33 | 0.29±0.11 | 50.00 |
| 0.625 | 1.67 | 10.00 | 38.33 | 45.00 | 55.00 | 60.00 | 54.72 | 40.0 | 0.29±0.105 | 54.17 |
| Control | 0.0 | 0.0 | 3.3 | 3.3 | 8.33 | 11.67 | 0.0 | 88.33 | 0.39±0.058 | 94.34 |

Table 4: Influences of different Emamectin benzoate concentrations on some biological aspects of *S. littoralis* treated as 4th larval instar.

| Conc ppm | % Cumulative larval mortality at indicated days | | | | | Corrected larval mortality % | Pupation % | Pupal weight (g) ±SE | Adult emergence % |
|---|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 5 | 7 | 9 | | | | |
| 50 | 93.33 | 96.67 | 100 | 100 | 100 | 98.89 | 0.0 | 0.22±0.635 | 0.0 |
| 25 | 36.67 | 70.00 | 93.33 | 100 | 100 | 98.89 | 0.0 | 0.31±0.109 | 0.0 |
| 12.5 | 33.33 | 56.67 | 66.67 | 90.00 | 100 | 98.89 | 0.0 | 0.31±0.087 | 0.0 |
| 5 | 20.00 | 33.33 | 56.67 | 80.00 | 90.00 | 88.89 | 10.00 | 0.34±0.11 | 33.33 |
| 2.5 | 3.33 | 23.33 | 46.67 | 66.67 | 76.67 | 74.08 | 23.33 | 0.36±0.013 | 57.14 |
| Control | 0.0 | 0.0 | 3.3 | 3.3 | 10.00 | 0.0 | 90.00 | 0.39±0.013 | 92.59 |

Results recorded in Table (5), summarized the $LC_{50}$ and $LC_{90}$ values of tested compounds after indicating time after exposure against both 2nd and4th larval instar of *S. littoralis*. Data clearly demonstrated that pyridalyl 50%EC was the most toxic compound than emamectin benzoate 50% WDG according to $LC_{50}$ values against both instar at all the tested time interval .The $LC_{50}$ values were 2.56, 1.75, 0.58 and 0.63ppm after 2, 3, 5, and 7 days post exposure against 2nd instar treated with pyrldalyl and were 6.31, 3.88, 1.06 and 0.66 ppm against 2nd instar treated with ememectin benzoate after 2, 3, 5 and 7 days post treatment, respectively. Also the $LC_{50}$ values against 4th instar were 11.26, 8.23, 6.05 and 4.9 ppm and 19.49, 8.62, 3.66 and 1.61ppm after 2, 3, 5, 7 days for pyradalyl and emamectin respectively. On they other hand data indicated that the 2nd instar was found to be more susceptible than 4th instar. Similar results were found with El-Zahi (2013) who found that pyridalyl was most persistent residual activity than emamectin-benzoate, it produced $Lt_{50}$ 6.74 days compared to 5.51 days for emamectin-benzoate against *S.littoralis.* Also. El-Dewy (2013) demonstrated that pyridalyl proved to be the most effective in residual activity causing 54% mortality than 42.13% for emamectin-benzoate. In addition Hanafy & El-Sayed (2013) found that pyridalyl was the most effective compound in reducing infestation of *Tuta absoluta* followed by Spinosad, emamectin

benzoate, also found that pyridalyl was more effective than Indoxcarb it reduced *Helicoverpa armigera* infestation form 42.5 to 19.2% after 7 days.

Table 5: Toxicity response of 2nd and 4th larval instar of *S. littoralis* to pyridalyl and Emamectin benzoate at different time intervals.

| Insecticide | Time after exposure (days) | LC values (95% FL) ppm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $LC_{50}$ | | Lower | | Upper | | Slop | | $LC_{90}$ | |
| | | 2nd | 4th | 2nd | 4th | 2nd | 4th | 2nd | 4th | 2nd | 4th |
| Pyridalyl | 2 | 2.56 | 11.26 | 2.11 | 10.16 | 3.23 | 12.55 | 1.59 | 3.09 | 16.41 | 29.3 |
| | 3 | 1.75 | 8.23 | 1.45 | 6.10 | 2.09 | 9.33 | 1.68 | 3.03 | 10.17 | 21.78 |
| | 5 | 0.58 | 6.05 | 0.31 | 4.2 | 0.83 | 8.32 | 1.14 | 2.47 | 7.78 | 20.01 |
| | 7 | 0.63 | 4.9 | 0.42 | 3.85 | 0.82 | 5.78 | 1.54 | 2.50 | 4.29 | 15.95 |
| Emamectin benzoate | 2 | 6.31 | 19.49 | 4.32 | 10.44 | 8.32 | 24.23 | 1.67 | 1.96 | 37.11 | 88.06 |
| | 3 | 3.88 | 8.62 | 2.12 | 4.27 | 5.12 | 15.03 | 1.54 | 1.64 | 26.51 | 52.17 |
| | 5 | 1.06 | 3.66 | 0.93 | 2.11 | 1.14 | 5.31 | 1.48 | 1.19 | 7.72 | 43.84 |
| | 7 | 0.66 | 1.61 | 0.42 | 2.24 | 0.82 | 0.97 | 1.99 | 1.56 | 2.82 | 10.62 |

**Animal's studies:**

**Clinical symptoms**

Rats treated with 1/10 of $LD_{50}$ Pyridalyl and E. benzoate developed clinical symptoms, which were progressing by time marked distension of the abdomen was the only clinical symptoms observed in rats after the first two weeks of treatment. In the third week, rats lost their vitality and depression. During the fourth week of the experiments, general weakness and cachexia were observed.

Table 6: Effect of E. benzoate.and Pyridalyl administration on body weight and some organs weight of rats in grams.

| Weight in gm. | Control Mean ± SD | E. benzoate Mean ± SD | Pyridalyl Mean ± SD |
|---|---|---|---|
| Body weight | 295±7.88 | 289±6.23 | 232±2.55 |
| Liver weight | 10.55±0.85 | 9.89±0.77 | 12.66±0.67 |
| Kidney weight | 3.11±0.33 | 2.78±0.41 | 2.34±0.11 |

The symptoms of toxicity of Pyridalyl in rats were similar to that produced by of which reported by (Hirohisa *et al*. 2010).The effects of E. benzoate and Pyridalyl on body weight are recorded in table (6) since it was observed a significant decrease in body and kidney weights of rats but show significant increased in liver weight these results were in agreement with (Hirohisa *et al*. 2010) and (Hassina *et al*. 2013).

**Biochemical studies**

**Biochemical effects of E. benzoate and Pyridalyl on rat:**

The elevation in the liver enzyme activities may be due to liver dysfunction with a consequent reduction in enzyme biosynthesis and altered membrane permeability permitting enzyme leakages into the blood (Hany and Gamal 2013 and Nahla 2010).

Table (7): Effect of E. benzoate and Pyridalyl on serum liver enzymes

| liver enzymes | Control Mean ± SD | E. benzoate Mean ± SD | Pyridalyl Mean ± SD |
|---|---|---|---|
| ALT (U/L) | 245.65 ±3.65 | 249.23±3.55 | 351.78±4.12 |
| AST (U/L) | 222.55±3.31 | 229.32±2.45 | 326.45±3.15 |
| Alk-p (U/L ) | 80.28±1.23 | 82.16±1.11 | 119.98±2.14 |
| T. protein content (g/dl) | 7.33±0.13 | 6.12±0.11 | 4.56±0.03 |

The mean values of plasma transaminase activities of AST and ALT showed in Table (7). A significant increase in Pyridalyl treatment more than E. benzoate and

control was observed. The obtained results are in agreement with the results obtained by (Hsu *et al*. 2001, Hirohisa *et al*. 2010) and (Hassina *et al*. 2013) who showed elevated levels of the cytosolic enzyme of the hepatocytes, aspartate aminotransferase (AST), in the blood serum of rats exposed to1-20 mg/kg body weight E. benzoate.Proteins are important organic substances required by organisms in tissue building and play an important role in energy metabolism (Yeragi *et al*., 2003; Remia *et al*., 2008; Pang-Hung *et al*., 2008). The result of the present study showed significant decrease in protein content in the treatment of Pyridalyl more than contact (E. benzoate) and control. (Table 7) these results were in agreement with the results of (Hsu *et al*. 2001), (Hirohisa *et al*. 2010 and Hassina *et al*. 2013).

Pyridalyl is a novel insecticide exerts excellent control against various lepidopterous pests on cotton and vegetables (Hirohisa *et al* 2009 and Hirohisa *et al*. 2010)they also consider that pyridalyl has different mode of action from any other existing insecticide, these results were in agreement with our results where the biochemical changes in the form of elevation of ALT, AST, depletion of protein in Pyridalyl treatment was more than with the biochemical changes of rat treated with E. benzoate.

Table 8: Effect of E. benzoate and Pyridalyl on kidney function tests:

| kidney function | Control Mean ± SD | E. benzoate Mean ± SD | Pyridalyl Mean ± SD |
|---|---|---|---|
| Creatinine (mg/dl) | 0.86 ±.05 | 1.12±0.01 | 3.11±0.12 |
| Urea (mg /dl) | 36.85±1.01 | 35.93±1.04 | 88.19±2.10 |

Serum urea and creatinine were determined as indicators of kidney functions, since the increase in these components means that the kidney is less active or abnormal case. Data in Table (8) showed significant increase in serum urea and creatinine with the treatment of Pyridalyl more than contact and control. The elevation of blood urea and creatinine in treated rats may be attributed to the toxic effect of Pyridalyl and E. benzoate which led to disorders of the kidney which reduced the glomerular filtration rate and consequently retention of urea in the blood. The accomplished results closely resembled to those obtained by (Eissa and Zidan 2010 and Hirohisa *et al* 2010), who reported that E. benzoate and Pyridalyl has a significant increase in serum uric acid and creatinine levels, in male rats administered with of E. benzoate and Pyridalyl. The elevation of uric acid and creatinine concentrations may be attributed to the reduction in glomerular filtration in the kidney. Such an elevation also reflects the dysfunction of the kidney tubules (Walmsley and White 1994).

## REFERENCES

Abbott, W.S. (1925). A method for computing effectiveness of an insecticide J. Econ. Entomol. 18: 265-267.

Abou-Taleb, H.K; A.S. Saad; H.A.Mesbah; S.M, Abdel-Rahman and D.A, El-Deeb. (2009). Toxicity of Emamectin benzoate against laboratory and field strains of *S.littoralis* with reference to its effects on the AST, ALT and ALP activity. Egypt. J. Agric. Res., 87(2): 119-133.

Andersch, W., Evans, P. and Springer, B. (2011). "Combinations of biological control agents and insecticides or fungicides", published -05-12.

Colosio, C. and Moretto, A. (2008). Pesticides International Encyclopedia of Public Health, 59-66.

Dahi, H.F; A.S. Kamel; N.M. El-Bakrey and M.F. Abdel-Aziz. (2011). Pyridalyl effectiveness on some biological and physiological parameters of *S.littoralis*. J. American. Sci., 7(12): 855-863.

Daniel SP and Marshall MK (1999). Evaluation of the liver: laboratory tests.Schiff's diseases of the liver, 8th edn. USA; JB Lippincott publications, 205-239.

Dunbar, D.M.; Lawson, D.S.; White, S.M.; Ngo, N.; Dugger, P. and Richter, D. (1998): Emamectin benzoate: control of the heliothine complex and impact on beneficial arthropods. In: Beltwide Cotton Conference, San Diego, California, *Procedings,* USA. v.2: 1116-1118.

Eissa F.I., Zidan N.A. (2010). Haematological, biochemical and histopathological alterations induced by abamectin and Bacillus thuringiensis in male albino rats. Acta Biol. Hung. 61 (1): 33–44.

El-Defrawi, M.E; A. Toppozada; N. Mansour and M. Zeid. (1964). Toxicological studies on the Egyptian cotton leafworm, *Prodenia litura.* J. Econ. Entomol. 57: 591-593.

El-Dewy, M.E. (2013). Biological, toxicological potency and field persistence of new insecticides against *S.littoralis*. J. Alex. Sci. Exch, 34(3):120-125.

El-Naggar, J.B. (2013). Sublethal effect of certain insecticides on biological and physiological a spects of *S.littoralis*. J. Nat. & Sci., 11 (7):19-25.

El-Zahi, S.E. (2013). Field persistence of some novel insecticides residues on cotton plants and their latent effects against *S.littoralis* Alex. J. Sci. Exch., 34(1): 37-43.

Finney, D.J. (1971). Probit Analysis. 3rd Ed. Cambridge Univ. Press, London: 333pp.

Hanafy, H.M and W.El-Sayed. 2013. Efficacy of bio-and chemical insecticides in the control of *Tuta absoluta* and *Helicoverpa armigera* Infesting Tomato Plants. Aust. J. Basic & Appl. Sci., 7 (2): 943-948.

Hany Kamal Abd-Elhady*, Gamal Elsayed Abou-Elghar (2013). Abamectin Induced Biochemical And Histopathological Changes In The Albino Rat, *Rattus Norvegicus*. Journal of Plant Protection Research, 53(3): 263-270.

Harris, J.M. (1995): Clinical Chemistry Interpretation and techniques. 4th ed.Williams and Wilkins. Baltimore, Philadelphia, Hong Kong, London.

Hassina, K.O., Camille, R., Nadia, D., Michel L., Luc,H. and Ahcène, B.(2013). Effect of sub-acute exposure to abamectin "insecticide"n liver rats (Rattus norvegicus) Ann Toxicol Anal. 10:1-8.

Hirohisa N., Koichi, S., Yoshitaka, T., Naohiko, I., and Hideo K. (2009). Metabolism of pyridalyl in rats. Drug metabolism and disposition, 37:2284–2289.

Hirohisa, N., Haruyuki, M., Yoshitaka, T., Naohiko, I., and Hideo K. (2010). Metabolism of 2,6-Dichloro-4-(3,3-dichloroallyloxy)phenyl 3-[5-(trifluoromethyl) -2- pyridyloxy]propyl Ether (Pyridalyl) in Rats after Repeated Oral Administration and a Simple Physiologically Based Pharmacokinetic Modeling in Brown and White Adipose Tissues. Drug metabolism and disposition, 38 :824–832.

Horowitz, A. R.;G. Forer and I. Ishaaya (1994). Insecticide resistance management as a part of an IPM strategy in Israeli cotton fields. In Challenging the future, Proc. Of the World Cotton Research Conference, I, ed. G. A.Constable and W. W. Forresater.Csiro,Australia, pp. 537- 544.

Hsu, D.Z., Hsu, C.H., Huang, B.M., Liu, M.Y. (2001). Abamectin effects on aspartate aminotransferase and nitric oxide in rats. Toxicology.165: 189–193.

Ioriatti, C., Anfora, G., Angeli, G., Civolani, S., Schmidt, S. and Pasqualini, E.(2009). Toxicity of emamectin benzoate to Cydia pomonella (L.) and Cydia

pomonella (L.) and Cydia molesta (Busck) (Lepidoptera: Tortricidae): laboratory and field tests Pest Manag Sci., 65(3):306-12. doi: 10.1002/ps.1689.

Nahla S. E.l.S. (2010). Effects of insecticides fenitrothion, endosulfan and abamectin on antioxidant parameters of isolated rat hepatocytes Toxicol Vitro, 24(4): 1148-1157.

Nair, N; K. Sekh; A.K. Some noudhury and P.P Dhar. (2008). Bioefficacy of pyridalyl 10 EC against the bollworms of cotton and its effect on natural enemies in west bengal condition. J. Entom. Res. 32 (4): 313-315.

Pang-Hung ,Y., S. Jian, R. Amartalingam and J.B.Choon-Fah (2008). Boric Acid Levels in FreshNoodles and Fish Ball. Am. J. Agril. Biol. Sci., 3:476-481.

Prasad, K. D; T. Madhumathi; P. A. Rao and V.S. Rao. (2007). Toxicity of insecticides to resistant strain of *S.litura* (Fab) on cotton. Annals. Plant. Prot. Sci., 15: 77-87.

Peterson, R. F. and Starner, V. R. (1997). Emamectin benzoate: A novel avermectin derivative for control of Lepidopterous pests in cotton. – Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN., pp. 1078–1082.

Remia, K.M., S. Logaswamy, K. Logankumar and D. Rajmohan, (2008). Effect of an insecticides (Monocrotophos) on some biochemical constituents of the fish Tilipia Mossambica. Poll. Res., 27: 523-526.

Satio, S; S. Isayama; N. Sakamoto; K.Umeda and K. Kasamatsu. (2002). Pyridalyl: A novel insecticdal agant for controlling lepidopterous pests. Proc. Brighton Crop Prot. Conf. Pests and Diseases, BCPC, Farnham Surrey, UK, 33-38.

Satio, S; N. Sakamoto and K.Umeda. (2005). Effect of pyridalyl a novel insecticidal agent on cultured cells. J. Pestic. Sci., 30 (1): 17-21.

Smagghe, G. and D. Degheele (1997). Comparative toxicity and tolerance for the ecdysteroid mimic tebufenozide in a laboratory strain of cotton leafworm (Lepidoptera: Noctuidae). J. Econ. Entomol., 90: 278- 282.

Taylor, A. J. and Vadgama, R. (1992): Analytical reviews in clinical biochemistry: the estimation of urea.Ann.Clin. Biochem., 29-245.

Tzung, H. Y., and Ja-Liang, L. (2004). Acute Poisoning with Emamectin Benzoate,Vol. 42, No. 5, Pages 657-661.

US Environmental Protection Agency (2008). Pesticide Fact Sheet: Pyridalyl. US Environmental Protection Agency, Washington, DC.

Walmsley R.N., White G.H. 1994. A Guide to Diagnostic Clinical Chemistry. 3rd ed., Blackwell Publication, London, UK., 543 pp.

White SM, Dunbar DM, Brown R, Cartwright B, Cox D, Eckel C, Jansson RK, Mookerjee PK, Norton JA, Peterson RF, Starne VR. (1997). Emamectin benzoate: a novel avermectin derivative for control of lepidopterous pests in cotton. Vol.2 Proceedings of Beltwide Cotton Conferences; National Cotton Council; Memphis, TN: pp. 1078-1082.

Wilding P and Kennedy JH (1977). Manual of routine methods in clinical chemistry for use intermediate laboratories WHO Lab./78.1 p. 25-28.

Yeragi, S.G., A.M. Ranaand V.A. Koli, 2003. Effect of Pesticide on protein metabolism of mudskipper, Boleophtalmus dussumieri. J. Ecotoxicol. Environ. Monit., 13: 211-214.

Yen, T.H. and Lin, J.L. (2004) .Acute poisoning with emamectin benzoate. Clinical Toxicology, 42(5): 657-661.

**تاثيرات البيريداريل و ايمامكتين بنزوات على بعض الدلائل البيولوجيه والبيوكيميائيه على دودة ورق القطن وفأر الألبينو.**

## ARABIC SUMMARY

**حنان فاروق السيد عبد الحافظ و حنان حسين عثمان**
معهد بحوث وقايه النباتات مركز البحوث الزراعيه – الدقي – الجيزه

هدفت الدراسة لالقاء الضوء لدراسه كفاءه مركبين حديثين وهما البيريداريل و ايمامكتين بنزوات( الكونتاكت) وهو احدى مشتقات المنتج الطبيعى ابامكتين لكلا من دودة ورق القطن وفأر الالبينو ودراسه عوامل الامان لكلا من المركبين. وقد اجريت التجارب لحساب التركيز النصف مميت للحشره بعد مرور ٢و٣ و٥ و٧ يوم من معاملة العمراليرقى الثانى والعمر اليرقى الرابع لدوده ورق القطن لكلا من المركبين تحت الظروف المعمليه للتحكم فى درجه الحراره ونسبه الرطوبه. كما تم دراسة تأثير المركبين على بعض الدلائل البيوكيميائيه لفيران التجارب. واظهرت النتائج ان مركب البيرايدريل اكثر سميه من تاثير ايمامكتين بنزوات كما اظهر المركبين تاثيراعلى بعض المظاهر البيولوجية للحشره حيث سبب البيرايدريل نقص فى وزن العذارى ونسبه التعذير وخروج الفراشات الناتجة اكثر من ايمامكتين بنزوات مقارنة بالكنترول و تم تسجيل التغييرات البيوكيمائيه لفار التجارب الابيض حيث سبب البيرايدريل زياده فى الانزيمات الناقلة لمجموعة الأمين واليوريا والكرياتنين بينما احدث نقص فى وزن الفار وكذلك الكبد والكلى والمحتوى البروتينى فى الدم اكثر من ايمامكتين مقارنة بالكنترول . وتحث هذه الدراسة على الاهتمام بمعالجة مشكلة التلوث البيئي ونقترح الاهتمام باستخدام المكافحه الحيويه مثل مركب ايمامكتين بنزوات بالرغم من انه اقل سميه للحشره من البيرايدريل المركب التقليدى ولكنه اكثر امانا ولو انها غير مطلقه الا اننا نقترح زياده من البحث لزياده كفاءه المركبات الحيويه المستخدمه لتقليل استعمال المبيدات الحشرية التقليديه.