

**ECOLOGICAL AND TOXICOLOGICAL STUDY  
ON SOME TERRESTRIAL SNAILS SPECIES**

**Submitted By**

**Walaa Mohamed Moustafa Mousa**

B.Sc . of Agricultural Sciences, Faculty of Agriculture, Cairo University, 2007  
Diploma in Environmental Sciences, Institute of Environmental Studies & Research,  
Ain Shams University, 2014

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## CONTENTS

TITLE	Page
<b>LIST OF TABLES</b> .....	iv
<b>LIST OF FIGERS</b> .....	v
<b>I- INTRODUCTION</b> .....	1
<b>II- REVIEW OF LITERATURE</b> .....	5
1-Ecological studies.....	5
1.1. Effect of some ecological factors on some land snail's <i>Eobania vermiculata</i> and <i>Helicell vestalis</i> .....	5
1.1.1- Effect of soil type and soil moisture.....	5
1.1.2- Effect of food type.....	6
2-Toxicological studies.....	15
2.1- Effects of insecticides on land snails <i>Eobania vermiculata</i> and <i>Helicell vestalis</i> under laboratory conditions.....	15
3- Biochemical impacts of two insecticides on immature stage and adult of <i>Eobania vermiculata</i> .....	28
3.1- Total protein content.....	28
3.2- Glucose content.....	32
3.3- Alkaline phosphatase activity.....	33
<b>III-MATERIALS AND METHODS</b> .....	36
1-Rearing and Source of snails.....	36
2-Ecological studies.....	37

2.1. Effect of some ecological factors on some land snail's <i>Eobania vermiculata</i> and <i>Helicell vestals</i> under laboratory conditions.....	37
2.1.1- Effect of soil type and soil moisture.....	37
2.1.2- Effect of food type .....	37
3-Toxicological studies.....	38
3.1- Effects of two insecticides on two species of land snails <i>Eobania vermiculata</i> and <i>Helicella vestalis</i> under laboratory conditions.....	38
3.1.1-Insecticide used.....	38
3.1.2- Treatment for eggs.....	39
3.1.3-Treatment for different stages.....	40
4- Biochemical impacts of two insecticides on immature stage and adult of <i>Eobania vermiculata</i> .....	41
4.1- Determination of Total protein content.....	41
4.2-Determination of glucose .....	42
4.3- Estimation of Alkaline phosphatase (ALP) activity.....	43
<b>IV- RESULTS AND DISCUSSION.....</b>	45
1- Ecological studies.....	45
1.1- Effect of some ecological factors on some land snail's <i>Eobania vermiculata</i> and <i>Helicella vestalis</i> .....	45
1.1.1- Effect of soil types and soil moisture for adult land snails <i>Eobania vermiculata</i> and <i>Helicelal vestalis</i> under laboratory conditions.....	45
1.1.2- Effect of food types of <i>Eobania vermiculata</i> and <i>Helicella</i>	

<i>vestalis</i> .....	75
2-Toxicological studies.....	91
2.1- Effects of two insecticides on land snails <i>Eobania</i> <i>vermiculata</i> and <i>Helicella vestalis</i> under laboratory conditions.....	91
3-Biochemical impacts of two insecticides on immature stage and adult of <i>Eobania vermiculata</i> .....	103
3.1- Total protein content.....	103
3.2- Glucose content.....	106
3.3- Alkaline phosphatase activity.....	109
<b>VI-SUMMAY</b> .....	113
<b>VII-REFRENCES</b> .....	120
<b>VIII-ARABIC SUMMARY</b> .....	

## LIST OF TABLES

No	Title	Page
1	Average food consumption gm month <sup>-1</sup> of lettuce leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 30% soil moisture during four months.	46
2	Average food consumption gm month <sup>-1</sup> of lettuce leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 60% soil moisture during four months.	48
3	Average food consumption gm month <sup>-1</sup> of lettuce leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 90% soil moisture during four months.	49
4	Average food consumption gm month <sup>-1</sup> of mint leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 30% soil moisture during four months.	51
5	Average food consumption gm month <sup>-1</sup> of mint leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 60% soil moisture during four months.	52
6	Average food consumption gm month <sup>-1</sup> of mint leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 90% soil moisture during four months.	54
7	Average food consumption gm month <sup>-1</sup> of wheat leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 30% soil moisture during four months.	55
8	Average food consumption gm month <sup>-1</sup> of wheat leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 60% soil moisture during four months.	57
9	Average food consumption gm month <sup>-1</sup> of wheat leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 90% soil moisture during four months.	59
10	Average food consumption gm month <sup>-1</sup> of lettuce leaves for adult of <i>Hellicela vestalis</i> as affected by three types of soil under 30% soil moisture during four months.	61

- 11 Average food consumption gm month<sup>-1</sup> of lettuce leaves for adult of *Hellicela vestalis* as affected by three types of soil under 60% soil moisture during four months. 63
- 12 Average food consumption gm month<sup>-1</sup> of lettuce leaves for adult of *Hellicela vestalis* as affected by three types of soil under 90% soil moisture during four months. 64
- 13 Average food consumption gm month<sup>-1</sup> of mint leaves for adult of *Hellicela vestalis* as affected by three types of soil under 30% soil moisture during four months. 66
- 14 Average food consumption gm month<sup>-1</sup> of mint leaves for adult of *Hellicela vestalis* as affected by three types of soil under 60% soil moisture during four months. 67
- 15 Average food consumption gm month<sup>-1</sup> of mint leaves for adult of *Hellicela vestalis* as affected by three types of soil under 90% soil moisture during four months. 69
- 16 Average food consumption gm month<sup>-1</sup> of wheat leaves for adult of *Hellicela vestalis* as affected by three types of soil under 30% soil moisture during four months. 70
- 17 Average food consumption gm month<sup>-1</sup> of wheat leaves for adult of *Hellicela vestalis* as affected by three types of soil under 60% soil moisture during four months. 72
- 18 Average food consumption gm month<sup>-1</sup> of wheat leaves for adult of *Hellicela vestalis* as affected by three types of soil under 90% soil moisture during four months. 74
- 19 Daily food consumption gm day<sup>-1</sup> of *Eobania vermiculata* snail in non- choice test of food types (vegetable, ornamental and field crops) under laboratory conditions. 76
- 20 Daily food consumption gm day<sup>-1</sup> of *Helicella vestalis* snail in non- choice test of food types (vegetable, ornamental and field crops) under laboratory conditions. 80
- 21 Daily food consumption gm day<sup>-1</sup> of *Eobania vermiculata* snail in free- choice test of food types (vegetable, ornamental and field crops) under laboratory conditions. 84

22	Daily food consumption gm day <sup>-1</sup> and number of <i>Helicella vestalis</i> snail in free-choice test of food types (vegetable, ornamental and field crops) under laboratory conditions.	89
23	Toxicity of Propinb 70% W.P on different stages of <i>Eobania vermiculata</i> under laboratory conditions.	93
24	Toxicity of Propinb 70% W.P on different stages of <i>Helicella vestalis</i> under laboratory conditions.	95
25	Toxicity of Protecto 9.4%W.P on different stages of <i>Eobania vermiculata</i> under laboratory conditions.	99
26	Toxicity of Protecto 9.4 % W.P on different stages of <i>Helicella vestalis</i> under laboratory conditions.	101
27	Average total protein content of immature stage of <i>Eobania vermiculata</i> as affected by fungicide and bactericidal after one and 72 h under laboratory conditions.	103
28	Average total protein content of adult stage of <i>Eobania vermiculata</i> as affected by fungicide and bactericidal after one and 72 h under laboratory conditions.	105
29	Average glucose content of immature stage of <i>Eobania vermiculata</i> as affected by fungicide and bactericidal after one and 72 h under laboratory conditions	107
30	Average glucose content of adult stage of <i>Eobania vermiculata</i> as affected by fungicide and bactericidal after one and 72h under laboratory conditions	108
31	Average alkaline phosphatase activity of immature stage of <i>Eobania vermiculata</i> as affected by fungicide and bactericidal after one and 72 h under laboratory conditions	110
32	Average alkaline phosphatase activity of adult stage of <i>Eobania vermiculata</i> as affected by fungicide and bactericidal after one and 72 h under laboratory conditions	111

## LIST OF FIGURES

No	Title	Page
1	Average food consumption gm month <sup>-1</sup> of lettuce leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 30% soil moisture during four months.	47
2	Average food consumption gm month <sup>-1</sup> of lettuce leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 60% soil moisture during four months.	48
3	Average food consumption gm month <sup>-1</sup> of lettuce leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 90% soil moisture during four months.	50
4	Average food consumption gm month <sup>-1</sup> of mint leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 30% soil moisture during four months.	51
5	Average food consumption gm month <sup>-1</sup> of mint leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 60% soil moisture during four months.	53
6	Average food consumption gm month <sup>-1</sup> of mint leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 90% soil moisture during four months.	54
7	Average food consumption gm month <sup>-1</sup> of wheat leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 30% soil moisture during four months.	56
8	Average food consumption gm month <sup>-1</sup> of wheat leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 60% soil moisture during four months.	57
9	Average food consumption gm month <sup>-1</sup> of wheat leaves for adult of <i>Eobania vermiculata</i> as affected by three types of soil under 90% soil moisture during four months.	59



- 10 Average food consumption gm month<sup>-1</sup> of lettuce leaves for adult of *Hellicela vestalis* as affected by three types of soil under 30% soil moisture during four months. 61
- 11 Average food consumption gm month<sup>-1</sup> of lettuce leaves for adult of *Hellicela vestalis* as affected by three types of soil under 60% soil moisture during four months. 63
- 12 Average food consumption gm month<sup>-1</sup> of lettuce leaves for adult of *Hellicela vestalis* as affected by three types of soil under 90% soil moisture during four months. 65
- 13 Average food consumption gm month<sup>-1</sup> of mint leaves for adult of *Hellicela vestalis* as affected by three types of soil under 30% soil moisture during four months. 66
- 14 Average food consumption gm month<sup>-1</sup> of mint leaves for adult of *Hellicela vestalis* as affected by three types of soil under 60% soil moisture during four months. 68
- 15 Average food consumption gm month<sup>-1</sup> of mint leaves for adult of *Hellicela vestalis* as affected by three types of soil under 90% soil moisture during four months. 69
- 16 Average food consumption gm month<sup>-1</sup> of wheat leaves for adult of *Hellicela vestalis* as affected by three types of soil under 30% soil moisture during four months. 71
- 17 Average food consumption gm month<sup>-1</sup> of wheat leaves for adult of *Hellicela vestalis* as affected by three types of soil under 60% soil moisture during four months. 72
- 18 Average food consumption gm month<sup>-1</sup> of wheat leaves for adult of *Hellicela vestalis* as affected by three types of soil under 90% soil moisture during four months. 74
- 19 Daily food consumption gm day<sup>-1</sup> of *Eobania vermiculata* snail in non-choice test of vegetable crops under laboratory conditions. 77
- 20 Daily food consumption gm day<sup>-1</sup> of *Eobania vermiculata* snail in non-choice test of ornamental plants under laboratory conditions. 77

21	Daily food consumption gm day <sup>-1</sup> of <i>Eobania vermiculata</i> snail in non-choice test of field crops under laboratory conditions.	78
22	Daily food consumption gm day <sup>-1</sup> of <i>Helicella vestalis</i> snail in non-choice test of vegetable crops under laboratory conditions.	80
23	Daily food consumption gm day <sup>-1</sup> of <i>Helicella vestalis</i> snail in non-choice test of ornamental plants under laboratory conditions.	81
24	Daily food consumption gm day <sup>-1</sup> of <i>Helicella vestalis</i> snail in non-choice test of field crops under laboratory conditions.	81
25	Daily food consumption gm day <sup>-1</sup> of <i>Eobania vermiculata</i> snail in free-choice test of vegetable crops under laboratory conditions.	85
26	Daily food consumption gm day <sup>-1</sup> of <i>Eobania vermiculata</i> snail in free-choice test of ornamental plants under laboratory conditions.	85
27	Daily food consumption gm day <sup>-1</sup> of <i>Eobania vermiculata</i> snail in free-choice test of field crops under laboratory conditions.	86
28	Daily food consumption gm day <sup>-1</sup> and number of <i>Helicella vestalis</i> snail in free choice test of vegetable crops under laboratory conditions.	90
29	Daily food consumption gm day <sup>-1</sup> and number of <i>Helicella vestalis</i> snail in free choice test of ornamental plants under laboratory conditions.	90
30	Daily food consumption gm day <sup>-1</sup> and number of <i>Helicella vestalis</i> snail in free choice test of field crops under laboratory conditions.	91
31	Toxicity of Propinb 70% W.P on different stages of <i>Eobania vermiculata</i> under laboratory conditions.	94
32	Toxicity of Propinb 70% W.P on different stages of <i>Helicella vestalis</i> under laboratory conditions.	96
33	Toxicity of Protecto 9.4 % W.P on different stages of <i>Eobania vermiculata</i> under laboratory conditions.	100

34	Toxicity of Protecto 9.4 % W.P on different stages of <i>Helicella vestalis</i> under laboratory conditions.	102
35	Average total protein content of immature stage of <i>Eobania vermiculata</i> as affected by fungicide and bactericidal after one and 72 h under laboratory conditions.	104
36	Average total protein content of adult stage of <i>Eobania vermiculata</i> as affected by fungicide and bactericidal after one and 72 h under laboratory conditions.	106
37	Average glucose content of immature stage of <i>Eobania vermiculata</i> as affected by fungicide and bactericidal after one and 72 h under laboratory conditions.	108
38	Average glucose content of adult stage of <i>Eobania vermiculata</i> as affected by fungicide and bactericidal after one and 72 h under laboratory conditions.	109
39	Average alkaline phosphatase activity of immature stage of <i>Eobania vermiculata</i> as affected by fungicide and bactericidal after one and 72 h under laboratory conditions	111
40	Average alkaline phosphatase activity of adult stage of <i>Eobania vermiculata</i> as affected by fungicide and bactericidal after one and 72 h under laboratory conditions.	112

## ABSTRACT

**Walaa Mohamed Moustafa Mousa: Ecological and Toxicological Study On Some Terrestrial Snails Species. Unpublished M.Sc. Thesis, Institute of Environmental Studies & Research, Ain Shams University, 2019.**

Ecological studies indicated that, type of soil and soil moisture playing an important role of increase or decrease the food consumption, whereas, lettuce leaves for adult of *E. vermiculata* at 60% soil moisture in clay soil was recorded highly food consumption at December with an average  $135.6 \pm 4.35$  gm month<sup>-1</sup> followed by November, January and February  $133.64 \pm 4.06$ ,  $123.78 \pm 3.68$  and  $115.32 \pm 3.17$  gm month<sup>-1</sup> respectively, while at 30% soil moisture in sand soil was recorded the lowest food consumption  $98.64 \pm 1.64$  gm month<sup>-1</sup>. While used 90% soil moisture, Food consumption were slightly high in clay soil in November and December with an average  $125.38 \pm 3.26$ ,  $125.36 \pm 5.55$  gm month<sup>-1</sup>. For mint leaves at 30% soil moisture, the highest food consumption was recorded at November and December in clay soil  $43.06 \pm 3.75$  and  $40.88 \pm 2.58$  gm month<sup>-1</sup>, respectively, then peat soil the food consumption was recorded  $33.58 \pm 2.66$  and  $35.44 \pm 2.75$  gm month<sup>-1</sup>, respectively. While in 60% was recorded the highest food consumption in clay soil  $46.84 \pm 4.06$  gm month<sup>-1</sup>, following at November, January and February were recorded  $45.04 \pm 7.14$ ,  $41.66 \pm 4.07$  and  $32.84 \pm 4.47$  gm month<sup>-1</sup>, respectively. In 90% soil moisture was recorded the lowest food consumption in sand soil  $26.72 \pm 4.59$  gm month<sup>-1</sup>. For wheat leaves, results, were recorded no significant differences between three type of soil during different months, in 30% soil moisture was recorded highest food consumption at February in clay soil  $16.12 \pm 1.23$  gm month<sup>-1</sup> following peat and sand soil with an average  $14.60 \pm 1.28$  and  $14.10 \pm 1.57$  gm. / month. In 60% soil moisture at November, the highest food consumption was in clay soil  $18 \pm 0.5$  gm month<sup>-1</sup> then

peat and sand soil were  $16.80 \pm 0.88$  and  $15.80 \pm 0.73$  gm month<sup>-1</sup>, respectively. In 90% was recorded the lowest food consumption in sand soil at February  $13.98 \pm 1.45$  gm month<sup>-1</sup>.

For adult of snail *H. vestalis*, lettuce leaves in 30% soil moisture at December there was highly significant differences between sand soil comparing with peat and clay soil with an average  $124 \pm 3.12$ ,  $118.02 \pm 6.60$  and  $113.64 \pm 4.46$  gm month<sup>-1</sup> respectively. In 60 % at December no significant differences between sand and peat soil comparing with clay soil with an average  $139.38 \pm 5.47$  and  $136.02 \pm 79$  gm month<sup>-1</sup> respectively, but in clay soil the lowest food consumption  $123.10 \pm 6.84$  gm month<sup>-1</sup>. While the lowest food consumption was recorded in clay soil at January and February with an average  $99.36 \pm 6.64$  and  $93.72 \pm 5.48$  gm month<sup>-1</sup> in 90% soil moisture. For mint leaves in 30% soil moisture was recorded the lowest food consumption at February in clay soil with an average  $20.38 \pm 1.06$  gm month<sup>-1</sup>. In 60% soil moisture at November, sand soil was recorded the highest food consumption  $35.78 \pm 3.23$  gm month<sup>-1</sup> comparing with peat and clay soil with an average,  $29.44 \pm 1.57$  and  $28.40 \pm 1.17$  gm month<sup>-1</sup> respectively. while at February no significant differences between three types of soil but in sand is considered slightly high of food consumption  $27.22 \pm 2.86$  gm month<sup>-1</sup> comparing with peat and clay  $24.34 \pm 3.87$  and  $22.56 \pm 2.06$  gm month<sup>-1</sup> respectively, in 90% soil moisture. For wheat leaves the lowest food consumption was recorded in clay soil  $10.94 \pm 0.81$  gm month<sup>-1</sup> at February in 30% soil moisture while in 60% at December the highest food consumption was recorded in sand soil  $17.66 \pm 1.75$  gm month<sup>-1</sup>, but in 90% the lowest food consumption was recorded in clay soil at February  $10.86 \pm 0.48$  gm month<sup>-1</sup>.

On the other hand, daily food consumption during 10 days for *E. vermiculata* and *H. vestalis* in non-choice test under laboratory conditions. In *E. vermiculata* snails showed that, the highest values of

daily food consumption on lettuce and cabbage leaves,  $4.37 \pm 0.38$  and  $3.22 \pm 0.40$  gm day<sup>-1</sup> respectively. The lowest values of food consumption of vegetable crops were  $2.28 \pm 0.24$  gm day<sup>-1</sup> when snails fed on watercress leaves, while in ornamental plants was recorded the lowest values  $0.84 \pm 0.14$  gm day<sup>-1</sup> on mint leaves, but in field crops barley leaves was recorded the lowest food consumption with an average  $0.91 \pm 0.2$  gm day<sup>-1</sup> but regarding *H. vestalis* snail, also showed that, the highest values of daily food consumption on lettuce and cabbage leaves  $3.81 \pm 0.60$  and  $3.42 \pm 0.07$  gm day<sup>-1</sup> respectively. Also, in ornamental plants, mint was recorded the lowest values of daily food consumption  $0.94 \pm 0.27$  gm day<sup>-1</sup> and in field crops barley was recorded the lowest daily food consumption  $0.91 \pm 0.34$  gm day<sup>-1</sup>.

Concerning with food consumption in free-choice test of *E. vermiculata* was illustrated that, in vegetable crops lettuce leaves followed by cabbage leaves were recorded highly food consumption  $3.73 \pm 1.13$  and  $2.61 \pm 0.19$  gm day<sup>-1</sup> respectively, while in ornamental plants, thyme leaves was recorded the lowest food consumption  $0.71 \pm 0.09$  gm day<sup>-1</sup> but, in field crops also, barley leaves was recorded the lowest food consumption  $0.21 \pm 0.05$  gm day<sup>-1</sup>, in free-choice test of *H. vestalis* was conducted that, lettuce and cabbage leaves were recorded the highest daily food consumption  $4.20 \pm 0.65$  and  $3.40 \pm 0.32$  gm day<sup>-1</sup>, but in ornamental plant and field crops, thyme and barley leaves were recorded the lowest food consumption  $0.76 \pm 0.12$  and  $0.20 \pm 0.12$  gm day<sup>-1</sup> respectively.

The Effects of bio insecticides on land snails of fungicide (propineb 70% W.P) and bio insecticides (Protecto 9.4% W.P) under laboratory conditions at different concentrations against eggs and immature stages and adult stage of *Eobania vermiculata* and *Helicella vestalis* by using leaf dipping technique under laboratory conditions revealed that, eggs was more sensitive to propineb 70%, since *H. vestalis* recorded higher mortality percentage compared to *E.*

*vermiculata*. At the concentrations 0.1, 0.2, 0.3 and 0.4 %, with LC<sub>50</sub> values 0.17 and 0.19%, respectively. Regarding immature stages (one week) also, *H. vestalis* recorded higher mortality percentage than *E.vermiculata* 23, 40, 73 and 97% and 20, 33, 70 and 93% respectively at concentrations 0.2, 0.4 0.6 and 0.8%. But for four weeks' age was more sensitive than eight weeks and adult. Protecto 9.4% W.P also, eggs were more susceptible than immature stages and adult. A high mortality percentage was recorded to *H. vestalis* compared to *E. vermiculata* (20, 33.30, 70 and 76.70%) and (10, 30, 60 and 70%) respectively while for immature stages (one week) also, it was more sensitive than four, eight weeks and adult for *H. vestalis* compared to *E. vermiculata*.

Biochemical effects of fungicide (propineb70% W.P) and bactericide (Protecto 9.4% W.P) on immature stage and adult *Eobania vermiculata*, on total protein content, effect of sub-lethal concentration (1/4 Lc<sub>50</sub>) of the two tested compounds on the total protein in immature and adults stage of *E. vermiculata* land snail showed that, Fungicide (Propineb 70% W.P) treatment increased total protein with 333.33 and 327.77 % after one and 72 hours in comparison with control. On the other side bio insecticides (Protecto) increased total protein by 644.44 and 727.77 % than control after one and 72 hours from treatment in immature stage respectively, Fungicide treatment high significant decreased total protein with -39.28 % after 1 hour while non-significant increase with 82.14 % 72 hours after treatment, respectively. On the other side bio insecticides compound non-significant increased total protein by -3.32 and -6.06 % compared with the control after 1 and 72 hours of treatment. While on glucose, results cleared that, glucose level significantly increased by fungicide (Propineb 70% W.P) and bio insecticides pesticides (Protecto) treatments with difference percentage 222.22% and 277.77 % after one and 72 hours after treatment by bio insecticides

(Protecto). Whereas on alkaline phosphatase activity results indicated that, the maximum reduction of acid and alkaline phosphatase enzyme (ALP) activity occurred after fungicide (Propineb 70% W.P) and bio insecticides pesticides (Protecto) treatments immature stage *E. vermiculata* with the different percentage -30.73 % and 4.76 % after one hours post treatment for each compound respectively, but non-significant change after 72 hours after treatment.

**Key words:** Terrestrial snails, *Eobania vermiculata*, *Helicella vestalis* , type of soil, soil moisture, Vegetable crops, Ornamental plants, Field crops, fungicide, bio insecticides, total protein, glucose, alkaline phosphatase.