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STUDY REGARDING THE INFLUENCE OF ROYAL INSECTICIDE ON SOME PHYSIOLOGICAL INDEXES AT *CARASSIUS AURATUS GIBELIO* BLOCH L. 1758

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Abstract
The main objective of this study is to see how the royal insecticide influences the energetic metabolism, the breathing rhythm, the blood sugar and the number of red blood cells at the Prussian carp individuals. Experimental samples were subjected to under-lethal concentrations of 0.00125, 0.0025 and 0.005 ml/l royal insecticide from 24 to 336 hours. The physiologic parameter with the highest growth rate was the oxygen consumption, which, at the concentration of 0.005 ml/l grew by 50.81% in 168 hours, compared to the witness values, registering the value of 216.66 ml oxygen/kilo/hour compared to 143.66 oxygen ml/kilo/hour. The blood sugar was the single physiological biomarker which decreased, so that the lowest value was 48 mg/dl, 29.62% approximately lower compared to the witness value (68.2 mg/dl) at a concentration of 0.00125 ml/l.

Keywords: physiological indices, exposure time, concentration, poikilothermic.

1. INTRODUCTION

Water represents a good without which life on Earth would not exist. The bad influence on the water quality is due to the industrial and urban waste water, the agricultural pollution consisting of extremely toxic insecticides and fungicides, from fertilizers and animal waste. The most toxic effects are produced by the nitrates, the fluorides, the toxic metals such as: mercury, arsenic, lead and cadmium, then pesticides, anionic detergents, radioactive waste, with a continuously growing list.

The exceeding of certain concentrations has direct toxic effects on the water fauna (Barnea and Papadopol, 1975).

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A significant danger coming from the agriculture for the pollution of natural waters is represented by the pesticides. Among them, insecticides, acaricides, herbicides, fungicides, algicides are mostly organic components with phosphorus, brimstone, chlorine, iodine, bromine etc. Applied, they destroy or lower the mycoses, bacterioses, viroses and the pests, but they have an extremely negative effect on life in general terms.

These substances carried by the flowing water from the precipitations reach the rivers, tidal rivers and seas, producing a toxic effect on the fishing stock, on the catch or on the house animals which drink the water and finally on the human, by concentrating the substances in the food chain.

We estimate that barely 0.1% of the pesticides that are used on a agricultural field reach the "target" organisms, while 99,9% are dispersed in the environment, thus representing a potential risk for the neighboring ecosystems (Repetto, 1995).

Carefully observing the negative effects of different pesticides, I further propose to see how a product among the pesticides, namely the royal insecticide influences certain physiological parameters at the *Carassius auratus gibelio* individuals.

2. MATERIALS AND METHODS

During this research, individuals from the *Carassius auratus gibelio* Bloch species were used, originating in Oeşti, Cerbureni, Budeasa şi Cătească lakes, with a weight between 3 and 20 kilos.

Preparing the experimental individuals was made such as before the experiment, an acclimation was made (FRY, 1967), with each separate sample at the respective temperature (for a week) (AT=ET).

The temperature during the period of the experiment was between 18-20^{o}C, and the illumination was between 8 and 12 hours.

Thus, in all cases, eventual influences of some factors were avoided, irrespective of the objectives of this experiment. We especially avoided the "negative" influence (from the perspective of an "hypometabolic" effect) of the low concentrations of oxygen in the water, the oxygen consumption being estimated (during the preliminary "optimization" determining experiments) as not to exceed 25-30% from the total existing quantity at the beginning of the experiment.

The individuals used in different experimental variants were selected and sorted on weight categories, in order to avoid or emphasize the effect of the individual factor of the individual weight. Choosing the individuals and creating the experimental samples was carefully made, using just healthy fishes with an adequate condition.

The individuals were ranked in the following samples:

- The witness sample of 10 individuals;
- Sample 1, of 10 individuals under the effect of royal insecticide at a concentration of 0.00125 ml/l;
- Sample 2 consisting of 10 individuals under the action of the royal insecticide with a concentration of 0.0025 ml/l;
- Sample 3 consisting of 10 individuals under the action of royal insecticide with a concentration of 0.005 ml/l;

For each individual in the 13 samples, I determined the oxygen consumption and the breathing rhythm at 24, 48, 72, 96, 168 and 336 hours, and then I counted the red blood cell and determined the blood sugar.

Determining the energy consumption was made using the classic Winkler method or the method of confined space (Picoş and Năstăsescu, 1988).

The evaluation of the breathing rhythm was made using a procedure indicated by de E.A. Pora and Nițu (1952) while contenting the fishes to carry out the Winkler method (Picoş and Năstăsescu,

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1988); successive determination of this index were made (using a chronometer) until 3 close values were obtained (their average representing the breathing rhythm at the moment).
The determination of the blood sugar was made using an Accutrend GCT device which allows the measuring of its value in the blood drop from the caudal artery (Picoş and Năstăsescu, 1988), in a very short time.
The determination of the number of red blood cells was made using a Thoma counting camera using the method described by Picoş and Năstăsescu (1988), from blood from the caudal artery.

3. RESULTS AND DISCUSSIONS

Analyzing the results registered for the oxygen consumption under the influence of the royal insecticide with concentrations of 0.005, 0.0025 and 0.00125 ml/l, compared to the witness sample, we notice the significant growth of the oxygen consumption for each concentration, but the highest is at the concentration of 0.005 ml/l, displayed in figure 1.

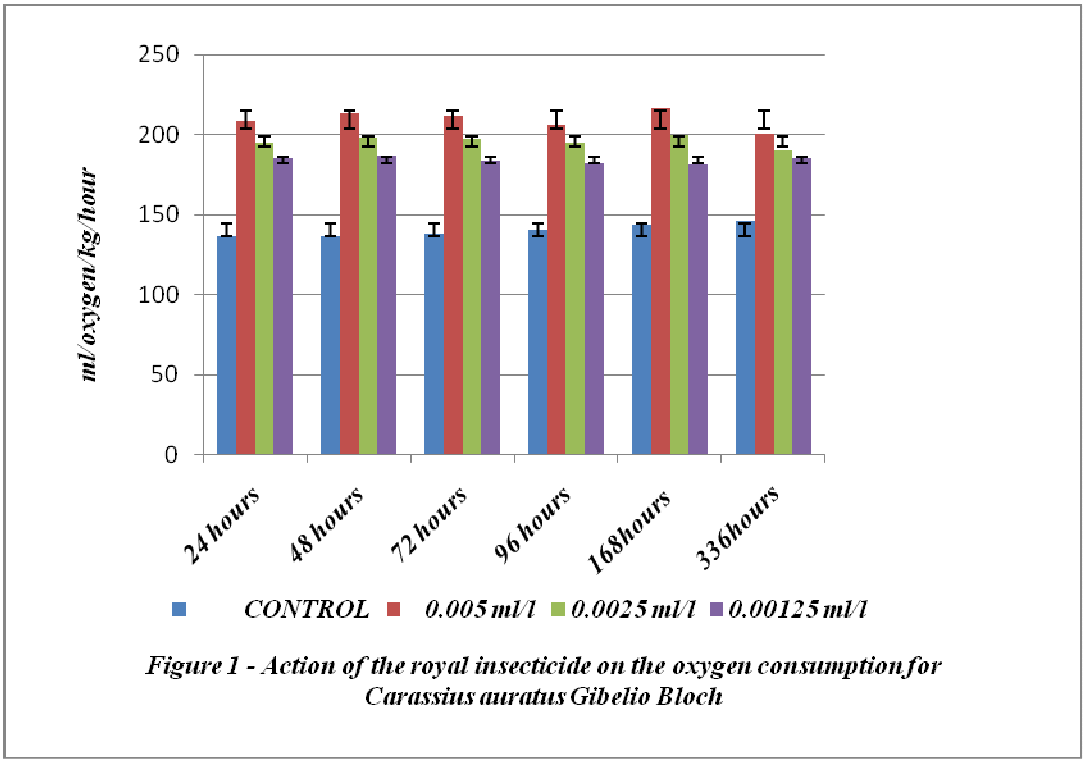

Figure 1 - Action of the royal insecticide on the oxygen consumption for Carassius auratus Gibelio Bloch

At this concentration, the oxygen consumption rose by 50.81% at 168 hours, compared to the witness value, with a value of 216.66 ml oxygen/kg/hour compared to 143.66 ml oxygen/kg/hour.
Oxygen consumption growths under the influence of some insecticides are emphasized in the literature at the Prussian carps exposed to Talstar One insecticide with the first three tested concentrations (0.000625, 0.00125 and 0.0025 ml/water l) displayed growth of the oxygen consumption in the first stage (Ponepal et al., 2010) – with its period between 96 and 24 hours from the exposure, with the most significant intensification of the energetic metabolism being registered after 24 hours from the exposure to insecticide with the concentration of 0.0025 ml/ water l (45.2% higher compared to the value registered before introducing the fishes in the toxic environment).

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Further, we notice that under the action of royal insecticide, the breathing rhythm significantly increases for all the experimented concentrations, but the highest growth happens at the concentration of 0.005 ml/l, displayed in figure 2. At this concentration, the breathing rhythm has increased by 43.30% in 24 hours, compared with the witness value, reaching 92 breaths/minute compared to 64.2 breaths/minute.
The increase in the frequency of the breathing moves represents the fishes' attempt to compensate the decrease in the oxygen quantity in the gills (whose permeability is affected by the insecticide), given the decrease of the oxygen consumption, as I previously mentioned (Ponepal et al., 2006).

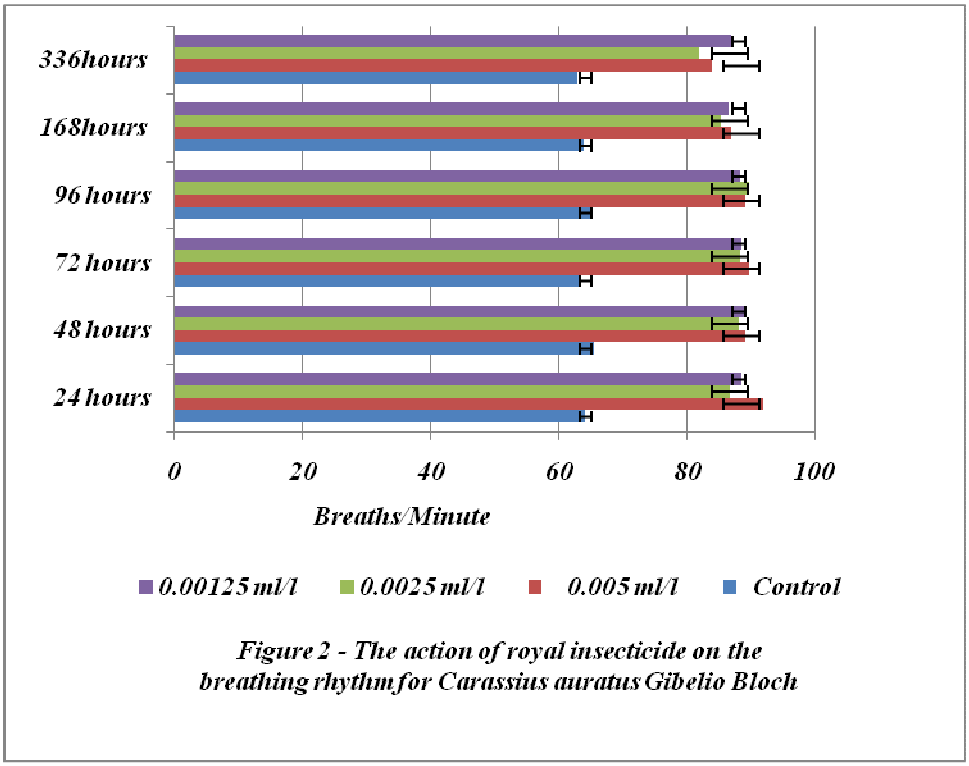

Figure 2 - The action of royal insecticide on the breathing rhythm for Carassius auratus Gibelio Bloch

The blood sugar of the fishes was significantly modified under the action of royal insecticide, with lower values compared to the witness value. The lowest value was 48 mg/dl, with approximately 29.62% lower compared to the witness value (68.2 mg/dl) at a concentration of 0.00125 ml/l fig.3.
Samuel and Sastry (1989) though notice the reduction by 12.7% of the plasma blood sugar for Channa punctatus exposed at 10 mg/l water monocrotophos (insecticide from the same class – organophosphates, such as chlorinepirihpos), a change associated to the decrease in the liver glycogen by 2.4% and the muscular one by 35.4%.
Analyzing the registered results regarding the variation of the red blood cells under the action of the royal insecticide, we notice their significant growth at any concentration, but the highest one is at the concentration of 0.005 ml/l, displayed in figure 4.
At this concentration, the number of red blood cells grew by 40%, compared to the witness value, registering the value of 1540000 red blood cells/ml compared to 1100000 red blood cells/ml.
A similar research on the number of red blood cells under the action of Reldan 40 EC was also carried by Paunescu et al. (2009) on the lake frog (*Rana ridibunda*), at the same time with the decrease in the number of white blood cells.

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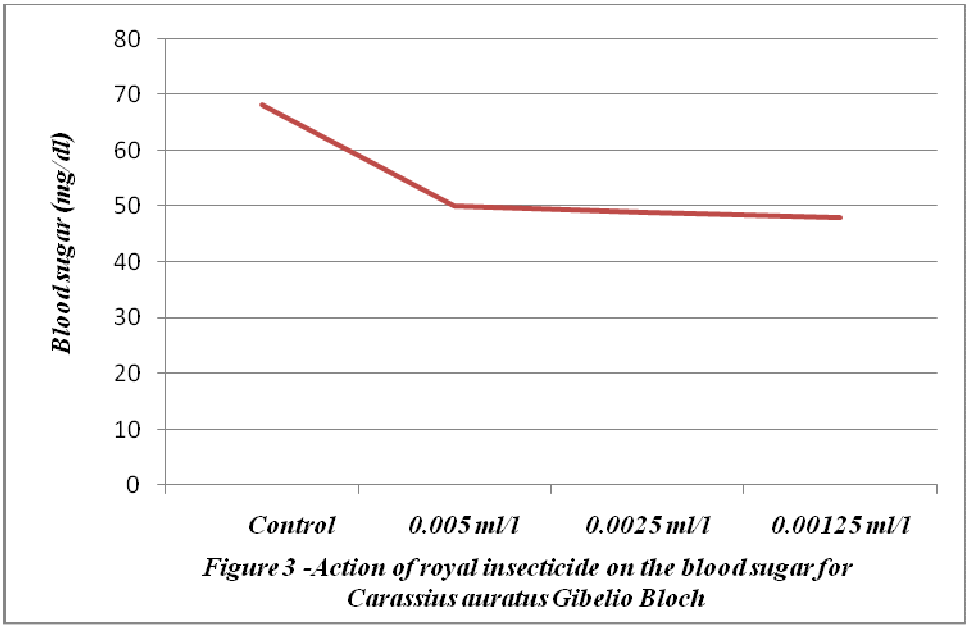

Figure 3 -Action of royal insecticide on the blood sugar for Carassius auratus Gibelio Bloch

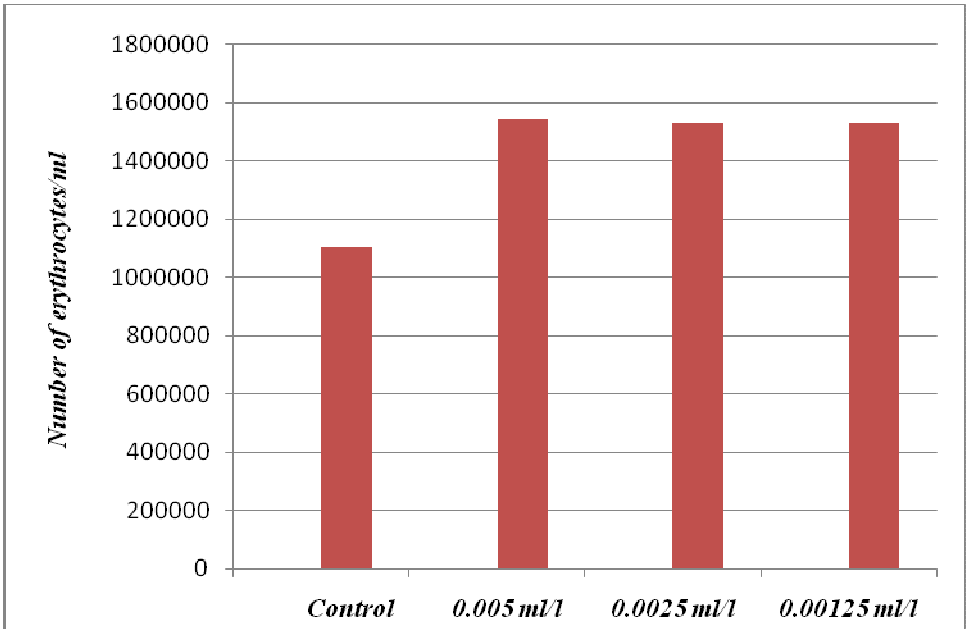

Figure 4 -Action of royal insecticide on the number of red blood cells for Carassius auratus Gibelio Bloch

By correlating the results registered for the oxygen consumption on under the action of analyzed chemical products, we notice that during the experiments, the growth of the oxygen consumption is finally correlated to the growth of the breathing rhythm.

4. CONCLUSIONS

Depending on the percentage variations, the most affected physiological parameter amongst the studied ones was the oxygen consumption, which at the concentration of 0.005 ml/l grew by

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50.81% at 168 hours, compared to the witness value, being 216.66 ml oxygen/kg/hour compared to 143.66 ml oxygen/kg/hour.
In this case, the growth of the oxygen consumption can be associate to the growth of the breathing rhythm, where, at the concentration of 0.005 ml/l, it grew by 43.30% in 24 hours compared to the witness value, being of 92 breaths/minute compared to 64.2 breaths/minute.
From the perspective of the positive variations, the lowest increase was experienced by the number of red blood cells, which grew by 40$ compared to the witness value, with a value of 1540000 red blood cells/ml compared to 1100000 red blood cells/ml at a concentration of 0.005 ml/l royal.
Of all the physiological parameters, the blood sugar was the single physiologic biomarker which decreased, so that the lowest value was 48 mg/dl, approximately 29.62% less compared to the witness value (68.2 mg/dl) at a concentration of 0.00125 ml/l.
Significant changes in the oxygen consumption, the breathing rhythm, the number of red blood cells and the blood sugar for the *Carassius auratus gibelio* individuals under the action of royal insecticide are seen as answers to the stress the insecticide causes.

5. ACKNOWLEDGEMENTS

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