Захист рослин

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BIOLOGICAL ACTIVITY MANGANESE NANO-AQUACHELAT IN AN ARTIFICIAL DIET PODISUS MACULIVENTRIS SAY

Established that the use of beneficial insects nano-aquachelates probable presence of two strategies for implementing protection systems at an early stage action biogenic elements. Against the background of general metabolic activation, optimal concentrations of manganese nano-aquachelat form a protective reaction to reduce the effects of negative influence of abiotic factors. Conversely, high concentrations of manganese nano-aquachelat violate the activation of defence reactions, reduce metabolism Podisus maculiventris Say.

Key words: *genetic resources, industrial cultures, hemocytes, enotsitoides, manganese nano-aquachelat, Podisus maculiventris* Say.

A problem statement

During the past 50 years the study of the biological role of macro- and microelements is one of the topical areas of life sciences. This aspect is closely related with the nanotechnology solution in terms of creating metal-based nano-particles as a new effective treatments and improving the functionality of living organisms taking into account the safety, especially, for people in respect of creating newly products and introducing effective agro technology. Nano-aquachelates normalize the function of the immune system; promote the growth of the total biomass of the population without violating the usual functioning of the body, enhancing humoral regulation through the coordination processes of life during ontogenesis. Created on the basis of nano-aquachelates the environmentally friendly entomological technologies and their application for plant protection contribute to the saving natural resources, effective use and safety of agricultural plant production at their compliance with national and international standards.

The analysis of recent publications

Long-term researches formed the artificial populations of useful types of different genotypes. It was found out that the genetic structure of the artificially formed population limits its heterogeneity and viability. On a background the optimal action of stress abiotic and biotic factors adaptive micropopulations are created with the set proof properties [4, 5, 6]. One of factors of influence on the population of useful kinds is trophic one. It is set that the heterogeneous feeding in the diets of useful kinds allows

to educe high expression of genes comparatively with influence of factors of age and morphological signs [1, 2, 5].

Important to say, the intensive development of nanotechnology leads to the biosphere different nature of synthetic nanomaterials. Assess their effects on the position of entomophagous environmental safety is important. As shown monitoring studies, it is important to estimate the toxicological properties of nanomaterials themselves as well as their derivatives in the form of ionic and molecular compounds formed by the interaction of both pure reagents and components of the biosphere. In the process of experimental research on cultures of beneficial insects brought perspectives of nano- aquachelates [6]. The synthesis of citrate significantly cheaper metals and chemical products makes it possible to obtain the required purity in the form of aqueous solutions. Their concentrations vary widely depending on the process parameters. The use of nanotechnology at an early stage to obtain nano-aquachelates can achieve their high purity with no secondary contaminants because not used traditional chemical reactions. In the final product as there are no nanoparticles because they are immediately after receiving react with clean food acids, including citric. The usage of deionized water and pure metals are a guarantee of their ecological and biological safety.

For maintenance of the optimized typical cultures of useful kinds we offer the nanocorrection of rations of natural and synthetic diets. In the process of the use of nanotechnologies we set reactions of populations of useful silkworms and zoophags on influence of abiotic and biotic factors from position of genetic and ecological conformities of development [7]. With the use of nanotechnologies adaptive micropopulation we formed *Antheraea pernyi* Guerin-Meneville (Lepidoptera: Saturniidae), *Chouioia cunea* Jang. (Hymenoptera: Eulophidae, Tetrastichinae), *Macrolophus nubilis* H.S. (Hemiptera: Miridae), *Ambliseulus brevispinis* Kennett.(Parasitiformes: Phytoseiidae), *Phytoseiulus persimilis* Ath.-Henr. (Parasitiformes: Phytoseiidae), *Orius leavigatus* Fieb. and *Orius niger* Wolff. (Hemiptera, Anthocoridae), that differ from paternal populations by physiology and etology properties[4,6]. With the use of nanotechnologies individual of population positively react on the change of abiotic and biotic factors, and during realization of the technological programs more competitive comparatively with a biological feedstock. At the use of nanotechnologies we educed changes of physiology and biochemical processes, that provide firmness and functionality in the changeable ecological terms of individuals of micropopulation *Antheraea pernyi* Guerin-Meneville, *Chouioia cunea* Jang., *Macrolophus nubilis* H.S., *Ambliseulus brevispinis* Kennett., *Phytoseiulus persimilis* Ath.-Henr., *Orius leavigatus* Fieb. and *Orius niger* Wolff. [3, 4, 5, 6].

We found modification and restrictive factors by means of nanotechnologies that allowed in desirable direction to influence on tolerance, spatially-otological structure, optimize forming of difficult and inadequate mutual relations between the individuals

of micro population. It is experimentally well-proven that forming of adaptive micro population of useful kinds and their optimization will assist the balanced use, maintenance of genetic and biological resources, ecological equilibrium in an ecosystem [1, 2, 6].

Purpose, objects and methods of research

Laboratory population Podisus maculiventris Say. was cultivated on the experimental base of the National University of Life and Environmental Sciences of Ukraine in accordance with biological characteristics of the species.

Artificial food was natural replacement feed. This environment consisted primarily of cattle meat and sucrose solution. During the experimental trials, the addition of ascorbic acid, salt mixture, chicken yolk was found improving nutritional value to *Podisus maculiventris* Say. Thus, the environment used for experiments consisted of: 200 g beef liver, 200 g of fatty beef (containing about 15 g a lot of fat on fresh weight), 24 ml of sucrose (5 %), 1 g ascorbic acid, Wesson salt 2 g and 20 g of fresh egg yolk. All the ingredients are mixed in a blender, until smooth. Stored in a mode of deep-frozen (-20 ^{0}C) in small foil packets. If you're on an artificial diet feeding larvae and imago we placed in plastic containers (18 x 11 x 6 cm and 24 x 16 x 8 cm, respectively). The larvae were placed in abundance and replenished daily. Water is fed through the soaked paper in a plastic saucer (2,5 cm diameter).

The larvae of the first age that has just hatched four repetitions of 10 individuals were placed in ventilated disc Petri dish (9x1,5 cm), and the achievement of the 4th century, nymphs were placed in a large Petri dishes (14x2 cm). Humidity was maintained at 80%. Development held twice a day, the presence ekzuviyu was used to determine molting. Control of survival in the larval stage and performance imago performed once per day. Fine *Podisus maculiventris* Say. grown on an artificial diet was studied from the second generation. To study the dynamics of females laying eggs placed individually in Petri dishes (14x2 cm) of filter paper. Every day spent record deferred eggs. To avoid cannibalism egg, eggs were taken from Petri dishes and accounted. Fertility and viability females reared on artificial diet studied individually for each individual. In experimental versions of an artificial diet for *Podisus maculiventris* Say. optimal doses and added nano-aquachelat complex biogenic manganese 0,00005 – 0,0005 % concentration. Control animals *Podisus maculiventris* Say. grown larvae in *Galleria mellonella* L. The experiments were conducted in klimochamber a temperature 24±1^{0}C, humidity 75±5 % and photoperiod 16 hours.

The study aims to:

Study the possibility of using manganese nano-aquachelat correction lifecycle *Podisus maculiventris Say*.

To achieve this goal settled the following tasks:

To conduct a retrospective analysis of environmental conditions and their joint actions manganese nano-aquachelat life cycle *Podisus maculiventris* Say.

Results and discussion

Established that the use of beneficial insects nano-aquachelates probable presence of two strategies for implementing protection systems at an early stage action biogenic elements. Against the background of general metabolic activation, optimal concentrations of manganese nano-aquachelat form a protective reaction to reduce the effects of negative influence of abiotic factors. Conversely, high concentrations of manganese nano-aquachelat violate the activation of defence reactions, reduce metabolism *Podisus maculiventris* Say.

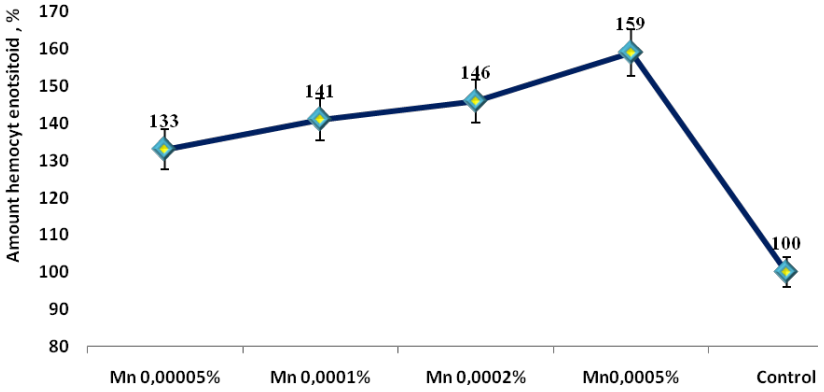

Figure 1. **Effect of manganese nano-aquachelat on the formation of nonspecific immunity of fourth age larvae Podisus maculiventris Say. (average for five generations)**

According to the data presented in Figure 1, under manganese nanoakvatsytrat larvae fourth age *Podisus maculiventris* Say. formed ontogenetic differences in the implementation of protective reactions. With increased concentration of manganese in nanoakvatsytratu artificial diet in the larval hemolymph fourth age increases fate hemocyte enotsitoid who perform phagocytic function and influence the formation of specific immunity *Podisus maculiventris* Say. Availability adaptive response in the fourth age larvae *Podisus maculiventris* Say. allows for the existence of specific and long-term biochemical defense reactions. These processes are related to ontogenetic particularities *Podisus maculiventris* Say., as for the physiological functionality larva differs from adults.

Longer life larvae, depending on their immunity to the negative impact of environmental factors. Our studies refute the idea of an insurmountable border between innate and adaptive protective system beneficial insects [1, 2, 3, 6].

The effects of manganese nanoakvatsytrat in an artificial diet for larvae viability of

forming the fourth age *Podisus maculiventris* Say. shown in Figure 2. According to the results, the minimum sustainability indicators fourth age larvae *Podisus maculiventris* Say. watched in research variant (67 %), where the number manganese nanoakvatsytrat in artificial diet was 0,0005 %, which is 4 percent less than in the control variant.

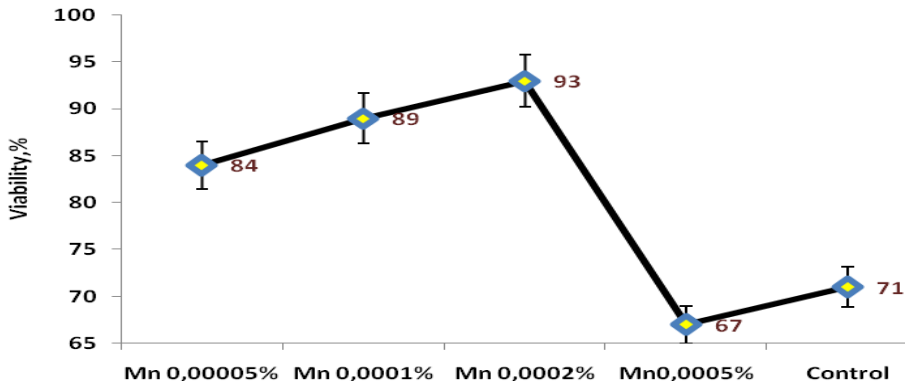

Figure 2. **Effect of manganese nano-aquachelat in an artificial diet for larvae viability of forming the fourth age Podisus maculiventris Say. (average for 2012-2014 years)**

The most marked in the sustainability indices introduced in artificial diet manganese nanoakvatsytrat 0,0001–0,0002% – concentration, respectively 89% and 93 %, which is 18 and 22 percent compared with a control option. The results are an important proof of ontogenetic mechanisms of biochemical protective mechanisms in larvae of the fourth age *Podisus maculiventris* Say. According to the research concluded that manganese nanoakvatsytrat provides adaptive plasticity during development postembryonic *Podisus maculiventris* Say. In-depth study of these processes may alter the overall picture of the biochemical mechanisms of resistance beneficial insects to adverse environmental factors in their feeding on artificial diet in laboratory and industrial conditions.

Conclusions and perspective of further researches

1) When using manganese nano-aquachelat in an artificial diet set ontogenetic changes in the body *Podisus maculiventris* Say. and the possibility of their use for the diagnosis of a physiological state population. 2) Ontogenesis *Podisus maculiventris* Say. are critical periods metamorphosis characterized the restructuring of many functional systems and increased sensitivity of these systems to external influences. 3) Biological activity manganese nano-aquachelat in an artificial diet *Podisus maculiventris* Say. expressed in changing morphogenetic processes that correlate with their vitality and resistance to environmental factors. 4) Using manganese nano-

aquachelat in an artificial diet *Podisus maculiventris* Say. strengthening plazmocytic possible phagocytosis, which is the basis of cellular immunity beneficial insects.

A few drugs based on derivatives of nano-aquachelates included copper, cobalt, zinc, magnesium, manganese and water-containing raw materials as well as fullerene nano-particles of vanadium together with vitamin E are proposed for adding to the feed insects and zoophages.

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