SECȚIUNEA I

A. Biodiversitatea organismelor dăunătoare şi benefice în ecosistemele naturale şi antropizate şi rolul lor în reglarea biocenotică a densității populațiilor organismelor dăunătoare

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MASS REARING OF *TENEBRIO MOLITOR* (*Coleoptera*: *tenebrionidae*)

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Summary. Currently, the market for edible insects is being formed in the European Union and other economically developed countries. In particular, this applies to the yellow mealworm. We have proposed a technology for the mass breeding of this insect. This technology does not require significant equipment costs and can be quickly implemented. Research methods - systematic and experimental approaches.

Keywords: *edible insects, yellow mealworm, technology, mass rearing*

Introduction. Currently, in economically developed countries, the issue of production, marketing and human consumption of so-called edible insects, that is, insects suitable for human consumption, has become actual. Thus, in 2021, for the first time in the European Union, an insect, namely a mealworm, is allowed for production and sale for human consumption as food [1]. Since 2022, the European Commission has allowed the production and sale of crickets as food [2].

Compared to livestock, insect farming is associated with low greenhouse gas emissions, low land-based activity, low ammonia emissions, and efficient conversion of dietary protein [3].

The above circumstances determine the current request of society to researchers and enterprises specializing in the mass rearing of insects, in particular, the yellow mealworm (*Tenebrio molitor* Linnaeus, 1758).

Materials and methods. The rearing technology of *T. molitor* is described in [4]. We, in turn, set the goal of creating a technology that is maximally adapted to the conditions of Ukrainian manufacturers. Research methods - systematic and experimental approaches.

Results and discussions. The mass rearing technology we have developed for *T. molitor* is based on a cage system. The cages contain both adult insects during the laying of eggs and developing larvae. Cages of 60×50×25 cm are used for keeping larvae and adults (Fig. 1). This size of the cage is convenient for use, in addition, the sufficient depth of the cage prevents the escape of adults or larvae.

The cages can be made of wood or high density polyethylene. Cages are placed in racks. The bottom of the cage is made as a screen. The cell size in the egg-laying cage is 0,75 mm. In cages for growing larvae – 0,5 mm, 0,75 mm and 1 mm. In the cages, food for adults or larvae is placed - wheat bran and food additives: chopped vegetables (potatoes, carrots and cabbage).

The screen allows flour particles to fall through. The addition of nutritional supplements significantly improves development time, larval survival, food conversion efficiency, and adult fecundity. Adult insects and larvae are kept at a temperature of 25-28°C. Relative humidity is 70-90%.

To provide water to adult insects or larvae, it is necessary to spray.

Figure 1. The cage for mass rearing of *T. molitor*

The density of adults is 1 individual per 1 cm^2. The density of larvae is 1 individual per 1,5 cm^2.The egg-laying cage is placed on top of the larval rearing cage. The movement of insects in the upper cage leads to the fact that food particles through the screen fall into the lower cage.

Also, the larvae that emerge from the eggs enter the lower cage. The cage for laying eggs with insects moves every 5 days - it is installed on a new cage for breeding larvae.

The contents of the cage for growing larvae are sieved every 7 days through a screen with a mesh size of 0,5 mm, 0,75 mm and 1 mm. The larvae are distributed to other cages according to size. Further, different fractions are grown. After the next 7 days, sieving is carried out again through screens with three different mesh sizes. Such actions are repeated until the larvae turn into pupae.

Conclusions. The technology of mass rearing of the yellow flour worm is proposed. This technology does not require complex equipment and significant costs for it and can be quickly implemented. All processes can be performed without significant costs for mechanization and automation. The yellow mealworm mass rearing technology can be quickly deployed and mastered by staff.

References:

1. EU greenlights first insect food products made from yellow mealworm. URL: https://www.foodingredientsfirst.com/news/eu-greenlights-authorization-of-the-first-insect-food-products-made-from-yellow-mealworm.html.
2. EU insect sector predicts expansion of products containing newly authorized crickets and yellow mealworms. URL: https://www.foodingredientsfirst.com/news/eu-insect-sector-predicts-expansion-of-products-containing-newly-authorized-crickets-and-yellow-mealworms.html.
3. Sánchez-Muros M.J., Barroso F.G., de Haro C. Brief Summary of Insect Usage as an Industrial Animal Feed/Feed Ingredient. *Insects as Sustainable Food Ingredients* / Ed. A. T. Dossey, J. A. Morales-Ramos, M. G. Rojas . London: Academic Press is an imprint of Elsevier, 2016. P. 273–309.
4. Morales-Ramos J.A., Rojas M.G., Kay S., Shapiro-Ilan W.L., Tedders W.L. Impact of adult weight, density, and age on reproduction of *Tenebrio molitor* (Coleoptera: Tenebrionidae). *J. Entomol. Sci.* 2012. Vol. 47. P. 208–220.