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Determination of Laboratory Feeding Dose of Gipsy-Moth *(Lymantria dispar* L.*)*

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Abstract: ***This article outlines laboratory feeding dose of gipsy-moth taken from population developed in nuciferous plantations in mountainous conditions of Uzbekistan. Revealed hereby the data concerning evaluation of feeding dose for each age. Laboratory experiments were conducted on worm feeding with apple-tree Siversa.***

Keywords: gipsy-moth, worm, overeating, feeding dose, feeding plant, apple tree Siversa.

1. Introduction

In forest ecosystem of nuciferous plantations of the Republic of Uzbekistan one of the most wide-spread flea-beetles is gipsy-moth. In recent years a huge increase in gipsy-moth amount has caused to considerable damage in these valuable plantations. In the result of overeating of leaves by the worms of this pest the most parts of nuciculture harvest were lost following abundant economic damage in forest economy.

Developing massively the pest spreads over a large area of forest causing a damage which in its turn leads to yield decline of nuciferous plantations to 45 - 55%, frequent overeating of leaves during years resulted in forests turning into desiccation.

This harmfulness character of gipsy-moth draws greater attention of researchers and forest-protectors.

On gipsy-moth there is data in research works in Uzbekistan published in different times [1, 2, 3, 4], which investigated outburst population of pests in piedmont regions, and also in low forest areas of Chatkal and Turkestan ridges.

For the determination of feeding dose of gipsy-moth in natural population it is required to know theoretical (laboratory) feeding doses in advance, that is, feed amount, which kills one worm while abundant feeding in whole time of its growth and development.

For the organization of control, recording and forecasting of flea-beetle insects amount the works of A.I.Ilinskiy [2], have been applied.

2. Methods of research

For the determination of laboratory feeding dose were collected ovipositors of gipsy-moth from natural pest population. In laboratory condition under + 24ºC air temperature and relative air moisture of 60% young worms appeared in ovipositors in April 2016. Gipsy-moth worms were kept in nursery on cut branches of apple tree Siversa to get research results. The worms of each age contained 20 pieces in a group in 5 repetitions that allowed to evaluating easily feeding dose for each age.

3. Results and discussion

During the research conducted on the study of laboratory feeding dose in the nutrition of gipsy-moth worm from the I age to VI age were introduced weight category for damaged and undamaged leaves of apple tree Siversa in practice. Mass loss of leaves in the result of worm feeding was identified by weighing 50 damaged and undamaged leaves. At the beginning the weighing of 50 leaves was performed, then a mean weight of one leaf was determined. Difference between the weight of damaged and undamaged leaves showed the mass which is lost by the damage of worms in a particular age. Research results are shown in table.

Table: Average weight of 50 pieces of damaged and undamaged leaves of apple tree Siversa

Worm age	Worm quantity in actual (pcs.)	Indicators						
		Quantity of weighed undamaged leaves (pcs)	Average weight of 50pcs of undamaged leaves (*g*)	Average weight of 1 undamaged leaf (*g*)	Quantity of weighed damaged leaves (pcs)	Average weight of 50pcs of damaged leaves (*g*)	Average weight of 1 damaged leaf (*g*)	Loss in the weight of one leaf (*g*)
IV	100	65	70,0	1,49	72	13,5	0,27	0,21
V-VI	100	65	71,3	1,50	70	5,25	0,11	1,39

According to table analysis it should be noted that the loss in the weight of one leaf by overfeeding the worms of different I-II ages made 0,76 *g*, in feeding the worms of V-VI ages it made 1,39 *g*.

By dividing the amount of damaged leaves by the amount of worms, we can obtain the number of leaves damaged by one worm. A mean loss in the weight of one leaf by worms of I and II age constituted 0,76 *g*. Identification of the loss in leaves weight damaged by one worm allowed to determine feeding norm for the worms of I and II ages. In this case it is equal to 0,486 *g*. Through this method we determined

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feeding dose of worm of III, IV and V age. By each age it made 0,617 *g*, 0,871 *g* and 0,973 *g* relatively. In this way feeding dose is sum up from the amount of feeding dose by worm age with the help of formula:

$$\textbf{К.Н.}_{\textbf{total by age}}\textbf{= К.Н.}_{\textbf{LI-II}}\textbf{ + К.Н.}_{\textbf{LIII}}\textbf{ + К.Н.}_{\textbf{LIV}}\textbf{ + К.Н.}_{\textbf{LV}}\textbf{=}$$
$$\textbf{= 0,486+0,617+0,871+0,973 = 2,945 } \boldsymbol{g}\textbf{.}$$

Feeding dose of gipsy-moth worm in whole period of nutrition made 2,945 *g*. Except experimental calculation of feeding dose in laboratory condition, the calculation of feeding dose through the sizes of particular types were used. Feeding dose in air-dried mass was evaluated by the mass of pupa by formula (1)

$$r = 5,9\ g \qquad (1)$$

here r – feeding dose in air-dried mass, *g*;
g– arithmetic mean mass of male and female pupa, *g*.

Arithmetic mean mass of male and female pupa of gipsy-moth under the records of 2016 showed 0,953 *g*. Adding the figures of above-mentioned formula we may obtain:

$$r = 5,9 \times 0,953 = 5,62\ g$$

In order to transfer the obtained quantity into the raw mass, we multiplied it by 2,82. Overall, it made totally 15,8 *g*. In the experiment feeding dose and also the calculations by moth wing scopes are defined by formula (2):

$$r = 0,66 \times 10^{0.341\,l} \qquad (2)$$

where r – feeding dose in air-dried mass, *g*;
l – moth wing scope, cm.

In laboratory condition at linear measure mean wing scope (male and female) made average 5,52 cm. Here the feeding dose was found through formula, which resulted 0,895 *g* of dried weight of leaves or 2,52 *g* of raw weight:

$$r = 0,66 \times 10^{0.341 \times 5,52} = 0,895\ g.$$

The data obtained by this way was similar with experimental feeding dose.

4. Conclusions

Laboratory feeding dose calculations of gipsy-moth are necessary for forecasting the level of present overeating of plantations and allow to deciding strategically the needs for conducting controlling measures.

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