The establishment of the rational growth methods of an Angoumois grain moth *Sitotroga cerealella Oliv. (Lepidoptera, Gelechiidal*) – a host-insect of the entomophages

Shelestova V., Drozda V., Potopalsky A.

Institute of Rehabilitation and Renewal of the Ukrainian Nation, Kyiv, Ukraine
National Agrarian University, Kyiv, Ukraine
Institute of Molecular Biology and Genetics of NAS of Ukraine, Kyiv, Ukraine

A study of the possibilities and perspectives of the mass laboratorial entomophages implantation, with following entomophages' colonization into agrocenosises, still remains an important concept of the biological shielding of the cultivated plants. Exactly this method intensifies the natural regulatory factors, weakened by different reasons, and fixes the artificially settled entomophages as a component part of the agrocenosises. In the context of this problem is a matter of no less significance – mass growing of the entomophages host-insects populations. Among them, are the prevailing species – an Angoumois grain moth Sitotroga cerealella Oliv., the main host-species for growing in biolaboratories the species of ***Trichogramma*** family – a primary instrument of the biologic control of the lepidopterous pests complex. All efforts of the scientists and manufacturers focused on obtaining of the highly viable trichogramma's populations, although, it is obvious that trichogramma's technological and biological characteristics basically depend on a physiological state of the Angoumois grain moth – as trichogramma develops in the Angoumois grain moth eggs in biolaboratories. There are only several methods and local measures directed on the Angoumois grain moth culture stabilization. It is well known, there is quite a number of unsolved problems.

The collective researches of the National Agrarian University and the Institute of Molecular Biology and Genetics of NAS of Ukraine allowed to conduct a detailed analysis of the problem essence, to draw up the primary tasks, to work out modern methods of research, to select the most effective biostimulants, to carry

out the series of experiments and to formulate objective results, scientific conclusions and production recommendations.

As all other populations of the laboratorial insect cultures, Angoumois grain moth, after continuous mass laboratorial breeding, gradually lost the highly viable population characteristics that cause unstable or weak affection of the grain and drastic decrease of the females breeding potential. Except for decrease of the breeding potential, oviposited eggs are physiologically weak and do not satisfy the linear dimension standards. As a result, trichogramma is not able to affect them or the parasite's breed characterized by a low level of vitality, motion and searching activity.

Angoumois grain moth eggs used for maintenance the uterine culture, were treated over a period of two hours by water solution of native or modified by thiophosphamide or cyclophosphamide deoxyribonucleic acids (DNA, DNT, DNC correspondingly) preparations, in a different concentration. Simultaneously, Angoumois grain moth eggs were treated by antiseptic nibiol (5-nitrox) according to the known technology.

The main development, productivity and vitality indexes of an Angoumois grain moth, grown from these eggs described in the table 1.

It is determined that preparations, described above, testify a considerable stimulant effect, expressed in the pupae mass increasing, and as a result, the females breeding potential and vitality increasing. An optimal range of the reactant concentrations is within 0,500-0,005%. It is important, that statistically probable increasing of the test indexes is not only comparing to control, but to better analogue too.

Use of the offered compounds in an offered technology allows stably increase an Angoumois grain moth vitality and breeding potential. Except for this, achievement of a positive effect in the known technology is accompanied by severe conditions of a treatment terms: during only one day after an oviposition, that is difficult to keep in the mass production conditions of the biolaboratories,

because of a high level of the population heterogeneity. The technology, we offered, considerably simplify operating processes of the preparations' use.

In the table 2 has given the dependence data of a stimulant influence on an Angoumois grain moth depending on a period and exposition. A maximum result achieved in the range of 2 - 3 hours. Under the condition of a long-term influence (4 hours) exhibits the inhibition of the Angoumois grain moth growing effect.

The overall positive result of the original technology shows an obvious advantage over an existing one. Low preparation consumption rate and usability characterize the offered technology as a production contributing one.

Thus, we offer the accomplished scientific research, grounded and tested. Its general idea – is an intensification of the biological control of the phytophages' number in agrocenosises, and, accordingly, the chemical pesticides expenses reduction and environmental sanitation.

Table 1

The indexes an Angoumois grain moth growth after embryos' treatment by the water solutions of native and modified DNA

Preparation	Concentration, %	The average mass of females, %	Number of the eggs, oviposited by one female, specimens	Vitality, %
DNA	1,000	6,39±0,19	31,8±1,5	67,7
	0,500	7,58±0,21*	43,7±1,6*	79,6*
	0,005	7,49±0,42*	42,9±1,4*	77,9*
	0,001	6,62±0,37	33,6±1,9	68,8
DNT	1,000	6,40±0,18	30,9±1,3	69,0
	0,500	7,64±0,24*	42,5±1,2*	80,7*
	0,005	7,50±0,30*	44,3±1,7*	78,5*
	0,001	6,66±0,31	32, ±1,5	66,9
DNC	1,000	6,19±0,36	31,4±1,3	67,2
	0,500	7,88±0,36*	43,1±1,9*	81,2*
	0,005	7,72±0,41*	44,8±2,0*	79,0*
	0,001	6,54±0,33	31,7±1,2	66,5
Nibiol (5-nitrox)	-	6,72±0,18	36,8±1,2	69,4
Control (without treatment)	-	6,05±0,14	33,4±1,2	65,5

Note: above and below, the indexes, pointed out by asterisks, statistically may exceed the indexes of the better analogue.

Table 2

The comparative indexes of an Angoumois grain moth productivity after nucleotides treatment

The indexes, compared, Angoumois grain moth productivity	Result, obtained by Angoumois grain moth growing		Positive result of the original technology use comparing to known technology
	Offered technology	Known technology	
Range of the directive effect on eggs	First-fifth days	Only the first incubation day	Absence of the time limitation
Range of the acting concentrations, %	0,500-0,005	2,50-5,00	Reduction of the overdosage probability, preparations consumption 5-50 times less
Toxicological characteristic	Serial issue	Nibiol-chemical fungicide, harmful for health	Preparations and technology harmless for people and insects
Mass of the female pupae, mg	7,65	6,75	+0,9
Prolificacy, number of the eggs, oviposited by one female, specimens	47,20	36,90	+10,30
Vitality, %	79,6	69,1	+10,5
Technological effectiveness in use	High level of the entomophages vitality	Lower entomophages vitality	+15-25