Operative breeding and utilization technology of the synovigene entomophages – composing part of the plant protection integrated systems

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Parasitic hymenopteran – the ichneumons form the large group of Hymenoptera that combines superfamily of Lchneumonoidea, Chalcidoidea and Proctotrupoidea. Large amount of the ichneumon specimens play an important role in regulation of the phytophagous insects number including plant pests. Some of them have the economy significance and were used in the biologic control of agriculture pests.

The biology of the ichneumons breeding is characterized by range of specific features. This biology includes moderate growing of sexual gland and low potential prolificacy, comparing to other parasitic organisms. The human activity directed on artificial creating of the favorable conditions for the ichneumons' nutrition and breeding provides high level of their vitality and thus increases their significance in process of number control the injurious insects.

We analyzed the determining parameters of vitality and productivity of the pupal parasites of the cabbage white butterfly and the brown-tail moth ***Pteromalus puparum L.***, and the pupal parasites of leaf-winged insects, including the codling moth ***Itoplectis maculator F***. After affection, the newborn filial generation, were grown and feed up using original diet: the isatizon water solution simultaneously with methyluracil (MT) and 10% sugar solution. The part of the grown in this way entomophages, affected the uterine laboratorial culture of the host-insect, the other part was used for colonization into agrocenosises for natural phytophages affection as a composite part of the integrated protection systems. It was established the entomophages efficiency depending on physiological age of pupae. With this aim, the "active" pupae, those were formed in current year, were suggested to the entomophages. Furthermore, the pupae formed in autumn and hibernate, were suggested to the entomophages. Thus, duration of the "active" pupae growing was 10-15 days, and those pupae formed in autumn and hibernate – 6-7 months.

Experimentally were determined the optimal and boundary isatozon concentrations in the diet of imago. The efficiency of the technology was judged by the main agricultural and biologic indexes.

It is determined that jewel wasps populations, grown according offered technology, differed by increased characteristics and have determining significance in the biologic control practice. The most considerable advantage over better analogue was at 0,025-0,006% isatizon concentration (table 1). The pupae of the cabbage white butterfly, formed in autumn and hibernate, were used in the experiments. It was determined that according to the test indexes, the jewel wasps specimens considerably exceed the analogues, this fact allows to make a conclusion about principal possibility of using entomophages, grown in accordance with original technology, to control the number of the cabbage white butterfly, formed in autumn and hibernate.

The pupae of codling moth, affected by etoplexis, were used in the experiments. The active pupae, formed in the current year, were used too. The characteristic of technologic indexes of the etoplexis, grown according to original technology, showed their considerable advantage over analogue, as it illustrated in the table 2.

In accordance with a purpose, in the field experiment on the planting of the cabbage kind “Amager”, were evaluated the efficiency of the pupal jewel wasps, grown in accordance with worked out technology to limit the number of the cabbage white butterfly. The entomophage issue was conducted against the second generation of the cabbage white butterfly on the basis of 7000 specimens on 1 hectare. The repeated issue of the jewel wasps was conducted in 13 days after the first one.

It was determined that in conditions of the practically equal number of the cabbage white butterfly (10,8-12,5 caterpillar/plant), the level of affected natural populations are 77,4%, and where the issue of population was conducted without any influence – were affected 61,5%, in control – 17,9%.

Thus, using the offered technology of the sinovigene entomophages that affect pupae of pests, comparing to better analogue provides the next advantages:

1. The sinovigene entomophages, grown in accordance with offered technology, equally affect both active, and pupae that, formed in autumn and hibernate.

2. The high level of the technology efficiency allows suggesting to the production sphere a method of the biologic control of the number of fruits and vegetables crops.

Table 1

The vitality and productivity of the pupal parasite Pteromalus Puparum L. grown in accordance with the original technology

Diet, offered for imago of the parasite	Concentration of the preparations, %	The number of female ovipositors, %	The affected level of the host-pupae, %	Vitality, %	Duration of the generation growth, days	Specimens deformed, %
Isatizon+MT – 0,002%	0,05	80,1±3,3	68,3±1,5	77,4±2,5	19,0±0,6	5,6±0,7
	0,025	89,0±2,7*	75,8±1,9*	81,9±1,7*	18,0±0,7*	3,3±0,4*
	0,012	88,3±3,4*	77,5±2,7*	82,8±2,5*	18,2±0,9*	3,1±0,2*
	0,006	89,4±2,9*	76,9±3,1*	84,5±1,7*	17,9±0,6*	2,9±0,2*
	0,003	78,3±3,4	72,5±2,4	74,8±2,2	18,7±0,7	5,8±0,7
Better analogue -MT	0,002	77,6±3,1	60,9±2,7	73,1±3,2	19,4±0,8	15,2±0,9
Control-water	-	63,4±2,7	48,3±1,7	60,3±2,1	18,8±0,6	14,2±0,8
Hydrocarbon extra nutrition-etalon	10,0	68,4±2,1	52,3±2,2	68,8±3,1	19,2±0,9	8,8±0,5

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

Table 2

The vitality and productivity of the codling moth pupal parasite Itoplectis Maculator grown in accordance with the original technology F.

Diet, offered for imago of the parasite	Concentration of the preparations, %	The number of female ovipositors, %	The affected level of the host-pupae, %	Vitality, %	Duration of the generation growth, %	Specimens deformed, %
Isatizon+ MT-0,002%	0,05	77,5±3,0	76,5±3,1	71,6±3,1	18,6±0,3	5,6±0,7
	0,025	84,4±2,4*	82,3±2,2*	81,7±1,4*	18,2±0,7*	2,8±0,3*
	0,012	82,9±1,7*	81,7±2,1*	82,1±2,3*	18,1±0,5*	2,5±0,2*
	0,006	83,5±1,9*	84,5±1,8*	80,5±1,7*	18,4±0,3*	2,7±0,3*
	0,003	74,6±2,2	74,9±2,3	69,5±1,4	19,1±0,4	3,9±0,7
Better analogue -MT	0,002	72,4±1,8	75,8±2,1	70,5±2,2	19,4±0,4	14,7±0,8
Control-water	-	60,1±1,4	60,2±1,9	60,1±1,5	20,1±0,3	23,8±2,2
Hydrocarbon extra nutrition-etalon	10,0	68,5±1,6	68,3±2,5	63,4±1,4	19,7±0,5	18,5±1,2