Experimental vindication of the optimal regimens of the exogenous nucleic acids use in the silkmoth *Antheraea pernyi G.M.* growing

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The silk raw material, obtained from the silkmoth cocoons, specified by the unique characteristics like high strength, moisture resistance, hygienic feature and thereby may be successfully used in the textile industry, medicine and radio electronics.

After breeding of the original monovoltine species of the silkmoth – Poliskyi tasar – biologic form, acclimatized and adapted to the industrial growing on the territory of Ukraine and other regions of the European part, there is a real possibility for development of a new field of the national economy – forest sericulture.

In the National Agrarian University together with the Institute of Molecular Biology and Genetics of NAS of Ukraine, scientifically based and tested technology that has no other analogues, relates to higher category and concerns usage of such compounds and preparations as: uracil ($C_4H_4H_2O_2$) (URL), methyluracil (MT) and 5-piperidine-methylene-6-methyluracil (BES-221) in the silkmoth culture growing. These compounds were used for directed treatment of the silkmoth eggs of Poliskyi tasar species, obtained from Kivercivskiy centre. Furthermore, as the stimulants, used on the fifth stage of the caterpillars' age, were applied native yeast RNA, purified according to the method of IMBG (RN), modified by thiophosphamide (RNT) and RNA, modified by cyclophosphamide (RNC).

To implement the technology we took three portions of silkmoth grain, the mass of each grain is 1 g, and treated with 0,1% solution of MT, URL and BES-221 over 1 min. 45 sec. on the third day of the incubation. The caterpillars of these

groups on a first half of the fifth age were fed with forage treated by 0,04% water solution of RN, RNT and RNC preparations. The cocoons, grown according to this technology, had the mass exceeding the silk capsule of the control variant of cocoon on 55-59% at 40-42% - of the better analogue index. It is significant, that the obtained positive result exceeded all known native and foreign analogues on considerable amount. Until now, in the sericulture were no other similar developments.

The RNA predecessors reveal the highest effect over the range of 0,10-0,02% concentrations. Higher or lower concentrations conduce to decreasing of the effectiveness. Analysing the results of the silkmoth productivity after the grain treatment in different days of its growing, it is significant that treatment was not conducted in a first day because of mass grain ovipositing in the first too days. The experimental data indicate the effectiveness of treatment on the first periods of grain growing, including a fifth day. Later on, the results sharply decrease.

In table 1 illustrated the results of an impact of grain treatment duration on the silkmoth productivity indexes. Evidently, the optimal exposition is 1h-1.45h duration of the grain treatment. At these regimens, the silk capsule exceeded the control variant on 40,3-47,2%. It is significant, that this result obtained after the effective regulation of the protein mass redistribution in favour of the silk capsule. Herein is the specificity and uniqueness of the nucleotides effect.

The result of a grain treatment by such preparations as URL, MT and BES-221 is a considerable intensification of the caterpillar growing process and biomass accumulation. A component part of the technology is the caterpillars' forage treatment by the water solutions of the native and modified yeast RNA, RN, RNT and RNC in a first half of the fifth caterpillars' age. The use of these stimulants specified by the included substances that efficiently transform caterpillars' biomass to target product – silk thread of the cocoons capsules. This phenomenon illustrated in the table 2.

Use of the stimulants only in a first half of the fifth caterpillars' age specified by the increasing of the cocoons' comparative silk-bearing feature after

treatment during this period, otherwise, by more effective transformation of the protein resources into silk raw material on a caterpillar stage. A treatment in the later period of an embryonal development allows only insignificant proportional increasing of the both component parts – cocoon-pupa and silk capsule. Illustrative data indicate a high specificity of the preparations effect that exhibits in increasing of a silk issue on 4-7% comparing to the control variant.

It is essential to underline that discovered phenomenon of the nucleic acids effect and their modifications, has a universal effect on the insects, and probably on the other fauna representatives. We obtained the similar data concerning a silkworm, silkmoth-pests of the cultural plants, insects-entomophages. Taking into account reasonable prices of the preparations and obvious problem of the own high-quality silk raw material in Ukraine, this technologies are much in demand and partially actualized.

Table 1

Productivity of the silkmoth, grown from the grain after applying the RNA predecessors' directive effect

Variant	Treatment exposition, minutes	Females, mass, mg/% before the control			Issue of the silk raw material, %	Females, mass, mg/% before the control			Issue of the silk raw material, %
		Cocoon	Pupa	Capsule		Cocoon	Pupa	Capsule	
Control	-	5704	5268	436±16	7,64	4430	4054	376±13	8,48
MT, concentration 0,02%	60	7211 126,4	6619 125,6	592±22* 135,7	8,21 +0,57	5285 119,3	4748 117,1	537±18* 142,9	10,16* +1,68
	105	7124 124,9	6512 123,6	612±21 140,3*	8,59 +0,95	5247 118,4	4694 115,8	553±19* 147,2	10,54* +2,06

Note: here and below, the indexes of the silk capsule size, pointed out by asterisks, statistically may exceed the control indexes.

Table 2

The native and modified yeast RNA effect on the silkmoth productivity

Variant	Concentration, %	Females, mass, mg/% before the control			Issue of the silk raw material, %	Females, mass, mg/% before the control			Issue of the silk raw material, %
		Cocoon	Pupa	Capsule		Cocoon	Pupa	Capsule	
Control (water)	-	5704	5268	436±16	7,64	4430	4054	376±13	8,48
RN	0,040	5659 99,2	5002 94,9	657±11* 150,6	11,61 +3,97	4432 100,0	3878 95,6	554±19* 147,4	12,50* +4,02
	0,008	5760 100,9	5116 97,1	644±14* 147,7	11,18 +3,54	4539 102,5	3977 98,1	562±22* 149,4	12,38* +3,90
RNC	0,040	5702 100,0	5052 95,9	650±12* 149,2	11,40 +3,76	4247 95,9	3711 91,5	536±16* 142,6	12,62* +4,14
	0,008	5916 103,7	5210 100,0	646±12* 148	10,92 +3,28	4360 98,4	3808 93,9	552,16* 146,7	12,66* +4,18
RNT	0,040	5966 104,6	5339 101,3	627±14* 143,8	10,51 +2,87	4299 97,1	3775 93,1	524±12* 139,4	12,99* +4,51
	0,008	5588 101,1	5247 99,6	634±19* 145,4	10,78 +3,14	4523 102,1	3964 97,8	559±18* 148,7	12,36* +3,88