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CHANGES IN THE MAIN PRODUCTION CHARACTERS OF SILKWORM HYBRIDS DURING THE SPRING AND SUMMER FATTENING OF SILKWORM CATERPILLARS IN HOT CLIMATE OF UZBEKISTAN

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ABSTRACT

In the less favorable hydrothermal and fattening conditions of a summer silkworm nursery, the average indicators of cocoons and silk weight were observed as decreasing by 22.0 and 25.0% respectively, in comparison with the favorable conditions of the spring season. The hybrids (a 'hybrid' pertaining to biology, is an animal or organism that is the result of the crossing-breeding of two different species or varieties) have been revealed, which are more suitable to the specific conditions of summer silkworm fattening. We have started tests focused on increasing the silk productivity of the silkworm by repeated fattening using nitrogen antiseptic sources.

JEL CLASSIFICATION

■ Q19 ■ Silkworm ■ Fattening ■ Catterpillar ■ Uzbekistan

INTRODUCTION

Repeated fattening in the summer-autumn period, when the mulberry leaf harvest has a sufficient yield after pruning in the spring, is one of the conditions to increase manufacturing value of silk cocoons in Uzbekistan. Broad repeated fattening solve a number of important issues in the silkworm breeding field, including employment sources for the rural population, use of fodder leaves from the summer-autumn mulberry vegetation, efficient use of premises and equipment of the silkworm egg factories, silk cocoons dryers and silk cocoon breeding farming. This article details the research results and findings regarding the possible limits in changing production character of examined zoned and perspective silkworm hybrids during spring and summer fattening.

Excessively high temperature in conjunction with low relative humidity in the summer period contribute to the rapid growth of mulberry-tree branches and leaves, but also affects the nutritional value of fodder leaves, as well as how they are eaten and absorbed. Scientists and practitioners in Ukraine, Bulgaria, Uzbekistan, Romania and Turkey conducted research aimed at improving the effectiveness of repeated feeding of silkworms. In particular, the hybrids are created for use in the summer feeding and farming techniques are developed for repeated feeding of silkworms. According to N. Petkov's (1975) and I. Nacheva's (1976) information on silk research stations in Bulgaria, for the period of spring-summer, 14 repeated feedings of silkworms were carried out. During this time, the productivity indicator was low. Ukrainian scientists have created a separate type of silkworm for repeated feeding, and believe that for the continuous production of silk cocoons it is necessary to create special silk farms (A. Braslavsky M. E. , Akimenko L. M. , Zharkova G. G. , 1992). Mumin Kara (1992) affirms that in Turkey, silkworm feeding is carried out mainly in the summer-autumn periods. To ensure high viability the hybrid bivoltin was used. In the opinion of O. V. Galanovoy, Yu. S. Molodyh and O. Z. Zlotina (1995) it is necessary to select genotypes which are sustainable in the hot summer climate, on the basis of determining the duration of diapause, the viability of breeding species for summer feeding. Based on experiments, M. Madaliniski (1998) showed the loss of productivity of silkworms when the temperature rose – from 97. 6% at 25°C heat to 69. 8% at 28°C. N. A. Ahmedov (1999) also confirms that at high temperature and low humidity conditions the viability of silkworms reduces from 92. 0% and 75. 5%-77. 5%. There is a task set in Uzbekistan to gradually develop summer-autumn fattening of silkworm caterpillars alongside spring fattening. Success of the repeated fattening generally depends on two factors, the species of fattened caterpillars for the summer-autumn periods and the nutritional value of mulberry-tree leaves in summer.

In order to raise the efficiency of repeated fattening zoned and perspective hybrids of silkworm and fodder additives and antiseptics were examined. In both cases, nutrition was enriched with additional nitrogen and eliminating pathogenic bacteria. The research found that the production performance level and industrial purposes of the hybrids examined were different. In order to estimate the production performance level depending on the fattening season the caterpillars were nurtured in spring and summer. To obtain impartial and accurate results of the hybrids' production performance, the nurture and maintenance conditions for all hybrid caterpillars were identical. All the hybrid caterpillars were fattened with mulberry-tree leaves of the same nutritional value and quality. In each hybrid type there were 1000 caterpillars fattened in 4-multiple replication, 250 caterpillars per each. The first day replications were formed by the caterpillars of II age. After completing the fattening, the leading production performance rates of silkworm hybrids fattened in spring and summer were defined. The weight of silk cocoons obtained under more favorable conditions in spring and in less favorable conditions in summer is summarized in Table 1.

Table 1 show that the hybrid caterpillars react to changing nutritional conditions in different ways. After changing the nurture and maintenance conditions, several hybrids lost weight, as follows: Marvarid x Line 31 (33,3%), Line 31 x Line 36 (24,3%) and Atlas x Margilan (25,7%). The hybrids Uzbekistan 5, Marvarid x Line 40 lost weight insignificantly (16,6% and 18,0%). Difference in average weight of silk cocoon grown in spring and summer were shown to be consistent. Changes in silk content in hybrid cocoons in spring and summer conditions are summarized in Table 2.

The table shows that under less favorable conditions during summer nutrition, there was greatest responsiveness, as indicated by a significantly reduced content of silk in cocoons for the following hybrids: Marvarid x Line 31 (28,5%), Atlas x Margilan (27,0%) and Line 31 x Line 36 (26,3%). For the hybrids Marvarid x Line 40 (19,2%) and Uzbekistan 5 (19,5%) the difference between these rates was found to be lower. Figures in the tables clearly demonstrate a change in the hybrids' silk coat content by nutrition seasons. It must be noted that silkworm, being poikilothermal monophag

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Table 1: The weight of silk cocoons in Spring and Summer conditions

Hybrid Name	Average Cocoon Weight (g)			
	Spring	Summer	Reduction of summer rates against spring rates (%)	Pd
Uzbekiston 5	2,04 ± 0,018	1,71 ± 0,08	16,2	0,999
Uzbekistan 6	2,07 ± 0,017	1,62 ± 0,07	21,7	0,999
Baraka 1	2,33 ± 0,023	1,87 ± 0,08	19,7	0,999
Baraka 2	2,27 ± 0,021	1,83 ± 0,05	19,4	0,999
Oltin Vodiy 1	2,29 ± 0,019	1,79 ± 0,09	21,8	0,995
Oltin Vodiy 2	2,24 ± 0,022	1,76 ± 0,05	21,4	0,995
Marvarid x Line 31	2,48 ± 0,020	1,68 ± 0,07	33,3	0,999
Marvarid x Line 40	2,01 ± 0,020	1,65 ± 0,01	17,9	0,99
Line 30 x Line 36	1,79 ± 0,02	1,39 ± 0,012	22,4	0,995
Line 31 x Line 36	1,77 ± 0,021	1,34 ± 0,013	24,3	0,995
Atlas x Margilan	1,91 ± 0,022	1,42 ± 0,070	25,7	0,99
Average	2,1	1,64	22,1	0,995

Source: Own research

Table 2: Changes in silk content in hybrid cocoons in Spring and Summer conditions

Hybrid Name	Average Weight of Silk in Cocoons (mg)			
	Spring	Summer	Reduction of Summer rates against Spring rates (%)	Pd
Uzbekistan 5	484 ± 4,0	390 ± 2,0	19,5	0,999
Uzbekistan 6	491 ± 3,6	371 ± 1,6	24,5	0,999
Productive 1	546 ± 0,023	416 ± 2,2	23,9	0,999
Productive 2	530 ± 5,3	414 ± 1,4	21,9	0,995
Golden Valley 1	539 ± 4,5	399 ± 2,5	26	0,999
Golden Valley 2	526 ± 5,0	395 ± 1,8	24,9	0,999
Diamond x Line 31	598 ± 2,0	425 ± 1,2	28,9	0,999
Diamond x Line 40	485 ± 4,7	392 ± 4,6	19,2	0,99
Line 30 x Line 36	422 ± 4,4	318 ± 4,1	24,7	0,995
Line 31 x Line 36	403 ± 4,6	301 ± 4,1	26,3	0,995
Atlas x Margilan	433 ± 4,4	316 ± 1,5	27	0,999
Average	496	376	24,2	0,999

Source: Own research

strongly reacts to summer nutrition conditions. This is a key consideration for changing the hybrids' performance in a production setting. Lower contents of proteins, carbohydrates, vitamins, moisture and other nutrients in mulberry-tree leaves, combined with high temperature in the environment impedes eating and absorption of nutrients. Moisture-deficit in leaves impairs digestion in the caterpillar' salimentary canal and reduces the number of substances absorbable by hemolymph which are involved in the synthesis of silk in larvae's silk gland. It must be noted that high temperature in the environment accelerates silkworm development. This is the reason why in the absence of adequate organic substances, larvae start curling small cocoons with a low silk content.

Conclusion

The results of experiments have derived the following conclusion: a) The limits for cocoon weight and silkworm hybrids silk coats decrease in less favorable nutritional conditions in summer, as compared with the rates of good spring fattening conditions are established; b) The possibility of determining the extent of adaptation of silkworm hybrids to unfavorable nurture and hydrothermic summer conditions according to their reaction to summer nutritional conditions was shown. After three years of fattening examinations, the higher productive industrial hybrids were chosen for repeated fattening; and c) In order to prevent a considerable decrease in production performance rates, actions were taken to enrich and refine summer silkworm leaves from malignant bacterium using cheap resources of nitrogen and antiseptics.

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