

RESEARCH CONCERNING THE INFLUENCE OF TREATMENT, HARVESTING MOMENT AND MULBERRY LEVEL FROM WHERE THE LEAVES WERE HARVESTED IN THE IIIrd AGE SILKWORM PERFORMANCES

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Abstract

The influence of some biostimulators used in larvae feed (5% propoli and echinacea, respectively, aqueous solution), the effect of the mulberry leaves harvesting time (morning and evening), and influence of mulberry level from where the leaves were harvested on the silkworm performances, (from all mulberry floors - up, middle and base) are presented in this paper. The variance analyses performed in IIIrd age larvae weight, show distinct and very significant differences between the graduations of the analyzed factors (applied treatments, moments of leaves harvesting and floors from where mulberry leaves were harvested). This suggests the presence of real differences between the graduations of all three studied factors.

Key words: silkworm, mulberry leaf, propoli, echinacea

THE RESEARCH OBJECTIVES

The influence of some biostimulators used in larvae feed (5% propoli and echinacea, respectively, aqueous solution), the effect of the mulberry leaves harvesting time (morning and evening), and influence of mulberry level from where the leaves were harvested on the silkworm performances (from all mulberry floors - up, middle and base) as aspects of the interaction genotype x environment (reaction of the same genotype - individuals of the same breed and different feed and environment conditions) are presented in this paper.

MATERIAL AND METHOD

The experiment was developed within the Laboratory of Sericulture of the Department of the Technologies of Apicultural and Sericulture Products of the Faculty of Animal Production, USAMV Cluj-Napoca, in 2005.

The 24 experimental silkworm groups (variants) were fed with mulberry leaves from the intensive mulberry tree plantation from USAMV Cluj-Napoca. The plantation is made up of Ukraine 107 mulberry trees very well adapted to the pedoclimatic conditions from Transylvania.

The biological material used for the research was constituted from only one silk worm breed **Băneasa 1 (B1)**, respectively, for best genetic uniformity, only environmental conditions being different (feed).

In order to study the influence of the leaves treatment with biostimulators, the moment of mulberry leaves harvesting and floor from where the leaves were harvested, a **three factor experience** of 3 x 2 x 4 type was organized, with 24 experimental variants with 30 individuals each.

30 larvae of each variant were weighted in order to record the body weight at IIIrd and IVth ages, and in the beginning and the end of the Vth age. The variance analyze programme **AGRO**, similar with **ANOVA**, was used, and variance analyze and F sample were determined for each trait. The calculation of the average values by variant, differences between them and interactions between two and three respectively, factors, were determined.

The testing of the significance of the differences between the average values was performed by limit differences (DL) and **Duncan** test. The results of the Duncan test and interactions between the analyzed factors are not presented in this paper.

RESULTS AND DISCUSSIONS

The variance analyze performed for the IIIrd age larvae weight (table 1) indicates that for graduations between A type factor - type of the treatment applied to the leaf (not treated, treated with propoli and treated with echinacea) very significant differences were recorded. Between the graduation of the B factor – the moment of the leaf harvesting (in the morning and in the evening) distinct significant difference was recorded and between the graduations of the factor C the

floor from where the mulberry leaves were harvested (mixed from all floors, superior, middle and base) very significant differences were recorded. Concerning the interaction variations between both factors (TE, ME) and three analyzed factors (TME) statistically assured differences were recorded at significance threshold of $p = 0.1\%$ and $p = 5\%$. The interaction variance between treatments and moment of harvesting (TM) is statistically not significant.

Table 1

The variance analyze and F sample for the three factor experience (3 x 2 x 4) concerning the IIIrd age larvae weight

Variation source	Square sum	Degree of freedom	Average square	F sample	Signification of variants
Treatments(T)	0.02434	2	0.01217	9.766	xxx
Moments (M)	0.21257	1	0.01257	10.251	xx
Floors(E)	0.02840	3	0.00947	9.889	xxx
TM	0.00185	2	0.00093	0.755	ns
TE	0.02687	6	0.00448	4.680	xxx
ME	0.00884	3	0.00295	3.080	x
TME	0.01779	6	0.00297	3.099	x
Erorr T	0.07229	58	0.00125	-	
Erorr M	0.10665	87	0.00123	-	
Erorr E	0.49962	522	0.00096	-	
Total	0.83044	719			

The influence of the treatment, harvesting time and floor from where the leaves were harvested on the IIIrd age larvae weight is presented in table 2.

Between the groups (variants) feed with leaves treated with 5% aqueous propoli solution and those which received untreated leaves (control) a positive difference (+ 0.02 g) and statistically very significant in advantage of the leaves treated with 5% aqueous ropoli solution was recorded, while between the average values of the variants feed with echinacea treated leaves (5%) and those feed with untreated leaves (control), no difference was recorded.

The difference between the average values of the variants feed with mulberry leaves harvested in the morning (control) and those feed with leaves harvested in the evening, is negative and statistically significant in advantage of the leaves harvested in the evening. Results that the leaves harvested in the morning are much

valuable, having positive effect on IInd age larvae body weight.

Concerning the influence of the floor from where the leaves were harvested, on the IIIrd age larvae weight, very significant differences between the average values of the experimental variants feed with leaves harvested from the middle floor and base, respectively, compared to the control variant made up of leaves mixture from all floors.

Surprisingly, between the variants feed with leaves harvested from the upper floor (considered the most valuable) and control variants, no significant differences between averages were recorded.

The average values, differences between variants, and their significance concerning the IIIrd age larvae weight are presented in table 3, considering the three studied experimental factors. The variant feed with untreated leaves mixed from all mulberry floors, and harvested in the morning was considered control (**T1M1E1**) and all 23 other experimental variants were compared to this.

Table 2
 The influence of the treatment, harvesting moment, and floor from where the leaves were harvested on the IIIrd age larvae weight

Symbol	Variant	n	Average value(g)	Relative value (%)	±d (g)	The significance of the difference	DL		
							5%	1%	0.,1%
T1	Untreated (Mt)	240	0.22	100.0					
T2	Propoli	240	0.24	105.7	+0.02	xxx	0.01	0.01	0.01
T3	Echinaceaea	240	0.22	100.3	0.00	ns			
M1	Morning (Mt)	360	0.23	100.0					
M2	Evening	360	0.22	96.4	-0.01	ooo	0.01	0.01	0.01
E1	Mixture (Mt)	180	0.22	100.0					
E2	Superior	180	0.22	99.3	0.00	ns	0.01	0.01	0.01
E3	Middle	180	0.23	105.6	+0.01	xxx			
E4	Base	180	0.23	104.9	+0.01	xxx			

From this table, results that statistically assured differences at different significance thresholds only between variants treated with leaves treated with propoli, harvested in the morning from the middle floor, or from the mulberry base (**T2M1E3**, **T2M1E4**) and control variant (**T1M1E1**) were recorded on one hand, and between the variant feed with propoli treated leaves harvested in the evening and mixed from all floors (**T2M2E2**) and control, on the other hand. Positive and significant differences ($p = 0.1\%$ and $p = 1\%$) were recorded between variants feed with leaves treated with echinacea, harvested in the morning (mixed from upper or base floor)

(**T3M1E1**, **T3M1E2**, **T3M1E4**) and control variant (**T1M1E1**). Distinct significant difference was recorded (+0.02 g) between experimental variant feed with echinacea treated leaves and harvested in the evening from the mulberry base (**T3M2E4**) compared to control variant.

In conclusion, the best effect on the IIIrd age larvae weight was recorded in biostimulators treated mulberry leaves (propoli and echinacea), harvested in the morning, whatever the floor from where the leavers were harvested.

Table 3

The average values, and differences between variants concerning the IIIrd age larvae weight (n = 30 heads/variant)

Nor. Crt	Name of the variant	Average value (g)	Relative value (%)	±d (g)	Significance
1	T1M1E1(Mt)	0.22	100.0		ns
2	T1M1E2	0.23	104.5	+0.01	ns
3	T1M1E3	0.21	95.4	-0.01	ns
4	T1M1E4	0.23	104.5	+0.01	ns
5	T1M2E1	0.22	100.0	0.00	ns
6	T1M2E2	0.22	100.0	0.00	ns
7	T1M2E3	0.22	100.0	0.00	ns
8	T1M2E4	0.21	95.4	-0.01	ns
9	T2M1E1	0.23	104.5	+0.01	ns
10	T2M1E2	0.22	100.0	+0.00	ns
11	T2M1E3	0.25	113.6	+0.03	xxx
12	T2M1E4	0.25	113.6	+0.03	xxx
13	T2M2E1	0.20	90.9	-0.02	xx
14	T2M2E2	0.22	100.0	0.00	ns
15	T2M2E3	0.23	104.5	+0.01	ns
16	T2M2E4	0.22	100.0	0.00	ns
17	T3M1E1	0.25	113.6	+0.03	xxx
18	T3M1E2	0.25	113.6	+0.03	xxx
19	T3M1E3	0.23	104.5	+0.01	ns
20	T3M1E4	0.24	109.0	+0.02	xx
21	T3M2E1	0.23	104.5	+0.01	ns
22	T3M2E2	0.22	100.0	0.00	ns
23	T3M2E3	0.23	104.5	+0.01	ns
24	T3M2E4	0.24	109.0	+0.02	xx
<i>ns=not significant difference</i>				<i>DL(p5%)</i>	<i>0.02</i>
<i>x or o = significant difference</i>				<i>DL(p1%)</i>	<i>0.02</i>
<i>xx or oo = distinct significant difference</i>				<i>DL(p0.1%)</i>	<i>0.03</i>
<i>xxx or ooo = very significant difference</i>					

CONCLUSIONS

Between groups feed with propoli treated leaves and control variant very significant differences were recorded in IIIrd age larvae weight.

Positive and very significant differences were also recorded in groups feed with leaves harvested from the base of the mulberry in IIIrd age larvae weight too.

Comparing the 23 experimental variants with control (**T1M1E1**) the positive effect of larvae feeding with propoli and echinacea treated leaves harvested in the morning was recorded. Thus, whatever the floor of the mulberry three from where the mulberry three leaves were harvested, the groups feed with biostimulators treated leaves harvested in the morning (**T2M1E3**, **T2M1E4**, **T3M1E1**, **T3M1E2**, **T3M1E4**), had significant differences compared to control in smaller ages.

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