

## Impact of Using Terrestrial Snail *Eobania vermiculata* Powder on Mulberry Silkworm Traits

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### ABSTRACT

Different treatments of terrestrial snail *Eobania vermiculata* powder used to study its effects on mulberry silkworm, *Bombyx mori* L. traits. Two varieties of mulberry silkworm imported hybrid and local race were chosen. Mulberry plant of *Morus alba* var Koukuso-27 selected for feeding silkworm. Traits of fifth duration (days), total larvae duration (days), mortality (%), number of cocoon per liter, cocooning percentage, pupation ratio, fecundity (No.), cocoon weight (g), cocoon shell weight (g), pupal weight (g), cocoon shell ratio (%) and silk productivity (cg/days) were put under investigation. Results revealed that, using snails' powder (treatments of A and B) were better than other treatments. So that, using snail powder are recommended for enhance silkworm rearing.

**Key words:** Mulberry silkworm, *Bombyx mori*, *Eobania vermiculata*, snails' powder

### Introduction

Silkworm *Bombyx mori* is monophagous insects. It depends on special varieties of mulberry *Morus alba*. Many researches were carried out to study the impact of many materials to increase the quality and quantity of silkworm traits. To raise the cocoons harvested and increase the rearing profit. Some substances were proved its importance in disinfectant and other in food additives Ravikumar *et al.* (2002).

Snails are found in river and sea water as well as on land. Snails are belonging to the phylum Mollusca Thompson and Cheney, (1996). There are many researches, which insure the importance of snails' powder in industry, food staff of pigs, hens, checks, antibiotic ..... etc.

Waste water from a food-factory was characterized and treated using snail shell. Change in color from dark brown before treatment to light brown after treatment was noticed. Snail shell as a coagulant is very effective in the treatment of waste water at any pH. A high level of success was achieved in reducing the dissolved solids, Nitrates, sulphate and of removal phosphate completely from the waste water Jatto *et al.* (2010).

Because phenomena of resistance to antibiotics. Which consider as great problem for public health, so that many researchers tried to find effective solutions. Conventional antibiotics and antimicrobial peptides have activity against many bacteria species. An antimicrobial peptide was isolated and purified from a fresh water large snail *Lymnaea stagnalis*, Gauri *et al.* (2016).

The present investigation is aim to study impact terrestrial snail *Eobania vermiculata* powder on mulberry silkworm traits.

### Material and Methods

Two varieties of mulberry silkworm eggs were collected from Sericulture Research Department (SRD) Giza Egypt. Imported hybrid from Bulgaria called H<sub>1</sub>X UV X G<sub>2</sub> X V<sub>2</sub> (R<sub>1</sub>) and local race of L<sub>444</sub> (R<sub>2</sub>).

Mulberry leaves of *Morus alba* var Koukuso-27 offered to the silkworm larvae four mails daily. The leaves were chopped during first three instars while the whole leaves were applied for feeding fourth and fifth instars. Polyethene sheets were used as cover and bottom during the young

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instars. Foam strips were put around the young larvae. Collapsible were carried out for mount age. Krishnaswami *et al.* (1973) and Ghazy (2008).

Adult of *Eobania vermiculata* handling collected from citrus trees field in Moshtohor village, Toukh district Qalubia governorate. Healthy snails' individuals were washed carefully with fresh water Mohamed, (2010). Snails were dried under 70C° for 72 hours. Dried snails were milled by handle and wise mix ball mill in the faculty of science Banha University. Snails' powders were disinfected under 121 C° with 1.5 bar for 20 minutes.

Different treatments of *Eobania vermiculata* snail powder were compared with recommended silkworm larval disinfectant powder.

Control treatment was kept without any application (E). Recommended disinfectant (D) 3g paraformaldehyde + 3 g salicylic acid + 3 g benzoic acid + 91 g lime powder Hosny *et al.* (2002). Nine gram of snails' powder was mixed with 91 g of lime powder (C). While 100g from snails' powder represent the treatment (B). Ninety-one grams of snails' powder were added to 3 g paraformaldehyde + 3 g salicylic acid + 3 g benzoic acid (A). Treatments applied on silkworm larvae with the same dose and times recommended by Hosny *et al.* (2002).

Twelve characters of fifth duration (days), total larvae duration (days), mortality (%), number of cocoon per liter, cocooning percentage, pupation ratio, fecundity, cocoon weight (g), cocoon shell weight (g), pupal weight (g), cocoon shell ratio (%) and silk productivity (cg / days) were used. Collected data were analyzed by using SAS program (1998).

## Results and Discussion

### Effect of snail powder treatments on silkworm traits:

#### a. Differences between snail powder treatments

Effect of different terrestrial snail powder treatments on mulberry silkworm characters were found in Table, 1.

There were highly significant differences between treatments for mortality, number of cocoons per liter, cocooning percentage, cocoon weight, cocoon shell weight, pupal weight, cocoon shell ratio and silk productivity characters. A Significant difference was observed for fecundity character while the difference between treatments was insignificant of 5<sup>th</sup> instar and total larval duration.

The lowest mortality was registered for A and B treatments. These may be due to snails' powder have antibacterial activity. These results are agreement with Bensig *et al.* (2014) they reported that, extracts of snails were able to inhibit the bacterial activity. Terrestrial snails' extracts have been used as very important antibiotics, these animals have a higher microbial activity against some bacteria species Abiona *et al.* (2013), Herlunis *et al.* (2014), Eukene *et al.* (2014), Pavlina *et al.* (2015) and Lawrence *et al.* (2016).

**Table 1:** Effect of different terrestrial snail powder treatments on mulberry silkworm, *Bombyx mori* L. economic characters.

Character Treatment	Fifth duration (days)	Total larvae duration (days)	Mortality (%)	Cocoon/liter (No.)	Cocooning (%)	Pupation (%)	Fecundity (No.)
A	9.000	30.000	10.250	96.425	93.800	96.500	483.850
B	10.000	30.000	13.000	109.480	89.170	93.750	444.600
C	10.500	30.500	15.700	114.310	85.910	91.500	410.650
D	9.500	29.330	17.700	131.530	79.040	87.500	390.050
E	9.560	30.060	26.000	144.760	68.310	83.000	381.400
F Between treatments	0.710	0.130	35.32**	114.56**	93.91**	5.90**	3.21*
LSD 5%	-	-	2.974	4.99	3.023	6.144	66.25

**Table 1: Cont.**

Character Treatment	Cocoon weight (g)		Cocoon shell weight (g)		Pupal weight (g)		Cocoon shell ratio (%)		Silk productivity (cg / days)	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
A	1.7645	1.465	0.306	0.311	1.389	1.085	17.194	21.491	3.399	5.409
B	1.719	1.368	0.321	0.290	1.339	1.008	17.998	21.120	3.309	4.561
C	1.486	1.324	0.290	0.274	1.127	0.965	19.145	20.842	3.018	4.513
D	1.356	1.092	0.229	0.210	1.057	0.812	16.436	19.166	2.431	4.243
E	1.054	0.960	0.157	0.178	0.827	0.713	14.952	18.329	1.570	1.777
F Between treatments	75.67**		54.69**		63.10**		8.29**		47.23**	
LSD 5%	0.0526		0.0148		0.0447		0.8554		0.1940	

Treatment A is best for number of cocoon/liter, cocooning percentage, pupation ratio, fecundity, cocoon weight, cocoon shell weight, pupal weight, and silk productivity characters. The same trend was observed for treatment B. This is may be due to terrestrial snail *Eobania vermiculata* powder has minerals and proteins which improved the quality of mulberry silkworm traits.

Snail shell can be using in laying hens diet in substitution of oyster shell decreased the feed cost and increased the economic feed efficiency. Economically, snail shell can be used even alone in diet of old layer hens. The snail shell appeared therefore as an efficient source of mineral in layer hens feeding Diarra *et al.* (2015). As well as, Sogbesan *et al.* (2006) registered that the possibility of using garden snail (*Limicolaria aurora*) meat meal as a protein source in fish feeds.

*b. Differences of interaction between treatments and varieties*

Data in Table 2 showed the effect of different snails' powder on interaction between treatments and varieties of mulberry silkworm economic characters.

Insignificant differences were observed for fifth duration, total larvae duration, mortality and fecundity traits. On the other hands, differences of number cocoons per liter, cocooning percentage, pupation ratio, cocoon weight, cocoon shell weight, pupal weight, cocoon shell ratio and silk productivity were highly significantly. Treatment A is better for almost characters of variety R<sub>1</sub> and R<sub>2</sub>. Treatment B set in the second order for varieties of R<sub>1</sub> and R<sub>2</sub>.

**Table 2:** Effect of different terrestrial snail powder on interaction between treatments and varieties of mulberry silkworm economic characters.

Character Treatment		Fifth duration (days)	Total larvae duration (days)	Mortality (%)	Cocoon/Liter (No.)	Cocooning (%)	Pupation (%)	Fecundity (No.)
		A	R <sub>1</sub>	9.00	30.00	7.500	100.80	89.600
	R <sub>2</sub>	9.00	30.00	13.00	92.05	98.00	94.00	485.10
B	R <sub>1</sub>	9.00	30.00	9.00	101.36	83.333	95.00	466.00
	R <sub>2</sub>	11.00	30.00	17.00	117.60	95.00	92.50	423.20
C	R <sub>1</sub>	10.00	30.00	15.00	106.96	81.818	93.00	440.00
	R <sub>2</sub>	11.00	31.00	16.400	121.66	90.00	90.00	381.30
D	R <sub>1</sub>	9.00	28.67	17.400	112.00	71.074	91.00	399.20
	R <sub>2</sub>	10.00	30.00	18.00	151.06	87.00	91.00	380.90
E	R <sub>1</sub>	9.125	30.125	25.00	130.48	51.429	75.00	394.40
	R <sub>2</sub>	10.00	30.00	27.00	159.04	85.185	84.00	368.40
F Between Interaction TX V		0.28	0.09	2.42	25.51 **	26.91**	4.91**	0.25
LSD 5%		-	-	-	7.049	4.275	8.688	-

**Table 2: Cont.**

Character Treatment	Cocoon weight (g)		Cocoon shell weight (g)		Pupal weight (g)		Cocoon shell ratio (%)		Silk productivity (cg/ day)		
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	
A	R <sub>1</sub>	1.916	1.598	0.360	0.336	1.485	1.192	19.048	20.978	4.005	7.657
	R <sub>2</sub>	1.613	1.332	0.251	0.285	1.292	0.978	15.339	22.003	2.792	3.161
B	R <sub>1</sub>	1.872	1.489	0.391	0.332	1.431	1.087	20.819	22.223	4.346	6.869
	R <sub>2</sub>	1.566	1.246	0.250	0.248	1.246	0.928	15.177	20.016	2.272	2.253
C	R <sub>1</sub>	1.863	1.489	0.383	0.317	1.409	1.071	20.711	21.780	4.257	6.756
	R <sub>2</sub>	1.109	1.159	0.196	0.230	0.844	0.859	17.579	19.904	1.778	2.270
D	R <sub>1</sub>	1.807	1.341	0.322	0.307	1.414	0.964	17.701	22.844	3.582	5.914
	R <sub>2</sub>	1.054	0.960	0.157	0.178	0.827	0.713	14.952	18.329	1.570	1.777
E	R <sub>1</sub>	1.688	1.321	0.301	0.256	1.317	0.995	17.673	19.363	3.297	6.993
	R <sub>2</sub>	1.024	0.863	0.156	0.164	0.797	0.629	15.198	18.969	1.564	1.493
F Between Interaction TX V	15.630**		5.830**		15.670**		3.800**		4.880**		
LSD 5%	0.093		0.022		0.082		1.367		0.471		

From the previous results it could be concluded that the snails powder work as antibacterial and enhance the quality of mulberry silkworm productivity. These results are in agreement with those found by Serra (1997), El-Deek *et al.* (2002) and Diarra *et al.* (2015) reported that, snail is rich in calcium, crude protein and high energy value so could replace possibly meat meal or fish meal in animal diets. As well as it beneficial to feed swine, Chicks, laying hens, ducks and tilapia fish.

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