

"USING OF SOME PLANT EXTRACTS AND HONEYBEE PRODUCTS FOR FEEDING OF IMPORTED AND LOCAL HYBRIDS OF MULBERRY SILKWORM (*Bombyx mori* L.)"

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ABSTRACT

Nine aqueous or alcoholic plant extracts and three hive products were offered to 4th and 5th instar of imported and local hybrids of silkworm. They were: aqueous and alcoholic extracts of *Eucalyptus*, Mulberry, Christ's thorn (Hozaen and Baladi), *Psidium*, *Ocimum basilicum*, Mint, *Budlia asiatica*, *Lantana camara*, and Pollen, Bee Bread, Propolis. The measured or calculated parameters were: initial, final, average larval weight (g) and growth index, silk glands weight and ratio %, weight of cocoons, cocoon's shell and pupae, and cocoon shell ratio %.

Concerning imported race of silkworm, feeding with mulberry leaves treated with aqueous extracts leads to significant increment of cocoon shell weight (g) in *Eucalyptus*, Christ's thorn (Baladi), *O. basilicum*, mint, pollen and propolis. Insignificant increase in cocoon shell ratio % was noticed in *Eucalyptus*, *Psidium*, mint and propolis, while in case of alcoholic extracts, maximum significant shell weight was detected in Christ's thorn (Baladi) treatment, followed by: *Eucalyptus*, mulberry, Christ's thorn (Hozaen), *Psidium*, *O. basilicum* and mint, with significant differences with control. Insignificant increment in cocoon shell ratio % was noticed in *Psidium* treatment only. All differences in treatments of imported race were significant with both of aqueous or alcoholic extracts, except cocoon shell ratio %.

Concerning local race of silkworm, feeding with mulberry leaves which treated with tested aqueous extracts leads to significant increase in cocoon shell weight (gm) in *Eucalyptus*, mulberry, Christ's thorn (Hozaen), *B. asiatica*, *L. camara*, and pollen treatments, and insignificant increase in Christ's thorn (Baladi), *Psidium*, *O. basilicum*, and mint treatments. General increase in cocoon shell ratio % in all treatments except bee bread and significant differences were detected in *Eucalyptus* and propolis treatments, while in case of alcoholic extracts significant increase in cocoon shell weight (gm) was found in *B. asiatica* treatment, followed by: *eucalyptus*, mulberry, Christ's thorn (Hozaen), *L. camara*, pollen and propolis treatments. Insignificant increment in cocoon shell ratio % in propolis, *L. camara*, *B. asiatica*, mint and *Eucalyptus*. For local hybrid of silkworm, no significant differences in alcoholic treatments, were observed, however insignificant increment differences were detected in five treatments. Aqueous extracts of *Eucalyptus* or propolis increased cocoon shell ratio % in both of tested hybrids. Aqueous or alcoholic extracts of *B. asiatica* or *L. camara* increased cocoon shell ratio % in local hybrid. Aqueous extracts increased cocoon shell ratio % in 15 cases, while in case of alcoholic extracts in 6 cases only.

The most effective treatments were: *Eucalyptus*, *Psidium* and propolis. Using of aqueous extracts was more effective available, and cheap as compared with using alcohol in extraction.

INTRODUCTION

The silkworms consume mulberry leaves in large quantities. The scope of the work of many researchers was observing their reaction to addition of various extracts for their food.

Rajeswari and Isaiarasu (2004) supplementation of *Moringa olifera* elicited varied responses in silkworm. Sridevi *et al.* (2004) used extracts of some medicinal plants, *Terminalia arjuna*, *Withania somnifera*, *Tinospora cordifolia*, and *Leptedenia reticulata* and found that all biological and economical parameters of silkworm were higher values compared with control. Murugesh and Baskar (2008) studied the effect of aqueous extracts of some plants on increasing of silk productivity of silkworm. Manjula *et al.* (2010) suggest that the administration of *Dolichos lablab* with mulberry leaves at 7.5% concentration was enhanced the biochemical reaction involved in the silk production.

Zah *et al.* (2001) reported that the olive oil is detrimental to the development of silkworm, regardless of the method of administration. Chandrakala *et al.* (2012) tested *Parthenium hysterophorus* extracts on young silkworm and concluded that utilizing of this extraction silkworm rearing is of special merits. Shahin *et al.* (2013) reported that lettuce seed oil, as a food additive, enhanced the productivity of silkworm. Karthikairaj *et al.* (2014) proved that herbal aqueous and alcoholic extracts of *Ocimum*, *Acalypha*, and

Leucas can be exploited to control of microbial pathogens at the time of silkworm rearing and to get improved silk yield. Pardeshi and Bajad (2014a,b) used *Amaranthus hybridus* and *Xanthium indicum* extracts to improve the economic parameters of silkworm (*Bombyx mori*).

Aqueous leaf extract of *Ocimum sanctum* was tested by Sujatha *et al.* (2015). The same plant species was also tested by Padma *et al.* (2015) in India. Rateb and Abdel-Rahman (2015) tested some extracts including plant extracts on biological and economical parameters of silkworm.

This work aimed to study the effect of alcoholic and aqueous extracts of nine plant species and three honeybee hive products on the biological and economical characters of the silkworm (*B. mori*).

MATERIALS AND METHODS

This work was conducted in the Laboratory of Silkworm Rearing, Plant Protection Department, Faculty of Agriculture, Assiut University, during 2015.

Local and Bulgarian hybrid of silkworm were supplied from Sericulture Division, Plant Protection Institute, Ministry of Agriculture, Giza, to be used in the experimental work.

I- Rearing of silkworm:

The temperature during the incubation of silkworm eggs, was ranged from 23 to 25°C, while the

relative humidity was ranged from 85 to 90%. Complete hatching took place, after few days of incubation. New leaves, or tender strips of mulberry leaves, were put over the hatching larvae, which crawled up the leaves, then these were removed with silkworms to the rearing place.

Normal method of silkworm rearing was carried out, till the beginning of 4th instar, or beginning of tested treatments. The mulberry leaves for feeding of silkworm were cut early morning, then covered with wet clothes to protect than from loss of water. The leaves were cleaned and given to the first and second larval instars as strips or buds. Afterwards, the whole leaves was distributed in a usual manner four times/day, till the beginning of fourth instar. Regular cleaning of rearing beds were carried out.

II- Treatments:

Nine alcoholic or aqueous plant extracts and three honeybee colony products were tested during this work. They were: *Eucalyptus*, Mulberry, Christ's thorn (Hozaen and Baladi), *Psidium*, *Ocimum basilicum*, Mint, *Budlia asiatica*, *Lantana camara*, and hive products: Pollen, Bee Bread and propolis. These extracts were sprayed on mulberry leaves and used for feeding of 4th and 5th instars larvae of imported and local hybrids silkworm (*Bombyx mori*).

For preparing of alcoholic or aqueous plant extracts: The dried leaves were extracted using 70% ethyl alcohol or dish water in a rate of 10 gms/100 ml alcohol, in a water bath at 45°C for 48 hrs. Then filtered and the filtrated was completed to 100 ml using alcohol 70%.

All these treatments were used at concentration of 1% with water.

Every tested treatment was replicated three times in three carton boxes (20.5 x 19.5 x 6.5 cm), each contain fifty silkworms larvae and 150 larvae/treatment. Feeding with treated leaves was conducted four times/day. Control larvae were fed with untreated mulberry leaves. Twelve treatments were used during the work in addition to control.

III- Criteria for evaluation:

1- Fresh weight of silkworms larvae:

Twenty larvae were weight had initial and final weight, average weight and growth index were calculated 60 from each replicate were weighed (in gms), larvae/ treatment. Control larvae were also weighed. Total and mean weight/larvae (gm.) was calculated.

2- Fresh weight of silk glands:

Fifteen nine days old 5th instar larvae, from each treatment were used for determination of silk glands weight (in gms). Control silk glands were also weighed (in gms). Total and mean weight (in gms) were calculated and ratio of glands weight body weight was calculated.

3- Fresh weight of cocoons:

From each replicate and treatments, good cocoons were collected, cut, opened, and pupae were weighed. The whole cocoon was weighed (in gms).

Total and mean weight/cocoon (in gms), were calculated.

4- Pupal weight:

From each replicate and treatment, pupae were weighed (in gms). Total and mean weight/pupa (in gms) were estimated.

5- Cocoon shell weight (C.S.W.):

The previous cocoons were carefully opened and pupae were removed and cleaned from excuviae, then weighed. Total and mean weight/shell (in gms) were calculated.

6- Cocoon shell ratio (%) (C.S.R.%):

Cocoon shell ratio for each treatment was calculated as follows:

$$\text{Cocoon shell ratio \%} = \frac{\text{Weight of cocoon shell}}{\text{Weight of cocoon}} \times 100$$

Total and mean weight/shell (in gms.) were calculated.

7- Growth Index:

Twenty five 5th instar larvae of one, three, five and seven day old were weighed (in gms) and the following formula was used for calculation of the Growth Index:

$$\text{Growth Index} = \frac{\text{Final weight of 5}^{\text{th}} \text{ instar} - \text{Initial 5}^{\text{th}} \text{ instar larval weight}}{\text{Initial larval weight of 5}^{\text{th}} \text{ instar (gms)}}$$

VI- Statistical analysis:

Obtained data were analysed using the factorial design. F-test was estimated for each analysis. The means were compared according to Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

I- Effects of used aqueous and alcoholic extracts on imported hybrid of silkworm summarized in Tables 1 and 2, respectively.

Table 1 show the effect of tested aqueous extracts on some growth parameters of silkworm. Maximum initial weight (gm) was detected n *B. asiatica* treatment, while maximum final weight (gm) and growth index of 5th instar larvae was found in Christ's thorn treatment. Maximum and highly significant silk gland weight (gm) in Christ's thorn (Hozaen) treatment. General significant increment in average larval weight (gm) was noticed in all used treatments except in case of *Psidium*, *L. camara*, *B. asiatica* and bee bread, where this increment was insignificant.

Silk gland/larval weight ratio % was generally decreased, except in mint treatment. Significant increase in fresh cocoon weight (gm) in *Eucalyptus*, and Christ's thorn treatments, while this increment was nonsignificant in mulberry, *Psidium*, *O. basilicum*, mint, *L. camara* and pollen treatments. Highly significant increase in pupal weight (gm) was measured in Christ's thorn (Baladi) treatment, only.

Significant increase in (C.S.W) in *Eucalyptus*, Christ's thorn (Baladi), mint, *O. basilicum*, pollen and propolis treatments. Insignificant increase in (C.S.R.%) was detected in *Eucalyptus*, *Psidium*, mint, and propolis treatment.

Effect of used alcoholic extracts on imported hybrid of silkworm is summarized in Table 2. Highest initial larval weight (gm) was detected in pollen treatment, while maximum final weight (gm) was found in *Eucalyptus* treatment, followed by: mulberry, Christ's thorn, *Psidium*, *O. basilicum*, mint, and bee bread treatments. Maximum larval growth index was found in mulberry treatment, followed by *Eucalyptus*, Christ's thorn, *Psidium* and *O. basilicum*, without significant differences.

Maximum significant increase in silk gland weight (gm) was detected in Christ's thorn (Baladi) treatment, followed with insignificant increment in *Eucalyptus*, mulberry, Christ's thorn (Hozaen), mint and *O. basilicum* trials. General significant increase in

average larval weight (gm) except in *B. asiatica*, *L. camara*, bee bread and pollen treatments. General and significant decrease in silk gland ratio was calculated in Christ's thorn, *O. basilicum*, mint and pollen treatments.

Significant increment in fresh cocoon weight (gm) in *Eucalyptus*, mulberry Christ's thorn, mint and pollen trials, while maximum weight was in Christ's thorn (Baladi) treatment. Maximum and significant pupal weight (gm) was in the last treatment, followed significantly by Christ's thorn (Hozaen), mulberry, mint, and pollen. Maximum significant figure of (C.S.W.) was measured in Christ's thorn (Bladi), followed by *Eucalyptus*, mulberry, Christ's thorn (Hozaen), *Psidium*, *O. basilicum*, and pollen treatments. Insignificant increase in (C.S.R.%) was noticed in *Psidium* treatment.

Table 1: Effect of feeding imported silkworm on treated mulberry leaves with aqueous extracts.

Parameters	Initial larval weight (g)	Final larval weight (g)	Range	Growth index	**	Silk gland weight (g)	**	Average larval weight (g)	**	Silk gland weight ratio %	**	Fresh cocoon weight (g)	**	Pupal weight (g)	**	Cocoon shell weight (g)	**	Cocoon shell ratio %	NS	
Treatments	Initial larval weight (g)	Final larval weight (g)	Range	Growth index	**	Silk gland weight (g)	**	Average larval weight (g)	**	Silk gland weight ratio %	**	Fresh cocoon weight (g)	**	Pupal weight (g)	**	Cocoon shell weight (g)	**	Cocoon shell ratio %	NS	
1- <i>Eucalyptus</i>	0.6545	3.5310	2.8765	4.3950	BCDE	0.8415	AB	2.9726	BC	28.31	BC	1.4213	AB	1.0994	ABC	0.3219	A	22.65	A	
2- Mulberry	0.6089	3.4868	2.8779	4.7264	AB	0.8096	ABC	3.2478	AB	24.93	CD	1.4044	ABCD	1.0998	ABC	0.3046	B	21.69	ABC	
3-Christ's thorn(Hozaen)	0.592	3.5459	2.9539	4.9897	AB	0.9110	A	3.2545	AB	27.99	BC	1.4145	ABC	1.1221	AB	0.2924	CD	20.67	BC	
4-Christ's thorn(Baladi)	0.618	3.7400	3.1220	5.0518	AB	0.8658	AB	3.2516	AB	26.63	BC	1.4696	A	1.1609	A	0.3087	B	21.00	ABC	
5- <i>Psidium</i>	0.6046	3.4226	2.8180	4.6609	ABC	0.7825	BC	2.6829	CD	29.16	ABC	1.2954	CDEF	1.1017	BCD	0.2817	EF	21.75	ABC	
6- <i>Ocinumbasilicum</i>	0.6209	3.3031	2.6822	4.3199	BCDE	0.8562	AB	3.3876	A	25.27	CD	1.3986	ABCD	1.1019	AB	0.2967	C	21.22	ABC	
7- Mint.	0.648	3.6119	2.9639	4.5739	ABCD	0.8579	AB	2.8645	BC	29.95	AB	1.3608	ABCDE	1.0665	ABCD	0.2943	C	21.62	ABC	
8- <i>Budleia asiatica</i>	0.6601	2.7748	2.1147	3.2306	F	0.7112	CD	2.5744	CD	27.63	BC	1.2239	F	0.9631	D	0.2608	G	21.31	ABC	
9- <i>Lantana camara</i>	0.6273	3.1551	2.5278	4.0297	DE	0.7058	CD	2.6382	CD	26.75	BC	1.3231	BCDEF	1.0616	ABCD	0.2615	G	19.76	C	
10- Pollen	0.6403	3.3248	2.6845	4.1926	BCDE	0.7754	BC	2.8486	BC	27.22	BC	1.3429	BCDEF	1.0565	ABCD	0.2864	DE	21.33	ABC	
11- Bee Bread.	0.643	3.1637	2.5207	3.9202	E	0.6939	CD	2.6356	CD	26.33	BC	1.2248	F	0.9643	D	0.2604	G	21.26	ABC	
12- Propolis	0.6266	3.0918	2.4652	3.9342	E	0.6387	D	2.9292	BC	21.80	D	1.2581	EF	0.9788	CD	0.2793	F	22.20	AB	
Control	0.6305	3.2367	2.6062	4.1335	CDE	0.7616	BC	2.3379	D	32.58	A	1.2862	DEF	1.0072	BCD	0.2790	F	21.69	ABC	
LSD value at 0.05 alpha level						0.5027		0.1066		0.3692		3.7210		0.1079		0.1043		0.00623		1.617
LSD value at 0.01 alpha level																				

Table 2: Effect of feeding imported silkworm on treated mulberry leaves with alcoholic extracts.

Parameters	Initial larval weight (g)	Final larval weight (g)	Range	Growth index	**	Silk gland weight (g)	**	Average larval weight (g)	**	Silk gland weight ratio %	**	Fresh cocoon weight (g)	**	Pupal weight (g)	**	Cocoon shell weight (g)	**	Cocoon shell ratio %	NS	
Treatments	Initial larval weight (g)	Final larval weight (g)	Range	Growth index	**	Silk gland weight (g)	**	Average larval weight (g)	**	Silk gland weight ratio %	**	Fresh cocoon weight (g)	**	Pupal weight (g)	**	Cocoon shell weight (g)	**	Cocoon shell ratio %	NS	
1- <i>Eucalyptus</i>	0.6248	3.6370	3.0122	4.8211	AB	0.8669	AB	3.1047	AB	27.92	BCD	1.3926	ABC	1.0904	AB	0.3022	BC	21.70	AB	
2- Mulberry	0.596	3.5477	2.9517	4.9525	AB	0.8797	AB	3.4264	AB	25.67	CDE	1.4080	ABC	1.1102	A	0.2978	C	21.15	AB	
3-Christ's thorn(Hozaen)	0.6229	3.4813	2.8584	4.5889	ABC	0.8896	AB	3.0654	ABC	29.02	ABCD	1.4396	AB	1.1377	A	0.3018	BC	20.97	AB	
4-Christ's thorn(Baladi)	0.6468	3.3698	2.7230	4.2100	BCD	0.9520	A	3.0278	ABC	31.44	ABCD	1.4571	A	1.1473	A	0.3098	A	21.26	AB	
5- <i>Psidium</i>	0.6086	3.4416	2.8330	5.6549	ABC	0.7831	BC	2.8034	BCD	27.93	BCD	1.3356	BCDE	1.0350	ABC	0.3006	C	22.51	A	
6- <i>Ocinumbasilicum</i>	0.6198	3.4740	2.8542	4.6047	ABC	0.8843	AB	3.0674	ABC	28.83	ABCD	1.3695	ABCD	1.0689	AB	0.3006	C	21.95	AB	
7- Mint.	0.6285	3.1856	2.5571	4.0685	CDE	0.8029	BC	2.8882	BCD	27.80	BCD	1.4489	AB	1.1406	A	0.3083	AB	21.28	AB	
8- <i>Budleiaasiatica</i>	0.6529	2.9966	2.3437	3.5897	E	0.7236	C	2.6706	CDE	27.09	BCDE	1.3158	CDE	1.0461	AB	0.2696	E	20.49	B	
9- <i>Lantana camara</i>	0.6516	2.9870	2.3354	3.5841	E	0.7227	C	2.4970	DE	28.94	ABCD	1.2540	EF	0.9869	BC	0.2671	E	21.30	AB	
10- Pollen	0.6574	3.2340	2.5766	3.9194	DE	0.7878	BC	2.6723	CDE	29.48	ABC	1.4206	ABC	1.1242	A	0.2963	C	20.86	AB	
11- Bee Bread.	0.6505	2.9801	2.3296	3.5810	E	0.5639	D	2.5503	DE	22.11	E	1.2476	EF	0.9957	BC	0.2519	G	20.19	B	
12- Propolis	0.6363	3.1578	2.5215	3.9628	DE	0.6892	C	2.8811	BCD	23.92	DE	1.1895	F	0.9288	C	0.2607	F	21.91	AB	
Control	0.6033	3.2162	2.6129	4.3310	ABCD	0.7947	BC	2.3464	E	33.87	A	1.2781	DEF	0.9966	BC	0.2815	D	22.03	A	
LSD value at 0.05 alpha level						0.5538		0.119		0.3653		4.704		0.1005		0.0965		0.00623		1.5
LSD value at 0.01 alpha level																				

Thus it is possible to say that, in imported hybrid of silkworm all differences between tested treatments

were highly significant in case of aqueous or alcoholic extracts, except in (C.S.R.%), where it was insignificant with both of aqueous or alcoholic extracts.

Effect of plant extracts was studied in India by Jeyapaul et al. (2003). Eswaran and Savarkodiyone (2004) used 1% aqueous extract tapioca flour and *Amaranthus* leaves for feeding of silkworms.

II- Effects of used aqueous and alcoholic extracts on local hybrid of silkworm summarized in Tables 3 and 4, respectively.

Effect of examined aqueous extracts on local hybrid of silkworm is summarized in Table 3. Maximum initial larval weight (gm) was found in *O. basilicum* treatment. General increase in silk gland weight (gm), except with bee bread was detected. It was significant in Christ's thorn (Hozaen) followed by: Christ's thorn, *Psidium*, mint and *L. camara*. A general increase in silk gland ratio was detected. It was significant in *Psidium*, followed by: *Eucalyptus*, Christ's thorn, *O. basilicum*, mint, *L. camara*, and pollen treatments.

Insignificant increment in cocoon fresh weight (gm) was found in *Eucalyptus*, mulberry, Christ's thorn,

L. camara, bee bread and maximum figure was noticed in pollen treatment. Insignificant increase in pupal weight (g) was measured in: mulberry, followed by: Christ's thorn, *B. asiatica*, *L. camara*, pollen and bee bread treatments.

General increase in (C.S.W) in all treatments, except bee bread. It was significant in: *Eucalyptus*, mulberry, Christ's thorn (Hozaen), *P. asiatica*, *L. camara*, and pollen treatments. A general increment in (C.S.R.%) was noticed in all examined aqueous extracts, except in bee bread treatments. This increment was significant in *Eucalyptus* and propolis trials.

Rajeswari and Isaiarasu (2004) found that extracts of *Moringa oliefera* (1% w/v) elicited a responses in the final instar larvae. The same was noticed in our work.

Hiware and Bhalarao (2008) used aqueous extracts of two medicinal plants and found interesting and pesticide results with respect to many parameters. Effect of used alcoholic extracts on local hybrid of silkworm are summarized in Table 4. Maximum initial weight (gm) was found in *O. basilicum* treatment.

Table 3: Effect of feeding local silkworm on treated mulberry leaves with aqueous extracts.

Parameters	Initial larval weight (g)	Final larval weight (g)	Range	Growth index	**	Silk gland weight (g)	NS	Average larval weight (g)	**	Silk gland weight ratio %	**	Fresh cocoon weight (g)	**	Pupal weight (g)	**	Cocoon shell weight (g)	**	Cocoon shell ratio %	**
1- <i>Eucalyptus</i>	0.6606	2.8283	2.1677	3.2814	ABCDE	0.8324	AB	2.5663	CDE	32.44	AB	1.1606	ABC	0.9095	ABCD	0.2511	AB	21.64	AB
2- Mulberry	0.7556	2.9390	2.1834	2.8896	DE	0.7649	ABC	2.6947	ABCDE	28.01	BCD	1.2366	ABC	0.9863	A	0.2503	AB	20.24	BC
3-Christrom(Hozaen)	0.6968	3.0265	2.3297	3.3434	ABCD	0.8983	A	2.8402	ABC	31.63	AB	1.1887	ABC	0.9354	ABCD	0.2534	A	21.32	ABC
4-Christ's thorn (Baladi)	0.6974	2.8605	2.1631	3.1017	BCDE	0.8518	A	2.5915	BCDE	32.87	AB	1.1514	ABCD	0.9159	ABCD	0.2355	ABC	20.45	ABC
5- <i>Psidium</i>	0.6299	2.8710	2.2411	3.5579	AB	0.8575	A	2.4739	DE	34.66	A	1.0824	CD	0.8533	CD	0.2291	BC	21.17	ABC
6- <i>Ocinumbasilicum</i>	0.8197	2.7514	1.9317	2.3566	F	0.8071	AB	2.7711	ABCDE	29.13	ABC	1.1196	BCD	0.8809	BCD	0.2387	ABC	21.32	ABC
7- Mint.	0.609	2.7037	2.0947	3.4396	ABC	0.8632	A	2.5720	CDE	33.56	AB	1.0587	D	0.8337	D	0.2250	C	21.25	ABC
8- <i>Budleia asiatica</i>	0.759	2.8762	2.1172	2.7895	EF	0.8230	AB	2.9048	ABC	28.33	BCD	1.2265	A	0.9723	AB	0.2541	A	20.72	ABC
9- <i>Lantana camara</i>	0.7875	2.9577	2.1702	2.7558	EF	0.8542	A	2.9173	AB	29.28	ABC	1.1833	AB	0.9338	ABCD	0.2495	AB	21.09	ABC
10- Pollen	0.6858	2.7362	2.0504	2.9898	CDE	0.8221	AB	2.4538	DE	33.50	AB	1.2268	A	0.9783	A	0.2485	AB	20.26	BC
11- Bee Bread.	0.6394	2.7307	2.0913	3.2707	ABCDE	0.6151	C	2.3961	E	25.67	CD	1.1483	ABCD	0.9654	AB	0.1829	D	15.93	D
12- Propolis	0.7369	2.8328	2.0959	2.8442	DEF	0.7557	ABC	2.6586	ABCDE	28.42	BCD	1.1075	BCD	0.8620	CD	0.2455	ABC	22.17	A
Control	0.6865	3.1938	2.5073	3.6523	A	0.6772	BC	2.9391	A	23.04	D	1.1390	ABCD	0.9148	ABCD	0.2243	C	19.69	C
LSD value at																			
0.05 alpha level					0.4746		0.1410		0.2967		5.0610		0.0859		0.0812		0.0197		1.5940
0.01 alpha level																			

Table 4: Effect of feeding of local silkworm on treated mulberry leaves with alcoholic extracts.

Parameters	Initial larval weight (g)	Final larval weight (g)	Range	Growth index	**	Silk gland weight (g)	**	Average larval weight (g)	**	Silk gland weight ratio %	**	Fresh cocoon weight (g)	**	Pupal weight (g)	**	Cocoon shell weight (g)	**	Cocoon shell ratio %	**
1- <i>Eucalyptus</i>	0.7766	2.9081	2.1315	2.7447	CDE	0.8202	ABC	2.5957	B	31.60	BCD	1.1446	AB	0.8993	AB	0.2453	AB	21.43	A
2- Mulberry	0.7105	2.9472	2.2367	3.1481	BCD	0.7602	BC	2.6961	AB	28.20	CDE	1.2197	A	0.9751	A	0.2446	AB	20.05	A
3-Christrom(Hozaen)	0.6948	2.8954	2.2006	3.1672	BCD	0.8445	ABC	2.5141	B	33.59	BC	1.2287	A	0.9800	A	0.2487	A	20.24	A
4-Christ's thorn (Baladi)	0.7506	3.0353	2.2847	3.0438	BCD	0.8745	AB	2.8317	AB	30.88	BCD	1.1825	A	0.9422	A	0.2403	ABCD	20.32	A
5- <i>Psidium</i>	0.6589	2.6892	2.0303	3.0813	BCD	0.9400	A	2.4139	B	38.94	A	1.0675	BC	0.8419	BC	0.2256	BCDE	21.13	A
6- <i>Ocinumbasilicum</i>	0.8345	3.0346	2.2001	2.6364	DE	0.7367	CD	2.5344	B	29.07	CDE	1.1765	A	0.9332	A	0.2433	ABCD	20.68	A
7- Mint.	0.6231	2.9189	2.2958	3.6845	A	0.7767	BC	2.8009	AB	27.73	DE	1.0286	C	0.8080	C	0.2206	DE	21.45	A
8- <i>Budleiaasiatica</i>	0.7601	3.1842	2.4241	3.1892	BC	0.8694	ABC	3.0867	A	28.17	DE	1.2463	A	0.9855	A	0.2608	A	20.93	A
9- <i>Lantana camara</i>	0.8019	2.6653	1.8634	2.3237	E	0.8829	AB	2.5133	B	35.13	AB	1.1813	A	0.9317	A	0.2496	A	21.13	A
10- Pollen	0.7079	2.7814	2.0735	2.9291	BCD	0.8201	ABC	2.6518	B	30.93	BCD	1.2255	A	0.9748	A	0.2507	A	20.46	A
11- Bee Bread.	0.6328	2.7599	2.1271	3.3614	AB	0.5793	E	2.0392	C	28.41	CDE	1.1500	AB	0.9450	A	0.2050	E	17.83	B
12- Propolis	0.7416	2.7820	2.0404	2.7513	CDE	0.7673	BC	2.5949	B	29.57	BCD	1.1656	A	0.9140	AB	0.2516	A	21.59	A
Control	0.67	3.2106	2.5406	3.7919	A	0.6313	DE	2.6753	B	23.60	E	1.0619	BC	0.8397	BC	0.2222	CDE	20.92	A
LSD value at																			
0.05 alpha level					0.4646		0.1192		0.3614		4.8450		0.0859		0.0812		0.0197		1.6670
0.01 alpha level																			

Maximum and significant increase in mean larval weight was detected in *B. asiatica* treatment, followed by insignificant increase in mulberry, Christ's thorn (Baladi) and mint. General increment in silk gland ratio was noticed. It was significant in *Eucalyptus*, Christ's thorn (Hozaen), *Psidium*, *B. asiatica*, *L. camara* and propolis.

Concerning fresh cocoon weight (g): significant increase was found in *B. asiatica*, followed by mulberry, Christ's thorn, *A. basilicum*, pollen, *L. camara*, and propolis.

Significant increase in pupal weight (gm) was noticed in treatments Christ's thorn (Hozaen), followed by mulberry, Christ's thorn (Baladi), *O. basilicum*, *B. asiatica*, *L. camara*, pollen and bee bread. Significant increment in (C.S.W.) was noticed in *B. asiatica*, followed by: *eucalyptus*, mulberry, Christ's thorn (Hozaen), *L. camara*, pollen and propolis. Insignificant increment, was noticed in (C.S.R.%), when alcoholic extracts of propolis, *L. camara*, *B. asiatica*, mint and *Eucalyptus*, were used.

Concerning feeding local hybrid of silkworm, on mulberry leaves which sprayed with alcoholic extracts, insignificant increment in (C.S.R.%) in five treatments.

From the above mentioned results, it can be concluded that aqueous extracts of *Eucalyptus* and propolis leads to increment in (C.S.R.%), in both of imported or local hybrids of silkworm. Aqueous or alcoholic extracts, increased (C.S.R.%) in local hybrid. Aqueous extracts increase (C.S.R.%) in 15 cases, while with alcoholic extracts it was detected in 6 cases only. This reflects the merits of using water extraction, and in the same time it is more cheap and available, as compared with using alcoholic extraction.

The best and more effective treatments during this work were: *Eucalyptus*, *Psidium*, and propolis.

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استخدام بعض المستخلصات النباتية ومنتجات طائفة النحل الهجين المستورد والمحلي لدودة الحرير التوتية (بومبيكس نوراي)

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تمت تغذية يرقات العمر الرابع والخامس لهجين دودة القز المستوردة والمحلية علي ٩ مستخلصات نباتية مائية أو كحولية وعلي ٣ من منتجات طائفة نحل العسل وكانت كما يلي: كافور، توت نبق (حزبن)، نبق (بلدي)، جوافة، ريحان، نعناع، بدليا، لانتانا بالإضافة إلي حبوب اللقاح، خبز النحل والبروبوليس. تم إجراء القياسات التالية: الوزن الإبتدائي والنهائي ومتوسط الوزن ومعامل النمو ليرقات دودة القز، وزن غدد الحرير ونسبتها للجسم %، وزن الشرائق الطازجة والعداري وغلّاف الشرنقة ثم حساب معامل غلّاف الشرنقة % . أدي استخدام المستخلصات المائية علي السلالة المستوردة إلي زيادة معنوية في وزن غلّاف الشرنقة (جم) في معاملات: كافور، نبق بلدي، ريحان، نعناع، وبروبوليس، ولوحظت زيادة غير معنوية في معامل غلّاف الشرنقة % وكافور، جوافة، نعناع، والبروبوليس، بينما بالنسبة للمستخلصات الكحولية كانت أعلى زيادة في وزن غلّاف الشرنقة في معاملة النبق البلدي ويليها: كافور، توت، نبق (حزبن)، جوافة، ريحان، نعناع في وجود فروق معنوية عن المقارنة. لوحظت زيادة غير معنوية في معامل غلّاف الشرنقة % في معاملة الجوافة، فقط. كانت كل الفروق معنوية بين المعاملات سواء بالنسبة للمستخلصات المائية أو الكحولية وذلك فيما عدا معامل غلّاف الشرنقة %.

عند تغذية السلالة المحلية لدودة القز علي أوراق توت مرشوش بالمستخلصات المائية المستخدمة ظهرت فروق معنوية في وزن غلّاف الشرنقة (جم) في معاملات: كافور، توت، نبق حزبن، بدليا، لانتانا، وحبوب اللقاح، وكانت الزيادات غير معنوية في معاملات: نبق بلدي، جوافة، ريحان ونعناع. لوحظت زيادة عامة في معامل غلّاف الشرنقة % فيما عدا معاملة خبز النحل وكانت الفروق معنوية في معاملي الكافور والبروبوليس. بينما بالنسبة للمستخلصات الكحولية كانت الزيادة معنوية في وزن غلّاف الشرنقة (جم) في معاملة البدليا ويليها: كافور، توت، نبق (حزبن)، لانتانا، حبوب لقاح وبروبوليس. لوحظت زيادة غير معنوية في معامل غلّاف الشرنقة % في معاملات: بروبوليس، لانتانا، بدليا، نعناع والكافور.

بالنسبة للسلالة المحلية لدودة القز لم يتم رصد فروق معنوية في معاملات المستخلصات الكحولية وكانت الزيادة غير معنوية في خمسة معاملات. أدت المستخلصات المائية للكافور والبروبوليس إلي زيادة معامل غلّاف الشرنقة % في كلا من الهجين المستورد أو المحلي. أدي استخدام المستخلص المائي والكحولي للبدليا والانتانا إلي زيادة معامل غلّاف الشرنقة % في السلالة المحلية. أدي استخدام المستخلصات المائية إلي زيادة معامل غلّاف الشرنقة % في ١٥ حالة، بينما بالنسبة للمستخلصات الكحولية كانت الزيادات في ٦ حالات فقط. كانت أفضل المعاملات هي الكافور، الجوافة، والبروبوليس.

إن استخدام الماء في عملية الاستخلاص أرخص وأفضل كثيراً من استخدام الكحول في هذا الشأن.