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EFFICACY OF SOME PLANT EXTRACTS IN CONTROLLING AND BIOCHEMISTRY OF *Spodoptera littoralis* (Boisd.) (Lepidoptera : Noctuidae)

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ABSTRACT

The objective of this study was conducted to determine the efficacy of three plant extracts; (Achook 0.15 % (Azadirchtin)), Cloves oil(*Syzygium aromaticum*) and Plant extract damasesa (Ambrosiamaritima) ,using different rates of concentrations on the fourth instar *S. littoralis* larvae mortality, the contents of carbohydrates, proteins and lipids and some enzymes activity. Obtained data showed that cloves oil exhibited the highest reduction percentages and toxic action followed by neem extract, while damasesa extract was the lowest one. The larval duration was significantly affected by all treatments, as well as the total carbohydrates, proteins and lipidssuffered considerable reduction of the treated 4th instar larvae of *S. littoralis* whereas, they were highly significant with cloves oil and Azadirchtin extract non-significant with damasesa extract, except total lipids were significant with both neem and damasesa extract.

The Trehalase, Amylase and Invertase enzymes were significant affected by different treatments.

INTRODUCTION

Egyptian cotton leaf warm *Spodoptera littoralis* (Boisd.) (Lepidoptera:Noctuidae), is considered the most important economic, polyphagous and widespread pest, not only an cotton plants ,but also, it infesting each plant has green parts , including, leaves, fruits and pods. information on development and different host crops is given by (Abd El-wahab 1982). the extensive use of insecticides to control *s. littoralis* larvae has led to its resistance to various classes of insecticides (Tabashink *et al* 1987).

In recent years, the use of environment friendly and safely, an easily biodegradable natural insecticide of plant origin has received more attention for control (Scott, 1999). Alternative methods pest controls are of prime importance, to replace insecticides that kill both pests and natural enemies (Berenbaum 1989). there fore, pest control has been directed to the utilization of biocontrol agents as safely sources, natural enemies (predators and parasites), plant extracts and plant oils (Naglaa, 2001).Especially botanical insecticides have been a subject of resistance in as effort develop alternatives to conventional insecticides . The multiple biological activities of various botanical extracts as repellent, toxic, antifeedant and production inhibitors against insects have been reported by several investigators as an example (Mordue and Blackwell,1993;Scott,1999 andAbd El- Wahab, 2003). The purpose of this work reported here evaluates the % mortality and Toxicity of Azadirchtin , Cloves oil and Damasesa extract treated the fourth instar *s.*

littoralis larvae mortality, carbohydrate, protein and lipid contents and some enzymes activity have been detected.

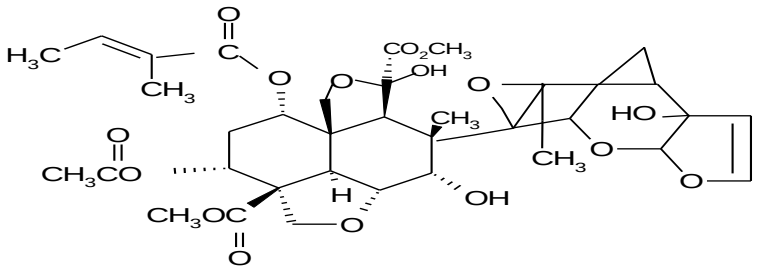
MATERIALS AND METHODS

The experiment was conducted under laboratory conditions, castor bean leaves were dipped in the tested concentration and left to dry. The 4th larval instars were allowed to feed on the leaves. Five replicates for each concentration were made. Mortality was recorded daily for 5days after treatment and the living ones of the treatment were examined daily until final mortality, and this mortality was calculated and corrected by (Abbott´s 1925). Data were plotted on log dosage Probit Papers and statistically analyzed according to (Finney 1952). The same technique was used with water only and the emulsifier as a control at Vegetable Plant Pests Department, Plant Protection Research Institute-Agriculture Research Center –Cairo. Egypt.

Chemical compounds tested:

Azadirachtin (Achook 0.15%) [neem kernel based EC containing Azadirachtin, *Azadirachta indica* A., Fam: Meliaceae]. Produced by Bahar Agrochem and Foods Pvt. Ltd., India.

Structure Formula:



C35H44O16

Chemical structure of Azadirachtin

Achook application rate were 15, 10 and 5 ml/1 liter water.

-Plant Extract damaseia Scientific Name *Ambrosia maritime*, English name: Damasesa (Family Compostiae) , concentrations used: at rate 15, 10 and 5 ml/1 liter water.

The natural oil, Clove-oil was bought from the local market and applicated rate 15, 10 and 5 ml/1 liter water.

Biochemical effects

Treated larvae of Clove-oil ;Neem extract and plant extract damasesa the LC50 (2.48; 4.69 and 7.32 ml) were used to determine the total carbohydrate, protein and lipid content, by the method described by Seifter *et al.* (1950). Total lipid content was determined according to Knight *et al.* (1972). Total protein was determined by the method (Wooten, 1964).

Invertase and amylase activity were determined according to Ishaayu and swirski (1970) and isahaaya *et al*. (1971)

Statistical analysis of Duncan's new multiple range tests were used for testing the difference between treatments were made according to (Le Clerg *et al.*, 1966).

RESULTS AND DISCUSSION

Data in Table (1) showed that clove oil exhibited the highest reduction percentages against 4th larval instar of *S. littoralis* after 5 days from treatment at all concentration. (98.6,96.6 &80.4%) with a general mean reduction mortality 91.6% ,while damasesa extract was the lowest one, whereas ,it gaves (74.0,50.5 &42.5%) with a general mean reduction 55.6 %.On the other hand neem extract proved to be intermediate to xic to treated larval instar after five days of treatment at all concentrations;15,10 &5 mL/liter water. Therefore, neem extract showed (79.0, 60.0&52.0 %) reduction percentages.

Table (1): Efficacy of some plant extracts against fourth instar of cotton leaf worm, *Spodoptera littoralis*(Boisd) larvae.

Treatment	Conc.	Corrected mortality %	Mean Gneral mortality %	Lc50	Lc90	Slope ± S.D.	Lc50/ Lc90	RR	P
Clove oil	15	98.0	91.6	2.48	6.96	2.86±0.6	0..35	1	0.01
	10	96.6							
	5	80.4							
Neem extract	15	79.0	66.6	4.69	30.7	1.6±0.43	0.15	1.5	0.01
	10	69.0							
	5	52.0							
damsesa	15	74.0	55.6	7.32	46.4	1.6±0.35	0.15	2.9	0.01
	10	50.5							
	5	42.5							

R: Resistance ratio compared with clove oil
P: Probability

The Lc50 values for clove oil and neem extract were (2.48 and 4.69 ml), while Lc90 values were for clove oil and neem extract were (6.96 and 30.7 ml), respectively .Neem extract and plant extract damasesa had the same slope values .Table (1) and Fig (1).

The 4th larval instar treated with 15 mml of the tested extracts, had a significant effects on the duration of 4th larval instar for clove oil ; neem extracts and plant extract damasesa, , compared with the control, respectively . Plant Extract damasesa had a significant effect on 4th larval instar reach to 4.75±0.85 days compared with 3.1±0.5 days for the control. Table (2).While 4th larval instar treated with 10 mml. Clove oil had a highly significant effects on the duration of 5th larval instar, compared with the untreated one (contol) Table (1).

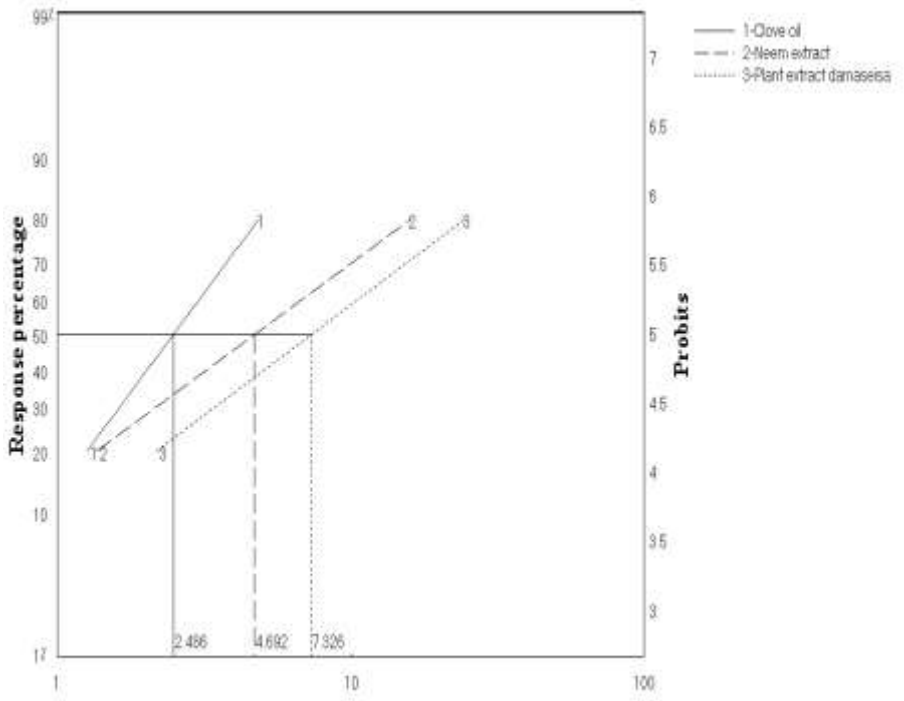


Fig. (1):Regression lines representing toxicity of some extracts against tofourth instar of cotton leaf worm, *Spodoptera littoralis*(Boisd) larvae after 5 days from treatment.

At concentration 10ml, clove oil and neem extracts had a significant effects on the duration of 5th larval instar compared with the control in the same Table(2). At concentration 5ml, clove oil had a significant effects on the duration of 4th larval instar compared with the control. These results were in agreement with results obtained by El- Sayed (1982) .

The results show that clove oil was the most effective plant extracts on 4th larval instar ,while plant extract damasesa was the low effective plant extracton 5th and 6 th larval instars resulted from treated larvae . These results are in agreement with Hegazy *et.al.* (1992) ,Taha (1997) and Mogahed and EL-Gengaihi (1998) .

In the Table (3) The results indicated that total carbohydrate, proteins and total lipids suffered considerable reduction in the treated 4th instar larvae of *Spodoptera littoralis* (Boisd.) with some plant extracts (plant extract damasesa, clove oil and neem extract) the carbohydrate was high significant with clove oil, neem extract and non-significant with plant extract damasesa, compared with control. The total proteins were high significant with clove oil and neem extract while plant extract damasesa and neem extract were significant effect compared with control. The total lipids were high significant with clove oil but significant with neem extract.

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Table (3): The Correlation between photochemical components of the 4th instar larvae of *Spodoptera littoralis* (Boisd) treated with some plant extracts and mortality

Components(Ug./Larvae)	Mean general mortality%			Control
	Clove oil	Neem extract	Plant extract damsasa	
	91.64	66.62	55.65	_
Total carbohydrate	310.7±7.34	294.6±3.11	279±2.44	479±7.01
r	-0.931	-0.929	-0.438	_
Total protein	655.3±9.81	646±12.49	534.7±12.86	588.7±10.26
r	0.983	0.949	-0.892	_
Total lipids	980±7.21	154±3.464	113.3±6.11	136.7±4.163
r	-0.88	0.99	-0.897	_

In this connection, our results could be supported by the work of Taha *et al* (1989) ; Abu El- Ghar *et al.* (1995) and Schmidt *et al.* (1998).

The result in Table (4) Trehalase is activated during moulting to generate production of glucose for chitin build-up. Invertase and amylase are also two important digestive enzymes, trehalase activity was reduced in neem extracts; Plant Extract damasesa and clove oil treatments compared with control. The effect of clove oil, neem extract treatment showed highly significant increased in case of amylase activity as compared with the control, whereas plant extract damasesa treatments caused significant decreased in case of amylase compared with the control. The percentages of reduction was (5.36 %) compared with control respectively. Also showed that there was a highly significant decreased in the invertase activity for 4th larval instar of *Spodoptera littoralis* (Boisd.) Treated with clove oil; neem extract and plant extract damasesa compared with control. Our results agreed with, Abdul Kareem (1980) and AboEL-Ghar *et al*. (1996) .

Table (4): Activity of carbohydrates hydrolyzing enzymes trehalase; amylase and invertase of the 4th larva instar of *Spodoptera littoralis* (Boisd) treated with some plant extracts.

Tested compounds	Enzyme activity expressed as Ug glucose/min/larva					
	Trehalas		Amylase		Invertase	
	Activity mean	Change%	Activity mean	Change%	Activity mean	Change%
Clove oil	**415.3±3.512**	**29**	**224.3±8.36**	**50.5**	**717±6.2**	**18.9**
Neem extract	**418.7±7.09**	**28.5**	**141±3.606**	**5.36**	**732.7±3.51**	**17.14**
Plant extract damsasa	**46.3±2.511**	**21.4**	**174.3±5.13**	**14.91**	**764±4.58**	**13.6**
Control	**585.7±2.51**	–	**149±6.5**	–	**884.3±7.234**	–

Highly significant at level 0.01%

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كفاءة بعض المستخلصات النباتية على تركيب الكيمياء الحيوية ومكافحة دودة ورق القطن ***Spodoptera littoralis*** **(Boisd)(Lepidoptera : Noctuidae)**

سامية عبد الفتاح ياسين
معهد وقاية النباتات –مركز البحوث الزراعية -الدقى

فى هذه الدراسة تم تقييم ثلاث مستخلصات نباتية هى زيت القرنفل ومستخلص النيم ومستخلص الدمسيسة بتركيزات مختلفة على العمر اليرقى الرابعلدودة ورق القطن لدراسة نسبة الخفض فى تعداد هذه اليرقات (الموت) بالاضافة الى تأثيرها على الكربوهيدرات والبروتيناتواللبيدات وايضا نشاط بعض الانزيمات الانفرتاز والاميليز وترى هاليز.

أوضحت النتائج المتحصل عليها أن المركبات المختبره أدت الى خفض فى تعداد اليرقات وصلت الى 98% لزيت القرنفل و97 % لمستخلص النيم و74 % لمستخلص الدمسيسة عند التركيز الاعلى 15 مم/لتر كما أن المستخلصات المختبرة كان لها تأثير على الكربوهيدرات والبروتينات واللبيدات بدرجات متفاوتة بالاضافة الى تأثيراتها على الانشطة الانزيمات المختبرة لذا فانه يمكن التوصيةباستخدامالبرامج هذه المستخلصات فىبرامج المكافحة المتكاملة لدودة ورق القطن على محاصيل الخضر باعتبارها من المركبات الامنة بيئيا.

قام بتحكيم البحث

أ.د / سمير صالح عوض الله — **كلية الزراعة – جامعة المنصورة**
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Table (2): Effect of some plant extracts on the biological aspects of egg masses of *Spodoptera littoralis* (Boisd) under laboratory conditions 25 c°±2 c° and 65±5% RH.

Developmental stages	Control	Duration of different stages at 15ml. (days)			L.S.D	Duration of different stages at 10ml. (days)			L.S.D	Duration of different stages at 5ml. (days)			L.S.D
		damsasa	Neem extract	Clove oil		damsasa	Neem extract	Clove oil		damsasa	Neem extract	Clove oil	
Incubation	2..2 ± 0.5	4.66±0.33*	3.5±0.5*	_	0.96	4.33±0.33**	3.5±0.5*	_	0.95	4.5±0.5*	4±0.57*	3.5±0.5*	0.91
1st instar	2.7 ±0.9	2.5±0.64	2±1	_	0.87	1.5±0.5*	2±0.57	_	0.88	2.66±0.88*	2.66±0.66*	1±0.0*	0.69
2nd instar	2.4 ± 0.5	3±0.40*	_	_	1.1	2.5±0.5	2.66±0.33	_	0.68	2.33±0.33	4±0.57*	_	0.84
3rd instar	2.6 ±0.5	1±0.0*	_	_	0.58	2.66±0.88		_	0.67	3±0.57*	2.66±0.33	_	0.89
4th instar	2..5 ±0.9	4.75±0.85*	_	_	0.99	4.25±0.62*		_	0.94	4.5±1.5*	2.33±0.33	_	0.93
5th instar	3.1 ± 0.5	_	_	_		4. 5±0.50		_	1.7	4±0.57*	2±0.0*	_	0.81
6 th instar	4..3 ± 0.1	_	_	_		5±1		_	1.1	2.66±0.33	4±0.57*	_	0.79
Total	16.0± 0.15	_	_	_		20.41±0.66*		_	1.9	19.15±0.6**9		_	1.2
Pre-pupa	0..95 ± 0.1	_	_	_		1.0±0.0		_	0.43	1.6±0.66		_	0.66
Pupa	10.6 ±0.16	_	_	_		10.6±0.88		_	3.5	7.25±0.85*		_	2.9
Pre-oviposation	2.18± 0.13	_	_	_		-		_		_		_	
oviposation	4.1±0.36	_	_	_		-		_		_		_	
Post-oviposatin	1.94±0.4	_	_	_		-		_		_		_	
femal Longevity	8.4±0.22	_	_	_		-		_		_		_	
male Longevity	6.8±0.21	_	_	_		-		_		_		_	
femal Life cycle	37.0±0.38	_	_	_		_		_		_		_	
male Life cycle	35.4±0.44	_	_	_		_		_		_		_	
femal Life spane	45.4±0.98	_	_	_		_		_		_		_	
Life spane	42.2±0.87	_	_	_		_		_		_		_	
hatchability	96.9%	_	_	_		-		_		_		_	