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Control of the Fig Longihorne Beetle, *Hesperophanes griseus* (Fabricius) (Coleoptera: Cerambycidae) on the Fig Trees, *Ficus carica* L

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ABSTRACT

The long-horned beetle (LHB), *Hesperophanes griseus* (Fabricius) (Coleoptera: Cerambycidae) is one of the most destructive pests of fig trees (*Ficus carica* L.) in Egypt. Some safe control measures were experimented for controlling LHB in fig orchards at El- Twayle village, Arish city, North Sinai Governorate, Egypt, using extracts of Antholyza, (*Antholyza ringens*) ; Hawthorn, (*Crataegus sinaica*) and Chey-laurel (*Prunus laurocerasus*) as well as mechanical treatments including pruning of infested fig trees branches, worming existed larvae inside their tunnels or both treatments. All above mentioned treatments significantly suppressed the population of the pest. *A. ringens* extract at the rate of 5% was the most effective treatment (82.09% reduction). Practicing both pruning and worming together magnified their role in controlling the pest, whereas the level of infestation was reduced by 55.38%. Mechanical control followed by applications of the plant extracts was advocated for reducing the population of *H. griseus* larvae to its minimum level in fig orchards.

Key words: *Hesperophanes griseus*, fig, pruning, worming, plant extracts, control

INTRODUCTION

Ficus carica L. has been cultivated for a long time in various places worldwide for its edible fruit. Remnants of figs has been found in excavations of sites dating as far back as at least 5,000 B.C. *F. carica* presumed to originate from Western Asia and spread to the Mediterranean by humans. It is an important world fruity crop today.

Fig trees are infested with several insect pests mainly stem borers, scale insects, mealy bugs, and fruit flies, (Ismail and Abdalla, 2001). The long-horned beetle, *Hesperophanes griseus* (F.). (Coleoptera: Cerambycidae) is considered a serious borer on fig trees (*Ficus carica*), (Özdikmen and Şahin, 2006). Newly hatched larvae boring and feeding just beneath the bark. As the larvae grow older, deeply excavate longitudinal cylindrical tunnels were found parallel to the axes of the stems. In case of severe infestation, the trees undergo stress weakness which hardly affected the yield of fig.

Trials to control this pest were directed only towards chemical treatments with insecticides in vineyards and in fig orchards (Kinawy 1981 and Tadros, 1982).

Previous trial for *H. griseus* control was processed with conventional chemical pesticides causing many hazardous and pollution to the environment. Therefore, the present study aimed to investigate some safe alternatives such as natural plant extracts and agricultural practices to reduce the level of *H. griseus* infestation in fig orchards. This may offer a reliable role in exploring integrated pest control program in fig orchards.

MATERIALS AND METHODS

Field experiments were conducted in three localities in three infested fig orchards at El- Twayle village, Arish city, North Sinai Governorate, Egypt. The three localities were designated to test the effect of the plant extracts from Antholyza, (*Antholyza ringens*); Hawthorn, (*Crataegus sinaica*) and Chey-laurel (*Prunus laurocerasus*), agriculture practices (pruning and worming) and integration of both on *H. griseus* infestation.

The fig trees in each locality were (8-10) years old and about 2.5 m in height. The 1st experiment was divided into 10 randomized plots, each containing 10 trees. Nine plots were treated with the tested extracts (one plot/ extract /concentration), whereas, the 10th plot was left untreated for check.

The tested plant extracts at each proposed concentration were inserted into the active larval tunnels – indicating the existence of alive larvae.

Injection was accomplished with a syringe (20 ml). Evaluation of treatments was carried out 15 days after application by counting the numbers of active larvae in tunnels containing the alive larvae in treated and untreated trees, (Salama and Ismail, 2007).

Plant materials:

Antholyza, Hawthorn and Chey-laurel were collected from El-Arish area, North Sinai. The plants were kindly identified by Prof. Dr. M. El-Gebali,

National Research Centre, Egypt. The total herbs of tested plants were air dried separately and ground into fine powder.

About 250g of each air dried plant powder (all parts of herb) was defatted in soxhelt extractor using 70 % methanol. The alcoholic extracts were evaporated under vacuum at about 45° C till dryness.

Water emulsions were prepared by mixing five drops of Tween-60 as emulsifier with 5g of plant extract, then water was added up to 100 ml to obtain 5% concentration of plant extract. The other desired dilutions were prepared from the stock emulsion (5%), (El-Gengaihi *et al.* 2002).

Mechanical control:

In the 2nd infested fig orchard, mechanical treatments including pruning of infested branches of fig trees, worming the larvae into their tunnels and both treatments together were performed as follows:

Four randomize selected plots were divided equally into four groups, each contained 10 trees. The 1st ,2nd and 3rd groups received the treatments of pruning, worming and both pruning and worming together, respectively, while the 4th group was the check. Worming treatment was carried out to kill the old larvae inside their tunnels by mean of a flexible wire hooked at its top.

Trees were examined 15days after mechanical treatments to evaluate their efficacy in the reduction of *H. griseus* infestation by counting the number of active larval tunnels in treated and untreated trees. All these experiments were carried out during the two successive years (2005 and 2006).

Integrated action of plant extracts and mechanical methods:

An integrated control program was carried out by the techniques of both mechanical methods (pruning and worming) beside the tested bio-insecticides (plant extracts), in the 3rd infested fig orchard.

The efficacy of all control treatments of the present work was calculated by means of the following formula:

% Reduction of infestation = [(C-T) / C] x 100

Where: C= Mean number of active larval tunnels in untreated trees.

T= Mean number of active larval tunnels in treated trees.

Data were statistically analyzed using Duncan's

RESULTS AND DISCUSSION

1- Effect of plant extracts:

Results in Table (1) indicated that insertion effects of each of the three tested plant extracts (*A. ringens*; *C. sinaica* and *P. laurocerasus*) at the concentrations of 5, 2.5 and 1.25% in the larval active tunnels infestation. Reduction of *H. griseus* larvae ranged between 37.31 - 82.09 %.

Data presented in Table (1) showed a positive correlation between concentrations of plant extracts and the reduction percentage of larval infestation, however, *A. ringens* at 5% concentration level was the most effective treatment (82.09% reduction).

Analysis of data indicated that the tested plant extracts at almost all concentration levels caused significant reduction in the calculated levels of larval infestation.

The extract of *P. laurocerasus*, showed the least effect, especially at 1.25% concentration (37.31% reduction).

Table (1): Influence of three tested plant extracts upon *H. griseus* infestation in fig orchard trees at El-Arish region, season 2005 and 2006.

Plant extract	% Concentration	Mean no. of alive larvae/tree	% Reduction of infestation
Antholyza ringens	5	1.2 b	82.09
	2.5	2.3 c	65.67
	1.25	3.7 b	44.78
Crataegus sinaica	5	1.7 c	74.63
	2.5	2.4 c	64.18
	1.25	3.9 b	41.79
Prunus laurocerasus	5	1.9 c	71.64
	2.5	2.5 c	62.69
	1.25	4.2 ab	37.31
Untreated control	0.0	6.7 a	0.0

Means within a column followed by the same letter are not significantly different at 5% level.

2- Effect of mechanical methods:

Data in Table (2) indicated that the separate performance of either pruning or worming process showed 29.23 and 46.15%, reduction in insect infestation, respectively.

Practicing both pruning and worming together magnified their role for controlling the pest, whereas the level of infestation was reduced by 55.38%, which almost indicated additive effects of the two treatments.

reduction in infested fig trees due to the treatment of either pruning or worming or both (Benz, 1971 and Matter & Zohdy, 1981).

The above mentioned results are in agreement with those of Kinawy *et. al*, (1992) in apple orchard against *Paropta paradoxa*, and Tadros *et. al*, (1993) in grapevine orchards.

Table (2): Effect of mechanical control on the infestation level of *H. griseus* infestation in fig orchard trees at El-Arish region, season 2005 and 2006.

Treatment	Mean no. of alive larvae /tree	% Reduction of infestation
Pruning	4.6 ab	29.23
Worming	3.5 bc	46.15
Pruning + Worming	2.9 c	55.38
Untreated control	6.5 a	0.0

Means within a column followed by the same letter are not significantly different at 5.0% level.

3- Integrated action of plant extracts and mechanical methods:

Mechanical control was carried out once during January by only pruning and burning the infested branches; in addition to, worming the old larvae into their tunnels. Later using the three tested plant extracts started in April, 2005 and 2006.

Data in Table (3) indicated that the combined effects of the mechanical methods and either of *A. ringens, C. sinaica* or *P. laurocerasus* extracts reduced the infestation by 92.45, 81.13 or 77.36%, respectively.

Table (3): Integrated effect of plant extracts and mechanical control (both P and W) on *H. griseus* infestation in fig orchard trees at El-Arish region, season 2005 and 2006.

Treatment		Mean no. of alive larvae/tree	% Reduction of infestation
Extract	Mechanical		
Antholyza ringens 5%	*P+**W	0.4 [c]	92.45
Crataegus sinaica 5%	P+W	1.0 [b]	81.13
Prunus laurocerasus 5%	P+W	1.2 [b]	77.36
Untreated control	-	5.2 [a]	0.0

Means within a column followed by the same letter are not significantly different at 5% level.
* Pruning ** Worming

In conclusion, annual performance of pruning and worming techniques in early winter season, followed by applications of plant extracts in April may help in reducing the population of *H. griseus* larvae to a minimum level in fig orchards. Such work needs further studies for chemical analyses and active ingredient (s) of the three tested plant extracts to know which material or factor(s) are important for control such insect pest and environmental friendly.

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