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EFFECT OF HORTICULTURAL, MECHANICAL AND CHEMICAL TREATMENTS ON THE REDUCTION OF *MACROTOMA PALMATA* INFESTATION IN APRICOT ORCHARDS

A.W. TADROS, M.H. SAAFAN AND W.A. SHEHATA

Plant Protection Research Institute, Agriultural Research Centre, Dokki, Egypt.

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Abstract

The effect of horticultural (Pruning), mechanical (worming) and mechano/chemical (injection) treatments, as well as the three treatments all together was evaluated as means of reducing *Macrotoma palmata* F. (Coleoptera : Cerambycidae) infestation in aprioct orchards at Kalubia Governorate during the period from October, 1991 to October, 1993. The percentage reduction of infestation due to pruning, worming, injection treatments and the three treatments together for one year (1991 - 1992 or 1992 - 1993 seasons) was 7.2 - 9.6%, 21.8 - 23.1%, 33.9 - 34.6% and 56.9 - 59.1%, respectively. The cumulative effect for the two successive seasons had resulted in 17.3, 35.9, 47.5 and 74.8%, respectively. This programme eliminates environmental pollution and magnifies the role of biological control agents.

INTRODUCTION

In Egypt, the sunt macrotoma, *Macrotoma palmata* F. (Coleoptera : Cerambycidae) is a serious pest on more than 20 fruit tree species and 24 wood and ornamental tree species (Alfieri, 1909, 1976; Nour, 1963; Mostafa, 1977; Tadros et al., 1993). Apricot trees, *Prunus armeniaca* are subject to considerable infestation with *M. plamata* (Clainpanain , 1917). Tadros *et al.* (in press) recorded severe infestation in apricot orchards at Kalubia governorate (34.2%), the beetles started to emerge during June and continued until October. Willcocks (1992) stated that eggs were laid in cracks in the bark of stem and branches, and the larvae bore their de-

structive tunnels inside the heart-wood of trees.

Apart from the bioassay on eggs carried out by El-Sebay (1984), nothing was done to control this pest in fruit orchards. On the other hand, chemical control treatments alone pollute the environment and adversely affect biological control agents, mainly parasites and predators.

The aim of the present study is to evaluate the effects of alternative safe treatments (horticultural, mechanical and mechano / chemical treatments) as methods for reducing *M.palmata* infestation on apricot trees.

MATERIALS AND METHODS

Studies were carried out during the period from October, 1991 until September, 1994 to evaluate the effect of horticultural (pruning), mechanical (worming) and mechano / chemical treatments as well as the three treatments together on the reduction of *M.palmata* infestation in apricot orchards at Tokh district, Kalubia Governorate. An orchard was divided into 15 plots (16 trees each) and each of the four treatments was randomly replicated three times. Three replicales were left untreated as a control. In order to eliminate interaction between treatments, only data of the internal four trees of each replicate were inspected and considered in the experiments .

A. First year trials (October 1991 - September 1992)

1- Horticultural treatment (Pruning)

During winter, pruning was carried out each year in December. Dried and infested branches and stubs as well as the crowded and undesired branches were removed using the saw and not the battle axe. The pruned sites were painted with Bordeaux mixture. Supports (or stands) of all fruit and wood tree species were replaced with Melia azadirachta L.(Arabic : Zanzalakht) or guava branches only. All the waste was burned outside the orchard.

2- Mechanical treatment (Worming)

From October to Sepember of the next year, grown larvae, prepupae and pupae were killed inside their tunnels by pushing a flexible wire hooked at its tip inside the larval tunnel which starts with an outside hole. Jack knife could be used to facilitate reaching the larval tunnel. This treatment was applied six times each year at 2

month intervals. Resulting wounds were painted with Bordeaux mixture.

3- Mechano / chemical treatment (Injection)

Active holes harbouring alive larvae, prepupae or pupae were injected with Phosalone (Zolone Z35%) paste by means of a special gun instrument (one shot / tunnel). This treatment was applied twice on the 28 th of April and 15th of July, 1992.

4- Horticultural (Pruning), mechanical (worming) and mecha-no/ chemical (injection) treatments together

This treatment included pruning, worming and injection altogether.

Treated and untreated trees were inspected the next year in October, 1993. Evaluation of the four treatments together was based on the following formula:

% reduction of infestation = (C-T) / C X 100 where, C = the mean number of new emergence holes / tree in untreated plots.

T = the mean number of new emergence holes / tree in treated plots.

B. Second Year trials (October, 1992 - September, 1993)

During the second season, the same experimental design and treatments were repeated in the same orchard to study the effect of each treatment for two successive years, and in another apricot orchard in the same district to confirm the first year trials.

RESULTS AND DISCUSSION

1- Horticultural treatment (Pruning)

Data in Table 1 indicated that the effect of pruning treatment for one year experiment slightly reduced *M.palmata* infestation in apricot orchards. The percentage reduction of infestation ranged from 4 to 13% (mean, 7.2%) and from 3 to 18% (mean, 9.6%) during 1991 - 1992 and 1992 - 1993 seasons, respectively.

Application of pruning for two successive years showed a slow increase in percentage reduction of *M.palmata* infestation resulting in 6- 29% (mean, 17.3%).

Although this horticultural treatment slowly affected *M. palmata* infestation during the one and two-year experiments, yet on the long run, pruning all infested and dried branches and stubs, on addition to the removal of the undesired branches with the saw and not with the battle axe, and painting the pruned sites with a suitable fungicide, then collecting all these wastes with the supports of fruit and wood tree specied and burning them, could satisfactorily reduce *M. palmata* infestation. Supports should be made from *Melia azadirachta* L. or guava wood.

On the other hand, increasing tress health through adequate pruning, manuring, chemical fertilization, irrigation, drainage, hoeing, .. etc., could give rise to vigorous trees capable to tolerate infestation.

2- Machanical treatment (worming)

Killing active larvae, prepupae, and pupae in addition to newly formed adults before emerging from the tree trunk and branches by pulling them from their tunnels with a wire (worming), is quite an effective treatment in reducing *M.palmata* infestation in apricot orchards.

Table 1. Percentages of reduction of *Macrotoma palmata* infestation on apricot trees treated with pruning, worming, injection and the three treatments together at Kalubia Governorate for one year (1991 - 1992 or 1992 - 1993) and for two successive years, (1991 - 1993).

Treatment	Percentages reduction of infestation		
	one year treatment		Two year treatment
	1991 / 1992	1992 / 1993	1991 / 1993
Pruning	7.2 (4-13)	9.6 (3-18)	17.3 (6-29)
Worming	21.8 (18.39	23.1 (11-52)	35.9 (23-58)
Injection	34.6 (14-52)	33.9 (10-39)	47.5 (23-58)
Pruning Worming and Injection	56.9 (51-61)	59.1 (50-67)	74.8 (65-78)

Data in Table 1 show that one year treatment had resulted in 18-39% (mean, 21.8%) and 11-42% (mean, 23.1%) reduction in infestation during 1991 - 1992 and 1992-1993 seasons, respectively. The cumulative effect for the two successive seasons reached 23-58% (mean, 35.9%) reduction in infestation.

3- Machano / Chemical treatment (Injection)

Injecting the insecticide Zolone Z 35% as a paste inside the active holes harbouring larvae, prepupae and pupae, had reduced infestation by 14-52% (mean, 34.6%) and 10-39% (mean, 33.9%) when was applied for only one year (1991 - 1992 or 1992 - 1993, respectively). Applying the same treatment for two successive seasons (1991 - 1993) had increasingly reduced the infestation by 31-58%(mean, 47.5%) (Table 1).

4- Pruning, worming and injection treatments all together

Table 1 further showed that applying the three treatments (pruning, worming and injection) all together in the same season had increasingly reduced the percentages of reduction by 51-64% (mean, 56.9%) and 50-67% (mean, 59.1%) during 1991 - 1992 and 1992 - 1993 seasons, respectively. Applying this programme for two successive seasons increased the percentage reduction of infestation to 65 - 78% (mean, 74.8%).

It is therefore apparent that applying horticultural (pruning), mechanical (worming) and or mechano - chemical (injection) treatments periodically in apricot orchards could satisfactorily control *M.palmata.* This control programme matches environmental cleanliness, and magnifies the role of the biological control agents in the orchards.

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تأثير المعاملات البستانية والميكانيكية والكيماوية على تقليل الاصابة بحفار ساق السنط فى حدائق المشمس

انطون ولسن تادرس ، محمد حسن سعفان
وجيه أيوب شحاته

معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الدقى .

أجرى تقييم للعمليات البستانية (التقليم) والميكانيكية (السلك) والميكانو – كيماوية (الحقن بمبيد) بالاضافة الى العمليات الثلاثة معا كوسائل لتقليل الاصابة بحفار ساق السنط (رتبة غمدية الأجنحة وعائلة سيرامبيسدى) وذلك فى حدائق المشمش فى محافظة القليوبية خلال الفترة من أكتوبر ١٩٩١ حتى اكتوبر ١٩٩٣. أظهرت النتائج أن النسبة المئوية لتقليل الاصابة بالحفار نتيجة عمليات التقليم والسلك والحقن والثلاثة معاملات معا لمدة عام واحد فقط (١٩٩١ / ١٩٩٢ أو ١٩٩٢ / ١٩٩٣) كانت ٧,٢ – ٩,٦٪ ، ٢١,٨ – ٢٣,٩ ، ٣٤,٩ – ٥٩,١ ٪ ، على الترتيب . أما التأثير المتراكم لهذه المعاملات لمدة عامين متتاليين (١٩٩١ / ١٩٩٢ و ١٩٩٢ / ١٩٩٣) فقد أدى إلى تقليل الاصابة بنسبة ١٧,٣ ، ٣٥,٩ ، ٤٧,٥ ٧٤,٨ ٪ ، على الترتيب . ويؤدى هذا البرنامج إلى تقليل التلوث فى البيئة كما أنه يعظم دور الأعداء الحيوية .