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IMPACT OF THE ENTOMOPHAGOUS FAUNA ON THE *Parlatoria blanchardii* TARG POPULATION IN THE BISKRA REGION
Part II

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Abstract *: Based on the Iperti scale (1987), infestation map of Parlatoria blanchardii Targ on the date palm trees in the Biskra region shows different levels of infestation . These are du either to the presence or the absence of natural and local predators of P. blanchardii such as Pharoscymus semiglobusus and Cybocephalus palmarum.*
To elliminate or at least to decrease the white cochenial population, individuals of Pharoscymus semiglobusus and Cybocephalus palmarum were taken from oasis classified as free of P. blanchardii and relocated in infested ones.
Two sites were selected ; the first one as a sampling site with an average mean of 59 white cochenial / m² and 10 predators in the same palm leaf , the second as a receiving site with an average mean of 171,4 white cochenial / cm² of palm leaf and where almost no predators were recorded .
A known number of individuals of the predatory fauna were taken from the first site and relocated in the second one in a known number of date palm trees. Before relocating the predators, P.blanchardii population was measured in the receiving site and every 30 days during the two next months. After this period of time, population of P.blanchardii decreased in some cases up to 50%.
Besides that, the observed pattern proved that in presence of its natural predators, P.blanchardii population could be decreased or at least kept at an acceptable level.This relocating technique could be used as an alternative to the conventioanal one i.e. an increase of the predatory population in a breeding unit and then its release in infested oasis.

Key Words *: levels of infestation, relocating, entomophagous fauna, taking site, receiving site.*

الملخـــــص : أظهرت خريطة الاضرار التي تسببها القشريات البيضاء على أشجار النخيل في منطقة بسكرة، إصابات متفاوتة الدرجة و ذلك حسب سلم ايبراتي (1987).

و على ما يبدو أن هذه الفروق في الإصابة تكون ناتجة ، أما عن تواجد مجموعة عشيرة الحشرات الخاتلة للقشريات البيضاء مثل ، *Cybocephalus sp. Pharoscymnus semiglobosus* أو الى انعدامها.

و بهدف التقليص أو على الاقل التخفيض من مجموعة القشريات البيضاء في بساتين النخيل و التي صنفت على آنها بساتين ذات درجات عالية من الإصابة بهذه الحشرة الضارة. قمنا بتحويل و تغيير لموقع عدد من مجموعة عشيرة الحشرات الخاتلة من بساتين النخيل التي صنفت درجات إصابتها بالحشرة الضارة إلى مستويات ضئيلة و التي تحتوي خاصـــة على عدد كافي من الحشـــــرات الخاتلـــة مثل *Cybocephalus sp. Pharoscymunus ovoideus* و نقلها الى البساتين المصابة بدرجات عالية بالقشريات البيضاء.

موقعين تجريبيين تم إنتقائهما ، بحيث يكون الأول موقعا للاستقبال و يحتوي على معدل إصابة بالقشريات البيضاء بنسبة 171،4 قشرة/سم^2 من مساحة الوريقة و تنعدم به مجموعة الحشرات الخاتلة أما الثاني ، يمثل موقعا لسحب عدد من الحشرات الخاتلة و سجل به معدل إصابة بالقشريات البيضاء بنسبة 59 قشيرة/سم^2 من مساحة الوريقة و تتواجد به ايضا نسبة تقدر بعشرة (10) حشرة قاتلة في الجريدة الواحدة.

عدد معينا من افراد عشيرة الحشرات الخاتلة تم نقلها و تحويلها من موقع السحب الى موقع الاستقبال و نشرها و توزيعها على عدد معينا من أشجار النخيل المصاب.

و كانت قد تمت قراءات لمعرفة درجات الإصابة بالقشريات البيضاء على مستوى النخيل شهر قبل المعالجة ثم شهرين بعد المعالجة. في هذه الفترة ، تقلص معدل عدد القشريات البيضاء بصفة محسوسة ، و إنخفض الى 50 بالمئة في بعض النخيل المعالج.

هذه النتائج أكدت على أنه من الممكن التقليص في معدل الإصابة بهذه الحشرة الضارة أو على الأقل تثبيتها الى مستويـــــات مقبولة و هذا إذا قمنا بتوفير العدد الكافي من الحشـــرات الخاتلة في تعايش مع *Parlatoria blanchardii TARG* لوحدة تربية تكاثر الحشرات المفترسة.

الكلمات الدالة : درجات الإصابة ، تحويل ، الحشرات الخاتلة ، موقع السحب ، موقع الإستقبال.

INTRODUCTION

Among the many problems and constraints that face the date palm trees in the Biskra region, *Parlatoria blanchardii Targ* is actually a real threat not only for the growth of the palm tree but also for its fruits.

Notwithstanding the eradicating means used it is widely accepted that if the white cochenial is living in presence of its natural predators, it could be possible to control its population . The damages caused on date palm trees could be also kept at a relatively acceptable level with preservation of the environment.

To reach these two aims , this experiment was conducted in two parts. The first one started in april 1997 and lasted 6 months (Mohammedi and Salhi, 1999). Througout this period, the main activities were focused on the understanding of :

- The extent of the infestation by *P. blanchardii* in the Biskra region.
- The relationship between *P. blanchardii* and its local predatory fauna. (Table I).

The second part of this experiment started in June 1998, where two oasis or experimental sites were selected using two criteria :

- Levels of infestation in the two oasis by *P. blanchardii*
- The population of the entomophagous fauna living in the same oasis

A Known number of local predators of *P.blanchardii* was relocated from the first oasis to the second one.

Table I : Infestation levels by *P. blanchardii* in the 17 oasis selected for the experiment throughout the Biskra region. (Mohammedi and Salhi 1999)

	Districts	Number of Date palm Trees	Number of white cochenils/cm²	Infestation levels (1)
1	Sidi Okba	213 100	101	2
2	Ourlal (Saâda)	110 168	128	2
3	El Haouch	72 302	117	2
4	Oumache	106 011	112	2
5	Aïn Naga	32 777	125	2
6	Chetma	72 800	126	2
7	Bouchagroun	61 100	58	1
8	El Hadjeb	116739	51	1
9	Lichana	74 900	48	1
10	El Ghrous	85 600	38	1
11	Magtoufa	209 000	59	1
12	Ouled Djellal	166 500	12	0.5
13	Sidi Khaled	82 000	13	0.5
14	Lioua	155 520	05	0.5
15	Mekhadma	96 848	15	0.5
16	M'lili	109 351	08	0.5
17	El Kantara	16 500	10	0.5

(1) According to the Iperti Scale (1987)

This transfer or relocating individuals of the entomophagous species such as *Pharoscymus semiglobusus* and *P. ovoidus* should be able to reduce the white cochenial population in the receiving site and will tend to create an equilibrium between the two populations.

This trend and/or control of P. *blanchardii* by its natural predators such as *C. palmarum* and *P. anchorago* was reported by Balachowski (1926). Iperti and al (1970) confirmed. the same phenomena with *Chilochrus bipustulatus*.

MATERIAL AND METHODS

1 - Selection of the two sites :

With its low level of infestation by *P. blanchardii* and the presence of local predators in high number, Magtoufa district was selected as the «taking» site. The «receiving» site was located in Oumache district (Table II).The same criteria as for the «taking» site were used however with reversed values. Distance between the two selected sites is around 62 Km.

Table II : Criteria used in the experiment to select the receiving and the taking sites.

Criteria used to Select the tow Sites	Taking site	Receiving site	Selected sites
Number of white cochenials/cm²	59	171,4	Magtoufa
Number of predators/palm leaf	10	0	Oumache

2 - Relocating Process :

Three predatory species were selected for the experiment : *Pharoscymus semiglobusus*, *P. ovoidus and Cybocephalus palmarum* . Individuals from this species were picket up from the lowest crown of the date palm trees. Each palm leaf was covered with a 1m x 2m of white clowth and shaken hardly. The white clowth was then layed down on the ground and all predators found in this clowth were collected put in test tubes and taken back to the laboratory for identification , selection and counting .

All selected individuals were settled back in test tubes and taken to the receiving site. These were then freed onto the palm leaves of the date palm trees used for the experiment (Fig.1) Seventeen date palm trees were taken at random in the receiving site. 5 groups of 10 individuals of the predatory species were freed in each of the 17 date palm trees. The first four groups were put in opposite palm leaf, the fifth in the middle of the crown.

Each of the 4 palm leaves that received the predatory individuals was covered with a piece of tulle.

To measure the impact of the entomophagous fauna used in this experiment on *P. blanchardii* population, three countings were carried out. The first one before the beginning of the treatment, while the next ones were done respectively at the end of september and october 1998.

Twelve leaflets were cut from each of the date palm trees taken back to the laboratory to be examined under a dissecting binocular.

Three samples of 1cm were taken to be used for this counting. Two of the three samples were taken on both end of the leaflet, the third one in its middle. With a specific ruler, individuals of *P. blanchardii* present on the 12 leaflets were counted. Empty follicles were disreagarded. The average mean of the three samplings were taken as the infestation average mean of each leaflet. The 12 means from the 12 leaflets were taken as the infestation level of each date palm tree (Table III).

Table III : Average mean of infestation by *P. blanchardii* in the 17 date palm trees throughout the experimental period (individuals of white cochenial / cm)

Date palm trees Treated Pu / y (1)	Before treatment	After 1 month	After 2 months
P 1/7	190	169	124
P 10/7	196	174	124
P 12/7	192	144	99
P 13/7	182	140	120
P 15/7	160	140	69
P 16/4	152	112	86
P 8/10	167	136	101
P 10/10	186	158	112
P 13/10	172	166	105
P 14/10	198	176	112
P 17/10	150	136	96
P 18/10	193	174	104
P 6/2	167	144	98
P 9/2	174	156	112
P 16/5	130	99	74
P 1/6	163	140	109
P 2/6	142	120	59

(1) u = Palm tree, y = line tree in the oasis.

RESULTS

After transformation of the observed infestation means in the treated date palm trees into differences between each of the three countings that is, before treatment, one month then tow months later, results were analysed using ANOVA (Table IV). All sources of variance as well as interactions exhibited highly significant levels ($P < 0,001$), suggesting that there is an impact of the entomophagous fauna on the white cochenial population. Furthermore, to test the lack of consistancy of the treatment over the two months, a 5% S.N.K. test (Steel and Torrie, 1980) was carried out through

$$Wp = q \propto (p, f)\, Sy$$

$$p = t\ ,\ t\text{-}1\ ,\ldots\ldots,2$$

using q from the upper 5% points of the standartized range, where :

p = t = full number of variables, and
f = error d f

A summary of the results using underscores (Table V) shows that there is a consistancy in the decreasing of the white cochenial population in the 17 treated date palm trees suggeting that the applied treatment was very efficient over the two countings.

Table IV : Analysis of variance of the impact of the entamaphagous fauna on *P. blanchardii* population during the experimental period.

	D.F	**M.S**	**F**
Locations	16	1 087,73	12,57***
Countings	2	22 131,38	255,74***
Error	**32**	**86,54**	

Figure 2 shows also very clearly that the number of white cochenials individuals decreased with the applied treatment. Further more this decreasing trend was more or less constant after the two months.

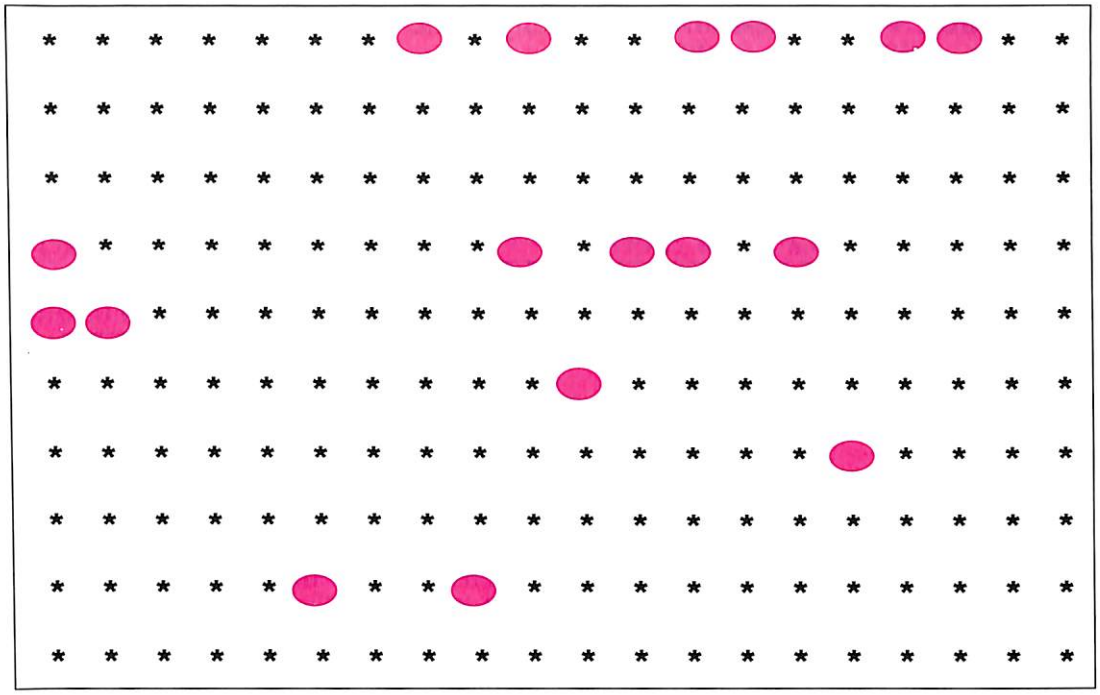

Figure 1 : receiving site of Oumache

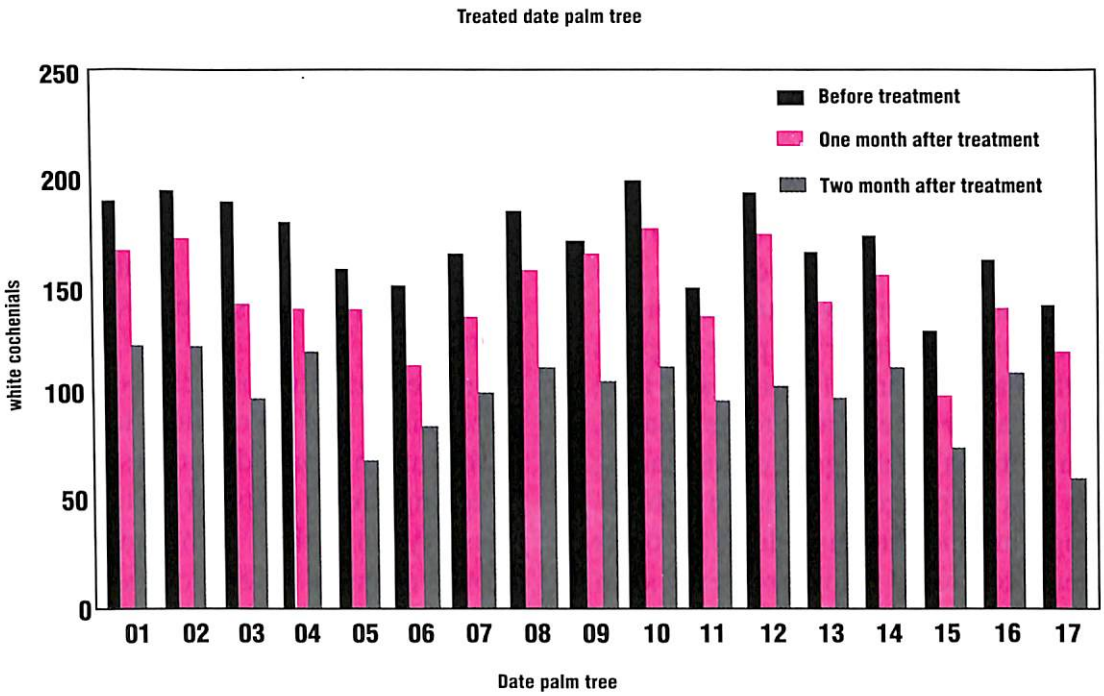

Figure 2 : Evolution of the averages means of the white Cochenials population over the three counting in the treated palm trees.

Table V : SNK test for homogeneity of the mean responses of the entomophagous fauna throughout the experimental period at 5% level

P	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
Wp	15,47	18,66	20,58	21,95	23,01	23,88	24,61	25,24	25,79	26,29	26,73	27,14	27,51	27,85	28,17	28,16	
Sorted Means	164	162	161	157	152	147	147	147	145	137	136	134	127	123	116	107	101

DISCUSSIONS

Throughout many regions of the world many techniques have been tried to eradicate or at least reduce the white cochenial population. Burning the leaves has been used up to the moment where it was found that some individuals if the parasite could survive an/or hide under some parts of the date palm tree such as the bark. Treatment with chemical products showed also its limits in terms of high costs, environmental effects etc...

One way that could avoid many negative aspects of common use means is without any doubt the biological way. However in poor regions with scarce financial means and long distances between oasis to be treated, conventional techniques of increasing the entomophagous fauna in a breeding unit and then its release in oasis seems to create many problems such as :

- high costs of the breeding unit and its equipments .
- acclimatization and adaptation of the new colony to a new and sometimes hostile environment.

Sensitivity of the new bred colony in regard to its unknown enemies living in the new environment

The method suggested in this paper that is the delocation of a known number of individuals from the local entomophagous fauna from a less infested site to a more infested one by the white cochenial seems in the first place very efficient. Analysis of these first results are very promising in a way that the population of the white cochenial living in the treated palm trees decreased in some cases up to 50%.

Besides that, the first results are very promising, the delocation technique offers much more advantages than the breeding unit, costs of equipments, mastery of the technique etc... However many aspects of the delocation technique have to be perfected at a small and/or medium scale before its generalization at a field scale.

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