

Contribution to a Study of the Effect of the Essential Oil of Henna (*Lawsonia inermis* L), on the Biological Aspect of White Scale (*Parlatoria blanchardi* targ) of Date Palm

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ABSTRACT

The study was carried to evaluate the effect of the essential oil of henna's leaves on the biological aspects (egg, larvae and adults stages) of *Parlatoria blanchardi*. The insect is one of the serious pest infected the date palm cultivated in Algeria. The sample of leaves of date palm infested by the insect putted in Petri dishes were treated under the laboratory conditions with 05 treatments (C0, C1, C2, C+, C-); two were obtained by the dilution of the essential oil (the concentration of 5 % and 20 % of essential oil) and three controls (two negative controls and an insecticide as positive control). The results obtained in the earliest 06 days of the experimentation, showed that the two treatments of the essential oil caused high mortality on different stages of *Parlatoria blanchardi*, close to those obtained with the control with a delay of one day.

Keywords: Bioinsecticide, Essential oil, White scale, Serious pest, Laboratory conditions, High mortality.

INTRODUCTION

Discovered in 1868 by. Blanchard M.E., in an oasis of the Oued-Righ, in the Algerian Sahara. White scale, caused by *Parlatoria blanchardii* Targ. is widely present in most date palm growing areas of the world. It is considered a serious pest in Algeria. There are no date palm areas free from the attack of *Parlatoria blanchardi*.¹ Damage by white scale is very serious on young palms between two to eight years of age, but even under severe attacks, the palm and its offshoots do not die, Nymphs and adults suck the sap from the leaflet, midribs and the dates. Under each scale insect, a discolored area appears on the leaflet. Heavy infestation causes leaflets to turn yellow and contributes to the premature death of the fronds.² In recent years, the importance of essential oils as biocides and insect repellents has led to a more detailed study of their antimicrobial potential.³ Since the last century the henna

flowers named "Faghia" were used as bio insecticide to protect the wool against worms that may develop in it.⁴

Our work consists in studying the effect of essential oils of henna's leaves (*Lawsonia inermis* L) on the evolution of populations (egg stage, larvae and adult) of the white scale (*Parlatoria blanchardi*) of the date palm.

MATERIAL AND METHODS

Plant material

The sample of fresh leaves is collected from shrub of henna cultivated in a village based in Sidi Okba (department of Biskra Algeria) on March 2016.

Animal material

The animal material consists of individuals of *Parlatoria blanchardi* on palms took from the medium foliage of a young date palm,

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cultivated in Agronomics Sciences Department, University of Biskra.

Insecticide

The insecticide used as positive control is the petroleum oil, which is used frequently by farmers to treat against *Parlatoria blanchardi*.

METHODS

The extraction of essential oil was carried out by the hydro-distillation type Clevenger, we weighted 750 g of fresh leaves were placed in a flask of 2 L containing 1.5 L of distilled water at temperature of 100°C during 4 h. The organic layer was separated from the water than the distillate was dehydrated using anhydrous sodium sulfate

Yield of essential oil

The yield of essential oil is defined as the ratio between the mass of essential oil obtained and the mass of the plant material to be treated.⁵

Treatments preparation

We tested during our study two dilutions from the extracted essential oil by adjusting the volume with ethanol: C₁ dose: The less concentrated dilution with 5% of essential oil; and the C₂: dose with 20% of essential oil. The dose C+ (the positive control) was obtained by taking 0.1 ml of insecticide adjusted to 100 ml of ethanol. The two last treatment were the negative control C- equivalent volume of ethanol, and the C0 applying only the equivalent volume of water.

All the treatments prepared were sprayed on the leaves, and covered by the lid of Petri dishes.

Estimation of the infestation

The EUVRETE method⁶ was used to estimate the infestation rate of each leaflet taken and returned to the laboratory. This consists of choosing 3 cm² on the upper face of the leaflet. All the individuals of the

different stages (egg, larvae and adult stages) were counted under a binocular (X 50)

Statistical analysis

Statistical analyzes were performed using the Statistica version 8 software, which allowed the analysis of variance (ANOVA) in two ways and the comparison of means by the Fisher LSD test.

RESULTS AND DISCUSSIONS

The yield of essential oil

The yield of extracted essential oil from henna leaves was 1.06 %. This result is improved; it is more than obtained by Rahmat *et al*, where it was 0.83%.

The effect of treatments on different stages of *P. blanchardi* life

The effect of the two dilutions of essential oil and the three controls are summarized in Table 1 and Figure 1. From those results, we can deduce that the effect of C+ appear after one day of treatment spraying on larvae and adult stages. Focusing on the 4th day of the experiment we can deduce that the stage egg is the more resistant; at the time when the number of larvae and adults is reduced 100 % on this day the eggs are not affected by the insecticide.

Chemical control using insecticides to treat against *P. blanchardi* caused mortality percentages of 73.2 and 80.0 according to the plot. Biological control using beetles resulted in mortality percentages of 18.1 and 19.7. The use of bio-insecticide can be the ideal alternative of chemicals because those affected the pest but also the auxiliary.⁸

Other experiment that study the effect of different extracts from the leaves of *L. inermis* against blowfly, showed that the egg stage of the insect was the most resistant stage to all plants extract that used especially water and hexane extracts, and the highest mortality

Table 1: The effect the treatments on the number of the larvae and the egg stages.

Treatments	Larvae stage				Egg stage			
	j1	J2	j4	j6	j1	j2	j4	j6
C0	1361.25 F	971.5 D	381.5 B	0.0 A	681J	487.75E	347.25D	0.0A
C1	1355 F	650.75 D	421.5 B	0.0 A	678.5J	322D	206.5C	0.0A
C2	1330 F	386.75 B	5.75 A	0.0 A	666.25F	193.5C	50.75B	0.0A
C+	1215.75 ^E	19.75 A	0.0 A	0.0 A	685.75J	10E	342.25D	0.0A
C-	1356.25 F	976.5 D	663.5 C	0.0 A	617F	387.25E	0.0A	0.0A

Mean values followed by the same letter in the same column are not significantly different according to the Fischer LSD test at P < 0.05.

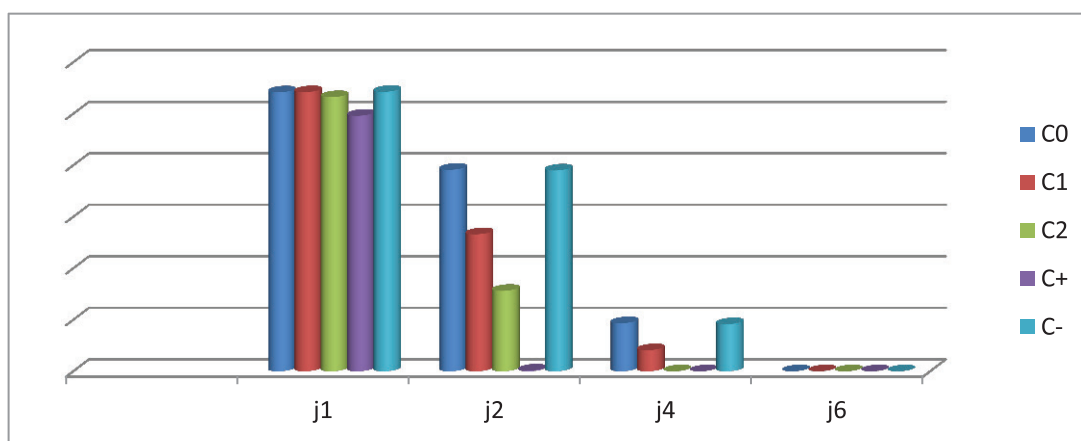


Figure 1: The effect of the treatments on the number of the adult stage.

percentage was recorded with the crude extract of *L. intermis* on 100 % concentration.⁹

CONCLUSION

The main result of this study is that the essential oils extracted from henna leaves can affect on *P. blanchardi*. The concentration of 20% of essential oil can induce mortality of larvae and adult stage delayed by one day from the C+. This experimentation should be conducted on field in order to obtain results applicable by farmers.

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CONFLICT OF INTEREST

None

ABBREVIATION USED

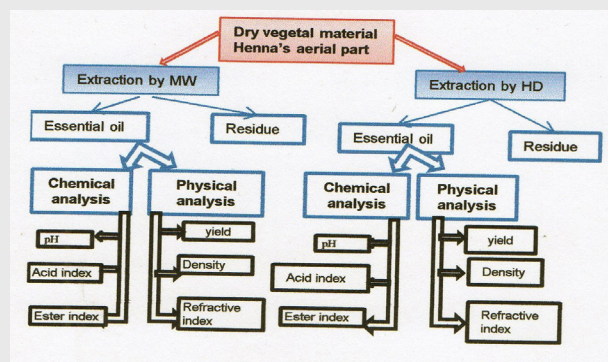
C1: 5% of essential oil; C2: 20% of essential oil; C+: volum of petroleum oil; C0: volume of water; C-: vol-

ume of ethanol; J1-J2-J4-J6: 1st-2nd-4th-6th day after treatment.

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PICTORIAL ABSTRACT



SUMMARY

- The aromatic oil extracted from the leaves and the seed of henna used to prepare two dilutions of bioinsecticides.
- The *in vitro* anti-insecticide activity of essential oil was tested against different stages of the white scale; the results were statistically interpreted.
- The treatment C2 (20% of essential oil) induced mortality of larvae and adult stage delayed by one day from the C+ (insecticide).

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