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Study of the level of infestation by the white cochineal *Parlatoria blanchardi* Targ.1868 (Homoptera, Diaspididae) on the principal varieties of date palm in the valley of Oued Righ (South East of Algeria)

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Abstract

In the palm groves of the region of Oued Righ, the density of white cochineal varies according to several factors. We quote the variety, the age of the palm tree and the foliar crown. The variety Deglet Nour is more infested with regard to Ghars and Degla Beida with respectively 23.25; 9.06 and 1.57 cochineals / cm².

Concerning the foliar crown, the infestation is higher at the level of the lower crown with 41.65 cochineals / cm² for Deglet Nour, 15.61 for Ghars and 2.21 for Degla Beida. On the other hand, the low infestation is registered at the level of the superior crown with respectively 5.35; 2.13 and 1.03 cochineals / cm².

As for the age of palm trees, the young palm of Deglet Nour are more affected with regard to the old palm trees with respectively 24.11 and 22.39 cochineals / cm².

Keywords: Date palm, Oued Righ, palm grove, variety, white cochineal

1. Introduction

Algeria is the biggest country among Al-Maghrab Arab countries in respect of growing date palm and was at sixth position in the list of top ten countries of the world during the year 2010. Oases cover 57% in the North-East of the Algeria Sahara (Zibans, Oued Righ, El Oued and Ouargla) and 43% in the West (M'zab, Touat, Gourara and Saoura) [1]. The number of date palm is estimated at more than 18 millions trees, whose more than 4 millions belong to Deglet-Nour variety and 1000 other varieties [2]. A yearly average production estimated at more than 500000 tons annually [3].

The date palm is among the strategic cultures in the dry zones, because this species is adapted in the conditions of these regions. It is distributed in most of the Saharan zones. The zone of the South-East is more productive in quantity and quality; in particular for the best variety with 48% of the total production, this variety is intended most of the time for the export [3].

Date palm cultivation with the position that takes over in Saharan agriculture constitutes the main resource of people within Saharan regions of Algeria [4]. Date production remains correlated with the number of productive tree and their state. The yields obtained are very weak (35 kg / tree) [2]. This product is affected in quantity and in quality by various factors which could be linked to climate, soil, tree age, water quality, fertilization, irrigation, drainage, diseases and pests, cares of bunches from pollination to harvest.

Among the depredators more and more redoubtable is white scale (*Parlatoria blanchardi* Targioni-Tozetti 1892) which is known in Algeria for a long time. There isn't any date palm grove unscathed of white scale attack [5].

In fact, intense population of *P. blanchardi* doesn't impede the normal plant growth solely. But it causes premature desiccation of palms and can lead up to a total loss of a vegetal as robust as date palm tree [6].

2. Materials and methods

This study realized in region of Oued Righ region, South-East of Algeria. The palm groves are characterized by the presence of diversity of date palm.

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The vegetal material studied is date palm tree, whose selection criteria are: the variety and age of palm trees. For this reason we have retained the three principal varieties: Deglet-Nour, Ghars and Degla-Beida with the young palm 10 year-old and the adult palm 50 year-old.

We have chosen 10 palm trees whose 5 young and 5 adult for each variety which will be used for sampling.

Within each palm tree, we have subdivided foliage on three levels: The upper crown, the middle crown and the lower crown.

On each level of the foliage and by taking into account of the four orientations: North, South, East and West. One palm was chosen from which was sampled 3 leaflets: one from the peak, one from the middle, the other from the base of palm.

Once these leaflets brought back to the laboratory, we take 3 samples of 1 cm² of the two faces, in order to count of the existing cochineals.

A total counting of white cochineal population was carried out using binocular magnifying glass. Then we obtain for each foliar face the values of A1, A2, A3 (number of cochineals for three cm² chosen). Superior face $f_s = A1+A2+A3 / 3$ and lower face $f_l = A1+A2+A3 / 3$. The population density of cochineals is then: $f_s + f_l / 2$ [7, 8, 9].

3. Results and discussions

3.1 Relation of the infestation according to the variety of date palm

The results obtained during one year are summarized in figure 1.

The results of this study show that the Deglet-Nour variety is more sensitive to *P. blanchardi* attacks with 23.25 cochineals / cm², in comparison with Ghars and Degla-Beida whose infestation is 9.06 and 1.57 cochineals / cm² respectively. The differences of infestations between three varieties of date palm are bound to the effect exercised by the plant host on the devastating.

Indeed, [10] and [11] found in the region of Ouargla the similar results as found in the present study our. [12, 13] also found differences of the rate of infestation by the white cochineal between three varieties of date palm in the region of Biskra, but according to them, it is the variety Ghars which is the most infested, followed by Deglet Nour. The lowest infestation is registered on the Degla Beida variety.

According to [13], various factors such as the climate, the natural enemies and the plant host act on the biology of the devastating and interfere between them to modulate the digital importance of the populations of cochineal. However, [14] indicated that the relation plants hosts-cochineal is of nutritional order. Hosts Plants according to the importance of the nourishing elements which they arrange have a big influence on the development of the stinging-sucking arthropods among others diaspsines by modifying considerably their behavior. [12]

Shows that there exists a positive correlation between the foliar contents in nitrogen, calcium, magnesium and in total sugars of three varieties of date palms (Deglet Nour, Degla Beida and Ghars) and between their rates of infestation by *P. blanchardi*. Besides the author was able to highlight that the rate of infestation by the diaspsine evolves conversely with the foliar content in potassium and in water of three varieties. According to [15], the nitrogen and the sugars are two groups of nourishing compounds play a key role in the growth and the development of the plant-eating insects.

The study of [12] relative to the infestation of *P. blanchardi* on three varieties showed that there exists a significant difference

with the content of sepals nourishing elements between three varieties. According to the same author, the sepals of the Ghars variety presented a high content in nitrogen and total sugars with regard the Deglet Nour. The lowest content is registered on Degla Beida.

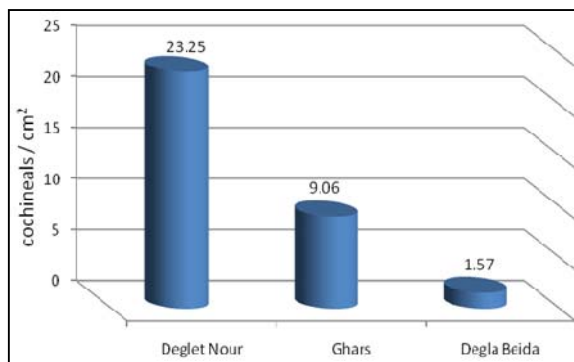


Fig 1: Distribution of white cochineal according to varieties of date palm

3.2 Relation of the infestation according to the foliar crown

Concerning the infestation of different crown of Deglet Nour variety, the results obtained (figure 2). Indicate that the levels which are more occupied by white cochineal are the old palms constituting lower crown with an infestation level of 41.65 cochineals/cm², followed by middle crown with 22.71 cochineals/cm². On the other hand, the low infestations are noticed on young palms which constitute the upper crown with 5.35 cochineals/cm².

Concerning the Degla Beida and Ghars varieties the heaviest infestations were observed on the level of the lower crowns with respectively 2.21 and 15.6 cochineals / cm². Followed by middle crown with 1.43 and 9.56 cochineals / cm². The upper crowns are slightly infested with 1.03 and 2.13 cochineals / cm².

Our results Match with those of [16] who indicated that the palms which establish the outside crown support the highest infestations of *P. blanchardi*, than the average crowns are less infested, and the low infestation is noted at the level of the superior crowns. [17]

In Mauritania and [10] in the region of Ouargla, also found that infestations are higher at the level of the outside crown to all the varieties of palm tree.

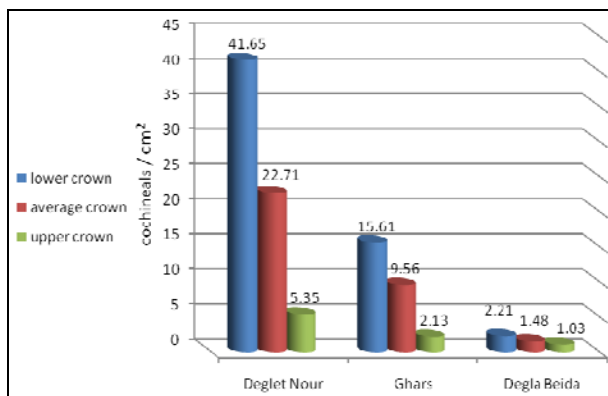


Fig 2: Distribution of white cochineal on foliar crown

3.3 Relation of the infestation according to the age of date palm

The results concerning the effect of the palm tree age on the

infestation (figure 3) level showed that the young palm trees of Deglet Nour variety are more infested than the old palm trees with degrees of infestation respectively 24.11 cochineals/cm² and 22.39 cochineals / cm².

Concerning the Ghars variety, in fact the old palm trees are more infested with 11.11 cochineals / cm² compared to the young palm trees with 7 cochineals / cm².

Concerning Degla Beida variety, palm age has no net difference of infestation.

This difference on the rate of infestation at the Ghars variety compared to the Deglet Nour variety could be explained by the nature of the biotope, which is characterized by a great heterogeneity of date palms age. Consequently, the palm trees which have a low height, such as in the case of the Ghars variety are less sunny and shaded compared to those of Degla-Beida and Deglet-Nour which can prevent the influence of certain climatic parameters (solar radiation, temperature) on the degree of infestation.

Our results go to the same sense with those of ¹⁸ and ¹⁹ who indicated that the white cochineal is very harmful to the plantations of date palm in particular on the young trees.

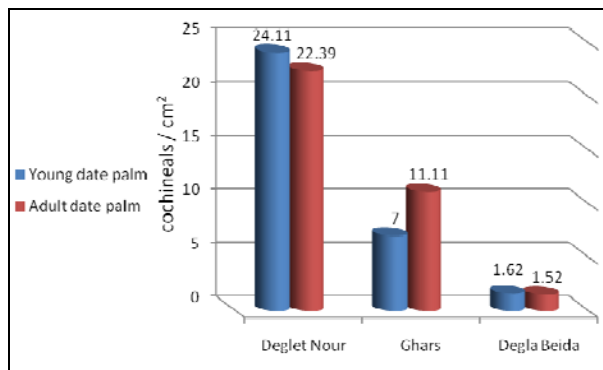


Fig 3: Distribution of white cochineal according to age of date palm

4. Conclusion

The study of the relationship of infestation by white cochineal (*Parlatoria blanchardi*) and variety of date palm in the region of Oued Righ concluded that Deglet-Nour is more infested than Ghars and Degla Beida with density respectively of 23.25; 9.06 and 1.57 cochineals / cm².

Concerning the effect of foliar crown, the results obtained indicate that the crown has a remarkable difference of infestation. Then the lower crown is infested with average degrees of infestation of 41.65 cochineals / cm² in Deglet Nour; 15 cochineals / cm² in Ghars and 2.21 cochineals / cm² in Degla Beida.

Concerning palm trees age for Deglet Nour the young palm trees are more attacked than the old palm trees with respectively 24.11 and 22.39 cochineals / cm². For Ghars, the adult palm trees are more attacked than the young palm trees with respectively 11.11 and 7 cochineals / cm².

With regard to Degla Beida, the age of the palm trees haven't any effect on the degree of infestation.

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