

## Some biological aspects of *Virachola livia* on *Acacia farnesiana* in the South of Tunisia

Rym Mkaouar<sup>a,\*</sup>, Samir Dhahri<sup>a</sup>, Mohamed Lahbib Ben Jamaa<sup>a</sup>

**Abstract:** The pomegranate butterfly *Virachola livia* constitutes a severe pest to the pomegranate in Tunisia, since its record in 2006. However, *V. livia* was found to breed not only in the pomegranate but also in the pods of *Acacia farnesiana* which is a very common plant in Gabes region (South-East of Tunisia). This study which was carried out in Metwia (the most infested area in Gabes) from April to July 2013, aims to clarify some biological aspects of *V. livia* on *A. farnesiana* such as: fly of adults, egg laying, larva development, pupae and number of generation. Randomized samples of green *Acacia* pods were collected weekly from different trees of *A. farnesiana*. In the lab, pods were examined under a binocular to detect eggs, after pods were desiccated to count larva stage and pupae. The monitoring of adults activity and emergence were made by experimental apparatus both in the field and the laboratory. The preliminary results show that *A. farnesiana* is the main and primary host plant of *V. livia* in South Tunisia. On *A. farnesiana* this pest develops three annual generations, each one lasts about four weeks. The first generation starts late in April and finished in the end of May. The second one is from the end of May to about the twenty five of the next month; the third is from the last one to the middle of July. Due to the absence of green pods on the tree from July, the butterfly migrates to its alternative host the pomegranate.

**Keywords:** *Virachola livia*, *Acacia farnesiana*, Bioecology, Tunisia

## Güney Tunus'ta *Acacia farnesiana* üzerinde yaşayan *Virachola livia*'nın bazı biyolojik özellikleri

**Özet:** Nar kelebeği *Virachola livia*, 2006 yılında ilk kez kaydedildiği zamandan bu yana Tunus'ta narlar için çok zararlı bir böcek olmuştur. Ancak, *V. livia*'nın sadece nardan değil aynı zamanda Gabes bölgesinde (Tunus'un Güneydoğusu) çok yaygın bir bitki türü olan *Acacia farnesiana*'nın tohumlarında da beslendiği tespit edilmiştir. Nisan ve Temmuz 2013 arasında Metwia bölgesinde (Gabes'te en çok istila edilen bölge) gerçekleştirilen bu çalışmanın amacı, *A. farnesiana* ile beslenen *V. livia* böceklerinin ergin uçuşu, yumurtlama, larva gelişimi, pupa ve nesil sayısı gibi bazı biyolojik özelliklerini açıklığa kavuşturmaktır. *A. farnesiana* türünde yer alan farklı yeşil Akasya ağaçlarının tohumlarından haftalık olarak rasgele örnekler alınmıştır. Larvaları ve pupa evresini saymak için tohumlar kurutulduktan sonra yumurtaları belirlemek üzere laboratuvarında binoküler ile incelenmiştir. Ergin böceklerin aktivitesi ve çıkışı, hem sahada hem de laboratuvarında deney aleti ile izlenmiştir. İlk sonuçlar, *A. farnesiana*'nın Güney Tunus'ta *V. livia* için ana ve birincil konukçu bitki olduğunu göstermektedir. Bu böcekler *A. farnesiana* üzerinde üç senelik nesil geliştirmektedir ve her senelik nesil yaklaşık dört hafta sürmektedir. İlk nesil nisan ayının sonlarında başlayıp mayıs ayının sonunda ömrünü tamamlamaktadır. İkinci nesil, mayıs sonlarında başlayıp bir sonraki ayın yirmi beşinci gününe kadar sürmektedir. Üçüncü nesil ise en son aydan başlayıp temmuz ortasına kadar devam etmektedir. Temmuz itibarıyla ağaçlarda yeşil tohum zarfları olmadığı için, kelekler alternatif konukçu olan nar bitkilerine göç etmektedir.

**Anahtar kelimeler:** *Virachola livia*, *Acacia farnesiana*, Biyo-ekoloji, Tunus

### 1. Introduction

The pomegranate butterfly *Virachola livia* constitutes a severe pest to the pomegranate in Tunisia, since its record in 2006. However, *V. livia* was found to breed not only in the pomegranate but also in the pods of *Acacia farnesiana* which is a very common plant in Gabes region (South-East of Tunisia). The genus *Acacia* is one of the most useful types for the economy because it plays an important role in soil science, agriculture, reforestation and farming. In

southern Tunisia, several species of Acacias, including *Acacia farnesiana* have been planted since the 60s as windbreaks around irrigated pomegranate.

However, many questions remain raised, both on the migration of the pest *V. livia* from *Acacia* to the pomegranate, both biology and the understanding of the involvement of Acacias in outbreaks of the pest and the considerable decrease in pomegranate production. In a previous work, we show that *Acacia farnesiana* is considered the secondary host of *V. livia* (Mkaouar et al

✉ <sup>a</sup> Laboratoire "Gestion et Valorisation des Ressources Forestières", INRGREF, BP 10, 2080, Ariana, Tunisie

@ <sup>\*</sup> Corresponding author (İletişim yazarı): mkaouar19@yahoo.fr

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2013). In this work, we aim to clarify some biological aspects of *V. livia* on *A. farnesiana* such as: fly of adults, egg laying, larva development, pupae and number of generation.

## 2. Material and methods

### 2.1. Studied localities (Figure 1)

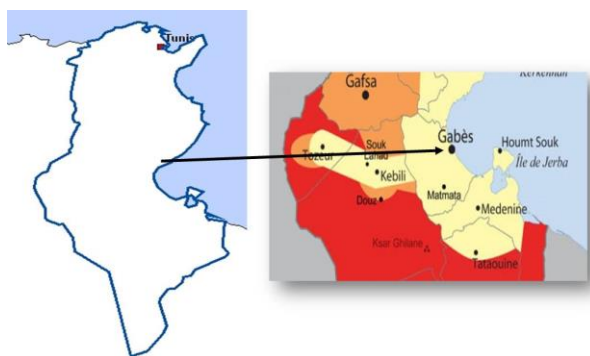


Figure 1. Prospection sites (Gabes region)

### 2.2. Experimental protocols

Our study was carried out in South of Tunisia, in Metwia (the most infested area in Gabes) from April to July 2013. Green pods from *A. farnesiana* were collected weekly separately placed in plastic bags. In the lab, pods were examined under a binocular to detect eggs, after pods were desiccated to count larva stage and pupae (Figure 2). The monitoring of adults activity and emergence were made by experimental apparatus both in the field and the laboratory. Green pods were carried out at room temperature (20-25°C) for one week and stored until adult emergence. The specimen were stored in alcohol 95% in Eppendorf safe-lock tubes and stored at -4° C.

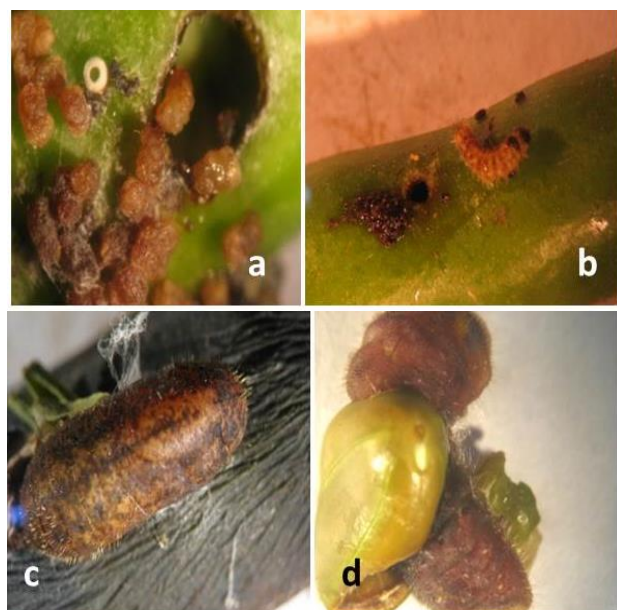


Figure 2. Different development stage of *Virachola livia* on Acacia (a: eggs; b: young larvae; c: pupae; d: old larvae)

## 3. Results and discussion

The occurrence of three distinct peaks of *V. livia* in Acacia pods for both preoviposition period and adult emergence (Figure 3).

In Tunisia, on *A. farnesiana* *V. livia* develops three annual generations, each one lasts about four weeks (Figure 3). The first generation starts late in April and finished at the end of May. The second one is from the end of May to about the twenty five of the next month; the third is from the last one to the middle of July (Figure 3). However, in the Middle East, on *Acacia* sp., this pest can develop between six and eight generations (Avidov, 1958; Awadallah, 1966). Infestation of pomegranate starts at about the end of the third generation, and owing to the dryness of acacia pods (Figure 4) starting from about the end of July, the butterflies migrate to pomegranate.

No infestation with *Virachola* appeared on pomegranate fruit before September. When acacia pods got dry, the butterflies were forced to lay their eggs on pomegranate. Infestation continued till the fruiting season came to the end and the green pods of Acacia showed up and the butterflies moved to the alternative host once again. A similar cycle was mentioned by Hanna (1939) in Egypt and Avidov (1958) in Palestine. Due to the absence of green pods on the tree from July, the butterfly (Figure 5) migrates to its alternative host the pomegranate.

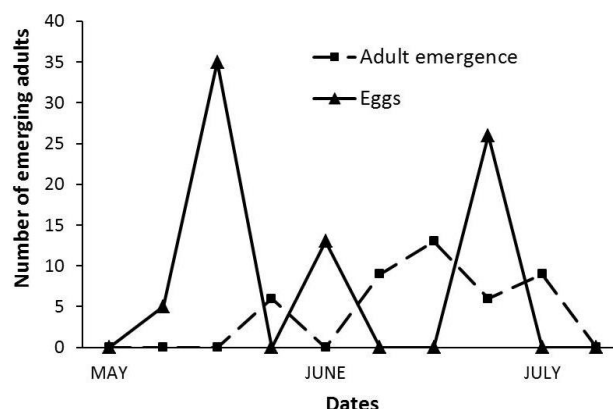


Figure 3. The population dynamics of *Virachola livia* on *Acacia farnesiana*

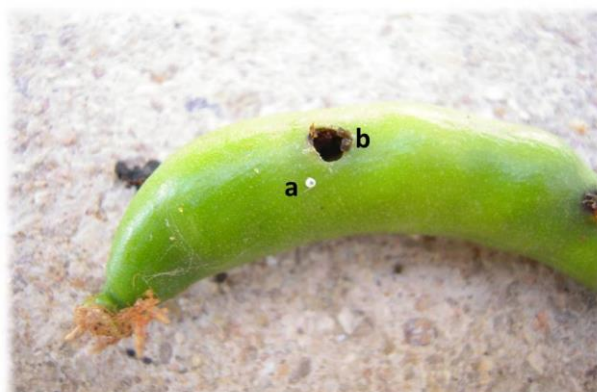


Figure 4. *Virachola livia* egg (a) and entrance hole of larva (b) on Acacia green pod



Figure 5. *Virachola livia* adult

#### 4. Conclusion

In this work, some biological aspects of *V. livia* on *A. farnesiana* were clarified for the first time in North Africa and in Tunisia. Preliminary biological cycle is assessed regarding host plant and peaks of adult emergence in Metwia region. More observations on pomegranate and date palm are planned to fulfill the complete cycle per year and for a better management of the pest in the future.

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