

Cycle of *Chaetoptelius vestitus* on pistachio fruit (*Pistacia will vera* L.) and counting galleries at four cardinal exposure in Algeria

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Abstract. *Chaetoptelius vestitus*, is very harmful to the cultures of pistachio orchard. Adults of this insect emerge in April-May and the trees to bear vegetation on the young twigs, where they dig a tunnel deep power cord at the level of fruit buds and wood, resulting in a weakening of the tree and a drop in production. Several branches can then be successively undermined by the same individual whose activity nutriciale lasted until autumn to see the beginning of winter. Nesting of the insect occurs in the branches and twigs. It is noteworthy that the life cycle of *Chaetoptelius vestitus* in Algeria seems to have only one generation per year. This study at in Algeria on counting by the beetle tunnels allowed showing that southern exposure is the most sought for several reasons compared to other exhibitions in the tree.

Keywords: *Chaetoptelius vestitus*, exposure, galleries, *Pistacia will vera*.

1. Introduction

Among the fruit pistachio Anacardiaceae. (*Pistacia will vera* Linnaeus) is the only species that produces edible fruit. Generally pistachios are characteristic species of the Mediterranean region. [1] However, in the field of pistachio production in Algeria certainly still far behind compared to other Mediterranean countries. The genus *Pistacia* includes a large number of species that have no agronomic their possible use as rootstocks interest [2]. They cite *Pistacia atlantica* Desfontaines, *Pistacia palestina* Linnaeus *Pistacia terebinthus* Linnaeus or *Pistacia integerrima* Linnaeus. Moreover, Morocco pistachios are present in a wild state in various soil and climatic conditions, represented by wild forms in particular *Pistacia atlantica*, *Pistacia terebinthus* and *Pistacia lentiscus* [3]. Similarly, in Algeria many endemic species, or the Atlas pistachio (*Pistacia atlantica*), the terebinth (*Pistacia terebinthus*) and mastic (*Pistacia lentiscus* Linnaeus) are reported [1]. In Algeria insect pests of fruit pistachio (*Pistacia will vera* L.) are little studied, despite their harmful effects and their economic importance. Similarly, in Batna, Bouira and Tlemcen [4], [5], [6] and [7] mention the presence of a bud borer *Chaetoptelius vestitus* (Mulsant & Rey) on the young shoots of pistachio fruit induces a significant loss of production of pistachio.

2. Materials and Methods

2.1. The station study

The station is found near Timgad Batna in the North-East of Algeria and at an altitude of 1019 m. (35 ° 30' 04" N, 6 ° 27' 56" E). The orchard Timgad is bounded on the north by the plots of grain, to the south by the town of Timgad, to the east by grain fields and finally to the west by a fruit orchard composed of apricot and olive trees and a timber yard in the nursery of the agricultural cooperative. Pistachio orchard was established in 1972, in the farm of the regional agricultural production cooperative plants service (C.R.A.P.P.S), which occupies an area of 36 hectares. Planting *Pistacia vera* covers 10.8 hectares and has 700 trees 4 to 5 meters high, 70 males feet and 630 feet females. Two adjacent rows are spaced 10 meters.

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2.2. Sampling techniques used in the study site

At the study Timgad station, one technique was considered. It is that of the removal of branches to study the beetle *Chaetoptelius vestitus*. Pistachios used for this purpose have a homogeneous population in terms of age, height and health status. From January 2003 until December 2005. 4 outputs are performed annually at the rate of output per season. On each occasion, 15 trees are considered random. 4 branches and 30 cm are taken per tree, on a total of 15 randomly selected trees. The branches are severed collected bagged isolation. The density of galleries is one of the easiest parameters to be determined on each branch. Maternal galleries made up in the branches of the year are taken into account in making their measurements, taking into account two groups of variables, one related to the host plant and the other in connection with the insect.

3. Results and Discussion

3.1. Short-Data beetle pistachio *Chaetoptelius vestitus*

The Scolytidae measure 2.5 to 3.5 along mm. It is oval in shape characterized by clubbed antennae of 3 items at the end. The husks are dark, black or very dark brown with pronotum almost entirely naked in it. The elytra are covered with white and brown squamules spiniform among which emerges a row of stiff bristles and spaced [8] (Fig .1)



Fig. 1: Pistachio fruit borer Overview beetle (*Chaetoptelius vestitus*)

3.2. Biological cycle *Chaetoptelius vestitus* in Timgad

During the study carried out from September 2003 until September 2004 in the resort of Timgad, it is noted that *Chaetoptelius vestitus* is the adult stage between June and October. It is the larval stage is between November and May 5 instars for this Scolytidae. The period during which the insect appears as nymphs begins in December and continues until March. It is important to mention that this insect develops one generation per year in the station Timgad. The female *Chaetoptelius vestitus* lays 25-35 eggs [9]. In this study, the number of eggs found in Timgad is between 21-32 eggs, which is comparable to advanced by the previous author values. There are actually a single spawning period from the beginning of September until October 25, when this number varies depending on the country. Actually in Syria, there are two spawning periods per year *Hylesinus (Chaetoptelius) vestitus*, one from the beginning of April until May 20, and the other in early October until 15 January [10]. In Tunisia, the bud borer has a long spawning period [11]. Near Mosul in Iraq eggs of *Hylesinus (Chaetoptelius) vestitus* are issued under the bark of dead trees between November 11 and December 12. [12] In terms of larval development after hatching there is a period of overwintering larvae inside the galleries themselves in weak or dead branches for 4 to 5 months [10]. The larvae go through five Scolytidae successive stages [9]. The last cited author draws attention to the fact that the morphological characteristics of young stages, including neonates, are different from those of advanced stages. The pupal stage in Scolytidae offers little of interest to the systematic point of view because of its transience. It should be noted in this work that the larval development takes place between November and May. Apparently the first instars appear in November Timgad and old fifth instar in May. But having noticed the presence of nymphs in December, January and March suggests a staggering pupal moult between late fall and spring. It should be noted that *Chaetoptelius vestitus* is adulthood between June and October. And the emergences begin in June. Moreover, near Mosul in Iraq larvae are present from January 1 to 25 March. [12] The last cited author mentions only one generation per year in Iraq and that adults are present throughout the year. Already in 1958, Syria [13] reported that the driller bud develops one generation per year. This is what is confirmed in this study, since it seems that this bug has to Timgad in Algeria one generation per year (Fig.

2). However, Turkey *Hylesinus (Chaetoptelius) vestitus* has 2-3 generations per year. [10] In Tunisia the same xylophage reported only one generation per year. [11] The duration of the life cycle *Hylesinus (Chaetoptelius) vestitus* and the number of generations depends on climatic factors [10].

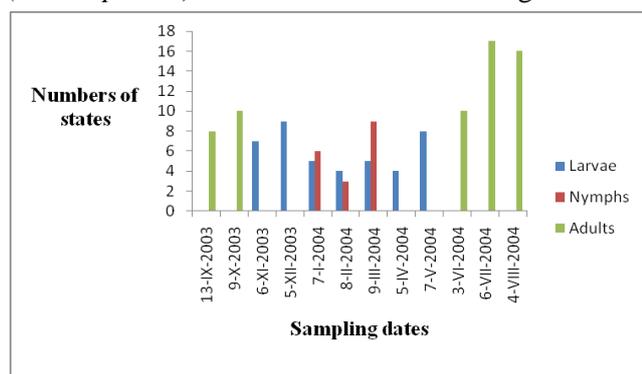


Fig. 2: Biological cycle *Chaetoptelius vestitus* in Timgad

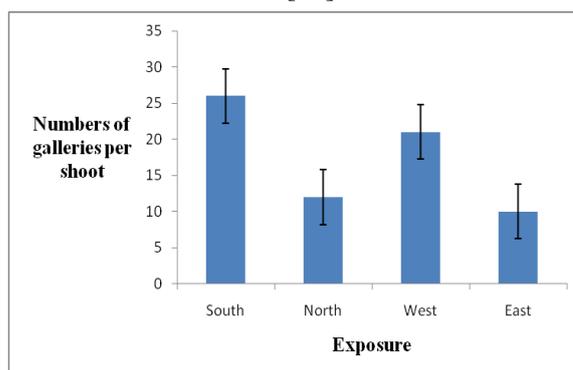


Fig. 3: Counting burrows by *Chaetoptelius vestitus* at the four cardinal exposure pistachio fruit in Timgad

3.3. Number of galleries for exhibitions of the four cardinal tree from autumn 2003 to summer 2005 (planting Timgad)

In the station at Timgad southern exposure the number of galleries is 26 or gallery 0.37 / dm². Counting galleries since autumn 2003 to summer 2005 in the resort of Timgad in the western part of the trees. At the western part of the pistachio near Timgad the number of galleries per unit area of branch is 0.32 gallery / dm² (N = 21 galleries). Counting galleries on branches based in the northern exposure station Timgad shows the presence of 12 galleries or gallery 0.18 / dm². Eastern exposure pistachio near Timgad 10 galleries are counted with a density of 0.15 gallery / dm² (Fig. 3). It is possible that the insect research more southern exposure to benefit from maximum heat. Indeed, the temperature is relatively high when playing a very important role in the proliferation of *Chaetoptelius vestitus*. It is also possible that the chosen insect southern orientation to avoid excess observed especially at the northern exposure moisture. Counting galleries from the four cardinal directions of the pistachio fruit in Timgad shows that branches attacked southern exposure of the tree shows the highest average with 0.11 per dm² gallery, followed by that of the west gallery 0.07 dm². Eastern exposure pistachio appears the least sought with an average of 0.04 per dm² gallery. The Scolytidae *Chaetoptelius vestitus* is reported [14] Syria described by the same author driller fruit buds and wood and twigs. Beetles are considered pests of forest trees and the population density of these are naturally limited by the amount of food available [15]. It is possible that the insect research more southern exposure to benefit from maximum heat and also to avoid excess moisture. Similarly, during the cold season as the temperature remains below 5 °C., Scolytidae cease nutrition. Their digestive tract is empty [16]. However, abiotic factors affect the populations of wood-boring and the highest density *Hylesinus (Chaetoptelius) vestitus* is obtained in June 1967 at 37 °C. and an air humidity of 21% [12].

3.4. Description of data-station Timgad

Table I: Values of various statistical parameters calculated on 6 Variables.

Variables	N	\bar{x}	S	x _{min}	x _{max}
Dg	69	2.029	0.320	1.500	2.630
Lg	69	15.359	6.220	2.410	28.460
Dp	69	5.522	1.829	1.210	9.070
Dpb	69	3.742	3.058	1.050	9.800
Vc	69	50.660	26.260	6.410	131.130
Dtp	69	1.579	0.570	0.780	2.650

dp: diameter of the shoot dpbt: distance from the terminal bud; dg: diameter of the gallery, lg: length of the gallery dtp: diameter of the penetration hole, vc: volume consumed.

The descriptive statistics of the different parameters of the station Timgad show that the average diameter of the galleries (dg) is 2.03 mm. The average volume consumed is 50.66 mm³ wood, which is quite

large for such a small case. This is explained by the effect of abiotic factors such as temperature and humidity that promote the activity of this insect.

In the station Timgad the average diameter galleries (dg) is 2.0 mm. The average volume consumed is 50.7 mm³ wood (Table. I). This is a fairly large mass caused by a small insect. The presence of the borer buds at the young shoots of the tree induces a decrease in Algeria pistachio yield 20% [5].

Table II: Matrix of correlations calculated between the six variables taken 2-2 in Timgad

Variables	dg	lg	Dp	dpbt	vc	Dtp
Dg	1					
lg	-0.030	1				
P	(0.806) ns					
dp	0.060	-0.181	1			
P	(0.623) ns	(0.136)				
dpbt	0,134	0.054	-0.472	1		
P	(0.274)	(0.662)	(0.000)***			
Vc	0,577	0.764	-0.112	0.128	1	
P	(0.000)***	(0.000)***	(0.357) ns	(0.293) ns		
Dtp	-0.004	-0.042	-0.265	0.031	-0.015	1
P	(0.971) ns	(0.733) ns	(0.028)*	(0.800)	(0.902)	

If $P > \alpha = 0.05$ (ns) no significant differences

$p \leq \alpha = 0.05$ (*) just significant differences

$p \leq \alpha = 0.01$ (**) highly significant differences

$p \leq \alpha = 0.001$ (***) very highly significant differences

dp: diameter of the shoot dpbt: distance from the terminal bud; dg: diameter galleries, lg: length of the gallery dtp: diameter of the penetration hole, vc: volume consumed.

There are very highly significant correlations between the variables, or the distance from the terminal bud (dpbt) and shoot diameter (dp), $P = 0.000$ volume consumed (vc) with the diameter of the gallery (dg) and the same parameter with the length of the galleries (lg) $P = 0.000$ (Table. II). With regard to the same station, there are significant differences between the diameter of the hole penetration fair correlations (dtp) and shoot diameter (dp). As against the other parameters do not present significant differences. The distance between the terminal bud (dpbt) and diameter of shoots (dp), shows a very highly significant correlation corresponding to the probability $P = 0.000$). The scatterplot shows that the greater the distance from the terminal bud is, the larger the diameter increases galleries with a strong determination. There is a very highly significant correlation with the probability $P = 0.000$ between the volume consumed (vc) and the diameter of the gallery (dg) and between the volume consumed (vc) and the length of the galleries (lg) with $P = 0.000$. There are significant differences between the diameter of the penetration hole gallery (dtp) and the diameter of the shoot (dp) just correlations.

4. Acknowledgements

I thank Professor François lieuthier from the University of Orleans, who confirmed the identification of the species and the consevation Forestry Batna.

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