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Morphological Characteristics of the Sensilla Ovipositor, Tarsus and Antenna in Dates Moth Female, *Ectomyelois ceratoniae* (Lepidoptera : Pyralidae)

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Abstract: Dates moth, *Ectomyelois ceratoniae* Zeller (Lepidoptera: Pyralidae), is one of the most redoutable pest of a wide range of crops worldwide. In Algeria, *Ectomyelois ceratoniae* is considered the main dates (*Phoenix dactylifera*) pest and as the principal constraint on dates exports. As in most of the Lepidoptera, success to recognize and colonize a wide range of host plants is based on the interaction of their sensory system and the physicochemical characteristics of the environment (Semiochemical communication). The ultra-structural study by means of a scanning electron microscope (SEM) of the external morphology of the head, ovipositor, antennae and the legs of the female *Ectomyelois ceratoniae*, reveals structural features morphological of different types of sensilla existing on the organs studied. Taste receptors are present at the end of the ovipositor, on the basal part of the antennas on the tarsus and around the proboscis. Olfactory receptors are also ubiquitous in all organs examined, with a high concentration on the antennae and ovipositor (Trichoid Sensilla).

Key words: Scanning Electron Microscope (SEM) · Sensilla · Olfactory Receptors · Taste Receptors · Phoenix Dactylifera

INTRODUCTION

Date palm (*Phoenix dactylifera*) currently has an economic importance for Algeria to the extent that it is considered the second source of foreign exchange after oil. The Algerian phoenicicole Heritage is estimated more than 16 million date palm with a production of 492,188 tonnes [1].

However, this culture faces several constraints, among others, the date moth *Ectomyelois ceratoniae* Zeller (Lepidoptera: Pyralidae) wich is considered the most redoubtable dates pest and as the main constraint to the Algerian dates export [2]. It may cause damage that can sometimes reach 80 % of the harvest [3].

In fact, as in most of the Lepidoptera, success to recognize and colonize a wide range of host plants is based on the interaction of their sensory system and the physicochemical characteristics of the environment [4]. We find it useful to conduct this study, to display the different sensory structures morphology, responsible of semiochemical communication in *E. ceratoniae* female, using the scanning electron microscopy (SEM) technique.

MATERIALS AND METHODS

Insects: The biological material that is the subject of this study is the *Ectomyelois ceratoniae* Zeller (Lepidoptera, Pyralidae) (Fig.1). The Adult females samples, were obtained from the rearing done at INRAA (National Institute of Agronomic Research of Algeria) entomology Laboratory station, located at Touggourt, 600km south of the capital of Algeria.

Fig 1: Dates moth *Ectomyelois ceratoniae* Zeller

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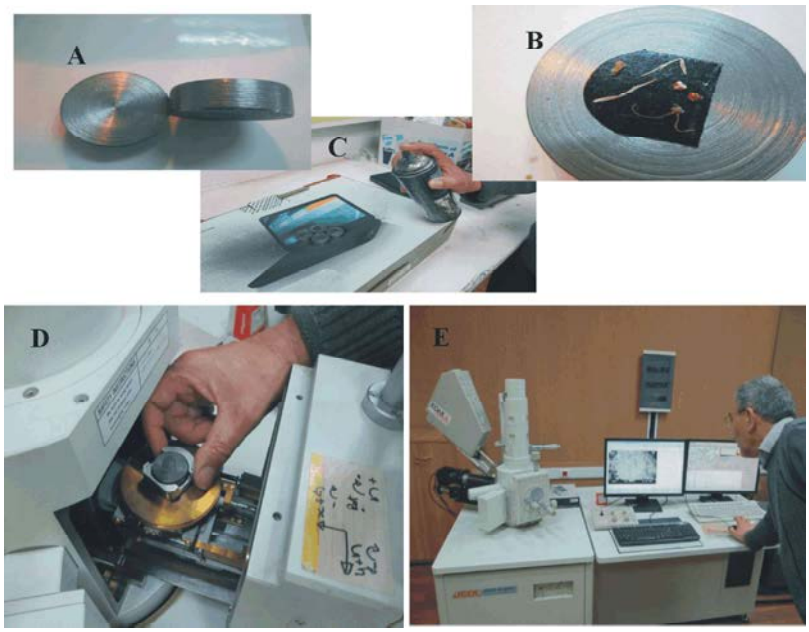

Fig 2: Various stages of samples preparation for viewing with the scanning electron microscope (SEM). A : Metal cylinder (Sample holder) ; B : Horizontally fixation of the organs on a carbon tape ; C : Coating samples by a carbon layer ; D : Mounting location on SEM specimen stubs ; E : image acquisition

Scanning Electron Microscope (SEM): Samples preparation was done according to the methods described by Obonyo *et al*. [5], Juma *et al*. [6] and Sawsan and Amal [7]. Adult female of dates moth (*E. ceratoniae* Zeller), newly emerged were soaked in a solution of 70% ethanol for 10 minutes. Then, we proceeded to the dissection of five spécimens to extract and separate their external genitalia (Ovipositors), tarsi and antennae for scanning electron microscope (SEM) observations.

Indeed, isolated organs have undergone several treatments; first, they were placed in 70% ethanol solution for 72 hours, then transferred to 90% alcohol for 15 min. Then all the organs were removed from the solution smoothly. They were air dried for at least 20 minutes.

The organs were then fixed horizontally on a carbon tape, double sided adhesive, mounted on specimen stubs (Fig. 2B) (sample holder : 30 mm diameter x 10 mm height (Fig. 2A), then they were coated with 20nm. of carbon (Fig. 2C).

The receptors sensory ultra- structural observations were examined in JEOL. JSM-6360 scanning electron microscope at a beam voltage of 15-20 kv. (Fig. 2 (D & E) in Sciences and Materials Engineering Laboratory at the Faculty of Mechanical Engineering and Engineering Process, at Houari Boumediene Univesity, Algiers, Algeria.

RESULTS AND DISCUSSION

The scanning electron microscopy (SEM) observation, of the female ovipositor, tarsi and antennae of the dates moth, *Ectomyelois ceratoniae* allowed us to distinguish several types of sensilla on all organs studied:

Sensilla Trichoid (ST/TS) (*Sensory Hairs*): We found different types of trichoid sensilla various in length and shapes as follows:

Trichoid Sensilla type I (TSI): Prominent structures, slender, cylindrical, has a length of length of 40µm. and an average diameter of 2.28µm. with a pointed distal portion and slightly curved. This kind of sensilla are distributed in a dense manner on the antenna (Fig. 3A), the ovipositor (Fig. 3B) and a degree less on tarsi (Fig. 3C) of the dates moth female, *E. ceratoniae* [7], even noticed their presence on the male genitalia of the same species.

Trichoid Sensilla Type II and III (St Ii & St III): They are scattered along the ovipositor and tarsi of the *E. ceratoniae* female. They are found in few number between the trichoid sensilla type I (TS I) ; the ST II & ST III are less abundant compared to TS I. Compared with the ST III (Fig. 4A), the ST II (Fig. 4B) is characterized by their small size and their edges pronounced (Angular). The curved

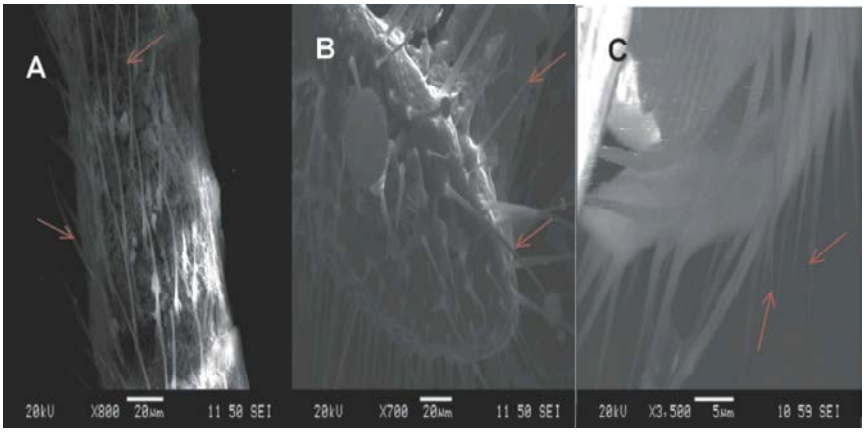

Fig 3: SEM. Micrographs show E. ceratoniae trichoid sensilla type I (arrows) ; A : Antenna ; B : Ovipositor ; C : Tarsus.

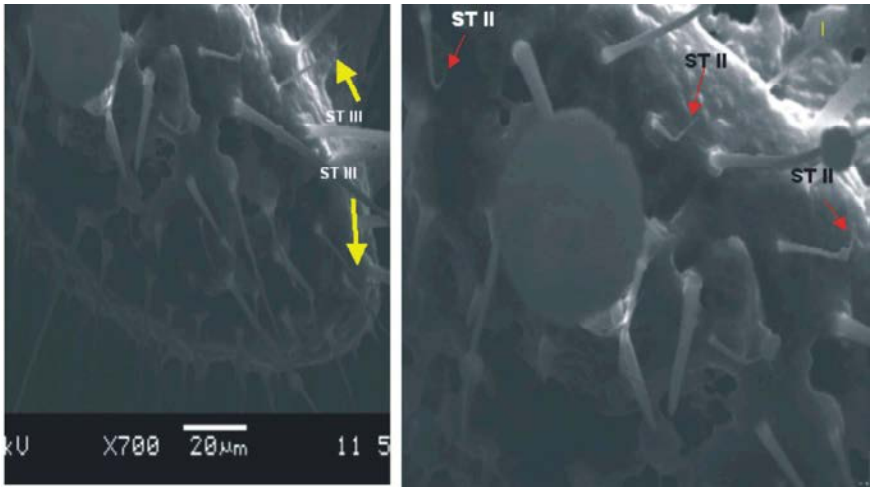

Fig 4: SEM. Micrographs show trichoid sensilla type III (A) and II (B), at the E. ceratoniae female ovipositor.

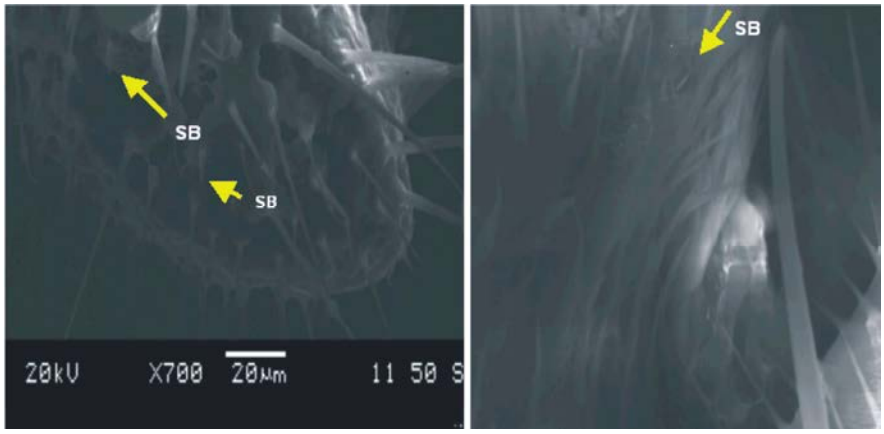

Fig 5: SEM micrographs show Sensilla basiconic. A : *E. ceratoniae* female Ovipositor ; B : *E. ceratoniae* male tarsus.

part is approximately 4.44µm. in contrast, the ST III measures 2 µm. Regarding the straight side (From the base to the point of the sensillum arching), it measures 11.11µm. length in the ST II and 22.22µm. in the ST III.

Sensilla Basiconic: They are conical shaped sensilla with a rounded end and thick walled, short enough, they are medium length (7,27µm) ; found on the ovipositor surface of the *E. ceratoniae* female (Fig. 5A); as we found on the tarsi of the male of this species (Fig. 5B). This type

of sensilla are similar to those recorded by Anac-Narcisa [8] and Sharaby and Dosary [9], on the antennal segments of the *Dinocras cephalotes* larva and the *Rhynchophorus ferrugineus* tarsi respectively. These structures act as olfactory sensilla [10]. However, they can play a role of contact chémiorécepteur ; in the case of basiconic sensilla found on the tarsi of plum curculio (*Conotrachelus nenuphar*), that have eggs laid reconnaissance function [11].

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