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Short Communication

Morphology and chorionic sculpture of eggs of two pest species *Chilo infuscatellus* Snellen and *C. auricillia* Dudgeon (Insecta: Lepidoptera: Crambidae)

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Abstract

Two crambid species of subfamily crambinae i.e., *Chilo infuscatellus* Snellen and *C. auricillia* Dudgeon, commonly known as sugarcane shoot borer and stalk borer respectively, whose eggs were analyzed through Scanning Electron Microscopy (SEM) for studying their morphological features present on the egg chorion. This chorionic sculpture can be used by a taxonomist for precise identification of taxa along with other taxonomic characters. The egg surface shows structural elements such as micropylar rosette, ribs, cross-ribs, and aeropyles which differ significantly amid the higher taxonomic groups. In the species i.e., *C. infuscatellus* Snellen, the egg chorion has somewhat smooth with weak ornamentation in comparison to irregular reticulation present with both alternating and longitudinal ridges reaches the micropyle in *C. auricillia* Dudgeon

Keywords: *Chorion,* Egg, Morphology, Micropyle, SEM

Introduction

The sculpturing of insect eggs is often complex in nature, which may give out number of functions. These functions comprises of protection of egg against aridness and physical hurt, and exchange of gases. The intersecting ridges always show some prominences even if the pattern is poorly developed. The surface of the chorion has a crumpled or granular texture.The anterior pole of the egg has micropylar area which is surrounded by rosette-like sculptures of the chorion (Scoble, 1995). Micropylar canals opened into an anterior pit that is surrounded by a rosette of quite short, petal-shaped primary surrounded by series of secondary and tertiary cells. The aeropyles open on slight prominences immediately next to the proximal end of the egg. The present study is aimed to analyze the morphometric in general and external morphological distinctiveness predominantly the details of chorion sculpturing and rosette of cells surrounds the micropylar region of the eggs of both the species i.e., *Chilo infuscatellus* Snellen and *C. infuscatellus* Dudgeon.

Material and Methods

For SEM study, the material used were the eggs of *Chilo infuscatellus* Snellen and *C. infuscatellus* Dudgeon, which were fixed in aldehyde fixative i.e., 2.5% glutaralhyde for a minimum period of one hour. After initial fixation, the eggs were rinsed repeatedly with PBS (phosphate buffered saline) for a minimum period of fifteen minutes and then dehydrated by using a series of graded ethyl alcohol (70% for15 minutes, 95% for 15 minutes and 3 changes of 100% for 10 minutes each). For post fixation process, the eggs were fixed in 1% Osmium tetroxide in 0.1M Phosphate Buffer for one hour. The processed material was allowed to dry up to considerable point using a Polaron quorum technology. After drying, the eggs were mounted on aluminum stubs with adhesive tapes and sputter coated for three minutes by means of a Polaron (Model no.-Hitachi E 1010). Subsequently, the processed eggs were examined critically and photographed under the Scanning Electron Microscope (Hitachi S 3400N).

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Results

The adults of both the species were collected with the help of light trap fixed near the sugarcane fields in dusk from May to June, October to November and March to September (2008-2010) by using mercury bulbs. For ex-situ rearing, the collected specimens shifted to insect rearing cages containing fresh host plant trimmings and paper stripes for egg laying. It had been noticed that in vitro, gravid females chosen to lay eggs on paper strips. The freshly laid eggs were found scale like, somewhat oval in shape, creamy white in the case of *Chilo infuscatellus* Snellen and dirty white in colour in *C. auricillia* Dudgeon. The egg capsule contains vitelline membrane and the chorion in both the species. When laid, the egg capsule becomes harder and typical polygon like structures become evident on its surface. The average dimensions of the eggs were 0.61±0.07 mm in length and 0.65±0.01 mm in width (in the widest section) and length 0.32±0.07 mm, width 0.39±0.01 mm in the species *Chilo infuscatellus* Snellen and *C. auricillia* Dudgeon respectively as seen and calculated through Scanning Electron Microscope (SEM). A single micropylar opening occurs on the lateral side of the anterior pole of eggs surrounded by nine rosettes.The egg chorion of *Chilo infuscatellus* Snellen has somewhat smooth but with weakly expressed longitudinal ridges. Micropylar area very conspicuous and rosette with 9–10 petalled cells secondary cells long and narrow whereas, *C. auricillia* Dudgeon has irregular reticulation present with both alternating and longitudinal ridges reach the micropyle. Micropylar rosette with 10–14 long and slender petalled cells and with 6 micropylar openings.

Discussion

The shell of the chorion sculptured with typical complex of polygons in both the species of genus *Chilo* studied presently. A sculpture similar to above said is covering the egg capsules of many insect species such as *Thermobia domestica*, *Leptoperla bifida*, *Isoper larivulorum, Perla marginata* and *Leptotusmar moratus*has investigated by many workers *viz*., Cobben, 1958; Gaino *et al.,* 2008; Kubrakiewicz *et al*., 2005; Poprowa and Rost, 2004 and Rosciszewska, 1991a respectively. Yamauchi and Yoshitake, 1984 investigated that cellular sculpture, ridged cellular sculpture and ridged sculpture remained typical and species specific while studying egg chorion structure of subfamily Hadeninae of family Noctuidae. Slightly elevated longitudinal ridges joined by the transverse ridges are the most basic pattern of sculpturing. Skudlik *et al*., 2005 found the poorly developed sculpturing patterns in *Melitaeatran scaucasica.* The sculpturing pattern in the *Chilo infuscatellus* Snellen not very prominent but is ample to carry out the egg morphological studies especially the rosette of micropylar end. On the other hand, *C. auricillia* Dudgeon irregular ridges presnt with micropylar rosette containing 10-14 petalled cells. According to Gaino *et al.,* 2008, the number of micropylar openings in Lepidopteran eggs varies from 1 to 20. A rosette of petal like primary cells surrounds the micropylar pits and each of the rosettes is outlined by fine walls Skudlik *et al.,* 2005. But in *C. auricillia* Dudgeon, six micropylar openings were there as seen in SEM images. The number of micropylar openings considered to be species specific character (Simiczyjew, 1999). In 1980, Arbogast and co-workers suggested that although there is often considerable intraspecific variation in the shape and the number of primary cells but still this rosette like pattern always remained a vital diagnostic character. Some more advanced studies on egg sculpuring of other different species of genus *Chilo* Dudgeon will certainly fling in some assured relationship between different taxa which can be used to classify them.

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Plate 1

(a) *Chilo infuscatellus* Snellen

(b) *Chilo auricillia* Dudgeon

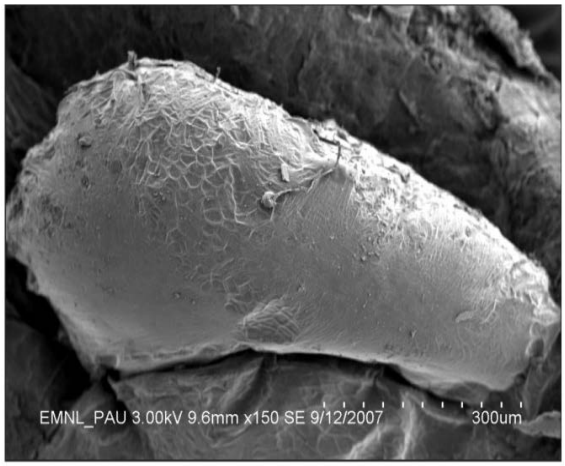

Figure 1. Egg of *Chilo infuscatellus* Snellen

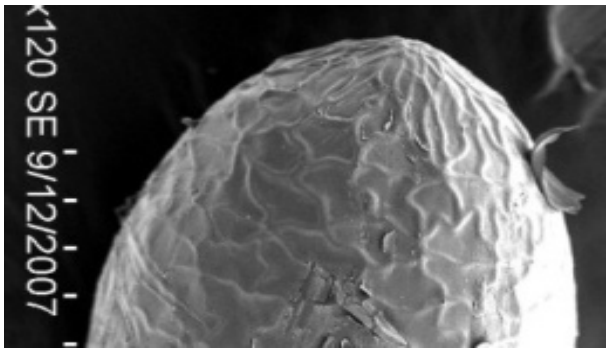

Figure 2. Egg of *Chilo infuscatellus* showing micropylar region.

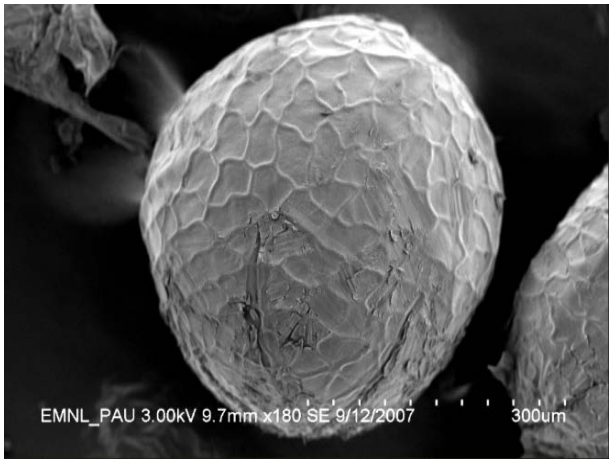

Figure 3. Egg of *Chilo auricillia* Dudgeon