

FIRST DOCUMENTATION OF *TUTA ABSOLUTA* MEYRICK LARVAL INFESTATION TO EGGPLANT FRUITS AT MATROUH GOVERNORATE, ARAB REPUBLIC OF EGYPT

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ABSTRACT

Through tracking the entrance of tomato leafmining moth, *Tuta absoluta* Meyrick (Lepidoptera: Gelechiidae), into the Egyptian borders coming from Libyan Arab Jamahiriya, the invasion of its caterpillar to the eggplant fruits was internationally documented for the first time under the eggplant greenhouse conditions in Siwa Oasis, Matrouh Governorate, Egypt. The possible reasons that may lead this event to occur in Siwa Oasis rather than in other experimental sites were discussed.

Keywords: Lepidoptera, Gelechiidae, *Tuta absoluta*, Tomato leafmining moth, Eggplant fruits, Matrouh, Siwa oasis and Egypt.

INTRODUCTION

Tomato leafmining moth, *Tuta absoluta* Meyrick (Lepidoptera: Gelechiidae), is one of the most devastating pest threats the international production of tomato crop (Viggiani *et al.*, 2009). The danger of this pest lies in its high ability to attack and deteriorate the mesophyll tissue of tomato leaf in a short time. The attacking of this photosynthetic tissue may drastically influence the photosynthesis efficacy of tomato leaf, which in turn may affect the quality of the final product. Also, the establishment of fruiting system is synchronized by mines burrowing due to *Tuta* larvae that may have negative response on the quantity of sound fruits produced at the end of the season. That is to say, quality and quantity losses occurring annually in tomato production are due to the attacking of *T. absoluta* larvae to both leaves and fruits. From 2010 beginnings and while its crossing the Egyptian borders, *T. absoluta* was responsible for huge losses in tomato production that reflected on the craze increase in its final price causing great disturbances among both producers and consumers. Beside tomato, this pest has the ability to attack other members of family Solanaceae (including potato, eggplant and pepper). Among all these solanaceous plants, tomato fruit was the only fruit that recorded to be attacked by *T. absoluta* larvae. In harmony, Garzia *et al.* (2009) reported that leaf-miner damage to tomato plants was found to be the work of *T. absoluta*. In addition to tomatoes, where crop loss was considerable, it also attacks aubergines, peppers and potatoes though not the tubers. Similar observation was also declared by a lot of authors (Haji *et al.*, 1995, Viggiani *et al.*, 2009 and Hrcic and Radonjic, 2011). Where, according to the later authors the arrival of this pest as a new pest in Montenegro was detected at the beginning of July 2010 upon set up the pheromone traps in tomato greenhouses. The infestation symptoms were detected on tomato leaves, green and ripe fruits and during the end of August, symptoms were also detected on aubergine leaves which were grown outdoors. As there is no documented data confirming the invasion of solanaceous fruits other than tomato one by *Tuta* larvae, this study aimed to

documents this event and also to state the foundations that made this incident occur.

MATERIALS AND METHODS

Study sites

Two sites within Matrouh Governorate were chosen to implement this experiment. The foundations of choice were done according to several criteria; these sites represent one of the closest points of the joint border between Egypt and Libya and they are characterized by several solanaceous crop cultivations (tomato, eggplant and pepper...etc.). The first experimental site was at Siwa oasis that is far-away from the south direction of Mersa Matrouh city by about 300 km. The second experimental site was Sidi Barany city, which is approximately 150 km western of Mersa Matrouh city.

Experimental design

To investigate the status of tomato leaf-miner, *T. absoluta*, on eggplant crop, four greenhouses (2 greenhouses/ location) of 360 m² area were chosen to achieve the intended target. Eggplant seedlings of keem variety were cultivated under each greenhouse on 19/4/2010 with about 40 cm separating each neighbouring rows and adjacent seedlings were of 25 cm apart from each other. The detection of larval invasion of both leaves and fruits of eggplant was carried out depending on the direct investigation technique. In addition, the influence of neighbor tomato cultivation on the behavior of *T. absoluta* on eggplant crop was considered.

RESULTS AND DISCUSSION

Periodical investigations of eggplant greenhouses revealed that the invasion of eggplant leaves by *Tuta* larvae was detected in both experimental locations. The intensity of attack was of more frequent at Siwa greenhouses than that in Barany ones. Following the establishing of fruiting system, *Tuta* larval invasion was extended to attack eggplant fruits at Siwa greenhouses whereas, those of Barany location weren't. I.e., although the simulating conditions in both Siwa and Barany greenhouses, the attacking of eggplant fruits by *Tuta* caterpillars was only detected in Siwa Oasis. Upon dissecting eggplant fruits it could be reported that larval invasion occurred underneath the fruit crown and even inside the fruit itself with small heaps of excrement near the entrance hole beneath the crown (Fig. 1).



Fig. (1): *T. absoluta* larvae attacking eggplant fruits underneath the crown.

The foundations of eggplant fruit invasion was observed at Siwa Oasis, but not at Barany location although the establishing of all prevailing conditions in both locations (the same cultivated variety, the same greenhouse areas, the same time of cultivation and the same agricultural practices) this may be attributed to the effect of the neighbouring cultivated solanaceous crops. Upon monitoring the tomato crop, that was cultivated in the neighbour of Siwa's eggplant greenhouse, the severe infestation of its leaves and fruits by *Tuta* larvae led to complete collapse of tomato crop. Accordingly, removing of such tomato cultivation was the sole decision. This action led to full orientation of the *Tuta* moths to attack the sole existing solanaceous crop, which was the eggplant. So, beside the already existing *Tuta* moths attacking eggplant leaves, such continuous flow and massive crowding of *Tuta* moths within the eggplant greenhouse may facilitate eggplant fruit invasion. These condition were not found at Barany experimental site. Although the heavily infested tomato cultivation nearby Barany's eggplant greenhouse, it wasn't removed. This action led to the continuity of *Tuta* attack to tomato crop (leaves and fruits) or shed the attention of *Tuta* moths and consequently their larvae toward tomato which is the most preferable crop for *T. absoluta* compared to other solanaceous crops. However the intensity of *Tuta* invasion to the eggplant greenhouse was of low frequency. Such previous observation may interpret why eggplant fruit was attacked in Siwa but not at Barany. From other viewpoint, as Siwa Oasis is far-away from the south direction of Matrouh Governorate by about 300 km and due to its deepness from the sea level by about 17 m, such aspect may participate in the warmer conditions at Siwa Oasis than at Barany City. Besides, as the farmers who are inhabiting such provinces resort to removing the greenhouse plastic cover due to the high temperature conditions during this cultivation season, such action with the pre-mentioned ones may facilitate the migration of *Tuta* moths and motivate the attack of eggplant fruits at Siwa Oasis. Finally, the cultivated variety of eggplant (Keem variety) maybe of an internal chemical contents that may put eggplant fruit under the invasion capacity of *T. absoluta*. In harmony and through declared the hosting capacity of certain insect pests, Leite *et al.* (2011) indicated that the higher density of *Bemisia tabaci* (Genn.) adults on *Cucumis sativus* can be due to the higher amount of pentacosane and octacosane in this plant. The occurrence of *Brevicoryne brassicae* (L.) on only in *Brassica* spp. Plants can be accounted for by the nonacosane of these plants. The low trichome density and greater palmitic acid level can explain the greatest damage by *Aphis gossypii* Glover in *Abelmoschus esculentum*. *Empoasca* sp. was more frequent in *Phaseolus vulgaris* followed by *A. esculentum*, which are plants with lower K content. *Solanum melongena* was attacked more by *Hydrangea similis* (Walker) and *Epitrix* sp. perhaps because of higher palmitic acid and 11, 14, 17 eicosatrienoic methyl ester concentrations in their leaves. *Frankliniella* sp. exhibited more damage in *Cucumis sativus* probably owing to higher pentacosane and octacosane in its leaves. The presence of yenumulene and hexacosane can explain the damage by *T. absoluta* (Meyrick) on *Lycopersicon esculentum*. Thus, it is of an urgently important to

carry out a lot of experiments in order to understand the factors that predispose eggplant fruit to *T. absoluta*.

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**التوثيق الأول لإصابة يرقات صانعة أنفاق الطماطم *Tuta absoluta* Meyrick
لثمار الباذنجان في محافظة مطروح, جمهورية مصر العربية
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2- قسم وقاية النباتات – مركز البحوث الصحراء – القاهرة**

تم أثناء تتبع دخول آفة صانعة أنفاق الطماطم إلى داخل حدود جمهورية مصر العربية قادمة من الجمهورية الليبية رصد مهاجمة يرقاتها لثمار نبات الباذنجان تحت ظروف الصوبة الزراعية بواحة سيوة, محافظة مطروح, مصر. حيث يعتبر هذا هو التوثيق الأول لمهاجمة آفة صانعة أنفاق الطماطم لنوع آخر من ثمار العائلة الباذنجانية بخلاف ثمرة الطماطم وقد تم توضيح الأسباب التي أدت إلى حدوث هذا الحدث في واحة سيوة وعدم تسجيله في الأماكن التجريبية الأخرى.

قام بتحكيم البحث

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