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Hakim Drouai
Department of Agricultural
Sciences, University of
Biskra, BP 145 RP, 07000
Biskra, Algeria

Fateh Mimeche
Department of Agricultural
Sciences, University of M'Sila,
BP 166 Echbilia, 28000 M'Sila,
Algeria

Abdelghani Zedam
Department of Agricultural
Sciences, University of M'Sila,
BP 166 Echbilia, 28000 M'Sila,
Algeria

Hayet Mimeche
Department of Agricultural
Sciences, University of M'Sila,
BP 166 Echbilia, 28000 M'Sila,
Algeria

Mohammed Belhamra
Department of Agricultural
Sciences, University of
Biskra, BP 145 RP, 07000
Biskra, Algeria

Mohamed Biche
Department of Zoology and
Forestry, National Agronomic
Institute (ENSA. EX: INA),
16200 El-Harrach, Algiers,
Algeria.

Correspondence
Fateh Mimeche
Department of Agricultural
Sciences, University of M'Sila,
BP 166 Echbilia, 28000 M'Sila,
Algeria

New floristic records of *Tuta absoluta* Meyrick 1917, in Zibans's Oasis (Biskra Algeria)

Hakim Drouai, Fateh Mimeche, Abdelghani Zedam, Hayet Mimeche, Mohammed Belhamra and Mohamed Biche

Abstract

The study was carried out in the region of Biskra (Sahara, Algeria) in order to know the plants able to be hosted by tomato leafminer (*Tuta absoluta* Meyrick 1917) invasive species in Algeria. Ten plants were identified: spontaneous and cultivated. These plants belong to three families: Solanaceae, Amaranthaceae and Fabaceae. It is important to note that including the found plants, four species were not reported as plant hosts of this pest (*Chenopodium rubrum* L., *Chenopodium bonus-henricus* L., *Spinacia oleracea* L. & *Beta vulgaris* L.).

Keywords: *Tuta absoluta*, Plant host, Invasive species, Zibans's Oasis, Algeria.

Introduction

The South American tomato leafminer, *Tuta absoluta* Meyrick (Lepidoptera: Gelechiidae), is an invasive Neotropical pest ^[1] of the cultivar tomato. It was first discovered in Algeria in greenhouses tomatoes in Mostaganem region in March 2008 ^[2]. The wild host plants play an important role in the spread of *T. absoluta*. When the cultivar host plant of tomato is absent, there are other secondary or occasional wild plants those can play an important role ^[1, 3]. The aim of this work was to check the plants able to host *Tuta absoluta* in the Zibans's oasis region, an important area for the agronomic production of the cultivated Solanaceae (tomato and piper) in order to know and prevent the development of this pest and to reduce the proliferation of weeds related to agricultural activity in Biskra region.

Material and Methods

The study was conducted in the Zibans's oasis, region of Biskra (Feliache's Oasis and Bouchagroune's one) south of the foothills of the Saharan Atlas. To achieve our aim and to have more biological information about the evolution of this insect, pheromone traps were installed in two sites (table 1):

Table 1: Location of the investigated sites of the study

Oasis site	Remoteness from Biskra city	Latitude	Longitude	Altitude
Feliache	05 Km	34°49'19,8" N	5°46'35,2" E	82 m
Bouchagroune	26 Km	34°42'44,61" N	5°28'41,13" E	123 m

As based on the active periods of the studied pest: The flight period of the adult pest of *T. absoluta* is between mid-July and mid-September, the rest of the year is the period of quiescence (rest). This work took place during two years: from August 2009 to July 2011 ^[4]. The tomato leafminer, is an example of the lack of an effective conventional chemical control, it encourages the use of technology pheromones to control pest damage immature ^[5]. To avoid possible damage, it is very important to detect early symptoms in plantations, hence the establishment of pheromone traps indicate the presence, or not, of the insect ^[6]. We shall check plants visually and with a hand lens, inside and outside greenhouses, beneath the palm trees and the crops in the field. These investigative sites enabled us to identify the plants infested by *Tuta absoluta*.

Infected plants are photographed with a digital camera and put into kraft paper bags for verifying the presence by binocular microscope in the laboratory. The collected plants were identified by using the flora available at our level ^[7-10].

The plants' voucher specimens were deposited in the Botanical Laboratory of Agricultural Sciences Department - University of M'Sila (Algeria). To confirm the infestation of these plants by the tomato leafminer, we have covered them with a fine mesh tulle with a minimum density of 9 x 6 thread/ cm², with the aim of capturing the adult pest which already have completed their cycle in these plants.

Results

The infested plants were recognized and we identified ten species of plants attacked by *Tuta absoluta*. These infested plants belong to wild and cultivated species: five wild plants and five cultivated species. These plants belong to three botanical families: Solanaceae, Amaranthaceae and Fabaceae.

1. Solanaceae family

Yellow nightshade (*Solanum elaeagnifolium* Cav.)
 Black nightshade (*Solanum nigrum* L.)
 Datura (*Datura stramonium* L.)
 Potato (*Solanum tuberosum* L.)
 Aubergine (*Solanum melongena* L.)

2. Amaranthaceae family

Red goosefoot (*Chenopodium rubrum* L.).
 Lincolnshire Spinach (*Chenopodium bonus-henricus* L.).
 The Spinach (*Spinacia oleracea* L.)
 The Beet (*Beta vulgaris* L.)

3. Fabaceae family

The common bean (*Phaseolus vulgaris* L.).

Discussion

1. **Solanaceae family:** In our study, it counts three spontaneous species and two cultivated in ones.

a. Spontaneous species

Three spontaneous plants belonging to Solanaceae family were found and they are known to be host plants of *T. absoluta* ^[11].

***Solanum elaeagnifolium* Cav.:** known as host of tomato leafminer plant ^[12]. This plant presents an average distribution in the Biskra region related to agricultural activity and the proliferation of weeds.

***Solanum nigrum* L.:** A rare plant found in Biskra region, as a host of tomato leafminer plant ^[12].

***Datura stramonium* L.:** This species is known as a host plant of *T. absoluta* ^[6, 12], but it's very rare in Biskra region.

b. Cultivated species

***Solanum tuberosum* L.:** the infestation has been identified in all the visited plots. The damage is severe in some. According to ^[13, 14 15]; *T. absoluta* attacks the potato's leaves but not the tubers.

***Solanum melongena* L.:** Identification of infestations in under plastic greenhouse and in the field. The damage is very serious on leaves and fruits in greenhouses especially in the spring time. ^[16] reported also that *Capsicum annuum* L. (Pepper and Cayenne pepper) as host plant of *T. absoluta*. Note that this species is cultivated in greenhouses and in fields of the Biskra region but it is important to raise that no statement of infestation on this species was reported

according to our study, and after the declaration of farmers in the region no infestation has been detected up to now in the investigated areas. ^[3] Indicates the *T. absoluta* shows a high propensity to use various plants as secondary hosts, notably species within the Solanaceae.

2. **Amaranthaceae family:** We have found four species belonging to this family: two wild (spontaneous) species and two cultivated ones.

a. Spontaneous species

There are two spontaneous (wild) plants of this family which are the first records as a host plant of *T. absoluta* (original). They were never reported as such before: *Chenopodium rubrum* L. and *Chenopodium bonus-henricus* L.

b. Cultivated species

For the cultivated plants of Amaranthaceae family, there are also two which are the first records as a host plant of *T. absoluta* (original). They were not reported as such before, *Spinacia oleracea* L. and *Beta vulgaris* L.

3. Fabaceae family

This family encountered only one species. This species is a cultivated one. It's the *Phaseolus vulgaris* L. The infestation was seen in greenhouse and field. It was already declared as a host plant in Italy by ^[12].

Conclusion

To prevent the development of this pest it is necessary to reduce the proliferation of weeds related to agricultural activity in the studied area. These results can be used in combating against the tomato leafminer by the elimination of wild host plants in the plots reserved for different cultures. It will be important to ensure never left two host plants of *Tuta absoluta* in the same plot as an intercalary crops. Enable the research work to find the phenomenon of resistance of *Capsicum annuum* L. to the tomato leafminer in the Biskra region. It is necessary to develop biological control and the fight by the plant extracts to reduce the impact pest of *Tuta absoluta* to an economic acceptable level and for environment preserve.

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