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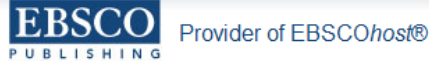
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Yazışma Adresi / Corresponding Address

Tekirdağ Ziraat Fakültesi Dergisi NKÜ Ziraat Fakültesi 59030 TEKİRDAĞ

E-mail: ziraatdergi@nku.edu.tr  
Web adresi: http://jotaf.nku.edu.tr  
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## New Host Plants of *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) in Turkey

Y. Bayram<sup>1</sup>

M. Büyük<sup>2</sup>

C. Özaslan<sup>3\*</sup>

Ö. Bektaş<sup>4</sup>

N. Bayram<sup>5</sup>

Ç. Mutlu<sup>4</sup>

E. Ateş<sup>4</sup>

B. Bükün<sup>3</sup>

<sup>1</sup>Republic of Turkey Ministry of Food, Agriculture and Livestock. General Directorate of Food and Control Department, Ankara

<sup>2</sup>Dicle University, Agriculture Vocational College, 21280 Diyarbakır

<sup>3</sup>Dicle University, Faculty of Agriculture, Department of Plant Protection, 21280 Diyarbakır

<sup>4</sup>Plant Protection Research Station, 21110, Diyarbakır

<sup>5</sup>Diyarbakır Provincial Directorate of Food, Agriculture and Livestock, Diyarbakır

[cumaliz@yahoo.com](mailto:cumaliz@yahoo.com)

Surveys for determining alternative host plants of *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) in the Southeast Anatolia Region of Turkey were carried out in open fields of tomato growing areas between the years of 2011 and 2012. Plants of four different families including Solanaceae, Amaranthaceae, Asteraceae and Poaceae have been identified as host plants. From cultivated members of the Solanaceae family; *Solanum lycopersicum* L. (tomato), *Solanum melongena* L. (aubergine), and *Capsicum annuum* L. (pepper), uncultivated Solanaceae; *Solanum nigrum* L., (black nightshade), *S. woronowii* Pojark. and *Physalis angulata* L. (cutleaf groundcherry), from the other non-cultivated weeds around tomato fields *Amaranthus viridis* L. (slender amaranth), belonging to the Amaranthaceae, *Sorghum halepense* L. (Pers.) (johnson grass) belonging to Poaceae and *Xanthium strumarium* L. (coclebur) belonging to Asteraceae family were detected as host plants of *T. absoluta*. Among them, *S. woronowii*, *P. angulata*, *X. strumarium*, *A. viridis* and *S. halepense* are the first records as hosts of *T. absoluta* in Turkey.

**Key words:** Tomato leafminer, *Tuta absoluta*, new host plants, Southeast Anatolia Region, Turkey

## Türkiye’de *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae)’nın Yeni Konukçu Bitkileri

*Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae)’nin alternatif konukçularının belirlenmesi çalışmaları Güneydoğu Anadolu Bölgesi’nde açık alan domates yetiştiriciliği yapılan alanlarda 2011-2012 yıllarında yürütülmüştür. Dört farklı familyaya ait (Solanaceae, Amaranthaceae, Asteraceae ve Poaceae) bitkilerden alternatif konukçular belirlenmiştir. Solanaceae familyasına ait kültür bitkilerinden *Solanum lycopersicum* L. (domates), *Solanum melongena* L. (patlıcan) ve *Capsicum annuum* L. (biber) bitkilerinde ve aynı familyadan olan yabancı otlardan *Solanum nigrum* L., (it üzümü), *S. woronowii* Pojark. ve *Physalis angulata* L., türleri konukçu bitki olarak tespit edilmişlerdir. Ayrıca domates yetiştirilen alanlarda ve çevresinde Amaranthaceae familyasından *Amaranthus viridis* L., Poaceae familyasından *Sorghum halepense* L., ve Asteraceae familyasından *Xanthium strumarium* L., türleri *T. absoluta*’nın konukçuları olarak tespit edilmiştir. Bu konukçu bitkilerden *S. woronowii*, *P. angulata*, *X. strumarium*, *A. viridis* ve *S. halepense* türleri *T. absoluta*’nın Türkiye’den ilk konukçu kayıdır.

**Anahtar Kelimeler:** Domates galeri sineği, *Tuta absoluta*, yeni konukçu bitkiler, Güneydoğu Anadolu Bölgesi, Türkiye

### Introduction

The Tomato moth, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) was only found in South America in the early 1900s. European, Asian and African countries were infected during the 2000’s because of the import and export activities among countries and even continents (Cáceres, 1992; Desneux et al., 2010; Ostrauskas and

Ivinskis, 2010; Bech, 2011; Abbes et al., 2012). However, it is predicted that in the near future, the pest is likely to emerge in China and India—countries which are first in tomato production in the world (Desneux et al., 2011).

In Turkey, *T. absoluta* was first found in 2009 (Kılıç, 2010), and has spread rapidly in all regions of the country because of its high reproductive

capacity. *Tuta absoluta* is one of the most important lepidopterous pests on tomato in both greenhouses and open fields. Although the primary host of this pest is tomato, it can also attack other cultivated Solanaceae plants such as aubergine (*Solanum melongena* L.), potato (*Solanum tuberosum* L.), pepper (*Capsicum annuum* L.), tobacco (*Nicotiana tabacum* L.), Cape gooseberry (*Physalis peruviana* L.) and goji berry (*Lycium* sp.) (Vargas, 1970; Campos, 1976; EPPO 2009; Tropea Garzia, 2009; Portkaldalı et al., 2013), as well as non-cultivated Solanaceae (*Solanum nigrum* L., *Solanum eleagnifolium* L., *Solanum bonariense* L., *Solanum sisymbriifolium* Lamarch, *Solanum saponaceum* Welwitsch, *Lycopersicum puberulum* Phil., etc.) and other naturally available host-plants such as jimson weed, *Datura ferox* L., devil's apple, *Datura stramonium* L., tree tobacco, *Nicotiana glauca* Graham and *Malva* sp. (Garcia and Espul 1982; Larrain, 1986; Caponero, 2009). Furthermore, it was reported in Fabaceae family on common bean (*Phaseolus vulgaris* L.) in Sicilia, Italy (EPPO, 2009). This shows that *T. absoluta* has a high tendency to use various plants as secondary hosts, especially species within the Solanaceae family. The alternative host plants allow *T. absoluta* to survive in many habitats in case of absence of tomato crops. This fact is important to improve control methods and for the eradication of the pest. It is expected that additional plant species as alternative hosts will be increased in the near future. The aim of this study was to find alternative host plants of *T. absoluta* in the Southeast Anatolia Region of Turkey in 2011 and 2012.

## Material and Methods

Survey studies were carried out to determine alternative host plants of *T. absoluta* in the Southeast Anatolia Region (Şanlıurfa, Diyarbakır, and Mardin provinces) of Turkey (Table 1). Sampling of *T. absoluta* was performed monthly in open fields of tomato production areas (Bora and Karaca, 1970). Surveys were carried out in tomato fields, as well as some cultivated plants that can be host for the pest such as aubergine and pepper fields near to tomato fields and on weeds inside/outside of the tomato fields.

## Results

Tomato (*S. lycopersicum*) is the most preferred host plant for *T. absoluta*. In addition to tomato, cultivated Solanum species including aubergine (*S. melongena*) and peppers (*C. annuum*), non-cultivated Solanum species as black nightshade (*S. nigrum*), *S. woronowii* and cutleaf groundcherry (*P. angulata*), non-cultivated weeds around tomato fields including slender amaranth (*A. viridis*), belonging to Amaranthaceae, Johnson grass (*S. halepense*) belonging to Poaceae, and coclebur (*X. strumarium*) belonging to Asteraceae family were detected as host plants of *T. absoluta*. This study is the first to document *Solanum woronowii*, *P. angulata*, *X. strumarium*, *A. viridis* and *S. halepense* as hosts of *T. absoluta* in Turkey (Table 2).

## Conclusion

Preliminary surveys confirmed that *T. absoluta* was found in cultivated and non-cultivated plants and even away from tomato crops. This means that they are able to survive in various habitats, have a high potential for natural spread and infest other plants. The pest was recorded in many of alternative host plants such as on greenhouse pepper (*Capsicum annuum*), golden berry (*Physalis peruviana*), aubergine (*Solanum melongena*), bean (*Phaseolus vulgaris*), potato (*Solanum tuberosum*), and tobacco, (*Nicotiana tabacum*). Among its alternative hosts are the weeds: *Solanum nigrum*, *Datura stramonium*, *Datura ferox* and *Nicotiana glauca*, *Lycium* sp., *Convolvulus arvensis* and *Malva* sp. (Pastrana, 1967; Vargas, 1970; Campos, 1976; Estay, 2000; EPPO, 2005; EPPO, 2009; Caponero, 2009; Tropea Garzia, 2009; Desneux et al., 2010; Portakaldalı et al., 2013).

One of the important information in order to control pests is to know their hosts. Rotation and weed control strategies should be performed for preventing reproduction and spread of the pest. Weeds should be removed from the direct surroundings that might act as a host plant for *T. absoluta*. In the United States, a crop rotation with a host-free period is essential for reducing pest populations in tomato crops (Zalom et al., 2008).

Table 1. Surveyed areas of the Southeast Anatolia Region in Turkey

Provinces	Surveyed area in 2011 (ha)	Surveyed area in 2012 (ha)	Total surveyed area (ha)
Diyarbakır	7	11	18
Şanlıurfa	19	41	60
Mardin	4	10	14

Table 2. The host plants of *Tuta absoluta* on surveyed area in Turkey

Provinces	Host Plants	
	Scientific name	Family
Diyarbakır	<i>Solanum lycopersicum</i> L.	Solanaceae
	<i>Solanum melongena</i> L.	
	<i>Capsicum annuum</i> L.	
	<i>Solanum nigrum</i> L.	
	<i>Solanum woronowii</i> Pojark. *	Amaranthaceae
	<i>Physalis angulata</i> L.*	
	<i>Amaranthus viridis</i> *	
Şanlıurfa	<i>Xanthium strumarium</i> L.*	Asteraceae
	<i>Solanum lycopersicum</i> L.	Solanaceae
	<i>Solanum melongena</i> L.	
	<i>Capsicum annuum</i> L.	
	<i>Solanum nigrum</i> L.	Poaceae
	<i>Sorghum halepense</i> L.*	
<i>Solanum lycopersicum</i> L.		
Mardin	<i>Solanum melongena</i> L.	Solanaceae
	<i>Capsicum annuum</i> L.	
	<i>Solanum nigrum</i> L.	

\*New host plant record for Turkey

When a new pest is display in new areas, it invades native species that have not been identified as host plants previously. Alternative host plant species should be taken into consideration and surveys should be extended to local species within the host genera as well as the other host plant families. *T. absoluta* could reproduce and spread to so many areas because of the presence of alternative host plants. Certain lepidopteran species have considerable active dispersal capacity (Chen et al. 1989; Fitt 1989; Feng et al. 2005), Furthermore, the pest likely colonizes new areas actively through flying or passively by the wind. All these factors should be taken into consideration to improve control strategies against the pest. In this study except for cultivated and uncultivated Solanacea plants five host plants that belonging to different families were determined as new host plants in Turkey.

We predict the list of host plant of *T. absoluta* will increase with the future studies. In addition, these new host plants, are very common in Diyarbakır and Şanlıurfa (Özaslan et al., 2011; Özaslan and Bükün, 2013). Especially host plant list belonging to different families gives an idea that even its cultivated host plant harvested or getting worse still *T. absoluta* could survive, reproduce and spread because of so many alternative host plants species.

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