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A New Host Plant for *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) in Turkey

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ABSTRACT

Survey to determine alternative host plants of *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) in the Eastern Mediterranean Region of Turkey was carried out in greenhouses and open fields of vegetable production areas between the years of 2010 and 2011. Plants of three different families including Solanacaeae, Convolvulaceae and Chenopodiaceae have been identified as host. From cultivated Solanaceae family; tomato (*Solanum lycopersicum* L.), aubergine (*Solanum melongena* L.), potato (*Solanum tuberosum* L.), pepper (*Capsicum annuum* L.), pepino (*Solanum muricatum* Aiton), non-cultivated Solanaceae; black nightshade (*Solanum nigrum* L.), field bindweed (*Convolvulus arvensis* L.) belonging to Convolvulaceae and lamb's-quarters (*Chenopodium album* L.) belonging to Chenopodiaceae family were detected as host plants of *T. absoluta*. Among them, *C. album* is the first record as host of *T. absoluta* in Turkey.

Key Words: Tomato leafminer, *Tuta absoluta*, host plants, Turkey

INTRODUCTION

Even though the Tomato moth, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) is only in South America in the early 1900s, European, Asian and African countries have been infected in the 2000s because of the import and export among countries or even continents (Cáceres, 1992; Desneux *et al*., 2010; Ostrauskas and Ivinskis, 2010; Bech, 2011; Abbes *et al*., 2012). However, it has been mentioned that in near future, the pest likely to emerge in China and India countries which were taking the first place in tomatoes production of the world (Desneux *et al*., 2011).

In Turkey, *Tuta absoluta* was first found in 2009 (Kılıç, 2010), and has spread rapidly in the all regions of country because of its high reproductive capacity. *T. 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 (*Solanum lycopersicum* L.), *T. absoluta* can also attack on other cultivated Solanaceae 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), as well as on 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). This shows that *T. absoluta* has a high tendency to use various plants as secondary hosts, especially species within the Solanaceae family. Furthermore, it was reported in Fabaceae family on common bean (*Phaseolus vulgaris L.*) in Sicilia, Italy (EPPO, 2009). The alternative hosts plants allows *T. absoluta* to survive in many habitats in the 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 near future. The aim of the study was to find alternative host plants of *T. absoluta* in the East Mediterranean Region of Turkey in 2010 and 2011.

MATERIAL AND METHOD

The survey was carried out to determine alternative host plants of *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) in provinces (Adana, Mersin, Osmaniye, Hatay, Gaziantep, Kahramanmaras and Kilis) of East Mediterranean Region of Turkey (Table 1). Sampling of *T. absoluta* was performed weekly in greenhouses and open fields of vegetable production areas (Bora and Karaca, 1970). However, in cultivated plants that can be host for the pest and on weeds inside/outside of the fields, 20 plants were sampled at least one of acres in both greenhouses and open fields.

Table 1. The surveyed areas of the Eastern Mediterranean Region of Turkey.

Provinces	Latitude/ Longitude	Surveyed area (ha)
Adana	35:18 E 37:01 N	5.45
Mersin	34:38 E 36:48 N	24.28
Hatay	36:07 E 36:14 N	2.5
Osmaniye	36:14 E 37:05 N	1.45

Provinces	Latitude/ Longitude	Surveyed area (ha)
Kahramanmaras	36:55 E 37:36 N	7.5
Gaziantep	37:22 E37:05 N	2.55
Kilis	37:05 E 36:44 N	2.35

RESULTS

Tomato (*Solanum lycopersicum* L.) is the most preferred host by *T. absoluta.* In addition to tomatoes, in cultivated Solanum species including aubergine (*Solanum melongena* L.), potato (*Solanum tuberosum* L.) and pepino (*Solanum muricatum* Ait.); in non-cultivated Solanum species as black nightshade (*Solanum nigrum* L.), in other genera in the Solanaceae include peppers (*Capsicum annuum* L.), and other families non-cultivated Convolvulaceae as field bindweed (*Convolvulus arvensis* L.) and Chenopodiaceae as lamb's-quarters (*Chenopodium album* L.) were detected as host plants of *T. absoluta*. Among them, *C. album* is the first record as host of *T. absoluta* in Turkey (Table 2).

Table 2. The host plants of *Tuta absoluta.*

Provinces	Host Plants	
	Scientific name	Family
Adana	*Solanum lycopersicum* L.	Solanaceae
	Solanum melongena L.	
	Solanum tuberosum L.	
	Solanum nigrum L.	
Mersin	*Solanum lycopersicum* L.	Solanaceae
	Capsicum annuum L.	
	Solanum nigrum L.	
Hatay	*Solanum lycopersicum* L.	Solanaceae
	Solanum nigrum L.	
	Solanum muricatum Ait.	
	Convolvulus arvensis L.	Convolvulaceae
	*Chenopodium album**	Chenopodiaceae
Osmaniye	*Solanum lycopersicum* L.	Solanaceae
Kahramanmaras	*Solanum lycopersicum* L.	Solanaceae
	Solanum nigrum L.	
Gaziantep	*Solanum lycopersicum* L.	Solanaceae
	Capsicum annuum L.	
Kilis	*Solanum lycopersicum* L.	Solanaceae

* New host plant record for Turkey

CONCLUSION AND DISCUSSION

Preliminary surveys confirmed that *T. absoluta* was found in cultivated and non-cultivated plants and miles 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. In South America, Europe and other parts of its expanded geographical range, *T. absoluta* prefers tomato. Besides, the pest was recorded in many of alternative host plants such as on greenhouse pepper (*Capsicum annuum* L.), goldenberry (*Physalis peruviava* L.), aubergine (*Solanum melongena* L.), bean (*Phaseolus vulgaris* L.), potato (*Solanum tuberosum* L.), tobacco, (*Nicotiana tabacum* L.). Among its alternative hosts are the weeds: *Solanum nigrum* L., *Datura stramonium* L., *Datura ferox* L., and *Nicotiana glauca* L., *Lycium* sp. and *Malva* sp. (Pastrana, 1967; Vargas, 1970; Campos, 1976; Estay, 2000; EPPO, 2005; EPPO, 2009; Caponero, 2009; Tropea Garzia, 2009; Desneux *et al*., 2010).

Knowing of the host plants is important in controlling the pest. To prevent the multiplication and spread of the pest, rotation and weed control strategies should be performed. Especially weeds should be removed from the direct surroundings and inside the greenhouses that might act as a host plant for *Tuta 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).

When a new pest is entered into new areas, they invade native species that have not been identified as host plants previously. That's why, alternative host plant species should be taken into consideration and surveys should be extended to native species within the host genera as well as the other host plant families. Because, *T.absoluta* finds distribution areas and multiplies owing to an alternative host plants. Furthermore, the pest likely colonize new areas through actively flying or passively by the wind. All these factors should take into consideration to improve control strategy against the pest.

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