



THE CURRENT STATUS OF
TUTA ABSOLUTA (MEYRICK)
(LEPIDOPTERA: GELECHIIDAE) IN TURKEY
AND TOXICITY OF SOME INSECTICIDES

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INTRODUCTION

- Tomato is a main crop and the most important vegetables in Turkey.
- Turkey is an important tomatoes producer country in the world.
- The Food and Agricultural Organisation (FAO) considers Turkey to be the world **third largest producer of tomato** (FAO, 2010).
- It is growing in the field and the greenhouse conditions.

- Average of 40 million tons of fresh fruit and vegetables produced in Turkey.
- Tomato (*Lycopersicon esculentum* Mill.) production alone constitutes approximately $\frac{1}{4}$ in the production of fresh fruit and vegetable.
- According to the statistical data, the production of tomato in Turkey is more than ten millions (10.052.000) tons in 2010 .

- Tomato production for fresh consumption and industrial consumption According to the statistical data, the production of tomato in Turkey is more than ten millions (10.052.000) tons in 2010 (Anonymous, 2011).
- brings the highest gross financial return to farmers especially in Aegean, Mediterrenean and Marmara Regions.
- In addition to other insect pest, the tomato leaf miner, *Tuta absoluta* is an economically significant pest of tomato in many countries and Turkey.

History of *Tuta absoluta* in Turkey

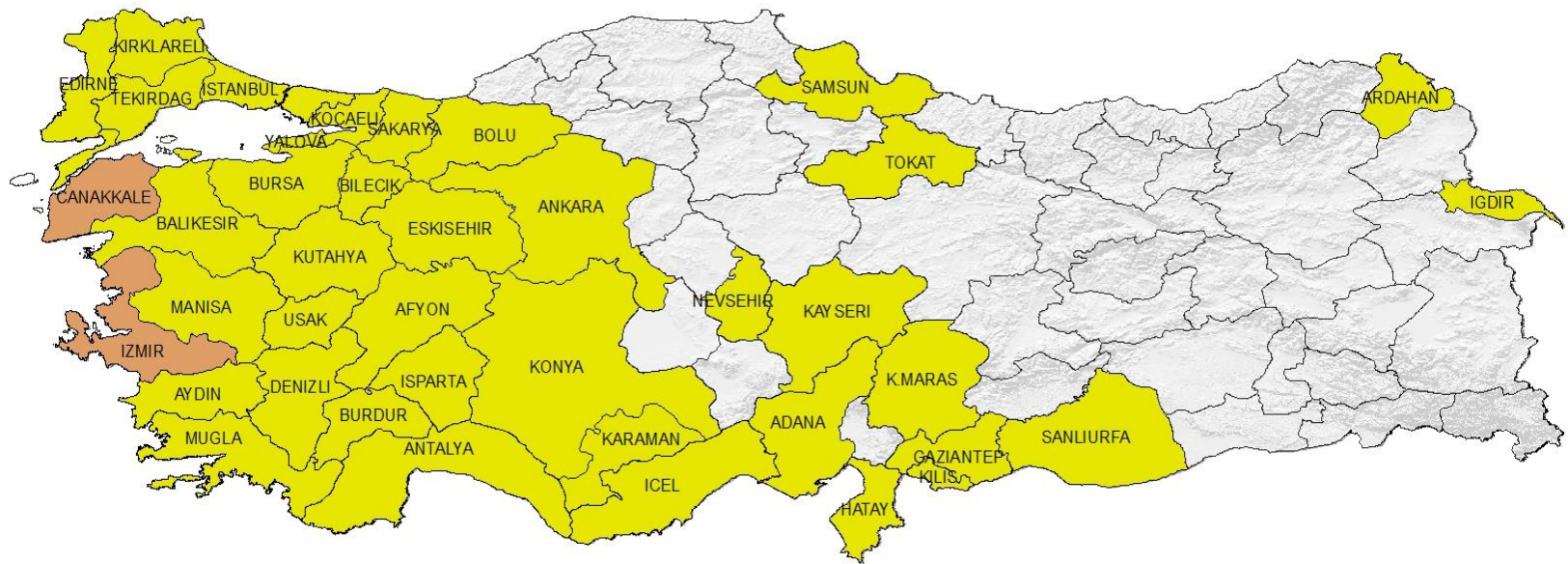
- *T. absoluta* (tomato leafminer) was firstly recorded in Aegean regions of Turkey in 2009 (Kılıç, 2010).
- The first discovery in August 2009 when boring lepidopteran larvae were found on aerial parts of tomato (*Lycopersicon esculentum* Mill.) plants in the **Urla District of Izmir Province** within the Aegean Region of Turkey.
- This is the first official record of *Tuta absoluta* in Turkey made by Tulin Kılıç.

- After this, there were some reports in the Turkish press about the appearance of *T. absoluta*.
- The Turkish news paper Yeni Alanya reported the presence of Tuta absoluta in regions of **Canakkale, Mugla and Izmir**.
- Prof. Dr. Rifat Ulusoy from the Cukurova University, Faculty of Agriculture confirmed the presence of Tuta absoluta in **Gallipoli district** in addition to **Izmir and Mugla**.
- Dr. Bouncers Values from the Akdeniz University, Faculty of Agriculture published an article confirming the presence of Tuta absoluta in the **Antalya** province.

- A survey study was carried out in tomato greenhouses of Mersin province during the autumn 2009 (September-January) and spring (February-June) 2010 by Karut et al.,(2011).
- They reported that there was no *T. absoluta* during autumn season in 2009, but *T. absoluta* was recorded for the first time on 29th April 2010 in a tomato greenhouse in Adanalıoglu laccation in Mersin.

CURRENT STATUS OF TUTA ABSOLTA IN TURKEY

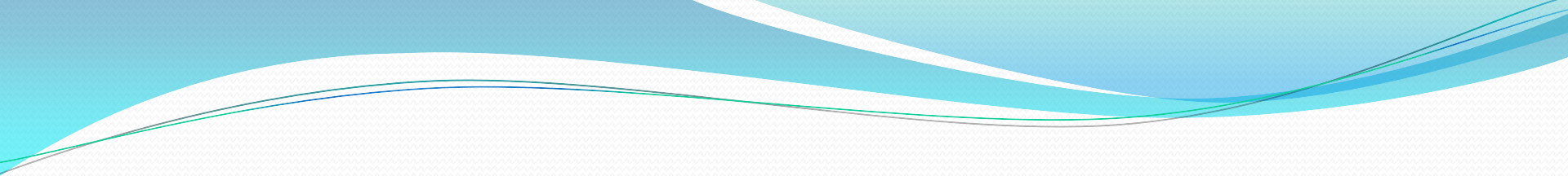
- After firstly recorded in Aegean region, it has spread out rapidly to the other regions of Turkey and became the main pest of tomato.
- Now, according to the record of The Turkish Ministry of Food, Agriculture and Animal Husbandry, approximately half of the country was infested by *Tuta absoluta*.

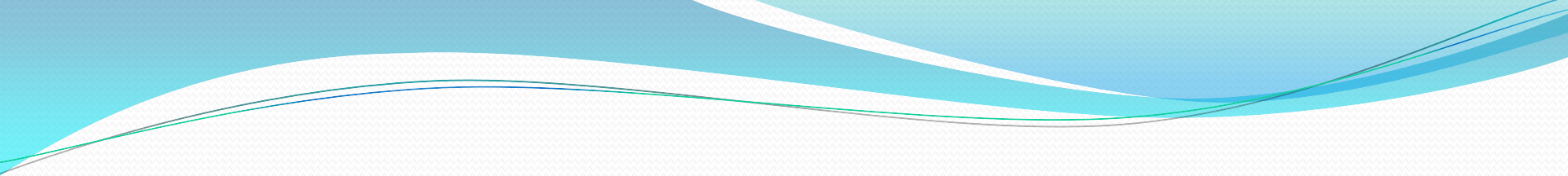


Infested provinces in Turkey

- The geographical spread of the reported locations and its coverage of both greenhouse and open field tomato, raises the alarm to the potential risk for tomato production in Turkey.



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- With its high reproductive capacity, *T. absoluta* is considered to be one of the most important lepidopterous pests on tomato.
 - *T. absoluta* is an oligophagous insect, which attacks solanaceous crops.
 - Larvae can damage tomato plants during all growth stages, producing large galleries.

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- Mediterranean and Aegean Region, of Turkey, the life cycle going on all seasons of year, but in Middle Anatolia and other regions they appear only summer time during the tomato growth season.
 - In 2011 the damage was seen in the end of growth season in September and October in Middle Anatolia.





Tomato damaged by *Tuta absoluta*



Tomato field damaged by *Tuta absoluta* Beypazarı-Ankara

Table1. The registered pesticides for *Tuta absoluta* on tomato

Active substane	Plant	Formulation	Dose
Azadirachtin A 10g/L	Tomato	NEEMAZAL T/S EC	300ml/100 L
45g/l Chlorantraniliprole + 18g/l Abamectin	Tomato	VOLIAM TARGO 063 SC	80 ml/100 L
Mataflumizone 240 g/L	Tomato	ALVERDE SC	100ml/da
Spinosad 480 g/L	Tomato	FLEENTER SC	25ml /100L
Bacillus thuringiensis subsp. curstaki ABTS-351 strain	Tomato	DÍPEL DF	100/100

Table 2. The insecticides are at the evaluation stage the registration for *Tuta absoluta*

Active substances	Formulations
%30 Indoxacarb	STEWARD
%35 Chlorantraniliprole	ALTACOR 35 WG
50g/l Lufenuron	SCOOTER 050 EC
50% <i>Bacillus thuringiensis</i> kurstaki BG2348 1rk1	AGREE 50 WG
50% <i>Bacillus thuringiensis</i>	RAPAX
5% Emamectin benzoate	FORGARD 5 SG
<i>Bacillus thuringiensis</i> subsp. <i>Aizawai</i>	FLORBAC WG
50% Clothianidin	DANTOTSU 50 WG
500g/l Pyridalyl	SUMIPLEO 50 EC

Table 3.The program in 2010 to control *Tuta absoluta*

ANTALYA	Chemical	35.000	da
AYDIN	Chemical	1.000	da
ÇANAKKALE	Chemical	3.000	da
KÜTAHYA	Chemical	380	da
	Chemical		
MANİSA		120.000	da
MUĞLA	Chemical	650	da
SAMSUN	Chemical	500	da
	Chemical		
DÜZCE		150	da
TOTAL		160.680	da

THE IPM PROGRAM FOR 2011 TO CONTROL *TUTA ABSOLUTA*

According to records of The Ministry of Food, Agriculture and Animal Husbandry

- **Province Number: 32**
- **Total area: 11.569.728 da**
- This area is programmed, but it is not certain yet in the all area control measures applied or not. Because in 2011 year, *Tuta absoluta* damage was not seen as expected.

- In 2011, a national project was prepared by the Ministry of Food, Agriculture and Animal Husbandry in Turkey.
- The project title
“Investigations on insecticide resistance mechanisms, possible control methods, natural enemies and biology of tomato leaf miner (*Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae)”
- Under this project, different studies will be carried out related to *T. absoluta*.

- *Tuta absoluta* caused the less damage in 2011 than that of 2010.
- The reason of this situation is not clear.
- The farmers did not realize the importance of *Tuta absoluta* for the tomato plants in the beginning.
- But, they understood the seriousness of *T. absoluta* and checked very often their plants and they used much insecticides to control it in 2011.

THE TOXICITY OF SOME INSECTICIDES

- In this study, the toxicity of some insecticides was determined.
- LC₅₀ values of some insecticides were determined by using leaf-dip bioassay method (IRAC, Susceptibility test method No: 022) in Serik-Antalya and Beypazarı-Ankara populations of *Tuta absoluta*.
- The study was carried out in Ankara Plant Protection Central Research Institute.

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Material and Methods

- Tuta absoluta populations were collected from the field with infected tomato plants from Antalya and Ankara.
- They reared in the laboratory in the controlled conditions $25 \pm 2^{\circ}\text{C}$ temperature and 60-65% humidity and (16h:8h) Light: Dark conditions.
- The experiment was conducted with F1 and F2 second instar larvae.



Rearing of *Tuta absoluta* in the controlled conditions



Insect rearing cages in the controlled conditions

- The commercial formulations of insecticides was used.
- The insecticide are including following active substances: pyridalyl, metaflumizone, chlorantraniliprole, abamectin, indoxacarb
- The dilutions was prepared with distilled water containing 0.2 % triton X-100 in different consantrations.
- The control solution only water containing 0.2 % triton X-100.
- The tomato leaflets was taken from the young plants.
- The tomato leaves were dipped for 3 seconds. After dried, it was placed into the pethri dishes.

- Then, the larvae was placed onto this leaves.
- After the application, bioassay trays was stored in an area where a temperature of $25 \pm 2^{\circ}\text{C}$, 60-65% RH, and 16:8 light: dark photoperiod regime.
- The deads were recorded after 72 hours.
- The LC₅₀ values was calculated by probit analysis using POLO PC software programme.

RESULTS

- The LD₅₀ values of pyridalyl, metaflumizone, chlorantraniliprole and abamectin were determined in *T. absoluta* populations collected from Serik-Antalya and Beypazari-Ankara.

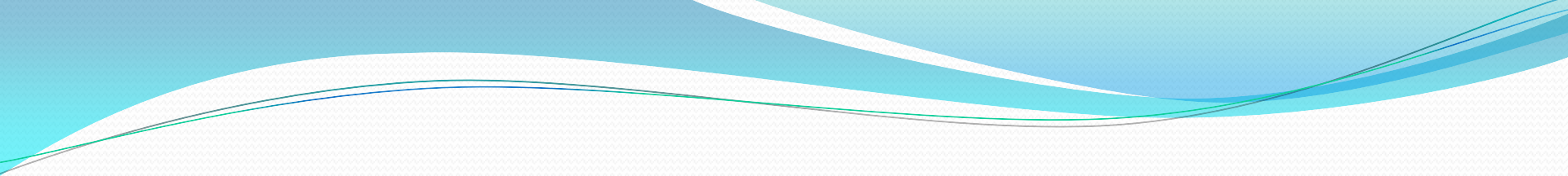
Table 3. The toxicity of some insecticides in Antalya population of *Tuta absoluta*

Population	Inseticides	Insect numb.	LC ₅₀ (ppm)	(%95 FL)	Slope
Antalya	Chlorantraniliprole	120	6.35	3.70-9.46	1.498±0.37
	pyridalyl	120	7.56	0.034-1656.9	0.350±0.46
	metaflumizone	120	21.02	11.72-29.8	1.72±0.40

Table 4. Toxicity of some insecticides in Beypazarı-Ankara population of *Tuta absoluta*

Population	Insecticides	Insect num.	LC50 (ppm)	95% Limits	Slope
Ankara	pyridalyl	170	572.2	337.5- 848.6	2.07±0.54
	metaflumizone	140	52.7	24.82- 105.65	1.095±0.28
	abamectin	140	0.43	0.234-0.675	1.560±0.31
	chlorantraniliprole	170	0.46	0.217-0.695	1.540±0.32

- According to the this results, LC₅₀ values are different in Ankara and Antalya populations for the same active substances
- We need further study with other populations of *T. absoluta* from Turkey or susceptible population of *T. absoluta*.



THANKS FOR YOUR ATTENTION