First Report of Invasive South American Tomato Leaf Miner Tuta absoluta (Meyrick) (Lepidoptera: Gelechiidae) in Tajikistan

Authors: Saidov, Nurali, Srinivasan, Ramasamy, Mavlyanova, Ravza, and Qurbonov, Zulfiqor

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First report of invasive South American tomato leaf miner *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) in Tajikistan

Nurali Saidov[1], Ramasamy Srinivasan[2], Ravza Mavlyanova[3], and Zulfiqor Qurbonov[4]*

Tomato is an important vegetable crop in Central Asia, with a production area covering 126,600 hectares (FAO 2017). This area includes Tajikistan, which has about 12,000 hectares planted with tomato in both open field and protected cultivation conditions. Tomato production is constrained by numerous insect pests and diseases. Among these biotic constraints, an invasive pest species, South American tomato leaf miner, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) has recently become a serious threat to tomato production in several countries in Europe, Asia, and sub-Saharan Africa. It was reported first outside South America, in Spain in 2006 (Urbaneja et al. 2007). Since then, the pest has spread to Mediterranean countries in Europe and North Africa (Desneux et al. 2011). In recent years, it has been reported in sub-Saharan African countries including Nigeria, Niger, and Senegal in West Africa (Guimapi et al. 2016), Tanzania (Chidege et al. 2016), Kenya and Uganda (Tumuhaise et al. 2016) in East Africa, and in the Republic of South Africa (Visser et al. 2017), and South Asian countries including India (Chandrashekar & Shashank 2015; ICAR 2015), Bangladesh (Alam et al. 2016), and Nepal (Bajracharya et al. 2016). In early 2016, *T. absoluta* damage was noticed in Uzbekistan (Fayad & Adiga 2017), which led to speculation regarding its presence in Central Asia. A recent publication from Kyrgyzstan confirmed the presence of *T. absoluta* in greenhouses producing tomatoes near Bishkek (Uulu et al. 2017). Hence, we conducted a rapid survey in selected tomato-producing regions of Tajikistan to check for the presence of *T. absoluta*.

Four locations—(i) Turmazor-1 village, Dukoni Jamoat of Norak city of Khatlon region (38.6600°N, 69.4504°E), (ii) Navobod village, Hissor Jamoat of Hissor district in the region of Republican Subordination (38.8411°N, 68.9661°E), (iii) Eshonobod village, Guliston Jamoat of Sarband district of Khatlon region (37.8490°N, 68.9022°E), and (iv) Guliston village, Ghayrat Jamoat of Qurghonteppa city of Khatlon region (38.3985°N, 69.2652°E)—were surveyed for the presence of *T. absoluta* between Mar and Jun 2016. Although tomato, potato, and sweet pepper were surveyed, *T. absoluta* damage was found only on tomato. Within each selected village, 1 greenhouse or field growing tomato was surveyed. In each greenhouse or field, 10 randomly selected plants in a 100 m^2 area were sampled. On each plant, the total number of leaves and the number of leaves damaged by *T. absoluta* larvae were counted to determine the percentage of leaf damage. Additionally, on each plant, the total number of fruits (if available) and the number of fruits with *T. absoluta* damage also were recorded. The survey was conducted at an interval of about 10 d until the harvest in each greenhouse or field.

Tuta absoluta damage was found on tomato in all the surveyed regions of Tajikistan. Blotch mines—the typical damage symptom caused by *T. absoluta*—were observed on the leaf surfaces in all the survey locations. When the plants started setting fruits, *T. absoluta* pinholes also were observed on fruits. Damage to fruit increased as the season progressed, which was reflected by multiple holes on fruits. In Dukoni Jamoat, the leaf damage increased from 2% (in early Mar) to 30% (in May). Similarly, the fruit damage also increased from 2% (toward the end of May) to 20% in early May (Fig. 1A). A similar trend was recorded in Hissor Jamoat, where the leaf damage increased from 5% in mid-May to 30% by the end of Jun. Although there was no fruit damage in mid-May, it rose to 15% at the end of Jun at this site (Fig. 1B). The fruit damage was very low (0-5%) in both Guliston and Ghayrat Jamoats (Fig. 1C, 1D). However, the leaf damage increased to 15% toward the end of Jul, from an initial damage of only 2% by the end of May in Guliston Jamoat. Leaf damage reached 20% from an initial 1% from Jun to Aug in Ghayrat Jamoat.

This survey confirmed the presence of *T. absoluta* damaging tomatoes both in greenhouses and in open field conditions in Tajikistan. Since its introduction into Spain in 2006, *T. absoluta* is continuing to spread in Mediterranean countries, Asia, and Africa. In Africa, it has already reached the Republic of South Africa (Visser et al. 2017). It has invaded northeastern parts of India (Sankarganesh et al. 2017) and the eastern side of Bangladesh. *Tuta absoluta* is spreading to all those regions predicted to be climatically suitable for its establishment and long-term survival (Tonnang et al. 2015). Central Asia was reported to be a region at high risk for *T. absoluta* establishment; hence, it is not surprising to have found it in Tajikistan. It already had been reported in Uzbekistan, Afghanistan, and Kyrgyzstan (Fayad & Adiga 2017; Uulu et al. 2017), the countries that surround Tajikistan. Although we did not conduct any systematic survey in Uzbekistan, one of the coauthors of this paper observed that the *T. absoluta* infestation reached 100% toward the end of Jul 2016 from an initial damage estimate of 10-20% in early Jun in Zangiota district of Tashkent region. Thus, *T. absoluta* already has become established in some Central Asian countries, including Tajikistan, and it is likely to cause severe economic damage in

[1]World Vegetable Center Project Office, Nusratullo Makhsum Street 67, Apart. 19, Dushanbe, Tajikistan; E-mail: nurali.saidov@worldveg.org
[2]World Vegetable Center, Shanhua, Tainan 74151, Taiwan; E-mail: srini.ramasamy@worldveg.org
[3]World Vegetable Center, Program Facilitation Unit of CGIAR Program for Central Asia and the Caucasus, PO Box 4375 Tashkent, 100000, Uzbekistan; E-mail: ravza.mavlyanova@worldveg.org
[4]Research Institute of Horticulture and Vegetables, Tajik Academy of Agriculture Sciences, 21 Rudaki Street, Dushanbe, 734025, Tajikistan; E-mail: zkurbonov.2017@mail.ru
*Corresponding author; E-mail: srini.ramasamy@worldveg.org

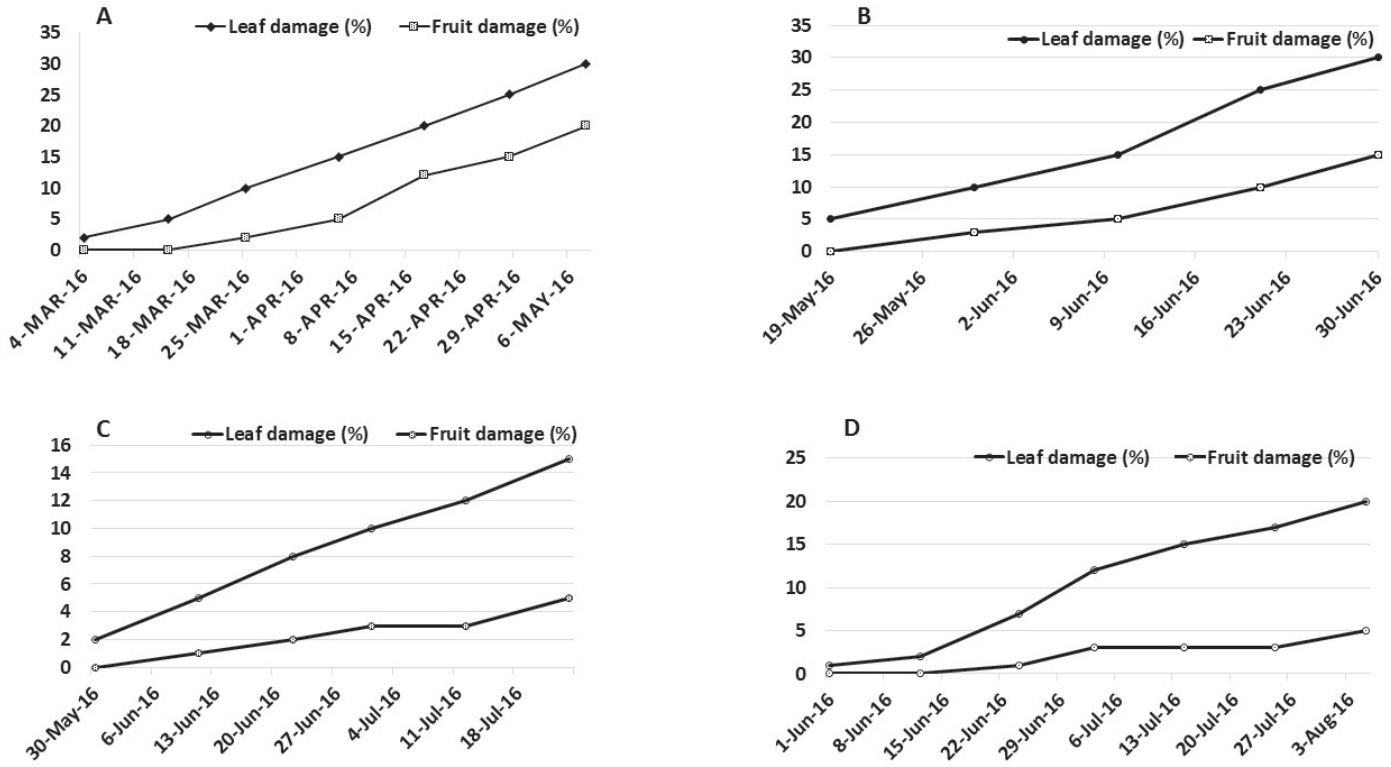

Fig. 1. Damage (%) of *Tuta absoluta* on tomato in Tajikistan during Mar to Aug 2016. (A) Dukoni Jamoat, (B) Hissor Jamoat, (C) Guliston Jamoat, (D) Ghayrat Jamoat.

tomato production based on the high eco-climatic index. Appropriate pest management strategies including quarantine measures should be deployed in this region to prevent further spread of *T. absoluta* and reduce the economic losses caused by this pest.

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Summary

For the first time in Tajikistan, South American tomato leaf miner, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) was detected in greenhouses and open field environments in Khatlon region and the region of Republican Subordination. Leaf damage, although lower at the beginning of the season, gradually rose to 15-30% in surveyed sites. Fruit damage also gradually increased during the season. Fruit damage was as high as 20% in the locations surveyed, with the exception of Guliston and Ghayrat Jamoats, which had very low fruit damage. *Tuta absoluta* is becoming established in Tajikistan. Suitable integrated pest management strategies are needed to reduce the incidence of this invasive pest species.

Key Words: *Tuta absoluta*; Khatlon region; region of Republican Subordination

Sumario

Por primera vez en Tayikistán, el minador sudamericano de hojas de tomate, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) fue detectado en invernaderos y en campod abiertod en la región de Khatlon y en la región de la Republica Subordinada. El daño de la hoja, aunque reducido al comienzo de la temporada, aumentó gradualmente al 15-30% en los sitios estudiados. El daño a la fruta también aumentó gradualmente durante la temporada. El daño de la fruta fue tan alto como el 20% en los lugares estudiados, con la excepción de Guliston y Ghayrat Jamoats, que tenían muy bajo daño en la fruta. *Tuta absoluta* se está estableciendo en Tayikistán. Se necesitan estrategias adecuadas de manejo integrado de plagas para reducir la incidencia de esta especie plaga invasora.

Palabras Clave: *Tuta absoluta*; región de Khatlon; región de Subordinación Republicana

References Cited

Alam SN, Begum K, Sarkar MA, Shah MMR, Mannan MA, Pradhan MZH, Islam MA, Rahman MZ. 2016. First record of the tomato leaf miner, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) in Bangladesh. Bangladesh Journal of Entomology 26: 71–76.

Bajracharya ASR, Mainali RP, Bhat B, Bista S, Shashank PR, Meshram NM. 2016. The first record of South American tomato leaf miner, *Tuta absoluta* (Meyrick 1917) (Lepidoptera: Gelechiidae) in Nepal. Journal of Entomology and Zoology Studies 4: 1359–1363.

Chandrashekar K, Shashank PR. 2015. Invasive pest alert. Indian Agricultural Research Institute, New Delhi, India. http://www.iari.res.in/files/Latest-News/INVASIVE_PEST_ALERT-05022015.pdf (retrieved on 05 Sep 2016).

Chidege M, Al-zaidi S, Hassan N, Julie A, Kaaya E, Mrogoro S. 2016. First record of tomato leaf miner *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) in Tanzania. Agriculture & Food Security 5: 17.

Desneux N, Luna MG, Guillemaud T, Urbeneja A. 2011. The invasive South American tomato pinworm, *Tuta absoluta*, continues to spread in AfroEurasia and beyond: the new threat to tomato world production. Journal of Pest Science 84: 403–408.

Fayad A, Adiga A. 2017. Monitoring the spread and management of *Tuta absoluta*. Current Science 113: 844–845.

FAO - Food and Agriculture Organization. 2017. FAOSTAT. http://www.fao.org/faostat/en/#data/QC (accessed 21 Sep 2017).

Guimapi RY, Mohamed SA, Okeyo GO, Ndjomatchoua FT, Ekesi S, Tonnang HE. 2016. Modeling the risk of invasion and spread of *Tuta absoluta* in Africa. Ecological Complexity 28: 77–93.

ICAR. 2015. *Tuta absoluta*: a new invasive pest alert. Indian Council of Agricultural Research, New Delhi, India. http://www.icar.org.in/en/node/8600 (accessed 05 Sep 2016).

Sankarganesh E, Firake DM, Sharma B, Verma VK, Behere GT. 2017. Invasion of the South American tomato pinworm, *Tuta absoluta* in northeastern India: a new challenge and biosecurity concerns. Entomologia Generalis 36: 335–345.

Tonnang HEZ, Mohamed SF, Khamis F, Ekesi S. 2015. Identification and risk assessment for worldwide invasion and spread of *Tuta absoluta* with a focus on sub-Saharan Africa: implications for phytosanitary measures and management. PLoS ONE 10: e0135283. doi: 10.1371/journal.pone.0135283.

Tumuhaise V, Khamis FM, Agona A, Sseruwu G, Mohamed SA. 2016. First record of *Tuta absoluta* (Lepidoptera: Gelechiidae) in Uganda. International Journal of Tropical Insect Science 36: 135–139.

Urbaneja A, Vercher R, Navarro V, Garcia MF, Porcuna JL. 2007. La polilla del tomate, *Tuta absoluta*. Phytoma Espana 194: 16–23.

Uulu TE, Ulusoy MR, Çalışkan AF. 2017. First record of tomato leafminer *Tuta absoluta* Meyrick (Lepidoptera: Gelechiidae) in Kyrgyzstan. EPPO Bulletin 47: 285–287.

Visser D, Uys VM, Nieuwenhuis RJ, Pieterse W. 2017. First record of the tomato leaf miner *Tuta absoluta* (Meyrick, 1917) (Lepidoptera: Gelechiidae) in South Africa. BioInvasions Records 6: 301–305.