



Tomato Leaf Miner, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) Detected in Namibe Province Angola

**Maneno Chidege^{1*}, João Abel², Zola Afonso³, Matteo Tonini³,
and Barbara Fernandez⁴**

¹Department of Research, Plant Protection Division, Tropical Pesticides Research Institute (TPRI),
P.O.Box.3024, Arusha, Tanzania.

²Department of Rural Development, Provincial Director of Agriculture, Phytosanitary,
Namibe Province, Angola.

³Food and Agriculture Organization of the United Nation, Angola.

⁴Department of Agriculture and Economic Development, Ministry of Agriculture, Angola.

Authors' contributions

This work was carried out in collaboration between all authors. Author MC tomato field survey data collection, analysis and wrote the first draft of the manuscript. Authors JA, MT and BF did tomato field survey and data collection and author ZA managed the analyses of the study review of the second and third draft of the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Aim: The aim of this study is to detect the presence of the South American tomato leaf miner *Tuta absoluta* (Meyrick 1917) (Lepidoptera: Gelechiidae) in Angola. This pest has recently attracted attention to the scientific community of Africa and worldwide due to its tomato destructive nature and its rapid spread. The invasion of *T. absoluta* in an area has negative impact on food safety, security and livelihood. Additionally, this may have ecological impact due to the loss of beneficial organisms by pesticides use, competition or co-existence with native arthropods and thereby perturbs the natural ecosystem.

*Corresponding author: E-mail: mchidege@yahoo.com;

Methodology: Between 3rd to 15th February 2017 the survey was conducted in tomato farms in order to determine the presence of the pest in the province.

Result: During the survey, larvae were detected on the aerial parts of tomato (*Solanum lycopersicum* L.) plants and created blotched leaf galleries and superficial mines on fruits. Additionally, the adult male was investigated under stereo microscope which captures by a specific pheromone traps (TUA optima lure), thereby confirming and indicating the presence or absence of *T. absoluta* in the tomato fields.

Conclusion: This is the first study on detection of tomato leaf miner, *T. absoluta* in Angola with its attendant destructive ability on tomatoes which should necessitate quick surveillance methods and management tactics before the situation gets out of control.

Keywords: Detection; tomato; Invasive; *Tuta absoluta*; Namibe; Angola.

1. INTRODUCTION

The South American tomato leaf miner, *Tuta absoluta* (Meyrick) (*Lepidoptera: Gelechiidae*) is one of the most serious pests of tomato (*Solanum lycopersicum* L.; *Solanales: Solanaceae*) but is also known to attack cultivated solanaceous plants such as eggplant (*Solanum melongena* L.; *Solanaceae*), potato (*Solanum tuberosum* L.; *Solanaceae*), pepper (*Capsicum annuum* L.; *Solanaceae*), tobacco (*Nicotiana tabacum* L.; *Solanaceae*), solanaceous weeds and garden bean (*Phaseolus vulgaris* L.; *Fabales: Fabaceae*) [1]. It is a native pest of South America but has spread to Africa, Asia and Central America. Since its introduction to Spain in 2006, it has invaded most of the countries in Europe, Mediterranean, Middle East, Northern, western and Eastern Africa and India in South Asia [2,3]. In Northern Africa, it was reported in Tunisia in 2008 [4], north of the Sahel in 2008 [3], Western Africa in 2010, Sudan and Ethiopia in 2011 [5], Kenya and Tanzania 2014 [6]. In these countries, it causes 80 to 100% crop loss when proper management technologies are not implemented [7]. The pest can reproduce 10-12 generations a year and each female can lay 250-300 eggs in her life span [3, 8]. There are four (4) larval instars; the first two (2) instars mine the leaves by feeding on the mesophyll and leaving the epidermis intact, thus creating tunnels on the leaf commonly known as "mines". These mines reduce the photosynthetic surface of the leaves and result in early drying and eventual death of the plant. Later the third and fourth instar larvae leave the mines and bore into stalks, apical buds, and fruits. Pupation takes place in the mines, dried leaves or in soil [2]. This study reports the detection of *T. absoluta* in Namibe province of Angola.

2. METHODOLOGY

2.1 Description of the Study Locations

The tomato damages inflicted by the pest was noted in January 2017 in Namibe province of Angola by the Province Directorate of Agriculture and Rural Development. In this province, several villages were affected; approximately 7.436 tons of all tomatoes 255.95 ha out of 3,500.00 ha (13.67%) under cultivation in 2017 were completely destroyed. The villages affected were: Bentiaba, Lucira, Forte Sta, Cavelocamue, Mughanga, Bomba, Tombwa and Curoca Valey.

During the training of personnel (twenty eight agricultural technical staffs and I) engaged on the detection, surveillance, phytosanitary measures and management of *T. absoluta* conducted between 3rd to 15th February 2017 under FAO in Namibe province, the presence of the pest was confirmed in two severely devastated tomato farms of Agrosul Farm - Giraul Valey and Kaparula Farm - Mid Giraul Valey belonging to Forte Sta (Rita Division) in Namibe province.

2.2 Sampling, Data Collection and Identification

Tomato farms were surveyed based on the damage symptoms as directed by the officer incharge of province agriculture and rural development of Namibe province. In a cross-section pattern, 100 plants were examined in each field, with percent damages determined by counting number of damaged plants against the undamaged ones. Thus; % plant damages = No. damaged plants x 100/ total no. of plants examined [6]. These data were analysed using Ms-excel software to determine the Mean percent damages in each field surveyed.

The larval-infested tomato fruits, leaves and other plant debris were examined with the aid of hand lens and stereomicroscope. Furthermore, *Tuta absoluta* specific pheromone traps (TUA optima lure) from Russell IPM was installed on 09 March 2017 to catch adult male moths of the pest (Plate 1).



Plate 1. Adult male moths captured by pheromone lure (TUA optima lure) in Namuve farm

3. RESULTS AND DISCUSSION

In the survey, it was observed that, two out of four tomato farms were heavily infested. The mean plant damages inflicted by the pest in the two tomato farms were scored to be between 85% to 100% (Plate 2 and Table 1). This is a typical damage characteristic feature of *T. absoluta* when it invades an area as also reported by other authors [9]. The fruit damages were observed to have characteristic holes in the surface and the leaf's mesophyll tissues were mined between the upper and lower epidermis. The larva from the dissected tomatoes and leaves were creamy-white in the early instars and green or pinkish with dark brown head in later instars. The adults were small (less than 7 mm in length), had grey to brown scales and black spots on anterior wings and filiform antennae (alternating white and black bands).

The larva mined the leaves (Plate 3), producing large galleries and later burrow into fruits. The plant damage symptoms, larva and adult



Plate 2. Huge tomato losses due to *T. absoluta* damage in Namibe province



Plate 3. *T. absoluta* damaged leaves
(Note the frass on the damaged surfaces)

Table 1. Tomato farms in Namibe Province detected to have *T. absoluta*

Tomato farms	Number of damaged plants	Total number of Plants examined	Percent damage
Agrosul	89	100	89
Giraul	100	100	100
Kaparula	84	100	84
Mid Giraul	98	100	98
Average			92.75

morphological features observed under the microscope is typical of South American tomato leaf miner. The species specific pheromone lure (optima lure) installed on 9 march 2017 captured several male moths (Plate 1) indicating the presence of this pest.

4. CONCLUSION

The invasion of South American tomato leaf miner, *T. absoluta* (Meyrick 1917) (Lepidoptera: Gelechiidae) in Angola will impact negatively on the tomato industry as it has been reported many other countries if the government and other stakeholders does nothing about it The yield of marketable fruits will go down and production cost will go higher due to purchase of pesticides. Measures such as surveillance, awareness creation, capacity building and phytosanitary measures are crucial at this stage of invasion. Therefore, there is no time to keep quiet or wait for invasion by the pest before concrete steps are taken to combat the infestation. The country should therefore devise appropriate pest management approaches before it spread all over the country and beyond.

In view of the foregoing, we recommend the following measures: The government of Angola and research institutions should collaborate with other local or international organizations to undertake surveillance, develop and train growers and extension officers on environmentally- friendly management strategies against this pest including the possibility of utilizing local or exotic natural enemies to combat this pest.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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