

Tuta absoluta

Subjects: Zoology

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The South American tomato pinworm *Tuta absoluta* (Meyrick) has aggressively invaded the African continent. Since its first detection in North Africa in Morocco and Tunisia in 2008, it has successfully invaded the entire southern, eastern and western Africa, where it has been on the offensive, causing significant damage to Solanaceous food crops.

Keywords: botanicals ; invasive species ; liabilities ; pest management ; tomato pinworm ; natural substances

1. Economic Impact of *Tuta absoluta* in Africa

Tomatoes are an important component of horticulture and a major pillar of sustainable development, with significant contribution to household and national food and nutritional security ^{[1][2]}. They are a cash crop grown for home consumption in the backyards of the majority homesteads across SSA and are an important source of vitamins ^[3]. Tomato production also significantly contributes to economic development ascribed to its high economic returns and ability to create employment (~60% of total labour force) and along the value chain ^{[4][5]}. About 170 million tonnes of tomatoes are produced worldwide ^{[6][7]}. Of this figure, Africa accounts for ~37.8 million tonnes annually. However, this figure is threatened by increased *T. absoluta* damage ^[8], with downstream consequences on African socio-economic value chains and household livelihoods ^[9].

Tuta absoluta larvae attack almost all aerial parts of tomato plants, resulting in ~80–100% yield losses if left uncontrolled ^[10]. Larval feeding also reduces fruit quality through creating pin holes prone to secondary attack by pathogens, rendering them unmarketable ^[11]. Increased cost of production has been reportedly experienced by small- and large-scale farmers in Africa due to increased costs for pesticides ^[12]. For example, recent evidence suggests decreased tomato yields and increased production costs ^[9]. Highest losses are mostly experienced during early invasion owing to inadequate mitigation measures related to lack of preparedness ^[13]. Nigeria experienced up to 80% losses in tomato produce in 2016 due to unfamiliarity with the pest and management strategies ^[5]. This reduced supply and catapulted an estimated 10-fold increase in tomato prices due to the laws of demand and supply ^[14]. Similarly, following *T. absoluta* invasion in South Africa (2016), pest-free countries banned importation of tomato and other Solanaceae crops from that country ^[15], resulting in significant economic losses. Similar losses have also been reported in South-western Angola ^[16]. Thus, *T. absoluta* pest pressure has negatively affected agricultural enterprises in Africa through direct losses (crop damage) and indirect losses through increased costs in pest management ^[8]. *Tuta absoluta* remains a pest of quarantine importance in countries under the Inter-African Phytosanitary Council (IAPSC) and has been reported on the European and Mediterranean Plant Protection Organization's (EPPO's) A2 list as a regulated insect pest ^[17].

2. *Tuta absoluta* Invasion Pathways and Distribution in Africa

Long-distance transmission and short-distance dispersal are the key drivers of *T. absoluta* invasion ^[18]. International agricultural trade is a key long-distance transmission mode that may have contributed to a larger extent in the introduction of *T. absoluta* into Africa, e.g., importation of fruits (e.g., tomatoes and egg plants) from pest-infested areas ^{[8][19]}. Other possible pathways for long-distance dissemination include production facilities and packaging materials (e.g., boxes, crates and pallets) from infested countries ^{[20][21]}. Hence, production facilities repack and distribute infested fruits, resulting in long-distance dissemination, reviewed in ^[22]. In addition, propagule material (e.g., seedlings), farm equipment and transportation vehicles from pest-infested areas are also possible pathways for long-distance transmission ^{[18][19][23]}. From the foregoing, the rapid spread across Africa may have been exacerbated by porous port of entries, weak phytosanitary regulations and ineffective early surveillance in the region ^[13]. Furthermore, natural factors (e.g., wind and water), larval crawling and adult flight are possible key short-distance dispersal pathways ^[18]. To date, *T. absoluta* has been reported in

41 of the 54 African countries (see [8]). The pest has not yet been officially reported in a few central and south-western African countries [15][6]. However, cognisant of its widespread presence in Africa, this absence may be a consequence of lack of surveillance and pest detection mechanisms.

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