

# Field effectiveness of *Metarhizium anisopliae* and pheromone traps against *Phthorimaea absoluta* on tomato in Tanzania

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## Abstract

*Phthorimaea absoluta* is an invasive pest and a major threat to tomato production in sub-Saharan Africa, including Tanzania. Although chemical pesticides are commercially available and used locally, mis- and overuse can cause detrimental effects on human and environmental health, and can lead to emergence of resistance among populations of *P. absoluta* within a short period, increasing production costs among smallholder farmers in Tanzania. The effectiveness of alternative options, such as the use of [biological control agents](#) and [pheromone traps](#), has not yet been studied in the field in sub-Saharan Africa. The present study evaluated the effectiveness of a commercially available [biopesticide](#) based on [Metarhizium anisopliae](#) and [pheromone traps](#) for managing *P. absoluta* in field conditions in Tanzania during the dry and [wet season](#), and compared effectiveness with chemical pesticides (a combination of chlorantraniliprole, [abamectin](#) benzoate, spinetram and clofenamide) and untreated plants as a positive and negative control, respectively. The two field experiments were conducted in a randomized complete block design with three replications per treatment. Two weeks after transplanting, 20 plants were randomly selected from each plot, with the number of fully expanded leaves per plant and mines per plant counted at 7-day intervals until harvest. At harvest, the number and weight of damaged and marketable fruits were recorded, and yield and marketable yield per plot calculated. The number of leaves per plant (an indicator of *P. absoluta* infestation) was higher in the [wet season](#) than in the [dry season](#). In the wet season, *M. anisopliae*-treated plants contained more leaves than plants in control or pheromone-treated plots. The number of *P. absoluta* mines per plant was higher in the [dry season](#) than in the wet season. In the dry season, the number of mines per plant was higher in control plots than in plots of other treatments. However, total yield and marketable yield were higher during the dry season than during the wet season. During both seasons, damage was highest and yield lowest in control plots. During the dry season, total yield and marketable yield did not differ significantly between pesticide-treated and *M. anisopliae*-treated plots. Biological control using *M. anisopliae* could be integrated in field management of *P. absoluta* in tomato in the highlands of Tanzania as well as in other regions of this country and throughout Africa.

**Keywords:** *Metarhizium anisopliae* , pheromone traps, *Phthorimaea*, tomato, Tanzania.