

Research Application Summary

**Studies on the etiology, epidemiology and management of dieback disease of passion fruit in Kenya**

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**Abstract**

Passion fruit (*Passiflora* spp.) is an important cash crop in Kenya. In the recent past, diseases have increasingly reduced its production with yield losses ranging from 50 – 100%. Dieback is a recently emerged disease that is highly virulent and causing 100% orchard loss within a short time. The disease has no effective control measure. A recent survey confirmed its status as a major threat to passion fruit production in Central and Eastern Kenya. The causal agent(s) of this disease and its epidemiology are being investigated. Various control options will be evaluated and effective ones recommended to farmers.

Key words: Dieback, epidemiology, Kenya, passion fruit

**Résumé**

La passiflore (*Passiflora* spp.) est une importante culture commerciale au Kenya. Dans un passé récent, les maladies ont de plus en plus réduit sa production avec des pertes de rendement allant de 50 à 100%. Le dépérissement est une maladie récemment apparue qui est très virulente et provoquant 100% de perte de verger dans un bref délai. La maladie n'a aucune mesure de contrôle efficace. Une enquête récente a confirmé son statut comme une menace majeure à la production de passiflore en Europe centrale et au Kenya oriental. L'agent causal de cette maladie et son épidémiologie sont en cours de recherche. Les différentes possibilités de contrôle seront évaluées et celles qui sont efficaces seront recommandées aux agriculteurs.

Mots clés: Dépérissement, épidémiologie, Kenya, passiflore

**Background**

Passion fruit production in Kenya has been severely reduced by the impacts of pests and diseases. The industry is threatened with collapse due to reduced export volumes and scarcity of raw materials for local processing. Dieback is emerging as the most severe disease on the crop and sustainable control measures are urgently needed for the disease.

## Literature Summary

In Kenya passion fruit is mostly produced by small-scale farmers owning less than 1 hectare of land (Wasilwa *et al.*, 2004). Compared to global standards, local yields are low at 8 ton ha<sup>-1</sup>, compared to about 18 – 24 ton ha<sup>-1</sup> in South Africa and Australia (Morton, 1987). The low productivity is largely due to diseases which cause yield losses of 40 to 100% (Wasilwa *et al.*, 2004; Amata *et al.*, 2009) and reduced life of orchards from 5 to 2 years (Fushimi *et al.*, 2001). The main diseases have previously been reported to be brown spot (*Alternaria passiflorae*), Fusarium wilt (*Fusarium oxysporum* fsp.*passiflorae*) and woodiness virus (Gardener, 1989). In addition to these diseases, Mbaka *et al.* (2006) reported Phytophthora canker and root rot after a countrywide survey in Kenya.

Dieback is a new and highly virulent disease that is spreading rapidly causing 100% loss and reducing orchard lifespan to less than 2 years (Amata *et al.*, 2009; Otipa *et al.*, 2009). Growers have reported increased dieback severity in times of drought, which suggests linkage to climate change effects, while some agronomic practices, e.g. pruning without disinfecting the tools can accelerate its spread (Otipa *et al.*, 2009). A recent survey confirm widespread occurrence of dieback in Eastern and Central Kenya. Unfortunately, adequate effort was yet to be made to tackle this new threat.

There has been considerable confusion on the causal agent of the dieback disease, with suspicion that it is a complex involving *Fusarium*, *Phytophthora* and possibly *Alternaria* sp. Previous attempts to isolate the causal organism from dieback infected tissue have given inconclusive results (Amata, 2009). Inability to identify the dieback pathogen has hindered efforts to develop effective control measures.

## Research Approach

The research is being carried out at Kenyatta University and in selected farmer fields in Central and Eastern provinces, Kenya. Areas with high dieback incidence have been identified and diseased plant samples collected for laboratory isolation and identification of the pathogens. Pathogenicity tests will be conducted to determine the individual and collective roles of each of the isolated organisms in disease development. Disease epidemiology will be studied to determine the key drivers of the pandemic. Management options will be tested including use of fungicides, host plant resistance and appropriate agronomic practices.

<b>Research Application</b>	This study will establish the pathogen(s) causing dieback on passion fruit in Kenya. This knowledge, in addition to increased understanding of disease epidemiology, will be vital in the development of effective control measures.
<b>Acknowledgement</b>	The authors thank RUFORUM for financial support, Kenya Agricultural Research Institute (KARI) Thika, and FACT Ltd. for facilitating this research.
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