Tropentag, September 17-19, 2018, Ghent

"Global food security and food safety:
The role of universities"

Citrus Greening Disease, East African Situation: Incidence, Severity and Patterns of Distribution

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Abstract

Citrus fruits are highly ranked as important crop for household consumption and as cash crop with great economic potential. However, due to attack by pest and diseases, the annual production of citrus fruits in East Africa has been below demand with smallholders producing around 4-10 t ha^{-1}, far below the expected 50-75 t ha^{-1}. This has resulted to high local requirement with 5 - 21% of the citrus currently supplemented by imports from South Africa and Egypt.

Trioza erytreae vector transmits the bacteria *Candidatus Liberibacter africanus* (*CLaf*) causing African citrus greening disease (CGD) that is a major threat to citrus production in East Africa and beyond. Furthermore, the recent establishment of a close relative vector '*Diaphorina citri*' and the potential of *T. erytreae* to transmit *Candidatus Liberibacter asiaticus* in East Africa (unpublished report), indicates that the two citrus greening vectors and pathogens could be quickly spreading and adapting to new environments that were not reported in the past. The study objective was to assess incidence, severity and distribution patterns of CGD in Kenya and Tanzania and to characterise potential circulating pathogens through sequencing and phylogenetic analyses of 16SrDNA and rpIJ genes.

Incidence and severity of CGD varied considerably across the different altitudinal gradients in the surveyed regions ($P < 0.05$). Though CGD was absent in some regions, the disease had widely spread in most of the highlands and midland regions. Lemon had the highest severity with a mean visual score of 2.05. When compared with members of the genus *Liberibacter*, sequence obtained from symptomatic citrus samples linked to *CLaf.* subsp. *clausena* (KX770998) and *CLaf.* (GU120044) with the given accession numbers in the gene Bank. The occurrence of *CLaf.* subsp. *clausena* previously reported on indigenous rutaceous plants and now on citrus plants suggests that they could act as alternative sources of *CLaf* infection to citrus orchards. These findings help to understand the possible economic and environmental impact other liberibacter subspecies may have on citrus crops and provides valuable insights into understanding and controlling CGD by putting in place stringent phytosanitary measures and internal quarantine system to avoid the spread of the disease to new areas.

Keywords: *Candidatus Liberibacter africanus* (CLaf), *Trioza erytreae*

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