

Tracheomycosis (*Gibberella xylarioides*) – A Menace to World Coffee Production: Evidenced by Cross Inoculation of Historical and Current Strains of the Pathogen

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SUMMARY

The objectives of this study were to determine regional diversity of the coffee wilt pathogen *Gibberella xylarioides* (*Fusarium xylarioides*) strains collected from *Coffea spp.* in different countries of East and Central Africa, and to test reactions of various coffee collections to the pathogen and thereby demonstrate its pathogenic threat to world coffee production. In this regard, three independent sets of cross inoculation experiments were conducted using strains of *G. xylarioides* recently isolated from *Coffea arabica* in Ethiopia (G3P22) and *C. canephora* in Uganda (CAB003), DR Congo (RDC002) and Tanzania (TZ008, TZ009). In addition, the infectivity of a historical strain collected from *C. excelsa* in the 1960s from Central African Republic (DSMZ62457) was tested in comparison to an isolate from the same host species in the recent tracheomycosis outbreak in Uganda (OUG152). Seedlings were raised in humus substrate mixed with vermiculite from seeds obtained from *C. arabica* in Ethiopia, Kenya and Costa Rica; *C. canephora* from DR Congo and Ivory Coast; and *C. liberica*. Between 25 and 30 seedlings/cultivar were inoculated at fully expanded cotyledon leaf stage by the standard stem inoculation method with spore suspension of each strain adjusted to 2×10^6 conidia per ml. Seedlings treated with sterile water were included as a control. The inoculated seedlings were then kept in a growth room with a 12 hr light/dark cycle at 25 °C temperature at CIRAD, Montpellier. The number of infected (dead) and healthy seedlings was recorded fortnightly following disease development and finally percent seedling death was computed and analyzed. Re-isolations were also made to prove host-pathogen compatibility. Results showed that the Ethiopian Arabica strain G3P22 (IMI375909) severely infected (killed) seedlings of all of six Arabica cultivars obtained from Ethiopia, Kenya, and Costa Rica (severity ranging from 30 to 94%) but did not cause wilt symptoms on any of the Robusta lines. Conversely, the strains isolated from Robusta coffee, CAB003 (IMI392263), TZ008 (IMI392678), TZ009 (IMI392679) and RDC002 (IMI392268), were pathogenic to all eight Robusta coffee lines. The historical strain from Excelsa, DSMZ62457 (IMI127629) killed seedlings of two *C. liberica* lines, T-1984 and T-1872, with 80 and 94% deaths, respectively. This strain also induced some symptoms in *C. arabica* (37%) and *C. canephora* (15%) and thus the Excelsa strain has a compatible interaction with all three *Coffea spp.*. The strain isolated more recently from Excelsa, OUG152 (IMI392681), was pathogenic specifically to *C. canephora* seedlings, confirming its pathogenic fitness over time to this host. *C. liberica* showed susceptibility to strains CAB003 (95%) and G3P22 (21%). In conclusion, these results indicate host specificity of *F. xylarioides* such that strains isolated from Canephora attack *C. canephora* and strains from Arabica induce disease on *C. arabica*.

These results also confirm susceptibility of most of the commercial *Coffea* spp. which indicates that tracheomycosis is a potential threat to the world coffee production. Although the disease is currently limited to East and Central Africa where it is attacking both Arabica and Robusta coffees, these findings warrant establishment of a strong quarantine policy against this disease by every coffee producing country in the world.