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MOLECULAR EPIDEMIOLOGY OF EMERGING BEGOMOVIRUS DISEASES ON VEGETABLE CROPS IN BURKINA FASO

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BACKGROUND and OBJECTIVES

Begomoviruses (family *Geminiviridae*) are transmitted by *Bemisia tabaci* and are responsible for serious diseases in the world. Except cassava-infecting bipartite begomoviruses (DNA-A and DNA-B components), all African begomoviruses described on crops are monopartite (DNA-A component). In recent years, a complex of more than 10 monopartite begomoviruses responsible for tomato (yellow) leaf curl diseases (TYLCD-ToLCD) has been described on tomato in sub-Saharan Africa [1]. Faced with the upsurge of vegetable virus diseases in Burkina Faso, we have undertaken (1) to identify the causal agents and their molecular diversity, and (2) to investigate their main epidemiological parameters in the field and under controlled conditions.

MATERIAL and METHODS

Thirty-nine localities from the main vegetable-growing areas of Burkina Faso were surveyed during 2013 to 2015. Altogether 939 leaf samples from cultivated and uncultivated crops were collected. Samples were subjected to begomovirus diagnosis by PCR, RCA, cloning and sequencing. Agroinfectious clones were constructed in order to assess the pathogenicity of some characterized viruses.

RESULTS

We have cloned and sequenced 143 DNA sequences (109 DNA-A and 34 DNA-B). Whereas, nucleotide similarity analyses confirmed the presence of at least four known African monopartite begomoviruses (CLCuGV, PepYVMV, ToLMLV and ToLCGHV), it also revealed for the first time in West Africa the mastrevirus CpCDV on tomato and a new species named "tomato leaf curl Burkina Faso virus". Unexpectedly, we characterized a DNA-B molecule on cultivated and uncultivated plants, always associated with the DNA-A of PepYVMV, which is distantly related to the known DNA-B. Our agroinoculation tests demonstrate that the sole PepYVMV DNA-A doesn't induce TYLCD-ToLCD symptoms on tomato in experimental conditions. However, in mixed infection the DNA-B is an activator of the virulence of the cognate PepYVMV DNA-A.

CONCLUSIONS

A complex of four known begomoviruses (CLCuGV, PepYVMV, ToLMLV and ToLCGHV) and a new begomovirus species on tomato (ToLCBFV) were described on diseased vegetable crops in Burkina Faso. Interestingly, a mastrevirus (CpCDV) was described for the first time in West Africa on tomato. Finally, we demonstrate experimentally that the newly characterized DNA-B component, naturally associated with PepYVMV DNA-A component in the field, represents a major pathogenicity activator. Our first investigations may suggest that this DNA-B component recruited by PepYVMV DNA-A could be the main epidemiological factor for the emergence of PepYVMV as the most prevalent and severe plant virus disease on tomato and pepper in Burkina Faso.

REFERENCES

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