

MOLECULAR EPIDEMIOLOGY OF EMERGING GEMINIVIRUS DISEASES ON TOMATO CROPS IN BURKINA FASO

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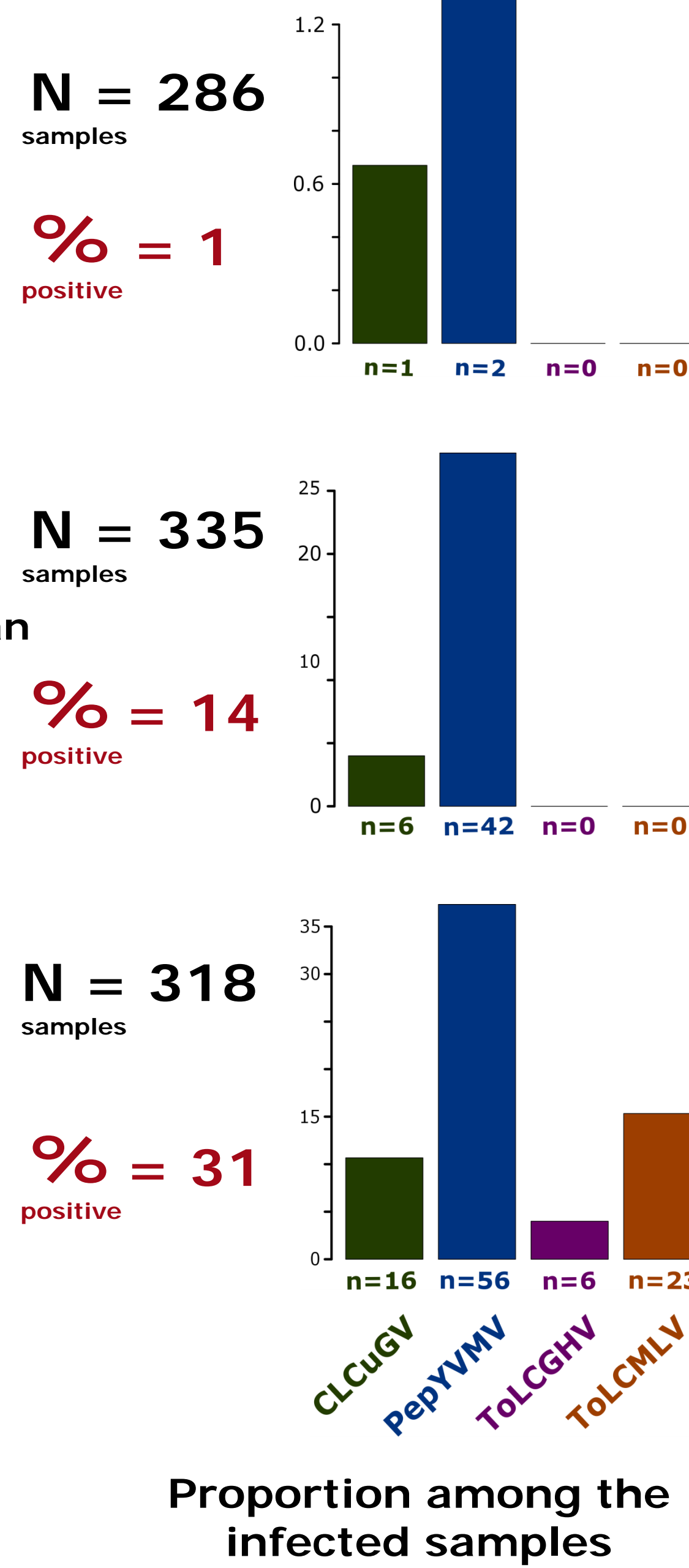
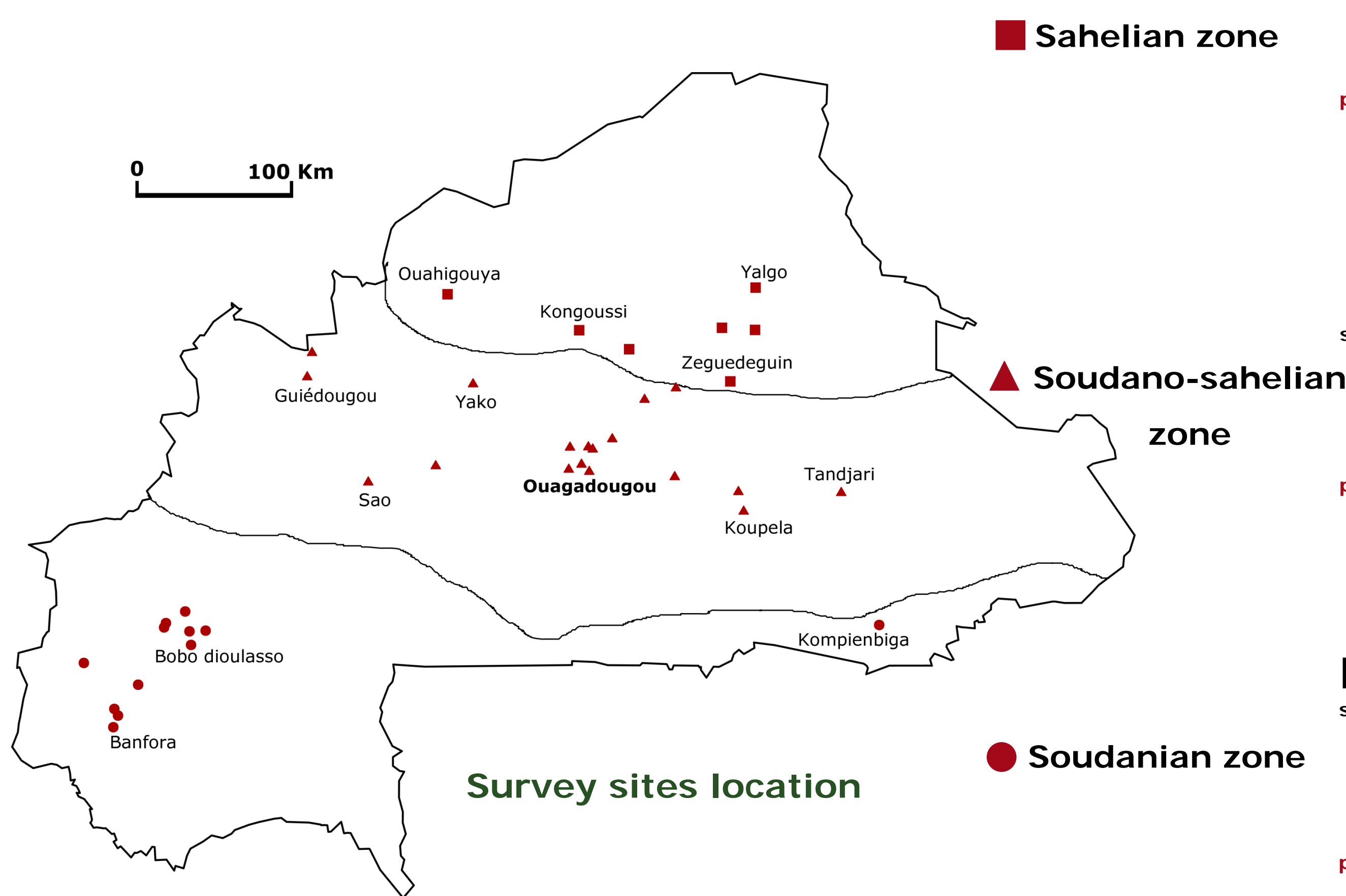
- Importance of tomato culture: global nutrition and sources of income for farmers in sub-Saharan Africa
- Major constraint: tomato leaf curl disease (ToLCD)
- Causal agents: complex of monopartite begomoviruses (*Geminiviridae*) in Africa
- Geminivirus: monopartite (DNA-A) or bipartite (DNA-A and DNA-B) circular ssDNA virus
- Vector: whitefly *Bemisia tabaci* (Hemiptera)



Objectives : Molecular diversity, geographic distribution and epidemiology of Burkina Faso begomoviruses

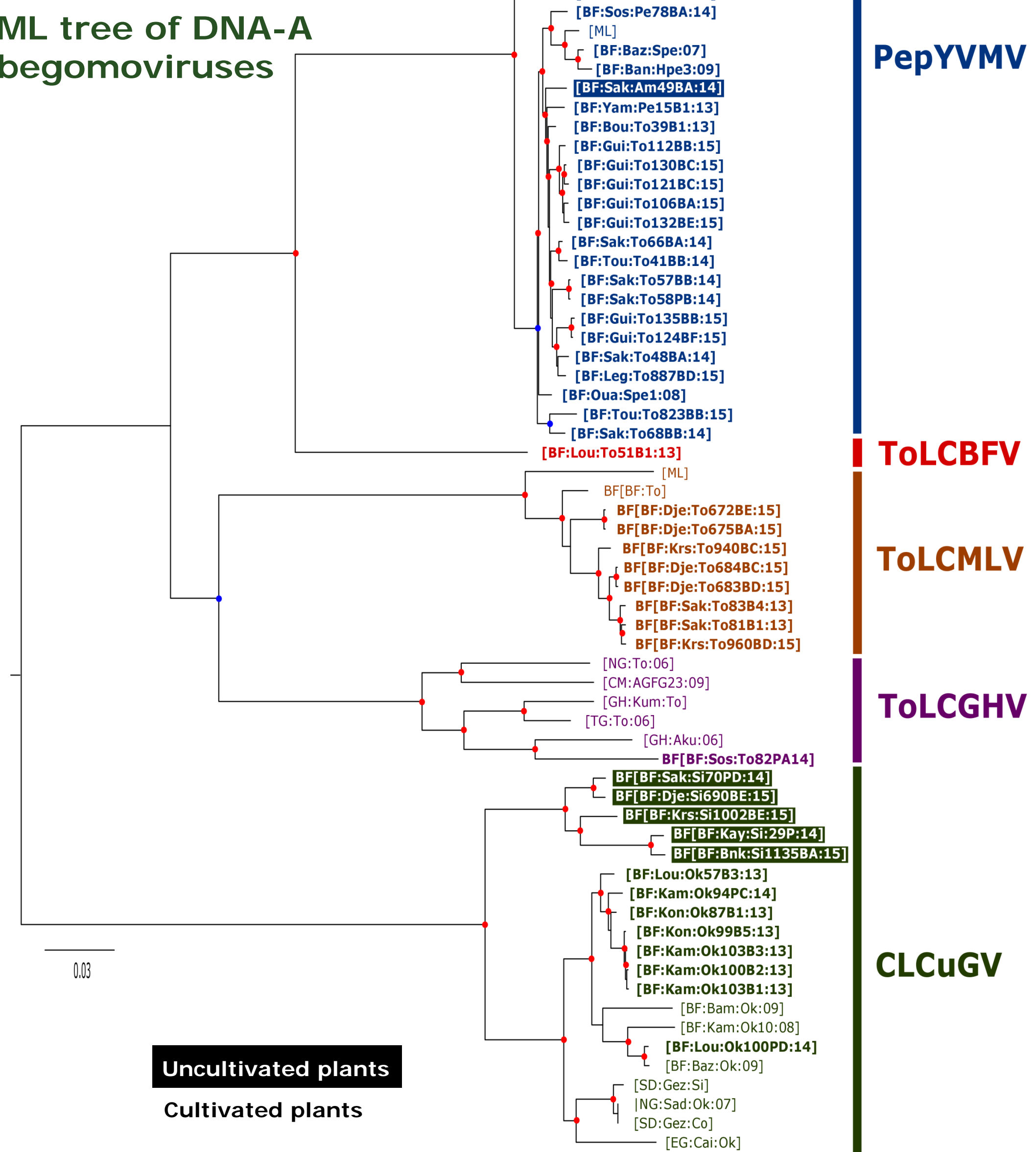
1. ToLCD: complex of begomoviruses and mastrevirus

- Survey: 939 leaf samples from 39 sites (726 cultivated and 213 uncultivated plants)
- PCR diagnosis (generic primers) and direct sequencing



- Cloned and sequenced 109 DNA-A and 34 DNA-B sequences

ML tree of DNA-A begomoviruses



▼ Four monopartite begomovirus species previously described in Africa:

- Pepper yellow vein Mali virus (PepYVMV)
- Tomato leaf curl Mali virus (ToLCMLV)
- Tomato leaf curl Ghana virus (ToLCGHV)
- Cotton leaf curl Gezira virus (CLCuGV)

▼ NEW SPECIES :

- Tomato leaf curl Burkina Faso virus (ToLCBFV)
- ▼ First description of a mastrevirus on tomato in West Africa:
- Chickpea chlorotic dwarf virus (CpCDV)

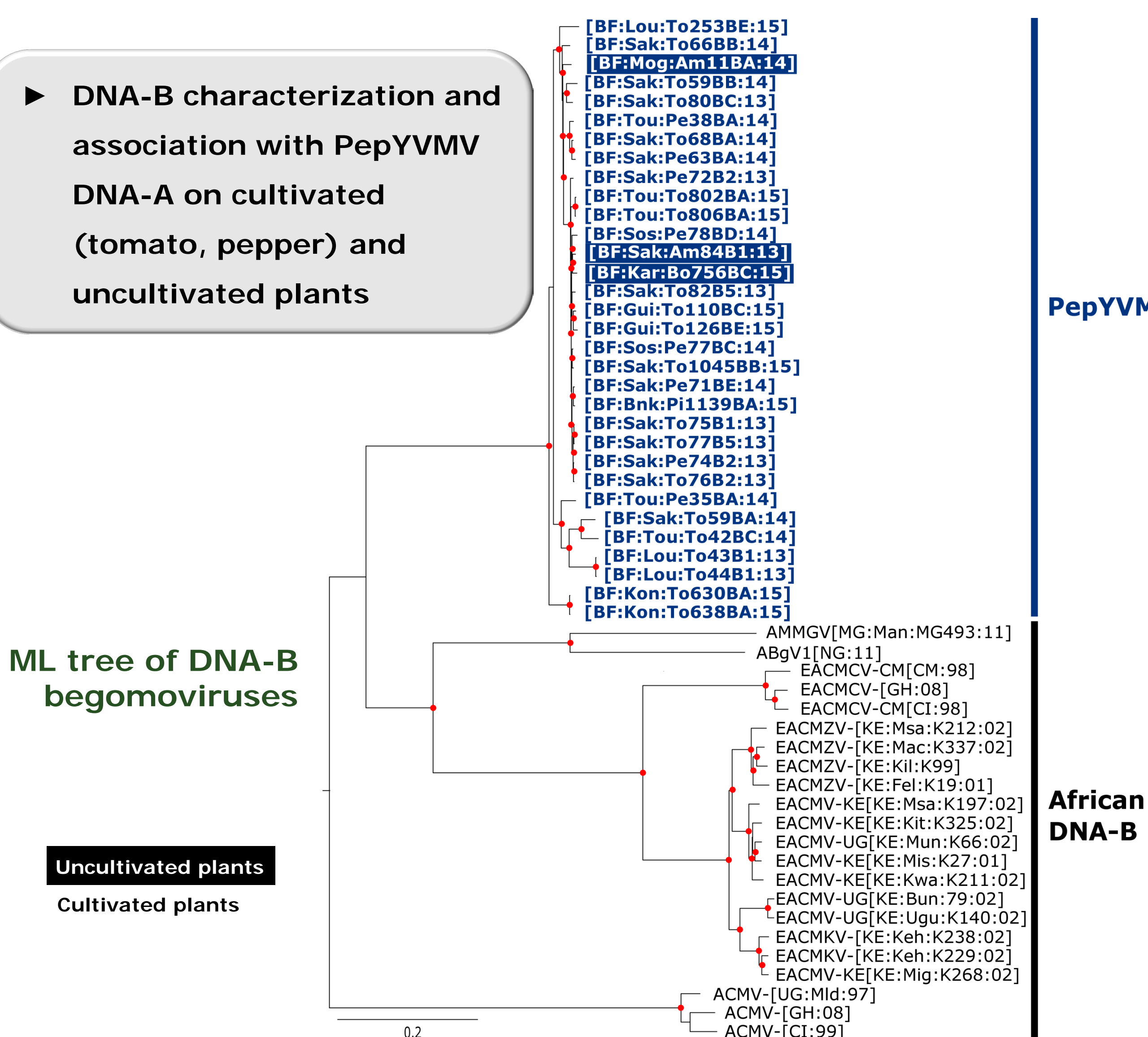
- ▼ North to South increasing gradient of ToLCD prevalence
- ▼ PepYVMV: the most prevalent and widely distributed begomovirus on vegetables in Burkina Faso

▼ Uncultivated hosts:

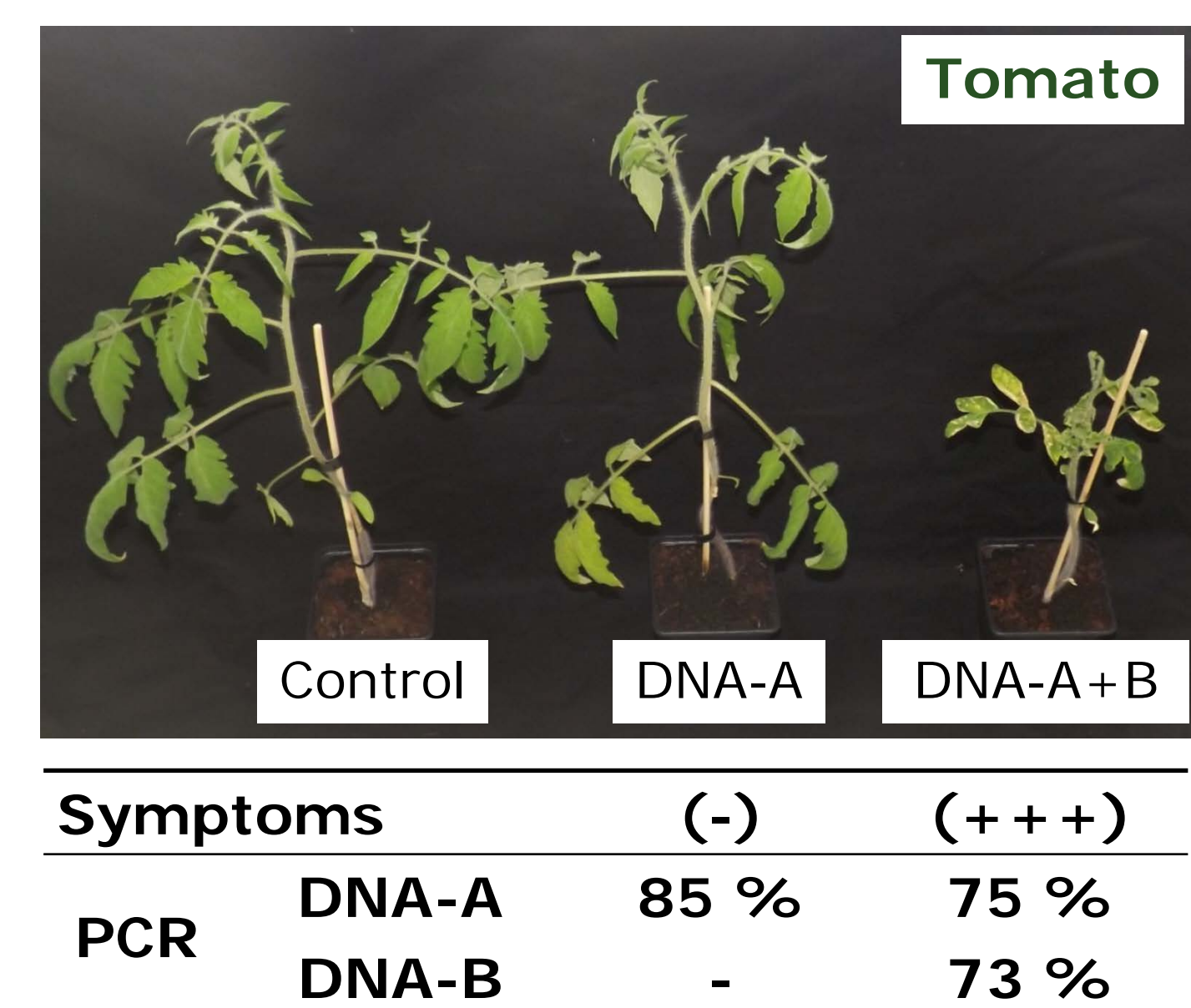
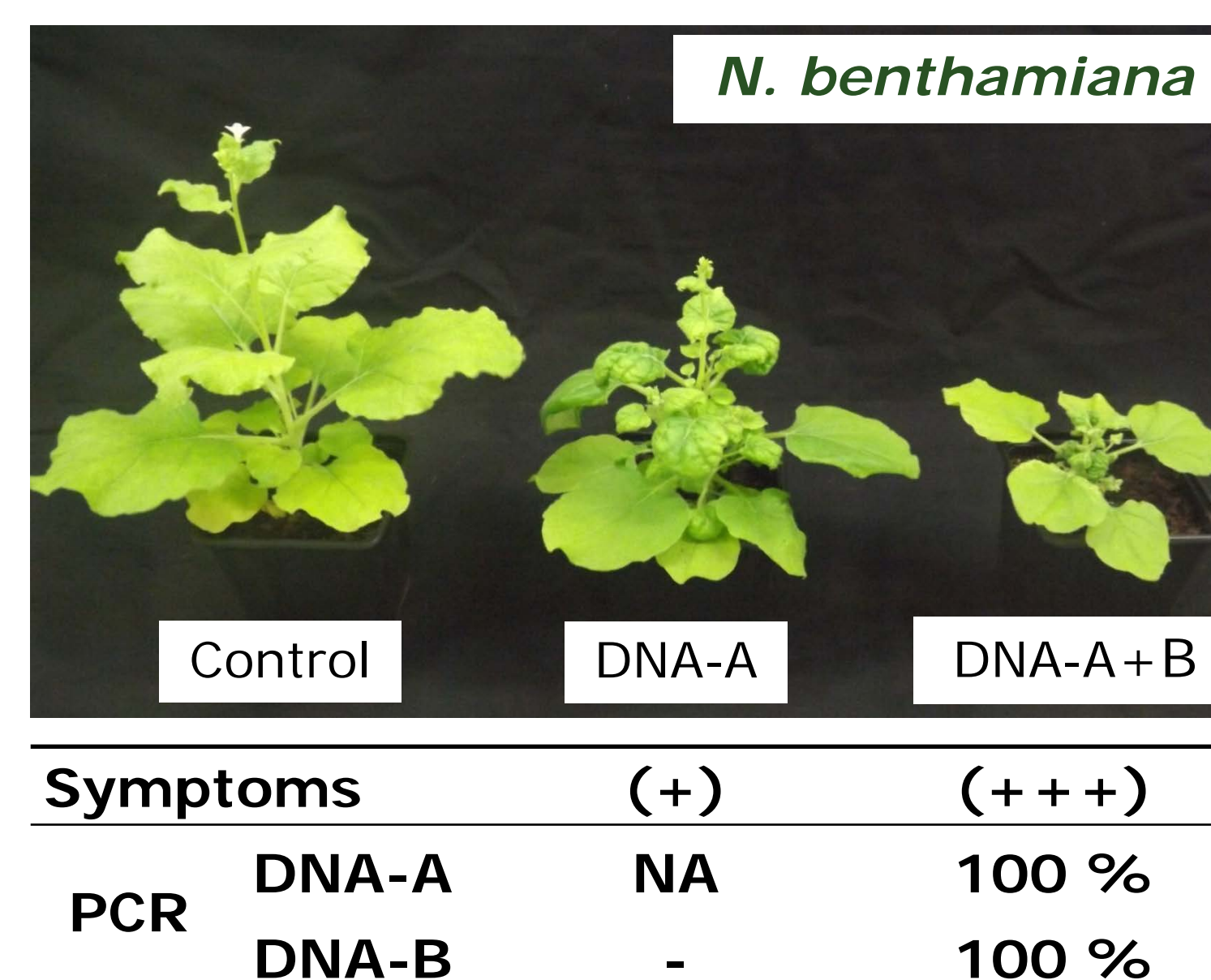
- PepYVMV:
 - Amaranthus viridis* (Amaranthaceae) [1/35]
 - Boerhavia erecta* (Nyctaginaceae) [2/9]
 - Ageratum conizoides* (Asteraceae) [1/2]
- CLCuGV:
 - Sida acuta* (Malvaceae) [14/27]

2. PepYVMV association with DNA-B component: Are we stronger together?

► DNA-B characterization and association with PepYVMV DNA-A on cultivated (tomato, pepper) and uncultivated plants



- Construction of agroinfectious clones of PepYVMV DNA-A and -B
- Agroinoculation : *Nicotiana benthamiana* and tomato
- Symptom monitoring and PCR diagnosis 30 days after inoculation



- ▼ DNA-A infectivity: DNA-B not required
- ▼ Mixed infection (DNA-A + DNA-B): strong symptoms
- ▼ DNA-B: a major pathogenicity enhancer

Future prospects

- Evaluation of the main epidemiological parameters (field prevalence, virulence, transmission efficiency, within-plant accumulation)
- Dynamics of begomovirus communities at agroecological interfaces