

Breeding *Musa balbisiana* genitors devoid of infectious eBSV alleles

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Banana streak viruses (BSV) infect bananas and plantains worldwide. They are naturally transmitted by mealybugs; however infections can also occur in the absence of vector-mediated transmission, through the activation of infectious endogenous BSV sequences (eBSVs). Infectious eBSVs are present in the genome of *Musa balbisiana* spp, which are important progenitors for breeding improved banana varieties. Once activated by biotic or abiotic stresses, these viral sequences cause spontaneous infection in both natural and synthetic interspecific hybrids harbouring the *M. balbisiana* genome, denoted B [1]. Therefore, the presence of infectious eBSVs within B genomes is currently the main constraint for breeding banana and plantain interspecific hybrids and for exchanging *Musa* germplasm.

The sequence and organization of eBSVs in the diploid *M. balbisiana* genitor Pisang Klutuk Wulung (PKW) was elucidated [2], showing that integration of infectious eBSGFV [3] and eBSOLV is di-allelic, with one infectious and one non-infectious allele, whereas that of infectious eBSImV is monoallelic [2]. Taking advantage of the development of allele-specific molecular markers [2; 4], eBSV signatures were established for all *M. balbisiana* genitors of the CIRAD Guadeloupe *Musa* collection. This work unveiled important differences between accessions. All combinations of infectious and non-infectious alleles were observed for the three BSV species, as well as complete and uncomplete integrants when compared to those described in PKW. Breeding improved *M. balbisiana* progenitors devoid of infectious eBSGFV and/or eBSOLV alleles was undertaken through self-pollination and chromosome doubling of haploid lines. Both approaches successfully lead to *M. balbisiana* cultivars devoid of infectious eBSOLV and/or eBSGFV resulting from the segregation of eBSOLV and eBSGFV alleles. Improved lines of one particular *M. balbisiana* cultivar, cv. Honduras, originally free of eBSImV, were shown to be free of infectious eBSV. These results pave the way to the safe use of *M. balbisiana* in breeding programs, and open new perspectives for breeding improved banana and plantain hybrid varieties.

Keywords : endogenous pararetrovirus; infectious; Banana streak virus; segregation; breeding; *Musa*

References :

- [1] Côte F, Galzi S., Folliot M., Lamagnère Y., Teycheney P.-Y., Iskra-Caruana M.-L. (2010). *Mol. Plant Pathol.* **11**: 137–144
- [2] Chabannes M., Baurens F. -C., Duroy P. -O., Sidibe-Bocs S., Vernerey M. -S., Rodier-Goud M., Barbe V., Gayral P., Iskra-Caruana M. -L. Three infectious viral species lying in wait in the banana genome. *Submitted*.
- [3] Gayral P, Noa-Carrazana J-C, Lescot M, Lheureux F, Lockhart BEL, Matsumoto T, Piffanelli P, Iskra-Caruana M-L (2008). *J. Virol.* **82**, 6697-6710.
- [4] Gayral P, Blondin L, Guidolin O, Carreel F, Hippolyte I, Perrier X, Iskra-Caruana ML. (2010). *J Virol.* **84**: 7346-59.