

## **PhD position in plant virology at Gembloux Agro-Bio Tech**

### **Genomic and biological characterization of the viruses infecting banana (*Musa* sp.)**

#### **Scientific context:**

The advances in high-throughput sequencing (HTS) technologies and bioinformatic analyses have created new opportunities for the analysis of genome diversity of known viruses as well as the discovery of new viruses and viroids. The importance of HTS technologies has been demonstrated during Covid pandemic with their ability to compare genomes, to detect the emergence of new variants, and to monitor their spread.

HTS technologies are also very useful to detect and characterize plant viruses and they can provide an improved understanding of their impact on crops and in the ecosystems. More specifically, the number of genomes of known viruses is exponentially rising, with the potential to lead to a better understanding of their diversity and to the development of improved diagnostic tests. In addition, hundreds of new plant viruses have been recently discovered thanks to the analysis of HTS data. Currently, five new virus species infecting banana have been detected by the hosting laboratory. Nevertheless, there is usually no information on the biological properties associated to these newly discovered of the newly discovered. It is therefore very difficult to evaluate the risk they may pose to plant health.

**The team and the laboratory.** The scientist will join an international team (8 nationalities) of 14 members, including post-docs, PhD students and technicians with a research expertise on plant virus epidemiology, ecology and diagnostic improvement.

The team is integrated within the Laboratory of Plant Pathology (LPP) from Gembloux Agro-Bio Tech (Liège University, Belgium) and has strong network of international collaborations ongoing with 18 countries around the world, through both European and international projects. It has, for example, coordinated the development of international guidelines for the use of HTS technologies to detect plant pests<sup>1</sup>. The LPP is also hosting the Germplasm Health Unit (GHU), which ensures virus testing<sup>2</sup> and sanitation for the world's largest collection of banana germplasm belonging to Bioversity International.

The work will be carried out in close collaboration with the technicians and scientists of the team through formal (journal club, lab meetings, international conferences ...) and informal (coffee break brainstorming, idea sharing, mutual support ...) exchanges.

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<sup>1</sup> <https://zenodo.org/record/6637519>

<sup>2</sup> <https://doi.org/10.1111/aab.12353>

**Research.** The doctoral study will focus on 3 main research axes:

1. **Genomic characterization of the viruses infecting *Musa* sp.:** the diversity of viruses infecting *Musa* plants will be investigated by HTS technologies and bioinformatic analyses to reconstruct and compare the recovered viral genomes. A better understanding of viral diversity will be achieved, both for known and novel viruses as previously carried out by the team <sup>3 4</sup>.
2. **Diagnostic test development:** based on the genome sequences generated by HTS, new detection primers will be designed, tested and validated for improved detection. The validation will include the organisation of an international test performance comparison between laboratories
3. **Studying the biology of newly discovered viruses** and their impact on *Musa* plants through greenhouse (in Belgium) and, if possible, field survey or field trials (abroad). The objective is to contribute to a better evaluation of the threat they pose to banana production and exchanges.

The PhD student will also provide scientific support to the routine testing operations of the GHU.

**Skills:** The candidate should have a strong interest in virology, plant pathology and molecular biology. Additional expertise in high throughput sequencing, diagnostics and/or bioinformatics is welcome.

We look for a scientist with very good communication skills and teamwork ability to interact daily within and outside the research team. Curiosity, rigor, and autonomy are also key assets.

**Techniques used:** Greenhouse assays, laboratory techniques (RNA extraction, PCR, RT-PCR, high throughput sequencing) and bioinformatics (genome reconstruction, phylogenetics, primer design, ...).

**Location:** Liège University, Gembloux Agro-Bio Tech campus in Belgium

**Duration:** from October 2022 to September 2025 (a one-year contract will be renewed for a 2-years contract after first year) with the possibility of an additional year

**CONTACT:** Please send your CV and a letter of motivation to Prof. Sébastien Massart ([sebastien.massart@uliege.be](mailto:sebastien.massart@uliege.be)) before 25<sup>th</sup> August 2022. Feel free to ask any additional information at the same e-mail address before 10<sup>th</sup> August or after 22<sup>nd</sup> August.

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<sup>3</sup> <https://doi.org/10.3390/plants11020226>

<sup>4</sup> <https://doi.org/10.3390/pathogens9121045>