At KU Leuven, the faculties of Science and Bioengineering jointly search a young and qualified **postdoc** in the field of plant molecular biology with notions of, or at least special interest in CRISPR/ Cas Biotechnology in plants. This project is a collaboration between Profs **W. Van den Ende**(Science) and **R. Swennen**(Bioengineering),KU Leuven, Belgium

**Accelerating evolution: engineering invertase enzymes to enhance fructan metabolism in *Musa* spp. (banana)**

No funding available yet, project submission deadline: **Feb 1, 2017**

Project starting date: **Oct 1, 2017**

Bananas are produced in more than 120 countries in South-America, Africa and Asia and around 85% of the crop is retained as a vital food source for 400 million people. With a worldwide production of 145 million tons, banana represents one of the most important food crops. The major threat to banana cultivation is drought, which causes yield losses up to 65%. Climate change (or global warming) is a leading human and environmental crisis of the 21st century.

Banana fruits can accumulate smaller amounts of inulin-type fructans (Cruz-Cardenas et al., 2015), fructose containing oligo-and polysaccharides that are well-known because of their prebiotic, immunomodulatory and antioxidant properties contributing to human health when used in functional foods (Peshev and Van den Ende, 2014). On the other hand inulin-type fructans are emerging as important signals during plant stress responses (Van den Ende, 2013). In banana, fructans are produced by one or more vacuolarinvertase enzymes (VIs) that are “on their way” to becoming “genuine” fructan biosynthetic enzymes or fructosyl transferases (FTs), as occurring in plants that accumulate fructans more abundantly (e.g. chicory, Jerusalem artichoke etc). It is widely accepted that FTs evolved from VIs in plants (Van den Ende, 2013).

The goal of this project is to use the CRISPR/Cas 9 technology to edit the banana genome in such a way that evolution is accelerated by transforming two banana VIs into FTs, with a dual purpose:

1. To increase fructan levels in banana fruit as a **direct** strategy to launch these **health-improving compounds into human diets**.
2. To increase fructan levels in other parts of the banana plants to **counteract stresses** (with focus on drought stress).

In collaboration with Dr. **Thorben Sprink** (a 3 month internship in the Julius Kühn Institute, Quedlinburg, Germany), a **directdelivery approach** will be undertaken to edit the banana genome because it allows to solve/limit the major issues of CRISPR/Cas9: lack of specificity, necessity of careful selection of the promoters for Cas9 and gRNA expression, and presence of foreign DNA in edited plants.

C. I. Cruz-Cárdenas, M. L. Miranda-Ham, L. A. Castro-Concha, R. Ku-Cauich, José, Vergauwen, T. Reijnders, W. Van den Ende, and R. M. Escobedo-Gracia Medrano, “Fructans and other water soluble carbohydrates in vegetative organs and fruits of different *Musa* spp. accessions,” *Front. Plant Sci.*, vol. 6, no. June, pp. 1–10, 2015.

D. Peshev and W. Van den Ende, “Fructans: Prebiotics and immunomodulators,” *J. Funct. Foods*, vol. 8, pp. 348–357, May 2014.

W. Van den Ende, “Multifunctional fructans and raffinose family oligosaccharides,” *Front. Plant Sci.*, vol. 4, no. July, p. 247, 2013.

Candidates should send a **motivation letter, CV and publication list** to [**wim.vandenende@kuleuven.be**](mailto:wim.vandenende@kuleuven.be)**asap or at least before Jan 19, 2017.**

**Useful links:**

<https://www.biw.kuleuven.be/biosyst/plantenbiotechniek/tropical>

<http://www.bioversityinternational.org/research-portfolio/conservation-use-of-bananas-tree-crops/international-musa-germplasm-transit-centre/>

<http://www.rtb.cgiar.org/blog/2014/02/26/from-the-university-of-leuven-belgium-bananas-and-rtb/>

<https://bio.kuleuven.be/pf/molecular_plant_biology/>

<https://www.julius-kuehn.de/en/biosafety-in-plant-biotechnology/staff/p/s/thorben-sprink/>