



OPEN DOORS FELLOWSHIP PROGRAM- APPLICATION TEMPLATE FOR RECEIVING LABORATORIES IN FLANDERS

APPLICATION MODALITY A: This modality has been conceived for research institutions in Flanders' higher education institutions or research centres looking for new scientific partners in Africa and willing to explore new joint research streams with their counterparts.

Objective: The application presented by the candidate ODFP fellow shall align with the scope and the requirements of open slots offered by the Flemish research laboratories and published on the ODFP web page.

Examples of the testimonies and open slots offered by the Belgian research laboratories are published [on the ODFP web page](#).

Information from the hosting institutions in Belgium

Contact details of a focal point	✉: sogoo@psb.ugent.be ☎: 0032 9 331 3910
Name of the research or academic institution	VIB-UGENT Center of Plant Systems Biology
Name of the research group	Rhizosphere group
Website of institution /research group	https://www.psb.ugent.be/groups/rhizosphere

Present the group's research line(s) and activities, including a list of commonly used technologies (e.g. *bioinformatics*, *genetic engineering*, *chromatography*, *sequencing*, *metabolomics*, *metagenomics*).

The rhizosphere lab focusses on how **interactions between plant roots and neighboring organisms positively influence plant growth**. The emphasis is on the symbiosis between legumes and rhizobia, resulting in the formation of **new root organs, the nodules, in which the rhizobia reside and fix atmospheric nitrogen** for the plant, making plant growth independent of nitrogen fertilizers. We study the influence of the environment on the control of nodule development and functioning by using the model legume *Medicago truncatula* as well as legume crops pea and soybean. The rhizosphere group also takes great initiatives in order to introduce soybean as a new crop in Flanders. The research in the Rhizosphere group extends beyond leguminous plants. Plants engage in numerous interactions with both beneficial and harmful soil organisms. These can be bacteria and fungi but also other plants, such as Orobanchaceae sp.. It is thus of great importance for plants to attract friends and repel foes. This intra- and interkingdom communication occurs through molecular signaling pathways



involving the secretion and sensing of various metabolites and proteins. The team combines **root microbiome analysis with proteomics, transcriptomics, genetic approaches and high throughput phenotyping** to elucidate the mechanisms by which microbes communicate with plants roots resulting in beneficial effects for the plants.

Describe the primary hard and soft skills desirable from the awarded ODFP fellow to deliver the task at hand.

- The candidate should have a profound text book knowledge about plant molecular biology and recombinant DNA technology.
- The candidate will learn many techniques related to these topics during the stay: DNA and RNA prep, qRT-PCR, microscopy, statistical analysis
- Soft skills: Related to soft skills & competencies, the fellow should have excellent communication (verbal and written) in English, interpersonal communication, self-management, teamwork, and problem-solving. People speaking French are also welcome, but some basic knowledge on English is always an asset.
- Language preferences: English and French

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Indicate the short and long-term outputs and synergies the PI in Belgium would like to see arising from this collaboration.

Expected Short-term synergies	Expected Long-term synergies
Common publication	Opportunity for long-term cooperation in legume research, for example through MSc students or PhD thesis projects and research projects.

Summarise (between 400 - 800 words approx.) the research project(s) or activities where the ODFP fellow would contribute to her/their research.

Pea (*Pisum sativum*) enters into a symbiotic interaction with rhizobia bacteria, resulting in the development of new organs, nodules, in which the bacteria find the ideal niche to fix atmospheric nitrogen for the plant. Hence, like many legumes, pea receives its nitrogen in a natural way that allows them to grow in a nitrogen-poor environment.

But it is not a free lunch. To participate in the symbiosis and allow nitrogen fixation to take place, the pea plant has to invest quite a bit of energy. For example, the plant will provide the energy required for the nitrogen fixation process in the form of hexoses. So, in order not to waste energy, plants tightly control nodulation and will constantly adjust the nodulation process to its specific N requirements and C availability for own growth and development.



How this happens at the molecular level is not well understood. In this project, we will use N and C markers to understand the process in more detail. We will combine mutant analysis with expression analysis using qRT-PCR and plant marker lines.

Are there additional resources relevant to the work/project related to the short research stay (e.g. articles, videos, project documents and summaries, repositories) that would help the fellow have a broader background of the intended project? If so, please list them below.

Van Dingenen J, De Keyser A, Desmet S, Clarysse A, Beullens S, Michiels J, Planque M, Goormachtig S. Strigolactones repress nodule development and senescence in pea. Plant J. 2023 Oct;116(1):7-22. doi: 10.1111/tpj.16421. Epub 2023 Aug 22. PMID: 37608631.

An official letter from the Principal Investigator of the Belgian receiving group confirming the collaboration with the ODFP should be sent together with this form duly filled.

Applications can be submitted electronically to IPBO@vib-ugent.be (The application form must be named as follows: "ODFP_ModalityA_name of research group". Please send the application form and supporting letter as a **single PDF file**).