MASTER 2 INTERNSHIP OFFER

URD ABI – AgroParisTech

Duration: 6 months (February 2023 – August 2023)

Production and characterization of decarboxylases to produce bio-sourced 4-vinylphenol derivatives

Host laboratory:

Located in the European Center for Biotechnology and Bioeconomy (CEBB), at the heart of the Pomacle-Bazancourt biorefinery, the URD ABI (Unit of Research & Development in Industrial Agro-Biotechnologies) is interested in the valorization of biomass through an approach combining biotechnologies, green chemistry and process engineering. Thanks to its expertise in green chemistry, microbiology/biochemistry/molecular biology, chemical engineering and separation process engineering as well as in analytical chemistry, the URD ABI is able to carry out multi- and transdisciplinary fundamental and applied research projects with the ambition of developing and optimizing sustainable industrial processes and high value-added products from agro-resources and industrial by-products.

Context and objectives:

The bioproduction of antioxidants, fine flavors and fragrances has expanded rapidly in recent years. Among these aromatic compounds, 4-vinyl guaiacol (4-VG) is a particularly valuable product in the food, cosmetic, pharmaceutical, and chemical industries. This phenol metabolite with a spicy clove-like aroma can be obtained from the decarboxylation of ferulic acid (FA). The commercial 4-VG is essentially obtained by chemical decarboxylation of FA using metal catalysts under harsh conditions, which raises concerns about the product safety and hazardous waste. Finally, usual 4-VG synthesis is not particularly green and 4-VG production cost remains forty times higher than that of FA. Under these considerations, producing renewable 4-vinylphenol derivatives from biomass through a sustainable process is a research topic for which the industrial/societal demand for cutting-edge technologies is very high.

The aim of this internship is to use recombinant phenolic acid decarboxylases (PADs) or ferulic acid decarboxylases activities (FADs) as biocatalysts to develop bioproduction processes to get renewable biosourced 4-VG under mild processing conditions.

The key objectives are:

- Heterologous production and purification of rFAD and/or rPAD
- *In vitro* implementation of FA enzymatic decarboxylation to produce 4-VG. The rate of the reaction will be determined through HPLC as described in the literature
- Development of UV-light absorbance spectroscopy methods to measure FA and 4-VG at milliliter-scale to replace HPLC analysis.

The selected candidate will have skills in biochemistry and in biotechnology (microbial cultures), a strong inclination towards lab work and will integrate easily into a multidisciplinary dynamic team.

Candidate profile:

- Master-level student (M2) in biochemistry/biotechnology
- Rigorous, motivated, autonomous with a good adaptability

Location:

European Center for Biotechnology and Bioeconomy, 3 Rue des Rouges-Terres, Pomacle (51110), France, located at 15 km from Reims (having a vehicle is recommended).

Grant:

According to the current scale

To apply, please send a CV and a cover letter to nabila.imatoukene@agroparistech.fr