

## A “BioEcoAgro” integrated research approach for new/renew valorizations of ancient traditional medicines and today/tomorrow’s uses of plant secondary metabolites.

**Eric GONTIER**<sup>1\*</sup>, Rebecca DAUWE<sup>1</sup>, Thi Kieu Oanh NGUYEN<sup>1,2</sup>, Lucine GOURLIN<sup>1</sup>, Florian MARTINI<sup>1,3,4</sup>, Priscille HINARD<sup>1</sup>, Marie-Laure FAUCONNIER<sup>4</sup>, Jérémy BERDY<sup>4,5</sup>, Haïssam JIJAKLI<sup>6</sup>, Jérôme MUCHEMBLED<sup>3</sup>, Nathalie JULLIAN<sup>1</sup>, Jean-Pierre ELE EKOUNA<sup>1</sup>, Chabha SEHAKI<sup>1,7</sup>, Thi Loan HA<sup>1,8</sup>, Néhémie DONFAGSITELI TCHINDA<sup>9</sup>, Semballa SILLA<sup>10</sup>, Rodrigue GOÏMASSE<sup>1,9,10</sup>, Thi Le Minh TRAN<sup>11</sup>

1) BIOPI-UPJV, UMRt BioEcoAgro INRAE 1158, Faculty of Sciences, Univ. Picardie Jules Verne, 80 000 Amiens, France.

2) Laboratory of Biotechnology and Life Sciences, USTH, Hanoi, Vietnam.

3) Joint Research Unit, INRAE 1158 BioEcoAgro Junia, 59000 Lille, France.

4) Laboratory of Chemistry of Natural Molecules, Gembloux Agro-Bio Tech, Univ. of Liège, 2 - 5030 Gembloux, Belgique.

5) Ecole Régionale d'Aménagement et de Gestion Intégrés des Forêts et des Territoires Tropicaux (ERAIFT), Univ. Kinshasa, R.D. Congo.

6) Integrated and Urban Plant Pathology Laboratory, Gembloux Agro-Bio Tech, Liege Univ., Gembloux, Belgium.

7) Laboratory of Natural Resources, University Mouloud Mammeri of Tizi-Ouzou, Tizi-Ouzou, Algeria.

8) Biotechnology Center of Ho Chi Minh City, District 12, Ho Chi Minh City, Vietnam.

9) Institut de Recherches Médicales et d'Etudes des Plantes Médicinales, BP 13033 Yaounde-Cameroon.

10) Laboratoire des Sciences Biologiques et Agronomiques LASBAD-BOUSSINGAULT, Faculté des Sciences, Université de Bangui, RCA.

11) Faculty of Biological Sciences, Nong Lam University, Ho Chi Minh City, Vietnam.

\*Speaker & corresponding author: [eric.gontier@u-picardie.fr](mailto:eric.gontier@u-picardie.fr)

**Context:** The immense diversity of wild plants has been naturally selected over thousands/millions of generations within their changing biotic and abiotic environments. The pressure of natural selection led to necessary adaptations which conditioned the survival of true phylogenetic groups. Beyond basic physiological needs, branches of the plant kingdom subjected to spontaneous mutations have developed an incredible capacity to synthesize biomolecules with useful properties to defend these non-mobile individual organisms. Called “secondary metabolites”, and more recently “specialized metabolites”, some of these molecules are biologically associated with the living environment. Thus, many biological activities became interesting for the plants and, later, for humankind when modern medicine did not yet exist. **Problem:** Today, alongside the massive use of chemically synthesized drugs, there is a need for natural compounds with therapeutic, even nutraceutical or cosmetic effects.... **Solutions:** The development of innovative valorizations of plant secondary metabolites can be done at high throughput thanks to blind screenings. It could also rely on the use of ancient and traditional knowledge itself based on empiricism and oral transmission. From this point of view, a rational path implies the establishment of the conditions necessary for the preservation of biodiversity, ancestral knowledge, the environment, soil fertility, environmentally friendly processes, ...finally for uses not frivolous, and also not false allegations. **Perspectives:** We will attempt here to draw up a heuristic diagram integrating all the dimensions of the bioeconomical, ecological and agronomical problem. To do this, some projects and results from the “BioEcoAgro INRAE 1158 cross boarder research unit” will then illustrate in more depth what such a multi-criteria and integrated approach could be, with a view to innovating on the basis of traditional knowledge on medicinal and aromatic plants.

**Key words:** plant specialized metabolites / secondary metabolites / medicinal plants / biodiversity / Metabolomics / Traditional medicines / eco-friendly valorizations

*In Memory of Rodrigue and dedicated to his son, Lurod*