

## Special ID4TECH issue

# Eco-vegetal extraction in six principles

**Using innovative processes and solvents that are more respectful of the environment, eco-vegetal extraction consists of isolating interesting compounds from natural resources (plants, flowers, seeds, roots, micro-algae, yeasts, bacteria...) for various markets : feed, food, cosmetics, perfumery...**

**F**or Farid Chemat, Professor at the University of Avignon and Director of the GREEN extraction laboratory, eco-vegetal extraction is based on six main principles :

**Principle 1:** Towards a renewable raw material. Over-exploitation of plants in a region can lead to the extinction of some endemic species. In the context of eco-extraction, the use of renewable raw materials, varietal improvement or the use of ingenious biotechnological processes are all avenues to consider in order to avoid the extinction of endemic species.

**Principle 2:** Favor the use of alternative sol-

vents. Several alternative approaches exist: «without solvent», use of green solvents like water allowing a modulation of the polarity, agrosolvents.

**Principle 3:** Generate co-products instead of waste. Co-products derived from plant extraction can be used for animal feed, human food or insects.

**Principle 4:** Reduction of energy consumption, particularly through the application of new technologies (microwaves, ultrasound or pulsed electric fields) capable of boosting existing processes.

**Principle 5:** Reduction of the number of unit operations through new extraction processes: extraction of plants with supercritical CO<sub>2</sub> or with other liquefied gases such as dimethyl ether, or extraction of the plant directly into the final solvent of the formulation.

**Principle 6:** Privilege naturalness: towards a new definition of an eco-extract. Since the emergence of green chemistry, innovative processes are being used more and more, allowing the process to be intensified by working at lower temperatures, without solvents



*The ID4TECH eco-extraction platform of Valréas near Avignon (France) ©Kreastyl*

and with the least number of unit operations. "Technological innovation is at the heart of eco-vegetal extraction, but extraction is just one step in the process of obtaining a product, and all the other steps are important to get an eco-extract" concludes Fanny Mary, ID4TECH R & D Engineer who offers her customers tailor-made solutions in eco-vegetal extraction (see interview page 2).

## World of botanicals

### Industrial use of *Capsicum* products

The authors review the interest of the bioactive compounds of *Capsicum* plants.

Besides the classic use as condiment (pungency, colour and flavor) pepper-derived ingredients could be used as antioxidants and antimicrobials to improve the lifespan of industrial products.

The most promising applications are for a health-promoting effect and for the treatment of inflammation and pain-related conditions, due to their content in capsaicinoids, carotenoids, phenolic compounds, vitamins C and A, iron, calcium.

*Baenas N. et al., 2019, Food Chemistry 274.*

### Carvacrol and *Campylobacter*

*Campylobacter* is a leading cause of foodborne human disease mainly due to poultry meat consumption.

By using a specific galenic formulation of carvacrol, the main component of Oregano essential oil, in artificially challenged broilers, the authors prevented a too fast digestive absorption of the active ingredient. They significantly decreased the *C. jejuni* caecal load by 1.4 log. The formulation also increased the diversity and modified the structure of the microbiota.

*Allaoua M. et al., 2019, XIII JRA-JRFG.*

## INTERVIEW

### Fanny Mary : "The widest offer in eco-vegetal extraction"

**Fanny Mary is R & D Engineer of ID4TECH, a sister-company of ID4FEED created in February 2019.**

**Biosis:** What is the goal of ID4TECH's creation?

**Fanny Mary:** The company ID4TECH took over in March 2019 the PEEV platform (Valréas Eco Extraction Platform) initially created by the PACA region, the Vaucluse department, the University of Avignon (Green laboratory) and various competitiveness clusters of the South-East of France (Terralia, Pass, Trimatec...) in order to offer its customers tailor-made services in eco-vegetal extraction and/or galenic-vectorization\* and this at all stages, from the plant to the active.

The objectives of the new platform are to introduce innovative eco-extraction technologies and to develop sustainable processes and know-how that improve the economical and ecological efficiency in a range of industries, from agri-food to animal health and nutrition.

**Biosis:** Could you describe the equipment of the Valréas platform?

**F. M. :** Our platform is unique in terms of the diversity and the size of the equipment (to date 1 M€ has been invested between 2014 and 2016) and it offers our customers the possibility of passing from laboratory tests to a semi-industrial scale. We are able to propose our customers various extraction pilots : microwave or ultrasound assisted extraction, extraction by liquefied gases, water extraction «in all its states»...without forgetting plant treatment, filtration, purification, galenic (Lyophilization, granulation spray, chilling spray, digestive vectorization study for animal health target).

**Biosis:** What are the pillars of your unique offer?

**F. M.:** ID4TECH relies on complementary partners to build a common offer : ERBO SPRAYTEC AG in Switzerland and ATELIER FLUIDES SUPERCRITIQUES at Nyons, Vaucluse. Located 15 km from Valréas, the ATELIER FLUIDES SUPERCRITIQUES platform offers complementary technologies to those offered by ID4TECH (supercritical CO2 extraction, purification) in industrial supply and subcontracting. For its part, ERBO SPRAY-



Fanny Mary, ID4TECH R&D Engineer ©Kreastyl

TECH, a long-time partner of ID4FEED, is one of the European leaders in the delivery and subcontracting of spray encapsulation.

**Biosis:** What is the interest of this platform for animal nutrition?

**F. M.:** We operate at the interface between the world of plant extracts and animal nutrition.

Indeed, the advantage of the platform will be to develop at a single site innovative technologies of extraction and galenisation of plant extracts, covering the entire spectrum from the plant through to studying the behavior of these extracts in the digestive tract of animals. Thanks to our encapsulation technologies, we are able to protect the active substances naturally occurring in plant extract and release them at their site of action in the animal's gut.

*\*Galenic is the physical forming of an active whatever its nature so that it is administered to a man or an animal. The vectorization is a particular galenic forming which aims to associate the active to vectoring matrices that will bring and release the active at the place of its absorption (for oral administration) or its action (whatever the pathway used).*

## News

### Minister Brune Poirson interested in ID4FEED technologies

ID4FEED had the honor to meet on its booth of the last Clean Tech Week Minister Brune Poirson, Secretary of State to the Minister of Ecological and Solidarity Transition and since March 2019, Vice-President of the United Nations Environment Assembly (UNEA). "She was very interested in our technologies and promised to visit "the City of plants" based in the department of Vaucluse which she was elected to the National Assembly", says François Gautier, ID4FEED's General Manager. ID4FEED and its sister company ID4TECH exhibited at the International Clean Tech Week which took place in Annecy (France) from 19 to 22 June 2019. This international event, organized for the first time in 2018, is focussed on green technology and innovation.

### ID4TECH recognized training center

The adult education courses offered by ID4TECH's Valréas platform are now part of several reference catalogs, including that of Biotech, a database of biotechnology training in France, and that of CPE Lyon, a French "Grande Ecole" specialized in the fields of Chemistry and Chemical Engineering. ID4TECH's training is made in partnership with the Universities of Avignon and Lyon.

**id4feed**  
Ideas for animal feed



## DIARY

**Nusa Dua (Bali)**  
Annual IFEAT Conference

**29**  
**Sept-**  
**9 Oct**

**Famagusta (N. Cyprus)**  
6th World Congress on Medicinal and Aromatic Plants

**13-17**  
**Nov**

**Atlanta (Georgia, USA)**  
Poultry Tech Summit

**20-22**  
**Nov**