

# Promoting Flavor Research amongst PhD Students in Europe Academic Year 2024/25

PROJECT ROADMAP

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*Project sponsored by*

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**PEPSICO**

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## 1. BACKGROUND

This document presents the planned programme of the industry-sponsored project promoting flavor research amongst PhD students across European universities and institutes.

Many of the major global players in flavor and flavor ingredient production are located in Europe where they make a significant contribution to national economies through their production and R&D activities. Furthermore, flavor and flavor ingredient production, as well as flavor R&D, involve many smaller companies which contribute specific expertise and products to the larger businesses. There are also numerous large and small European companies that use flavor technology to develop their own unique food and beverage products. Although the economic value of these activities to Europe is difficult to estimate accurately, there is a very strong socio-economic case for retaining and supporting these activities within Europe.

In today's global business environment, companies are under constant pressure to consider relocating to alternative sites in the USA or the Far East for marketing reasons and/or financial advantages. In addition, fast-developing economies such as China and India are investing vast sums in basic R&D activities to gain economic advantage over the West. These economies are leveraging on their low cost-base to woo basic research away from the West. One decisive factor keeping flavor companies in Europe is the availability of well-trained personnel and a wide range of Universities and Research Institutes that can supply them with research facilities, specialist advice and consultancy services. These Universities and Institutes are already well-connected through various informal mechanisms (e.g. COST actions and scientific meetings such as Weurman and Wartburg). For Europe to compete effectively in flavor R&D against established countries such as the US and Japan, as well as against fast-rising giants such as China and India, it will need to show a strong, unified and synergistic face in the future.

Following thirteen highly successful programmes, a unique and focused industry consortium of 7 companies renewing its support to expand flavor research competence in Europe by encouraging PhD students to select this avenue of research. This PhD Award project is organized by Giract ([www.giract.com](http://www.giract.com)) and is co-ordinated by Andrea Cattaruzza of AndCat Limited. Andrea is a highly experienced Director of Science with 30 years of a diversified career in a global organisation and a multinational environment with substantial experience in Research & Development and Food. He is an expert in research strategy, open innovation and programme management. Professor Emeritus Andy Taylor of the University of Nottingham, has co-ordinated the programme for over 10 years and will work in concert with Andrea as Research Advisor. Andy has over 40 years of experience in flavor research in academia and corporate industries, has worked on palatability of food in space with the European Space Agency and is Managing Director of his own consultancy, Flavometrix, which aims to use research knowledge generated at the university to be applied in commercial flavor-related problems.

## 2. PURPOSE AND SCOPE

The purpose of this project is to promote innovative flavor research amongst PhD candidates across European universities and research institutes. PhD students enrolled in universities and research institutes from 35 European countries including 27 European Union countries, Iceland, Norway, Russia, Serbia, Switzerland, Turkey, Ukraine and UK are eligible to apply. The project targets two different groups of PhD students:

- **Group 1:** those who are about to commence their PhD studies
- **Group 2:** those who are about to complete their PhD and hence will soon be exploring opportunities for employment

This is translated into the following sub-objectives:

- **Publicise the attractions of flavor research** to attract high-calibre students into appropriate PhD courses and then into industry
- For **Group 1**:
  - Award bursaries to a selected number of students who have just embarked on their PhD studies in flavors
  - Provide the 6 winning 1st year PhD students with the opportunity of visiting the laboratory of selected sponsor companies, by using a part of their winning bursary for their travel and stay. This will enable them to obtain a first-hand view of an industry R&D centre
- For **Group 2**:
  - Solicit and evaluate innovative flavor research projects
  - Provide Giract's Annual Savory Flavor & Food Industry Conference, organised each spring in Geneva, as a platform for the winning student to present his/her work to 'potential employers'

### 3. PROJECT DETAILS

#### Group 1: Encouraging students to study flavor research

There is a need to attract scientists from a wider range of backgrounds, such as chemists and biochemists, to undertake PhDs in flavor, and not only those already studying for a food science/chemistry/ technology degree and thus who know something about flavor through their BSc/Masters studies.

One way of carrying out the above is to give bursaries to students who are starting PhDs to attract them into the flavor area and to show them there is an interest in them (as future employees) from the industry as shown by the composition of the sponsoring companies. PhD projects and students will be assessed to ensure both meet the basic eligibility criteria. **A bursary of EUR 3000 each will be awarded to 6 selected students**

In addition, the 6 winning 1st year PhD students will be offered the opportunity of visiting the laboratory of a selected sponsor company during the second year of their PhD studies, by using a part of their winning bursary for their travel and stay. This will enable them to obtain a first-hand view of an industry R&D centre.

The rules and regulations are detailed on a dedicated page on the Giract website ([www.giract.com/flavor-research-programme.php](http://www.giract.com/flavor-research-programme.php)).

Universities/institutes are being encouraged to announce the programme on their websites to attract students to flavor studies. Similarly, sponsoring companies are also requested to announce the programme on their respective websites. Selected trade press, including internet-based media, is being approached for news coverage of this programme.

#### Group 2: Publicising career opportunities in the flavor industry

The plan is to contact over 325 European universities and institutes with strong food and flavor science faculties and to encourage PhD students to participate in an annual competition for 'best thesis' in the flavor area. Innovation will be the key criterion in judging the theses submitted for evaluation. **An award of EUR 5000 will be presented to the author of the best thesis.**

#### **Selection of best theses**

The flavor industry has an on-going need for well-trained people. One of the ways of attracting such people is to encourage students to work towards high-quality and innovative theses.

A Steering Committee composed of Andrea Cattaruzza and Professor Emeritus Andy Taylor, will evaluate the theses received and select the most deserving. Giract will invite the winner to Geneva where the student will present his/her work to representatives from the sponsoring companies, receive his/her award, and attend the annual Savory Flavor & Food Industry Conference.

## Administration

This programme is administered by Giract, an organisation long involved in training and information for the flavor industry (see [www.giract.com](http://www.giract.com)). The aim is to ensure efficient administrative support and the smooth running of the project and its related activities. Giract manages the daily administration of the project, including the communication with the universities/institutes, contacting companies for financial support, liaising with the relevant EU instances, setting up and co-ordinating with Andrea Cattaruzza and Andy Taylor, posting regular programme updates on social media (LinkedIn, Twitter and Instagram), announcing results, and inviting the best thesis winner to the Savory Flavor & Food Industry Conference, handling the project financials such as the reimbursing of the bursary amounts to the 6 selected first year PhD students based on research-related invoices countersigned by the respective professors, liaising with the sponsoring companies, holding an evaluation meeting for the sponsoring companies on the day of the Savory Flavor & Food Industry Conference, etc. Andrea Cattaruzza of AndCat Limited and Andy Taylor of the University of Nottingham/ Flavometrix are responsible for the evaluation of the theses and help finalising contacts with the universities/institutes.

Any unspent bursary amount for selected Group 2 students within the project deadline is handed over to the department of the respective university/institute.

## Sponsor companies

The sponsoring partners are:

- AJINOMOTO
- ANGEL YEAST
- BIOSPRINGER BY LESAFFRE
- GIVAUDAN
- KERRY
- LALLEMAND BIO-INGREDIENTS
- PEPSICO

#### 4. RESEARCH TOPICS OF CURRENT INTEREST

Giract has asked the sponsor group to suggest current areas of interest which could be examined in the context of new PhD studies. These include:

- Consumer acceptance of and preference for savory products
- Kokumi
- Maillard reaction in food processing and its efficiency
- Changes in the flavor components (leading to typical Asian flavor) by Maillard reaction by heating Japanese type soy sauce
  - Sensory and LG-MS-MS evaluation/detection methodologies of complex Maillard key components in heated treated soy sauce
  - Development of methods to extract and store flavor components in stable condition to conduct sensory evaluation in further consumer tests
- Natural savory flavors for clean labelling
- Sensory science, consumer insights, market intelligence on labelling of savory products
- Shelf-life of savory products
- Influence of aroma molecules on salt perception (for salt reduction)
- Understanding salt perception and physiology at the receptor level
- Bitterness masking of alternative salts used to replace sodium chloride; solutions from natural or common foods
- Bitter and sour compounds as taste enhancer
- Taste-masking mechanism of bitter and acid blockers
- Interactions between aroma volatiles and taste active compounds to enhance salty and umami perception (savory context)
- Influence of aroma molecules on sweet perception (for sugar reduction)
- Masking stevia off notes
- Flavor molecules that can have an impact on satiation (to help people eat less and lose weight)
- Understanding fat perception and sensory perception (mouthfeel and fatty taste) of non-fat molecules/fat replacers
- Position of taste receptors on the tongue
- Structure-Function relation of natural taste modulators and its specific mechanisms

- Molecular response to astringency:
  - Taste receptors involved in astringency
  - Different molecules from different classes triggering astringency in sensory evaluations
  - These analyses would help to improve the mechanism and to provide a tool to search for modulators
- Molecular response to licorice and the taste receptors involved in licorice
- Evolution of taste receptors with age
- Non-GMO fermentation/enzymatic generation of flavor molecules
- Fermented foods/beverages, and impact on flavor, taste, nutrition and health
- Novel, natural sweet modulation ingredients – not from stevia
- Natural alternatives for carriers, solvents and/or encapsulation systems
- Exploring novel, clean/green, methods for extraction of flavor and taste components from natural sources
- Improving palatability of vegetable proteins by enzymatic modification
- Interaction of flavor ingredients with novel protein sources; Identifying natural off-note masking ingredients for plant-based proteins
- Unveiling the molecular taste and flavor complexity/richness of ethnic culinary dishes, and understand how they drive preference
- Flavor reactions in innovative food grade reaction media
  - Consumer friendly food grade deep eutectic solvents can be used as reaction media to generate desired flavors with high yields from precursor rich ingredients. The objective would be to develop an understanding of reaction pathways and the influence of reaction parameters
- Interactions of taste active peptides in culinary matrices, and their impact on sensory characteristics
  - Synergistic effects between taste active peptides can enhance taste perception. The objective would be to develop an understanding of the relationship between molecular structures and their taste impact, and these synergetic effects
- Incorporation of Artificial Intelligence in flavor research and/or analysis
- Enzymatic modification to improve the palatability of yeast protein
- Improve the processing performance of yeast protein in plant-based meat
- Study on salt reduction function of plant (soybean, wheat, rice) polypeptides
- Build a taste research platform based on Artificial Intelligence
- Plant-based cheese (process, applications, etc.)
- Application of natural fermented organic acids (citric, lactic, etc.) in food preservatives
- Study on immunostimulatory mechanism of yeast cell wall

## 5. TIMELINE

The deadlines for the programmes are:

### Group 1 (6 bursaries to first year PhD students):

- October 31, 2024 – Application and submission of relevant documents
- December 23, 2024 – Announcement of results
- January–December 2025: period during which the 6 successful first year PhD students will be reimbursed research-related expenses against countersigned invoices. Any unspent bursary amount within this deadline will be handed over to the department of the respective university/institute
- June 30, 2025 – Bursary winners submit a short summary of mid-year research progress
- December 31, 2025 – Bursary winners submit a short summary of the full year research progress
- During 2025, details of laboratory visits in certain sponsor companies will be communicated to the winning students who wish to take advantage of this opportunity

### Group 2 (Best thesis award):

- October 31, 2024 – Application by candidates
- December 1, 2024 – Submission of relevant documents for evaluation
- January 27, 2025 – Winner to be announced by Steering Committee
- Scheduled March 20/21, 2025 – Presentation of thesis by winning candidate to representatives from sponsoring companies in Geneva, followed by participation at Giract's Savory Flavor & Food Industry Conference

## 6. CRITERIA FOR SELECTION

### 6.1. GROUP 1: FIRST YEAR STUDENTS

#### Criteria for First Year PhD Applicants

Criteria	Description
<b>Eligibility</b>	<p>Projects must be designed for the award of PhD or equivalent.</p> <p>The applicant must be enrolled in any European university/institute (in any of the 35 European countries including 27 European Union countries, Iceland, Norway, Russia, Serbia, Switzerland, Turkey, Ukraine and UK) for his/her PhD study.</p> <p>Projects must have started between October 31, 2023 and October 31, 2024.</p> <p>The applicant should not be already sponsored by, and/or bound to, a commercial organization.</p>
<b>Student</b>	<p>Can be from any scientific background but one aim of the bursaries is to attract people who have not studied Food Chemistry, Food Science or Food Technology to study food flavors.</p> <p>Projects do not necessarily have to be restricted to scientific aspects, but can also cover other features of flavor science such as business policy, marketing, legislation, consumer impact, etc.</p>
<b>Novelty</b>	<p>A brief summary of the work should clearly state the background to the project, the hypotheses to be tested, and explain the novelty of the work and its potential to further our understanding of flavor science.</p>
<b>Interdisciplinary</b>	<p>Projects that involve training the student in more than one scientific discipline will be favoured.</p>
<b>Experimental design and data analysis</b>	<p>All projects should describe appropriate methodology for experimental design and data analysis.</p>
<b>Language</b>	<p>English.</p>
<b>Application</b>	<p>All documents should be countersigned by the Professor concerned. The application should be sent electronically. Evidence of enrolment between October 31, 2023 and October 31, 2024 at the university/institute should accompany the documents.</p>
<b>Bursary</b>	<p>The one-off bursary of EUR 3000 will be awarded during 2025 to the 6 selected first year PhD students. Bursary payment(s) will be based on research-related invoices countersigned by the respective professors. Invoices can relate to expenses such as purchase of equipment, databases, participation in conferences, visits to laboratories, etc.</p> <p>The 6 winning 1st year PhD students will be offered the opportunity of visiting the laboratory of a selected sponsor company in their second year of studies. Travel/stay expenses for this visit can be claimed as part of the bursary award.</p> <p>Any unused part of the bursary will be handed over to the respective department of the university/institute by December 31, 2025.</p> <p>Bursary winners will need to submit mid and full year short summaries of research progress due on June 30, 2025 and December 31, 2025.</p>

## 6.2. GROUP 2: BEST THESIS

### Criteria for Best Thesis

Criteria	Description
<b>Eligibility</b>	<p>The applicant must be enrolled in any European university/institute (in any of the 35 European countries including 27 European Union countries, Iceland, Norway, Russia, Serbia, Switzerland, Turkey, Ukraine and UK) for his/her PhD study.</p> <p>Any flavor related PhD project submitted in 2024.</p> <p>The applicant should not be already sponsored by, and/or bound to, a commercial organization. The winning candidate must be able to present all his/her research to programme sponsors, including patented work.</p>
<b>Thesis</b>	<p>The thesis should clearly explain the starting hypotheses or the goals and aims of the work.</p> <p>Research does not necessarily need to be restricted to scientific aspects, but can also cover other features of flavor science such as business policy, marketing, legislation, consumer impact, etc.</p> <p>Clarity of expression and effective communication of results is a key aspect in assessing the thesis.</p> <p>Appropriate data analysis should be evident.</p> <p>Clear abstracts and summaries are expected.</p> <p>Clear Figures and Tables are expected.</p>
<b>Novelty</b>	<p>All PhD studies should contain a degree of novelty and this will be part of the judging criteria. Novelty may be a new method for studying flavor or new findings or some other aspect of the PhD study.</p>
<b>Results</b>	<p>The results should show good experimental design and robust methodology, e.g. adequate replication and sampling to support the conclusions.</p>
<b>Publications</b>	<p>Some theses are composed of published papers, others are more narrative in style. Thus, the judging criteria will take these different styles into consideration and publication of the thesis results will <u>not</u> be an essential criterion for judging.</p>
<b>Language</b>	<p>English. If the thesis is not in English, the 10–page summary must be in English.</p>
<b>Application and Submission</b>	<p>Evidence of enrolment and thesis submission in 2024 at the university/ institute should be provided by the student. The electronic copy of the thesis must be countersigned by the professor concerned.</p>