



UNIVERSITY: Universidad de Navarra (UNAV)

WIT AREA:

Automotive, Mechatronics and Advance Manufacture

Health

Energy

IA

WIT PROGRAMME'S RESEARCH LINE NAME: Valorization of natural resources and wastes

Research subline: Valorization of vegetable organic wastes for health purposes

DOCTORAL PROGRAMME: Natural and Applied Sciences

(<https://www.unav.edu/web/programa-de-doctorado-en-ciencias-naturales-y-aplicadas/presentacion>)

COMPLETE DESCRIPTION OF THE LINE:

The environment is threatened by the continuous and huge production of wastes, some of them of vegetable origin generated in domestic and agricultural contexts. The current applications for these residues are almost limited to composting although it has been shown that they provide bioactive compounds with antioxidant properties that give them analgesic, anti-inflammatory, antipyretic, antimicrobial, antifungal and even anticancer effects. Our group analyzes the nutritional quality of pruning remains for their application in the human nutrition area and verified the cytotoxic effect of grapevine leaf extracts against different cancer cell lines. Recently, our research group has begun studies focused on verifying to what extent household vegetable wastes can inhibit the development of mycotoxin-producing fungi that threaten food safety. In addition, our team assesses the impact of biotic and abiotic factors on the levels of antioxidant compounds in plant wastes.

RESEARCH GROUP NAME: Vegetable Wastes and Health



COORDINATOR:

- **Last and first name; link to the “Portal of scientific production”:**
Goicoechea, Nieves (<https://www-scopus-com.ezproxy.unav.es/results/authorNamesList.uri?st1=Goicoechea&st2=Nieves&institute=navarra&origin=searchauthorlookup>)
- **Department:** Environmental Biology
- **Email:** niegoi@unav.es
- **Telephone number:** +34 948425600 (x 6489)

MEMBERS OF THE LINE RESEARCH:

Dr. Inmaculada Pascual (Professor and Researcher)
Dr. M Carmen Antolín (Professor and Researcher)
Dr. Carmen Sanmartín (Professor and Researcher)
Dr. Daniel Plano Amatriain (Professor and Researcher)
Dr. Carlos Aydillo Miguel (Professor and Researcher)
Dr Nuria Martínez Sáez (Professor and Researcher)
Other members: 7 PhD students and 3 technicians

ANOTHER RESEARCH LINES OF THE GROUP:

- **Effects of climate change on plants - Biology of grapevine - Plant responses to abiotic and biotic stress factors - Arbuscular mycorrhizae in natural and agricultural ecosystems.** The adaptations of plants to environmental constraints linked to climate change, such as drought, elevated air temperatures and elevated CO₂ concentration in the atmosphere have been the subject of study for many years. Research has been performed with diverse herbaceous and woody species, being grapevine the most studied crop. Many of these research works have included the study of the contribution of arbuscular mycorrhizal fungi (AMF) to improve the resilience of plants to environmental constraints. The production of plant residues linked to the usual pruning tasks during grapevine cultivation led these researchers to explore their possible applications in areas related to human nutrition and biomedicine.

- **Development of organoselenium compounds as bioactive agents.** Selenium is a micronutrient essential for life. Several studies have demonstrated that low selenium levels in the organism are related with greater susceptibility to suffer or worsen the prognosis of certain diseases. Additionally, our research group and many others have showed that incorporation of selenofunctionalities into organic frameworks entails a great increase of the biological activity of the selenomolecules compared with their counterparts without the selenium atom. Our research team covers a wide numbers of stages of the drug discovery process including design, synthesis, structural characterization, biological evaluation and formulation. Hence, the following diseases are the ones for which we are currently developing organoselenium compounds: cancer, leishmanial, Chagas, bacterial infections, Alzheimer and cardiovascular diseases.



▪ **Entities involved in research lines and contact person:**

✓ Academic entities:

- School of Sciences (UNAV) (<https://www.unav.edu/web/facultad-de-ciencias>) – Prof. Luis Montuenga
- BIOMA Centre (Institute for Biodiversity and Environment) (<https://www.unav.edu/web/centro-bioma/investigacion>) – Prof. Jesús Miguel Santamaría
- School of Pharmacy and Nutrition (UNAV) (<https://www.unav.edu/web/facultad-de-farmacia>) – Prof. María Javier Ramírez

▪ **Joint supervision of doctoral thesis with international universities or non-academic institutions:**

Co-direction of doctoral thesis

1. Johann Martínez Lüscher. Co-directed by Inmacualda Pascual & Jone Aguirreolea (UNAV) and Eric Gomès (Université Victor Segalen, Bordeaux, France). Defended in 2014
2. Marta Arrizabalaga Arriazu. Co-directed by Inmaculada Pascual & Juan José Irigoyen (UNAV) and Ghislaine Hilbert (Université de Bordeaux, France). Defended in 2019
3. Cristina Morán Serardilla. Co-directed by Dr Carmen Sanmartín (UNAV) and Dr Arun K. Sharma (PENN State University, USA). (*In progress*).

Mentoring of international PhD students

1. Marcelle Michelotti Bettoni. Universidade Federal do Paraná (Brasil). Brazilian supervisor: Dr Átila Francisco Mógor

Scientific publications:

- BETTONI MM, MOGOR AF, PAULETTI V, N GOICOCHEA. *Scientia Horticulturae* 180: 227-235 (2014)
- BETTONI MM, MOGOR AF, PAULETTI V, GOICOCHEA N, ARANJUELO I, I GARMENDIA. *Journal of Food Composition and Analysis* 51: 37-44 (2016)
- BETTONI MM, MOGOR AF, PAULETTI V, N GOICOCHEA. *Horticulture, Environment, and Biotechnology* 58: 432-440 (2017)

2. Eliseu Geraldo dos Santos Fabbrin. Universidade Federal do Paraná (Brasil). Brazilian supervisor: Dr Átila Francisco Mógor

Scientific publications:

- FABBRIN EG, GOGORCENA Y, MOGOR AF, GARMENDIA I, N GOICOCHEA. *Crop & Pasture Science* 66: 831-840 (2015)

3. Grasiela Bruzamarcello Tognon. Universidade Federal do Paraná (Brasil). Brazilian supervisor: Dr. Francine Lorena Cuquel

Scientific publications:



- TOGNON GB, SANMARTÍN C, ALCOLEA V, CUQUEL FL, N GOICOECHEA. *Plant Growth Regulation* 78: 389-400 (2016)

4. Sakineh Rashidi. University of Zanjan, Zanjan, Irán. Iranian supervisor: Dr Ali Reza Yousefi

Scientific publications:

- RASHIDI S, YOUSEFI AR, POURYOUSEF M, N GOICOECHEA. *Weed Biology and Management* 20: 95-108 (2020)
- RASHIDI S, YOUSEFI AR, POURYOUSEF M, N GOICOECHEA. *Mycorrhiza* 31:599–612 (2021)
- RASHIDI S, YOUSEFI AR, POURYOUSEF M, N GOICOECHEA. *Chemical and Biological Technologies in Agriculture* 9: 23 (2022)

▪ **Brief group overview**

The 'Vegetable Wastes and Health' group is a multidisciplinary team integrated by researchers from the departments of Environmental Biology (School of Sciences-BIOMA) and Pharmaceutical Technology and Chemistry (School of Pharmacy and Nutrition) of the University of Navarra. The collaboration between both departments began ten years ago with the design of experiments dealing with the application of different inorganic and organic selenocompounds in order to biofortify horticultural crops with selenium and to prolong the life of cut flowers. Afterwards, its research was focused on testing the cytotoxicity of extracts obtained from grapevine vegetative residuals. The promising results obtained support the interest of grapevine vegetative wastes for biomedicine and suggest that the environmental conditions and interactions between grapevines and rhizospheric microorganisms can modulate the effectiveness of grapevine wastes against different human cancer cell lines.

▪ **Link of the group to the “Portal of scientific production”**

- <https://www.unav.edu/web/departamento-de-biologia-ambiental/investigacion/grupos-de-investigacion/grupo-de-fisiologia-del-estres-en-plantas>
- <https://www.unav.edu/web/grupo-investigadores/derivados-selenados-como-terapia-frente-a-cancer-tripanosomas-y-otras-patologias>

▪ **Pictures, links... to academic or industrial partners**

• **Collaborations with academic partners:**

- Spanish partners: Spanish National Research Council (CSIC), University of Alicante, University of Granada, University of Alcalá de Henares
- International partners: Saarlands University (Germany), Penn State University (USA), Charité-University of Medicine (Germany), Karolinska Institut (Sweden), Jagiellonian University (Poland), University of Szeged (Hungary), University of Cardiff



(United Kingdom), University of Florencia (Italia), The Hebrew University of Jerusalem (Israel), Universidade Federal do Parana (Brasil), University of Zanzan (Irán), Université de Bordeaux (France), Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET, Argentina).

ACADEMIC REQUIREMENTS: All the admission profiles contemplated in the doctoral program Natural and Applied Sciences' require undergraduate training in the knowledge branch of Sciences (Biology, Physics, Environmental Sciences, Mathematics, Chemistry, etc.), in Health Sciences, or in Engineering or Architecture.

ADDITIONAL REQUIREMENTS: It is also mandatory that applicants present a Master's degree, recommended in the Science knowledge area.

