



Universitat de Lleida

FOOD TECHNOLOGY DEPARTMENT APPLIED MYCOLOGY UNIT



AGL2014-55379 PROJECT



RTC-2015-3508-2 PROJECT

Funded by the Ministry of Economy and Competitiveness (MINECO) and by the European Union through the European Regional Development Fund (ERDF)



Unión Europea

Fondo Europeo de Desarrollo Regional
"Una manera de hacer Europa"

Contact:

Food Technology Dept.
Avda. Rovira Roure, 191.
25198 Lleida (Spain)
973-702535

The Applied Mycology Unit focusses its research in the field of filamentous fungi and secondary metabolites (mycotoxins and other metabolites of industrial interest).

The members of the unit belong to the Unit of Technology of Plant Products (UTPV) in the Reference Network in Food Technology (XaRTA) of the Generalitat of Catalonia, as a Consolidated Group of Generalitat of Catalonia. Some of its members also belong to the Fundació Centre de Recerca en Agrotecnologia-AGROTECNIO.

The experience of the Unit in the field of moulds and mycotoxins in foodstuffs, has resulted in more than 200 international publications and more than 24 projects financed by European, national and local agencies, highlighting more than 16 CICYT or INIA projects and 8 European projects.

The current research lines are:

- Mycotoxin contamination in food and feed. Study of the conditions that enable the development of molds and mycotoxin production, and their transfer to animals and animal products.
- Applying predictive mycology tools.
- Assessing the impact of processing of these raw materials to food products on mycotoxins initially present in them.
- Evaluation of the efficacy of mycotoxin adsorbent compounds and development of new compounds.
- Obtaining fungal biocatalysts of agroindustrial interest.

Research team:

Dr. Vicente Sanchis Almenar. Full professor. vsanchis@tecal.udl.cat

Dr. Antonio J. Ramos Girona. Full professor. ajramos@tecal.udl.cat

Dra. Sonia Marin Sillue. Associate professor. smarin@tecal.udl.cat

Dra. Nuria Sala Martí. Associate professor. nsala@tecal.udl.cat

Dra. Mercè Torres Grifo. Associate professor. mtorres@tecal.udl.cat

Dra. Pilar Vila Donta. Postdoc researcher.

Sra. Laila Aldars García. PhD student.

Sra. Joana Diaz Gomez. PhD student.

Sra. Nuria Estiarte Piñol. PhD student.

Sr. Arnau Vidal Corominas. PhD student.

Sra. María Rodríguez Blanco. PhD student.

Sra. Montserrat Prim Latorre. Research technician.



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TECHNICAL ADVICE AND SERVICES TO COMPANIES

The Applied Mycology Unit offers to food industry companies an advisory and analytical service focused on the field of mold and mycotoxins, which provides, among other services:

- Isolation and identification of molds by morphological cultural techniques and molecular biology.
- Analysis of mycotoxins in raw materials, foods and feeds through immunochromatographic techniques, ELISA, HPLC and HPLC-MS/MS. Mycotoxin analysis include:
 - Aflatoxin B₁ and total aflatoxins.
 - Fumonisin.
 - Ochratoxins.
 - Patulin.
 - Trichothecenes: deoxynivalenol, T-2 and HT-2 toxins.
 - Zearalenone.
 - Analysis of some masked mycotoxins is also available.
- Determination of mycotoxin biomarkers in biological fluids.
- Predictive mycology studies.
- Assessment of effectiveness of fungicides *in vitro* and in the field.
- Assessment of effectiveness of mycotoxin adsorbent compounds.
- Study of the effect of processing of raw materials on mycotoxin contamination.
- Advice on prevention and control of mycotoxins in pre and post harvest.

Please contact Antonio J. Ramos for further information:

ajramos@tecal.udl.cat

Tlf: 973-702811

Fax: 973-702596



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RUNNING RESEARCH PROJECTS:

Novel advanced multi mycotoxin adsorbents for feed based on bentonite for improving food security (RTC-2015-3508-2).

FUNDING ENTITY: Financed by the Ministry of Economy and Competitiveness (MINECO) and funded by the European Union through the European Regional Development Fund (ERDF - *A Way of Making Europe*).

Program: CHALLENGES-COLLABORATION 2015 of the Spanish Program of Research, Development and Innovation facing the challenges of the Society, in the frame of Spanish Plan of Scientific and Technical Research and Innovation 2013-2016.

TOTAL FINANCIATION / TOTAL AID: 650.038,39 € / 562.260,56 €

The MICOBEN project aims to contribute to the objective of the call to "Promote technological development, innovation and quality research"

DURATION: 2015-2018

MAIN RESEARCHER: Dr. Antonio J. Ramos Girona.

Carry over of aflatoxins, deoxynivalenol, and their conjugates from cereals and other raw materials to food commodities (AGL2014-55379).

FUNDING ENTITY : MINECO

DURATION: 2015-2017

MAIN RESEARCHERS: Dr. Antonio J. Ramos Girona y Dra. Sonia Marín Sillué.



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PREVIOUS RESEARCH PROJECTS (last 10 years):

- High quality and safe food through antioxidant fortified maize (Recercaixa).
- Aproximación integrada a la exposición humana simultánea a ocratoxina A y deoxinivalenol (AGL2011-24862).
- Cambio climático y nuevos hábitos alimentarios: nuevos escenarios con impacto potencial sobre el riesgo de micotoxinas en España (AGL2010-22182-C04-04).
- Novel, multidisciplinary and integrated strategies to reduce mycotoxin contamination in the food and feed chains worldwide (Proyecto UE: KBBE-2007-2-5-05).
- Selection and improving of fit-for-purpose sampling procedures for specific foods and risks (Proyecto UE: KBBE 2007- 222738).
- Iberoamérica. Cooperación científica orientada a la búsqueda de estrategias de prevención y control de las micotoxicosis para mejorar las condiciones sanitarias en la producción pecuaria (CYTED. Acción 109AC0371)
- Evaluación de la exposición de la población española a las toxinas de Fusarium (AGL2008-05030-C02-01).
- Control de las principales enfermedades de uva, melocotón y nectarina en fruta de agricultura ecológica (Universitat de Lleida)
- Estudio sobre la ingesta de aflatoxinas y patulina en Cataluña (ACSA).
- Presencia simultánea de micotoxinas en alimentos. Evaluación del peligro potencial y real (AGL2007-66416-C05-03).



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PUBLICATIONS (last 3 years)

2015:

- García-Cela E., Crespo-Sempere A., Marin S, Sanchis V. and Ramos A. J. Effect of ultraviolet radiation A and B on growth and mycotoxin production by *Aspergillus carbonarius* and *Aspergillus parasiticus* in grape and pistachio media. *Fungal Biology* (2015), 119: 67-78.
- González-Arias, C.A., Piquer-Garcia, I., Marín, S., Sanchis, V. and Ramos, A.J. Bioaccessibility of ochratoxin A from red wine in an in vitro dynamic gastrointestinal model. *World Mycotoxin Journal* (2015), 8: 107-112.
- Vidal, A., Sanchis, V., Ramos, A.J. and Marín, S. Thermal stability and kinetics of degradation of deoxynivalenol, deoxynivalenol conjugates and ochratoxin A during baking of wheat bakery products. *Food Chemistry* (2015), 178: 276-286.
- Crespo-Sempere, A., Estiarte, N., Marín, S., Sanchis, V. and Ramos, A.J. Targeting *Fusarium graminearum* control via polyamine enzyme inhibitors and polyamine analogues. *Food Microbiology* (2015), 49: 95-103.
- Aldars-García, L., Ramos, A.J., Sanchis, V. and Marín, S. An attempt to model the probability of growth and aflatoxin B1 production of *Aspergillus flavus* under non-isothermal conditions in pistachio nuts. *Food Microbiology* (2015), 51: 117-129.
- Cano-Sancho, G., Ramos, A.J., González-Arias, C.A., Sanchis, V., Fernández-Cruz, M.L. Cytotoxicity of the mycotoxins deoxynivalenol and ochratoxin A on Caco-2 cells in presence of resveratrol. *In vitro Toxicology* (2015), 29: 1639-1646.
- González-Arias, C.A., Crespo-Sempere, A., Marín, S., Sanchis, V., and Ramos, A.J. Modulation of the xenobiotic transformation system and inflammatory response by ochratoxin A exposure using a co-culture system of Caco-2 and HepG2 cells. *Food and Chemical Toxicology* (2015), 86: 245-252.

2014:

- Vidal, A., Morales, H., Sanchis, V., Ramos, A.J. and Marín, S. Stability of DON and OTA during the breadmaking process and impact on determination of process criteria and performance criteria. *Food Control* (2014), 40: 234-242.
- García-Cela E., Crespo-Sempere A., Ramos A.J., Sanchis V. and Marin S. Ecophysiological characterization of *Aspergillus carbonarius*, *Aspergillus tubingensis* and *Aspergillus niger* isolated from grapes in Spanish vineyards. *International Journal of Food Microbiology* (2014), 173: 89-98.
- Cao, A., Butrón, A., Ramos, A.J., Marín, S., Souto, C. and Santiago, R. Assessing white maize resistance to fumonisin contamination. *European Journal of Plant Pathology* (2014), 138: 283-292.
- Astoreca, A., Vaamonde, G., Dalcerro, A., Marin, S. and Ramos, A.J. Abiotic factors and their interactions influence on the co-production of aflatoxin B1 and cyclopiazonic acid by *Aspergillus flavus* isolated from corn. *Food Microbiology* (2014), 38: 276-283.



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PUBLICATIONS (last 3 years)

- Santiago, R., Cao, A., Ramos, A.J., Souto, X.C., Aguin, O., Malvar, R.A. and Butron, A. Critical environmental and genotypic factors for *Fusarium verticillioides* infection, fungal growth and fumonisin contamination in maize grown in northwestern Spain. *International Journal of Food Microbiology* (2014), 177: 63-71
- Vidal, A., Marín, S., Morales, H., Ramos, A.J. and Sanchis, V. The fate of deoxynivalenol and ochratoxin A during the breadmaking process. Effects of sourdough use and bran content. *Food and Chemical Toxicology* (2014), 68: 53-60.
- García, D., Ramos, A.J., Sanchis, V. and Marín, S. Growth parameters of *Penicillium expansum* calculated from mixed inocula as an alternative to account for intraspecies variability. *International Journal of Food Microbiology* (2014), 186: 120-124.
- González-Arias, C.A., Benítez-Trinidad, A.B., Sordo, M., Robledo-Marenco, M.L., Medina-Díaz, I.M., Barrón-Vivanco, B.S., Marín, S., Sanchis, V., Ramos, A.J. and Rojas-García, A.E. Low doses of ochratoxin A induce micronucleus formation and delay DNA repair in human lymphocytes. *Food and Chemical Toxicology* (2014), 74: 249-254.

2013:

- Rodríguez-Cervantes, C.H., Ramos, A.J., Robledo-Marenco, M.L., Sanchis, V., Marín, S. and Girón-Pérez, M.I. Determination of aflatoxin and fumonisin levels through ELISA and HPLC, on tilapia feed in Nayarit, Mexico. *Food and Agricultural Immunology* (2013), 24: 269-278.
- Cano-Sancho G, Sanchis V, Marín S, Ramos AJ. Occurrence and exposure assessment of aflatoxins in Catalonia (Spain). *Food and Chemical Toxicology* (2013), 51: 188-193.
- Vidal, A., Marín, S., Ramos, A.J., Cano-Sancho, G. and Sanchis, V. Determination of aflatoxins, deoxynivalenol, ochratoxin A and zearalenone in wheat and oat based bran supplements sold in the Spanish market. *Food and Chemical Toxicology* (2013), 53: 133-138.
- García-Cela, E., Ramos A.J., Sanchis V. and Marín S. Risk management towards Food Safety Objective achievement regarding to mycotoxins in pistachio: the sampling and measurement uncertainty issue. *Food Control* (2013), 31: 392-402.
- García, D., Ramos, A.J., Sanchis, V. and Marín, S. Modeling kinetics of aflatoxin production by *Aspergillus flavus* in maize-based medium and maize grain. *International Journal of Food Microbiology* (2013), 162: 182-189.
- Santos, L., Marín, S., Sanchis, V. and Ramos, A.J. Mycotoxin in Medicinal/Aromatic Herbs – a Review. *Boletín Latinoamericano y del Caribe de Plantas Medicinales y Aromáticas* (2013), 12: 119 - 142
- Santos, L., Marín, S., Sanchis, V. and Ramos, A.J. In vitro effect of some fungicides used on cultivation of *Capsicum* spp. on growth and ochratoxin A production by *Aspergillus* species. *World Mycotoxin Journal* (2013), 6: 159-165.



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PUBLICATIONS (last 3 years)

- González-Arias, C.A., Marín, S., Sanchis, V. and Ramos, A.J. Mycotoxin bioaccessibility/absorption assessment using in vitro digestion models: a review. *World Mycotoxin Journal* (2013), 6: 167-184.
- Cao, A., Santiago, R., Ramos, A.J., Marín, S. and Butrón, A. Environmental factors related to fungal infection and fumonisin accumulation during the development and drying of white maize kernels. *International Journal of Food Microbiology* (2013), 164: 15-22.
- Cano-Sancho, G., Sanchis, V., Ramos, A.J. and Marín, S. Effect of food processing on exposure assessment studies with mycotoxins. *Food Additives & Contaminants: Part A* (2013), 30: 867-875.
- García, D., Ramos, A.J., Sanchis, V. and Marín, S. Equisetum arvense hydro-alcoholic extract: phenolic composition and antifungal and antimycotoxigenic effect against *Aspergillus flavus* and *Fusarium verticillioides* in stored maize. *Journal of the Science of Food and Agriculture* (2013), 93:2248-2253.
- Crespo-Sempere, A., Estiarte, N., Marín, S., Sanchis, V. and Ramos, A.J. Propidium monoazide combined with real-time quantitative PCR to quantify viable *Alternaria* spp. contamination in tomato products. *International Journal of Food Microbiology* (2013), 165: 214-220.
- Marín, S., Ramos, A.J., Cano-Sancho, G. and Sanchis, V. Mycotoxins: Occurrence, toxicology, and exposure assessment. *Food and Chemical Toxicology* (2013), 60: 218-237.
- Crespo-Sempere, A., Marín, S., Sanchis, V. and Ramos, A.J. VeA and LaeA transcriptional factors regulate ochratoxin A biosynthesis in *Aspergillus carbonarius*. *International Journal of Food Microbiology* (2013), 166: 479-486.