



Instituto de Ciências Agrárias e Ambientais Mediterrânicas

*Knowledge connecting land, food and people*



*ICAAM celebrates World Food Day 2014*

*Family Farming*

*Feeding the world, caring for the earth*

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## Introduction

**Teresa Pinto Correia, Director of ICAAM<sup>1</sup>**

Email: [mtpc@uevora.pt](mailto:mtpc@uevora.pt)

ICAAM (standing for Institute of Mediterranean Agricultural and Environmental Sciences) is a R&D unit of the University of Évora, which aims to develop research to promote sustainability of Mediterranean agriculture and related ecosystems. The ICAAM, which recently adopted the motto *Knowledge connecting land, food and people*, is organized in three large thematic strands, corresponding to three main goals of research, which cover the multiple dimensions of sustainability:

### **Efficiency in the use of production factors**

The efficient use of factors contributes to the economic sustainability and replies to the needed ecological modernization, for higher resilience towards climate change.

### **Agri-food products quality and added-value**

The quality of agri-food products increases the added value of the sector and society's appreciation of agriculture and the rural, increasing social sustainability, and the technologies developed can only be competitive if they have reduced environmental impacts.

### **Ecosystems integrity and landscapes multifunctionality**

The ecosystems integrity guarantee the preservation of the natural resources and the multifunctionality of landscapes is of growing economic and social relevance, in face of the present demand for the rural world, as well as its needed vitality.

Although the focus of ICAAM is on the production systems, products and Mediterranean ecosystems, which constitute its basis of differentiation, the Institute develops research activities and participates in projects applied to other ecosystems and regions, as exemplified by the recently approved INCAA project - *Innovative Approaches in Conservation Agriculture: Food Safety and Action against Climate Change Through the Conservation of Soil and Water*, in agricultural systems in sub-Saharan Africa.

Being a concern of ICAAM to be a driver of innovation in agriculture and rural land management, this Institute has celebrated the World Day of Food 2014. To this end, and in order to raise public awareness on the issues of nutrition and food, a small session of lectures under the theme *Quality and Safety of Agri-food Products and Consumers Behavior* was organized.

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<sup>1</sup> ICAAM, Instituto de Ciências Agrárias e Ambientais Mediterrânicas, Universidade de Évora - Pólo da Mitra | Apartado 94 | 7006-554 ÉVORA | Tel: +351 266 760 885 | [icaam@uevora.pt](mailto:icaam@uevora.pt) | [www.icaam.uevora.pt](http://www.icaam.uevora.pt)

## The FAO and the World Food Day

Fernando Capela e Silva, ICAAM

Email: fcs@uevora.pt

The United Nations Food and Agriculture Organisation (FAO) was founded in 1943, in Hot Springs (USA), during the conference of the United Nations Food and Agriculture, and was formally established during the First Session of the Conference FAO, held in Quebec (Canada), in 1945. This is an intergovernmental organization with 194 member states, two associate members and one member organization, the European Union. The FAO headquarters is in Rome, Italy.

The main objectives of FAO are<sup>2</sup>: *"the eradication of hunger, food insecurity and malnutrition; the elimination of poverty and the driving forward of economic and social progress for all; and, the sustainable management and utilization of natural resources, including land, water, air, climate and genetic resources for the benefit of present and future generations"*. Under these objectives, and having identified the main areas that are best positioned to respond to the issues raised by global trends in agricultural development, and the challenges faced by its member states, FAO defined as strategic objectives<sup>3</sup>:

- Help eliminate hunger, food insecurity and malnutrition
- Make agriculture, forestry and fisheries more productive and sustainable
- Reduce Rural Poverty
- Enable inclusive and efficient agricultural and food systems
- Increase the resilience of livelihoods to disasters

The essence of the activities of FAO to achieve food security for all and ensure that people have access to good quality food so that they can lead an active and healthy life, its Members, at its 20th General Conference in November 1979 established the 16th of October as World Food Day. The objectives of World Food Day, the anniversary of FAO, celebrated since 1981, are to<sup>4</sup>:

- Encourage attention to agricultural food production and to stimulate national, bilateral, multilateral and non-governmental efforts to this end;
- Encourage economic and technical cooperation among developing countries;
- Encourage the participation of rural people, particularly women and the least privileged categories, in decisions and activities influencing their living conditions;
- Heighten public awareness of the problem of hunger in the world;
- Promote the transfer of technologies to the developing world; and
- Strengthen international and national solidarity in the struggle against hunger, malnutrition and poverty and draw attention to achievements in food and agricultural development.

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<sup>2</sup> Available from <http://www.fao.org/about/en/> [accessed 07 November 2014]

<sup>3</sup> Available from <http://www.fao.org/about/what-we-do/en/> [accessed 07 November 2014]

<sup>4</sup> Available from <http://www.fao.org/world-food-day/background/en/> [accessed 07 November 2014]

The theme chosen for this year was *Family Farming: Feeding the world, caring for the earth*, publicized through the poster:



(FAO, 2014)<sup>5</sup>

### World Food Day 2014 at ICAAM

To commemorate World Food Day 2014, and in order to raise public awareness about the importance of nutrition and diet, and for spreading some of the work undertaken in ICAAM in the context of food and nutrition, ICAAM hosted a small session of lectures from some of its researchers under the theme *Quality and Safety of Agri-food Products and Consumers Behavior*. It was also mentioned the INCAA project, recently approved, which promotes the use of conservation agriculture in Africa.

This project, the INCAA project - *Innovative Approaches in Conservation Agriculture: Food Safety and Action against Climate Change through the Conservation of Soil and Water* aims to: improving soil, water use efficiency and agricultural productivity of smallholder farmers in Africa Saharan, and the resilience of their farming systems in the context of land degradation and climate change. Participants in INCAA, coordinated by ZALF Centre (Leibniz Centre for Agricultural Landscape Research, Germany), are ICAAM, represented by Professor Dr. Gottlieb Basch, another European institution from Austria (BOKU), and two scientific research institutions in the area of conservation agriculture and rural development in Kenya and Burkina Faso, as well as the African network of conservation agriculture ACT (African Conservation Tillage network, Nairobi, Kenya).

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<sup>5</sup> Available from <http://www.fao.org/world-food-day/home/en/> [accessed 07 November 2014]

## *EURAGRI-The EUROpean AGricultural Research Initiative Long-Term Strategic Agenda for Research and Innovation in Agriculture: North – South Partnership at Stake*

**Gottlieb Basch, ICAAM**

Email: [gb@uevora.pt](mailto:gb@uevora.pt)

Under the theme *Long-term strategic agenda for research and innovation in agriculture: North – South partnership at stake* the XXVIII EURAGRI Conference was held 28-30 September 2014 in Montpellier, Institut Agronomique Méditerranéen, France.

ICAAM was represented at this conference by Professor Dr. Gottlieb Basch, and in the presentations made at the event<sup>6</sup> it was emphasized that in 2030 the demand for nutritious food of a world population of 8.5 billion will only partially be satisfied. Further it was stressed that agricultural productivity and sustainability, as well as the concept of food security and food safety should move away from the conventional focus on individual components, but instead address more holistically the complex relationships between its different dimensions and actors, and that international cooperation, especially European – South cooperation, is needed to tackle these problems.

The European Agricultural Research Initiative (EURAGRI)<sup>7</sup> is the international (EU) platform for the political and executive organisations in the fields of Food and Agricultural Policy and Research. It provides a forum for informal exchange on opinions and views on developments in science, society and industry, especially in so far as those can have implications on the programming and execution and planning of food and agricultural research. The organisational set up of EURAGRI is informal. National members are grouped according to EU member states or accession countries. Members include the representatives of the Ministries of Agriculture and Research entities.

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<sup>6</sup> Available from <http://euragri.org/conferences/conference-2014/contributions/> [accessed 07 November 2014]

<sup>7</sup> Available from <http://euragri.org/> [accessed 07 November 2014]

## *For a Healthy Diet: The Role of Saliva in Oral Food Perception and Food Choices*

*Elsa Lamy<sup>1,\*</sup>, Cristina Pinheiro<sup>1</sup>, Lénia Rodrigues<sup>1,2</sup>, Marco Oewe<sup>3</sup>*

*<sup>1</sup> ICAAM, <sup>2</sup> PhD student in Biochemistry, University of Évora, <sup>3</sup> Master student of Nutrition Sciences, Potsdam University, Potsdam, Germany*

*\*Corresponding author: [ecsl@uevora.pt](mailto:ecsl@uevora.pt)*

Food choices and intake depend on hedonic and homeostatic mechanisms, which interact with each-other, making the process of ingestion particularly complex. Palatability, which is not a food characteristic, but rather the hedonic evaluation of a flavour stimulus, enhances pleasure and motivates consumption (Salles *et al.*, 2011). Palatability is linked to food sensorial characteristics and unappropriated food choices can be linked to altered sensations.

Oral food perception is essential in the process of food acceptance or avoidance. It is well established that different individuals can differ in terms of the intensity of perceived oral stimuli. In 1931, signs surged that the bitter compound phenylthiocarbamide (PTC) was perceived as extremely bitter for some individuals whereas it is tasteless for others. From this evidence, several studies were performed, most of them tentatively explaining this difference by differences at genetic level (e.g. Kim and Drayna, 2005). Polymorphisms at the level of the gene that codes for the bitter receptor TAS2R38 seem to have a strong influence in taste sensitivity status. Nonetheless, genetics cannot explain completely the inter-individual differences, and evidences start to appear about a potential influence of peri-receptor medium (Salles *et al.*, 2011). In this context, saliva composition can be important in oral food sensations sensitivity.

Saliva moistens the oral cavity, covers every structure inside, and interacts with food constituents. The role of saliva in oral food perception is best studied in terms of astringency development. Astringency is a sensory attribute that is described as a drying-out, roughening, and puckery sensation felt in the mouth (Lee and Lawless, 1991). Astringency development arrives from the interaction of salivary proteins and astringent substances. Inter-individual differences in astringency perception have been referred as differences in constitutive salivary protein profiles, as well as differences in the way they change after astringent stimulation. It was referred that individuals high sensitive for polyphenol astringency have a higher amount of salivary proteins with high affinity for these plant compounds, as well as higher amount of mucosal glycoproteins, but that are less able to maintain such protein levels after exposed to polyphenols (Dinella *et al.*, 2010). The relation of such a perception of astringency and food choices is well illustrated by studies reporting lower ingestion of vegetables and astringent drinks by people with high sensitivity for astringency (Dinella *et al.*, 2011). Moreover, astringent compounds ingestion induce changes in salivary protein profiles (e.g. da Costa *et al.*, 2008; Lamy *et al.*, 2010), what can also change the ability of individuals to ingest foods rich in astringent substances.

Basic taste sensitivity has also been tentatively related to food choices. Although some controversy exists, some authors have reported that individuals with higher bitter sensitivity eat fewer amounts of vegetables. Nevertheless, it has been found that such a relation also depends on the food availability. In a healthy food environment, children with lower sensitivity for bitter taste appear to choose healthier food, whereas in an obesogenic environment they have higher body weight gains (Burd *et al.*, 2012). A relation between salivary protein composition and taste status seems also to exist. Different studies report differences in salivary protein profiles between high- and low-sensitive individuals (e.g. Dsamou *et al.*, 2012; Cabras *et al.*, 2012).

Besides what has been stated, and reinforcing the interest of saliva studies related to diet, there are evidences of salivary changes in diseases related to unhealthy dietary choices. Individuals with diabetes and obesity, which are disturbances somehow related to unhealthy choices, present changes in salivary protein profiles. In one recent study from our research team, a positive correlation between one salivary protein frequently associated to taste (carbonic anhydrase VI) and body mass index has been observed (Lamy, 2014). Moreover, and even more interesting is that we observed differences in salivary protein composition in rats susceptible to obesity, even before weight gain (Rodrigues *et al.*, submitted).

In this context, our research group is involved in studies about the interaction of saliva and oral food perception, with the main aim of to contribute for a better understanding of the mechanisms governing food consumption and dietary choices. Such knowledge is relevant for healthy dietary adjustments, which have particular importance in situations of obesity and/or under- and malnutrition.

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### References

- Burd C, Senerat A, Chambers E, Keller KL. (2013) PROP taster status interacts with the built environment to influence children's food acceptance and body weight status. *Obesity* (Silver Spring), 21: 786-794.
- Cabras T, Melis M, Castagnola M, Padiglia A, Tepper BJ, Messana I, Tomassini Barbarossa I. (2012) Responsiveness to 6-n-propylthiouracil (PROP) is associated with salivary levels of two specific basic proline-rich proteins in humans. *PLoS One* 7(2): e30962. doi:10.1371/journal.pone.0030962
- da Costa G, Lamy E, Capela e Silva F, Andersen J, Sales Baptista E, Coelho AV. (2008) Salivary amylase induction by tannin-enriched diets as a possible countermeasure against tannins. *Journal of Chemical Ecology*, 34: 376-387.

Dinella C, Recchia A, Vincenzi S, Tuorila H, Monteleone E. (2010) Temporary modification of salivary protein profile and individual responses to repeated phenolic astringent stimuli. *Chemical Senses*, 35: 75-85

Dinella C, Recchia A, Tuorila H, Monteleone E. (2011) Individual astringency responsiveness affects the acceptance of phenol-rich foods. *Appetite*, 56: 633-642.

Dsamou M, Palicki O, Septier C, Chabanet C, Lucchi G, Ducoroy P, Chagnon MC, Morzel M. (2012) Salivary protein profiles and sensitivity to the bitter taste of caffeine. *Chemical Senses*, 37: 87-95.

Kim UK, Drayna D. (2005) Genetics of individual differences in bitter taste perception: lessons from the PTC gene. *Clinical Genetics*, 67: 275-280.

Lamy E, Graça G, da Costa G, Franco C, E Silva FC, Baptista ES, Coelho AV. (2010) Changes in mouse whole saliva soluble proteome induced by tannin-enriched diet. *Proteome Science* 2010,8:65. doi:10.1186/1477-5956-8-65

Lamy, E. (2014) Avaliação das alterações do perfil proteico salivar em indivíduos com obesidade mórbida nas fases pré- e pós cirurgia bariátrica. Dissertação apresentada à Faculdade de Medicina, Universidade de Lisboa, para obtenção do grau de Mestre em Doenças Metabólicas e Comportamento Alimentar. 124 páginas.

Lee CB, Lawless HT. (1991) Time-course of astringent sensations. *Chemical Senses*, 16: 225-238.

Salles C, Chagnon MC, Feron G, Guichard E, Laboure H, Morzel M, Semon E, Tarrega A, Yven C. (2011) In-mouth mechanisms leading to flavor release and perception. *Critical Reviews in Food Science and Nutrition*, 51: 67-90.

## Contamination of Olive Oil with Pesticides- A Matter of Food Security

Nuno Martins<sup>1</sup>, Maria João Cabrita<sup>2</sup>, Raquel Garcia<sup>3\*</sup>

<sup>1</sup> PhD Student in Agrarian Sciences at ICAAM- Universidade de Évora, <sup>2</sup> Professor at Universidade de Évora and Researcher at ICAAM, <sup>3</sup> Researcher at ICAAM- Universidade de Évora

\*Corresponding author: raquelg@uevora.pt; rmartagarcia@yahoo.com

Pesticides are widely used for the control of pests, weeds and diseases of cultivated plants all over the world, in order to increase the quantity and quality of food production. However, the indiscriminate use of these compounds causes serious problems to the environment and human health (Nollet and Rathore, 2009). Nowadays, the consumer concerns on food safety and also the society awareness for eventual chemical contaminants in foodstuffs have increased significantly.

Consequently, the European Union, the Codex Alimentarius Commission of the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) have established maximum residue limits (MRLs) for pesticides residues in several foodstuffs.

Concretely, the use of pesticides in olive orchards provides an unquestionable benefit for crop protection. Nevertheless, if these pesticides persist up to the harvest stage trace amounts of those contaminants could be found in olive oil, since it is obtained from the olives exclusively by mechanical and/or physical means, without any subsequent treatment (García-Reyes *et al.*, 2007). Therefore, the development of robust and reliable analytical methodologies that enable the trace analysis of pesticide residues in this complex food matrix is highly warranted. However, this task could be very challenging due to the presence of several interferents in olive oil matrix that could interfere in the chromatographic analysis, hampering an accurate trace analysis of the pesticide residues (Gilbert-López *et al.*, 2009). Thus, the isolation/pre-concentration of these analytes in high complex matrices is mandatory being a crucial step for the attainment of the desired low MRLs enforced by the legislation.

Recently, molecularly imprinted polymers (MIPs) have emerged as promising selective sorbents for Solid Phase Extraction (SPE) enabling the selective trapping of the target compounds from complex matrices (Garcia *et al.*, 2011). These polymeric materials have recognition sites with high molecular specificity for the target analyte and can be regarded as synthetic receptors with artificially tailor-made binding sites. Since, selectivity is significantly improved using the MIP-SPE-based approach, the interfering background can be reduced and much lower detection limits are predictably achieved, comparing to other less selective sample preparation methodologies (Martín- Esteban, 2013).

Currently, our research group is exploring the design and development of selective SPE sorbents using the molecular imprinting technology for the extraction of the latest

generation of pesticides from olive oil, followed by the quantification of the pesticide residue levels using suitable chromatographic techniques (Simões *et al.*, 2014).

Altogether, it is expected that this research work will contribute to open novel avenues in the field of pesticide analysis, particularly for matrices with high fat contents.

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### References

Garcia R, Cabrita MJ, Freitas AMC. (2011) Application of Molecularly Imprinted Polymers for the Analysis of Pesticide Residues in Food - A Highly Selective and Innovative Approach. *American Journal of Analytical Chemistry*, 2: 16-25.

García- Reyes JF, Ferrer C, Gómez-Ramos MJ, Molina-Díaz A., Fernández- Alba AR. (2007) Determination of pesticide residues in olive oil and olives. *Trends in Analytical Chemistry*, 26: 239-251.

Gilbert-López B, García-Reyes JF, Molina-Díaz A. (2009) Sample treatment and determination of pesticide residues in fatty vegetable matrices: A review. *Talanta* 79: 109-128.

Martín-Esteban A. (2013) Molecularly-imprinted polymers as a versatile, highly selective tool in sample preparation. *Trends in Analytical Chemistry*, 45: 169-181.

Nollet LML, Rathore HS. (2009) *Handbook of Pesticides: Methods of Pesticide Residues Analysis*. CRC Press, Taylor & Francis Group. New York.

Simões M, Martins N, Cabrita MJ, Burke AJ, Garcia R. (2014) Tailor made molecularly imprinted polymers for dimethoate and deltamethrin recognition: synthesis, characterization and chromatographic evaluation. *Journal of Polymer Research*, 21: 368-380.