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MAC-Oils
Mapping And Comparing Oils

Specific Support Action

PRIORITY 5 - Food Quality and Safety Priority, Call 4-C

Publishable Final Activity Report

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Project Coordinator name:

Dr. Gian Luigi Russo

Project Coordinator Organisation Name:

Consiglio Nazionale delle Ricerche – Istituto di Scienze dell’Alimentazione (CNR – ISA)

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Publishable final activity report

MAC-Oils is a **specific support action** which focused on the *individual and comparative assessment of safety, quality, environmental impact and aspects of eight oils and their respective production and manufacturing methods.*

The eight oils analyzed were **olive oil, argan oil, soybean oil, corn oil, sunflower oil, peanut oil, rapeseed oil and rice oil** and their choice was made according to the consumption and/or production criterion in the three areas involved in the project: Europe, Mediterranean area and Latin America.

MAC-Oils project was structured in two different phases. ***The first phase*** aimed at the creation of a permanent partnership among researchers from European and Extra-European Countries set up through ***eight thematic ateliers*** (an atelier for each oil), in which was stimulated the scientific comparison on the following ***five topics***:

- a. assessment of chemical and physical-chemical properties of oils;
- b. assessment of organoleptic properties of oils and their acceptability by the European consumer;
- c. assessment of extraction, conservation and packaging methods of oils;
- d. assessment of risks/benefits of the oils consumption on European consumer's health;
- e. oil seeds cultivation: problems and perspectives.

The second phase was dedicated to the preparation and realization of a final International Conference, held in Rome, during which the results collected in the project outputs were presented to public opinion. This phase was also dedicated to the dissemination of the project results through the MAC-Oils web-site (www.mac-oils.eu), the participation in other seminars, conferences etc. and through specific information campaign activities in order to raise public participation and awareness.



The project idea arose from three different kind of awareness, responding to different needs, leading to the elaboration of three different project outputs:

1. *The absence of a comparative and evaluation study concerning all the eight edible oils;* the results of the work on each target-oil were elaborated, with the final purpose of realizing a **Scientific Handbook Publication**, that gathers the existing know-how, at European and extra-European level, about these products.
 2. *The lack of knowledge towards the different kinds of alimentary oils nowadays present on the market;* to respond to this need, MAC-Oils realized a simple and readable Guide addressed to the consumers (**Consumer's Guide**) with the main objective to make them aware of the nutritional properties of the target-oils and the effect of their use on the health either in the raw condiment, or in the cooking.
 3. *The lack of knowledge about the funding opportunity for the SMEs* and the importance of the link between research and oil production world; MAC-Oils stimulated the active participation of SMEs in the project activities and realised a specific booklet addressed to SMEs (**Leaflet for SMEs**).

According to the fifth thematic priority, the project achieved two horizontal policy objectives: the first one aimed at stimulating international cooperation, whilst the second one aimed at promoting the participation of the Small and Medium Enterprises operating in the oil production field.

The partnership, sharing the innovative approach «from fork to farm», has developed a method of study consumer-oriented, and, at the same time, contributed to reach the following general objectives:

- to allow, in accordance with the statements of the Lisbon Strategy, the European researchers involved to gather all the scientific know-how, existing at regional and national level, on the vegetable oils, to establish a long-lasting network able to continue once the two-years project has come to an end and to promote the circulation of information among all the stake-holders: the academic and research community, the



producers, the buyers and the consumers through either scientific and technical publications and informative publications.

- according to the objectives of the Barcelona process, to deal with the argan oil extracted from the *Argania spinosa* produced in the Maghreb, in order either to valorise the argan plant, the argan oil and its by-products, to strengthen the international scientific cooperation on the quality and food safety topics, and to increase the interest of the Moroccan populations who are at the risk of survival.

As regards the specific objectives of the project, they can be summarized as follows:

- Gathering the existing know-how at European and extra European level about the eight target-oils.
- Analysis of health benefits and/or risks of oils and nutritional properties of the eight target-oils.
- Supporting and informing SMEs across the globe currently producing oils.

As regards, specifically, the work performed during the two years life span of MAC-Oils, the following main macro-areas of activities were realized:

1. Activities related to the organization of the eight MAC-Oils thematic Ateliers;
2. Activities for the largest SMEs' involvement
3. Web-site content implementation activities
4. Diffusion and dissemination of the project results
5. Management activities

For each macro-area here are summarised the work performed, the objectives and the results achieved:

- *Thematic Ateliers*

During the first and the second year, eight thematic Ateliers were realized, one for each MAC-Oils target oil: olive, peanut, sunflower, corn, argan, soybean, rice and



rapeseed. All the Ateliers provided very fruitful discussions on the scientific and technological aspects of oil preparation, composition, cultivation, healthy effects and quality. SMEs and large companies were invited to take part in the ateliers, together with some government bodies and policy-makers. Each WP-Leader elaborated a specific technological audit questionnaire to highlight needs and demands from companies.

- *SMEs involvement*

The involvement of SMEs was addressed to achieve the goal of promoting the participation of SMEs and oil producers in the thematic ateliers. Many SMEs showed their interest in taking part in the whole project. In order to assure the participation in each thematic Ateliers of a convenient and representative number of SMEs, the project exploited the address data-base of partner Euro Fed Lipid. With its monthly newsletter, Euro Fed Lipid addresses roughly 4.000 professionals globally from oils and fats research and technology. Of these, roughly 50% can be allocated to industry while the other 50% are located at universities and research institutions. It was not possible to distinguish between large and small companies, but it was, indeed, possible to identify a large majority of them as small and medium sized enterprises. SME's have been informed and regularly invited during the life span of MAC-Oils project to actively take part in. Additionally, special mailings to a reduced number of companies have been created in order to distribute more detailed information.

Thanks to the fulfilling of the technological audit questionnaires it was partly possible to highlight critical and problematic aspects linked to extraction, production, conservation, packaging and cultivation of oils. MAC-Oils supported SMEs at the end of the project, encouraging their participation in future research projects making them aware of the opportunities offered by the 7FP. With this aim it was realized and distributed the Leaflet for SMEs called "Mapping And Comparing Oils - a guide for small and medium sized enterprises".

- *WEB-site implementation*



During the second year of MAC-Oils life span, the project web-site (www.mac-oils.eu) was implemented following the results of the eight thematic ateliers and updated also at the end of the project. Since the start of the project, it was realized the Reserved Area, with limited access to the participants in the project, in order to facilitate the information sharing among participants. In this way, it was guaranteed the transparency and European knowledge sharing and the synergy of the international cooperation was strengthened.

The web-site is structured in several thematic sections and three main areas, differentiated by end-users. The final purpose of the MAC-Oils web-site is to create a permanent and endless dialogue among European and Extra-European researchers, stakeholders, consumers and oil producers. Also after the closure of the project, it will represent an opportunity for researchers to share knowledge and skills, while, for stakeholders and policy-makers, it will represent the privileged tool to control and follow the development of the research in the field of oil production, in order to facilitate their task of stake-holding and policy-making. The dialogue between research and oil production world will also be encouraged and the web-site will represent a instrument to facilitate the matching between SMEs' needs and research activities. Finally, the web-site will also reach the oil consumers, providing information on the results of each thematic atelier. In order to spread MAC-Oils results we realized a dedicated section for the download of the Conference Proceedings and the project outputs.

- *Dissemination tools and activities*

The activities were mainly focused on the preparation and realization of the Final International Conference and the creation of informative and disseminating products. This represented a fundamental part of the project, because it concerned the collection, rationalisation and dissemination of the project results which were collected in the Handbook-publication on target-oils, the Leaflet for SMEs and the Consumer's Guide, the three project outputs that will make aware the consumers and the other actors in



the sector of edible oils about the existing state-of-the-art on edible oils. This awareness will be the first step of the process of cooperation among the different actors of the oil sector that could create the basis for future research and cooperation projects.

The Final International Conference represented the synthesis of the research activities made by the partners of the project. It was foreseen the participation of spokesmen coming from European Countries and Extra-European Countries. The Conference represented a moment of study, meditation, dialogue and comparison among researchers, SMEs, stake-holders, policy-makers and citizens aimed at creating a common platform of dialogue shared by every participant. The meeting ended with an open debate that contributed to promote the comparison about the topics analysed in the ateliers. In addition, it represented a first meeting to exchange ideas and proposals on future RTD projects that could be presented in the Seventh Framework Programme.

The Conference, lasting two days, was held in Rome - Italy and organized by the CNR-ISA, the Scientific Coordinator of the project. The preparation of the conference took about four months, during which were also elaborated, as an advanced draft, the following disseminating products: Handbook-publication on target-oils; Leaflet for SMEs and Consumer's Guide. The huge quantity and quality of data collected led the MAC-Oils consortium to ask the Commission an extension period of three months in order to edit, upgrade and translate the three main outputs of the project and to produce and distributes these outputs (in hard-paper and electronic format) together with the Conference proceedings. The dissemination of the results of the activities performed by the researchers was realized, during the life span of the project, on peer reviewed journals and also through the European Journal of Lipid Science of partner Euro Fed Lipid.

- *Management activities*



The project management activities ensured an efficient technical/scientific co-ordination and general management of the whole project, including methodologies and instruments for the information sharing among the Partners of the project. MAC-Oils website, with all the functionality needed for successful project collaboration, supported all the communication flow aspects within the Consortium, including the reporting work, thanks to the activation of the reserved area, accessible only by MAC-Oils Partners.

All the MAC-Oils activities were performed by a large consortium composed by Research Institutes, Universities, SMEs, SMEs Associations and Technological Parks from Italy, Cyprus, France, Germany, United Kingdom, Greece, Spain, Israel, Morocco, Tunisia, Argentina and Brazil. (See table below).

Participant number.	Participant name	Participant short name	Country
1	National Research Council – Institute of Food Science	CNR-ISA	Italy
2	Consiglio per la Ricerca e la Sperimentazione in Agricoltura - Istituto Sperimentale per l'olivicoltura	CRA-OLI	Italy
3	Federal Research Centre for Nutrition and Food	BFEL	Germany
4	Institut des corps gras - Centre technique industriel	ITERG	France
5	European Federation for the Science and Technology of Lipid	Euro Fed Lipid	Germany
6	Faculté des Sciences Université Mohammed V-Agdal	FS-UMV-Agdal	Morocco
7	Centre de Biotechnologie de Borj-Cedria	CBBC	Tunisia
8	Istitut de l'Olivier	IO	Tunisia
9	Consejo Superior de Investigaciones Científicas	CSIC	Spain
10	Central Science Laboratori	CSL	United Kingdom
11	Food Industrial Research and Technological Development Company	ETAT	Greece
12	The Agricultural Research Organization	ARO	Israel
13	Hebrew University of Jerusalem	HUJI	Israel
14	Israeli Olive Oil Board	IOOB	Israel
15	RTD Talos ltd.	TALOS	Cyprus
16	Microform srl	MICROF	Italy
17	Technapoli	TECH	Italy
18	Planta Piloto de Ingeniería Química	PLAPIQUI	Argentina
19	União Brasiliense de Educação e Cultura – Universidade Católica de Brasília	UBEC-UCB	Brazil



Conclusions

MAC-Oils project arose from the common awareness within the partnership about the absence, in the current scientific Literature, of a comparative and evaluation study concerning all the eight edible oils analyzed. The state of art of the research in this area, in facts, recorded a lack of scientific contributions that MAC-Oils tried to fill up, using a multi-stakeholder approach, involving researchers, consumers and producers.

On one hand, the project tried to fill up the above mentioned "scientific hole" through the realization of the Scientific Handbook-Publication devoted to the scientific community, while, on the other hand, it involved actively in the project SMEs and consumers and devoted to these stakeholders two outputs: the Leaflet for SMEs and the Consumer's Guide.

Thanks to its relevant objectives and activities, it was established a long-lasting network, that will survive to the end of the project. MAC-Oils also produced a large impact thanks to its multi-regional dimension. In fact, the network strengthened the international cooperation in quality and food safety topics, not only among the EU Countries which participated in the project, but also between the EU and these two important world geographical areas: the Mediterranean Area (with the participation of Cyprus, Tunisia, Morocco and Israel) and the Latin America, in particular with Brazil and Argentina, which are part of the Mercosur subregion. Concerning these two geographical areas it is known that EU has launched strategies aimed at strengthening the multilateral trading system, by creating a favourable context to the commercial exchanges and investments, especially in those EU key sectors where it is possible to mobilise human resources and know-how and therefore to realise initiatives in the R&D framework programme.

The Final International Conference represented a unique occasion to discuss with MAC-Oils Partners and other colleagues participating in the meeting about the results of the project and its future developments within the FP7. To briefly summarize the voluminous data derived from the comparison of the eight oils, the Consortium found that extra virgin olive oil can be in many ways considered the "gold standard" among the vegetable oils since its high content in monounsaturated fatty acids and the presence of phenolic bioactive molecules (e.g., the



hydroxytyrosol), i.e., compounds with antioxidant and cardioprotective activities. However, the market globalization and the relatively high cost make olive oil hardly accessible to the majority of European citizens. Therefore, MAC-Oils project focused on new edible oils which may represent a possible alternative to olive oil. Among these, certainly, it must be considered rapeseed oil since its high content in monounsaturated (51-70%) fatty acids, or oils obtained from new cultivars of soybean, sunflower and peanut also with a high percentage of oleic acid (AO). For example, conventional sunflower oil has a percentage of AO between 14 and 40%, while in the “high oleic” variety, AO rises to 75-90%. In terms of advice to consumers, oils high in AO should be preferable for their greater resistance to oxidation. Moreover, the presence in olive oil a large number of molecules with antioxidant activity represents an added value in terms of health and stability of the product. Similarly, in rapeseed oil, nutritional properties are enhanced by a significant percentage of omega-3 fatty acids (5-13%). Vegetable oils high in AO are also a good alternative to olive oil in the preparation of cooked food for both the lower cost and for the greater market penetration worldwide.

Other topics in MAC-Oils activity which captured consents and interest regarded innovative strategies in seed oil packaging and new methods to rescue bioactive molecules from the waste of oil production. These and other ideas will be rapidly explored in order to identify possible topic of interest to be presented in the future FP7 calls.



Publishable results of the final plan for using and disseminating the knowledge

During the two year life span of project, the partners cooperated to assure the best use and dissemination of MAC-Oils knowledge, mainly represented by an improved know-how on the eight target oils, analysed using a multidisciplinary and multi-stakeholder approach. The chief activities carried out were:

- **Articles** on National/Local Magazine/newspapers;
- **Press releases**;
- **News releases** on web-sites;
- **Congresses, meetings and seminars** where MAC-Oils project has been illustrated;
- **Abstracts** in meetings and conferences where data elaborated during MAC-Oils project has been presented;
- **Publications** on peer-review international journals;
- **Acknowledgments** to MAC-Oils project in International/National papers and proceedings;
- **TV/Radio interviews**;
- **Web-site** with the objectives of promoting international cooperation and stimulating SMEs participation; to assure the consolidation of the Partnership after the closure of the project; to guarantee the sharing of information among Partners; to diffuse the project's results in the largest possible way; to give support to the SMEs also after the end of the activities; to facilitate the matching between SMEs needs and future research activities;
- **Scientific Handbook-Publication** gathering the existing know-how, at European and extra-European level, about the eight target oils;



- **SMEs Leaflet** about the funding opportunity for the SMEs and the importance of the link between research and oil production world;
 - **Consumer's Guide** with the main objective to make consumers aware of the nutritional properties of the target-oils and the effect of their use on the health either in the raw condiment, or in the cooking;
 - **Final International Conference** the last dissemination event during which the project results and the three MAC-Oils Handbooks (Scientific Handbook-Publication, Leaflet for SMEs, Consumer's Guide) were presented.