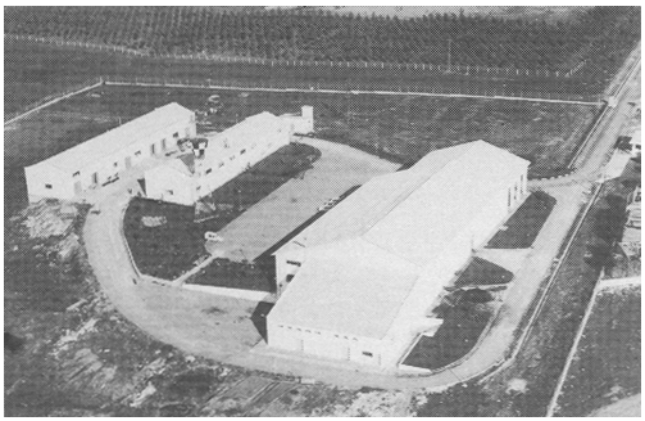
Report from Spain: The Instituto de la Grasa y Sus Derivados, Seville, Spain[1]



Experimental plants, part of the Instituto de la Grasa y sus Derivados.

The Instituto de la Grasa y sus Derivados (Institute of Fats and Derivatives) was created in 1947. It is one of 23 research centers which form the Juan de la Cierva (Scientific and Technical Research). Patronage of the Higher Council for Scientific Research, which operates under the Ministry of Education and Science. The Juan de la Cierva Patronage could be described as an important firm in which the main activity is research, with a market consisting in the demands and needs of industry. Other activities of the Patronage aid the private sector, resulting in higher social income or general benefit to the country.

The main aim of the Instituto de la Grasa y sus Derivados is to contribute to the progress of Spanish industry and economy in all sectors concerned with fats and derivatives, by means of scientific and technical research as well as by giving direct technical assistance with research contracts, reports on improvements and modernization of industrial equipment, analytical reports, standardization activities, information and documentation services, teaching and training courses, etc.

The Institute is part of the National Institute of Science and Technology of Foods (INCYTA), together with the Experimental Cold Center, the Institute of Agrochemistry and Food Technology, the Institute of Fisheries, the Institute of Dairy Products and the Institute of Industrial Fermentation, all belonging to the Juan de la Cierva Patronage.

Organization, staff and premises

The Instituto de la Grasa y sus Derivados is headed by Martínez Moreno, Professor of Technical Chemistry at the University of Seville. There is also a Technical Administration Council, representing the scientific, technical, social and economic interests of the fields of national production served by the Institute.

The Institute is staffed by 38 full time graduates and 60 auxiliary staff members (administration, laboratory assistants, workshop, library, general services, experimental plant staff, etc.). There are also 10 scholarship holders, Spanish and foreign, mainly from the Mediterranean area and South America. Therefore over one hundred persons are usually employed by the Institute.

The headquarters of the Institute in Seville consists of a four story building which was opened in 1953. There are 20 laboratories, as well as other rooms for special equipment, general and administrative services, library and workshop.

At the Cortijo de Cuarto, ca. 5 km from the main center, the Institute has three specially equipped buildings: the Almazara Experimental (industrial plant for the extraction of olive oil); the plant for the extraction of olive foot cake oil (*orujo* oil) with organic solvents; and the pilot plants for the extraction of seed oils and for the refining and hydrogenation of fats and oils.

The Institute has modern equipment for research and analytical work, including gas chromatographs and visible, UV and IR spectrophotometers. There are also other specialized techniques, such as triglyceride analysis with pancreatic lipase, flavor panel tests, measurement of rheological characteristics, microbiology in the process of olive pickling, bioautographic measurements of insect attractants, etc.

Research work

The Institute is engaged in two main fields of research work.

a) *Research on fats in general and especially on vegetables oils:* Particular attention is given to olive oil, of which Spain is the leading producing country. Its special characteristics present varied problems, quite different from those of other oils. The research in this field covers not only analytical aspects but also those of industrial production, storage, refining, etc., as will be described later on.

b) *Research on the processing of table olives*: This includes the different pickling methods of green and black olives, covering analytical and microbiological laboratory studies as well as industrial production, packaging and standardization.

The following results are all taken from recently published papers and are considered to be of outstanding interest.

i) *Chemical components of the olive:* Study of the chemical components of the olive has led to concrete findings relating to changes, during the ripening of the fruit, in the anthocyanic colorants (1) and in polyphenols (2). This work, apart from its scientific interest, may greatly facilitate the elaboration of black olives on an industrial scale.

ii) *Study of the chemical components of olive oil and olive foot cake oil*: A study has been made of improved analytical techniques, in order to determine the minor components of these oils, such as separation by column and thin layer chromatographies (3). The process of transesterification, produced when the oil is heated, was also studied (4).

iii) *Analysis of edible fats*: A study was made of the identification and determination of tocopherols (5) and nonglyceridic esters (6) by thin layer chromatography, as well as determinations of glycerol and esterified glycols by gas liquid chromatography (7).

iv) *Canning and storage of olive oil*: Extensive work has been done on the storage of olive oil in commercial recipients of glass, tin plate, vinylpolychloride and polyethylene, to determine the evolution of specific extinction at 232 nm and 270 nm (8), the Kreis test and the color of the oils (9), as well as the tocopherol content, AOM

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Headquarters of the Instituto de la Grasa y sus Derivados in Seville.

stability and metal traces (10).

To improve the stability of olive oil the effect of the addition of tocopherols has been studied (11), as well as the coating of the inside of containers with different resins (12).

v) *Improvements in the system of elaboration of green olives*: Research that has led to results of immediate practical interest is that on elimination of the microbial alteration in olives known by the name of *zapatería*, caused by certain species of propionibacterium (13), and on the elaboration of red peppers (chemical peeling, pickling and color determination) used in the stuffing of olives (14).

vi) *Preparation of black table olives*: A study has been made of the ripening of several varieties of olives typical of Spain suitable for black pickling. Tests have been carried out on both the natural method (15,16) and on the method of oxidation by alkaline medium (17). This research should promote black pickling in Spain, as well as encourage the use of varieties from other than traditional areas.

vii) *Other projects*: The following are other projects under research, although nothing has been published recently: Control of the *Dacus oleae* (Olive Tree Fly); Pesticide Residues in Olives and Edible Oils; Packaging of Green Olives; Different Systems for the Extraction of Virgin Olive Oil; Determination of Losses in the Neutralization of Oils in Industrial Refineries; Lipases; and Biodegradability of Detergents.

Collaboration with international organizations

The Instituto de la Grasa y sus Derivados collaborates with the following organizations: the International Olive Oil Council (COI); the International Federation of Oleiculture (FIO); the Fat Section of the Codex Alimentarius Mundi; the International Standardization Organization (ISO); the Food and Agriculture Organization of the United Nations (FAO); the Comité International des Dérivés Tensioactifs (CID); the International Union of Pure and Applied Chemistry (IUPAC); and the International Society for Fat Research (ISF).

Collaboration with industries

Several work projects are being carried out in direct contact with the industries. Among these are studies on the preparation of green and black table olives, packaging of table olives, control of olive oil extraction plants, testing of industrial machinery in the Almazara Experimental of the Institute, the extraction and refining of oils in the pilot plants, canning and storage of oils, etc.

In 1971, nine research contracts were carried out, and 28 technical reports on modernization and the installation of industrial plants were supplied to firms.

Standardization: The Institute heads Technical Work Commission No. 55, Fat and Detergent Industries, of the National Institute of Rationalization and Standardization. At present ca. 60 standards on fats and ca. 20 standards on surface active agents are under study.

General services of regular assistance for industries: The Institute offers services such as: Outside Analysis (in 1971 over 1300 technical reports requiring some 11,600 analytical determinations were issued); and Information and Documentation, based on the 2600 volumes and 200 specialized periodicals available in the Institute library. There is also the publication of the bimonthly magazine *Grasas y Aceites,* which for 22 years has published the results of research made by the Instituto de la Grasa y sus Derivados and other centers in Spain and in Egypt and South America.

Industries concerned with seed oils receive regularly abstracts of recent publications on that subject. A similar service, using key words, exists for industries of detergents, surface active agents and related products.

Teaching and training

The Instituto de la Grasa y sus Derivados is officially

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