Universidad de Alicante

Report for Case Study "Arroz de Valencia".

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Name of the Indication	**Arroz de Valencia**	
Country	**Spain**	
Category	**Rice**	
Protection Status under EC Regulation	**PDO:** : Regulation (EC) No 1971/2001 of 9 October 2001 supplementing the Annex to Regulation (EC) No 2400/96.	

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1. The Product and Product Information:

1.1.Product Description.

1.1.1. Rice varieties of the Albufera:

The rice varieties produced in this region are mainly *Japonica* or short/medium length rice grain kernels, which have traditionally dominated EU production[1].

Altogether, different rice varieties have been cultivated in the Albufera during the past centuries, in particular since the beginning of the 20th century. In 1913, after several years of low yields, farmers instigated the creation of the "Rice Farm", currently managed by the IVIA (*Instituto Valencianio de Investigaciones Agrarias*) in the city of Sueca, with the purpose of developing varieties which would reduce the risks and variability of outputs. At that moment, foreign varieties such as *Originario*, *Benlloch* and *Americano 1600* contributed to solve the problems related with the *falladas*, (literally "failures") mainly due to the Rice Blast disease. Later, in 1939, major improvements in the levels of production were achieved with the introduction of the *Balilla* variety.

Balilla, a round variety which comes from plants which tillers are of short height and which contain dense panicles, is the progenitor of most of the modern varieties produced in the Albufera region, such as *Bahía* and *Sequial* and, as a product of these two, came the *Senia* variety. Some of its important traits include its reproductive capacities and a good resistance to nitrogen (fertilizer).

Due to the great technological changes introduced in the nineteen sixties (combine harvesters, the replacement of transplanting by sowing and the intensification of herbicides and plague controls), the new *Bahía* and *Sequial* varieties experienced a great expansion, favoured by some characteristics such as the size of the grain, high productivity levels and a good

[1] *Japonica* varieties have always been preferably produced and consumed in the EU, contrary to world patterns which show a dominance of long grain –*Indica*- varieties. However, since the beginning of the last decade, there has been a steady growth of *Indica* rice, which has passed from representing 20% of European yields in 1992/1993, to 40% of the 2,689,924 Tn. Of rough rice produced in 2003/2004. (based on data of the European Commision included in Del Ciello, 2005).

resistance to the *encamado or* laying of rice stems[2] (see "Rice Production, *infra*). Commercially, the most appreciated variety was *Bahía*, with a rounder, "pearled"[3] grain, better suited for local culinary needs –such as the cooking of the *Paella*- and a very good adaptability to local conditions. However, and this was also an advantage of the *Sequial* variety, the plant presents more vulnerability to falling.

As mentioned already, the rice produced in this region is *Japonica* or short/medium length rice grain kernels. Long grain rice kernels[4], such as the well known "*Basmati", "Jasmine White", "Thaibonnet" or "Ferrini"*, as well as other *Indica* varieties, are preferred by world consumers and are more susceptible of finding international markets. They are also preferable from an industrial point of view because grains have fewer propensities to chip in mills.

However, these are still not fully cultivated in the Albufera region. This is mainly due to a higher "local" consumer preference for round to medium length grain rice, with a high-starch content. Thus, despite that there are changes in consumption patterns, local consumption preferences and traditions are sometimes seen to act as a protection mechanism which favours rice varieties such as *Senia and Bomba* which adapt well to local culinary needs (Mondria-García, 2005).

Other opinions link the this absence to limits in the potential of the Albufera for the production of long grain B type rices principally stemming from rigidity in the irrigation systems, which are fixed to certain periods and higher sensitivity of these varieties to the cold climate in the early months of cultivation (Ballestero, 2003). At the very least, however, "it can be said that local consumption habits do act as a natural protection against competing varieties." (See Interview 1) .

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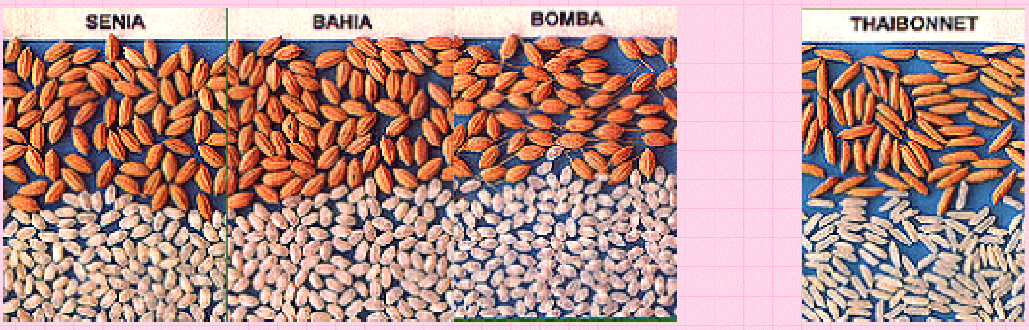
[2] One of the risks in rice production comes when rice stems "lay" and panicles soak in the flooded fields where the rice grows.

[3] The "pearl" property or *perlado* in Spanish, originates in the level of starch present in the grain. When this level is higher, the grain has a white colour, as oposed to the cristaline aspect of long grain rices, and gives the rice the level of absortion of liquids which is so appreciated by local cuisine.

[4] Long grain kernel sizes are three times longer (over 6 mm.) then they are wide (between 2 to 2,5 mm.). Short or round grain rice kernels are under 6 mm. long (usually 4 to 5 mm.) and 2.5 mm wide (Unctad – INFO COMM, http://www.unctad.org/infocomm/anglais/rice/quality.htm , *latest update, July 2006).* Varieties cultivated in the Albufera are considered medium-short varities.

One special mention should be made for the case of the *Bomba* variety. This rice variety, already used the nineteenth century, is now coming back to markets thanks to plant improvement techniques which have enhanced plant resistance to Rice Blast and incremented average yields. This variety, which is better rewarded in the markets as compared to other rice varieties such as the *Senia* rice, has high absorption capacities and, as a main competitive advantage, does not get sticky if overcooked. Thus, it is highly demanded for the cooking regional dishes as *paella* (see Box, "How to Cook a Valencian Paella", *infra*). and is often presented as a *gourmet* product.

Figure 1: Round and Long Grain Rice: Main Varieties Produced in the Albufera.



Source: Ballestero, 2003.

A great effort by the governing body of the PDO, the *Consejo Regulador del Arroz de Valencia* (CRAV), has been made to promote *Bomba* in gourmand circuits, with a particular focus on restaurants (see section 6, Marketing, *infra*).

1.1.2. The protected product: The protected rice varieties are the *Senia, Bahía and Bomba,* which are short/medium-grain kernel varieties These are perfectly adapted to the cultivation cycles and climate of the area. This adaptation favours homogenate growth, which is important for the quality, and reduces the need of extra, external, inputs for production.

The rice distinguishes itself for its uniform, homogenate, medium to round grains. These are rices with a higher concentration of starch. It is sometimes called the 'pearl of the rice' due to its form and colour, and it is responsible for the absorption of the flavours of the ingredients that, according to Valencian Region tradition, are cooked together with the rice itself.

Therefore, it has the adequate characteristics for local culinary needs and tradition. In addition, it may be added that two types of rice may be cultivated, namely white rice category (Extra) and whole-grain rice.

Finally, it must be said that in order to receive PDO protection the rice must be packed in boxes or sacks of 10, 5, 2, 1 or 0,5 kilos. Exceptionally, protected rice may be packed in 25 kg. recipients when exclusively intended for consumption of hotels and restaurants.

BOX 1: How to Cook a Valencian Paella.

VLC VALENCIA

Valencian paella recipe

INGREDIENTS

- Rice Denomination of Origin from Valencia (400 g.)
- Chicken (1.400 g.)
- 1 dozen snails
- Large, flat butter beans (lima beans) (400 g.)
- Tender white beans (150 g.)
- Wide green beans (250 g.)
- Olive oil (1 decilitre)
- 1 clove of garlic, peeled and chopped
- 1 ripe tomato, peeled
- 1/2 tablespoon of paprika
- Saffron threads
- Salt
- Rosemary (sticks optional)

PREPARATION

Cut the chicken into pieces. Salt them. Heat the oil in the paella pan. Brown the chicken pieces very slowly and thoroughly. Once the meat is browned, add the beans and brown them as well.

Next, add the garlic, paprika and tomato. Add 1'2 litres of water and the snails. Boil for 10 minutes.
Add the saffron and rice, distributing it evenly over the surface of the paella pan. Boil at high heat for 8 minutes. Then turn the heat down low and cook for 8 minutes more, in order to obtain the "socarrat" (the crispy bottom layers of rice).

Paella is a typical Valencian rice dish normally eaten on Sundays and during local festivities such as the *Falles*. There are many variations of it, with different ingredients. The name *paella* is the word for "frying pan" in Valencian (from Latin *patella*). However, the dish has become so popular in Spanish that the word *paellera* is now usually used for the pan and *paella* almost exclusively for the dish.

There is no one recipe to cook a Paella. Ingredients vary greatly from sub region to sub region. What is common to all variations is the way the rice is cooked practically together with the ingredients, therefore absorbing the flavours and juices. Just the same, there is a recipe approved by the Head Chefs' Club of the Region of Valencia and used in the Sueca International "Paella Valenciana" Competition by the contestants as the "official" Valencian Paella Recipe

Source: ***Turismo Valencia Convention Bureau.*** **www.Turisvalencia.com**

1.2. Farming and Processing.

1.2.1. Rice Cultivation.

Rice is cultivated on the wetlands of the Albufera, located in the eastern coast of Spain, in the Community of Valencia. The rice-cycle has several stages and *arroceros* –rice farmers- use traditional calendars to control the programming of agricultural activities.

The cycle begins in January. During the first two months of the year water is taken out from the rice-fields. Remaining muddy soils are moved and mixed with stray and wastes from the previous year, a compound is left to rot. During March and April soils are left to rest and curdle in the sun. Finally, sowing takes place from April until the half May. Sowing is done directly by hand or with light aircrafts. In the beginning of May, fields are filled with water and prepared for sowing which must not take place too late, so then harvesting and collection are not pushed forward in time and are not affected by the heavy rains of the beginning of Fall (The "*gota fría").*

Fields are flooded until the end of July, but during the vegetative cycle one or two 'eixugons', or dry-outs, are performed, which consist of leaving the crops a fews days without water in order to fight algae. In August fields are dried out definitely, and prepared for the harvest. After the harvest, in October and until December, the fields are flooded again in order too prepare fields for the next crop.

Harvesting is carried out from the beginning of September until the beginning of October. Then the rice is dried in the sun in *sequers,* or in warm air dryers, between September and October. This is still performed by farmer cooperatives before selling rice to industry for cleaning, grinding and packaging, which are performed mechanically, all year round.

BOX 2: Water Distribution, Drainage and Irrigation in the Albufera.

One of the crucial aspects in rice production comes from the complex irrigation system. Rice fields must be flooded during many months, at different periods during the year. First, as a part of the process of preparing fields for cultivation (between November and December/January) and then again after sowing, for the cultivation period (from May to August).

The main entry of water of the Albufera is the Royal Channel of the Jucar (*Acequia Real del Júcar*). The totality of the area of the marsh where the rice fields are located are crossed by a complexe and dense system of channels and ditches.

Irrigation presents two different problems: the flooding and the drainage of the fields, and according to the situation of the field, there are two models of irrigation:

In the lower fields which are next to Albufera Lake and are very exposed to floods, flooding is easily attained, but natural drainage is impossible and only achievable with the help of motor-pumps. In these fields, parcels –or *Tancats*- are encircled by small walls with floodgates which pass or retain the water from field to field. In the higher fields, irrigation water comes from other sources (irrigation ditches from the Júcar and and Turia rivers, and lake waters elevated with the help of motors). Drainage can be achieved "naturally" and does not need to be powered.

Two institutions manage the distribution and drainage of waters in the Albufera: the Júcar Royal Channel Board *Junta de la Acequia Real del Júcar)* and the Albufera Drainage Board (*Junta de Desagüe de la Albufera*).

The Royal Channel, which crosses 20 townships over almost 60 km., is governed by regulations (*ordenanzas*) which date from 1921 and remain strictly respected today (Mondria-García, *ibid*). The Board has a pyramidal structure, with the Chief Engineer of the Hydrographical Confederation of the Júcar as President –representing the central administration-, and a Governing Board body of five members, elected by and within the General Board, composed by local representatives of each locality.

The Drainage Board was created in 1862 and has the competence of managing the drainage of the lake by controlling the floodgates which close the passage of the water from the lake to the sea. The floodgates of Perelló and Perellonet, which exist since the 19th century, where supplemented by the floodgate of Pujol, in 1952. Since 1991, turbines are used to accelerate the drainage in critical situations.

The irrigation system of the Albufera is an excellent example of collective management of natural resources, achieved by farmers in a democratic and participative system of control.

Source: Mondria-García, M., 2004.

1.2.2. Plague control and plant-health measures.

The most important common plague in rice cultivation is the Rice-Stern Borer or *Chilo Suppressalis Walk.*, very common in the Albufera region. The most common plant-health problem is *pyriculiarosis* or Rice Blast, provoked by the *Pyricularia Orizae,* a fungal

pathogen. Rice Blast is a highly destructive disease which was kept under control during most of the 20th century, but has irrupted with important consequences in the last six years[5].

Plague control and plant health measures are in great measure determined by the situation of the rice-fields in the Albufera Natural Park.

In the case of the Borer, two methods of control were promoted by the Valencian Community Administration (*Conselleria de Agricultura, Pesca y Alimentación*- CAPA). In the first place, chemical treatments with low levels of toxicity. In second stance, biological treatments with pheromones, which reduce the reproductive capacity of the Borers.

Rice Blast seems to have expanded greatly inn the past years due to a combination of factors such as favourable climatologic conditions and the expansion of varieties which are less resistant to the disease other than *Senia* rice, the variety which has dominated rice production for more than half a century.

Means to counter this disease, which has caught farmers unprepared, include the use of fungicides, in campaigns which were subsidized by the CAPA.

Plant health treatment is a delicate issue, since it affects vegetation and fauna of the Albufera lake. Some treatments are collective, such as the campaign against the *Cucat* or Borer, promoted by the Vegetable Protection Service, the Federation of Rice Farmers and local agricultural chambers. Products which are used are normally not aggressive insecticides and fall under recommendation of the Valencia Administration. The CRAV has also been very active, in cooperation with the Administration, in the dissemination of the technique which inhibits Borer reproduction through pheromones, to expand it among the producers of the PDO.

Individual, or private, use of agro-chemicals has augmented greatly when the system passed from transplanting to sowing. Pesticides, algaecides, herbicides and fungicides are applied, as well products used to disinfect seeds. Atomized production, with many small fields

[5] In a study conducted by Laboratories in the region (Silla) in 1999, 74% of the samples denoted the presence of this disease.

administered by different farmers, has multiplied individual actions which remain somewhat uncontrolled and may affect the environment (Mondria García, *ibid:* 31.).

The CAPA has the competence to determine which products may not be used: Some of the limitations imposed by the administration include the impediment to use pesticides of the C toxicological category for fauna and plants[6], the ban to apply herbicides from the air, and the prohibition to use certain products and compounds[7].

1.2.3. Industrial Processing:

Rice is a commodity which must undergo several industrial processes before it is rendered to the public as a marketable product. Paddy –or rough- rice is not edible. Certain transformations must take place to make it appropriate for human consumption, therefore industrial processing is necessary. The first part of this process is the removal of the outer hull. Depending on the type of rice wanted, whether brown husk rice or white rice, the process may continue. White rice will still require the removal of the bran layers and germ and milling and polishing. And in addition to this, there will be packing and transport.

1.3. History

1.3.1. *Rice Production in the Albufera.*

The history of the Albufera is intimately linked with the history of rice cultivation. Its introduction is attributed to the Moors and dates back to the 8th Century. Across history, Rice fields have been successively banned and re-established several times: prohibitions were based on sanitary measures seeking to eradicate malaria plagues. During prohibition times, it was only allowed on naturally swampy soils that were considered as unproductive for other harvests. Notwithstanding, rice remained the highly profitable and with a high nutritional value when compared to other crops, explaining successive re-establishments of the rice

[6] Order of May 30 1998, (DOGV Nº 847).

[7] For example, by Order of April 28, 1992, (DOGV Nº 1784), the use of herbicides with quinclorat is banned. Other bans include the applications of aelgicides with tin salts.

farming activity. Finally, proper treatment of the water in rice fields permitted the problems associated with stagnant waters to be eradicated (Girona, 2003).

Rice cultivation has always taken place in the coasts of the Albufera, with the necessary flood-prone conditions. Ever since it was readmitted in permanent manner, rice production has leaded the agricultural expansion of the region. In the 19th century there was a very important growth of the surface dedicated to the production of rice. This increase is reflected in the decrease of the Albufera lake, reduced from 13,972 Ha to today's 2,896 Ha., mostly in favour of new rice paddies[8].

However, the area dedicated to rice production started to decrease after the Spanish Civil war, from over 34.000 Ha[9]. to the levels reached in the 1980s (around 16,000 Ha.)[10]. The sharp reduction experienced since 1940 is in part due to the irruption of competing horticulture produces, which were now possible thanks to the help of new machinery which permitted easier transformation of soil for other purposes other than rice cultivation, as well as for better returns which farmers obtained for alternative agricultural activities. Together with this reduction in the land allocated to rice came a decrease in the relative importance of Valencian rice, in terms of Spanish production, as may be observed in the following Table.

[8] Fields were gained to the lake by carrying earth with boats to fill in previously delimited areas. Around 1.500 to 2000 *barconas* were necessary to create one hectare of a a rice-farm.

[9] This figure corresponds to the total hectares of the Valencian Community, therefore reduction rates include the areas of rice production which practically disappeared in the Castellón and Alicante Provinces, aside from the diminishement in the Albufera region.

[10] It is not too clear if the area has continued to decrease in the last few years or if there has been an adjustment in the statistics which have cast figures below the 16,000 threshold, due to the implementation of new Geographic Information Systems (GIS).

Table 1: Evolution of the Area of Rice Cultivation and Relative Importance of Valencian Rice.

Year	Hectares	% of National Total
1940	34,854	65.1
1960	28,520	43.3
1980	16,089	23.3.
2000*	14,741	13.0

Source: FSA.* The information for year 2000 is provided by MAPA-

1.3.2. *The creation of the PDO "Arroz de Valencia".*

The PDO *Arroz de Valencia* is of very recent creation and implementation. The Regulatory Council or *Consejo Regulador,* managing board of the PDO *Arroz de Valencia,* started to function in 1997.

The PDO is an initiative of a group of primary producers and a part of the industry, wishing to seek ways to create new means to add value for a local product which is not only appreciated for it's importance as part of local culture, but –in particular- for the agro-environmental services which rice cultivation renders to the region and for which it is necessary to keep the cultivation sustainable. (Císcar and Claver, 1997)

The PDO is seen as one mean to face structural and conjunctural challenges which the sector is up to face:

- High costs of production, due to atomisation and small size of production units.
- New competition, due to trade liberalization coming from international agreements.
- Changes in CAP of the European Union, which tend to bring prices closer to international prices.

In September 2000, the "Code of Practice" or *Reglamento de Uso* of the DOP *Arroz de Valencia* was approved by the Valencian Council of Agriculture, Fishing and Food (*Conseilleria de Agricultura, Pesca y Alimentación*). This Regulation is bases itself on the achievement and guarantee of quality, and is limited to certain varieties, *Senia, Bahía and Bomba*, which are linked to local traditions and local cuisine. The Regulation established a

board, the CRAV. which has the mission to certify and control the registered product, and to promote it in markets.

1.4. Geographic Information.

The protected rice has to be cultivated within "the area of influence of the Albufera Park", in the province of Valencia. This includes the wetlands of the Albufera as well as other wetlands of the Autonomous Community of Valencia (ACV). More precisely it includes the municipalities of Albal, Albalat de la Ribera, Alfafar, Algemesí, Beniparrell, Catarroja, Cullera, Massanassa, Sedaví, Silla, Sollana, Sueca y Valencia, and include suitable areas in Alginet, Almenara, Almàssera, Almussafes, Alquería de la Condesa, L'Alcúdia, Benifaió, Villanueva de Castellón, Corbera, Favareta, Fortaleny, Llaurí, Massamagrell, Oliva, Pego, La Pobla de Farnals, Polinyà del Xúquer, Puçol, Riola, Sagunto y Tavernes de la Valldigna.

1.4.1.The Albufera Lake and Wetlands: General Characteristics. Geomorphology.

The Albufera Lake, located 15 km. south of the city of Valencia, is the largest lake of Spain. It was formerly a marine bay which has naturally closed over time. Around it lies one of the most interesting traditional landscapes recognized as a fine example of the interaction of man with nature, having an appreciable effect on the generation of landscapes and on the environment.

The lake itself belongs in its totality to the municipal district of Valencia, and limits with Alfafar, Albalat of the Shore, Algemesi, Beniparrell, Massanassa, Catarroja, Albal, Chair, Sollana, Sueca, Sedavi, Cullera, while the wetlands extend to other townships.

The "Information Sheet on Ramsar[11] Wetlands" compiled by the General Directorate for the Conservation of Natural Environments in 1992 (*Direccion General de Conservacion del Medio Natural*) summarizes the information on the Albufera as follows:

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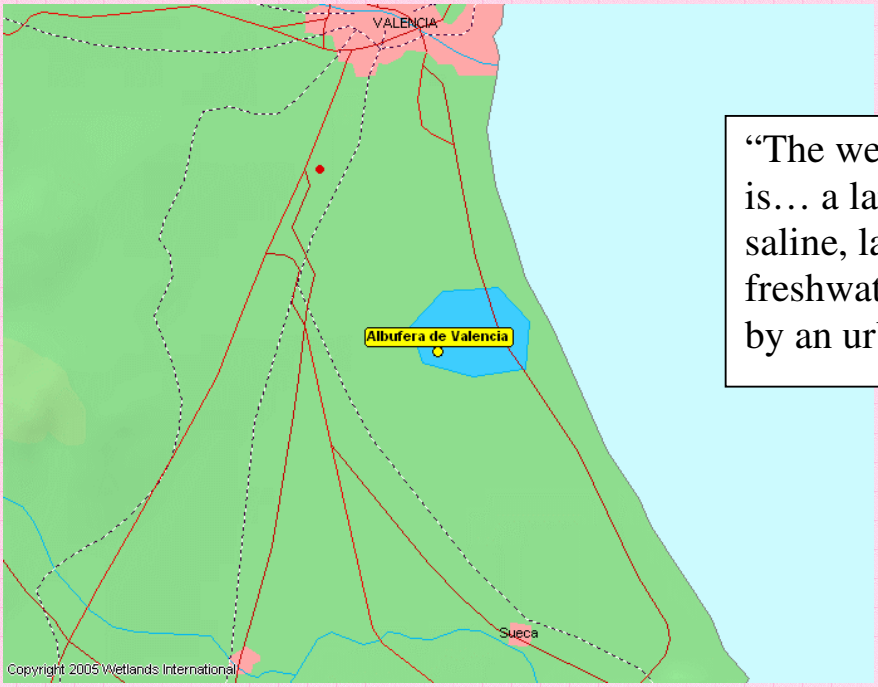
[11] The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 152 Contracting Parties to the Convention, with 1610 wetland sites, totaling 145.2 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance. Upon joining the Ramsar Convention, each Contracting Party is obliged by *Article 2.4* of the treaty to designate at least one wetland site for inclusion in the "List of Wetlands of International Importance", for which information is to be provided. Information on the Ramsar Convention of Wetlands may be found in www.ramsar.org.

"This is a coastal lake, fed by different strams, torrents and irrigation channels, and fringed by small bogs obtained from the lake to be cultivated mainly with rice. An emergent shoal isolates the lake from the sea. That bank is colonised by vegetal communities consisting of littoral maquis and crowned by *Carrasco* pinetrees.The river Turia limits the shoal in the North, and the *Serra de les Rabosse"* in the South*"*.

Map 1: The Albufera Lake.



"The wetland [of the Albufera] is… a large coastal, brackish to saline, lagoon with some areas of freshwater, separated by the sea by an urbanized shoal".

Source: Ramsar. Copyright Wetlands International.

The Natural Park extends over 21,000 hectares. The lagoon itself, today no larger than 2,800 hectares, has been reduced over time, on the one hand, due to the creation of new surfaces for agricultural production gained in its detriment and, in second stance, due to a natural tendency towards the siltation of these waters. The wetland is therefore a large coastal, brackish to saline, lagoon with some areas of freshwater, separated by the sea by an urbanized shoal.

Geologically speaking, the lagoon bottoms consist of brown muds, fluvial slimes and lagoon-black muds. The shoal is made up of holocenic sands. The origin of the bank is from fluvial materials provided by the Turia river, further spread by stream. Due to natural siltation processes, the bank came eventually to close a previously existing bay forming today's lagoon. Natural siltation processes, however, were greatly increased by human influence.

The lagoon and bogs compose a hydric unit of around 911 Hm^3. The average depth is of around 1 metre and the average volume held by the lake varies between 17,2 and 40,5 Hm^3. Levels are artificially managed by man for rice cultivation. The quality of the water is deficient, because of industrial wastes carried by rivers and channels from surrounding urban or populated areas.

1.4.2. Landscape, Flora and Fauna:

The vegetation in the Albufera is dominated by aquatic communities (species include curly leave pondweeds -*Potamogeton crispus*-, water *lentille* -*Lemna* spp.-, coontail -*Ceratophyllum demersum*-, marsh grass *Cladium mariscus*), halophytes (e.g. *Suaeda* sp., *Salicornia* sp.) and sand dune communities. An important diversity in flora and fauna may be found, which depends on the different land and water characterisitcs which create different habitats within the park.

According to the *Plan Rector de Uso y Gestión del Parque de la Albufera,* (PRUG)[12] The Landscape Units (LU) which may be found in the Albufera park are:

- Urban Areas and Centres.
- Touristic infrastructures.
- Industrial Zones.
- Rice Paddies.
- Woody agricultural areas.
- Non-woody agricultural areas.
- Cultivation under plastic protection.
- *Racó de la Olla*.
- Brushes and thicket.
- Dunar complexe.
- Brushes and Pine Trees on fixed dunes.
- *Malladas.*
- *Bassa de San Llorenç*
- *Micro-reserve.*

[12] The PRUG is the legal framework for all activities related with the management of the Albufera Park ressources. (Created by decree 259/2004, *Conseill de la Generalitat de Valencia,* also see "Legal Protection", *infra*).

In terms of ecosystems, the following are the main categories which have been identified and should be highlighted[13]:

The Lake or *Lagoon* area and the Wetlands. The Lake of the Lagoon has an average surface of around 2,800 Ha. together with wetlands (14,000 Ha.) area where rice paddies are mostly located, is a remarkeable habitat for bird species, in particular migrating *anatidae* which pass the winter..

An important subsystem of the wetlands are **the rice paddies**, which do not constitute a strictly natural environment since –as previously mentioned- they are lands gained upon the lake and the extense *Marjal* (Marsh, Lagoon) and lake, as seen in old cartography. A modern re-creation of the old *Marjal* is comes to the Albufera region in the periods when the rice fields are flooded, giving us a fairly good impression of the landscape as it was.

Figure 2: Dry and Flooded Rice Fields in the Albufera.

In the photograph to the top left, the Albufera Lake. At the bottom, the rice fields after the harvest, in September-October. To the right, the Albufera marsh and rice fields completely flooded, as they remain between November and January.
Source: www.albufera.com and Ajuntament de Valencia.

[13] The main sources for this section were MMA, 2003 d. and www.albufera.com .

The rice paddies are an important component of the biological wealth of the Park, sustaining vegetation and invertebrate fauna, and become a complementary atmosphere to the one of the lake, as an area where birds may feed and stop in the process of migration

The *Devesa*, Sand Dunes and the *Malladas*: *La Devesa* is a natural space composed by an external (towards the sea) sand dune complex (a), with grass and scrub like vegetation, an internal sand dune complex (c), with dense vegetation and pine trees and the coastline touching the lake (d).

Figure 3: The *Devesa*, Sand Dunes and the *Malladas*

The sand dunes and beaches have a great ecological value which comes from the great specificity of the life forms, resistant to great variations in temperature, they can hold. On the beaches, colonies of *charrancito* birds –Terns- (*Sterna albifrons*) and *chorlitejo patinegro* - Kentish Plover- *(Charadrius alexandrinus)* may be found. However, from an environmental point of view coastal sections are extremely deteriorated due to intense urbanization.

Located between the two sand dune complexes, the *Malladas* (b) are characterized by hardly permeable soils, with the phreatic level very near to the surface. Despite degradation, some *Malladas* still subsist, with characteristic flora and fauna like the *fartet* and the *samaruc.* The restored *Mallada del Raco de l'Olla* (40 Ha) serves as habitat to different species of birds.

Other agricutural areas. In addition to the rice paddies, three types of agricutural landscapes may be occupied by orange trees and –in smaller proportions- to almand trees. Some of these areas are located on old rice paddies which were dried out for this purpose. Non-woody agriculture areas are commited to vegetables such as lettuce, onions and watermelons. As in the previous case, many of these fields are on old rice paddies, a substitution which represents a dubvious choice, from the environmental point of view. In the coastal area, agriculture below plastic covers is reported as well.

Other important landscape features are the *Ullals*, isolated freshwater springs, permanent freshwater marshes and ponds, the *Matas* (small lake islands with dense vegetation), small ponds of fresh water such as the Estany de Pujol and the Bassa de San Llorenç.

1.4.3. Land uses:

The lands in the Devesa del Saler (the strip of land on the sandbank dividing the lagoon and the sea) are publicly owned by the Council of Valencia. However, the rest of the area is of private ownership. The seaward side of the bank is heavily urbanized. Unlike the rest of the lake area, it is is well communicated (the Valencia centre is just 20 minutes away by car). This and the presence of an important strip of beaches have given this area a great economic dynamism than has transformed what was a small nucleus in a tourist-center of importance.

The human activity which covers the greatest area is **agriculture**, where rice cultivation is predominant from the point of view of it's importance as an ecosystem. Woody groves, principally orange and mandarine tree groves located in former rice paddies, are second in importance, followed by agriculture aided by plastic covers and vegetable gardens.

Industry is a relevant activity, particularly in the *Horta* district area. Predominant industries – such as furniture, woods and the food industry seem to be slowing down, while the chemical industry and communication services seem to be expanding.

Service Sector: This sector is expanding rapidly. Above all, the expansion of tourism must be highlighted.

Other human activities within the reserve are fishing and hunting.

1.4.4. Population.

The population has increased of in those districts that have met greater industrial development – such as Albal, Alfafar, Catarroja, Sedavi and Silla-. Cullera, as mentioned, is an important tourist centre.

In agricultural populations pertaining to the "*Baixa"* shore, like Albalat de la Costa, Sueca and Sollana, population growth remains at lower levels. Employment in the services have expanded greatly in all the area of inlfuence of the park.

2. Relevant Legislation.

2.1. Laws and Regulations related with PDO Protection.

The Regulation that governs the Designation of Origin 'Arroz de Valencia' and its Regulating Council was subsequently approved on the following geographical levels until approval by the EU was achieved.

- Regional level: Autonomous Community of Valencia: by Order of 21 September 2000 of the CAPA approves the regulations of the PDO *Arroz de Valencia* and it's board CRAV, granting provisional protection, valid at a national level, in conformity to Art. 5.5. CE 2081/92.
- National Level, Spain: Ratification by Order of 27 June 2001 of the 'Ministerio de Agricultura, Pesca y Alimentación' (Ministry of Agriculture, Fishery and Nutrition)
- European Union: Approval by Commission Regulation (EC) No 1971/2001 of 9 October 2001 supplementing the Annex to Regulation (EC) No 2400/96 on the entry of certain names in the Register of protected designations of origin and protected geographical indications provided for in Council Regulation (EEC) No 2081/92 on the protection of geographical indications and designations of origin for agricultural products and foodstuffs

2.1.1. PDO Rules:

Rules related with the Protected Designation deal with two main subjects: the product specification, indicating product varieties, qualities and processes, as well as geographical areas of production, which are admitted to obtain the PDO.

The other subjects dealt with are the functions of the Managing Board –the CRAV-, in terms of control, certification, promotion and defence of the GI.

Product Specification

The Regulation for P.D.O. 'Arroz de Valencia' establishes that the geographical scope of the protected product is established within 34 townships in and outside of the Albufera Park. Rice paddies, in each case must receive qualification from the CR (see the Geographical Information Section) (Article 3).

Only three varieties, which must come from officially certified seeds, are admitted for PDO protection. These are *Senia, Bomba* and *Bahía*. Specification rules allow for new varieties to be introduced and authorized in the future, provided that they are of the quality necessary to meet PDO standards.

The maximum production allowed per hectare is 8.000 kg of rice, a deviation is only possible in exceptional circumstances[14] (Article 5).

Regarding cultivation practices, although not being very detailed in its precisions, the regulation indicates that these shall be the ones as approved of by the Regulating Council that tend to reach the best quality of the rice, and are compatible with the defence of the natural environment (Article 6). Although this does not obligate farmers further than to restrict from using methods and products which are banned by law, the "defence of the natural environment" has been implemented in practices which tend to reduce agricultural intensity in the use of harmful agrochemicals, for example by the active promotion by the PDO of pheromones to reduce Borer plagues.

Rice "quality" requirements, aside from the varieties admitted, are principally determined by criteria of sanitary nature: rice must be sound, present no rests of parasites or funghi, be clean, dry and not present "strange" odour and taste. Both white and brown varieties are admitted.

Due to the fact that PDOs are stricter than PGI on the geographical location of production processes, all processing and manipulation of the rice must take place within the `protected area (Article 7). However, fields must be registered beforehand by the CR.

[14] This is slightly above the Spanish average for the last two years according to the information of MAPA.

The Consejo Regulador (Managing Board) of the Arroz de Valencia.

The CRAV has the competence of ensuring the defence and promotion of the protected product, as well as ensuring and controlling that the regulation is applied (Article 3). As a organism which certifies agrifood products it must comply with the criteria established by the EN-45011 norm.

It is composed, in equal terms of representation, by farmers and mills. In addition, two representatives of the local administration (CAPA) participate as technical members (Article22). The CRAV has the faculty of registering rice fields for PDO product production, registering mills, controlling product qualities and production processes, verifying that a strict isolation of PDO protected products from other products is performed strictly, and supervising the packaging and presentation of the product[15] (Articles 21-23 and 8).

2.1.2. Monitoring and control of the criteria set out in the specification (frequencies and implementation agencies[16].

Monitoring of product quality is performed by the CRAV, by the competences which are set by Article 19 of the PDO regulation. Each year the CRAV controls the quantities which will fall under the designation, coming from quantities produced in registered fields, as well as from stocks corresponding to the previous season.

To comply with control measures farmers must present –each year- a declaration of the plots employed in producing PDO rice and an invoice showing that officially certified seeds have been bought to be employed.

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[15] Among packaging requirements, it is specified that sales must take place in packages of 0,5, 1, 2 and 5 kg. For sales to restaurants, 25 kg. sacs are admitted. The PDO logo must placed in a visible place.

[16] The sources of this section are the PDO Specification Rules (*Reglamento de la Denominación de Origen Arroz de Valencia)* and the interviews to the CRAV and Industry.

After harvest, farmers must declare quantities obtained after the campaign indicating if it has been sold and to whom, or if it will be stocked. Cooperatives grouping farmers may present the declaration in the name of their associates.

Processing industries must declare the quantity rice received, indicating packaging formats. In each case, they must state where they have bought these quantities and what their destination is.

The CRAV may perform inspections in any phase of the supply chain. During the months of July and August, when rice panicules show, controls measuring plant health are carried out[17]. In occasions, after important storms or floods, extra inspections are effectuated to control if rice crops have fallen or lean, putting panicules beneath water levels (this event, called *encamado* in Spanish, has been responsible for important crop losses at occasions).

Industries are inspected three times a year. Special attention is paid to the strict separation of batches of certified rice from other lots.

Any infringement to the regulation, under the form of alterations of the product, mixes of qualified rice with other batches or failure to comply with any of the rules of the PDO regulations will be considered as a serious fault and will have, as consequence, the loss of qualification for the entire consignment.

2.2. Conservation and Management of Natural Resources.

2.2.1. Regulation on the Management of Resources in the Natural Park of the Albufera.

The Natural Park of the Albufera is the oldest officially protected environment of the ACV. It was declared as such in 1986 by Decree Nº 89/1986 of the *Conseillería de la Generalitat Valenciana*[18].

[17] Usually, the inspector seeks for traces of equinocloa, pelicuria or *rebordonit* with the purpose of establishing a precedent for the final inspection after harvest and assisiting the farmer in corrective measures.

[18] Competences for the declaration and admistration of Protected Environments are delegated by the central government to the Autonomous Communities in by Law Nº 4 1989 (article 21).

Today, the National Park is governed by the *Plan Rector de Uso y Gestión del Parque Natural de l'Albufera (PRUG),* or "Governing Plan for the Management and Use of the Natural Park of the Albufera[19]" approved by Decree 259/2004 of the *Conseillería de la Generalitat Valenciana* in accordance with Law11 1994 of the Generalitat (Protection of Natural Areas) and Decree 96/1995 of the *Conseill* (Management of Natural Ressources of the Albufera Basin).

The PRUG in creating a framework regulating all activities carried out within the park, with the aim of keeping the conservation of ecologic values compatible with human activities – agriculture, tourism, study and research etc.- also affecting the urbanistic regime.

The importance of rice agriculture to the ecosystem of the Albufera is recognized by the PRUG. Among different agricultural activities regulated by it, a special mention is made to rice cultivation of which it is said that when carried out according to traditional methods, it shall be protected because of its environmental, cultural and social value. In this sense, the promotion of rice cultivation is considered a priority by the PRUG[20].

Because of this recognized importance, the rules contained in the PRUG affect rice farming in many manners.

The plan establishes that appropriate agri-environmental procedures shall be introduced by competent authorities aiming at implanting integrated methods for fighting plagues, the reduction of chemical pesticides, the management of organic agricultural wastes, and the reduction impacts produced by agricultural practices. It also prohibits the use of certain agrochemicals explicitly, with particular measures (for rice paddies the prohibition of quinclorac).

In reference to Rice production facilities, it establishes that existing infrastructure –drying facilities- may subsist, however new facilities must be authorized and attain to limits regarding their dimension.

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[19] As would be literally translated into English.

[20] Article 8.2.

Regarding the management of water resources, it subdues irrigation systems used in agriculture, including rice paddies, to the rules contained in the PRUG. In relation to dispositions affecting landscape, it prohibits any closure of rice fields.

One important condition which affects rice farming is that which establishes that agricultural areas dedicated to rice must maintain the physiographic traits of the *Marjal*, warranting that conditions for flooding will be preserved.

Finally, the PRUG forbids the conversion of rice fields to other agricultural or non agricultural purposes which entail drying up fields in a permanent or temporary way. This rule is an important measure protecting both rice production and the environment, as other agricultural activities, out on "dried" lands, are often more profitable and less reliant on external aids for subsistence.

2.2.2. Other Conservation Measures or Designations.

In addition to its declaration as a Natural Park by the ACV, the Albufera has been included as an area deserving special protection at Community and International levels.

As mentioned previously, it has been included, as from May of 1990, in the List of Wetlands of International Importance of the Ramsar Agreement.

It has also been declared as Special Protection Area (SPA), a designation under the European Union Directive on the Conservation of Wild Birds (79/409/CEE[21])

Member States of the European Union have a duty to safeguard the habitats of migratory birds and certain particularly threatened birds. Together with Special Area of Conservation or SACs, the SPAs form a network of protected sites across the European Union, called Natura 2000.

It is also included as a "habitat" in the "Habitats Directive[22]" and is retained by the Protocol of Geneva, of 1982 Specially Protected Zone of the Mediterranean.

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[21] Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds.

[22] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

2.3. Subsidies and Market Regulations.

Two types of economic aids are available to rice producers. Moreover, the profitability of this activity is highly dependent on their existence and support.

In 1995 the European Union established a Common Market Organization (CMO) for rice which conceded compensatory payments to producers of rice of the EU. EC regulations are complemented by national laws[23] and, at the regional level, through the competences which are given to the Valencian administration (CAP) enacted rules[24] covering procedures and requirements to be fulfilled by farmers whishing to accede to compensatory aids.

The common organisation of the market in rice is meant to stabilise prices and provide growers with a fair standard of living by laying down prices and detailed rules concerning trade with non-EU countries. The system was last modified with the **introduction of** Council Regulation (EC) No 1785/2003 of 29 September 2003 on the common organisation of the market in rice.

The system implied the reception of direct payments by farmers and guarantees a minimum price (150 Euros per TN) with the intervention EC agencies which can buy in quantities of rice offered for intervention up to a maximum of 75 000 tonnes (100 000 tonnes for the period from 1 April to 31 July 2004).

The system of payments was amended by the 2003 agricultural reform, with the introduction of a single payment per holding (Single Payment Scheme-SPS). Thus, a series of existing direct payments received by a farmer from various schemes were concentrated in a single payment, determined on the basis of previous entitlements, within a reference period[25]. Payments under the SPS are subject to other conditions introduced by the 200 CAP reform. These include: cross-compliance (linking of the SPS to the respect of environmental, food

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[23] RD 1893/1999, revoked in 2002 by RD 1026/2002.

[24] Order of December 27 2002.

[25] Council Regulation (EC) No 1782/2003 of 29 September 2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers.

safety, animal and plant health and animal welfare standards, and to the requirement to keep all farmland in good agricultural and environmental condition); modulation - a reduction in direct payments to finance the new rural development policy; financial discipline – cutting direct aids when necessary to ensure that the farm budget fixed until 2013 is not overshot; and, the introduction of farm audits.

The CMO for rice regulation -(EC) No 1785/2003-, also lays down rules on commerce: Imports and exports are subject to licences issued by the Member States, valid throughout the Community.The rates of duty in the common customs tariff apply to imports of rice, except for husked rice and wholly milled rice. Tariff quotas are opened and administered by the Commission according to different methods based on: a. the chronological order of the lodging of applications (first come, first served), b. distribution in proportion to the quantities requested when the applications were lodged (simultaneous examination), c. taking traditional trade patterns into account, or other non-discriminatory methods[26].

An export refund may be provided to facilitate export of the products referred to in this Regulation, to cover the difference between the prices of these products on the Community market and prices on the world market.

To the extent necessary for the proper functioning of the common organisation of the markets, the Council may prohibit the use of inward or outward processing.

In trade with third countries, it is normally forbidden to impose charges having equivalent effect to customs duties or to apply any quantitative import restrictions or measures having the same effect. However, safeguard measures may be taken if imports or exports threaten seriously to disturb the market.

According to reports (MMA, 2003 a.) and the interviews performed, 99% of rice producers of the Albufera receive support for their activity.

The second type of aid which producers receive is agro-environmental subsidies, which have the scope of promoting agricultural productions whilst protecting the environment and natural

[26] Council Regulation (EC) No 1785/2003 of 29 September 2003 on the common organisation of the market in rice., Art. 11.

spaces[27]. Such aids are compatible with CMO support. Today these agro-environmental subsidies are regulated by EC 1257/1999, which has governed the EU Rural Development Program applicable between 2000 and 2006.

In Spain, the implementation of agro-environmental supporting measures in the wetland environments was instrumented through several laws, in particular Royal Decree RD 928/95[28] which already coined measures to promote environmentally friendly methods of production in these areas. The scope covers the Spanish wetlands "which are in the Ramsar list of Wetlands of International Importance" (http://www.ramsar.org/key_sitelist.htm) , in particular those serving as habitats for water birds, with an explicit mention to the Albufera of Valencia[29] among other areas.

This Royal Decree was repealed by RD 4/2001[30], containing specific agro-environmental actions in rice production which are susceptible of receiving aids: Later, in 2002 this law was modified by RD 708/2002, in relation to commitments and retributions related with rice production.

A by-law, in 2002, was passed establishing complementary measures to existing regulations, related with the application of "Integrated Production Systems and Organic Production"[31].

At the regional level, Ordinances are passed yearly with the purpose of announcing the aids, determining potential beneficiaries, and laying down the specific requirements to be met. Recipients, in this case, are the owners of the farms located in Albufera Natural park which commit to the protection of flora and fauna through rationalization of agrochemicals and who commit to maintaining "traditional" rice agriculture.

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[27] EC 2078/1992.

[28] BOE n. 170 of 18/7/1995: 21898 – 21906.

[29] Annex 1.

[30] BOE n. 12 of 13/1/2001: 1587 – 1617.

[31] Ordinance of July 1 2002 establishes that

In order to qualify for agro-environmental subsidies of this sort, farmers must comply with some of the following obligations, for a period of at least five years.

1) Mechanical Control of unwanted plants, in particular by applying the technique of *"enfangado"* or flooding.. (Prime maximum of 150 Euros per hectare).
2) Preservation of rice in the areas surrounding lagoons, and substitution of other crops by rice. (Prime maximum of 120 Euros per Hectare).
3) Conservation of elements necessary to retain water, such as small floodgates, with the purpose of maintaining the level of waters necessary for flooding rice paddies during the winter months. (Prime Maximum of 60 Euros per Hectare).

If all three commitments are acquired, a maximum of 330,56 Euros per Ha. will be given to the producer. An increment of 20% is provided on all premiums when the producer proves that agriculture is his principal activity.

Today, around 95% of the farmers of the Albufera receive agri-environmental subsidies.

2.4. Other regulations affecting rice producers: Trade Measures (EBA - GSP)

Although trade measures do not affect Valencian rice farmers, these certainly have an effect on their activity by regulating commerce flows of competing foreign products. Trade measures included in the CMO Regulation must be read together with measures included in Regulation 2501/2001, establishing a General System of Preferences (GSP) for Less Developed Countries (LDC), other wise known as the EBA (Everything but Arms) regulation.

The EBA liberalizes trade with LDCs, granting duty-free access to imports of all products without any quantitative restrictions, except to arms and munitions. At present, 49 developing countries belong to the category of LDC's, including some important world producers of rice, such as Bangladesh[32].

[32] Clearly, the EBA Regulation creates fears of pressure on prices coming from competition from non EU third countries. However, it must be observed that many of the countries included in the LDC of the EBA are strong consumers of rice, as well as producers. The example mentioned, Bangladesh, is the fourth world producer but –at the same time- imports 2% of world rice exports due to it's food deficit.

Only imports of fresh bananas, rice and sugar are not to be fully liberalised immediately. Duties on those products will be gradually reduced until duty free access will be granted. For rice, this is to arrive in September 2009. In the meantime, there will be a duty free tariff quota which enlarges by 15% each year, starting from 2.517 TN in 2001, until total liberalization in 2009.

3. Environmental Issues and Impacts:

3.1. Introduction.

The most important resource of the Albufera is incontestably water. It is a region naturally endowed -with the Albufera lagoon right in between the Turia and Júcar river-mouths and the sea- over which human beings have intervened strongly by way of, for example the construction of channels, floodgates, and by gaining agricultural lands to the waters. Man, hence, has been the principal manager of this resource in a remarkable collective effort which has existed for centuries.

The wetlands of the Albufera –of which the rice paddies are an integrated part- are a very important source and reserve of biodiversity. Rice cultivation is the best adapted to this sort of environment for the capacity of provide habitats for wildlife species that include birds, fish, plants, amphibians, reptiles, molluscs, crustaceans and insects. The importance of rice fields as a source of biodiversity has been recognized in different fora at the international level at the occasion of the "International Year of Rice", celebrated in 2004 by the UN (FAO, 2004: Factsheet 7). The most important value of rice production in the Albufera may be linked to it's importance as a habitat and reproduction area for different animal species, in particular birds, as already recognized by national and international rules which have designated this area as protected zone (see 2.2. Conservation and Management of Natural Resources, *supra*).

3.2. Impacts of Rice Production on Natural Resources.

3.2.1. Water:

As seen in other parts of this report, the exploitation of rice is strongly linked with the management of waters in the Albufera. Rice is the only cereal which can stand water submergence. This explains long standing linkages between rice and water in most rice producing areas (FAO, 2004).

Two important environmental problems were detected concerning the waters of the Albufera (Girona, 2004; MMA, 2003d.; *ibid* 2004, www@lbufera.com): water pollution and loss of the waterlands due to siltation.

Water pollution, in particular eutrophication (the enrichement of the ecosystem with chemical nutrients) are provoked by the domestic wastes and remainders of more than 300.000 people, spills from the industries and agrochemicals used for agricultural production, including rice (MMA, 2004 b.)

The Albufera is hipertrophic lagoon, but the values of measurements taken recently show that there is a tendency towards a reduction of this problem[33] as compared to the values of the nineteen-eighties. Water transparency is severely affected by high concentrations of fito-plancton although, in the last years, there have been some "clear-water phases.

Siltation is a natural process in the Albufera Lagoon, but human intervention has tended to render this process more acute. Some studies have estimated that at this rate the lake would disappear before 150 years (MMA, 2003 g.).

Rice paddies have occupied more than 10.000 hectares, which were formerly part of the lagoon during the past two centuries, certainly representing important costs for the environment. However, loss of lake waters in favor of rice paddies is a minor problem as

[33] This may be due, in part, to the practice of emptying the rice paddies after the February, introducing fresh waters to the lake and to better sanitary infrastructures concerning waste-waters entering the lagoon. The adoption of better practices in rice cultivation -are also relevant. In helping to keep this process under control.

compared to fillings of lake areas and old rice paddies for other agricultural production, such as citrus trees and vegetables as these imply drying the lands out completely (rice paddies are flooded an important part of the year) and loosing important habitats for different living species (see Biodiversity, *infra*).

3.2.2. Soil (Contamination of Sediments in the Lagoon and Channel Areas).

Studies carried out by Peris, San Jaume, Monerris[34], were examined in a report commissioned by the Ministry of Environment (MMA, 2003 b.). Findings regarding the quality of soils of the Albufera may be synthesized as follows:

The lagoon receives a permanent inflow of loam. Only the thinnest sediments arrive to lagoon, basically loams (which take an upper stratus) and clay (below the loam). Sediments show a very important proportion of organic material and nutrients. Nutrients (Phosphorus and Nitrogen) levels are lower in the inferior layers, but quite high in the superficial layers due to the process of eutrophication. Soils show normal values in terms of salinity.

Heavy metals such as iron, lead, strontium, zinc, mercury, some clearly coming from human contamination, are present at medium levels. Chrome is the most important pollutant with concentrations which vary between 18 and and 561 ppm, according to the area of the lagoon.

Contamination from organochloride pesticides is reported to be "of signification", with higher concentrations registered towards the northern section of the lake.

In general, levels of contamination are higher in the northern sections of the lake, precisely where the most contaminating waters are brought by the channels in that area. (MMA, 2003b.)

Agrochemicals used for rice cultivation may contribute to the presence of high levels of nutrients in loams, although some have highlighted (Girona, *ibid*) that precisely because water

[34] See Peris Mora, E. "Caracterización de los Materiales de Fondo de la Albufera, evaluación del nivel de aterramiento y carga mineralogical de los materials, así como de la carga contaminante persistente resdidente en le lago". Dep. De Ingeniería, Universidad de Valencia. 1999. San Jaume et all. "Tasas de Sedimentación de la Albufera de Valencia" Cuad de Geogr., 51: 63-81, 1992. Monerris, M. "Modelación de la Calidad en Aguas Superficiales" Memoria de Tésis Doctoral. Universidad de Valencia1998.

eutrophication is very high –thus with high quantities of nutrients- the need for fertilizers – such as nitrogen- is very low since very high yields can be achieved in any case.

Regarding plague treatments, in particular the struggle against the Borer, although chemical treatments are used the administration and the CRAV are promoting the use of biological treatments with pheromones, which reduce the reproductive capacity of the Borers and result in no toxic hazard.

3.2.3. Landscape and Biodiversity[35].

Rice production is considered to render an environmental service to the community, as it contributes to several Community objectives defined in the frame work of its Rural Development Policy[36]. This is the reason for which rice farmers receive agri-environmental payments, in particular for their importance in the conservation of water, landscapes and biodiversity[37].

Despite the high level of human intervention, which is a characteristic linked to the production of rice, the Albufera may still be considered a wetland since it gathers enough environmental requisites in this sense.

By maintaining variable flood levels over a great part of the year, it allows soils to maintain optimal physical characteristics, permitting the regeneration of animal and vegetal communities. These same conditions favour the development of a nutrient base, necessary for the survival of different varieties of birds. For this reason, the Albufera wetlands are a Natural Park , are included since 1989 in the list of wetlands of international importance for water birds[38] and constitute a "Special Protection Area", or SPA[39] under EU laws.

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[35] Exceot when indicated, the main source of information for this section is the study "Relaciones entre Especies y Medioambiente de la Albufera" (MMA, 2003 h.)

[36] See the Council Decision on Community strategic guidelines for rural development (programming period 2007 to 2013): 2006/144/EC. OJEU, Nº L55/20,

[37] "To protect and enhance the EU's natural resources and landscapes in rural areas, the resources devoted to axis 2 should contribute to three EU-level priority areas: biodiversity and the preservation and development of high nature value farming and forestry systems and traditional agricultural landscapes; water; and climate change" (*ibid, p. 26)*..

[38] Following the criteria set out in the Ramsar Convention of 1971.

The avifauna of the Albufera is probably its most valuable biological resource. Around 330 different species have been cited in this region, and more than 90 nest regularly in this area. Among these, 7000 couples herons and more than 4.000 couples from the *Laridae* family – such as seagulls. It is thus the second most important reproduction site in Spain for birds, and one of the most important in Europe.

The Albufera, and the rice fields, are of greatest importance for birds in two periods of the year: during the winter and during reproduction periods.

An important part of European waterbirds, which reproduce in the northern parts of the continent, pass the winter season in southwestern European wetlands and other water habitats. In the particular case of the Valencia AC, it has become one of the most important wetlands, necessary for waterbirds survival.

In the water areas of Valencia, around 90.000 birds hibernate each year, more than half in the Albufera. The role of the rice fields is of great importance for this avifauna, since they provide a great source of food and contribute to add diversity to the landscapes for coming birds.

The maximum population of birds is achieved when the rice paddies are flooded, from October to January. From the moment rice fields are drained, the population descends gradually The explanation for this would be that the flooded fields provide both a diverse landscape and facilitates access to food to bird species that find their habitat in waters.

Then importance of the Albufera as an area of reproduction and nesting is however, somewhat reduced by the human intervention and activities in the area, in particular agriculture. Despite this, and due to the value added by the rice fields as a food provider, the Albufera attracts several birds such as the Black Wing Stilt, the *Chortilejo*, the Mallard, all of which nest in this area.

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[39] See 2.2.2. "Other Conservation Measures", *supra.*

3.3. Incidence of the PDO Arroz de Valencia on the Environmental Impacts of Rice Production in the Albufera.

Due to the limited percentage of lands dedicated to rice production of the Albufera wich are covered by the PDO (11%), and the volumes of production (8/9%) the incidence of PDO rules and agricultural and entrepreneurial actions in terms of impacts on the whole Albufera region is not of significant relevance. The importance of the PDO must rather be viewed from the perspective of its contribution and potential for the improvement of the profitability of an environmentally essential activity for the region.

4. Rice Supply

4.1. Introduction.

Until the entry of Spain in the EU (1986) rice farming was a strictly controlled, authorized and limited in particular "reservoirs", mainly wetlands such as the Albufera, the Marismas del Guadalquivir, la Vega de Guadiana or Delta del Ebro. .

The entry to the EU brought liberalization to the sector, bringing it to successfully compete with other agricultural activities with resulting expansion the agricultural area dedicated to rice, aided by the EU aids in the frame of the CMO. Since 1995 these aids are granted on the basis of a direct payments, based on a determined surface measure which is allocated to each country of the EU. The basic surface for Spain is of 104.973 Ha., although the real surface of cultivation is between 15% and 20% over that area.

Today Spain is a modest rice producer and consumer, if considered from the global market perspective. However, the Spanish rice sector is a world reference from different point of views, such as its productivity –with average yields between 6,270 and 8,293 TN per HA[40], depending on the type of rice- close to the worlds highest averages- and the quality of it's products.

[40] Data corresponding to year 2003. Source: MAPA.

This last trait –quality- has been an axis for the rice sector in Valencia, which has always produced *Japonica* round rice varieties directed towards traditional consumer markets. This orientation towards quality is backed by initiatives which search to move production towards higher ends of the market, such as the recuperation of varieties which are highly appreciated for tyipical gastronomy-gourmet,consumers such as the *Bomba* variety, and an effort towards guaranteeing traceability and quality. The motivation of the existence and activities of the PDO *Arroz de Valencia* must be observed under this prism.

4.2. Production.

4.2.1. Valencian Rice in the Context of World, EU and National Production.

Despite of its importance as a part of component of the local diet –in Western European terms[41]- , the significance of Spain as a world producer and consumer is quite reduced, representing less than one percent of the global output, as may be observed in the following table.

Table 2: Rice production

World and EU	Area	Production	Part in World Prod.	Trade	
				Imports	Exports
	000 Ha	000 TN		000 TN	000 TN
World	**153.766**	**598.852**	**100%**	**1.718**	**1.532**
EU	402	2.534	**0,42%**	200	52
Italy	221	1.300	0,22%	84	11
Spain	**117**	**818**	**0,14%**	**62**	**8**
Greece	23	180	0,03%	1	–
Portugal	24	149	0,02%	29	–
France	19	107	0,02%	7	30
Rest of EU	0	0	0,00%	13	2

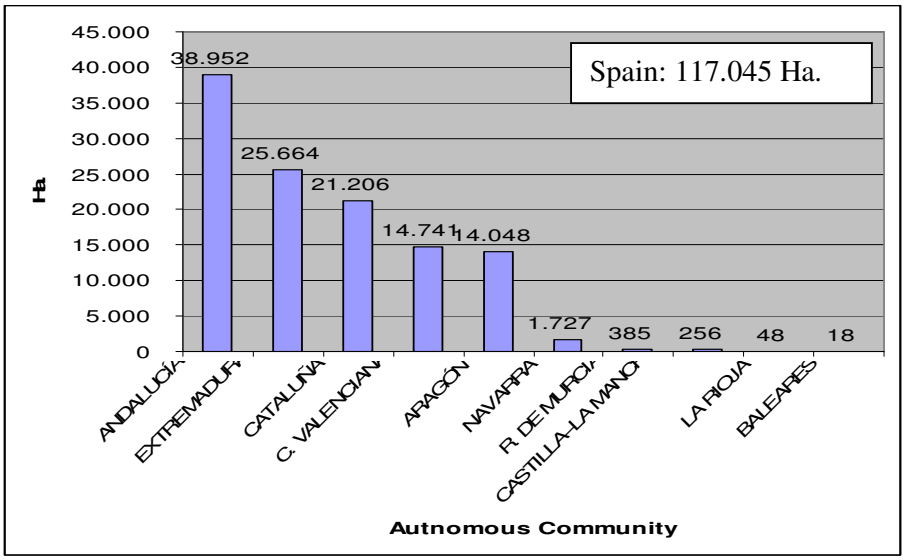
Source: CCAE (2005).

[41] Spain is a rather high consumer (more than 6 kg. per cápita) if compared to other western countries, most of which tend to consume less than 10 kg. pp each year. However, Sub-tropic develloping country and Asian "models" of consumption show much higher rates (between 30 and 60 kg, in the first case and over 80 kg. in the second. For more information on rice consumtion, see UNCTAD *Info Comm.* Market Information in the Commodities Area. Rice. http://www.unctad.org/infocomm/anglais/indexen.htm

Low levels of production -measured in global terms[42]- and the fact that the production and consumption pattern of Spain, and in particular of the Valencian region, have traditionally followed a pattern which is different to the global distribution of varieties produced and consumed[43] make it necessary to understand Valencian rice production in terms of it's importance for local markets.

Once the most important rice producer in Spain, the weight of the Valencia region as a rice producer has diminished greatly over the years. Today, as seen in the following figure, it is the fourth ranked Autonomous Community (AC) of Spain with a participation of 13% in the total area employed in rice production.

Chart 1: Total Rice Production in Spanish Regions: Surface Employed (Ha.)



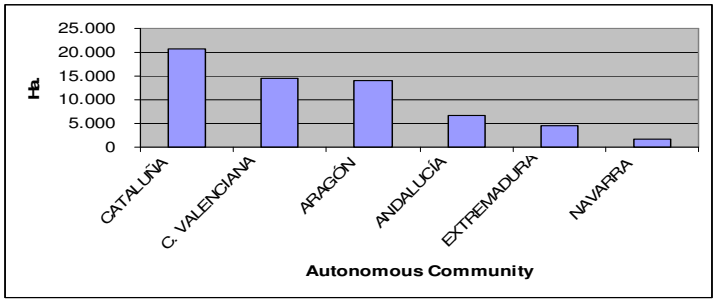
Source: MAPA.

It remains, however, the second largest producer of medium and short grain rice kernels. As mentioned previously, practically all of the area of the Valencia AC is employed in producing Japonica varieties, with more than 95% located on the Albufera wetlands.

[42] Spain is, notwithstanding, the EUs second most important producer (following Italy).

[43] Valencia traditionally has been *Japonica* or short and medium length grain kernels producer and consumer, while globally long grain kernel or *Indica* varieties dominate global markets.

Chart 2: Medium + Short Grain Rice Production (Japonica) in Spanish Regions: Surface Employed (Ha.)

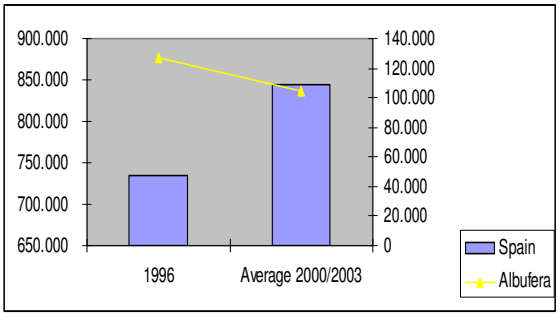


Source: MAPA.

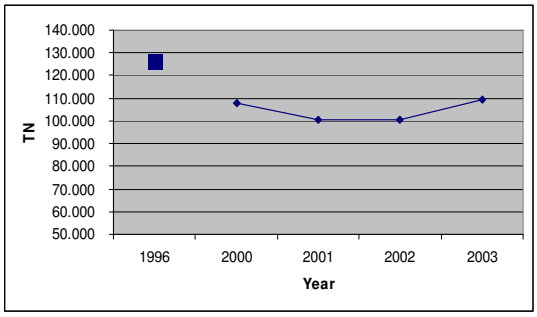
In terms of quantities, the Albufera region has produced an average of 104.300 TN, slightly less than one fourth of the total Spanish production as measured between 2000 and 2003. In relation to the evolution of the quantities produced, there has been a reduction in the past few years, contrary to the general Spanish trend showing an increment in production (Chart 3).

However, as seen further on in Chart 4, the quantities produced in the Albufera show greater stability if observed over a period of the first four years of this decade.

Ch 3: Rice Production (Albufera and Spain). 1996/Av. 2000-2003



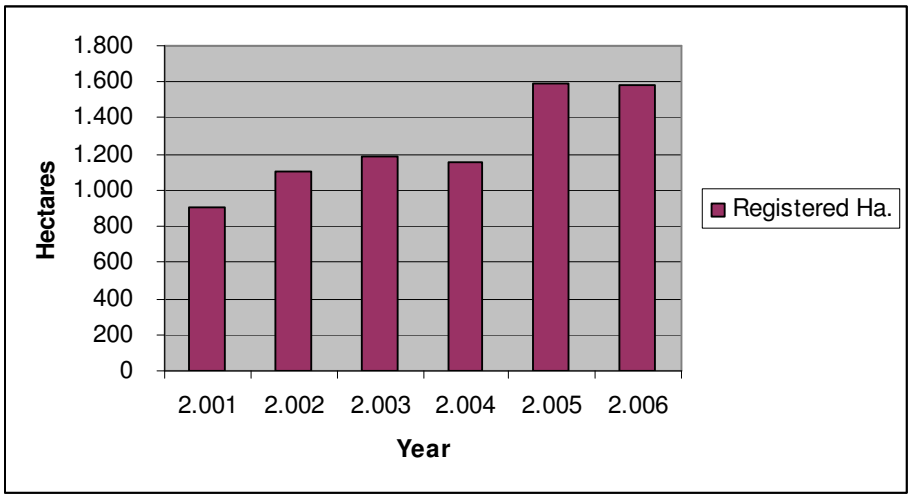
Ch 4: Rice Production of the Albufera. 2000/2003



4.2.2. PDO Arroz de Valencia Production Area and Output.

Regarding rice production bearing the PDO label, it must be observed that the surface area qualified for producing designated *Arroz de Valencia* varied between 900 and 1200 Ha. from 2001 to 2004. In 2005 there was a sharp increase reaching over 1500 Ha. The increment of *Bomba* variety was largely responsible for this increment, which was maintained in 2006.

Chart 5: Surface Area Employed for the Production of PDO *Arroz de Valencia.*



Source: CRAV

It must be pointed out that despite that three varieties are mentioned in the PDO specifications[44] code as susceptible of bearing the PDO label, in the past few years only rice of the *Senia* and *Bomba* categories have been produced. Although *Senia* has predominated, it must note that *Bomba* varieties are receiving more attention, due to the higher demand for consumption and higher prices to be perceived for their commercialization.

Table 3: Production of PDO *Arroz de Valencia.*
Protected Rice –Husked and White Rice-.

Campaign	Variety	TN.
2003/2004	*Senia*	3.447
	Bomba	311
	Total	**3.758**
2004/2005	*Senia*	3.821
	Bomba	703
	Total	**4.523**

Despite this growth, it seems very important to highlight that a very small part of the production of the Albufera (estimated- between 7 and 9%[45] after converting white and brown rice volumes to rough rice equivalents) corresponds to certified *Arroz de Valencia* PDO rice. Due to the increment in the lands qualified for PDO production in 2005 and 2006, it is possible that PDO production volumes could rise in the following years. However, this possibility is highly dependant on consumer demand for a product bearing this kind of certification and will be determined –more than by

[44] These are Bomba, Bahía and Senia (see 1.1. *supra*).

[45] This is so after converting white and brown rice volumes showed in Table to rough rice equivalents.

the quantities produced at the primary level- by the interest shown at latter supply chain stages, in particular by larger processing industries, to allocate larger portions of rice supply to PDO labelled products.

5. Price Premiums and Profitability.

5.1. Price Premiums.

At the farmer level, prices per kilogramme of round paddy rice tend to be similar, among different varieties produced in the Albufera, except for *Bomba* rice which may reach a superior value.

In the following table, corresponding to the 2004/2005 campaign, we observe that while prices of most round rice varieties, including *Senia* and *Bahía* rice susceptible receiving PDO protection are of around 0,24 Euros per Kilogramme, *Bomba* rice is sold at price which is almost three times above these figures, reflecting good demand rates for this product.

Variety	Price per Kg. (in Euros)
Senia	0,24
Bahía	0,24
Fonsa	0,23
Montsianell	0,24
Bomba	0,66

Source: Unió des Llauradors, Valencia.

At this level, price premiums perceived by farmers for a PDO qualified product are difficult to calculate, as they differ according to the general conditions of the transaction with industries. In cases where transactions occur with industries that have build a strategy including the PDO, and thus buy and sell Arroz de Valencia on a regular basis, premiums may amount to as much as 3% of normal price[46]. But, as reported (Interviews with Santos Ruiz, 2005 and 2006), price premiums may adopt "non-monetary" form and may not be quantifiable in the early

[46] Source: Interview with representative of DACSA, July 2006.

stages of the production chain, depending on the nature of the transaction[47]. In any case, the certification of DOP rice may be useful for producers (farmers and industries) that have opted for permanent strategies seeking diversification through the qualification that the PDO label gives.[48]

At the end of the supply chain, price premiums find higher levels. In supermarkets, consumers may pay up to 66% more for a kg. of round rice of the same trademark, if bearing the PDO label. In the case of "Arroz de Valencia", sold by the same supermarket under a white-label, a Kg. of rice may cost up to 45% more than well sold brands of round rice.

5.2. Profitability (Costs and Income):

According to different studies by farmer and cooperative associations[49], rice farming in the Albufera is not a lucrative activity, if not for the payments received in virtue of Rice CMO and the agri-environmental aids (see 2.4. *supra*).

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[47] For example, PDO certification may serve to ensure sales of the product in advance (Interview with Santos Ruiz, 2006).

[48] This is, for instance, the case of DACSA, the commercial brand of Maizeras Españolas, which sales to the Valencian region are 100% of the protected designation of origin. (Interview with industry representatives, 2006).

[49] Cost structures received from *Unió de Llauradors and Ramaders* (2006) and FECOAV (2004).

As may be seen in the table below, based on information from FECOAV (the Agriculture Cooperative Federation of Valencia) the production of the Senia rice variety results in losses of more than 450 Euros/Ha. and it is only after compensations received from subsidies that the profitability for the farmer appears (1037 Euros).

Table 4: Rice farm: Balance Sheet for 1 Hectare.

Concept	€/Ha
Costs	
1.- Preparation of the field.	*318,25 €*
2. Fertilization	*332,23 €*
3.- Sowing and complementary activities	*208,95 €*
4.- Plant health and sanitary activities.	*556,31 €*
5.- Harvest	*435,97 €*
6.- Taxes, Insurance, Plagues, Mortages.	*334,30 €*
A. Total Costs	***2.178,88 €***
B. Income (7200 kg. per Ha. at 0,24 Eur./kg.)	***1.728,00 €***
C. Profit without subsidies (B-A)	***- 450,88 €***
D. Subsidy payments (PAC + Agroenvironmental Subs.)	***1.487,00 €***
E. Total Income (B+D)	***3.215,00 €***
F. Final profits (E-C)	***1.037,00 €***

Source: Based on information of FECOAV.

In a second table presenting costs, from a different source, the structure takes into account seven different types of farms. As a difference with the previous table, we point out that while the previous model was for *Senia* rice, this one is constructed upon the weighted averages of the production of all varieties grown in the Albufera. Also, it considers a higher income per hectare than the table above and incorporates opportunity costs[50] to the profit calculus.

Due to this last fact, we see that the losses, without subsidies, appear to be greater, ranging between 1025 and 1680 Euros. Final profits, after the reception of the subsidy, appear to be modest but reasonable for all types of farms excepting those which do not contract external resources for the harvest period (categories 4 and 5). If one considers that the average farm surface is below 4 hectares, we see that the income per farmer (taking costs of opportunity into account) is moderate.

[50] Opportunity costs include losses related to the labour of the members of the household, land rent and investment (Unió de Llauradors, 2006).

Table 5: Rice farm: Costs and Income per Hectare, for different categories of productive units.							
	In Euros/Ha.						
Type of Productive Unit	**1**	**2**	**3**	**4**	**5**	**6**	**7**
*A. Income. (Price*productivity; weighted average for all varieties).*	*2009*	*2009*	*2009*	*2009*	*2009*	*2009*	*2009*
B. Subsidy payments (PAC + Agroenvironmental Subs.)	*1454*	*1454*	*1454*	*1454*	*1454*	*1454*	*1454*
C. Costs (excluding costs of opportunity).	*2090*	*2155*	*2406*	*2377*	*2459*	*2244*	*2400*
D. Total Costs	*3034*	*3239*	*3152*	*3651*	*3415*	*3312*	*3089*
E. Profits, without subsidies. (A-D)	*-1025*	*-1230*	*-1143*	*-1642*	*-1406*	*-1303*	*-1080*
F. Final Profits , excluding costs of opportunity (A+B-C).	***1373***	***1308***	***1057***	***1086***	***1004***	***1219***	***1063***
G. Final Profits (A+B-D)	***429***	***224***	***311***	***-188***	***48***	***151***	***374***

Source: Based on Information provided by *Unió de Llauradors*.

Productive Units (Categories)

1. Small farms/Scarcely specialized.
2. Small farms/Specialized.
3. Small farms under renting.
4. Small farms with do not use external means for harvest (tractors, external mechanical means).
5. Medium farms with do not use external means for harvest (tractors, external mechanical means).
6. Medium farms which are not specialized.

6. Supply Chain and Market.

Rice is a commodity which may undergo several industrial processes before it is rendered to the public as a marketable product. Paddy –or rough- rice is not edible. Certain processes must take place to make it appropriate for human consumption, at the minimum the removal of the outer hull. Depending on the type of rice wanted -whether brown husk rice or white rice- the process may continue. White rice will still require the removal of the bran layers and germ and milling and polishing. And in addition to this, there is packing and transport.

Producing marketable rice, therefore, implies the existence of an industry which normally controls the latter phases of the production chain and is strategically better seated to influence final prices.

The level of integration in this activity is normally very low in Spain, varying from region to region. Primary production is atomized, and rice-farmers are commonly organized into cooperatives to maximise scale advantages in stocking and to achieve greater commercial volumes in order to achieve better standing positions in commercial bargaining processes. In some parts of Spain cooperatives have merged to achieved greater levels of integration into the processing industries, as is the case in Cataluña. In this region around 80% of the production is controlled by cooperatives Montsiá and Arrosaires, both with industrial capacities.

In Valencia, the 2,740 farmers group into 12 cooperatives which stock the merchandise before selling it to the industry. Integration in this case is inexistent. The cooperative structure, which seeks to achieve greater concentration and increase bidding positions for farmers, is highly dissipated by the concentration of commercial agents at latter stages of the supply chain. This situation is not exclusive of the Valencia region, but is common to the rice sector in Spain in general although, as previously observed, in some regions cooperative structures have achieved more integration into industrial processes and final commercial operations (CCAE, 2005).

The position of farmers has not been aided by the irruption of big-surface retailers (according to sources such as CRAV more than 4/5 of sales end up being sold in supermarkets). The supply chain is therefore characterized by a situation where larger reaps are logically controlled by the very few commercial agents which are at the stages of the supply chain which are closer to the consumer.

In those regions where primary production is cut out of the latter processing and commercial phases, as happens in Valencia, this situation may have as a consequence that efforts by farmers to increase product and production process quality, for example, by certifying increased traceability, implementing integrated or other environmentally appropriate systems, etc. – may not be reflected directly in correspondent price premiums or revenues (*ibid*: see conclusions).

Sometimes the certification of DOP rice may bring an extra revenue for producers, in particular in transactions between cooperatives and industries that have opted for permanent

strategies seeking diversification through the qualification that the PDO label gives.[51] In this case, the PDO framework may play a significant important role in the coordination of economic relations among actors. Other times, the transactions between different levels of the supply chain take form of spot market operations: in such a case the extra-value added by PDO certification is not easy to quantify, may vary in between operations and become "part of the bargain" with the industry, which may include guarantees or commitments to buy predetermined volumes at current prices (Interview DOP). Even at latter supply-chain stages –in particular when seeking an outlet in supermarkets- premiums dissolve in transactions where, for example, the DOP label becomes part of the "price" a product pays to obtain space in gondola shelving. In contrast, as previously shown, the consumer may pay up to as much as 66% as a premium for the guarantee of origin and quality that the PDO offers[52].

7. Marketing Strategies and Consumer Perception of the PDO.

7.1. Marketing Channels of the PDO Arroz de Valencia.

Most of the production is sold in supermarkets of the Autonomous Community of Valencia. Minor fractions are sold to restaurants, a sector towards which the CRAV concentrates efforts in promotion (see figure on the right)

7.2. Relation with Trademarks.

There are six rice trademarks which are registered in the CRAV and which sell PDO Arroz de Valencia, among other types of rice. Among the most important of these we find DACSA, La Fallera and Sto. Tomás. An important presence of white-labels has been detected in several supermarkets, including presence among "local specialties" white brands, such as

[51] This is, for instance, the case of DACSA, the commercial brand of Maizeras Españolas, which sales to the Valencian region are 100% of the protected designation of origin. Even in these cases, price premiums for farmers do not exceed 2% or 3% of current prices (Interview with industry representative from DACSA, 2006).

[52] Based on the prices of a mix of brands (La Fallera, Sto. Tomás and white brands of Carrefour, Caprabo, Eorski and Mercadona (prices for sales over internet, Alicante region).

“Productos de Nuestra Tierra” of the Carrefour chain, which concentrate on the sales of PDO and other origin products.

Trademarks traditionally have served consumers as a reference for their purchase. Differentiation through origin (PDOs) is relatively recent. The main strategy of producers and the CRAV seem to tie the image of the product to local culinary tradition (Paella and other rice dishes). For example, the package of the PDO rice of an important brand “La Fallera” indicates that such rice is “Special for Paella”. The CRAV, as indicated, tends to lend importance to promotions in gourmet circuits and restaurants. This strategy seems to seek to ensure a market segment in face of the rapid growth of consumption of long-grain varieties.

8. Stakeholders

- Consejo Regulador ‘Arroz de Valencia’ **http://www.arrozdevalencia.org/**
- IVIA: InstitutoValenciano de Investigaciones Agrarias, Rice Department: Carretera Moncada - Náquera, Km. 4,5, Apartado Oficial, 46113 Moncada (Valencia)
- Instituto Valenciano de Calidad Agroalimentaria: Polo de Bernabé, 8, 46010 Valencia, 00 34 963 184 130 (Servicio de Control de Calidad, instituto_calidad@gva.es

- Delta-Med: Assotiation formed by representatives of the "Albufera de Valencia", the Estuary of Guadalquivir and the Deltas of the Ebro, Po, Rhône, Donau, Evros and the Nile: iate@iate.es
- Centro de Acuicultura Experimental: cae@mediterranea.org
- Farmers
- Arroz de Valencia Rice processing enterprises (see **http://www.arrozdevalencia.org/**).
- FECOAV

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- Background Information and History

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- Images:

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Promotion campaign in Supermarket.

2. Interview with Ricardo Ciscar, Vice-President CRAV and President of DACSA (July 2006)
3. Interview with Francisco Girona, FECOAV, (July, 2006)