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Rice production and research in Spain

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Résumé. En Espagne, la zone de riziculture oscille entre 54 527 ha (1995) et 104 900 ha (1996). Cette différence s'explique par une pénurie d'eau en Andalousie et en Estrémadure. Il existe plusieurs zones de riziculture, avec des problèmes différents et des préférences commerciales spécifiques. Le riz à grain long est destiné à l'exportation et le riz demi-long à la consommation intérieure. Le rendement national moyen est d'environ 6 t/ha, mais en Andalousie et dans la région de Valence il dépasse les 7 t/ha. Il existe une station de sélection principale dont les variétés sont largement utilisées. Certaines variétés californiennes et italiennes connaissent également une grande diffusion, notamment le type Thaibonnet (L.202). D'autres domaines de recherche sont la lutte contre le foreur des tiges et le riz rouge, la fumure, la pollution de l'eau, etc. La recherche relève principalement de centres officiels et la création d'un Réseau national de recherche sur le riz, pour établir un lien entre les travaux des chercheurs opérant au sein de nombreuses institutions différentes, s'avère nécessaire.

Abstract. The surface area for rice cultivation in Spain varied between 54 527 ha (1995) and 104 900 ha (1996). This difference was caused by water shortage in the areas of Andalusia and Extremadura. There are several rice areas with different problems and market preferences. Long grain is cultivated for export and medium grain for internal consumption. Average national yield is about 6 t/ha but in Andalusia and Valencia it is over 7 t/ha. There is a main breeding station whose varieties are widely cultivated. Some Californian and Italian varieties are also important, particularly Thaibonnet (L202). Other themes of research are stem borer control, red rice control, fertilization, water pollution, etc. Research is carried out mainly at official centres and it is necessary to create a National Rice Research Network to link the efforts of researchers belonging to many different institutions.

The total land area in Spain is 504,795 km², the cultivable area is 196,566 km² and the rice area can oscillate between 54,527 ha (1995) and 104,900 ha (estimated for 1966). These changes in the total rice area are caused by shortage of water in the areas of Andalucía and Extremadura.

Rice in Spain is cultivated in nine *autonomías*, as are called the main administrative divisions, but only in six of them rice reaches the 1500 ha level. These rice areas are geographically separated with different problems and different local market preferences.

Andalucía, in the south of Spain, is, when there is enough water supply, the biggest rice area with 35,000 ha cultivated in the province of Sevilla, and 1000 ha more in Cadiz. However, in a year with severe water shortage the rice area can drop under 2,000 ha.

Thaibonnet is the leading variety in Andalucía. It was originated in California where it is known as L202, and belongs to the commercial "indica type" that is basically exported.

Extremadura, in the south-west of Spain, also suffers from water shortage. In a good year, rice reaches 18,000 ha but in a bad year this can be reduced to less than 1,000 ha. Leading varieties are Thainato and Thaiparla which are medium grain varieties of Californian origin along with the long grain Thaibonnet.

Cataluña, in the north-east, has 22,000 ha of rice, mostly in the Delta of the Ebro river. This zone has plenty of water and the leading varieties are Senia, Tebre, and Bahía. These varieties are medium grain and come from the breeding work of the *Departamento del Arroz* (IVIA) located at Sueca (Valencia).

The *Comunidad Valenciana*, in the East, has nearly 16,000 ha of rice. Water supply can be problematic in dry years. Leading varieties are Senia and Leda, medium grain varieties obtained by the IVIA.

Aragón, with 12,500 ha and Navarra with 1,600 ha of rice, are colder regions needing varieties shorter in cycle than the varieties cultivated in the other regions. In Aragón, Balilla x Sollana (also an IVIA obtention), and Lido are the preferred varieties, and in Navarra Lido is the leading variety complemented with other Italian varieties.

The Spanish total rice area is limited to 104,973 ha by the common market organization of the EU. Water availability will be the main determining factor of the surface cultivated each year.

I – Constraints

The water problem has been described previously. In Andalucía, water shortage implies the additional problem of salinity of the water. Salinity is also a problem in the Ebro river zone. This area also suffers from strong NW winds.

Main diseases are caused by *Pyricularia Oryzae* and *Helminthosporium spp.* The stem borer, *Chilo suppressalis*, is the main insect problem in several zones, as Valencia and Delta del Ebro, while in Andalucía the main problems are caused by the pentatomid *Eusarcoris incospicuus* and by chironomids. *Echinochloa spp.* and *Cyperaceae* are the more important weeds and red rice is an important general problem.

II – Internal market preferences

There is a tradition favouring medium wide grain with central pearl. Bomba is an old variety considered the best one for traditional dishes as *paella*. This variety is tall and not very productive and is cultivated, in limited extension, only owing to the very high price paid for it.

The typical Spanish variety is actually Senia that superseded Bahía specially because of its better lodging resistance.

There is also a market for medium translucent grain, as Lido or Thainato, but the long grain, indica type, is basically for export. Parboiled rice is also of limited importance in the domestic market.

III – Rice Research

Agricultural research in Spain is developed by scientists belonging to official research centres and universities and is mostly financed through national contests where proposals are evaluated and eventually approved as projects lasting three or four years. Many research centres are administratively attached to the *Autonomía* where they are located, while the institutions ruling the assignation of funds are national.

The *Instituto Nacional de Investigaciones Agrarias* (INIA) belongs to the *Ministerio de Agricultura, Pesca y Alimentación* and rules the agricultural research financed by this ministry.

The *Ministerio de Educación y Ciencia* has another important call for research projects covering not only agricultural themes but many other scientific areas.

The local autonomic administration also finances agricultural research of regional interest to complement the national projects.

Additionally, Spanish researchers participate in projects financed by the European Union in co-operation with other European countries.

□ **Instituto Valenciano de Investigaciones Agrarias (IVIA).** The *Departamento del Arroz* is an IVIA department exclusively dedicated to rice research. Breeding experiments for nearly 80 years have allowed to obtain varieties that are extensively cultivated, e.g., Bahia, Senia, Tebre, Leda, Balilla x Sollana, etc. Some of them have been adopted in other countries. For instance, Bahía is cultivated as Padano in Italy and Sequial as Ispaniki in Greece. Actually the department works, besides breeding, in nitrogen fertilization. Breeding targets include long and medium grain, lodging resistance, cooking quality, and milling quality. Three researchers in the Department are working mainly on two national projects and one on a European project. Other IVIA departments occasionally work on rice, specially on weed control and water pollution. (Departamento del Arroz, Ronda del País Valenciano 42, 46410 Sueca, Valencia).

□ **Institut de Recerca i Tecnologia Agroalimentaries (IRTA).** This is the Agricultural Research Institute of Cataluña and has in Amposta (Tarragona) the *Estació Experimental del Ebro* working on rice but not exclusively. One researcher works specially in red rice control, and also co-operates in breeding with IVIA. They participate in two European projects on rice and have worked out a puddling method for controlling red rice without environmental impact (Estació Experimental de l'Ebre, Ctra Balada s/n, P.O. Box 203, 43870 Amposta, Tarragona).

The *Departamento de Genética Vegetal* del IRTA, located in Cabrils (Barcelona), works in stem borer resistance.

□ **Dirección General de Investigación Agraria de Andalucía.** The *Centro de Investigación y Formación Agraria* (CIFA) «Las Torres y Tomejil» has a department working on rice, especially on varieties, fertilization and irrigation. Economic studies are also carried out in this centre. There are four researchers working partially on rice (CIFA Las Torres, Apartado Oficial, 41200 Alcalá del Rio, Sevilla).

□ **Instituto Técnico y de Gestión Agrícola (ITGA).** In Navarra, ITGA works partially on rice. Main themes are nitrogen fertilization, weeds and red rice control, methods against stem borer, and studies on the physiology of growing (ITGA, Sadar s/n, Edif. El Sario -3ª planta, 31006 Pamplona).

□ **Plant protection services.** In the different *autonomías* there are the *Servicios de Protección de Vegetales*. Some interesting research work on stem borer and other pests are developed by technicians working in these services, for instance in Valencia and Amposta. They also carry out the general treatments of pest control in the zone.

□ **Universities.** Experts in biotechnology work partially on rice in the universities of Madrid, Barcelona and Valencia. In the universities located in Valencia, there are researchers working on various problems such as pollution, stem borer biology, weeds control, etc. At Lérida University there are occasional studies on rice. Studies on the economics of rice has been realized in the universities of Madrid and Córdoba.

□ **Instituto de Agroquímica y Tecnología Alimentos (IATA).** This centre, located in Valencia, belongs to the *Consejo Superior de Investigaciones Científicas*. Actually, rice is not one of the main research topics, but this institute has a well-equipped laboratory for quality studies and researchers with expert knowledge of this matter.

IV – Rice research coordination

In Spain, there is no rice network or any other system allowing coordination among the rice researchers belonging to diverse institutions, often located in different and distant *autonomías*. Partnership in common projects, national or European, is consequently the more efficient framework for assuring the necessary cooperation between researchers.

Table 1. Spain: Area and yield per region, 1995

Regions	Rice area (ha)	Yield (t)	Average (kg/ha)	Rice area (1996)
Andalucia	1,641	12,500	7,617	35,000
Cataluna	22,382	117,400	5,245	22,300
Extremadura	220	1,200	5,455	17,500
C. Valenciana	15,625	114,400	7,322	15,600
Aragon	12,644	71,100	5,623	12,600
Navarra	1,582	8,800	5,563	1,600
Others	430	2,000	4,651	390
Total	54,524	327,400	6,005	104,990

The 1995 data are provisional; the area for 1996 is the expected area.

Table 2. Rice in Spain

Year	Rice area (000 ha)	Production (000 t)	Price for farmers (pta/kg)	Import (000 t)*	Export (000 t)*	Consumption (kg per capita)**
1981	69.0	444.0	26.0	0.1	69.5	
1982	67.6	401.9	28.6	49.4	61.3	
1983	40.8	224.0	35.3	38.6	33.2	
1984	73.0	440.4	40.5	79.7	44.8	
1985	74.6	462.3	37.6	23.3	105.3	
1986	79.7	503.8	35.9	25.4	69.5	
1987	78.2	493.3	41.0	80.1	157.4	8.75
1988	81.4	514.5	45.0	66.3	126.3	6.93
1989	59.9	349.6	45.3	119.4	186.3	6.69
1990	90.3	569.9	42.6	181.5	184.7	5.70
1991	93.7	581.8	42.0	78.2	210.8	5.68
1992	85.7	552.6	44.0	66.9	196.4	5.63
1993	47.9	317.8	53.3	140.5	162.0	6.12
1994	66.3	407.6	63.5	177.7	103.1	6.26
1995	54.5	327.4	n.a.	n.a.	n.a.	5.68

* Milled rice equivalent ; ** Calculated from rice bought by families, restaurants and institutions.