Background information on the current state of GM agriculture in Spain and Catalonia

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a) Current state of the transgenic agriculture in Spain and Catalonia

Spain is the only state in the European Union that has allowed the cultivation of GM varieties –maize- at a commercial scale since 1998. The actual surface cultivated with GM maize has been reported in 32.000 ha, which could represent around 300.000 tonnes of maize per year. actualitzar

Genetic modified crops have been planted in Spain since 1998, when the Order 7052 of 23rd March was approved. This Order of the Ministry of Agriculture allowed the inscription in the Commercial Varieties' Register of the two first GM maize's varieties with the modification Bt-176: Compa CB and Jordi CB, both of the company Ciba Geigy, nowadays Syngenta. However, the variety Jordi CB was never commercialised (Alcalde, 2003).

In 2003 a new legislation was approved (Order APA/520/2003 of the 27th February) allowing the inscription in the Commercial Varieties' Register, and consequently the cultivation, of a third Bt-176 variety called Brama and a new GM trait, the one called Mon 810, patented by Monsanto. Finally, a third Order (APA/314/2004), approved the inscription of two additional Bt-176 varieties and seven of Mon 810 (see Table 1).

Table 1: Transgenic varieties inscribed in the Spanish Commercial Varieties' Register

Ministerial Order for approval	Variety	Event	Applicant company
Order 7052 of 23rd March 1998	Compa CB	Bt-176	Ciba Geigy (Syngenta)
	Jordi CB	Bt-176	Ciba Geigy (Syngenta)
Order APA/520/2003 of 27th February	Brama	Bt-176	Syngenta
	Aliacan Bt	Mon 810	Limagrain
	Aristis Bt	Mon 810	Nickerson Sur (Limagrain)
	DKC6575	Mon 810	Dekalb (Monsanto)
	PR33P67	Mon 810	Pioneer (DuPont)
Order APA/314/2004 of 4th February	Sansone Bt	Bt-176	Procase
	Escobar	Bt-176	Syngenta
	Campero	Mon 810	Advanta
	Cuartal Bt	Mon 810	Arlesa
	DKC 6550	Mon 810	Dekalb (Monsanto)
	Gambier Bt	Mon 810	Nickerson Sur (Limagrain)
	Jaral	Mon 810	Semillas Fitó
	PR 32 P 76	Mon 810	Pioneer (DuPont)
	Protect	Mon 810	Koipesol

Regarding the number of cultivated hectares in Spain, the only available data have been supplied by the companies selling the seeds[1]. According to this data, it can be estimated that the total cultivated area with GM crops in Spain the last year was around 32.000 ha (see Table 2 and Table 3).

Table 2: Number of GM seed doses* of Compa CB sold in Spain between 1998 and 2003.

Community	1998	1999	2000	2001	2002	2003
Andalucía	1.34	4.750	2.617	763	2.733	2.906
Aragón	19.641	12.435	13.727	7.255	14.113	14.819
Asturias	N.a.	N.a.	N.a.	N.a.	N.a.	10
Balears	4	3	45	N.a.	45	11
Castilla la Mancha	7.773	5.580	4.501	1.483	6.376	12.336
Castilla y León	360	612	2.000	N.a.	N.a.	125
Catalonia	**2.909**	**5.156**	**7.742**	**5.550**	**8.131**	**7.044**
Comunitat Valenciana	334	534	245	182	27	123
Extremadura	1.694	2.357	4.382	1.048	2.286	2984
La Rioja	43	55	58	N.a.	N.a.	N.a.
Madrid	1.124	10.649	10.152	3.296	1.197	1.721
Murcia	N.a.	1	N.a.	N.a.	N.a.	N.a.
Navarra	2.990	502	370	140	779	2.266
Total Spain	**36.872**	**42.634**	**45.839**	**19.717**	**35.687**	**44.345**
Hectares^	**21.689**	**25.079**	**26.964**	**11.598**	**20.992**	**26.085**

* A dose is equivalent to 50.000 seeds.

N.a.: not available data.

^ As a estimation, it was considered that 1,7 doses are planted per ha.

Source: Greenpeace (2004) from the data received from the Ministry of Agriculture in February 2004: Sales of seeds for the years 1998, 1999, 2000, 2001, 2002 and 2003. Secretary of Agriculture and Alimentation. Spanish Office of Vegetal Varieties, Ministry of Agriculture, Fisheries and Alimentation.

Concerning the more recently approved varieties, data are only available for four of them for the year 2003.

Table 3: Number of GM seed doses* of the varieties DKC6575, Aristis, Aliacan Bt and PR33P67 in Spain, 2003.

Community	DKC6575	Aristis	Aliacan Bt	PR33P67
Andalucía	1	2	N.a.	605
Aragón	20,2	115	10	6.442
Castilla la Mancha	15	75	3	630
Catalonia	**18**	**2**	**2**	**2.164**
Extremadura	5	4	3	233
Madrid	3	1	N.a.	32
Navarra	8	76	2	5
Total Spain	**80**	**275**	**20**	**19.717**
Hectares^	**47**	**161**	**12**	**5.948**

* A dose is equivalent to 50.000 seeds.

N.a.: not available data.

^ As a estimation, it was considered that 1,7 doses are planted per ha.

[1] Greenpeace has claimed that after multiple years asking for this information to the Ministry of Agriculture, it only remitted to the non-governmental organisation the same data that the industry provided, without any verification. Moreover, the number of ha were not given but the amount of sold seeds (Greenpeace, 2004).

Source: Greenpeace (2004) from the data received from the Ministry of Agriculture in February 2004: Sales of seeds for the years 1998, 1999, 2000, 2001, 2002 and 2003. Secretary of Agriculture and Alimentation. Spanish Office of Vegetal Varieties, Ministry of Agriculture, Fisheries and Alimentation.

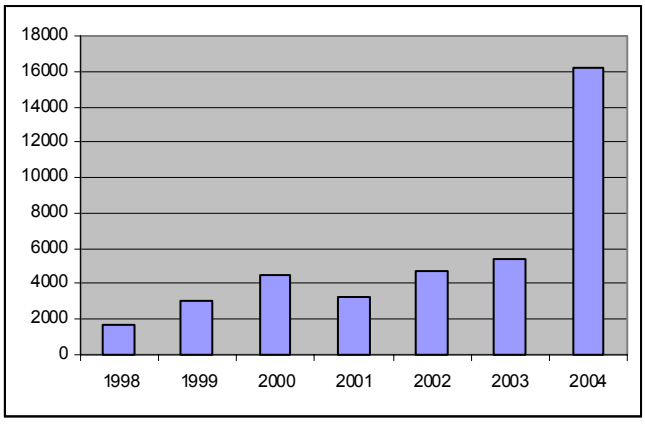
The sales of GM seeds, totally dominated by Syngenta and Pioneer, only reinforce the actual trend of the total seed market in Spain, as these companies concentrate the 70% of the total conventional market (Brookes, 2002).

Besides the internal production of GM crops, Spain is also importing GM maize. The EU production of maize is slightly below self-sufficiency; imports of maize contribute between 4 to 8% of the total consumed amount. This quantity belongs to strictly the WTO tariff quotas agreed for 2 million of tones to be imported to Spain and 0.5 million of tones to Portugal (Eurostat, 2003). In 2000, 92% of the imports came from Argentina, while the most of the rest was imported from USA. In the both countries GM maize plays an important and growing role (26% and 40% of the maize grown in 2003 in USA and Argentina respectively was GM) and for this reason, imports can be presumed as an important source of contamination.

Catalonia

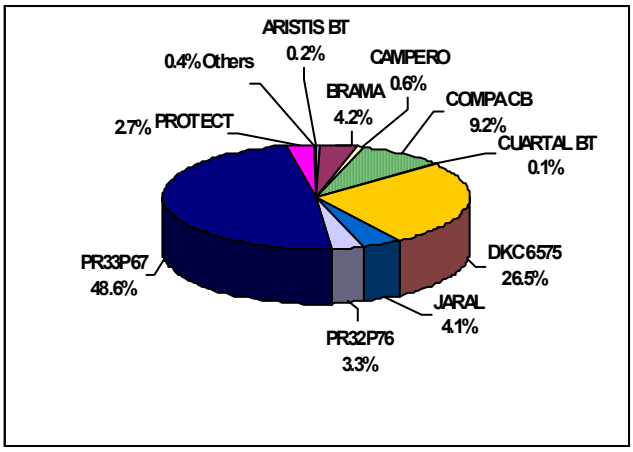
Catalonia has turned into one of the areas where more planted GM crops, specially since the last campaign, in which the cultivated surface tripled in respect to the previous year (see Figure 1) (Serra and Salvia, 2004). Following it, for the campaign 2003-2004, the Catalan Department of Agriculture (DARP) has estimated that more than 16.000 ha. were planted with GM maize, which represents 40% of the total ha planted with this crop (40.500 ha).

Figure 1: Evolution of the number of ha. planted with GM maize in Catalonia



Concerning the planted varieties, following DARP data, the distribution has been as follows (see Figure 2) for the 2003-2004 period:

Figure Fehler! Kein Text mit angegebener Formatvorlage im Dokument.**: Percentage of varieties planted in Catalonia in 2004.**



Source: Serra and Salvia, 2003; data originally provided by DARP.

It is important to notice that the share of the two legalised events in Spain (Bt-176 and MON810) has changed substantially during the last year, as in 2003, the 28,4% of the planted GM maize in Catalonia was MON810 while in 2004 this percentage represented 86,6%.

Regarding the yield of the GM varieties, the Catalan Institute of Agroalimentarian Research and Technology (IRTA, 2004) has published the comparative results of 38 commercial varieties used in its experimental plant in Lleida in 2003. Compa CB, the only GM variety analysed, was ranking in 15th place, with a productive index equal to the average.

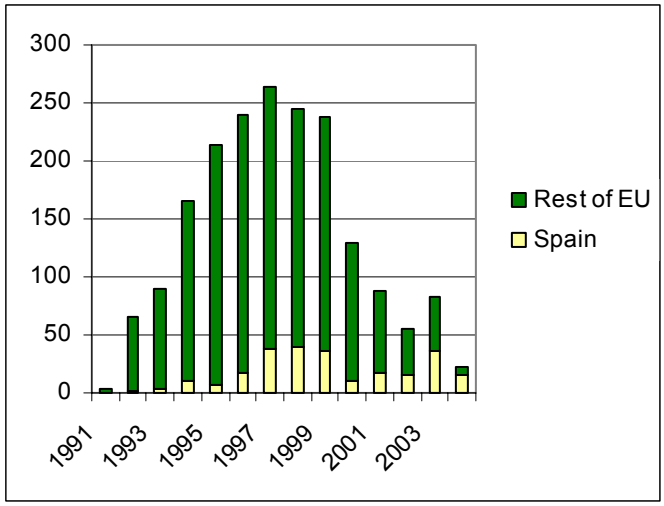
b) Research on biotechnology in Spain and field trials

Another remarkable fact is that Spain is not only the region in Europe where GM crops are grown in a commercial scale but it has also turned into the European country with a major number of field trials. As these experimental crops are a prerequisite for further commercialisation approvals, the analysis of them will allow making some predictions on the future development of GM agriculture.

As a result of the entrance into force of the Directive 90/220/EC the SNIF[2] database was created, which contains all the notifications for GMO field trials carried out within the EU from 1991 and onwards. An analysis of the database reveals, as a general trend, a drastic drop between 1998 and 2003 for the whole EU –probably due to the *moratoria de facto* situation-, which is not that pronounced in the case of Spain. It leads to the fact that 45% of the field trials made in the EU in 2003 were carried out in Spain. This percentage increases up to the 70% in the field trials notified until May 2004 (see Figure 3).

[2] The SNIF (Summary Notification Information Format) database, managed by the Joint Research Centre can be consulted at: http://gmoinfo.jrc.it/

Figure 3: Annual number of field trial notifications in the EU and Spain, 1991-2004[3]



From the analysis of the SNIF database can be extracted that the private sector has been carrying the 83% of the field trials made in Spain, while 8% were made jointly by private enterprises together with public research institutes and universities and the rest, 9%, was done by public centres.

This low share of the public research can be one of the factors to explain the fact that the GM research in Spain is based mainly in a single crop –maize- as in general, large companies work on products that have large potential markets and a high expectation of commercialisation (Lhereux et al., 2003).

Concerning the type of traits that are being investigated in Europe, the share of output traits[4] has suffered a progressive decrease since 1998, in front of input[5] ones, according to the data observed for both Europe and the US, but contrasting with the emphasis on these traits and "their promising developments" discussed in many general review papers (Lhereux et al, 2003).

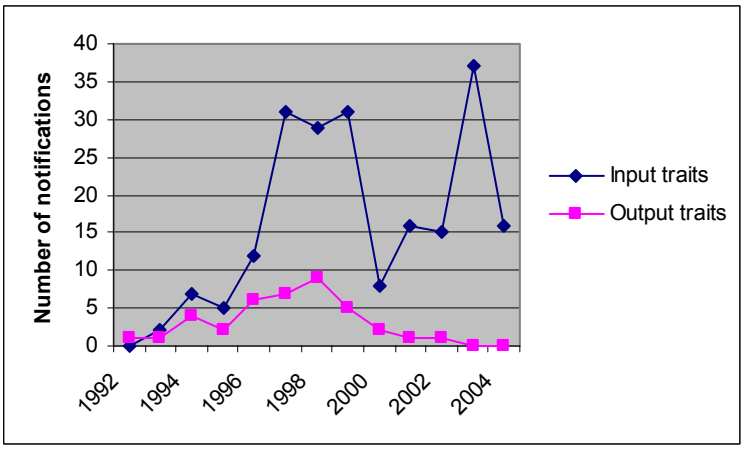
In the case of Spain, this trend is even much more pronounced (in the last five years, only 4 of the notifications have been for output traits, none of them in the last two) (see Figure 4). This tendency can be also explained by the high share of the investment from the private sector in biotech research, which focuses itself in products with low cost of production and broad market possibilities.

[3] The data from 2004 comprehends until 27th May.

[4] This is the so-called "second generation of GMOs", which were theoretically conceived to alter benefits beyond the farm or the nutrient content, flavour, processing and post-harvest characteristics. Included in this set are also traits for industrial use or health-related ingredients.

[5] These traits, also called "first generation of GMOs", are addressed to change agronomic conditions. These traits are mainly insect resistance, herbicide tolerance, resistance to other pathogens (such as viruses), abiotic stress/yield or male sterility.

Figure 4: Type of GM traits in Spanish field trials, 1991-2004[6]



"Resistance" traits, including herbicide tolerance (34%), insect resistance (22%) or both (22%) dominate field trial notifications in Spain adding up to 78% of the notifications – while this figure is around 53% in Europe. Resistance to other pathogens (mainly viruses) represents 9% of the trials.

c) Projections

The following review is based upon the analysis of the current trial fields made above, the "Communication Life Sciences and Biotechnology – A strategy for Europe" (European Commission, 2002) and other official reports assessing the possible future development of the GM crops in Europe, which are mainly based on information provided by research laboratories and industries (Lheureux et al., 2003).

Referring to a short period of time –up to 5 years- the more probable crops to be introduced in Europe are those that have already received a favourable opinion from the European Scientific Committee: herbicide tolerant maize, oilseed rape, fodder beet and cotton[7], Bt cotton[8] and maize, potato with altered starch composition and Bt and herbicide tolerant maize. As discussed above, few GMOs with output traits are expected. In the case of Spain, the first more probable GM crops to be introduced seem to be other maize varieties.

In the study made by Lhereux et al. (2003), the SNIF database (as field trials are a prerequisite step when applying for market approval) and the GM crops grown in third countries linked with the EU imports were analysed in order to assess the medium term -5 to 10 years- potential GM crops within the EU. In the study they conclude that the most probable GM to be introduced in a medium term will be: fungi-resistant wheat, oilseed rape, sunflower and fruit trees, virus resistant sugar beet, potato, tomato, melon and fruit trees, herbicide tolerant wheat, barley and rice, modified starch content in potatoes and maize, modified fatty acid content in soybeans and oilseed rape and modified protein acid content in oilseed rape, maize and potato. In Catalonia, herbicide tolerant and insect

[6] The data from 2004 comprehends until 27th May.
[7,11] Presented by Spain.

resistant rice has been tested, so it seems a potential crop to be introduced in the medium term.

Concerning the long-term projections for GM products, the European Strategy for Biotechnology highlights, once again, the potential of the products with output traits, the so-called "functional GMOs" and commits itself for the use of non-foodstuffs crops as raw materials or to develop new materials.

d) References

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