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The paradoxes of resistance in Brazil (renamed from 'Resistance to transgenics in Brazil')

Book section

Chapter 15

Resistance to Transgenics in Brazil (check title)

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(Morag + Martin shortened version; 8500 words)

To appear in: Gaskell G & MW Bauer (eds) (2006) Genomics Society and its Public, London, Earthscan.

Between 1998 and 2004 the European Union saw a de-facto moratorium for genetically modified (gm) crops and food. Many European food retailers are committed to either avoiding or labelling products with gm ingredients and thus to accommodate consumer sentiment. This policy and practice is only feasible for as long as Brazil and other crop exporters do not follow the USA and Argentina in adopting gm crops. This chapter describes how Brazil followed a cautious practice over gm crops and reaped the benefits.

In 2003, Brazil is the second largest producer of soya, producing 26% of the world's soya. Since the mid 1990s exports to Europe and Asia have increased dramatically. Between 1998 and 2005 Brazilian producers were under a **judicial moratorium for t**he planting and processing of gm crops. In this period the tussles between courts, government and parliament were initiated and shadowed by civil society. The consumer protection institute IDEC and Greenpeace were supported in the fight against gm crops by rural social movements, regional personalities, and, if not in ideology so in deeds, by industrial farmers from the main producing regions of the North. Political parties had no consistent policy on 'transgenicos'.

Rio Grande do Sul, the most southern Brazilian region, was the initial arena for the public controversy over this modern biotechnology between 1998 and 2003. Declaring itself a 'zona livre dos transgenicos', paradoxically it became the main gm producing region and incurred heavy export losses. Whereas northern and central regions massively expanded traditional soya production, and their exports multiplied six-fold from 1996 to 2004.

The slow arrival of gm crops in Brazil demonstrates some paradoxical consequences of resistance (Bauer, 1995): Firstly, an official gm-free policy created the contrary of what was intended: a gm crop region. Secondly, regions without anti-gm policy remained de-facto gm-free and profited from international markets. Thirdly, farmers who adopted gm technology lost out, while resistance to the 'New Green Revolution' paid off. I will trace the politics, mentalities and the currents of public opinion that sustained these Brazilian paradoxes between 1996 and 2004, and thus explore some explanatory factors.

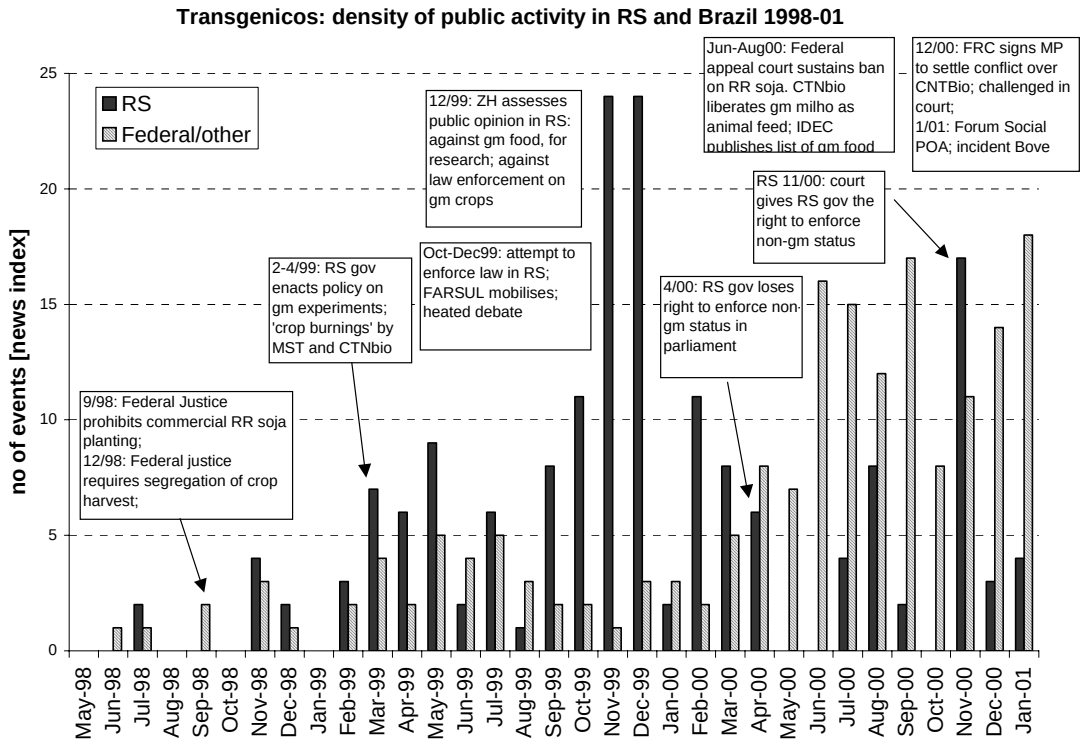
[a] Climates of opinion and the public debate

The heated debate over gm crops in Europe and North America is amply documented (e.g. Gaskell & Bauer, 2001). Key events occurred in late 1996. The freighter 'Ideal

Progress' arrived in Europe containing Monsanto's Roundup Ready gm soya. This delivery was legal according to EC regulations of 1990/91. But a loophole in labelling rules provided anti-gm activists with an opportunity for public action and a debate arose (Lassen et al, 2002). Europe saw a de-facto moratorium on gm crops and food from October 1998 to 2004, supported by major food retailers. These events created a context for action with its own dynamics in Brazil.

Figure 1 charts the monthly frequency of political events related to gm crops in Brazil between May 1998 and January 2001, and shows the leading role of Rio Grande do Sul in the national debate. The dark bar shows biotechnology events in Rio Grande do Sul, the light bar events in the rest of the country. Events in the South reached a peak in late 1999, while the rest of Brazil saw the peak of activity in mid 2000 or later.

***Figure 15.1**: Density of gm related public and political events in Rio Grande do Sul, 1998-2001 (source: various chronologies, e.g. Menasche, 2000a)*



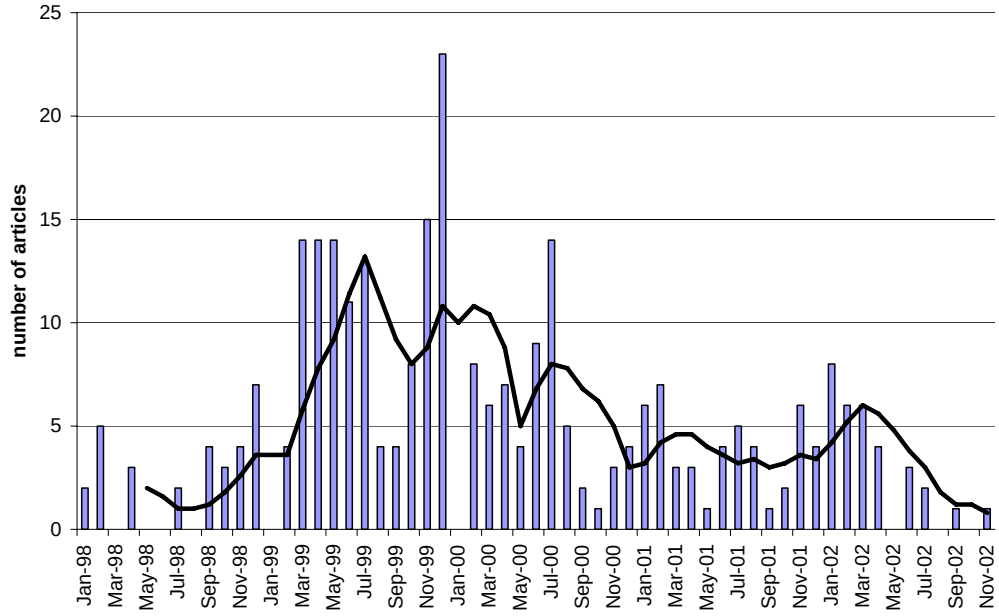
Public opinion does not fall from the sky, but is mobilised in and through civil society and variously impacts policy making or corporate strategy. Mobilisation in the South was the result of a tit-for-tat between two networks of actors. On the one hand were many state municipalities, various research institutes, the big farmers' unions of FARSUL, the processing industry and international corporations including Monsanto. On the other hand were the local government, IDEC, Greenpeace, Movimento sem Terra (MST) and small farmers, some state municipalities, the World Social Forum, and various scientific organisations. In Brazil, environmentalism has become mainstream policy, while consumer protection remains a marginal issue with a very

weak base amongst the middle classes (see Guivant, 2001). Public mobilisation over gm crops through public events and pronouncements culminated in the 'Farroupilha of the municipalities' (Leite, 2000) where, one by one, regions declared themselves for or against gm crops, sometimes retracting earlier decisions.[1]

[b]Changing media coverage

Figure 2 shows the number of articles about gm crops and food between 1998 and 2002 in the dominant daily newspaper of the South, *Zero Hora*. Over these 48 months, *Zero Hora* carried 296 major articles on the issue. Rio Grande do Sul, where transgenicos became a daily news issue, led the national debate. In the rest of Brazil it was a bi-weekly topic at best of times (Massarani et al, 2003). The editorship of *Zero Hora* prides itself on having set the agenda on this issue throughout 1999.

Figure 15.2 *Number of press articles per month about 'transgenicos' in Rio Grande do Sul, appearing in the newspaper Zero Hora*



Between March 1999 and July 2000 there was a heated debate in Rio Grande, reaching a peak in December 1999. Our analysis of two papers (see figure 3), *Zero Hora* and *Correio do Povo* (another quality newspaper of the South), comparing March 1999 and March 2000 shows a shifting discourse of biotechnology. In 1999 the main frames were economic prospects, public control, nature and globalisation. In 2000 the frames are scientific progress, Pandora's premonitions, and fatalism became more important. The actors in the 1999 debate are local governments, producers and multi-national corporations; by 2000 these are joined by scientists and the judiciary. The local scientific community tries to fend off 'ideology' and advocacy for gm crops declines.[2] The political polarisation to which both newspapers contributed in the fist place becomes thematic when the discussion shifts from 'ideology' to 'sound science'.

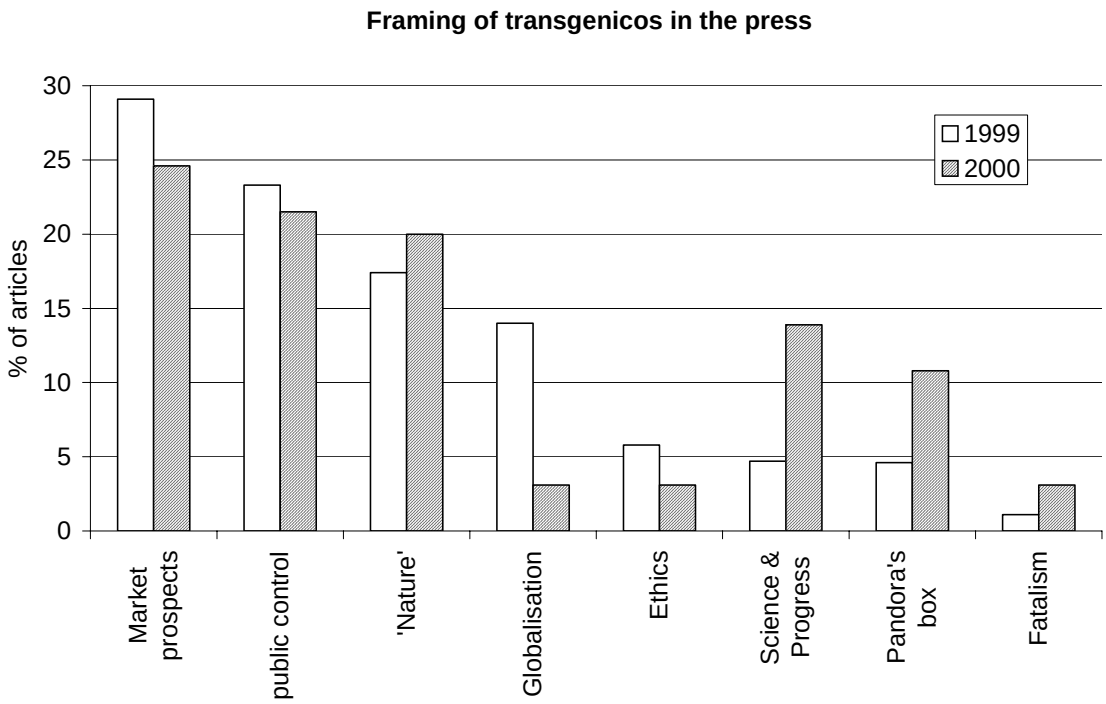


***Figure 15.3**: percentage of press articles in Zero Hora and Correio de Povo during March 1999 and March 2000 that frame the issues of gm crops in a particular manner (N=151; $p < 0.10$).*

[b]Political myth making

Local Research also demonstrates the political mythology created around transgenicos. Menasche (2004) shows in detail how two particular events had become political myths by the election time of 2002. The burning of illegal local fields by the Federal Police, at the request of the federal CTNbio on 22 April 1999, provided a photo opportunity for Hoffman, the local Agricultural Secretary of the Partida dos Trabalhadores (PT). The PT was henceforth associated with burning crop fields, despite the fact that they were not directly involved in crop destructions. The field burning was further linked to the Catholic inquisition and to the book burning of the Nazis, two historical expressions of anti-scientific obscurantism and authoritarianism. Thus the association of Hoffmann's image and crop burning came to signify an obscurantist and anti-scientific PT government.

The second event is Jose Bove's visit to the World Social Forum in Porto Alegre in January 2001. Bove, the French anti-globalisation activist, visited a sight where social movements had previously destroyed a gm crop field. The press and TV images turned Bove, ex-post-facto into the main protagonist. Bove was applauded loudly at the World Social Forum but was then escorted to the airport by Federal Police to leave the country. This media event created a xenophobic discourse. For pro-gm protagonists the protest signified everything foreign to the true Gaucho: violence and

disrespect for private property. The attribute 'foreign' was associated even with the MST which, despite the fact that it originated as a social movement in Rio Grande do Sul (Fernandes, 2000). For the non-committed public, sceptical but disapproving of crop destruction, Bove also represented things foreign: violence, activism, transgenicos themselves and foreign interests. The effect of these two myths was, that by the 2002 elections Gaucho politicians took positions as being either 'for research or for crop burning' for 'progress or obscurantism', leaving little space for differentiated arguments on either side. Polarisation and mythology constrained the debate.

[b]Public perceptions

We also observe agenda setting of the South in polls of awareness, consumer sentiment towards gm food, support for the moratorium and risk perceptions. After the surge of the national debate in mid 2000 the country as a whole moved towards the positions that were already prevalent in the southern regions of Brazil. A poll in Rio Grande do Sul showed 66% awareness of gm issues as early as December 1999 (CEPA, 1999) and confirmed this level for the Southern regions of Parana and Santa Catarina, whereas Brazil as a whole had only 37% issue awareness in 2002 (IBOPE 2001 and 2002). The South of Brazil showed more issue awareness than many EU countries (see Gaskell et al, 2001). The question 'given a choice, would you buy gm products' was denied consistently by over 70% of respondents in the South. Even, the judicial moratorium on gm crops of 1998 carried growing support in the South: 58% in 1999, 77% by 2002. By 2002, two thirds of all Brazilians supported the moratorium. Issue awareness did not affect support for the moratorium. The South and the rest of the country showed similar risk rankings: Loosing export opportunities due to transgenic production, health and environmental risks were the most salient.

In summary, our mass media analysis and the poll data showed media attention and issue awareness spreading from the South to the rest of the country. The controversy in Rio Grande do Sul raised awareness of gm crops and foods and by mobilising civil society made this a national issue beyond the narrow circles of producers, scientists, governments and courts. For international corporations, environmental and consumer activists the South became a test arena, and political mythology crowded out many a good argument on either side.

The narrative of the this controversy can be divided into four phases which show the paradoxical role of Rio Grande do Sul on this issue.

[b]Phase 1: The judicial moratorium of October 1998

After initial failures, success in genomics research for Brazil came later in the 1990s (Azevedo et al, 2002). The Rio summit of 1992 had positioned Brazil as the centre of biodiversity and a leading voice on intellectual property rights. It was widely expected that Brazil would adopt the biotechnology revolution as the USA and Argentina had. Global companies including Monsanto, Dupont, Bayer, Novartis had developed a presence. By 2000, Monsanto controlled 75% of crop field trials, or 90% of the test area, and pushing for commercialisation. In January 1995 CTNBio had been created to regulate matters of gm crops.[3] By 2000 the commission had considered 1294 field

test applications, of which 70% were approved. Indeed, Brazil was turning into the testing ground for international corporations (Vigna, 2001). But, what happened in Brazil about that time must have taken many observers by surprise.

On 14 December 1997 Greenpeace activists blocked the Port of San Francisco do Sul, in the state of Santa Catarina. US imports of gm soya authorised by CTNbio arrived for the production of oil. The activists' banners stated '**Frankensoja: don't swallow it'**. In February 1998 Federal Police confiscated sacks of gm seeds in Rio Grande do Sul that had been imported illegally from Argentina. When CTNbio approved Roundup Ready soya in September 1998 with only a 13 vote majority against those of consumers and the foreign ministry, its decision carried no authority. Days earlier the Federal Court supported a case brought by Greenpeace and IDEC claiming that the commercialisation of gm crops should undergo an **environmental impact assessment**. The court drew on the precautionary principle in the constitution of 1988. This decision was challenged by industry and government. Nevertheless, in December 1998, crop **segregation** and **labelling** was required and the environmental assessment was confirmed as a judicial requirement even for open field trials. The Federal Judge, Antionio Souza Prudente stated

> 'I believe that the irresponsible speed of progress in genetic engineering would lead to damaging de-regulation of the global economy, that may at the beginning of the new millennium lead to a civilisation bearing alien creatures …' (translated by the author from Leite, 2000, p13f).

These actions effectively established a **judicial moratorium**. Approved field trials, numbering 350 in 1999, collapsed in 2000 (Vigna, 2001). This moratorium continued until October 2003, when a presidential decree legalised gm crops on an annual cycle until the Law of Biosafety was ratified in April 2005.

[b]Phase 2: Rio Grande do Sul to be a 'gm-free zone': September 1998-July 1999

Let us back track. In May 1998 a delegation of soya producers from Espumoso, Rio Grande do Sul, travelled to France on a sales mission. The expedition was unsuccessful as the sample was 'contaminated' with transgenicos. Unperturbed, the region passed an aspirational law declaring itself 'zona livre dos transgenicos'. This sparked the **'batalha das prefeituras'** (battle of the counties), where municipalities positioned for or against gm crops. Other public bodies and organisations joined and formed networks, for and against. In October that year, *Zero Hora* published their first article in a series of 'Seeds of Polemic'. Thus the non-issue 'transgenicos' had become an issue.

In the same month the PT won elections in Rio Grande do Sul. In November PT leaders and Greenpeace met to discuss gm crops. Thus an election non-issue became policy. The new governor announced a **'zona livre dos transgenicos'.** The outgoing agricultural secretary pointed to the facts: an estimated 15% of the local soya crop is already gm. Notwithstanding, PT policy makers judge the issue compatible with the existing platform: environmental protection, public health, and humans before profit.

In February 1999, the PT governor proposed to ban of gm crops and to normalise the judicial moratorium in Rio Grande. This did not find a parliamentary majority, but small farmers and the landless movement MST started to enter and burn test fields. By March the governor modified an existing decree which now required notification of the planting of experimental and commercial gm crops and an environmental assessment. Thus, the law **enforcement** started. The closure of 50 experiments that did not have an impact assessments was followed by an injunction to prevent the harvest of Monsanto's experimental crop. In April, Federal agents burned experimental gm rice at a research station. Events cool off, but the official policy, protests by social movements and the closure of test fields had become a threat to farmers whose interests were being voiced by the traditional FARSUL (Menasche, 2004). The Agricultural Secretary travelled to Europe to open markets for non-gm crops, a policy supported by other agricultural secretaries who pass a motion to ban transgenicos in Brazil. He is convinced that PT pursued the right policy, consistent with its values, but also consistent with international markets. In July 1999 Greenpeace launched the campaign 'Rio Grande do Sul livre dos transgenicos'.

[b]Phase 3: Escalation and stalemate: August-December 1999

The battle of the counties continued: networks of actors form and declare their positions. In August 1999 the protests in France against the 'mal-bouffe'[4] and gm crops were widely noticed. At the main agricultural fair, Agricultural Secretary Hoffmann emphasized that the policy of 'zona livre' will be enforced. A month later the main seed producer declared 30% of Rio Grande do Sul's soya to be transgenic. This estimate, which is cited internationally, is part of the controversy. Hoffmann accused the industry of constructing facts and calls the Federal Police to investigate. His own test kits, ascertain only 4% in November.

Throughout the harvest season the conflict escalates, this time over the commercialisation of gm crops. 700 silo tests are conducted and 3588 sacks of gm soya (1 sack = 60 kg) are confiscated in Cruz Alta, Palmerira das Missoes, Passo Fundo, Erechim, Santa Rosa, Tupancireta. 24 producers are referred to the Federal Police. Traditional farming organisations, Clubes de Amigos da Terra, Sindicatos Rurais and FARSUL, mobilise civil disobedience, road blocks and non-cooperation with officials. FARSUL, traditionally anti-PT, alleges an abuse of power and a threat to private property. Its political arm calls a debate in parliament to challenge the legality of law enforcement: claiming that gm crop regulation is a federal, not a state matter.

On **11 November 1999** the vice-governor Rossetto calls a meeting of stakeholders (state ministers, Federal Agricultural Minister, industry and producers). A compromise is reached: stop all enforcement for three weeks to allow farmers time to recover gm seeds and to replant non-gm variety; costs will be covered by the state bank. The objective is to create a gm-free harvest for 2000/01 to position Rio Grande do Sul in the growing non-gm world market. While the processing industry supports the idea, FARSUL walks out and mobilises, and *Zero Hora* (12 Novmeber 1999) brandishes the agreement a 'pact against gm soya'. Rossetto's further attempts to mediate between the Agriculture Secretary and soya regions fail. On 8 December the parliament blocked all law enforcement on gm crops, on the grounds that it was not a

state but a federal matter. PT's policy of recovering 'zona livre' through law enforcement is blocked.

A radio interview of 29 November with a Franciscan brother named Goergen, representing the landless movement in parliament created a media event that became local memory. He insinuated that genetic modification introduces 'poison' into plants, and that some of the viral vectors used were HIV and Hepatitis B. This triggered reactions by university scientists of all affiliations deploring the level of scientific information and arguing against the **anti-science moratorium** on plant genetic research. Goergen, asked to explain himself in parliament, admitted that his comments were intended to provoke debate. The radio interview was later published together with contributions from two plant scientists who translated soundbites into 'sound science' (Goergen, 2000). It was oil to the fire of polarisation when the landless movement declared gm crops 'a criterion for invading land'.[5] MST in 2000 invaded two farms with gm crops in Santa Catarina, but not in Rio Grande. FARSUL retaliated by calling for the military to protect land and property.

On 13 December 1999 *Zero Hora* published a survey of the capital Porto Alegre: opinions on the moratorium were split 50:50; but consumer sentiment is more sceptical and, given a choice, 70% say they would not buy gm food (CEPA, 1999). This highlighted a contradiction in public opinion and to what some observers recognised as a potential alternative strategy; whilst consumer sentiment is against gm food, criminalising farmers carries no support. Instead of focussing on demand, for example the markets already offered a 10% bonus for non-transgenic soya and high level reconnaissance visits from European food retailers in search of non-gm soya were taking place, the Rio Grande government confirmed its commitment to law enforcement on production. In June 2000 there was a court ruling confirming the reliability of industry tests. Attempts to force crop separation in state silos failed. Not until November 2000 did the Rio Grande government regain the power to enforce the law.

In October 2002 PT lost the election in Rio Grande, but by this time transgenicos had become an election issue. The new centre-right government became a major driver towards the normalisation of gm crops across Brazil, ironically supported by some Rio Grande PT deputies thus revealing the split within the PT over this issue.

[b]Phase 4: The nationalisation of the debate: after 2000

After 2000 the focus of transgenicos moved north and to Brasilia. In November 1999 Greenpeace and IDEC launched the national campaign 'Por um Brasil livre dos transgenicos' across Brazil, and in May 2000 they won an injunction to block US bt-maize destined to feed poultry. Brazil, with an expanding poultry industry, is not self sufficient in poultry feed. Poultry producers tried to avoid paying the bonus on non-gm maize and to avoid labelling their chickens. In 2000 national information campaigns, websites, pamphlets and books on transgenicos were published (e.g. Goergen, 2000; Leite, 2000; Massarani, 2000). Increased corporate public relations activities tried to gain the hearts and minds of the Brazilians. National opinion polls, sponsored by Greenpeace and IDEC, gauged public sentiment across Brazil (IBOPE 2001 and 2002).

Figure 1 above showed that nationwide events peaked end of 2000. Henceforth Brasilia is the arena, as well as other regions of Brazil. The tussles between federal government, the two cambers of parliament and courts continued. In **December 2000** President Cardoso empowered the CTNbio to make decisions on gm crops. Challenged by IDEC in January 2001, the court concluded that CTNbio had only 'virtual existence' because of an unresolved parliamentary veto of 1995. Earlier in February 2000, a protocol had defined the environmental impact studies which the courts require. In June 2001 the President decreed labelling with a threshold of 4% tolerance. This again was found to contravene existing consumer legislation and was therefore invalid. A 1% threshold which was implemented later in 2004.

The widely anticipated liberalisation of gm crops finally happened. The elections of 2002 brought a new government, the presidency of Ignazio Lula da Silva, but no majority in parliament. In the forging of a coalition government, transgenicos moved off the agenda. The Senate investigated illegal imports and planting of GMOs, and on **25 Sepember 2003**, the vice-president signed a decree (MP 131) allowing planting of gm soya, regulating the handling of seeds and the monitoring of potential liabilities. The international press reported that gm crops had been finally accepted, overlooking that this decree allowed gm crops only for one year. In Parana, the centre-right governor, banned gm crops from the key harbour of Paranagua and thus ensured segregated crops. While Santa Catarina opens its port Sao Fransisco to gm soya. In **March 2004** the Ministry of Justice required all products containing more than 1% of gm crop to be labelled with a 'triangle', be they for human or animal consumption. Monitoring is coordinated by four research stations across the country. The rule allows for negative labelling, and applies equally to producers of poultry, pigs and milk, who must declare their feeding practice. In Rio Grande this ruling is enforced by a team of 40 trained and equipped technicians. With liberalisation in place the focus of the debate shifts to consumer information – a Greenpeace campaign during April 2004 - and to the vexing issue of royalties for gm seeds. This ran into difficulties in Canada, the USA and Argentina. Monsanto was accused of using royalty management to set incentives for gm crops (Azevedo, 2004).

The Federal parliament finally considers 17 proposals for the legislation of gm crops. Pressure increased to resolve the various contradictions: you cannot field test gm crops without an environmental assessment, but for an assessment you need field tests; gm crops are illegal, yet gm seeds are used; labelling laws cannot be enacted because gm food ingredients are illegal and therefore do not exist; CTNbio, the body to decide these matters, does not legally exist; gm crop areas are illegal and thus there is no official gm crop statistics. International crop statistics do not include Brazil (James, 2002), yet international media reported widely on gm crops in Brazil.

The policy of 'livre dos transgenicos', in stalemate in Rio Grande, moves successfully to other regions, although under different political colours. By 2001, restrictions on gm crops, foods or labelling had been introduced in Regio Norte, Paraiba, Bahia, Belo Horizonte, Minas Gerais, Sao Paulo, Spirito Santo. In July 2000 Greenpeace and IDEC published a list of products with gm ingredients, and Belo Horizonte confiscated gm foods in supermarkets. 16 of the 26 states officially appealled to the President to protect Brazilian crops from gm varieties.

The main soya states, Parana and Mato Grosso both with centre-right governments, rule against gm crops and campaign to win farmers' support. Parana destroys illegally imported gm seeds before it admits that parts of its crop is gm. Mato Grosso do Sul introduces a campaign 'soja limpa' (clean soya) to convince farmers to continue with conventional soya. These regions position themselves explicitly as gm-free, with law enforcement, segregation and public campaigns highlighting the market advantages in Europe, Japan and China. Greenpeace argues the market case in a well-documented report (Greenpeace, 2002). The president of the Agricultural Federation in Parana declares:

> '70% of the soya production of Parana goes to Europe and Japan, with the value of 1.6 Billion US$. They restrict transgenic soya. We have already gained 50% of this market, because we deliver what they require.'[6]

This position of producers in north and central Brazil had a significant impact on the expansion of soya production and soya exports for Brazil.

We end this chronological account in April 2005. By now the situation had shifted. The Law of Bio-safety had been passed. The controversy over biotechnology has migrated from 'transgenicos' to 'stem cell research' and bio-medical progress. On 3 March 2005, a brief and emotive campaign, including the rolling of patients in wheelchairs into parliament, before television cameras, closed with a clear vote (352 yes to 60 no). Last minute attempts by the Environment Minister, Greenpeace and others to lobby a presidential veto failed. The legislative package covering both GREEN gm crops and foods and RED bio-medical genetics and stem cell research, ended the judicial moratorium of 1998. In the media reportage one finds little memory of the 'transgenico' debate. VEJA's headline stated triumphantly: 'in Brazil, Galileo has not been burnt'.[7]

[a]Resistance: local failure – global success

The most startling outcome of the gm-free policy of Rio Grande do Sul between 1998 and 2002 was its complete failure. Rio Grande became the only state in Brazil where gm soya was the rule rather than the exception by 2004. Because it was an illegal crop, no official statistics of gm crops existed. Estimates ranged from 15% in 1999, to 30% in 2000, to 80% by 2004. The uptake of illegal Argentinian seeds undermined the efforts of local seed banks. Soya farmers no longer use the seeds that are adapted to the local climate. The imported gm seeds are not suitable for a subtropical climate. In March 2004, during a Southern drought, farmers experimented with traditional and gm crop and reported a 6% yield lag for gm variety (Correio do Povo 19 April, 2004, p15; also Benbrook, 2004). The failure of the Rio Grande government to win the support of the farmers for their policy had immediate effects: Rio Grande lost its traditional export destination of Europe to other Brazilian regions.

With the controversy over 'transgenicos' in Brazil several things came to pass. First, Brazil massively expanded soya production and exports after 1998. With the European moratorium in place, Japan being sceptical and China demanding labelling of gm crops, it paid off for farmers to reject gm technology and to satisfy demands for conventional soya. Brazil de-facto sustains the European policy of gm-free crops, of

labelling and offering a choice to consumers. Secondly, despite local policy failure, Brazil gained international attention as a place where globalisation US-style is successfully challenged.

[b]The Brazilian Soya miracle of 1996 to 2004

Comparison of soya production in Brazil and the USA points to the success of Brazil's precautionary approach. In 1996 US producers enthusiastically adopted Monsanto's Roundup Ready soya, by 2002 66% of its crop was transgenic and with mixed results (James, 2002; Benbrook, 2004). By 2002 US production had increased by 40%, but declined since 1998. In Brazil, where the adoption of gm crops was marginal and confined to Rio Grande, the production increased by 160% mainly after 1998, from 23 million tons in 1996 to 51 million tons in 2004. In 1991 it produced 19% of world soya; the USA produced 51%. By 2003 Brazil accounted for 26%, the USA for 34%. Argentina, who adopted gm crops even faster than the USA, doubled its share to 19% of the world production.

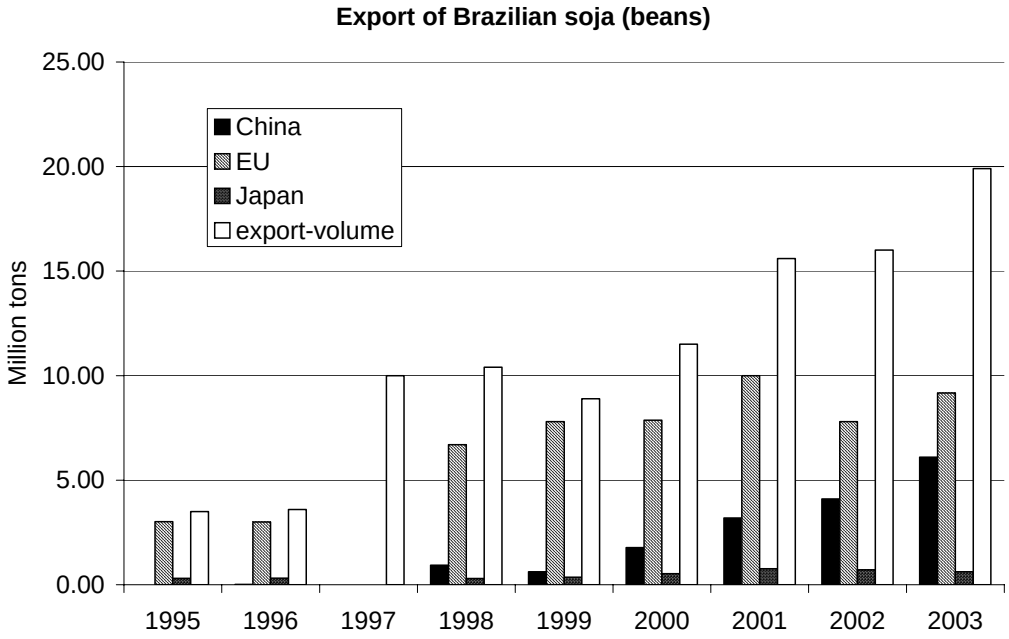
This expansion occurred mainly in the states of Parana and Mato Grosso, accelerating the trend of relocation of soya production within Brazil (Bastiani & Bacha, 2002; Villarim, 2004). It is explained entirely by expansion of traditional non-gm crops for the export market. The producer optimism was exuberant. The Brazilian trade press reports the 'soya miracle' and the 'tiger of the agro-business' (see VEJA Agronegocio, April 2004).

Gm crops in the South and gm-free crops in the other regions created a logistical problem. By 2002 export routes were segregated, resulting in non-transgenic crops being exported via the Amazon River through the northern route. Cargil International, a crop freighter company, has rapidly expanded its capacity in Santarem on the Amazon River. Gm-free crops also reach the southern port of Paranagua on thousands of truck loads, which for lack of storage facilities serve as rolling silos lining the road. The governor of Parana declared the port 'non-transgenic', and engaged in an image campaign defending the segregation policy against much opposition over such non-constitutional action. Only the two most southern ports of San Franciso do Sul and Rio Grande accept gm crops for shipping. Remarkably, of the states which sustained a gm-free crop none had a PT government nor majority. Where a PT government adopted such a policy it utterly failed. The transgenico issue became aligned with ideology of for or against-PT and the economic argument was crowded out.

Brazil responded to European and Asian demand for gm-free soya, with a sizable premium: Japan pays 40% more for the non-gm imports, Europe is willing to add between 4-10% (Villarmin, 2004; Nature Biotechnology, October 2005, p1195; Brookes, Craddock & Kniel, 2005). By 2003 the cash crop soya contributed over US$8 billion, a quarter of the export value, to the country's trading balance, up by 100% since 1994. Soya exports increased from 3.5 million tons in 1995 to 20 million tons in 2003 as shown in Figure 4. In 1992 16% of soya was exported, by 2003 this was 40%, with a massive increase after 1998. Exports to Europe increased after 1998 and there has been a steady increase in soya exports to China and Japan since 2000.

Considering that the USA, Brazil and Argentina produce 80% of the world's soya and that Europe depends almost entirely on imports, it is noteworthy that Brazil alone

sustained the European moratorium on gm crops and foods since 1998. Indeed gm



future scenarios for gm food in Europe hinge entirely on the timing of the liberalisation and adoption of gm crops in Brazil. After 1997 special missions of retailers like French Carrefour and British Sainsbury went to Brazil to secure supplies of gm-free soya to enable them to honour their consumer pledges.

Figure 15.4 *Brazilian soya exports for various destinations from 1995-03 (no figures available for 1997). Sources: MAPA; FEE Porto Alegre*

[b]Delayed global diffusion of gm crops and the end of the 'life science' industry

Resistance to new technology delays the diffusion rate and geographically concentrates the process (Hagerstrand, 1967). The international monitoring of transgenic crops indicates that their diffusion suffered a set-back with the European moratorium and the precaution in Brazil. The penetration rate of gm soya into the world production stagnated at around 63% in 2001 and 2002 (James, 2002) and declined to 56% by 2004 (James, 2004). Brazilian producer action reduced the world adoption rate. The world market split into gm soya supplied by USA and Argentina and non-gm soya supplied by Brazil. The soya case was instructive for wheat farmers. US and Canadian farmers deferred adoption of gm wheat in May 2004 to avoid a rerun of the US soya 'export disaster'.

The resistance, albeit temporary as history might show, to gm crops in Brazil adds to the global effects of resistance to biotechnology. International corporations such as Monsanto can no longer rely exclusively on lobbying policy makers and convincing farmers, their primary market, and have had to consider secondary markets. Farmers in turn, respond to consumers, as policy makers might increasingly do. The Brazilian

and European caution over the 'New Green Revolution' contributed to the demise of the Life Science Industry vision in which pharmaceutical and agrochemical companies envisaged a joint future in the early 1990s. The marriage of Monsanto to Pharmacia ended in divorce in August 2002 after a short honeymoon. Equally short was Novartis' and Rhone-Poulenc's attempt to marry farm and pharmacy, divorcing Syngenta and Aventis in turn in 2000 and 2001. The global biotechnology movement is now clearly split into an Agro-food sector (GREEN) and into a bio-medical sector (RED). The European moratorium, the debate in Rio Grande do Sul and Brazilian farming practice are likely factors of this new global situation.

[b] The symbol of 'anti-globalisation and resistance'

Rio Grande do Sul became a symbol of anti-globalisation resistance and democratic renewal (Sousa Santa, 2002; Herzberg, 2002). It positioned itself on the world map as a major soya producer adopting a gm-free policy. This was celebrated at the World Social Forum in Porto Alegre in 2000, 2001 and 2002 (Seoane & Taddei, 2001). The agricultural trade press and daily papers such as the *Guardian, Telegraph or Financial Times* in the UK, *Le Monde* in France, the *NZZ* in Switzerland, as well as the *New York Times* and the *Washington Post* in the USA regularly reported the Brazilian crop policy. The region was keenly observed as the 'the last bastion to fall', the only basis upon which a European moratorium was viable. In May 2002 the *Washington Post* famously commented that Monsanto lost its way by ignoring the international gm controversy. Brazilian caution over Roundup Ready seeds had blocked their capability to raise money on the stock markets.

In summary, while the gm-free policy utterly failed in Rio Grande do Sul, farming across Brazil continued gm-free. As a result soya production expanded massively between 1996 and 2004, exports increased six-fold and Brazil has ambitions to become the world's largest soya producer and exporter.

[a]Conclusions: explaining Brazilian paradoxes

Technological advances in food production such as the genetic modification of crops may reduce costs but, but if suspicions over gm food persist, this adulteration is impossible for consumers to detect. Here market reputation is unlikely to be an effective regulator. Thus the state offers transparency with a food control programme and rules on labelling (Law, 2003). Support for food regulation historically comes from established producers of 'quality food' as well as urban consumers concerned with public health. In Rio Grande do Sul, the policy of the PT government aimed at protecting small farmer, consumers and the environment (Almeida, 2003). This may explain what happened in Rio Grande, but does not explain what happened across Brazil, where industrial farmers observed the gm moratorium. Might one be able to model this resistance to a new technology as a rational economic choice contrary to innovation models?

Explaining the paradoxes of transgenicos in Brazil, the resistance to new technology by an otherwise high tech agri-food industry, is a far from an easy task. The politics of innovation is conditioned by many factors at the regional, national, and global levels, the unravelling of which would amount to an understanding of Brazilian politics, an

impossible task for this space and my competence. I content myself with exploring some likely factors.

[b]Geography

The location of Rio Grande do Sul with its 500 kilometre 'wild west' border with Argentina is a decisive factor in the failure of the gm-free policy. This extensive border is uncontrollable and with a long tradition of smuggling. Argentina readily adopted gm soya after 1995 (Sorman, 2001). No wonder therefore, with demand for gm seeds (many farmers were naturally curious to experiment) it was easy to bring gm seeds from Argentina. Policing illegal imports of gm seeds from Argentina was impossible beyond occasional strikes. The incoming PT government of 1999 underestimated these circumstances when they adopted a policy that focused on law enforcement rather than on world market information and consumer awareness.

[b]Political polarisation

Political science distinguishes between polarisation of the party system and polarisation of the political culture. The political culture of Rio Grande is historically polarised, while many different parties compete for votes. This cultural polarisation often translates into stalemate between the executive elected by majority, and the legislative elected proportionally. Rio Grande has a history of splitting in the middle, without a centre ground for compromise. The victory of the first PT local government in 1998, with a minority of 22% in parliament, polarised all issues into pro and anti-PT. This increasingly paralysed decision making, not only on transgenicos between 1998 and 2001. Decreasing numbers of laws originating from the government were debated in parliament, whilst increasing numbers of vetos by government and parliament can be observed in this period (Mello Grohmann, 2002).

Gm crops were initially not a PT issue. The issue travelled from the centre-right to the left and aligned with established polarities only after the election of 1998: The governor and social movements working towards a gm-free region, while the parliamentary majority and traditional farming interests fought for the liberalisation of gm crops. Symbolic politics blocked any compromise in Rio Grande do Sul. By mid 2000 many scientists and the press themselves deplored this polarisation because it curtailed informed arguments, not least the economic one of a global market for non-gm crops. Ideological positions pro and anti-PT divided opinions in 1999 more than any other variable.

This polarisation reflects in opinion polls. CEPA (1999) shows a 50:50 split for a gm-free region. 72% of respondents would not buy GM products and 61% would pay a premium for gm-free food products. But less than 40% think the state should tell the farmers what to do, and only 35% think that farmers planting gm crops should be prosecuted. The data shows the lack of support for an enforcement policy, but also the basis for a missed compromise: gm research yes, commercialisation not yet: 33% are against a gm-free zone, against a moratorium and for research; around 40% are for a gm-free zone, for a moratorium, but also for field trial research. 43% would not buy gm food, but would leave the decision over gm crops to the farmers, would pay more for gm-free foods or support the enforcement of the gm ban. The potential compromise would have had cross-party support: sceptical consumers supporting

producer autonomy. Qualitative research reveals contradictory attitudes even among local producers: they liberally apply gm seeds and use chemicals for their industrial production, but for their own consumption they maintain an organic garden (Menasche, 2003).

[b]Conflicts in government

Nationally gm crops were not a party political issue. The Rio Grande policy to create a 'gm free' state was not supported by the federal President who was working towards liberalisation by fighting off challenges in parliament and the courts. However, federal ministries were not pulling in the same direction. On the president's side were CNTbio, and the Ministries of Science and Technology and of Agriculture. On the other side, the Ministry of Justice supported labelling, and the Environment, Public Health, and at times the Foreign Ministry, supported the moratorium or at least further public debate. Positions converged only with the passing of the Bio-safety Law and its ratification in 2005, which combined stem cell research and gm crops regulations.

[b] Biased mass media

Many local observers see the failure of the Rio Grande transgenico policy in the light of a media conspiracy. Local researchers accuse RBS (the radio and television company of southern Brazil) and the newspapers of pernicious bias during the PT years in the South (see Guareschi, 2000; Menasche, 2003). This is demonstrated in issue framing and political mythology: the anti-scientific, obscurantist and authoritarian PT. However, the newspaper *Zero Hora* raised the issue before it was a party political one and thus set the agenda in the first place. However, they are an integral part of the political culture and they did not stem its polarisation. The later anti-PT bias of the local mass media is likely to have contributed to the failure of the gm-free policy in Rio Grande, but by leading the debate nationally contributed to its national soya miracle.

[b]The mentality of industrial agriculture

Brazilian soya production originated in Rio Grande do Sul in the 1970s; as a modernisation project of the military regime (Ruckert, 2003). With it came the mentality of industrial farming; cost consciousness and technology orientation, but it also brought the trauma of a credit crisis in the 1980s. In this context gm crop entered with the equation of 'technological progress = higher productivity by decreasing costs' (Gehlen, 2001, 73ff). PT's misreading this mentality of producers was recognised as a tactical error: farmers are experimenters, blocking experiments goes against the grain. Many farmers in Rio Grande planted parts with gm variety, parts with conventional seeds, testing for yield gains and drought resistance. Also, the Gaucho is traditionally rebellious towards federal governments, the historically secessionist spirit of Farroupilha. High-tech agro-industrial orientation and traditional rebelliousness contributed to the stalemate in the region. However, further to the north and in central Brazil the same agro-industrial mentality, resulting partly from Gaucho emigration following the 1980s debt crisis, engendered cautious attitudes towards gm crops. Mentality is not a key factor. It is not mainly the traditional and small farmer that rejects gm technology in Brazil, to the contrary, it is the globally thinking entrepreneurial producer that is cautious. In the south, the small farmer is against gm

crops, while the traditional cattle based Gaucho supports gm crops, but mainly because 'they smell a rat' with whatever is associated with the left PT.

[b]External influences

International corporations such as Monsanto, Aventis, Syngenta and Bayer have major stakes in Brazilian agriculture, providing funding for research and development as well as seeds and agrochemicals. Monsanto was the major player in challenging court rulings against gm crops. It also stands accused of creating facts on the ground by encouraging 'illegal' soya planting. With liberalisation after 2003, evidence emerges that Monsanto uses royalty management to set incentives for farmers to switch to gm crops. Monsanto denied this in an advert campaign in May 2003 (see Azevedo, 2004). And corporate public relations included the sponsoring of rural social events, intense image campaigning among farmers, and lobbying with CEO delegations in Brasilia. IDEC called for a public investigation on corporate lobbying over the gm issue.

On the other hand there is also the presence of international environmentalism in the debate. Greenpeace found a local ally in the consumer organisation IDEC. Together they staged stunts and successfully raised issue awareness. In 1999, 25% of Gauchos acknowledged that the local campaign for a 'gm-free Brazil' had influenced them (CEPA, 1999). Awareness of gm campaigns reached two thirds of Brazilians by December 2002 (IBOPE, 2002). They successfully challenged the gm regulations in courts. Greenpeace input was key to the adoption of the gm-free policy by the incoming PT government in Rio Grande late in 1998 (see Menasche, 1998). Brazil became not only a testing ground for Monsanto's gm field trials but also an arena for the global debate. Whether these external influences were decisive for the failure of the policy and subsequent stalemate in Rio Grande do Sul is doubtful. What is clear is the existence of international backup on both sides of the argument.

In this chapter we have explored the resistance to 'transgenicos' in Brazil and its paradoxical motives and consequences. An ideological gm-free policy utterly failed in one region, while a cautious farming practice succeeded in Northern and Central Brazil. This led to massive expansion of soya production and exports between 1996 and 2005. Why did a high tech agro-industry reject the 'New Green Revolution' in one region but not in the others? In the South, this is explained by uncontrollable borders with Argentina, a culture of polarisation and symbolic politics, and conflict within and between state and federal governments. Less clear is the impact of a partisan mass media, the mentality of industrial farming, and external influences. The party political alignment of the gm issue in the South crowded out the economic prospect of a huge market for traditional soya in Europe and Asia. The entrepreneurial Northern and Central regions capitalised on this without the interference of party politics, and under governments from the other side of the political spectrum than in the South.

The moral of my story: technological innovation does not always pay off, it might pay to wait; and resistance, not only from vested interests of old skills, but also from newer capital, might be a rational option. I end with wondering whether one could simulate this in an econometric model?

Acknowledgements

Research was undertaken with a CNPq Professorial Fellowship during a sabbatical in 2002; thanks to Professor Pedrinho Guareschi (PUC-RS); RBS and CEPA gave access to surveys and media data; interview partners and those who helped to arrange them (S Jovchelovitch and R Amaro in Porto Alegre, P Noleto in Brazilia). Renata Menasche and Luisa Massarani offered me generous 'testing ground' for my hopeless attempts to understand 'Brazil' and gave me access to their own materials. I take the blame for all remaining errors and misunderstandings. A version of this paper was presented in the Department of Sociology, UFRGS, on 16 April 2004.

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[1] Farroupilha refers to the secessionist civil war in Rio Grande do Sol in the mid 19th century.

[2] This analysis was part of an exercise with Masters students in content analysis conducted by the author at PUC-Rio Grande do Sul, Department of Psychology. The categories used were from Durant et al, 1999 (see also Verissimo & Felippe, 2000).

[3] The regulation of biotechnology in Brazil is based on the constitution of 1988 which adopted the 'precautionary principle', and law 8974 of 1995. This law was vetoed by parliament but re-edited with presidential powers of 'provisional measures' (MPs). In 1996 this led to the creation of CTNbio and 'Commission for the Administration of Biodiversity, in 2001 to the creation of an 'Inter-ministerial Committee', and in 2003 to the temporary legalisation of crops on a yearly cycle. Regulation on the basis of presidential powers (MPs) creates legal uncertainty. Unless parliament approves an MP into law within 60 days, an MP needs to be continuously reconfirmed by the president. On these occasions it can be re-edited. No MP on biotechnology has ever been ratified by the parliament before the law on Bio-safety of 2005 (www.mapa.gov.br).

[4] In Millau, southern France, protestors of Jose Bove's Confederation Paysanne, attacked a McDonald construction site as a symbol of the fight against globalisation and 'mal-bouf'.

[5] The MST tactically occupies land to exert political pressure for land reform. They identify land that is unproductive using official agricultural statistics. By including gm crops MST extended their usual set of criteria for occupation. Having spent time myself on a farm in the hinterland of Rio Grande I have experienced an atmosphere of 'civil war'. Cattle farmers talk openly, albeit with exaggeration, of shooting invaders. Guns are clearly visible in these lands and sadly remain an option in land disputes, which is documented by an annual death toll among MST activists and supporters.

[6] Paraphrasing an interview with Agide Maneguette 12 July 2002 in *Diario de Maringa.*

[7] This shift in public debate away from Green biotechnology to Red bio-medical issues, and the incoherent coalition that supported the new law is beyond the scope of this paper. At the time of final writing (June 2005) this law is again challenged in the Brazilian Supreme Court.