Resisting and accepting: Hybrid epistemologies in the GMO controversy in Chile

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Introduction: what we talk about when we talk about farmers in Latin America?

> GM products and seed research undertaken by corporations only aim to increase their profits and not the population's welfare […] The dominance of biotechnology and the use of GMOs is moving towards a world seed oligopoly controlled by just eight major economic groups […] Farmers will completely lose control of seed use and will be totally dependent on multinational corporations. (Movimento Sem Terra 2003, in Pellegrini 2009, 50)

The Brazilian Movimento Sem Terra (MST) is a prime example of the expected position of small and medium farmers regarding the GM crop debate in Latin America and the developing world at large. For the MST, the development of a GM-based agriculture is, above all, an attack to their cultural heritage, labor dynamics and socioeconomic ties. The MST contestation to GM development is not just based, therefore, on technical arguments about the economic benefit of GM crops or their potential environmental and health risks. As implied in the above citation, MST's query is much broader: it challenges the civic epistemology (Jasanoff 2005; Miller 2008) implicitly – and explicitly – imposed by the GM sociotechnical arrangement. It is thus an issue about how agriculture's significance is defined, which forms of knowledge are prioritized, and what should be the form and content of a politics of rural empowerment. In brief, the contestation to GM technologies becomes a wider "act of social resistance" (IEEP 2006, 3, in Pellegrini 2009, 49)

The case of Chile is, in many senses, at odds with cases of a wider social resistance to technology, such as the Brazilian experience. First of all Chilean small and medium farmer associations don't hold a common position on GM crops. Within these organizations anti- and pro-GM stances coexist, configuring a much more heterogeneous attitude landscape. But more importantly for our concerns, one key element cuts across Chilean farmers' position to GM crops: even when opposing the technology, Chilean farmers put forward a *liberal* idea of agricultural organization, their political role within the public arena, and the knowledge economy they (ought to) mobilize. Chilean farmers are not averse to market dynamics, technological development and scientific reasoning, nor to political actions enclosed within consensual and institutionalized spaces. In this sense, Chilean farmers do not *resist* the dominant civic epistemology that groups like the MST attacks; they *foster* it.

But this is just half of the picture. The other half is that although Chilean farmers support and mobilize a liberal epistemology, they also introduce heterogeneous ways of constructing, framing and applying knowledge. Thus while putting forward an *economic epistemology* based on freedom of choice and instrumental rationality, they also demand more state intervention. They assemble a *political epistemology* in which consensus-building strategies are prioritized and at the same time make strong claims of injustice and power inequalities. They articulate a *scientific epistemology* sustained by their confidence on 'hard' data and technical arguments, yet their claims deploy the importance given by them to embodied and experiential knowledge.

Thus the case of Chile calls for a thorough revision of how farmers are understood and played out in the accounts on the GMO controversies in Latin America. In the next section we summarize how the position of farmers regarding agbio technologies has been usually framed. In the third section we briefly describe the Chilean regulation on GMOs and map its most relevant actors. Next we make a few comments on our methodology to then turn to our results, describing how Chilean small and medium farmers assembled their epistemologies – economic, political and scientific. Finally, we put together some concluding remarks.

The GMO controversy, civic epistemologies and the purified farmer

Almost twenty years after the introduction of the first genetically modified food into the market, the debate over genetically modified organisms (GMOs) remains contentious (Levidow and Carr, 2007). Far from having reached a consensual stage, the discussion seems to be ever more polarized, intense and conflictive (Borch and Rasmussen, 2005; Freidberg and Horowitz, 2004; Herrick, 2005; Levidow and Carr, 2007). As with other iconic technological innovations (Bauer, 1995), there is no public consensus about the risks and benefits involved in the use of GMOs. This is due, in part, because incumbent parties have multiplied, but also these concerned agents often frame their claims as a mix of economic, agricultural, ethical, environmental, political, ecological and cultural issues, thus assembling a complex web of positions, arguments and facts.

In this context it has became increasingly important to know not just what is the position of different actors regarding GMOs, but also how these actors put forward – and operate from – particular civic epistemologies (Jasanoff, Miller): the modalities through which different actors understand and order the world in relation to political, economic and scientific objects, evidences and framings. In situations of uncertainty in which scientific statements are transformed into matters of concern (Latour, 2003), agents enact particular realities and assemble a variety of elements – trials, facts, demonstrations, moral commitments, political principles – to confirm and, to some extent, close the controversy. Böschen (2009, 509) has rightfully asserted that the call for a precautionary principle in the GM debate is not enough since the question about "What is the actual evidence on which decisions about the applicability of the PP [precautionary principle] are to be taken? And which evidence is necessary to decide about different precautionary strategies?" is still to be answered. We could add to Böschen's remark, moreover, that how "evidence" is construed and articulated with – and within – economic and political spheres becomes a fundamental question in situations of non-knowledge or uncertainty.

This paper focuses on the epistemologies and evidence-making performed by a key actor in the GMO debate in Latin America: medium and small farmers.[1] Indistinctly from their region, farmers have been noted as fundamental players in the GMO debate and policy making (Hall, 2008; Scott, 2003). On the one hand, farmers have to deal directly with the GMO impacts on agriculture (Mauro et al., 2009) and after a GM crop has been approved for commercial released is up to the farmer to decide whether to grow it or not (Hall, 2008). On the other hand, as a collective caught between anti- and pro-GM scientists, interests groups and consumer associations, farmers have to pragmatically resolve the controversy, thus being a good place to look for a more substantive and contextual position on GMOs, its risks and benefits (Guehlstorf, 2008; Kondoh and Jussaume, 2006). For the case of Latin America, and developing countries at large, farmers represent a significant share of the labour market (Bonanno et al. 1994) and, more importantly, it has been pointed that agrarian modes of living would be more extended in Latin American that in Europe or North America (Bryceson et al. 2000; Burdick 1998; Goodman and Watts 1997). An abundant literature has focused on the impacts of the 'Green Revolution' in Latin America precisely in these terms: how new, industrialized technologies have disorganized – and in some cases dissolved – traditional and locally based skills, techniques and social relations (see Desmarais 2007 and Shiva 1991 for India).

Indeed, much of the research on farmers' role and positions in GMO and agrotech controversies in Latin America has adopted what could be called a *resistance* stance. From this perspective, farmers would be ontologically at odds with the forces of globalization, scientification and bureaucratization put forward by GMOs and agbio technologies in general. This conflict has been usually framed as cultural clash between hegemonic and subordinate societies, the North against the South, or the Western culture in opposition to its (colonial) 'Other' (Apffel-Marglin and Marglin 1996; Berthoud 1992; Desmarais 2007). And this clash comprises an attempt to subjugate the *metis* of local farmers to the *episteme* of (western) experts (Scott 1993): the collective, embodied and experiential know-how put forward in practical and contextual situations, against the impersonal, cerebral and science-based knowledge that looks for objectivity and universalism. Stripped from their traditional knowledge and forced to embrace new technological and cultural arrangements that are often misadjusted to local requirements, agbio innovations would increase – and not diminish – the impoverishment of farmers in Latin America (González 2000, Ribeiro 2011). This is matched by the aggressive introduction of several trade agreements between Latin American countries and the US, the EU and international agencies like the World Bank and the IMF (Edelman 1999). This is why, it has been claimed, Latin American farmers' position regarding GMOs is not based just in a resistance against the technology per se, but against ubiquitous forces of neoliberalism and global markets (Edelman 1999, 2003).

In short, an important lineage of research has understood Latin American farmers as representatives of what Barry (20001) calls the *anti-technological* position and as the last resort of resistance against the hegemonic forces of technocracy, neoliberalism and science-based thinking (Castells 1998, Savage et al. 2005). But up to what point this anti-technological stance can be held? As Barry (2001) has also stressed, these positions often idealize and purify the 'local' – in our case represented by farmers – without attending to the complex epistemologies put forward in controversial settings. Just Callon and Rabeharisoa (2008) have claimed that purified distinctions between lay people and

[1] Just farmers hereafter.

experts may blur under certain circumstances (see also Epstein 1995), the purified demarcations between *episteme* and *metis*, scientific and experiential, contentious or consensual made to describe the epistemology of Latin American farmers in the GMO debate should be revisited. This is at least what can be retrieved from the case of Chile. As we will try to demonstrate, Chilean small and medium farmers articulate a particular epistemic framing on GMOs, one in which the nature of economic dynamics, political action and scientific evidence fleshes out a *resistance* against neoliberalization and scientification, but also an *acceptance* of them.

Case and context: Chilean regulations and actors in the GMO debate

According to public records, the first adoption of GM technology for crop use in Chile dates back to 1992, with very small areas of production. Adoption grew slowly until 2000 when GM cultivation areas increased in magnitude with onset of commercial GM seed production. Since then, production has grown steadily. The main GM crops grown in Chile are maize, soy and canola (table 1). Maize is clearly the predominant crop with 90% of total production, followed by soy and canola. Commercial GM production has been restricted to the seed-export industry. Non-seed cultivation is permitted only for research purposes.

Table 1: Surface area of GM crops in hectare, per crop and production year

Crop	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
canola or raps	203	36	110	139	746	628	445	1,188	4,012	1,862	2,648
maize	1,517	6,193	10,931	8,436	7,614	12,118	17,982	21,831	20,977	17,389	13,614
soy	6,506	279	215	128	273	166	250	1,398	5,389	5,474	3,514
Other crops*	2	16	12	4	51	18	163	47	4	44	22
Total/year	**8,228**	**6,524**	**11,269**	**8,707**	**8,684**	**12,929**	**18,839**	**24,464**	**30,382**	**24,769**	**19,798**

*Other crops include: others: rice, safflower, alfalfa, *B juncea*, barley, eucalyptus, flax, pumpkin, sunflower, melon, potato, pine, sugar beet, tobacco, tomato, wheat and grapes

Currently Chile is the 6th world seed producer[2] and GM crops represent an important part of the growing seed industry. Chile's value as a seed producer stems from its phytosanitary isolation and seasonal difference with the northern hemisphere where key markets are located. The seed industry, in general, is characterized as a highly innovative and technological sector. While its overall volume of production is small compared with other agricultural sectors in Chile, the seed industry's growth and progressive approach makes it a strategic sector for agricultural production.

Regulatory action for GM crops in Chile began, albeit precariously, shortly after the first GM food product was commercialized in the world. Chile's first GM regulation was a resolution enacted in 1993 by the Ministry of Agriculture's Animal and Livestock Service

[2] International Seed Federation: http://www.worldseed.org/isf/seed_statistics.html

(SAG for its acronym in Spanish). It limited seed reproduction activity for export purposes only, and outlined a general frame for procedures. Thus Chile's first regulatory action framed the issue as a phystosanitary one aimed at controlling the technology's impact on a specific economic sector.

In contrast, regulation dealing with GM products as a "food" was established more than a decade later with a 1996 amendment to the National Food Rule. The amendment mandates oversight of "biotechnlogical events" intended for human consumption by the country's food and drug safety agency, the Public Health Institute (ISP for its acronym in Spanish). This oversight has not generated actual GM food authorizations to date. Currently, there are no labeling requirements for GM foods or foods containing GM ingredients, either imported or produced locally. Table 4 indicates the principal norms that regulate GM crop technology in Chile today along with their enactment date.

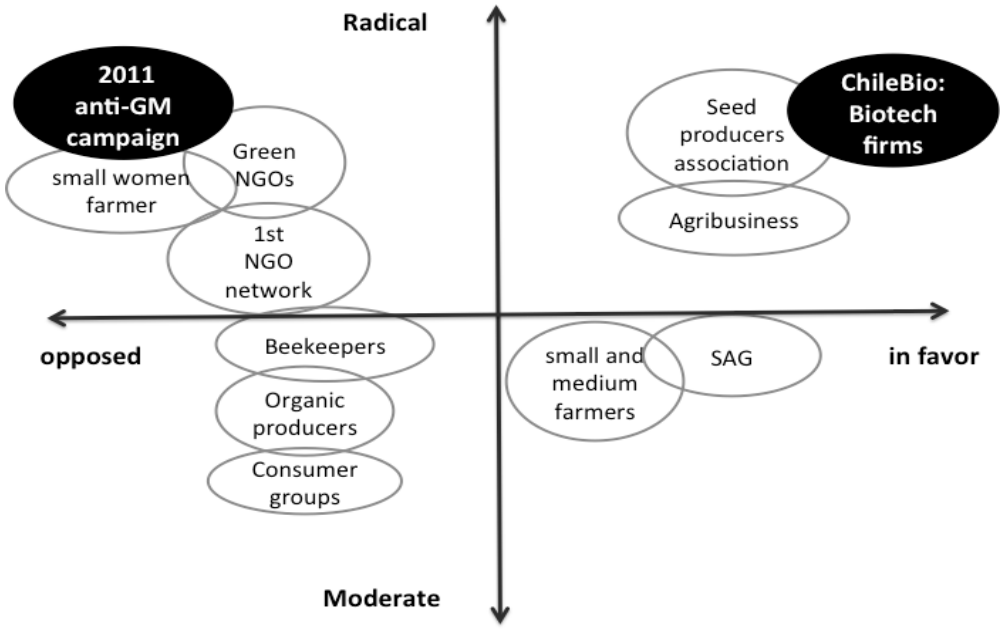
Table 4: Principal regulations and norms in GM food and crop oversight

Agency	Type of regulation	Year	Applies to
Ministery of Agriculture's Plant and Livestock Service (SAG)	resolutions	**1993**	GM seed imports
		1997	animal consumption of insect resistant maize
		1999	biosecurity norms for some pharmacrops
		2001	update of 1993 seed import norm
		2002	time frames for import and liberation into the environment of GM seeds
		2005	establishes technical comite for GMOs
		2010	status of information included in petition
Ministry of Health's Public Health Institute (ISP)	modification of 1996 Food Safety Rule	**2003**	oversight of GM food for human consumption
	technical-administrative norm	**2007**	assessment of GM food events for human consumption
	resolution	**2007**	procedures for establishing Approved Events List
	resolution	**2009**	establishment of new expert panel

In summary, under the existing regulatory scheme internal commercialization of crops or seeds is not permitted, but imports of GM food or ingredients for processing and food is allowed and until recently essentially deregulated. Some seed of GM maize not exported may be – and is – commercialized as animal feed. Imported animal feed is not segregated and hence may or may not be GM. There are no labeling requirements for GM products in general, either food, feed or crops.

This regulatory framework has propelled a particular cartography of actors. We categorized key actors in the public debate on GM crops in Chile into seven main groups: 1) seed companies 2) biotechnology firms 3) environmental and other civil society organizations 4) small and medium farmers 5) organic producers 6) beekeepers and 7) government and regulatory entities.[3] These collectives can be located according to a continuum ranging from "opposition" to "support" for the technology. Those actors falling at the "support" end tend to frame GM crops primarily as an emerging and promising market opportunity and as a central solution to poverty, food scarcity and economic development. At the "opposed" end, actors tend to frame GM crops as debilitating new market opportunities and as creating rather than solving issues of world poverty and injustice. We also aligned actors according to their use of the uncertainty/risk and co-existence frames, in what we labeled as "radical" versus "moderate" positions. Radical actors tend to frame the idea of co-existence in absolute terms, as either impossible or irrelevant often accompanied by framing risk issues as highly uncertain or very certain. This is often associated with a cognitive frame that defines GM technology as either something inherently novel or familiar. Moderate actors are more accepting of co-existence and the ability to manage risk.

Figure 1: Map of key actors and their positions



Methodology: grasping farmers

In this paper we focus on how small and medium Chilean farmers construe and assemble their epistemology regarding the GMO debate.[4] But how to seize them? Two methodological comments have to be made. First, and following the actor cartography or stakeholder mapping (Mitchell et al. 1997, Yaneva 2012), we used a qualitative case study

[3] Our preliminary analysis indicates that the organized participation of scientists is not prominent.
[4] This paper is based on the ongoing research "Public perceptions on GMOs and biotechnology in Chile". The research's main goal is to understand the development of Chile's regulatory style, explaining why, after several years, the controversy ensues and identifying the key concerned actors and their framings.

approach in which we identified key organizations participating in – or party to – the debate. These included farmers and producers, government officials, members of NGOs, scientists and biotech industry representatives. After identifying these key entities, we interviewed their spokespersons or leaders. Regarding small and medium farmers, we interviewed representatives of four key organizations: the Movimiento Unitario Campesino y Etnias de Chile (Chilean Peasant and Ethnic Unitary Movement), MUCECH; the Asociación de Agricultores Orgánico de Chile (Chilean Association of Organic Farmers), AAOCH; Tierra Viva (a network of producers organic and retailers); the Asociación Nacional de Mujeres Rurales e Indígenas (National Association of Rural and Indigenous Women), ANAMURI; and the Red Apícola (Apicultural Network).

However, for this paper we selected the interviews of those organizations that

(a) have being more active and visible in the GMO debate, and that are
(b) the largest collectives, thus best representing the overall epistemology of small and medium farmers.

These organizations are MUCECH, AAOCH and Tierra Viva, the former representing traditional farmers and the last two organic farming. Seven in depth-interviews were made with representatives of these organizations. The selection is made at the cost of excluding the voices and agendas of particular organizations. But in turn, by selecting MUCECH, AAOCH and Tierra Viva we concentrate on the most active and extended organizations, thus getting a hold on the most significant farmers' voice within the controversy. In this sense, when we refer to "farmers" in our results we are not implying a subject that represents the heterogeneity of positions and framings within the peasant and farmers' world, but what could be labeled as a "stakeholder farmer": the positions and framings of those farmers represented in the three largest and more vocal national organizations. In the following we describe these positions and framings.

Enabling the market, mobilizing the state: the economic logics of GM agriculture

When thinking about the agricultural impacts of GM crops, Chilean farmers do not attack the market; they *endorse* it. Or better said, when critiquing or praising GM developments, farmers mobilize market-oriented arguments to configure their claims. Market logics are not only accepted, but also taken as an operational framework to which every stakeholder should commit. Thus to be against GM crops doesn't translate into an epistemological revision, akin to the one put forward by the MST. Rather anti-GM farmers confirm and reinforce the validity of the market as the 'rules of the game' – and recur to it to justify their position regarding GMOs.

Farmers mobilize and accept a (neo)liberal anthropology to explain the ordering of things – including agriculture and the GM debate. Indeed, the idea of *freedom of choice* and *instrumental rationality* are pervasive in their discourses. An important officer of MUCECH puts it clearly. While he declares to be personally against GM crops, he states that as an association representative he has to defend the interests of its members, and that means letting them *choose* what is best for their businesses: "everyone should do what he wants… if a small [farmer] wants to buy seeds in China, if that suits him, if that seed works well for him, it's ok". Thus farmers see themselves as (liberal) calculative agents (Callon 1998), and that calculativeness rest on their possibility of choosing. This is linked to their view of agriculture as "just an economic issue" and as a job like any other. Therefore the search for economic benefits would be a completely *rational* and *natural* decision, an innate human propensity. This is not to say they do not value or perceive

agriculture in other terms as well, but rather that this economic view is mobilized to construct and sustain their claims in the transgenic debate. Another MUCECH officer puts it succinctly:

> farmers take a very rational decision; they would say 'if this one [seed] produces more than this other, I buy it'… a farmer's motto [is] if a business is good, the farmer will do it; if organic is a good business, if it is accessible and if he sees he makes money, he'll do it.

Being a rational decision it is also, then, a decision that *every individual* makes. Farmers, they claim, are no different from any other rational agent, thus no one has the right to blame or admonish them for their choice. "Because", as a MUCECH officer indicates,

> I *also* want to make money. If my tractor is wracked and I have to replace it, who's gonna do it for me? So if they give [a farmer] a transgenic tomato seed and if he makes money, just try saying to him 'hey, don't, you are screwing the population's health'. He won't care! He will tell you to take a hike!

Thus these representatives see farmers as a *homo economicus* – and naturalize this human condition. Just as everyone else, they should be free to choose the alternative that maximizes their economic returns and to seize their labor in monetary terms. Furthermore, from this economized framing the notion of *coexistence* emerges naturally among farmers. Within a framing that enables and justifies a market-based rationality, segregation or banning is an anathema: prohibition of any alternative would attempt against economic optimum. More specifically, farmers claim that any form of prohibition would attempt against the *ordering* capabilities of the market. In the face of increasing controversies and unsolved positions regarding GMOs, they rely on the ability of markets to differentiate niches, distribute economic space for every supplier, and thus create a harmonious coexistence. Interestingly, this position is not held just by pro-GM farmers, but also by organic and anti-GM ones. As one of the founders of the oldest Chilean organic farming network indicates:

> One of the strongest countries in organic consumption is the USA, and GMOs come from there as well… [in New York] there is an organic market in every block, 100% organic, there are sausages, meats, everything organic. You turn around the block, to another supermarket and everything is transgenic. To give people an opportunity [that's the key]; it is people who determines it [organic production]. If nobody would buy to us, we would have disappeared a long time ago, right? To produce or not produce is given to you by the market.

In brief, key Chilean farmers' organizations – whether conventional or organic, anti or pro GMOs – frame agriculture and farming debates within a market-enabling understanding. In this frame instrumental rationality is validated as the anthropological background against which farmers attitudes should be evaluated, and where a harmonious coexistence is assumed as a (positive) market externality. The market is not an entity to be attacked, but an ordering device that has to be naturally assumed and praised. In other words, market logics are not the problem but the solution.

Paradoxically, however, this marketization convenes together with strong claims for state intervention. The market is endorsed both as an anthropological reference and a distributing mechanism. Yet this doesn't prevent demanding that the state provide

economic protection, uncertainty reduction and ethical resolutions. Indeed, vis-à-vis claims that put their trust in market orderings, farmers demand economic, knowledge and ethical security from the state. Competition from international products is an especially sensitive issue for small and medium farmers. Thus reversing the market-based rationality mobilized to justify their right to choose – and to choose 'with their wallets' – these farmers allege that the Chilean state should protect local producers as well as Chilean consumers from foreign products. From their perspective, these products are uncertain entities whose agricultural and chemical characteristics are unknown.

> [The state] doesn't help preventing the entrance of Canadian lentils so our *viejos* [farmers] can produce lentils… Canadian lentils are at $580 y ours at $800 but you don't know what lentil you're eating [when eating Canadian]… I don't know what's the quality of the Peruvian strawberries sold by the *casero* [farmer's market vendor] on the street; we know they're cheaper that the ones produced by our farmers in San Pedro, but we don't know [their quality].

Thus the market should be enhanced, just as the state should intervene every time market logics do not operate as expected. This would balance the unfair economic structure in which Chilean farmers are trapped in, and reduce knowledge uncertainties related to agriculture and GMOs. From this perspective, the free-choice and market-based rationality is suitable for farmers in their productive endeavors but not for consumers in their purchasing ones. Presumably consumers do *not* (and cannot) know what they are buying and hence the state must resolve demand-side uncertainties. The role of the state as a centralized device for the reduction of knowledge uncertainties should not be restricted to the demand side. Farmers claim that the state – and not the market or other collective arena – should solve scientific controversies over GMOs. Or as an officer of MUCECH indicated:

> A serious debate would be one in which the state regulates and says 'this [GM crop] is approved; it was tested in field trials… the crop didn't caused [the harm] what was said.' That's serious… We want the state saying 'These [GM] crops cannot be farmed in Chile because there is no assurance that these transgenic crops are profitable, or ethically acceptable, but these other yes [can be farmed].' A list. Or to restrict or whatever, but clear information for everyone, not like today.

Thus farmers resort to the market in their search for a justification for their economic-driven rationality, but turn to the state for economic protection and certainties. Moreover, they claim that to fully unleash their instrumental (economic) rationality, the state should free them from any *ethical* burden:

> the state has to have an institution to regulate this [GM crops], because [the farmer] doesn't have to be questioning himself if what he's doing is ethical or not… we [farmers] don't have to be in charge of that ethical discussion… the one that has to decide, I insist, is the state.

In sum, farmers mobilize a particular economic epistemology, one in which the market is set as the template within which actors and institutions should – freely and in their self-interest – behave; but also one in which the state has to intervene to mitigate market asymmetries, protect local producers and decide unilaterally the ethical condition of GM crops.

GM politics: non-contentious politics within asymmetric networks

The mixed economic epistemology is matched by an equally hybrid political framing. Indeed, and concordantly with the neoliberal anthropology mobilized, farmers understand their sector as non-contentious political actors. What is more, they don't see themselves as *political* actors. Indeed, every effort is made to demarcate themselves as *technical* agents. Anti-GMOs organizations like Chile Sin Transgénicos are seen as too visceral and argument-less. "Because finally who wins?" asks an officer of AAOCH reflecting on which political strategy they should follow,

> those that are well organized!… if we are not capable of organizing ourselves from a *technical* perspective, no [we won't win], obviously… because the problem here is that the political is mixed in immediately, immediately comes the issue of injustice and that sort of thing, issues that can be absolutely valid and real, but I can't live with them, too intangible for a discussion that needs to be necessarily tangible. I need to have technical tools.

Distanced from any political identity, farmers – whether traditional or organic, against or in favor of GMOs – embrace institutionally-based and consensus-oriented political strategies. Collective mobilizations and other forms of direct political interventions are dismissed. "I think that to organize a protest to say no to GM crops won't change reality" concludes an AAOCH officer, "reality is too tough to be changed like that… what is left for us is to support our legislation, which is the only element I have, the 20.083 law and with it say [to GM crop producers] 'sirs, this is my law, a law from the Republic'."

Thus to participate in institutional and government-organized forums and commissions is a valid political strategy for these stakeholders, and not a subjugating exercise in which they lose political agency. Moreover, and attuned with this non-contentious and institutional-led political framing – and with the market-based rationality mobilized by farmers – moratoriums are seen by organic farmers as the best and more effective tool against GM producers. "I don't have the right to say to farmers that want to use GM technologies that they can't" assumes an AAOCH officer, "but I do have the right to say that we need more studies [for the approval of GM crops]". Connecting moratoriums with the need for technical arguments, one officer from Tierra Viva says that their strategy cannot be sustained in arguing that "pesticides are bad for people" because the industry and the government will reply "'who told you that? Do you have any research?' Then we cannot go that way; the way we have to use are moratoriums."

Accordingly, farmers prefer consensus-building strategies "in a democracy… I have to convince him [the minister], I have to discuss, to ally myself with others to obtain things, and we have obtained them slowly [with this consensual strategy]." (MUCECH officer). And in this context, *trust* and *trust-building* seem to be the key. Or as AAOCH officer puts it:

> We have to generate more trust… one has to understand the position of those people that are pro-transgenics… beyond the fact that one can think these people are wrong, they have a real business, and a business that creates jobs and creates capital and that is legal, within the Chilean law… there are people

> that are distrustful to the organic sector; they say 'damn, if they know [where I'm located] they can block me, *me pueden funar* [to organize a hostile protest], they can surround me with an organic ring, they can oblige me to get out of there', a lot of distrust… there is distrust on both sides.

In brief, farmers have a liberalized notion of their economic endeavor and concordantly a non-contentious political stance. They aspire to be technical agents – rather than radicalized political actors. They look for government-based arenas for discussion, prefer consensus- and trust-building strategies and, when against GM crops, embrace moratoriums as the most efficient tactical tool. But this non-contentious politics coexists with the acknowledgment of profound power asymmetries. Or put differently, the recognition of violent economic and political inequities regarding small and medium farmers vis-à-vis large corporations and their influence on government bodies does not encourage farmers to take more direct and contentious political strategies.

Indeed, despite their consensual political approach, farmers are concerned with issues of power concentration and imbalances in the crop production sector. For example, an AAOCH officer points out the problematic situation generated by government policies promoting increased private sector involvement in research, particularly for public research entities such as the National Institute for Agricultural Research (INIA), which should respond to the needs of all producers. Key public grants in agriculture now require private matching funds and this has pushed INIA to search for funding in the private sector: "and who is the 'private sector'? Big corporations! Then they obligated INIA to undertake research on issues that are only relevant to those that have the dough, to big corporations". Similarly, a MUCECH officer explains how economic power is, finally, the last word in the GMO controversy:

> Some say they [GMOs] are good, other that they are bad; there are studies that have demonstrated with prestigious scientists that they are bad, and there are others that say they are not bad. Then like in everything else in a globalized world controlled by an economic model of neoliberal development that absorbs families into the economy, here the biggest dog wins, the strongest animal.

Trapped in a situation where economic (thus political) power is unequally distributed and 'big dogs' always win, farmers – and especially organic farmers – are wary of conspiracies against them. A member of Tierra Viva told us how a program on GM crops aired in a popular TV program was not uploaded in the program's website and was subsequently erased from YouTube. "Damn, why?" he asks, "It is not a coincidence… phone calls here, phone call there and the coverage was lost."

Mixed knowledge economies: between scientificism and experiential empiricism.

Finally, farmers also deploy a hybrid evidential epistemology. Whether against or in favor of GM crops, farmers are not averse to technology. On the the contrary, technological innovation is as seen as an *achievement*. Thus in contrast to disenchanted and dystopic visions where technology is construed as a source of infinite uncertainty (Jasanoff 2010), farmers praise technology as a supplier of securities: technologies, because a scientific achievement, have to be trusted. "When I buy a medicine… I have absolute security that that medicine does what it says" assures an officer of MUCECH.

At the basis of these certainties rest an understanding of technology as an integral part of human development. Science, in this sense, is seen as a driver of progressive change. For farmers this is, in part, due to the inevitable development of technology: we cannot (and should not) resist technological change. More profoundly, technology would be an integral part of human nature. Humankind has evolved together with – and thanks to – its technological innovations. From this perspective ethical contestations to DNA recombination would be an exaggeration: its *utilization* can be challenged, but not the innovation per se. For example, an officer from AAOCH explains:

> I cannot make an ethical critique to transgenics. That's the *nature* of humankind. I insist, once men moved and roam the world by horse, he overpowered the horse. Then he invented the wheel and tomorrow it will be something else, is part of our evolution as specie.

Thus even if an anti-GMOs stance is held, we, as humankind, should not be ontologically against technology. An AAOCH officer explains the synthesis:

> What would I accomplish by saying 'no' [to DNA recombination], I would just distantiate myself from this [technology], marginalize myself from this, and lose the possibility of knowing what is going on, because I insist, it would be really interesting having plants or groups of plants in an organic system with minimum input requirements.

But farmers not only believe in technological innovation; they also frame the GMO debate in *technical* terms. More specifically, and linked to their aversion to political rhetoric as a mode of collective action, farmers explain their failures – indistinctly to their objectives and motivations – by their lack of technical skills and, specially, 'hard data': "the biggest weakness of the anti-GM movement is that it lacks hard data, *real* data, research and things like that", concludes and AAOCH officer. In other words, success will be accomplished once capable of *scientificizing* their resources, evidences and arguments.

> We don't have technical arguments, and in front of technical discussions you cannot present yourself just with political arguments. 'Sirs, this is my proposal, here it is, point 1, 2, 3... 10 points; this is how it will be done, it will take these many years, we want this moratorium and then we want a plan'… in this world you have to have ideas, and concrete ideas.

But the same AAOCH officer that claims for more "hard" and "real" data sustains many of his arguments in experiential evidence and intuition-based assessments. For example, a critical debate between crop producers and organic farmers is whether Chile has illegal GM farming. Because for organic farmers "hard" data is not trustful, since it would contradict situated and hands-on knowledge. "What you see in *reality*", says the AAOCH officer contesting the claim that GM farming is banned, "you may go to small seed distributers and [you can see how] farmers go 'hey, I want the transgenic one'". An officer from Tierra Viva confirms this suspicion, and also based on his observational evidence:

> there are people that produces transgenic sunflower for Monsanto, just for seeds, and they are asked for 2,000 kilos [of seeds] and they export them but

> they produced 2,500, and *we know* that those 500 kilos are being commercialized in local *tostadurías* [grain and cereal retailers] and mills".

This experiential knowledge about GM crops continuous what farmers see as an inherent 'farmer epistemology': a highly empirical, pragmatic and realistic way of understanding things – including the GM debate. As an officer from MUCECH explains, "the farmer is thoughtful, and agriculture is *empirical*, you learn by doing". Another member of MUCECH also resorts to his applied and embodied knowledge to reject the questionings against GMOs: "I have a much formed opinion about transgenics, with whom I haven't lived, but I've been next to them, I've planted on top of transgenics, so I have *empirical* experience". This is also "hard" data, but not the kind one might find in scientific research: it would be a *better* kind of evidence. Nothing else can be said beyond that embodied knowledge, no technical argument, data or piece of evidence can beat direct experience or the intuitional savvy derived from a longstanding and intimate relation with the land. An officer from MUCECH, explaining why he knows GM crops are being farmed in Chile, expresses: "Damn, how beautiful varieties grow in [the land of] our next door farmer that has more dough than us, how could he do that, wouldn't the crop be genetically modified?"

Final remarks: essencialisms, co-production and the neoliberal experiment

Confronted to the GMO debate, Chilean farmers – or at least the representatives of the largest and most active Chilean farmers' associations – mobilize an economic epistemology in which the endorsement of market dynamics coexists with demands for stronger state interventions, and a political epistemology where the distrust in large corporations, rejection of unequal power distribution and fears of conspiracy coexist with non-contentious political strategies, consensual framings and an anti-political sentiment. In addition, Chilean farmers put forward an evidential epistemology in which the support to and the confidence on hard data and technical skills coexist with embodied, experience-based and intuitional knowledge.

Due to the several data limitations of this paper, we are wary of expanding these results to the complex ecology of actors and entities constituting the Chilean farmers' realm – thus of articulating explanations about how, when and where this particular epistemology was assembled. However, at least three key questions arise.

First, these results – as preliminary as they might be – call for more fluid and non-essentialist approaches to farmers, especially in Latin American and the developing world where idealized categories are usually deployed. This is not to say that farmers are unable to mobilize differentiated and contesting/contentious knowledges, political strategies and practices, but a call for the recognition of the complexities involved in contemporary Latin American farming communities. As economic challenges change, new technologies are introduced and democratic institutions expand, the ways farmers understand and perform their world mutate. To anchor the role played by farmers in the GMO debate in a naturalistic and static definition of their identities and expectations may hamper a sound understanding of how agbio technologies travel to, land in and are implemented within Latin American countries.

Second, the case of Chile indicates the need to relate the epistemologies put forward by different actors in the GMO debate with the regulations that shape the form and content of these technological controversies. Or put differently, the need to utilize a co-

productionist idiom (Jasanoff 2006). Indeed, the ways different actors create a political, economic and evidential world cannot be separated from the ways legal frameworks, economic devices and institutional arrangements erect knowledge, practical and material boundaries. For the case of Chile, the fact that public information from state agencies has been traditionally hard –not to say impossible – to obtain modulates a participatory arena in which the main contentious object is transparency – well over other objectives such as moral or cultural claims. In turn, the agents' epistemologies reshape – or help to consolidate – the ways the political and scientific forum is defined. If concerned actors in the GMO debate enact a world in which "good" evidence is science-based, the probabilities of having a regulatory framework that includes heterogeneous epistemologies are negligible.

Finally, the case of Chile shows the impact that the neoliberal experiment conducted in the country (Lave 2010; Van Horn and Mirowski 2009) has had on multiple realms. As Plehwe (2009, 2) has claimed, "Neoliberalism must be approached primarily as a historical 'thought collective' of increasingly global proportions", and by "thought collective" he refers to "a set of shared values and principled beliefs" which would have allowed "community members [neoliberals] to effectively communicate across disciplines and audiences in the pursuit of hegemonic strategies." (Plehwe 2009, 35). As such, neoliberalism has survived way beyond Pinochet's dictatorial regime, becoming an undisputed worldview for most political and economic elites in Chile (Silva 1991). Farmers' confidence on market mechanism, consensual politics and technical knowledge – all elements of the neoliberal creed (Markoff and Montecinos 1993) – have to be explained, we suspect, by the percolation of a neoliberal epistemology into policy-making in Chile. Or put differently, farmers' epistemologies have to be explained against the light of a society's particular expert culture (Jasanoff 2003). In this sense, national trajectories and developmental histories, especially regarding how expert cadres are fleshed out, are critical for understanding the economic, political and evidential framing of concerned agent in the GMO debate.