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WHOSE REALITY COUNTS WHEN DESIGNING REGULATION ON TRANSGENIC SEEDS IN COTTON PRODUCTION?

Valeria Arza¹
M. Eugenia Fazio²
Laura Goldberg³
Patrick Van Zwanenberg⁴

This paper is based on research undertaken within an international research project called 'Rethinking Regulation', co-ordinated by STEPS centre. In Argentina the research was directed by CENIT. The Paper was written with the financial support of ESRC.

¹ Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Centro de Investigaciones para la Transformación (CENIT), varza@fund-cenit.org.ar

² Centro Redes

³ Centro de Investigaciones para la Transformación (CENIT); Universidad de Buenos Aires (UBA)

⁴ STEPS centre - SPRU – University of Sussex

Whose reality counts when designing regulation on transgenic seeds in cotton production?

Valeria Arza, María Eugenia Fazio, Laura Goldberg and Patrick van Zwanenberg **

Abstract

This paper discusses the regulation on transgenic cotton in perspective of actual practices and needs of poor farmers in Chaco Province – Argentina. The aim is to disentangle the extent to which the existing regulation take account of *all* farmers' practices and whether existing regulation, as it is designed and implemented has had any effect on improving the livelihood of *poor* cotton farmers. Based on fieldwork done in Chaco in June 2008, we claim that the regulatory designs neglected to take into account small farmers' traditional long-standing practices regarding relations within the value chain. As a consequence, poor farmer's real seed trade occurs beyond *The Seed Law*. On the one hand, this implies that these farmers do not pay royalties on IPR. But on the other hand it also implies they have no protection over the quality of seeds they buy. Moreover, informality also creates risks at national level because it introduces further weakness in the ways in which ecological risks can be managed, and potentially threatens continued access to international markets. The paper put forward guidelines for policy action.

** Valeria Arza: Fundación CENIT – CONICET. Corresponding author: Callao 796 6° piso, tel/Fax: 4815-1310, yarza@fund-cenit.org.ar; María Eugenia Fazio: Centro REDES; Laura Goldberg: Fundación CENIT – UBA; Patrick van Zwanenberg: STEPS Centre - SPRU – University of Sussex

1. Introduction

Regulation is a key device available to governments interested in shaping technology for socially desired purposes. The regulatory framework for a technology such as transgenic seeds affects investment decisions, innovation processes, how and to whom access is provided, and the distribution of risks and benefits amongst different stakeholders.

This document discusses the regulation of transgenic cotton seed in Argentina. It suggests ways in which the regulation of *access* to the technology and the regulation of *risk* could be improved in ways that support poor cotton farmers' livelihoods.

We argue that small cotton farmers' needs, views and practices were not properly taken into account when designing the current regulatory framework. We suggest that this helps to explain why the vast majority of small cotton farmers obtain and use transgenic seeds informally – beyond the regulatory framework. This not only poses risks to farmers' livelihoods, but it also poses problems for the regulatory system as a whole, undermining its capacity to properly manage risks and benefits on behalf of a broader range of stakeholders. As a consequence we argue that:

- Regulation needs to take account of *all* farmers' practices, if it is to, achieve its intended effects.

- Regulation needs to take account of vulnerable farmers' needs and views if it is not to neglect or even undermine those farmers' livelihoods.

This document will be of interest to all those involved in managing the production, distribution and use of transgenic seeds, including policy makers, public agricultural research organisations, regulators, seed breeders, seed retailers' associations, and farmers' associations.

This paper is based on research undertaken within an international research project called 'Rethinking Regulation' co-ordinated by the STEPS centre.⁵ In Argentina the research was directed by CENIT,⁶ and is based on fieldwork conducted by CENIT researchers in Chaco Province. The fieldwork consisted of focus groups and in-depth interviews with farmers of different sizes, seed retailers, seed breeders and regulators during 2008.

This document is organised in six further sections. Section 2 describes why regulation is usually contested and why it tends to reflect powerful actors preferences. Section 3 briefly discusses the history of cotton production in Argentina and describes the distribution of economic power between relevant actors involved in cotton production in Chaco. Section 4 outlines the regulatory

⁵ This project aimed at understanding the process of international harmonization of regulation and its consequences for poor users of technology in developing countries. It analysed the extent to which regulators understand issues of access and risk in relation to transgenic cotton and pharmaceuticals in Argentina and China, and how and why do these understandings overlap, compare and contrast with the way poorer users experience these issues. See <http://www.steps-centre.org/>

⁶ See www.fund-cenit.org.ar

framework within which access and risks of transgenic cotton seeds in Argentina are managed. Section 5 describes the potential and planned effects of that regulatory framework whereas Section 6 explains how and why regulation, once implemented, has largely failed to achieve its planned effects. Finally, Section 7 discusses challenges and steps that could be followed, in terms of rethinking regulation, capacity building and policy making, to improve regulation, especially from the perspectives of vulnerable farmers' livelihoods.

2) **Regulation and power**

Different stakeholders often have competing views about the most appropriate ways of regulating access to, and the risks and benefits of, a technology. . In the case of transgenic seeds, regulations influence **access** by the ways in which they allocate intellectual property rights (IPR) to seed varieties and genetic material. But in doing so there are choices available which affect the balance of interests between seed breeders, farmers, including those who are most vulnerable, and firms and public sector researchers interested in improving on existing seed varieties. There are choices over which 'public goods' should be prioritised: incentives for the private sector to commercialise new technologies, or incentives to promote the widespread and rapid diffusion of a technology. Regulation also affects the kinds of **risks** and benefits that are taken into account in public decision-making, and the ways in which those risks and benefits are managed. Seed quality, biosafety, an internationally competitive agricultural sector, the sustainability of export markets,

rural employment, food security, crop diversity, are all potential risks, but which ones are the most important, which should be taken into consideration, and how, in regulatory decision-making?

The design of a regulatory framework is usually the result of a negotiation process between government, private actors, and civil society, all of whom may have different and competing views as to the most appropriate set of rules, incentives and constraints. In both, developed and developing countries, powerful stakeholders will usually have greater capacity to voice and impose their interests over others during the negotiation process in the design phase of regulation. They usually constitute a coherent group who might also be more capable of influencing and in some cases even capturing regulators during the implementation phase. In contrast, the needs of poorer, less powerful groups in society are less likely to be reflected in the design of regulatory framework, and in its implementation, especially when their interests conflict with the interests of the more powerful. Their political voice is often fragile and sparse and their influence weak.

In developing countries, powerful groups with an interest in regulation are not only national but also international. For example, by using the rules of the World Trade Organisation (WTO), or by using bilateral trade sanctions, powerful trading partners and multinational firms, could threaten Argentina's access to international markets if the country does not comply with international regulatory obligations - e.g. regarding IPRs, where lack of enforcement in the transgenic seeds sector in

developing countries reduces the profits of multinational companies. Thus, even if poorer and less powerful groups manage to voice their needs, their influence might be subject to strong countervailing pressures if their interests and preferences did not coincide with those of international actors . Not only do developing countries need to cope with the conflicting demands of domestic stakeholders; they also need to deal with international threats of losing markets if they fail to harmonise their domestic regulations with international rules.

Regulation is therefore a compromise between different interests, and it cannot reflect fully the wishes of all stakeholders simultaneously. But beyond this problem, regulation can also fail to control technology access and manage risk in the ways intended, and that failure can occur in two ways. First, regulatory rules may be poorly implemented, so that intended effects on the behaviour of those who are subject to regulation do not occur. Second, regulatory rules may be poorly designed, regardless of the quality of implementation, if they fail to take into account relevant characteristics of the system that they are trying to control and manage.

The focus of this paper is on small cotton farmers. In the sections that follow, we analyse the extent to which the needs and practices of small cotton farmers were reflected in the design and implementation of regulation, and the consequences that this gave rise to . When necessary we will also discuss the extent to which their

needs match those of other actors in cotton production. First, however, we briefly describe the context in which small cotton farmers operate in Argentina.

3. Cotton production and producers' practices in Argentina

The province of Chaco accounts for about 60% of Argentinean cotton production by area. It is one of the poorest provinces of Argentina. In rural and dispersed parts of Chaco, 75% of the population live below the poverty line⁷.

Production of cotton in Chaco began in the early 1900s, and as summarised in Box 1, it has been subject to strong swings of stop and go, mostly in reaction to national policy and international prices. More recently the dramatic increase in soybean production has significantly displaced cotton production.

Data for 2000/1 indicated that there were about 13,000 cotton producers in Chaco⁸. Most of these are poor small holders working on small tracts of land and growing only cotton, alongside a few other crops for domestic consumption. A few, very large, producers are responsible for most of the cotton production by volume in the region. We classify cotton farmers in Chaco into three different groups based on a taxonomy used by agricultural researchers in the region⁹. These are (i) micro

⁷ Data from United Nations.

⁸ See Forclaz, M. A., Mazza, S. M. and Giménez, L. I., (2004). 'Clasificación De Los Sitemas De Producción Algodonera En La Provincia Del Chaco, Mediante El Uso De Análisis De Conglomerados', *Revista de Investigaciones Agropecuarias - INTA*, Vol. 33, No. 3, pp. 15-25.

⁹ See Elena, G. M., Imfeld, E., Pasich, L., Ricciardi, A. and Russo, J. L., (2000). Estudio De La Cadena Nacional Agroindustrial Algodón De La República Argentina, INTA - EEA Saenz Peña.

farmers (known as minifundistas in Spanish); (ii) small farmers, and (iii) medium & large sized farmers. Minifundistas and small farmers have little economic power and their influence over input suppliers and buyers of harvested cotton is weak, as suggested by their position in the distribution of power within the value chain. Figure 2 schematically represents the distribution of power of different actors; the larger the surface, the greater their capacity to exert influence over others.

Small farmers and minifundistas are the least powerful actors within the cotton value chain, with seed breeders, seed producers and other input sellers, on one side, and cotton buyers and textile mills, on the other. Cotton bales are sold to the textile industry or are exported; in both cases small cotton farmers are price takers.

As for the seed market, until the 1980s it was dominated by the National Institute of Agricultural Technology (INTA) - a public research institute - and a number of local seed firms. Since the introduction of transgenic cotton in 1996 a single breeder, Monsanto¹⁰, dominates the formal seed market. However, the majority of small farmers, as summarised in Box 2, obtain and use multiplied versions of transgenic seeds produced informally by those who own (or have access to) cotton gins. Following production of cotton on-farm the harvested cotton is then delivered to cotton gins, sometimes through intermediaries, which provide initial processing of the crop, separating the harvested cotton into seeds and baled fibre.

¹⁰ The firm is called Genética Mandiyú in Argentina. It is a joint venture between three private companies -Monsanto, DPL and a local company called Ciagro.

There are both privately owned gins and co-operative owned gins in Chaco. Seed retained at the ginning stages may also be used for re-planting and it was clear from the fieldwork that many cooperative leaders and other producers keep and multiply those seeds, which in of the vast majority of cases were transgenic seeds. These actors become seed producers and they usually sell other inputs as well (e.g. fertilizer, pesticides, diesel).

Since there is a long-standing practice in which small farmers exchange seeds, farmers sell their production to cooperatives or other owners of gins –who usually also produce and sell seeds. Farmers are often indebted to them because they previously bought (borrowed) inputs (including seeds) from them. Thus, small farmers do not usually choose the seeds they buy; the traditional relationships within the value chain make them get the type of seeds that are offered by cooperatives or seed producers. Small farmers are, therefore, technology takers.

On the other hand, poor farmers are horizontally trapped by the striking inequality in land distribution for cotton production (see Box 2). As summarised in Box 2 micro farmers do not have access to GM technologies, small farmers usually get informal access to GM seeds that are not certified and may be fake or poor quality, whilst only big farmers are able to obtain certified, good quality GM seeds.

In sum, although with a very unstable evolution, cotton has been produced for over a century in Chaco province in Argentina. A big push was given during the ISI

period and then again with the increase of international prices in the mid – 1990s and the introduction of transgenic seeds. This evolution has halted as a consequence of the expansion of soybean. There is a very unequal distribution of power among actors involved in this activity, with micro and small farmers trapped both vertically - mainly between seed breeders/producers and cotton buyers- and horizontally: they are the large majority of farmers but only produce about one third of the total cotton produced in the country.

4. The regulatory framework in Argentina, design phase

The Argentinean regulatory framework for transgenic seeds manages issues of access and risk via several different instruments, enforced by a number of public institutions, and these are summarised in Table 2. Rules covering access concern the protection of IPR, and are a response to both international and domestic pressure. Rules covering risk comprise a) a guarantee of quality to reduce farmers' uncertainty regarding the use of seed technology, b) the approval system for genetically modified organisms (GMO), which includes issues of agricultural and ecological biodiversity and standards for accessing international markets.

4.1. Access: IPR

In Argentina genes are patentable but plants are considered non-patentable. Nevertheless, plants are protected by plant variety protection legislation. Thus, for transgenic seeds the seed proper (the variety) falls under plant variety protection

legislation whilst the gene inserted into it - which gives the variety a specific characteristic - falls under the patent law.

In 1988, Argentina began to be put under pressure from the USA – by threats of unilateral economic sanctions - to update its patent legislation. In response, Argentina initiated the process of drawing up a new *Patent Law*, which was eventually approved in 1994 and after some amendments the current version allows modified genes to be patented.

During the same period, in response to pressure from both international and domestic seed firms, Argentina subscribed to the international conventions on *breeders' rights*. This also enabled Argentina to become compliant with the TRIPS Agreement. *The conventions* currently exist in two forms: UPOV 1978 and UPOV 1991.¹¹ The 1978 version is weaker than the 1991 agreement since it allows other breeders to use protected varieties to develop new varieties and because it also allows farmers to keep seeds for their own use (hereafter, *farmer's rights*). UPOV 1991 restricts those rights: farmers must pay royalties on the seeds they save and other breeders must prove their new variety is significantly different to get new protection. *The Seed Law*, created in 1991, adopted (and adapted) the weaker protection, namely UPOV 1978.¹²

¹¹ Stands for Union for the Protection of New Varieties of Plants

¹² Although UPOV 1978 also allows farmers to multiply seeds and to exchange them non-commercially with other farmers, *The Seed Law* did not include those rights but included the *farmers' rights* to keep seeds for next season.

4.2. Risk: GMO approval & Seed quality

Argentina's GMO approval system was created initially in response to the activities of multinational seed companies who were looking for locations where they could conduct 'off-season' field trials and seed production (i.e. in the Southern Hemisphere) in order to accelerate the development of new varieties, presumably for initial commercialisation elsewhere.

In 1991 a National Advisory Commission on Agricultural Biotechnology, known by its Spanish acronym as CONABIA had been created, under *The Seed Law*. CONABIA, which comprises representatives from the government and the seed industry, was tasked with developing a regulatory framework to cover field testing and commercialization of agricultural biotechnology. This took the form of a series of Resolutions issued by Secretary of Agriculture, Fishery and Food (SAGPyA), that set out the rules and regulations by which firms could apply for licenses for laboratory and greenhouse testing, field trials and eventually commercial release of genetically modified microorganisms and plants, all of which would have to follow reviews by CONABIA.

Approvals for the experimental and commercial release of transgenic cotton involve two stages: an assessment of the likely impact of transgenic cotton on the agricultural ecosystem, which is reviewed by CONABIA; and a market impact assessment. The latter, performed by the National Directorate of Agri-Food

Markets (DNMA) within SAGPyA, examines the regulatory status of the GM cotton in Argentina's export destination markets and, as a result, whether approval of the GM crop in Argentina might represent a potential barrier to those markets.

Regarding seed quality *The Seed Law* establishes that information on the variety, the germination power and the botanical purity¹³ must be clearly labelled in the package. All packages must also show a government stamp certifying the validity of such information. When seeds comply with this, they are called *certified* seeds.

5. How does the design of the Argentinean regulatory framework affect the reality of poor farmers?

Figure 3 represents the distribution of benefits as can be anticipated from the design phase of current regulations. The larger the surface the greater the anticipated benefit. This Figure can also be interpreted as a representation of the distribution of power in the regulatory negotiation process.

In terms of *access* regulation was designed to protect the IPR of seed breeders and only benefit farmers, insofar as seeds might not be commercially available in the absence of some form of IPR. Neither do the regulations benefit the local scientific community whose research capacity on transgenic seeds is not currently competitive.

¹³ The former informs the quantity of plants that should be expected from the seeding process, the latter guarantees that all plants will grow homogeneously.

Thus, in the case under analysis the breeder is the main *potential* winner from the design of IPR regulations. Although, the *farmers' right* does not benefit the seed breeder; it is such a powerful player that it usually establishes private contracts with its clients removing their *farmers' rights* by forbidding them to keep the transgenic seeds for their own use unless they paid a royalty to the breeder¹⁴. This is in clear contradiction to *The Seed Law*. For small farmers, however, these private contracts do not impose any further burden because they cannot afford the price of transgenic seeds sold by the breeder, which includes royalties. Thus, even if private restrictions did not exist, small farmers would not benefit from their *farmers' rights* to keep those transgenic seeds. Large farmers are the main clients of the breeder although they usually fail to comply with the private contracts signed with the breeder¹⁵.

In terms of *risks* regulation has potentially better consequences for small farmers. Firstly, regulation on seed quality reduces the technological uncertainty faced by farmers. If they bought *certified* seeds, they would have a reasonable guarantee of the seeds' main properties and they could choose the most suitable varieties given their production conditions. Secondly, GMO approval regulations impose constraints on breeders of transgenic seeds who are required to conduct pre-commercialisation tests to satisfy the regulator that there will be no significantly

¹⁴ Moreover, in order to enforce the ban on seed saving, most contracts oblige farmers to use the company's authorised gins to process the cotton bolls.

¹⁵ Although large farmers are the main clients of Genética Mandiyú they only buy 10% of seeds they use per year. They multiply the rest themselves.

greater environmental impact from the cultivation of GM crops as compared to the impact from conventional varieties. Regulators will also not approve seeds if significant international markets are not available. The spirit of this regulation should result in positive socioeconomic effects for poor farmers, (so long as the kinds of potential environment implications arising under small farmers' production constraints are taken into account in the regulatory approval process).

In practice, the regulatory framework fails to achieve most of those potential (planned) effects. On the one hand, the breeder does not gain as much extra revenue that intended under current IPR regulations. This is because the rules are not properly designed or enforced. On the other hand, most poor farmers are immersed in informal markets and therefore have no choice but to buy uncertified seeds whose quality cannot be assured. They may also buy varieties that have not yet been approved and therefore neither environmental implications or the availability of export markets can be assured. This is what we now discuss in more detail in section 6.

6. How and why has Argentinean regulation failed? The mismatch between practices and regulation design

There are a number of dimensions in which, and reasons why, the regulatory framework covering transgenic cotton seeds has failed to achieve anticipated effects on access and risk.

Firstly, there is poor enforcement of IPR: large farmers multiply transgenic seeds that they buy from the breeder, which clearly contravenes both *The Seed Law* and the private contracts signed with the breeder. Thus, the potential planned effects of regulation, which would have benefited the breeder, are not achieved and instead large farmers benefit from the lack of enforcement. In fact, representatives of the breeder told us that *The Seed Law* is useless for enforcing IPR –as we discuss below- and the breeder is currently planning strategies to obtain royalties on the gene by relying on *The Patent Law*.

Secondly, small farmers do not interact directly with the breeder; their traditional practice is to exchange seed for crops, usually with cooperatives. These practices have not been properly anticipated by *The Seed Law* (or at least they were not controlled), so small farmers' practices occur beyond the law in an 'informal market'. This not only means that small farmers do not pay IPR but more importantly that the quality of seeds they buy is not guaranteed.

The seeds small farmers buy from cooperatives and other seed retailers are not *certified*, which means their properties are uncertain. In the fieldwork, farmers complained about low germination rates and they said that from time to time they lost their harvest because the cotton plant was not tolerant to herbicides as it should have been if the seeds were the RR variety they were supposed to be purchasing. Interviewed INTA experts also agreed that seeds available to small farmers are

usually of very low quality. Therefore, there is a failure in the design of regulation regarding *quality*. Since the majority of farmers operate in informal markets the potential planned effects of reducing farmer's uncertainty by guaranteeing certain quality characteristics are not currently achieved.

The Seed Law's protection of *farmers' rights* could have benefited small farmers had they bought directly from the breeder. In such a case, they could have trusted the technology they bought in the first place, and keeping seeds for subsequent season should have been economically beneficial. But small farmers do not buy certified transgenic seeds either because they are not available, or because their prices are prohibitive. Rather, they buy in informal markets where quality is not monitored. Thus the *farmers' rights* included in *The Seed Law* are primarily functional to big farmers who directly interact with the breeder -and also to cooperatives as we discuss below.

Thirdly, although cooperatives and other gin owners are not supposed to commercialise seeds, they are effectively protected by *The Seed Law*. In the rare event of inspection¹⁶ cooperatives can always claim that seeds belong to farmers, a practice that then falls on *farmers' rights* authorised by *The Seed Law* – even if in reality farmers would need to pay with part of their cotton harvest to get those seeds back. The neglect of farmers' practices in the design of regulation, together

¹⁶ INASE is entitled to control whether seeds sold to farmers are *certified*. According to officers interviewed in INASE, seed multipliers would not sell uncertified seeds from retailers' shops but directly from the fields, which becomes more difficult to be identified and control. However, the strikingly low quantity of officers working in INASE for the Northeast area (including Chaco) suggests that their monitoring capacity is, at least, very weak.

with the lack of enforcement to avoid multiplication, means that cooperatives and seed multipliers benefit from regulatory failures.

Fourthly, the uncontrolled multiplication of seeds and the development of informal markets means that CONABIA cannot guarantee that only approved GMO will be commercialised in the Argentinean market. In fact, there is evidence that a third variety of transgenic cotton is being commercialised¹⁷, which has not been yet approved by CONABIA. This is a serious national problem, since ecological and market risks have not been fully assessed and it is likely that this new technology has already become widely diffused. There is no clear evidence on how these unapproved seeds have entered the market in the first place. Experimentation on new varieties is performed by the breeder on their premises, so the new variety could have been introduced directly by the breeder itself, or stolen from the breeder, before approval. Alternatively, it could have been illegally imported from other neighbour countries. It is clear, nevertheless, that the spread of informal markets aids the process of diffusion of unapproved varieties.

Figure 4 schematically represents the actual distribution of benefits derived from the implementation of current regulation.

In sum, the regulation of IPR does not ensure that the breeder receives royalties for the majority of cotton seeds circulating in Argentinean markets. Similarly, GMO approval becomes ineffective if informal markets spread widely. Finally, and more

¹⁷ The variety BR, which is a stacker of Bt and RR varieties.

importantly for the purpose of this document, regulation of quality does not affect the transgenic seeds used by small farmers. *The Seed Law* regulates seed quality, but only for seeds that are formally commercialised, while the great majority of cotton farmers have no choice but to buy transgenic seeds in informal markets or to receive conventional seeds by local Governments. In reality, then, *The Seed Law* is unable to guarantee the quality of the technology used by small farmers because it does not regulate the seeds cooperatives keep “on behalf” of farmers and later sold informally in exchange for cotton. However, this cannot easily be solved. Simply enforcing the current *Seed Law* – by prohibiting the multiplication of seeds -, would rebound in further damage to small farmers in the absence of compensatory measures. Small farmers’ cannot afford to pay the royalties on certified seeds.

To put it simply, farmers’ practices have undermined the design and regulatory power of *The Seed Law*. The regulatory designs neglected to take into account small farmers’ traditional long-standing practices regarding relations within the value chain. Small farmer’s real seed trade occurs beyond *The Seed Law*. On the one hand, this implies that farmers do not pay royalties on IPR. But on the other hand it also implies they have no protection over the quality of seeds they buy. Moreover, informality also creates risks at national level because it introduces further weakness in the ways in which ecological risks can be managed, and potentially threatens continued access to international markets.

7. How could regulation and policy improve the situation of poor farmers?

The above situation will only change if small farmers' concerns, and their practices, both in terms of their productive activities and also in their commercial relations with technology sellers, other farmers and cotton buyers, are taken into account when negotiating and designing regulations. This creates some **challenges**:

1. Small farmers have relatively little political and economic influence, either on other actors within the cotton production chain, or on the political process through which regulation frameworks are negotiated.
2. All stakeholders agree that specific regulations in the cotton sector should be part of a coherent agricultural policy. Moreover, many analysts believe that the current process of "soyisation" of Argentinean productive land needs to stop. The urgent need is to develop an integral agricultural policy prioritising the diversification of production and supporting small holders' needs.
3. The distribution of power among farmers is very diverse and this implies that some cotton farmers are much more vulnerable than others. Any regulation that attempts to improve the situation of the most vulnerable ones needs to be able to identify those groups. Vulnerability is usually related to exploitation size, but the relation is tricky. Not only is it difficult to define size limits but also other factors count. For example, location, type of land holding, type of workforce

(family or hired) and whether farming cotton is the primary economic activity of the land holder.

4. There are currently both international pressures, and domestic pressures from the seed industry, for the Government to adopt UPOV 91. The breeder, is also asking for stronger enforcement of the *Patent Law*. All of these options would worsen the situation of small farmers, who would not be sheltered anymore by the *farmers' rights* (even if today this right is primarily fruitful for cooperatives). If policy makers are to prioritise small farmers' welfare they should resist pressures from international and national lobbying groups or at least ensure that those new rules do not apply to poorer farmers.

Our experience during fieldwork has also provided insights on issues to be considered to avoid regulation failure, in general, and to improve the realities of vulnerable groups in cotton production, in particular. In Figure 5 we represented how we think priorities should be established when rethinking current regulation.

The above-mentioned insights from our analysis of fieldwork data could be organised in three groups:

1. Rethinking regulation:
 - a) All farmers' practices must be considered during regulatory negotiations to avoid regulation failure. This is regardless of the distribution of power in the negotiation process. As we have argued above, if small farmers'

practices are neglected the regulation is likely to fail their planned effect, if those effects were unrelated to the needs of small farmers.

- b) Not only practices but also needs of vulnerable farmers must be considered if the regulation is meant to improve the situation of groups with weak political voice..
- c) There is a need to promote especial regulation on *access* to technologies for small farmers. Currently, regulation on access only concerns about the needs of IPR owners. For example, royalty exemptions to transgenic seeds when sold to small farmers could be considered -or, as a second best, public subsidies on royalties for some specific cases.
- d) There is also a need that regulation considers the specific risks' of vulnerable groups. Our fieldwork informed that these groups currently face risks which are not properly accounted in existing regulation. They related to: uncertainty in the quality of seeds they use, risks on their livelihoods associated to expansion of soybean, risks associated to the spread of pest like the boll weaver (*picudo algodonero*), among others.

2. Capacity building

- a) It would be potentially beneficial for small farmers' the promotion of capacity building of INTA to form joint-ventures with international producers of transgenic technologies. We know from fieldwork that there is a wide support to INTA among small farmers. Joint ventures might be better served by south-south collaborations to balance international power.

Possible partners could be found among Brazilian and Chinese public research organisations or private companies.

- b) It is important to improve governance and managerial skills of regulatory bodies such as INASE or CONABIA and also of other related public actors such as local Governments responsible for seed distribution among micro farmers.

3. Policy making

- a) It seems necessary to give voice to small farmers by promoting grassroots organisations and movements not necessarily aligned to the existent cooperatives and unions, which could participate in national regulatory negotiations
- b) Participatory research could be helpful to identify the seed's qualities preferred by small farmers, whose development could be achieved with INTA's available research capacity and/or developed technologies. We believe the legitimacy enjoyed by INTA among stakeholders in general should be better exploited to improve the realities of small farmers.
- c) Participatory research can be informative on farmers' practices that must be considered in the design of future regulation to improve its rate of success.
- d) Research to provide solutions to the most important plague of cotton production in Argentina - the boll weaver- must be promoted.

Acronyms

ARPOV: Argentinean Association for the Protection of Plant Varieties

ASA: Argentinean Seed Association

CONABIA: National Advisory Commission on Agricultural Biotechnology

DNMA: National Directorate of Agri-Food Markets

INASE: National Seed Institute

INDEC: National Institute of Statistics and Censuses

INPI: Industrial Property National Institute

INTA: National Institute of Agricultural Technology

SAGPyA: Secretary of Agriculture, Fisheries and Food

UPOV: Union for the Protection of New Varieties of Plants

Boxes, Tables and Figures:

Box 1: The historical evolution of cotton production in Chaco

The production of cotton started in the 1900s when European settlers were encouraged to grow cotton by the Argentinean government after the indigenous population was defeated militarily in the 1880s and 1890s. Cotton production nationally, much of which was grown in Chaco, grew gradually, until the great Depression of the 1930, from 1,700 hectares in 1909/10 to 122,000 hectares in 1930. Most production at that time was exported .

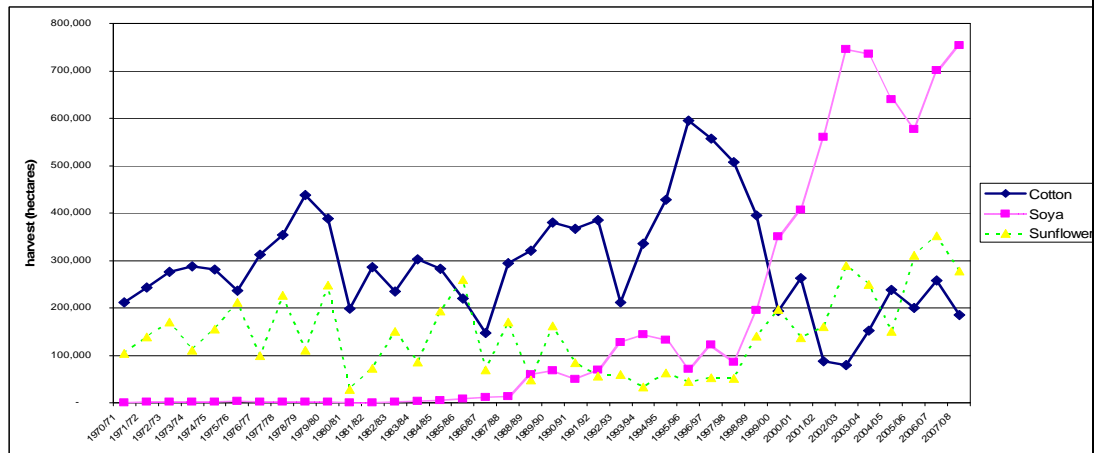
In the late 1930s, the process of import substitution (ISI) reoriented cotton production towards the domestic market. This gave cotton production a big push and by 1937/8 424,000 hectares were sown. The ongoing industrialisation carried out during the Peron administration (1946-1955) gave a further push to national cotton production which reached a peak of 730,000 hectares in 1957/8. Chaco province, nevertheless, remained a raw material supplier, since most of the spinning mills were established in Buenos Aires. That level of production was not surpassed for another forty years. In fact, in 1967/8 the area planted shrank to 307,000 hectares, mostly due to the failures in the ISI but also to a decrease in raw cotton price that resulted from the negotiation process in the value chain. Cotton farmers had weak bargaining power *vis à vis* the oligopolistic textile industry.

In the 1970s and 1980s, cotton production became once again orientated towards export markets and dependent on international prices, which increased significantly (by 60%) in the 1990s, thus providing a strong stimulus to production. In 1997/8 the area planted with cotton reached an historical peak of 1,113,000 hectares. This period coincided with the introduction of GM cotton in Argentina, in 1996. However, international prices soon fell again and simultaneously soybean appeared as a very profitable crop almost everywhere in the country. As can be seen in Figure 1, the increase in area planted to soybean in Chaco mirrors the decrease in area planted to cotton.

The “soyisation” of Argentina agro production is seen by many commentators as an significant threat to the livelihoods of the rural poor because it implies ecological and social risks. The soybean is known to be highly adaptable to extreme weather and soil conditions and its production is greatly mechanised. Given that in recent years soybean production has become extremely profitable, the

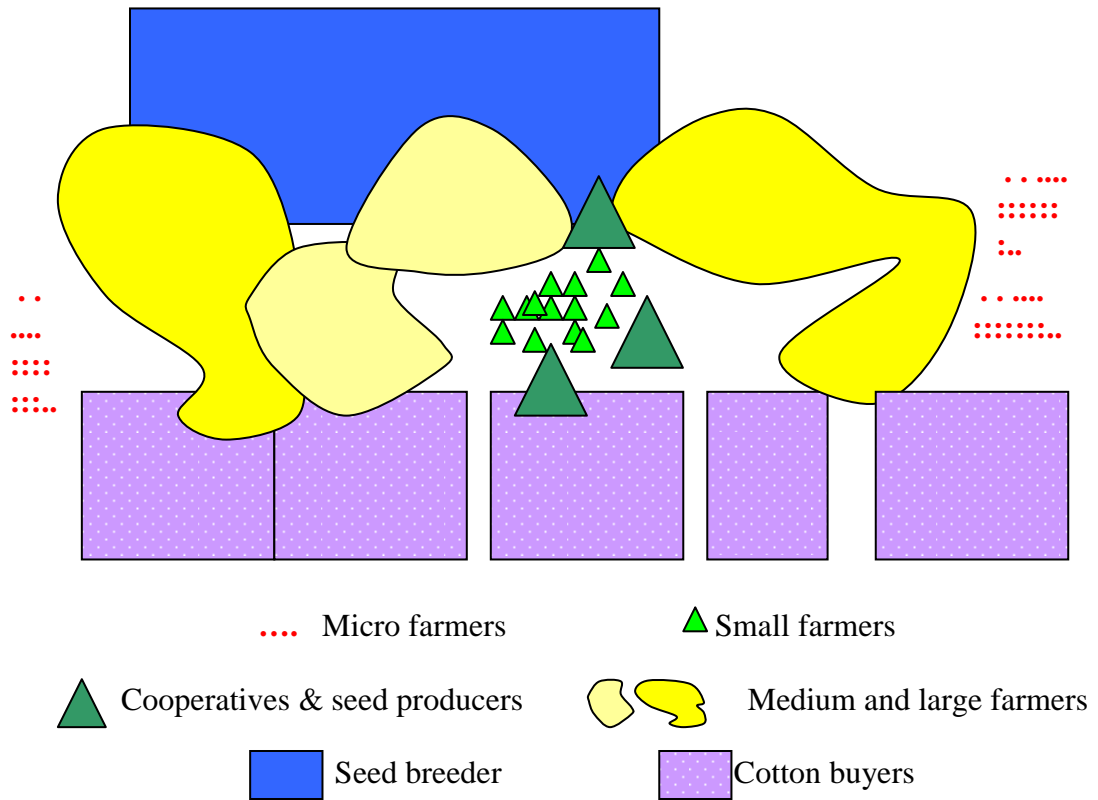
economic value of once remote lands has increased. In some cases this land belonged to traditional communities under weak ownership rights, who have been displaced. Even when that was not the case, soybean production has implied wide *deforestation* –loss of ecological diversity- and a decline of labour intensive activities such as cattle farming and collection of fruits and vegetables, which have been previously predominant on those lands.

Figure 1: The distribution of land cultivated area by crop in Chaco



Source Secretary of Agriculture, Fisheries and Food (SAGPyA), Argentina

Figure 2: Illustration of power distribution in cotton value chain



Box 2: The unequal distribution of land and production among cotton farmers

Micro farmers (*minifundistas*) represent about 60% of cotton producers in Chaco and are very small, resource-poor farmers, who cultivate less than 10 hectares of land as it is showed in Table 1. Most *minifundistas* have incomes that are below official poverty line figures. Cultivation of cotton is carried out manually, or with animals. Labour, in the vast majority of cases, is provided entirely by the family, most of whom leave school and begin working at about seven or eight years of age, and therefore seldom read and write. Cotton is the only commercial crop produced by this group of farmers; other cash crops, notably soybean, are not grown. Although comprising the majority of Chaco's cotton producers, *minifundistas* produce only about 1% of total cotton production within the province on about 9% of the total area sown to cotton¹⁸. Most of them do not buy seeds; they receive them from the local Government who distributes seeds produced by INTA (National Institute for Agricultural Technology). Since INTA does not produce transgenic seeds, these farmers do not have access to transgenic technologies. The main complaint we collect from this group during fieldwork is about the timing of seed distribution organised by the Government; seeds often arrive after the sowing season.

Small farmers represent some 38% of cotton producers and cultivate land of between 10 and 200 hectares in size (Table 1). The main commercial crop for this group of producers is cotton, but soybean may also be planted, and about two thirds of this group also raise livestock. In general, cultivation uses some mechanical equipment, usually of poor condition. Labour is usually provided by the family, but temporary employees may be hired for weeding and harvest. This group accounts for about 30% of the total production of the province. They mostly produce transgenic cotton, however they do not buy seeds from breeders or official distributors. As we said above, their long-standing traditional practices involve the exchange with cooperatives of cotton for seeds (and other inputs). Cooperatives¹⁹ usually process cotton bolls in ways that permit them to keep transgenic

¹⁸ Elena *et al.*, 2000 *ob.cit.* and INDEC, (2002). Censo Nacional Agropecuario 2002.

¹⁹ Although cooperatives were once founded to improve farmer's bargaining power *vis à vis* big cotton buyers and also to achieve better deals when buying key inputs such as gas oil, this original

seeds from which they produce hybridized varieties. These practices risk low germination rates and makes uncertain the presence (and if present the type) of the transgene²⁰, which has been one important complaint we received from this group during the fieldwork. Another risk mentioned by several farmers, is the spread of a pest to which the transgenic seeds are not resistant, namely the: the boll weaver (*picudo algodonero*)

Table 1: Size distribution of cotton farmers in 2001

Farmers' size	Land in hectares	% Farmers	% Production
(i) Micro	0.1 to 10 <i>hec</i>	60%	1%
(ii) Small	10 to 200 <i>hec</i>	38%	33%
(iii) Medium & Large	more than 200 <i>hec</i>	2%	66%

Source: Secretary of Agriculture, Fisheries and Food (SAGPyA), Argentina

The third and final group comprise medium and large producers with land under cultivation of more than 200 hectares . They represent 2% of the cotton producers but produce 66% of total cotton production. They use mechanized, modern equipment and employ labour. Large producers do not only grow cotton. Soybean, and sometimes sunflower, wheat and sorghum are produced too. Soybean in particular may represent a larger share of the cultivated land than cotton. The smaller farms within this group are family businesses, but the larger ones tend to have a corporate style management. Large producers usually have their own cotton gins and work with technologies at the frontier of commercial agricultural practice (direct sowing, mechanical harvesters, narrow furrow, etc). They are the main clients of the breeder of transgenic seeds although they also multiply seeds in their own fields.

mission is now perverted. They have become largely unaccountable to the farmers whose interests they originally represented.

²⁰ In Argentina there are two types of TS, Bt cotton (resistant to the boll-worm) and RR cotton (tolerant to broad-spectrum herbicides).

Table 2: Issues covered by the regulatory framework of Argentina and its instruments

Regulation on:		Instrument	Enforcing role by:
Access	IPR: Transgenes	<i>The Patent Law</i> N° 24.481 and Law N° 24.425	INPI
	IPR: Seed Variety	<i>The Seed Law</i> N° 20.247	INASE
Risk	Quality	Idem above	INASE
	GMO approval: Biodiversity	Various resolutions by SAGPyA authorised by <i>The Seed Law</i> , especially Resolution N°39 of 2003	CONABIA
	GMO approval: Export markets	Idem above	DNMA

Figure 3: distribution of power in the regulatory negotiation process

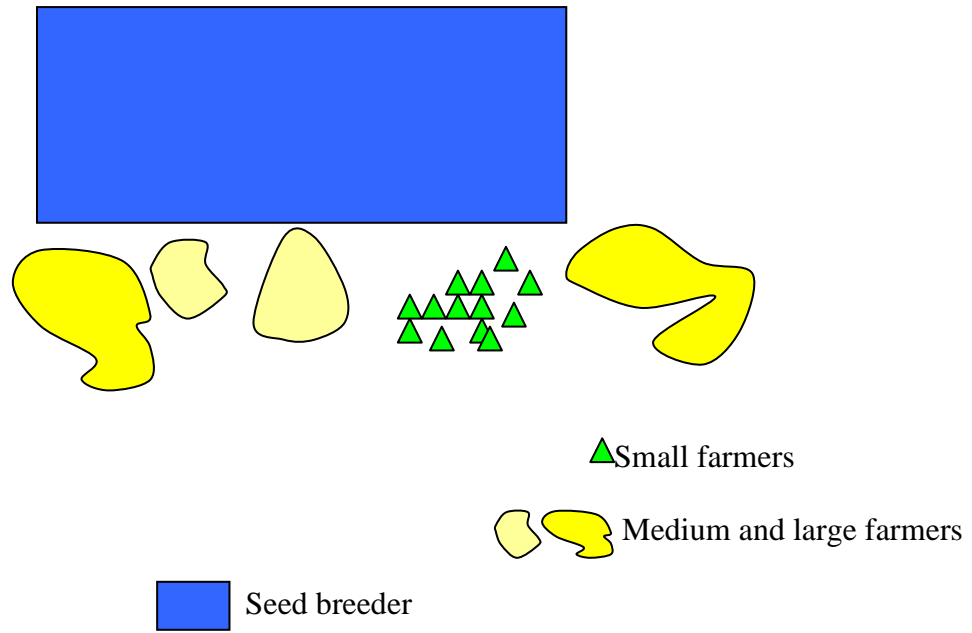


Figure 4: Actual distribution of benefits that results from the implementation of existing regulation

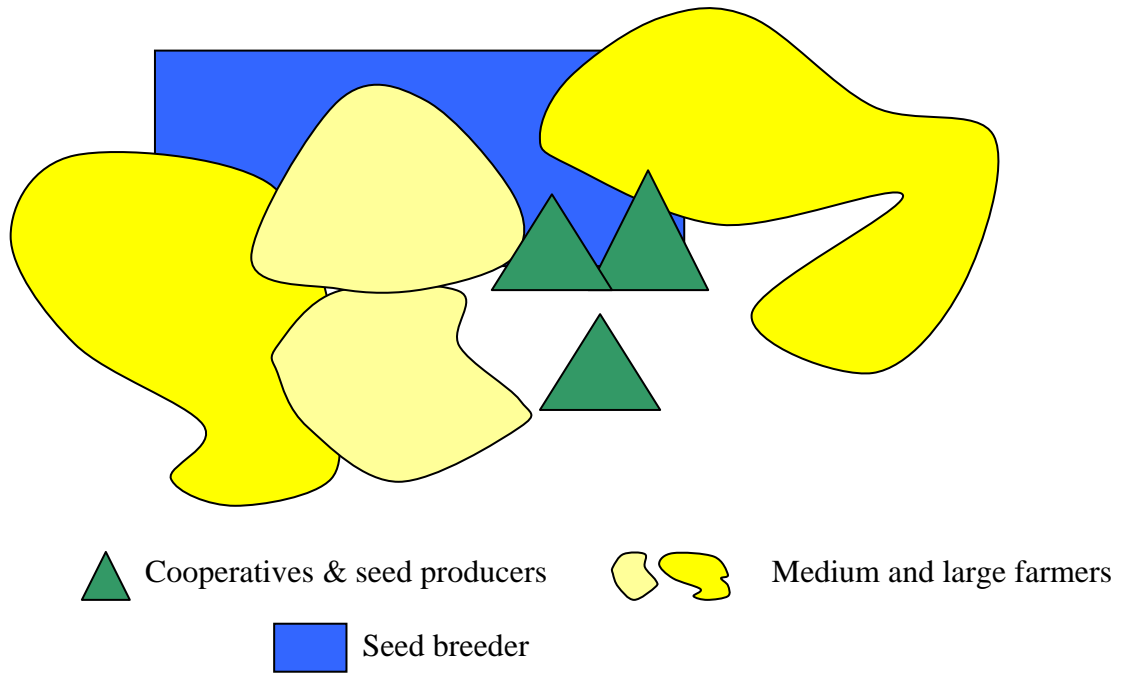


Figure 5: Distribution of benefits that result from an ideal regulatory framework

