

**Outlawing Informal Seed Systems in the  
Global South:  
Seed Laws, Certification, and Standardization**

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## **Outlawing Informal Seed Systems in the Global South: Seed Laws, Certification, and Standardization**

### **Abstract**

A series of relatively new and reformed Seed Laws have become novel mechanisms of accumulation by dispossession in agriculture. Authors writing within a Marxian political economy framework have rightly identified Intellectual Property Rights (IPR) laws that apply to living materials as tools that, by privatizing germplasm, dispossess people of certain seeds. What has not been addressed in depth, however, is the role that non-IPR related seed laws play in the seed enclosure. I argue that we should pay more attention to the implications of seed laws that do not deal directly with IPR issues because they are also being used to outlaw practices that are necessary for the functioning of informal seed systems. As a result, they are setting the stage for the further erosion of seed sovereignty and are becoming an additional threat to an already waning agro-biodiversity. These seed laws establish certification requirements and quality standards for the marketing and/or exchange of seeds. The requirements are essentially about standardization. Lawrence Busch's theoretical contribution about the nature of standards provides a powerful framework through which to analyze and explain the implications of these laws.

The paper is organized as follows. I begin by providing a brief summary of the major differences between formal and informal seed systems, so as to clarify why it matters that informal seed systems are under threat. I then present the history of seed laws requiring certification prior to seed marketing. Next, I summarize the major insights provided by Busch regarding standardization, which will serve as a theoretical framework that helps us understand how and why standardization processes are so powerful. I then engage the question: How and why are certification requirements and quality standards being currently introduced in many countries throughout the Global South? I use the example of contemporary Colombian seed politics to illustrate the broader argument. Lastly, I discuss the implications of these types of laws and the prospects for seed sovereignty in the Global South moving forward.

## I. Introduction

By ignoring standards and the disputes about them, we risk missing one of the most important aspects of the transformation of agriculture and contemporary rural life itself. – Lawrence Busch (2000)

As the seed industry expands and the agro-industrial complex becomes more powerful, the continued viability of local seed systems and the legality of various types of germplasm<sup>1</sup> commons are facing a series of threats. Seed sovereignty – defined as people’s right to save, replant, breed and share seeds; and their right to participate in decision-making processes regarding rules and laws that regulate their access and use – is menaced (Kloppenborg 2013). This is a dramatic change when placed in historical perspective. Until about a century ago, most people thought of seeds as a public good, as the common heritage of humanity, and/or as a resource to be shared freely amongst the farmers and gardeners of the planet.

Two major processes led to the systematic erosion of seed sovereignty worldwide: one biological and the other socio-political. With regards to biology, advances in genetics and plant breeding in the mid-twentieth century allowed for the development of the modern seed industry, which offers seed varieties that farmers can’t easily save and replant the next season, and thus pushes them to buy seed every year. Hybrid and transgenic seeds are examples of this phenomenon. In

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<sup>1</sup> The term “germplasm” refers to all living tissues and genetic materials (such as seeds or a piece of a stem) from which new plants and organisms can grow. Throughout the paper, I will use the terms “seed” and “germplasm” interchangeably, even though they are not exactly the same thing. All seeds are germplasm, but not all germplasm is necessarily a seed.

socio-political terms, a series of legal changes have facilitated the patenting or otherwise “protecting” of germplasm via mechanisms such as Plant Breeders Rights. Together, these biological and political changes have set the stage for the possibility of commodifying and monopolizing seeds (Kloppenburg 1988).

In the last fifty years – and more so in the last twenty – there have been rapid and profound changes in the legal status of germplasm globally. Numerous researchers have stressed that the introduction of different types of Intellectual Property Rights (IPR) laws for plant genetic resources is one of the legal mechanisms underwriting contemporary processes of accumulation by dispossession that further enclose agricultural commons (Aoki 2008; Kloppenburg 1988, 2010; Mooney 1979). Particular attention has been given to the implications of patent laws that regulate and facilitate the cultivation of genetically modified crops (Fitting 2011, McMichael 2009, Otero 2008). These laws are certainly worth paying attention to, as they are indeed eroding seed sovereignty by turning life into private property and banning seed saving. In spite of their importance, I argue that the focus on their implications has distracted us from paying attention to a simpler and in some senses more dangerous mechanism of dispossession: seed laws requiring mandatory certification and compliance with particular quality standards for commercializing and sharing seeds. Throughout this paper, I will focus mostly on how these types of legal frameworks are building the foundations necessary to continue eroding seed sovereignty in countries where a large proportion of farmers continue to save and exchange seed regularly.

My central purpose then is to explain how non-IPR centered seed laws are being used to set the stage to dispossess farmers of control over their seeds throughout the Global South. As I hope to make clear, seemingly impartial and harmless regulations that seek to institutionalize standards for germplasm production and exchange are becoming tools for the dissolution of farmers' seed systems and, as a result, they are a threat to an already waning agro-biodiversity. I do not mean to imply that seed laws are more important than IPR laws; they are both very important and often work together towards similar ends. What I am suggesting is that the extensive consequences of non-IPR related seed regulations are generally under-emphasized and at times outright ignored. In the spirit of filling this gap, I will analyze the history and repercussions of seed laws that deal with seed quality, certification, and standardization. An analysis of these laws is especially fruitful in light of Lawrence Busch's theory of standards.

In order to best understand the implications and assumptions behind the myriad seed laws arising worldwide, I will begin by briefly clarifying the major differences between formal and informal seed systems. I will then frame the analysis with a discussion of the nature of standards and standardization since seed laws are, after all, inherently about standardization. I will then provide a brief historical overview of how seed laws were used to institutionalize particular standards for seed production and exchange in Europe and the United States. This historical background will aid in the understanding of contemporary debates over seed laws in other countries. Next, I will examine how new seed laws throughout the Global South are threatening, and in the worst cases, completely outlawing

informal seed systems. I will provide examples from the Latin American region, with special attention to the Colombian case. In way of conclusion, I will comment on the broader implications of these laws as well as on the prospects for change. Throughout the paper, Busch's insights regarding the inherent value-laden nature of standards will illuminate the power struggles at play in the attempt to establish new rules that govern the relationship of people to germplasm.

## **II. Formal and Informal Seed Systems**

Seed legislation matters, in part, because it defines and shapes the type of seed systems that can exist in a particular country. The term “seed system” refers to the totality of processes that are part of the development, maintenance, production, storage, and diffusion of cultivars (Tripp 1997). There is often a distinction made between “formal seed systems” – or heavily regulated systems made up of public institutions and private industries engaged in scientific plant breeding – and “informal” or farmers’ seed systems – which are seed systems that are almost completely unregulated and dependent on farmers’ knowledge. Modern industrial agriculture calls for and depends on improved seed distributed via the formal seed sector, which is made up of “organizations responsible for the supply, distribution and marketing of quality-controlled seed, often backed by formal policies and legislation” (Louwaars 1997, 21). This formal sector coexists with the informal one. In much of the Global South informal seed systems encompassing the continued use of native and non-certified varieties, seed exchange networks, and widespread seed saving are still the preferred seed source for most farmers, especially smaller scale growers and indigenous populations farming in extreme conditions. There is not always a clear-cut border between formal and informal systems however; in fact, there are times when they overlap.

It is now estimated that about “ten companies account for about two-thirds (65 percent) of the world’s proprietary seed – that is, branded varieties subject to intellectual property protections – for major crops” (Hubbard 2009). These seeds

are distributed via the formal seed sector. Nonetheless, the persistence and vitality of local seed systems in some parts of the world is unquestionable. In the Global South, somewhere between 60-100% of the seeds planted are farmer produced and exchanged – depending on the crop and the country (Louwaars 2002). In Latin American and Caribbean nations the FAO estimates that around 75 percent of the seeds used are supplied through local or “informal” seed systems (Santilli 2012). Evidently, the private sector hasn’t been able to make all growers systematically prefer and depend on “improved” seed varieties that they must purchase every year. This is ultimately a story about the uneven development of capitalism into agriculture in the Global South, despite a clear generalized trend toward modernization. With such a large potential market to tap into, it is hardly surprising that seed companies are actively working to expand their markets throughout the Global South. The dissolution of so-called “informal seed systems”, however, is a pre-requisite for the growth and consolidation of private seed companies in such countries. One way to dissolve informal seed systems is to make them illegal, which is what some new seed laws are attempting to do.

Farmers and plant breeders acknowledge that a large part of the world’s *in situ* agro-biodiversity is preserved by those that participate in informal seed systems. Seeds that are saved and replanted generation after generation tend to be more genetically diverse and are adapted to a very wide range of ecological conditions. Decades of selection and adaptation to diverse ecosystems has made it so that crops can grow in settings that are far from ideal from the point of view of modern industrial agriculture. The living genetic diversity in farmers’ fields is vital



for the present and for the future of agriculture in a context of increasingly less predictable climate patterns. For all of these reasons, informal seed systems matter greatly; the *ex situ* preservation of agro-biodiversity in seed banks is not enough.

Even if it is important to acknowledge the virtues of vibrant informal seed systems, it is also important not to romanticize them; some work well, others less well. The common “conclusion of the studies on informal seed diffusion is that the speed and effectiveness of the system depends largely on: the quality of the variety to be diffused; kinship relationships; the existence of a culture of local agricultural experimentation; and the economic stability of the farming enterprise” (Louwaars 1997, 17). Regardless of the virtues or weaknesses of local seed systems in different places, it is unrealistic and probably unfeasible to have a country with a formal seed sector that is capable of supplying 100% of the seeds of all crops planted. Nowhere in the world – not even in the Global North – do formal seed systems exist without parallel farmers’ seed systems. Even if it is difficult to make farmers seed systems disappear completely, it is certainly the case that they are being increasingly threatened by the introduction of standardization requirements in seed laws. Before addressing the actual content of such seed laws, I will briefly elaborate on what it is about standards that make them inherently power-laden and controversial.

### **III. The Non-Neutrality of Standards and Standardization**

Who participates in setting the standards, the processes by which standards are set and what the consequences of setting the standards are have considerable impact on fundamental questions about who we are and how we shall live.  
– Lawrence Busch (2000)

Standards and standardization procedures are ubiquitous in the modern world. As a noun, a standard is a set of criteria that something must meet to be considered worthy. As a verb – to standardize – the implication is that something must be made uniform. Standards are important in large part because they are “the means by which we judge persons, processes, and things to be superior, acceptable, or unacceptable” (Busch 2011a). Anything that doesn’t meet a given standard is thus sub-standard and at times outright undesirable. As a result, standards and standardization processes are part of the moral order of our society insofar they set norms for behavior and standardize things, processes, and people – including workers, markets, capitalists, standards themselves, standard creators, consumers, and the environment. I will argue that even if standards “appear to be neutral, benign, merely technical, obscure, and removed from daily life, they are...largely an unrecognized but extremely important and growing source of social, political, and economic relations of power” (Busch 2011, 28). Standards, then, are one of the most important concrete manifestations of power relations today.

Those who can define and enforce standards are powerful especially because they have “the ability to set the rules that others must follow, or to set the

range of categories from which they may choose” (Busch 2011, 28). The needs of industrial agriculture neatly illustrate the ways in which the implementation of particular standards has implications for all of the people and things that come into contact with them. For example, the new technologies developed after the Green Revolution

only worked to the extent that new standards were met. These required seed producers, fertilizer suppliers, farmers, machinery designers and even processors to behave in certain ways. Unless all of the actors in the process were properly disciplined and standardized, such that all the products that they produced were standard as well, the entire Green Revolution technology chain was and would remain blocked (Busch 2000).

The standardization of the seed, of course, was an essential element of the Green Revolution and of industrial agriculture more broadly.

There are at least four characteristics of standards that make them especially powerful and significant:

1. Once instituted, they tend to become obvious, natural, invisible, and even seemingly unworthy of reflection.
2. They deflect attention away from the rulers by displaying anonymous power.
3. They tend to embody the biases and preferences of the rulers and of the powerful.
4. They generate path dependence and rigidify production regimes, making it difficult to discard them and/or to reimagine them.

The ensuing analysis about the development of non-IPR related Seed Laws will provide clear examples of how these four features of standards are made manifest and with what implications.

Despite their power, the creation, implementation, legitimization, and

naturalization of standards is not always a simple task. In many cases, the emergence of any particular standard is the result of conflict and disagreements because in choosing one standard over another there are inevitably both winners and losers. The politics of seed laws is a case in which the attempt to enforce particular standards *has* generated visible opposition and has not been able to turn the standards into deceptively natural and apolitical requirements. We are in a historical moment in which particular standards for seeds are not yet an obvious and taken for granted part of agricultural practices for the majority of farmers in the world, and hence it is more likely that they will continue to be contested.

In summary, agricultural standards and regulations are not merely convenient instruments for organizing national and global markets; rather, “they reflect much more fundamental social/technical relations that are essential to the establishment and regulation of social and ethical behavior in capitalist markets” (Busch 2000). As will become clear, in the case of standards for seed production and marketing, they usually represent the biases of agricultural policies that favor private agribusiness at the expense of seed sovereignty, farmers’ cultural practices, and biodiversity conservation. This is not to say that all standardization is evil or should be resisted; in fact much of it is pretty benign and necessary for the functioning of complex societies. The problem is that oftentimes standards are introduced with little concern for their disciplinary and ecological consequences. Before addressing in more detail some of these frequently disregarded consequences of standards in seed production and marketing, I will first explain the different types of laws and rules that regulate seeds today.

## **IV. The Rise of Seed Laws and Certification Requirements in Historical Perspective**

Along with the modernization of agriculture came the development of a series of standards and standardization procedures for practically all aspects of production. Some of these standards were eventually transformed into laws that molded the expectations and practices of those in the seed industry. The United States and the nations of Western Europe have the oldest and best institutionalized legal frameworks regulating germplasm. In the majority of the world, however, seed laws are comparatively young and in several cases still subject to intense and polarized debates. In this section I will explain the diverse types of laws that have emerged in the Global North. I will begin by clarifying the major differences between IPR and non-IPR related laws relevant to plant genetic resources. I will then summarize the content of the UPOV Convention, as it is an important multilateral agreement that is still very powerful and influential in seed politics today. I will then move to a more detailed description of the European and the US models. This information will serve as background to better understand contemporary discussions and debates about seed laws in the Global South.

### **A. IPR Laws vs. Quality Related Seed Laws**

Broadly speaking, there are two different types of laws that have facilitated the commodification of plants and contributed to the erosion of seed sovereignty worldwide. They are:

1. Non-IPR specific Seed Laws that oblige farmers, breeders, and seed companies to certify and/or register seeds according to pre-established standards;
2. IPR laws applicable to germplasm that authorize and legitimize its privatization through mechanisms such as Plant Variety Protection Acts, Plant Breeder's Rights, "sui generis systems", or Patent Laws for living materials.

Non-IPR related seed laws and industry-designed standards are all concerned with how to regulate seed quality, identity, production, marketing, and use. Often, these laws are introduced in the name of phytosanitation and national food security. It is common for countries to have separate laws or decrees for each of these issues, though this varies considerably. In fact, the distinction between IPR and non-IPR laws is not always clear-cut and there are cases in which one law addresses both issues, at least implicitly. For instance, mandatory certification might be partly motivated by a concern over the infringement of Plant Breeders' Rights.

Laws dealing with Plant Breeders' Rights have been especially important in the world of IPR laws for plant genetic resources. They are crucial for the functioning of the modern seed industry and for the regulation of formal seed systems. PBR laws are often a copy or a revised version of the Convention of the International Union for the Protection of New Plant Varieties (or UPOV, by its French acronym). The UPOV Convention is arguably the most important multilateral convention that lays down the guidelines by which a breeder can protect "new" plant varieties with an intellectual property right referred to as "the

breeder's right". "The breeder's right means that the authorization of the breeder is required to propagate the variety for commercial purposes. Under the UPOV Convention, the breeder's right is only granted where the variety is (i) new, (ii) distinct, (iii) uniform, (iv) stable and has a suitable denomination" (UPOV website). These criteria are often referred to as "DUS", which stands for distinct, uniform, and stable<sup>2</sup>. The DUS expectation, with all the standards that come along with it, looms large in both IPR and non-IPR related seed laws.

Based in Switzerland, UPOV was established in 1961 with 6 members, grew to around 20 members in the early 1990s, and had 71 members as of 2013. The UPOV Convention has been modified several times, and its qualitative changes are representative of broader global trends, as they are very much in line with the neoliberal spirit. The latest version was approved in 1991, and it is characterized by a noticeable progression towards more patent-like rights for breeders. The 1978 version included the "breeder's exemption" and "farmer's privilege" clauses, according to which breeders could freely use any protected varieties and farmers could save seeds to plant the next season. It also allowed countries to exclude certain species from any form of protection if they so wanted to. The 1991 version did away with these clauses and hence expanded breeders' rights significantly. As summarized by GRAIN:

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<sup>2</sup> "A variety is regarded as distinct if it is 'clearly distinguishable on one or more important characteristics from any other variety known in the Community' and as stable if it 'remains true to the descriptions of its essential characteristics' after successive propagation or multiplications or at the end of each cycle. If, 'apart from a very few aberrations, the plants of which it is composed are (account being taken of the distinctive features of the reproductive systems of the plants) similar or genetically identical as regards the characteristics, taken as a whole, which are considered for this purpose', a variety is also regarded as sufficiently uniform" (Winge 2012).

The expanded rights now allowed under UPOV-91 imply total market control for breeders over their varieties' reproductive material. Farmers using protected varieties cannot sell their harvest as seed and, in a growing number of UPOV member countries, they can not even save their own seeds or exchange them on a non-commercial basis. Farmers must now pay royalties every year when they buy seeds, and they may only plant the protected variety to produce seeds if the breeder grants them a specific license to do so (GRAIN 1999 in Wilkinson 2000).

The adoption of UPOV 1991 worldwide is being promoted by the US and European governments as well as by seed industry leaders, perhaps most effectively as part of bilateral trade agreements. Many nations are, indeed, adopting the 1991 UPOV Convention.

Only a handful of developing countries had working Plant Breeders Rights laws functioning starting the 1990s, but by 2013, 71 nations were part of UPOV. In Latin America, for example, only Argentina, Chile and Uruguay implemented PBR before the 90s, with varying degrees of implementation capacity. Mexico and Colombia followed. In all of them farmers were initially allowed to save seed to re-sow the next season as stipulated by UPOV 1978. As of 2013, however, twelve Latin American countries were officially members of UPOV, and some of them are trying to implement rules from UPOV 1991, restricting seed saving and exchange to unprecedented degrees. Attempts to introduce legislation that implements UPOV 1991 has provoked polarized debates in several countries, and will likely continue to do so. Like other IPR laws for plant genetic resources, it protects the interests of private breeders and companies at the expense of farmers, public breeding, and community experimentation.

Having explained the importance of UPOV, I will now move to a discussion of the history of non-IPR specific Seed Laws in Europe and the US. This historical



contextualization is telling because most seed laws are often imitations, albeit with some modifications, of Global North versions. Even if from this point on I will concentrate on the roles and implications of non-IPR related seed laws, it is important to keep in mind that IPR laws such as Plant Breeders' Rights regulations are intimately connected to the rise of quality related seed laws. UPOV content, in particular, is often incorporated into these laws. Together, IPR and non-IPR legislation are part of a larger legal system and agricultural paradigm that principally favors large-scale agro-industries. As seeds increasingly become commodities, a diversity of standards and laws work together for the strengthening and organizing of capitalist agribusiness markets.

## **B. The European System**

It is as if seed evolution itself is being outlawed, and farmers are being made accomplices to the crime (GRAIN Oct. 2013).

Seed laws and regulations first appeared in Europe in the first half of the 20<sup>th</sup> century as a result of pressure from both seed producers and farmers to put an end to generalized confusion and mistrust around crop variety names (Louwaars 2002, Winge 2012). The creation of some sort of centralized database that would prevent the duplication of cultivar names and rebuild trust in the industry was seen as a potential solution. Some farmers and seed producers wanted standardization procedures in place. The German Agricultural Society is credited for creating the first variety register in 1905 (Winge 2012). In the 1920s, the National Institute for Agricultural Botany in the UK formed committees whose task was to eliminate synonyms of crop varieties marketed under different names

(Tripp 1997). In the 1940s, a series of national seed laws were finally introduced with the intention of creating a more transparent seed market that would ensure quality. These nascent regulations often included registration and certification requirements, with the goal of guaranteeing that “new” varieties were not marketed unless they were genuinely different from already marketed varieties. Compulsory variety registration, the logic went, would eliminate the lack of clarity that had resulted from unregulated and speculative practices in the industry. By forcing producers to link one name with one variety described in detail, competitors would no longer be able to give misleading names to their varieties in an attempt to increase sales (Louwaars 2002).

In the 1960s there was a qualitative shift in the nature of European seed laws. The countries that then formed the European Economic Community (ECC) – the institution that eventually morphed into the European Union (EU) – decided that it was necessary to harmonize national seed laws in pro of more open and standardized Europe-wide seed markets. Hence, in 1966 the first ECC-wide regulations for the marketing of seeds appeared. It was then that the idea of a European Common Catalogue system for plant species was instituted. This meant that from the 1960s on plant varieties registered in national catalogues also had to be registered in the European Common Catalogue in order to be legally marketed. The resulting system, still in existence today, requires that all crop varieties be registered, performance tested, and certified before being sold (Winge 2012). Throughout the years, new directives added complexity to the European system, leading to an arrangement famous for its bureaucratic complexity and an almost

obsessive preoccupation with control.

The two main pillars of the European system are registration and certification. Certification processes include inspection of fields, processing plants, stores, and markets with the intent of confirming the origin and varietal purity of seeds. Seeds may also be tested for germination rates, moisture analysis, cleanliness, and the absence of pathogens (Louwaars 1997). The logistical implications of the registration and certification requirements is that, in order to be legally marketed in the EU, “a plant variety must be listed in a national catalogue and, depending on the species, in one of the EU Common Catalogues. To qualify for registration, a variety must be demonstrated to be distinct, uniform and stable (DUS), and the rules for naming of varieties must be followed” (Winge 2012). In addition to registration and certification, another important requirement is what is referred to as “VCU testing” – testing for Value for Cultivation and Use. Initially, some farmers’ association promoted it so as to validate claims made by seed suppliers (Louwaars 2002). Today, VCU testing is usually done to evaluate a variety’s adaptation to particular conditions (Winge 2012).

In summary, the three steps that need to be followed prior to the marketing of almost any germplasm in the EU are:

1. Register variety, which means fulfilling the DUS criteria
2. Performance test the variety, i.e., go through VCU testing
3. Certify seeds that will be sold (Winge 2012)

In some ways, all of these procedures are identical and interconnected with the rules and expectations of the UPOV system, so it is not rare for them to be handled

by the same government agencies that address PBR (Da Via 2012).

Apart from the fact that seed producers and suppliers have to deal with the many time-consuming procedures that such a system necessitates, and that business became a tad more complicated and inconvenient for dishonest and speculative seed traders, such requirements have had some detrimental consequences – some expected, others unexpected. One of the most frequently mentioned implications of the European legal framework is that it has fostered a system in which less and less crop varieties are marketed. In fact, in the EU it is almost impossible to commercialize old, non-homogeneous and local varieties legally. Informal seed systems are institutionally marginalized and considered outdated for large-scale agricultural production (Bocci 2009). Hence, varietal change and evolution are unnaturally prohibited by the rules. In short, the EU system promotes a degree of genetic uniformity that directly undermines biodiversity conservation. Crop standardization has led to the standardization of the entire rural landscape, and this has become a direct threat to biodiversity and to the continued use of traditional and locally adapted varieties.

Precisely because the standards are producing undesirable consequences from a genetic erosion and cultural point of view, they have become the subject of intense and polarized debates. In the face of mounting criticisms to the Common Catalogue system, it is now generally agreed that it must be at least partially modified. Indeed, the European Union is currently trying to reform its system. More than a decade after the need to transform the Common Catalogue system was formally acknowledged, however, consensus on how to actually do so is

strikingly lacking. The chosen strategy since 1998 has been to promote a new and special catalogue for so-called “conservation varieties” with the hope that it contributes to the conservation of genetic resources at risk of being lost. By February 2009, however, there was not a single conservation variety being legally marketed in the continent (Bocci 2009). It is increasingly uncertain if and when the Europeans will actually succeed in modifying their regulations to better preserve genetic biodiversity. Europeans are undoubtedly facing the challenging and constraining consequences of path dependence. They are also struggling with how to dismount the apparent naturalness of the model.

In spite of the overall homogenizing trend in European agricultural development, it is remarkable that informal seed systems are still relatively widespread in some European countries and regions, such as parts of Italy and Greece. Farmers have found ways to circumvent the law in order to be able to use, exchange and sell landraces and other “illegal” varieties (Winge 2012). Various grassroots initiatives attempting to counteract the logic of the EU directives have sprung up throughout Europe. For instance, “the Italian network *Rete Semi Rurali* has been actively involved in the formulation of legislative and ministerial proposals on the exchange of seeds and the recognition of collective rights on genetic resources, both at the regional and national level” (Da Via 2012). Further, some Italian regional administrations have passed local laws to protect local germplasm by creating separate catalogues for varieties that are suffering from genetic erosion. In France, the network *Réseau Semences Paysannes* has mobilized against the policy requiring the collection of royalties on seeds derived

from certified ones, as established by UPOV 1991 (Da Via 2012). Like in other parts of the world, the rules of the game for seed production and exchange are being questioned and redefined.

Paradoxically, at the same time that the Common Catalogue system is becoming increasingly contested and severely questioned, some countries in the Global South are modeling their new seed laws on the European system. Before discussing why and how this is happening, first I'll turn to a brief description of another system that is also an influential model for the rest of the world: the US system. Despite the similarities in the trajectories of the development of large-scale industrial capitalist agriculture in the US and Western Europe, these two places managed to come up with strikingly different legal frameworks for plant genetic resources, particularly in terms of the regulations for seed marketing.

### **C. The US System**

Like in many European countries, the rapid modernization of agriculture experienced in the USA was accompanied by a series of legal changes addressing new realities and needs. In the early 1900s, many US states passed legislation that regulated, to varying degrees, the growing seed industry. Like their European counterparts, seed traders became increasingly concerned with the uses and abuses of inconsistent varietal names for marketing purposes. In 1939, a Federal Seeds Act was passed that prohibited the use of synonyms for any single variety. Also like in Europe, the Department of Agriculture sought to introduce a law that would require compulsory registration of new varieties, but in the face of

opposition from seed companies, this never happened (Kloppenborg 1988). Firms feared that heavy government regulations would interfere with their business interests. As a result, the main difference between the European and the US systems today is that the US does not require mandatory registration, certification, or quality testing. This, of course, does not mean that they do not exist at all, but merely that decentralized organizations and associations organize them in a voluntary manner. For example, many producers choose to register varieties in the National Variety Review Boards, managed by the independent Association of Official Seed Certifying Agencies, AOSCA (Tripp 1997).

In broad comparative terms then, the European system for legally marketing and sharing germplasm involves significantly more regulations and restrictions than does the US model. In Europe, standardization is regulated by the government, whereas in the US it is a system of governance. One of the implications of such difference is that genetic uniformity is emphasized to a greater extent in the EU than in the US (Winge 2012). Even though the US legal framework is much friendlier to the continued existence of informal seed systems and the commercialization of non-uniform varieties, this does not mean that genetic erosion is absent. The logic of large-scale agribusiness is such that agricultural landscapes are homogenized and often rely on cultivars that do fulfill the DUS criteria, even if it is legal to do otherwise. This is an important point to keep in mind when thinking about the scope and limitations of legal frameworks for the promotion of a particular end. Even though informal seed systems and the commercialization of non-homogenous varieties are legal in the USA, the political

economy of agriculture is such that, like in Europe, they are not as widespread as they could – or perhaps – should be, if the preservation of biodiversity were a serious objective.

The rest of the world has taken up ideas from both the US and the European models for the design of their own legal frameworks for plant genetic resources. In the following section, I will highlight some of the most controversial points of newer seed laws from the Global South, with special emphasis on the implications of obligatory registration and certification requirements for local seed systems, agro-biodiversity, and farmers.



## **V. Seed laws and regulations in the Global South**

### **A. The rise of a formal seed sector**

In most countries, the seed first became the subject of agricultural policies during or after the Green Revolution of the mid 20<sup>th</sup> century (Louwaars 2002). The development of a robust formal seed sector turned into a crucial objective for many governments interested in stimulating agricultural modernization. Throughout the second half of the 20<sup>th</sup> century, states and banks were often complicit in the promotion of “improved” commodified seeds. In some cases, they would only provide technical support and loans to farmers that could prove that they were using certified seeds (GRAIN 2005). A worldwide-web of organizations that facilitate standardization processes emerged throughout the years. The FAO/UNDP, for instance, ran initiatives such as the Seed Industry Development Program whose goal “was to develop the infrastructure and technical know-how for mass dissemination of the new Green Revolution varieties to as many farmers as possible in a large number of developing countries” (Louwaars 2002, 2). In the private sector, the “International Seed Testing Association, designs uniform seed-testing methods and grants licenses to laboratories that meet its standards” worldwide (Louwaars 1997, 21). Organizations such as these are part of the standardization infrastructure upon which global agribusiness relies.

As agricultural modernization became a key priority for many governments around the world, policy makers sought to implement policies that would be conducive to the development of a formal seed sector. The ideas of J.E. Douglas

(1980) became influential in some seed policy circles working toward this end. Douglas argued that there exist “natural” stages in the development of seed systems and seed industries (Louwaars 2002). The evolution of national seed systems, he insisted, follows a linear approach. Seed systems universally progress from an initial stage characterized by the virtual inexistence of a seed industry to a final stage where most seeds are bred by and purchased from private companies. His world historic theory of seed systems development became the basis of policy designs in organizations such as the International Food Policy Research Institute and was influential in many other seed policy circles (Louwaars 2002). The four stages are:

1. No (private) seed industry exists because there are no improved varieties and local “informal” seed systems effectively supply farmers with the seeds they need.
2. Farmers begin to use improved cultivars distributed by predominantly public formal breeding programs but most seed is still produced by farmers.
3. The private seed sector grows steadily alongside the continued existence of public breeding institutions.
4. Public breeding becomes evermore irrelevant as most farmers buy seeds bred by private companies (Louwaars 2002).

Like the stages in other modernization theories, the implicit assumption is that later stages are more desirable. If only governments implemented the appropriate policies, the logic goes, national seed systems could reach a higher and, of course, superior level. This train of thought is still widespread among agribusiness advocates and the assumptions implicit in this theory can be recurrently identified

in contemporary discussions about desirable agricultural policies and regulations.

## **B. Transnational pressure**

Whereas in the Global North the two types of seed laws previously identified emerged mostly as a result of domestic pressures and organizations, in the Global South – with a few exceptions – they arose under heavy transnational pressure from agribusiness companies, bilateral trade agreements, and World Trade Organization (WTO) treaties such as the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS). In fact, the TRIPS Agreement practically forces nations in the Global South to strengthen their IPR regimes, including those regulating biotechnology and plants. Article 27.3 states that WTO members are required to grant some form of IPRs for plant materials – be it patents, Plant Breeders Rights or what they refer to as an “effective *sui generis* system”. Such a system, says TRIPS, had to be in place by the year 2000 in developing countries, and by 2005 in least developed countries. The pressures of the international political economic system have been undeniably effective, as most nations have passed some sort of Seed Law and IPR Law that addresses the regulation and control of plant genetic resources. “Capitalists do not absolutely require such a framework to function, but without it they do face greater risks. They have to protect themselves in environments that may not recognize or accept their rules and ways of doing business” (Harvey 2003, 90). Whether the rules are actually enforced or not is another story, but the willingness to comply with agribusiness preferences is undoubtedly there.

At the same time that many countries are implementing laws that facilitate the commodification of life, most members of the WTO have also signed the Convention on Biological Diversity (CBD), which states that each country has sovereignty over the biological diversity within its territory. The fact that plant genetic resources today are under sovereign control of nation-states means that they are no longer considered – at least under international law – the common heritage of humanity, as they once were. This means that there is no acknowledged global commons when it comes to germplasm, with some exceptions listed in Annex 1 of the International Treaty on Plant Genetic Resources for Food Agriculture. A series of tensions and contradictions result from the fact that, on the one hand, the nation-state is defined as having sovereignty over its genetic resources (so it could theoretically decide to prohibit the privatization of life forms within its borders), but on the other, the pressures of the globalized world economy virtually force countries to introduce strict seed laws and IPR frameworks for life forms, considerably eroding – and at times annulling – that theoretical sovereignty. It is in the midst of these tensions that many nations throughout the Global South are modifying the way they regulate germplasm.

Even though every country has dealt with global pressures to regulate plant genetic resources somewhat differently, and hence it is impossible to speak of a unique path followed by all countries in the Global South, there are some commonalities worth highlighting. These trends are direct consequences of the modernization of agriculture, which in turn is tightly linked to the growing

penetration of capitalism into different aspects of agricultural production, with the ever-increasing commodification that that entails.

### **C. Certification as dispossession: cases from Latin America**

An avalanche of new legal frameworks heavily geared toward formal seed system regulation has recently swept Latin America. Similar processes have also been documented in parts of Africa and Asia as well, but those are beyond the scope of this paper. These laws are often tainted by inherited ideas about the superiority of formal plant breeding and formal seed systems. The introduction of new certification and registration requirements for seed marketing are perhaps one of the most controversial aspects of seed laws today. Justifications and campaigns in favor of the implementation of such laws usually rely on a language of quality control and fear. Unregulated seeds are presented as “dangerous”, potentially contaminated by some disease, or as a threat to national agricultural health and even food security. The underlying motivation, however, is to design legal mechanisms that will allow private seed companies to maximize their profits and to expand their markets.

Juliana Santilli summarizes the trends for the Latin American region as of 2012 this way:

Despite varying considerably in each country, such laws tend to favor the growth of the private seed sector, and establish mandatory seed registration and certification requirements that can be met only by the large seed industry. With a few exceptions, farmers’ seed exchanges and local seed sales are outlawed, and strong penalties are imposed upon those who violate seed laws. Some examples of this trend are the new Mexican seed law (*Ley sobre Producción, Certificación y Comercio de Semillas*), published in June 15, 2007, which replaced the seed law of 1991; the Peruvian seed law (*Ley General de Semillas*) No. 27262, published in May 13, 2000.... the Ecuadorian seed law (*Codificación de la Ley de Semillas*),

approved in 2004; the Venezuelan seed law (*Ley de Semillas y Material para la Reproducción Animal e Insumos Biológicos*), approved in 2002; and the Costa Rican seed law, which is being completely revised by the National Congress. Chile is also revising its current seed legislation...to impose stricter rules on registration and certification of seeds. Brazil also enacted a new seed law in 2003, but it is among the few Latin American countries that have ensured (limited) legal space for farmers' seed systems (Santilli 2012, 49-50).

In the strictest versions, such as the Colombian and Mexican one, non-registered and non-certified seeds cannot be marketed or exchanged. In other words, if the law were actually implemented as it stands, farmers from a given community would “not be able to legally exchange seeds without the previous certification by government officials or a private entity that those seeds comply with the standards set by law” (GRAIN 2005). As a result, a series of commonplace and culturally important practices are being outlawed, including: “farmers' seed systems, when they involve the production and local exchange of non-tested seed; ...the restocking of genetic diversity after a disaster; participatory plant breeding, which relies on informal dissemination of new selections; [and] the organization of seed fairs, which aim at sharing locally adapted or selected materials” (Louwaars 2005). In such cases, the new laws are a direct assault on age-old practices of seed saving and exchange. Additionally, they are a genuine threat to biodiversity, as many local varieties do not meet the DUS standards set by the law, and hence could not be certified even if farmers wanted to do so. A more detailed analysis of the Colombian case follows, as it neatly illustrates what is at stake in the power struggles inherent in the modification of legal frameworks for germplasm elsewhere.

## D. Resolution 970 in Colombia

Illegal seeds, apart from posing sanitary risks, produce poverty in the agricultural sector because they diminish crop productivity, affect farmers' revenues, and shake Colombians' food security.<sup>3</sup> – Juan Manuel Monroy, Director of *Acosemillas*, Colombia's seed association (Dinero.com, 2013)

For every seed that they confiscate, we will make others germinate, flower, multiply, spread, and walk freely again along with farmers throughout Colombia's fields<sup>4</sup> – *Red de Semillas Libres de Colombia*, 2013.

The contemporary politics of seed in Colombia is one of the most dramatic and controversial examples of the attempt to criminalize farmers' seed systems and of resistance to the imposition of laws that do so. In 2010, a decree titled Resolution 970 was passed prohibiting the commercialization and sharing of all non-certified seeds. The introduction of this decree coincided with the negotiations that preceded the signing of the Free Trade Agreement with the United States, in which Colombia agreed to undertake several legal reforms that would bring the country in line with international agribusiness expectations and standards. An updated seed law and the approval of UPOV 1991 were central in this regard.

Prior to the signing of the Free Trade Agreement, the precepts of the UPOV Convention had already become part of Colombia's legal framework. In fact, Colombia became a member of UPOV-1978 in 1994 as part of a decision of the Community of Andean Nations. Some of the clauses of the seed law that precedes Resolution 970 were already instituting mechanisms to criminalize certain types of

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<sup>3</sup> Spanish original: "Las semillas ilegales además de riesgos sanitarios, generan pobreza para el sector agropecuario, pues disminuyen la productividad de los cultivos, afectan el bolsillo de los campesinos y la seguridad alimentaria de los colombianos."

<sup>4</sup> Original in Spanish: "Por cada semilla que nos decomisen, haremos que estas germinen y florezcan de nuevo, se multipliquen, se esparzan y caminen libremente con los agricultores por los campos de Colombia."

seed saving. For instance, article 4 in a 2006 law states: “Whoever fraudulently usurps plant breeders’ rights of a plant variety, protected legally or mistakably similar to one legally protected, will be imprisoned between 4 and 8 years and will be fined the equivalent of somewhere between 26.6 and 1,500 times the legal minimum monthly salary.” The most worrisome and controversial aspect of this norm, of course, is that one can be penalized for using a variety that is “mistakably similar” to one that is legally protected (Grupo Semillas 2013). The possibility of arbitrary imprisonments is inherent in the wording of this law.

In the aftermath of the signing of the Free Trade Agreement, in June 2012 Law 1518 was passed approving UPOV-1991, making the panorama even bleaker for informal seed systems in Colombia. Several activists and organizations argued that the law was unconstitutional for not having consulted indigenous and afro-Colombian communities prior to its approval and for violating their rights. In December of 2012, the courts declared Law 1518 unconstitutional for precisely that reason, as according to Convention 169 of the International Labor Organization these communities have a right to be consulted about matters that could affect their territories, cultures, and biodiversity. It is unclear if and when the Colombian government will be able to approve and enforce UPOV 1991 (Grupo Semillas 2013). Still, they are trying to achieve similar ends via other means, such as Resolution 970.

There are two institutions, one private and one public, that have been crucial for the justification and implementation of Colombia’s new legislation: Acosemillas and ICA. Acosemillas – the Colombian Seed Association – is a private



entity that groups representatives of the seed and biotech industries. It thinks of itself as the voice of the seed industry before the national government and other relevant domestic and international agribusiness actors. ICA, or the Colombian Agricultural Institute, is a public institution that is part of the Ministry for Agriculture and Rural Development. One of its self-identified goals is to design “strategies to prevent, control, and reduce sanitary, biological and chemical risks for animal and plant species and that could affect agricultural production in Colombia” (ICA website). Together, ICA and Acosemillas want to make sure that the new seed regulations are enforced, allegedly in the name of combating illegality and phytosanitary hazards.

What does Resolution 970 literally say? It states that people can only sell “legal”, i.e., certified seeds. In order to be certified, a variety must fulfill the DUS and VCU standards, just like in Europe. In fact, ICA can cancel or suspend variety registrations when it is proven that a cultivar has lost its stability, uniformity and/or agronomical value. Like in the rest of the world, the vast majority of creole seeds do not fulfill these requirements, which means that under Resolution 970, they cannot be certified. If it is illegal to commercialize uncertified seeds, then the exchange of many local varieties is effectively forbidden. The Resolution also contains a registration requirement, meaning that all people and organizations that produce, import, export, or store seeds, as well as those that do plant breeding research or agronomic evaluations, must register their production plots with ICA prior to planting. After doing so, they must keep their registration proof in a place that is publicly visible. In addition, it is explicitly forbidden for people to store

seeds that do not come from plots authorized by ICA in storage facilities used for certified seeds.

From the point of view of small-scale farmers and participants of informal seed systems, the most dramatic part of the decree is that it forbids farmers from saving, producing, commercializing, sharing free of charge, and/or using seeds not registered or certified by ICA without the authorization of ICA. Article 15 details what a farmer has to do if he or she is interested in saving seed from his or her harvest. It says that the farmer must: (1) prior to doing so, obtain ICA's authorization, indicating where he or she intends to replant that seed; (2) manage five hectares or less, depending on the species; (3) not exceed the planting density established for each species; (4) demonstrate that he or she has used certified or selected seed to begin with and that plant breeder's rights restrictions are no longer valid for the relevant germplasm; (5) the plot must be at least 1000 meters away from the next farmer growing the same species; and (6) use it personally and not share it with others under any terms. The farmer can only save seed once but not sell it, and the possibility to do so is not valid for fruits, ornamental plants, forestry species, or genetically modified seeds. Additional restrictions may apply, warns the law.

ICA has taken the lead in launching so-called national "brigades for the control of seed use and commercialization", with the staunch support of Acosemillas. Its budget was increased so that it can hire personnel qualified to run national brigades that "counteract the illegality scourge that is menacing national agricultural sanitation," as stated by ICA's seed director Ana Luisa Díaz (Grupo

Semillas 2013). ICA's staff has the character and functions of Sanitary Police and is supported by civil and military authorities. ICA is authorized to enter any farm and make inspections, seed confiscations, destroy seeds, and bring to court any farmer breaking the law. Alas, ICA was turned into the ultimate authority determining what farmers can and cannot do with germplasm.

Between 2010 and 2011 ICA reported the confiscation of 1,167,225 kg of seed, the majority of which was rice but also included potato, maize, wheat, beans, and others. In 2012, ICA rejected 2,793,392 kg of rice seed for not complying with the stipulated standards (Grupo Semillas 2013). The confiscation and destruction of "illegal" seeds became a national and even international controversy when, in an attempt to implement this infamous law, around seventy tons of uncertified rice seeds were publicly destroyed in a landfill in the state of Huila. ICA claims that the confiscated seeds came from plots of land not certified by ICA, which allegedly meant that the seeds posed a sanitary risk to rice production due to a lack of pathogen control and because the genetic purity of the seeds was not guaranteed. Further, argued ICA, the seed bags could potentially disseminate other seeds of prohibited, common, and harmful weeds. At the time, Acosemillas and Fedearroz (the rice federation) pronounced themselves in favor of the measures adopted by ICA against "pirate" inputs. This event is portrayed in documentary "9.70" by Victoria Solano, which contributed significantly to the visibility and politicization of these procedures.

In 2013 a massive national movement conformed by a diversity of social actors exploded in Colombia. It was labeled the *Paro Nacional Agrario* – or

National Agrarian Strike – and as the name suggests, small-scale farmers were at the forefront of this broader mobilization (GRAIN Sept. 2013). One of the main demands was the suspension or, at a minimum, the renegotiation of the Free Trade Agreement with the USA and the repeal of Resolution 970. Other important demands included “financial and political support for agricultural production, access to land, recognition of *campesino*, indigenous and Afro-descendant territories, the ability to practice small-scale mining, the guarantees of political rights of rural communities, and social investment in rural areas, including in education, healthcare, housing and infrastructure” (Duranti 2013). Evidently, the strike was about more than simply Resolution 970, but a crisis of the agricultural paradigm that made the Resolution thinkable to begin with was surely an important trigger for the strike. A small-scale potato farmer that participated in the *Paro Agrario* expressed: “We’re asking for conditions and agricultural policies that allow us to survive” (Duranti 2013).

In the aftermath of popular resistance, the government was forced to “freeze” Resolution 970 and announce that it would consider some modifications to the ill-famed decree. The government agreed to not apply Resolution 970 to national varieties until they could agree on a new proposal regarding seed certification. As of 2014 it is unclear if the decree will be kept the same, modified slightly/significantly, or repealed altogether. This small though important victory is representative of broader struggles and conflicts over the control of germplasm in other parts of the world. The Colombian example very clearly reveals the tensions and conflicts produced by the intent of capital to expand its reach in

agriculture with the complicity of the state by claiming that particular standards are necessary. Farmers whose livelihoods and cultural practices were directly affected by Resolution 970 understood the non-natural and political character of the new certification requirements. As a result, the state has not been able to impose standardization and certifications requirements for seeds.

## **VI. Concluding Discussion**

Ask yourself who established those standards and what justifications they used in establishing them. Think of who wins and who loses as a result of standards. Think of what virtues and vices are made manifest through standards. Ask yourself whose rights are supported and whose rights are abridged as a result of standards. And, perhaps most important, ask yourself how standards might be used, modified, or transformed to produce a more just and caring world.

– Lawrence Busch (Busch 2011, 309)

### **A. The ongoing struggle over standards that regulate germplasm**

The pressures to standardize seeds and dissolve informal seed systems are being felt worldwide. It is undeniable that such standards contribute to genetic erosion and threaten the agro-biodiversity upon which all our livelihoods depend. Such laws directly undermine the tenets of the increasingly popular notion of “farmers’ rights” laid out in the International Treaty on Plant Genetic Resources for Food and Agriculture. The FAO defines farmers’ rights as “rights arising from the past, present and future contributions of farmers in conserving, improving and making available plant genetic resources, particularly those in the centers of origin/diversity” (Van Amstel 1995). Some of these rights include the right to protect traditional knowledge related to agro-biodiversity and the right to participate in national decision-making processes regarding the conservation and use of germplasm. To criminalize farmers’ seed systems, evidently without asking for their permission to do so, is to infringe on basic farmers’ rights.

In dialogue with theory about the power of standardization and about accumulation by dispossession in the neoliberal era, I have argued that insufficient attention has been granted to the effect of seed laws that do not directly address

IPR issues but that also dramatically affect seed systems and farmers' seed saving practices. Unlike the outlawing of seed saving on the grounds of IPR infringement while growing transgenic crops, the erosion of seed sovereignty via certification and registration requirements is significantly less visible and insufficiently discussed.

Busch's call to ask questions such as, "How do standards influence behavior in ways that may or may not be beneficial to human welfare?" or, "When are standards just or unjust?" are as pressing and necessary as ever (Busch 2000). In the specific case of standards defined in regulatory frameworks for plant genetic resources, we have seen that behind the façade of seemingly good intentions lies a series of negative consequences, especially for seed sovereignty and agrobiodiversity conservation. One of the most obvious negative consequences is that that broadly held values of seed saving and seed exchange are increasingly threatened, outlawed, and policed. The rising criminalization of seed saving is made manifest in things like massive burnings of non-certified "illegal" seeds; in systematic inspection brigades and public threats that try to make sure that IPR and certification regimes are complied with; and in "denounce your neighbor" hotlines and websites – all of which contribute to the manufacturing of mistrust and suspicion in rural communities. In place of an ethic of collaboration and sharing in agriculture, we are witnessing the promotion of an ethic of individualism and policing. Relative autonomy in food production, another fundamental value for small-scale farmers, is also being undermined.

I do not mean to insinuate that rural realities would be immediately and magically better if we only did away with standards and standardization altogether. The problem is not inherently certification or standardization per se, but rather on the particular types of standards that are being institutionalized and in the biases and consequences they have. It is important to recall that historically, seed certification and quality control programs did at least partly emerge in order “to help farmers who purchase seed, since both the variety and the quality of the seed can rarely be observed from a visual inspection of the seed itself” (Louwaars 2005). Farmers should, after all, be “protected from purchasing substandard seed (consumer protection) and from planting it (national food security)” (Louwaars 1997, 94). I have argued, however, that seed laws that institutionalize and regulate seed trade have had many more implications other than “helping farmers” by preventing seed companies from deceiving them. If we are to have vibrant seed systems that promote *in situ* preservation of agro-biodiversity many nations’ seed and agricultural policies need to be redesigned.

Fortunately, the possibility of patenting life and regulating seed via certification mechanisms are not yet the dominant paradigms in much of the Global South. The seed is still, to varying degrees in different contexts, a contested commodity. In places where informal and formal systems coexist, myriad competing and conflicting standards, norms, traditions, and laws are colliding with each other as regulations that favor formal seed industries gain ground. We are living through a critical juncture in which the rules of the game for the regulation of plant genetic resources are being redefined and disputed.



## **B. Prospects for a different regulatory framework that prioritizes food and seed sovereignty**

Despite the unpromising panorama with regards to the direction that legal frameworks are taking, the existence of growing opposition movements and the difficulty of actually enforcing certification requirements in countries with thriving informal seed systems are reasons for optimism. Whereas seed sovereignty was once taken for granted, it has now acquired the aura of a utopia that requires defense and protection. If food and seed sovereignty are to be achieved, we need a different model for the regulation of plant genetic resources. As suggested by Kloppenburg, the central organizing feature of a legal framework that prioritizes and defends seed sovereignty would be distinguished for its:

commitment to institutionalized recognition of genetic resources and associated cultural/indigenous/community knowledge as a broadly social product, a collective heritage of farming communities that is to be freely exchanged and disseminated for the benefit of all. Seed sovereignty therefore entails creation of a legally defined space in which sharing is unimpeded but is protected from appropriation by monopolists” (Kloppenburg 2010, p.385).

Different strategies of resistance against the continued erosion of seed sovereignty currently exist in different parts of the world. Broadly speaking, there are at least five directions that struggles for seed sovereignty could take, and in some cases, are already taking. They are:

1. A generalized defiance and disobedience of seed laws that attempt to dispossess farmers of their seeds, while simultaneously strengthening local and national seed systems.
2. Opposition to and struggles against laws that facilitate the privatization of life and the criminalization of seed saving, and the demand and implementation of laws that protect customary practices.

3. The creation and implementation of a tool inspired by the logic of the open source software movement to create a protected commons for germplasm of interest.
4. A more comprehensive struggle demanding a new agricultural paradigm, including agrarian reform, subsidies for smaller-scale and agroecological growers, and the institutionalization of the idea that guaranteed access to culturally appropriate and sustainably produced food should be a human right, and hence cannot be treated solely as a commodity.
5. A combination of any one of the above points.

The extent to which the material interests of farmers are affected by new laws will influence how politicized they get and how willing they are to mobilize against what they consider unjust. Until now, the introduction of Seed Laws, IPR Laws, and genetically modified crops has not gone completely unnoticed, but for the most part, they haven't triggered sustained and massive social mobilization capable of overturning them altogether. The transnational movement Vía Campesina and Vandana Shiva's Navdanya are amongst the most well-known organizations vociferously opposing contemporary trends in seed legislation. Given the relative novelty of these laws, it is not inconceivable that the new "rules of the game" could still be challenged and perhaps reversed, as they are still weakly institutionalized and in many cases not effectively enforced. All nations do have legal sovereignty over the biological diversity within their territories according to the Convention on Biological Diversity, so with enough social pressure, they could theoretically decide to regulate it under a different logic. Still, it is important to recognize that the pressures of the WTO and the international political economic system more generally are very strong, and that it is not simple for states

embedded in this system to ignore global expectations, especially if that could translate into economic retaliations and political isolation. Judging by the trends, the scenario isn't particularly hopeful, but it is certainly not hopeless yet.

From a policy perspective, one specific proposal set forth by Louwaars is to support what he calls “integrated seed systems”, a concept that emerged in response to the linear conception of seed systems developed by Douglas. In the 1990s the accuracy and overall desirability of the stage theory of seed system development discussed earlier became increasingly questioned. The growing recognition and comprehension of the complexity and value of farmers' knowledge regarding seed selection, saving, and exchange, undermined the assumption that formal seed systems were necessarily better. The ecological and biodiversity crises produced by industrial agriculture led many farmers and breeders to reappraise their assumptions regarding the importance of agro-biodiversity and *in situ* preservation.

Integrated seed systems seek to combine the strengths of both formal and local knowledge (Louwaars 2002). Advocates of seed policies that favor integrated seed systems know that the design of a comprehensive blueprint seed policy is both impossible and undesirable, given the diversity of socio-historical contexts in which seed systems exist. In its place, argue researchers like Louwaars, the strategy should be to really understand seed systems in each particular location and then develop policies and regulations that make sense in that context, instead of drawing conclusions from supposed universal development stages (Louwaars 2002). It follows that integrated systems may look significantly different from one

place to the next. Thus, supporting integrated seed systems means that policies and regulations cannot focus on the formal sector alone, as that would likely be “counter productive for increasing seed quality and availability for the majority of farmers in most countries” (Louwaars 2002, 11). The ultimate goal is to regulate germplasm in such a way that does not compromise thriving farmers’ seed systems.

Seed sovereignty by itself, of course, doesn’t guarantee that farmers will live just and flourishing lives. Access to land, water, and other resources in the communities in which they live are also important issues to consider in any alternative project. An even more desirable scenario that builds on mere seed sovereignty would be to guarantee a universal right to culturally appropriate food for everyone, everywhere. Control over germplasm, however, is a fundamental prerequisite for a more just agricultural sector. The seed, after all, does come first; without access to germplasm we have no agricultural system to speak of. The importance of control over seeds and germplasm more generally cannot be overemphasized, as whoever controls the seed exerts significant power over the whole agricultural production process. That means that “if ‘food sovereignty’ is to be achieved, control over plant genetic resources must be wrested from the corporations that seek to monopolize them and be restored to, and permanently vested in, social groups and/or institutions with the mandate to sustain them and to facilitate their equitable use” (Kloppenborg 2010, 368-9). Hence, it is reasonable to think about how to impede and revert the continued erosion of seed sovereignty as a first step.

The best way to maintain peasant and local seed systems viable is to keep those agricultural endeavors viable. The most concrete and immediate way of resisting seed enclosures is to keep producing and exchanging seed. Fortunately, biology and cultural practices are on people's side when it comes to preserving existing seed systems in many places. Seed saving and exchange is difficult to police, so we have good reason to believe that the enforcement of laws that criminalize them is likely to be imperfect to say the least. This, however, is obviously not enough to prevent the continued growth of transnational agribusiness and its associated appropriation of germplasm. Not even good seed laws are enough to preserve biodiversity and promote food sovereignty. As we have seen, even though the US system is less strict than the European one, the dominant agricultural paradigm in the country has produced agricultural landscapes that are as homogeneous, if not more, than European ones. This means that better seed laws must be complemented by better agricultural policies that encourage and make possible more sustainable agricultural systems.

In sum, struggles for seed sovereignty and the preservation of crop biodiversity are tightly linked to broader disputes over competing agricultural paradigms. Consequently, debates about what seed systems and seed laws ought to look like if we want a more sustainable agricultural model inevitably raise difficult questions. Should agriculture merely be seen as a business and hence have productivity and efficiency at its center? Or are there other issues at stake, such as the preservation of biodiversity, culture, and self-sufficiency that deserve equal attention? What role should the state play in agriculture if want to

guarantee food sovereignty and preserve agro-biodiversity? The underlying issue is whether plant genetic resources will be increasingly treated as private property or if they will be used freely and cooperatively to nourish humanity. The battle of ideas in this regard will continue, as will the struggle over the content of legal frameworks for germplasm that are dramatically transforming the relationships between farmers, nation-states, multinationals, and germplasm worldwide.

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