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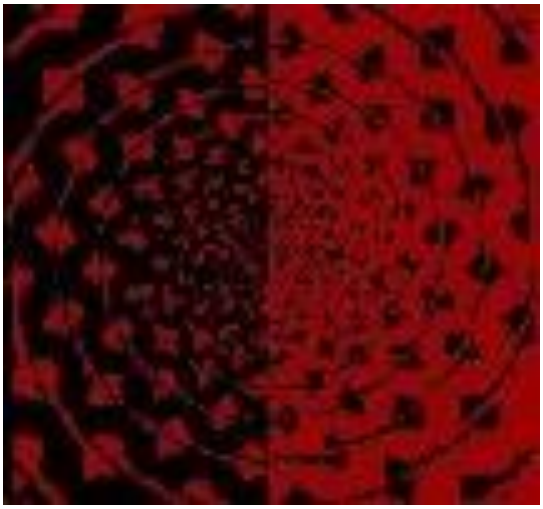

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Contents

List of Abbreviations

ABS: Access and Benefit-Sharing
CBD: Convention on Biological Diversity
CEDAW: Convention on the Elimination of All Forms of Discrimination Against Women
CGIAR, Consultative Group for International Agricultural Research
COP: Conference of the Parties
DSI: Digital Sequence Information
EU: European Union
FAO: Food and Agriculture Organization of the United Nations
GB: Governing Body (under the ITPRGRFA)
ICESCR: International Covenant on Economic, Social and Cultural Rights
IPLC: Indigenous Peoples and Local Communities
IPR: Intellectual Property Rights
MAT: Mutually Agreed Terms
MLS: Multilateral System of Access and Benefit-Sharing (under the ITPGRFA)
PIC: Prior Informed Consent
SMTA: Standard Material Transfer Agreement
TRIPS: Agreement on Trade-Related Aspects of Intellectual Property Rights
UNDRIP: United Nations Declaration on the Rights of Indigenous Peoples
UNDROP: United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas
UPOV: International Union for the Protection of New Varieties of Plants
WIPO: World Intellectual Property Organization

The "Rights of Relations" Between Humans and Seeds: An Ecological, Ontological, and Epistemological Approach to Recommoning the Recommoning the Property Regime Complex of Seeds

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Introduction

The international seed "regime complex" and international environmental law have been criticized for promoting a dualistic and naturalistic definition of the environment (Raustiala and Victor 2004; Jones 2021). This article seeks to rethink this regime complex through a relational approach to law by introducing the concept of "rights of relations" between humans and seeds (Walckiers 2022).

Following Raustiala and Victor's (2004) conceptual framework, a regime complex refers to a situation where a subject matter is regulated by several rules of law (international, supranational, and national) with sources, hierarchy, objectives, and projects that may be different or even contradictory. In this case, seeds are part of a regime complex because several legal instruments coexist and co-regulate (sometimes overlapping) this subject. Regarding legally binding rules, this regime complex is notably composed of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), the Convention on Biological Diversity (CBD), the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization (Nagoya Protocol), the International Union for the Protection of New Varieties of Plants (UPOV), and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). Although not legally binding, we may note the United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas (UNDROP). In the case of the seed regime complex, several issues are identified, such as the contradiction between legally binding intellectual property rights (TRIPS, UPOV), which seek to privatize access to seeds with intellectual (over)protection of seeds, on the one hand, and the weak protection of Farmers' Rights or limited benefit-sharing (ITPGRFA, CBD, Nagoya Protocol). Other criticisms are also addressed, such as the lack of participation of seed stakeholders in the management process and the unsustainable use of appropriation models related to seeds.

Facing these important criticisms, we propose reassessing this regime complex through the prism of the "rights of relations." Starting from the philosophy of law, the "rights of relations" is a set of rights to be imagined (as the rights of nature have been imagined), which do not (yet)

[1] I would like to thank my co-supervisor Christine Frison for her guidance on my research and for this article.

effectively exist in positive law, but which could be used in legal arguments (Jones 2021, 19). If the Rights of Nature aim to protect nature for itself, the "rights of relations" aim to protect all forms of relationships between humans and non-humans. From a legal point of view, we want to link the "rights of relations" with the theories of the commons (Ostrom 1990; Capra and Mattei 2015; Gutwirth and Stengers 2016). The commons have been an important approach to criticizing the seed regime complex, valuing practices where a group of humans autonomously organizes around a resource in a sustainable and generative manner (Frison 2018a; Tschersich 2021). Indeed, some authors argue that managing seeds as commons would facilitate access to the diversity of seeds, promote sustainable use, and enable their efficient conservation (Halewood et al. 2018; Dedeurwaerdere 2012; Frison 2018a). These propositions are important in the context of climate change, especially for developing countries (Beddington et al. 2012), as the protection of genetic diversity is an essential issue for food security (Altieri 1999). In this project, we want to extend these reflections by adding the proposal of the "rights of relations" to bring legal and philosophical arguments to the theories of the commons, particularly in their applications to the regime complex of seeds (Nayak 2021).

From an activist point of view, we believe that the protection of "nature for itself" without integrating the populations that live there and their relations with this nature prolongs a neo-colonial logic that is still too present in environmental law (Whitt 2009; Ferdinand 2019; Collins et al. 2021; Ali 2021; Blanc 2020; Jones 2021). From an anthropological approach, we would like to point out that the separation between nature and culture is far from universal, as it is the result of Western philosophy (Descola 2005; Graham 2010; Gardey 2013). Therefore, other types of ontology and relationships with the environment exist: the "naturalism" or "dualism" ontology, which distinguishes between nature and culture, is just one classification and constitution of the world among others (Descola 2005). These other ontologies (such as animism, totemism, and analogism) are legitimate and should be respected in environmental law. This separation between nature and culture is also found in the seed regime complex, where seeds are defined as "plant genetic resources" and are viewed as something appropriable and exploitable (Safrin 2004). Thus, all other forms of relationships with the environment and seeds (social, spiritual, etc.) are disregarded in these utilitarian and dualistic legal constructs (Frison 2018a, 2, 182). This is why it seems important to us to criticize the seed regime complex by applying the "rights of relations."

Our research objective is twofold: first, to critically present the seed regime complex, particularly the imbalances of rights that penalize farmers (O1), and second, to apply the "rights of relations" to protect the relationships between humans and seeds (O2). Our research questions are the following: considering the limitations of the seed regime complex, what contributions can the "rights of relations" between humans and seeds offer? Our first hypothesis is that the seed regime complex presents several significant gaps due to conflicts between competing rights and principles (H1). These limitations include the "hyper-appropriation" and "overprotection" of seeds (Safrin 2004, 641); the imbalance of rights that penalizes farmers and Indigenous peoples; the disregard for traditional knowledge, which is considered less scientific than Western knowledge (Whitt 2009); the absence of participation

from seed stakeholders in the management process; and the limited benefit-sharing for them. Taking these difficulties into account, our second hypothesis is that the "rights of relations" can propose an effective legal approach to protect the co-development links between humans and seeds, whether these relationships are physical or intangible, cultural, spiritual, medicinal, etc. (H2). In this way, the "rights of relations" would offer an alternative prism to the purely commodified views of the seed in its regime complex. Moreover, the "rights of relations" could also protect different from of knowledge and promote traditional knowledge in a decolonial manner. To bring our hypotheses together, the "rights of relations" would be a promising concept to address important criticisms of the legal regime of seed ownership, such as the oversimplification of the relationship between humans and seeds or a neo-colonial approach to Western science in comparison to traditional knowledge. Finaly, the "rights of relations" offer an interesting alternative legal prism, exploring parallel paths to commoning, which is relevant not only in this case but also in other areas of law.

We mobilize an interdisciplinary methodology, combining legal technique with legal philosophy and anthropology. Through the prism of the "rights of relations," we adopt a constructive approach to law, where legal frameworks can evolve to meet new social demands. In fact, we aim to envision a legal evolution and openness that would recognize these "rights of relations" between humans and seeds. This involves analyzing the proposals for the "rights of relations" alongside their actual possibilities through legal techniques. Furthermore, this interdisciplinary approach is justified because seed management is examined from various perspectives, including agronomy, economics, international relations, environmental and social sciences, and different areas of law (such as environmental law, intellectual property, and international law) (Frison 2018a).

This paper is divided into two parts. The first part critically presents the international seed regime complex. We critique the hyper-appropriation of seeds, the hegemony of economic relations concerning seeds, and the imbalance in the rights of farmers and Indigenous communities regarding their "rights to seeds" and the respect for their traditional knowledge. In the second part, we introduce the concept of the "rights of relations" between humans and seeds. The "rights of relations" are then explored as a potential way to mitigate the limitations of the seed ownership regime complex.

I. Critical Analyses of the Seed Property Regime Complex

The international seed regime may be defined as a "regime complex" because it is regulated by coexisting, co-governing, and conflicting norms of international law (Tschersich 2021, 2).

> According to Krasner (1982, 186), international regimes are a "set of implicit or explicit principles, norms, rules, and decision-making procedures around which actors' expectations converge in a given area of international relations."

> In this context, the term "regime complex" refers to "an array of partially overlapping and non-hierarchical institutions governing a particular issue area" (Raustiala and Victor 2004, 279; Tschersich 2021).

Within a regime complex, several legal agreements are developed and maintained across different forums with various actors. These rules often overlap and create interdependencies, leading to synergies or conflicts without a hierarchy of norms to resolve disputes between them (Raustiala and Victor 2004, 279). Furthermore, regime complexes may lead to tensions between rules of different natures and roles: some are legally binding, while others are not. Additionally, regime complexes can be influenced by the actors who compose them (Rabitz 2018). Therefore, an actor-centered approach highlights their influence and roles, interpretations, and applications in national, local, or corporate policies (Rabitz 2018; Acharya 2004; Finnemore and Sikkink 1998).

1. Main Instruments of the Regime Complex

The seeds legal property regime complex is composed of several rules of international law that address different issues. This article focuses on the tensions between the following international instruments: the Convention on Biological Diversity (CBD), the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (Nagoya Protocol), the (non-binding) United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas (UNDROP), the International Union for the Protection of New Varieties of Plants (UPOV), a specific instrument on intellectual property rights for plant varieties that stimulates plant breeding, as well as the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).

Several classifications can be made within this regime complex. Regarding objectives, a first distinction can be made between, on the one hand, rules relating to the conservation and sustainable use of genetic resources, as well as rules concerning access and sharing of benefits (ABS) arising from their use (particularly CBD, Nagoya Protocol, ITPGRFA), and, on the other hand, rules focusing on intellectual property that promote breeder's rights (specifically UPOV and TRIPS). Yet, this separation is not so clear-cut, as instruments related to access and benefit-sharing incorporate the logic of resource appropriation (national sovereignty over genetic resources) and Intellectual Property Rights (IPR) (Frison 2018a, 97; Tsioumani 2018, 113).

If we primarily distinguish between the instruments of intellectual property rights and access and benefit-sharing in this regime complex, there are other distinctions and influences within this framework. Non-binding declarations can also influence the regime complex. This is the case with the United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas (UNDROP), adopted in 2018 by the Human Rights Council, which can consolidate the Farmers' Rights, particularly in specific areas such as food sovereignty, including access to land and seeds, and can be articulated alongside the package of human rights (see later; Batur and Golay 2021, 20). Additionally, the plant genetic resource regime

complex is also influenced by national and supranational legislation. At the European Union level, there are a series of directives and regulations on patents, the plant variety protection regime, seed marketing legislation, the rules for their commercialization, and the biodiversity protection regime, among others (Batur and Golay 2021). Consequently, the combination of all these sources of international, supranational, and national law leads to major overlaps and great complexity in the governance of genetic resources (Tschersich 2021, 2; Oberthür and Pożarowska 2013; Raustiala and Victor 2004).

To delve into the details of the conflicts between access and benefit-sharing and intellectual property rights, there are instruments that address biodiversity conservation, involving the sustainable use of genetic resources and the just and equitable sharing of benefits associated with this use. The main instrument is the Convention on Biological Diversity (CBD), adopted on June 5, 1992, and entering into force on December 29, 1993. The CBD is a legally binding international treaty with 196 contracting parties[1]. Secondly, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization, adopted on October 29, 2010, and entering into force on October 12, 2014, includes 141 parties[2]. The primary aim of the CBD and its Protocol is to ensure the conservation of biological diversity, sustainable use, and, from the perspective of distributive justice, the just and fair distribution of benefits arising from it (Art. 1 CBD; Frison 2018a, 36). Additionally, in a specialized context for the agricultural sector, the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) is a binding international treaty, signed in 2001 and entering into force in 2004, with 152 contracting parties.

In line with the momentum of the 1991 Rio Conference and following UN Resolution 1803 (XVII) on "Permanent Sovereignty over Natural Resources," the CBD aimed to restore a balance between biodiversity conservation and the sovereign rights of nations over their genetic resources, allowing them to regulate (and commercialize) access to these resources (Frison 2018a, 36). Regarding the sustainable use of biodiversity, the CBD establishes a framework for the appropriation of genetic resources: the CBD allowed developing countries to control access to their biodiversity and to monetize it through a system of bilateral contracts (Frison 2018a, 36; Bagley 2022).

The ITPGRFA shares similar objectives with the CBD, namely the conservation, sustainable and equitable use of resources, and equal and equitable access to plant genetic resources for food and agriculture (Tschersich 2021, 4). The ITPGRFA establishes a *lex specialis* regime applicable to plant genetic resources, which is particularly necessary on two levels: first, to facilitate access to seeds, as their use and cultivation help ensure their sustainability; and second, in recognition that a national sovereignty approach is less relevant for seeds, given the

[1] Addendum: The list of contracting parties of all instruments have mentioned in this article was updated in November 2024.
[2] Addendum: The number of contracting parties to the Nagoya Protocol will reach 142 by December 24, 2024. The new contracting party will be Costa Rica, which ratified the protocol in September and will officially join 90 days after its ratification or accession..

difficulty of confining the origins of various varieties (which have interbred) within national borders (Frison 2018a, 37; Girard 2019, 9).

This ABS part of the regime complex collides with rules and instruments that protect intellectual property rights. In this context, the International Union for the Protection of New Varieties of Plants (UPOV) is a legally binding international instrument created in 1961 and consolidated through subsequent agreements in 1972, 1978, and 1991, with 79 member parties. The objective of the UPOV Convention is to provide a *sui generis* system of intellectual property rights for plant varieties, in line with the principles and objectives of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) (Tschersich 2021, 3; Koutouki, Matip, and Kwembou 2011, 138). Adopted within the World Trade Organization framework, the TRIPS Agreement, signed in 1994 and entering into force in 1995, encompasses 166 contracting parties. The TRIPS Agreement aimed at establishing a general framework for intellectual property rights protection, putting in place general standards for copyrights, patents, trademarks, geographical indications, industrial designs, and other forms of intellectual property. These two binding sources of public international law each assign exclusive ownership through patents on plant genetic resources and plant breeder's rights, thereby promoting seed appropriation (Oberthür and Pożarowska 2013; Tschersich 2021, 3).

This section introduced the main instruments composing the plant genetic resources regime complex. The following sections detail the objectives and principles of both sides of this regime complex and provide a critical analysis of the conflicting relationships between, on the one hand, the UPOV Convention and TRIPS Agreement, and on the other hand, the ITPGRFA or the CBD (Tschersich 2021, 2). In terms of conflict, the last section details how the plant breeder's rights of the UPOV undermine the Farmers' Rights of the ITPGRFA and specifically impact farmers in the Global South (Tschersich 2021, 3; Christinck and Tvedt 2015, 45).

2. Conflicting Objectives and Principles

Several objectives and principles arise from this regime complex. This section presents these objectives and principles and identifies the competition between them, particularly concerning the tensions between access and benefit-sharing and intellectual property rights.

2.1. Biodiversity Conservation and Sustainable Use

First, there is the objective of the sustainable management of genetic resources and the conservation of biodiversity. The sustainable use of genetic resources is a cross-cutting objective within this regime complex, which can be found in Article 1 of the CBD, the ITPGRFA, and the Nagoya Protocol. Taking the ITPGRFA as an example, its Article 1 states as its objective: "the *conservation* and of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use" (emphasis added). These instruments were adopted to combat biodiversity erosion, particularly considering that the conservation of crop diversity is essential for ensuring food security (Frison 2018a, 36; Bagley 2022, 7).

This objective of biodiversity conservation, however, must be nuanced by the internal logic of commercialization of these genetic resources. Indeed, one of the main breakthroughs of the CBD is the recognition of state sovereignty over genetic resources, thereby encouraging their conservation according to the logic "protect the biodiversity to sell it" (Frison 2018a, 37). By establishing sovereignty over biological resources and breaking away from a common heritage approach of humanity, the CBD allows developing countries to regulate access to genetic resources within their territories and to monetize their use. According to the instruments, there are systems of bilateral and multilateral agreements where biodiversity can be accessed and monetized. Thus, there is an internal tension within these instruments that limits the sustainable management of biodiversity through the appropriation and commercialization of seeds. Moreover, this internal tension is overshadowed by external pressures, particularly when considering the objectives of the TRIPS Agreement and UPOV concerning intellectual property rights and technological innovations in plant breeding, without taking into account the objectives of conservation and sustainability (TRIPS, Art. 7)

2.2. Access and Fair and Equitable Benefits Sharing

Another fundamental objective of the international seed regime complex is the rules on access to genetic resources, alongside the fair and equitable sharing of the benefits arising from their utilization (CBD, Art. 1) and plant genetic resources for food and agriculture (ITPGRFA, Art. 1; Lawson, Humphries, and Rourke 2019; Aubry et al. 2022).

The CBD, later complemented by the Nagoya Protocol, provides the general framework for access and benefit-sharing concerning all genetic resources. The CBD recognizes the principle of state sovereignty over natural resources (CBD, Art. 3, 15). In exercising this sovereignty, states can establish terms and conditions for access to their genetic resources, under the principles of prior informed consent (PIC), mutually agreed terms (MAT), and fair and equitable sharing of the benefits arising from their use (CBD, Art. 15.1, 15.4, 15.5, 15.7; Nagoya Protocol, Art. 5 and 6).

The CBD operates through a bilateral system in which providers and users negotiate the terms of access to genetic resources, as well as the forms of benefit-sharing (monetary or non-monetary) that result from it (Frison 2018a, 37; Bagley 2022, 10; Le Teno, Frison, and Cogolati 2022). As ABS and PIC mechanisms vary across countries, the Nagoya Protocol was adopted to specify the practical details of implementing these general ABS principles and to reduce legal uncertainties for both users and providers (Frison 2018a, 40; Bagley 2022, 12; Broggiato et al. 2014, 179). Without being exhaustive in its analysis, the Nagoya Protocol requires parties to ensure that only legally acquired genetic resources and traditional knowledge may be used within their jurisdictions, monitoring user compliance through checkpoints, and allowing ABS disputes to be addressed at the national level. The Nagoya Protocol also establishes an ABS Clearing-House Mechanism that presents national ABS laws and contact points (Bagley 2022, 12-13).

Alongside the general framework of the CBD and the Nagoya Protocol, other instruments establish distinct rules for specific areas (such as marine genetic resources, plant genetic

resources, pandemic influenza biological materials), leading to a fragmentation of the "ABS regime complex" (Oberthür and Pożarowska 2013, 101).

In this context, the ITPGRFA is a specialized instrument for plant genetic resources for food and agriculture. In line with its objective of promoting a facilitated access to plant genetic resources for agriculture, the ITPGRFA implements access and benefit-sharing through a multilateral system (MLS) where seeds are collectively exchanged via a virtual common pool (Frison 2018a, 95; Tschersich 2021, 8). Indeed, in exercising the sovereignty of states over their plant genetic resources for food and agriculture, contracting parties have decided to create the MLS as a common pool for 64 species of plant genetic resources for food and agriculture listed in Annex I(ITPGRFA, Art. 10-13; FAO, 2021a, 55; Frison 2018a, 95). With these 64 species, the MLS covers 80% of human consumption, yet it does not include certain major crops for food security, such as soybean, groundnut, tomato, coffee, and sugarcane (Tsioumani 2018, 113; Frison 2018b, 85). The MLS is mainly composed by plant genetic resources in the public domain, under the management of contracting parties and the Consultative Group for International Agricultural Research (CGIAR) (ITPGRFA, Art. 11 of Annex I; Frison 2018a, 95). Therefore, privately held plant genetic resources are not automatically included, and their integration is limited (Frison 2018a).

This multilateral system aims to facilitate access to seeds while ensuring the fair and equitable sharing of the benefits arising from their use. For these purposes, several tools have been established by the ITPGRFA to facilitate access to plant genetic resources and promote research, innovation, and information exchange without restrictions, including a database of species conserved by the contracting parties and gene banks (Frison 2018b, 64). Access to plant genetic resources is enabled through a specific contract, the Standard Material Transfer Agreement (SMTA), for researchers, breeders, and trainers working in food and agriculture (Frison 2018a, 96; Frison 2018b, 64). In fact, the multilateral approach and the SMTA were preferred over the CBD bilateral approach to save time and money spent on contract negotiations between users of plant genetic resources (Frison 2018a, 96). Without relying on bilateral negotiations, access to plant genetic resources is therefore facilitated with the SMTA, with pre-established and publicly available contractual conditions (ITPGRFA, Art. 12, (a), (b); Frison 2018a, 95).

Under the ITPGRFA, benefit-sharing can take the form of non-monetary contributions such as information exchange, access to and transfer of technology, capacity building, and monetary contributions in the case of commercialization of a covered MLS variety (ITPGRFA, Art. 13.2; Frison 2018a, 105). Following the structure of the MLS, access to seeds covered by the MLS is practically free, and the benefit-sharing conditions are provided by the SMTA and apply when a product derived from MLS material is commercialized. In practice, this system is accompanied by a Benefit-Sharing Fund launched in 2009 and financed by mandatory and voluntary payments in the case of a commercialized product obtained through the MLS (ITPGRFA, Art. 13.2(d); Frison 2018b, 64; FAO 2021b, 35). Nevertheless, for a series of reasons discussed further, there are several serious obstacles to the effective implementation of the benefit-sharing system (see: I.3.1), as well as for the CBD. In this context, it has been argued

that while the Treaty aimed to reward farmers, especially those in developing countries (ITPGRFA, Art. 9.2(b), 13), it is primarily breeding companies, researchers, and gene banks that benefit from the MLS (Tschersich 2021, 8; Tsioumani 2018, 113; Frison and Coolsaet 2018; Rabitz 2017).

2.3. Farmers' Rights

By "Farmers' Rights," we refer to a set of rights recognized by various sources of international law to support farmers, Indigenous peoples, and others working in rural areas regarding the conservation, access, and utilization of genetic resources. Farmers' Rights also extend to the protection of their traditional knowledge and political representation. It is argued that the recognition of Farmers' Rights is a prerequisite for biodiversity conservation, as farmers are the custodians and developers of genetic biodiversity in their fields (FAO, 2021b, 3).

The protection of Farmers' Rights is primarily found in the ITPGRFA, and secondarily in the CBD through the protection of traditional knowledge, as well as in other binding and non-binding international instruments. Indeed, Article 9 of the ITPGRFA and recitals 7 and 8 are dedicated to the recognition of Farmer'' Rights.

> Article 9, paragraph 1 recognizes: "The enormous contribution that the local and indigenous communities and farmers of all regions of the world, particularly those in the centers of origin and crop diversity have made and will continue to make for the conservation and development of plant genetic resources" (ITPGRFA, Art. 9.1).

While allowing contracting parties to exercise sovereignty in implementing Farmers' Rights at the national level, the ITPGRFA recognizes various rights for farmers, including:

- The "protection of traditional knowledge relevant to plant genetic resources for food and agriculture" (ITPGRFA Art. 9.2(a));
- The "right to equitably participate in sharing benefits arising from the utilization of plant genetic resources for food and agriculture" (ITPGRFA, Art. 9.2(b)); and
- The "right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture" (ITPGRFA, Art. 9.2(c)).
- More implicitly, Article 9 recognizes the importance to farmers of the rights "to save, use, exchange, and sell farm-saved seed and propagating material." In that sense, it indicates that nothing in this Article can be interpreted to limit this right (ITPGRFA, Art. 9.3; FAO 2021b, 37).

However, while the ITPGRFA provides an ambitious framework for Farmers' Rights, the Treaty leaves the implementation of these rights to the contracting parties, granting them broad discretionary power regarding their enforcement and protection (ITPGRFA, Art. 9.2, 9.3, Recital 8). In fact, by leaving the implementation of these Farmers' Rights to the contracting parties, their effective application is limited, as some states may interpret Farmers' Rights restrictively, particularly in relation to their legally binding obligations under intellectual

property systems through the TRIPS Agreement and UPOV (Frison 2018b, 64; Haugen 2020; Claeys and Edelman 2020). Consequently, while Farmers' Rights are presented as a form of compensation for the establishment of the MLS and IPR over improved varieties, these rights remain quite limited, given that very few countries have adopted national laws to enshrine Farmers' Rights (Frison 2018b, 64; FAO 2021b, 9).

Again, other sources of international law are also relevant for Farmers' Rights. Indeed, the protection of traditional knowledge related to plant genetic resources can be interpreted within the broader framework of traditional knowledge protection established by the CBD and the Nagoya Protocol. The CBD recognizes the need to protect and promote the traditional knowledge of indigenous and local communities, including the equal sharing of benefits arising from the use of such knowledge and practices (CBD, Art. 8(j)). In international contexts, traditional knowledge is understood as the knowledge and practices developed and maintained within a community from generation to generation, often forming part of their cultural and spiritual identity (definition used by the World Intellectual Property Organization – WIPO; Yentcharé 2016, 117). By linking the protection of Farmers' Rights and their knowledge related to genetic resources with the protection of indigenous or local communities, these instruments pursue the transversal objective of strengthening the self-determination of these communities, taking into account that these knowledges are essential to their practices, cultural and spiritual identities.

Then, the promotion and recognition of Farmers' Rights can also rely on other sources of international law (both binding and non-binding) that are closely related to the human rights framework. Indeed, Farmers' Rights can draw upon the human right to food under the International Covenant on Economic, Social and Cultural Rights (ICESCR, Art. 11), the full set of rights in the UN Declaration on the Rights of Peasants and Other People Working in Rural Areas (UNDROP), certain rights dedicated in the Declaration on the Rights of Indigenous Peoples (UNDRIP, Art. 31), and the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW, Art. 14). To protect Farmers' Rights, it is also possible to rely on customary practices, which are partially recognized in international law..

Although legally non-binding, the UNDROP provides strong tools for the protection of Farmers' Rights (Le Teno, Frison, and Cogolati 2022, 48; Frison 2018a, 90). These rights are intended to apply to "peasants and other people living in rural areas," defined as "any person […] alone, or in association with others or as a community" (UNDROP, Art. 1.1; Le Teno, Frison, and Cogolati 2022). Even though it is not binding in international law, the Declaration offers valuable elements. First, it provides an interpretation of the right to food, which is recognized as binding (ICESCR, Art. 11). Secondly, some states (such as Colombia) have transposed this Declaration into their national law (Batur and Golay 2021). Finally, the Declaration can always be used to consolidate interpretation in case law, as demonstrated in Honduras, where the judge gave legal effect to the UNDROP (Ruling on PVP law, Honduras 2022).

To analyze the Declaration more precisely, the UNDROP affirms both specific rights for farmers, peasants, and other people living in rural areas, as well as indigenous populations and

farming communities (such as the right to seeds, for example, UNDROP, Art. 19). Additionally, it asserts that general fundamental rights must be respected for these individuals, such as the right to life, freedom of thought, non-discrimination principles, etc. (UNDROP, Arts. 3, 4, 6, 7, 8, 9, 12). Particularly useful for the realization of Farmers' Rights, Article 19 of the UNDROP proclaims a "right to seeds," which includes the protection of traditional knowledge, innovation, and practices related to seeds (UNDROP, Art. 19.1(a), 20.2); equal participation in the sharing of benefits arising from the use of seeds (UNDROP, Art. 19.1(b)). Linked to the right to seeds, the Declaration also enshrines the right to the participation of farmers and indigenous communities in decision-making related to or affecting seeds (UNDROP, Art. 19.1(c) and 10.1). This right to seeds also extends to the "right to save, use, exchange, and sell their farm-saved seed or propagating material," which includes the right to "maintain, control, protect, and develop their own seeds and the related traditional knowledge" (UNDROP, Art. 19.1(d), 19.2; Le Teno, Frison, and Cogolati 2022).

The Declaration entails several obligations for States, which are responsible for implementing Farmers' Rights and the right to seeds, including access to quality seeds at affordable prices (UNDROP, Art. 2, 19.3, 19.4); promoting farmers' choices regarding the types of seeds and crops they wish to cultivate (UNDROP, Art. 19.5); supporting farmers' seed systems and promoting agrobiodiversity (UNDROP, Art. 19.6); integrating farmers (or their needs) into research programs (UNDROP, Art. 19.7); and, finally, ensuring the active and free participation of farmers in decision-making related to seeds (UNDROP, Art. 2.4, 10.1, 11.3, and 19.8; Le Teno, Frison, and Cogolati 2022).

Farmers' Rights to seeds (particularly the right to reuse farm-saved seeds) are in tension within the seed regime complex, as they are often restricted by intellectual property protection mechanisms. Given this, the UNDROP reaffirms the responsibility of States to ensure that laws related to intellectual property, plant variety protection, and seed certification and commercialization respect and take into account Farmers' Rights (UNDROP, Art. 19.8). More specifically, the Declaration imposes an interpretation of other international agreements in a manner compatible with the human rights obligations applicable to peasants (UNDROP, Art. 2.4). This is important because Farmers' Rights are often seen as being in direct confrontation with intellectual property rights. The next section will detail how these intellectual property mechanisms work and how they may hinder the realization of Farmers' Rights.

2.4. Protection of Intellectual Property Rights

As previously discussed, the different objectives and principles of sustainability, access and benefit-sharing, or Farmers' Rights may conflict with intellectual property rights instruments. The IPR instruments relevant to the seed property regime complex are the UPOV Convention, which protects plant variety breeders, and the TRIPS Agreement, each favoring a system of appropriation of seeds (Safrin 2004; Oberthür and Pożarowska 2013).

In their principles and objectives, the TRIPS Agreement (general protection of IPRs) and the UPOV Convention (creation of a *sui generis* system of IPR for plant varieties) stimulate and

protect a relationship of exclusivity, fostering innovation and plant breeding through intellectual property rights (Tschersich 2021, 7). In this case, these instruments limit the utilization and exchange of seeds, since any use or sale of protected material (for example, any biotechnological breeding methods or an improved and protected variety) must be subject to the consent of the inventor or breeder (TRIPS, Art. 28 and UPOV, Art. 14; Tschersich 2021, 7). By promoting a relationship of exclusive and restrictive property over plant materials, UPOV and TRIPS are contrary to collective, polycentric seed management and present major obstacles to any form of commoning (Frison 2018a; Tschersich 2021).

The TRIPS Agreement is the first IPR instrument analyzed in this article. The TRIPS Agreement provides the general framework applicable to intellectual property rights, implementing international standards for copyrights and related rights (Arts. 9-14), trademarks (Arts. 15-20), geographical indications (Arts. 21-24), industrial designs (Arts. 25-26), patents (Arts. 27-34), layout-designs (topographies) of integrated circuits (Arts. 35-38), protection of undisclosed information (Art. 39), and the control of anti-competitive practices in contractual licenses (Art. 40).

Patents are an important tool for the appropriation of seeds within its regime complex (Frison 2018a, 30, 41; Safrin 2004, 646). According to Article 27.1 of TRIPS, patents can be granted for "any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step, and are capable of industrial application." If granted, the patent offers exclusive rights to the patent holders for a limited period (typically 20 years), allowing them to control the making, using, offering for sale, selling, and importation of the patented product or the product obtained directly by the process (TRIPS, Art. 28.1, 33).

Although the TRIPS Agreement opens patentability to "any invention [...] in all fields of technology," there are optional exclusions left to member states, for instance, to protect public order, morality, human, animal, or plant health, or the environment (TRIPS, Art. 27.1, 27.2). In addition, Article 27.3(b) provides an optional exception concerning "plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes." As a result, micro-organisms and essentially biological processes to produce micro-organisms are not included in this exception, while member states may decide to exclude plants, animals, and essentially biological processes for their production from patentability (Kock 2022, 66; Tschersich 2021, 7). Yet, this article also requires member states to provide for the "protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof" (TRIPS, Art. 27.3(b)). This *sui generis* system is provided at the international level by the UPOV Convention, which aims to provide protection for plant variety breeders, yet it allows certain access to the protected variety for research in order to encourage the breeding of new varieties (Frison 2018a, 31; Tschersich 2021, 7).

To recapitulates, the TRIPS Agreement states that plant varieties must be protected either by patents or a *sui generis* system. However, member states may choose to exclude plants and non-essentially biological processes from patentability. Without going into technical details here, patents on plants (through isolation of plant DNA sequences and traits) and patents on

non-essentially biological processes are technically possible in Europe under the European Patent Convention and the EU Directive on biotechnological inventions (Kock 2022, 63-87)[1]. In addition, the United States provides a more permissive system with practically no restrictions on patent eligibility for plant-related inventions (Kock 2022, p. 66).

The second IPR instrument in the regime complex is the UPOV Convention. In line with the TRIPS Agreement , the UPOV Convention establishes a system of exclusive property rights for the breeder or developer of a new plant variety (UPOV Art. 1, Nguyen and Weckström Lindroos 2021).

> Variety is defined as follows: "a plant grouping within a single botanical taxon of the lowest known rank, which grouping, irrespective of whether the conditions for the grant of a breeder's right are fully met, can be defined by the expression of the characteristics resulting from a given genotype or combination of genotypes, distinguished from any other plant grouping by the expression of at least one of the said characteristics and considered as a unit with regard to its suitability for being propagated unchanged;" (UPOV, Art. 1 (vi)).

For a plant variety to be eligible for protection under breeder's rights, it must be "new "and meet the DUS criteria, which stand for Distinctness, Uniformity, and Stability (UPOV, Art. 5). The candidate variety is considered distinct if it is "clearly distinguishable from any other variety" (UPOV, Art. 7); uniform if it is "sufficiently uniform in its relevant characteristics" (UPOV, Art. 8); and stable if "its relevant characteristics remain unchanged after repeated propagation" (UPOV, Art. 9). Regarding the novelty condition, the variety "shall be deemed to be new if […] the variety has not been sold or otherwise disposed of to others" (UPOV, Art. 6.1). A variety cannot be distinct and new if it is part of the common knowledge, which is presumed if it is included in an official register of varieties (UPOV, Art. 7; Tschersich 2021, 7). These criteria pose problems for farmers' varieties and local seeds are generally considered as common knowledge, and they do specifically not meet the DUS criteria (Tschersich 2021a, 7; Christinck and Tvedt 2015).

When these criteria are met, he UPOV Convention grants the "breeder's rights." Whit the "breeder's rights," the UPOV Convention allows breeders to have exclusive rights over activities involving the propagation of the protected variety, including multiplication, use, production, sale, marketing, import and export, or its storage (UPOV, Art. 14; Tschersich 2021, 7). This exclusive right is granted for a defined period of at least 20 years (25 for trees and vines) from the date of the grant of the breeder's right (UPOV, Art. 19).

Then, the UPOV Convention provides conditions, limitations, and exemptions to these "breeder's rights." Indeed, Article 15.1(i) to 15.1(iii) of the UPOV Convention establishes compulsory exemptions for acts done privately, for non-commercial purposes, and for acts done for experimental purposes. Article 15.1(iii) also establishes the "breeder's exemption," the rationale of which is to allow the breeding of a new improved variety from a protected

[1] Addendum: A more precise analysis on patents on plants is undertaken in another article, provisionally titled: P. Walckiers "Traditional Knowledge, Western Science, and Discrimination within Intellectual Property Rights on Plant Genetic Resources."

variety and to enable breeders to claim breeder's rights over the new improved variety, thus encouraging innovation (Frison 2018a, 41). As for the other exemptions for acts undertaken privately, it is acknowledged that they are interpreted restrictively. For example, according to UPOV's Explanatory Notes: "non-private acts," even if non-commercial, are interpreted as falling outside of the exemption. It also limits the exemption to "the propagation of a variety by a farmer exclusively for the production of a food crop to be consumed entirely by that farmer and the dependents of the farmer living on that holding," excluding any form of small seed exchange networks between neighboring farmers (Christinck and Tvedt 2015, 68-69).

Another limitation to these "breeder's rights," which is optional, is the "farmer's privilege" exemption (which is not the same as "Farmers' Rights," discussed later 3.1). Following Article 15.2 of the UPOV Convention:

> "Contracting Party *may*, within reasonable limits and subject to the safeguarding of the legitimate interests of the breeder, restrict the breeder's right in relation to any variety in order *to permit farmers to use for propagating purposes*, on *their own holdings*, the product of the harvest which they have obtained by planting, on their own holdings, the protected variety or a variety covered by Article 14(5)(a)(i) or (ii)." (Emphasis added).

This optional exemption, if adopted by contracting parties, allows farmers to reuse seed produced from their crops on their own land (Nguyen and Weckström Lindroos 2021, 678; Le Teno, Frison, and Cogolati 2022).

Therefore, it is argued that the farmer's privilege exemption may enable contracting parties to limit intellectual property rights, thus aligning with the objectives set out in the "Farmers' Rights" under the ITPGRFA and UNDROP (Nguyen and Weckström Lindroos 2021, 678; Lee 2008, 159). The farmer's privilege exemption is also seen as a tool for balancing the rights of plant breeders with those of farmers, in a context where several critics argue that the UPOV Convention privileges the commercial interests of plant breeders (Nguyen and Weckström Lindroos 2021, 678). Nevertheless, this farmers' privilege exemption must be nuanced and cannot allow for an effective implementation of Farmers' Rights due to two significant limitations: its optional nature and its limited material scope.

First, the material scope of this exemption is limited to safeguard "the legitimate interests of the breeder" (UPOV, Art. 15.2). Specifically, this farmer's privilege exemption only pertains to the reuse of seeds on the farmers' own holding, excluding any form of trade, exchange, or donation of seeds by farmers (Nguyen and Weckström Lindroos 2021, 680). Indeed, this farmer's privilege exemption remains limited and does not grant farmers the right to freely exchange or circulate seeds without restriction (ITPGRFA, Art. 9.3). Depending on its interpretation, this privilege can also be limited based on factors such as the size of the "small" farm, the type of seed variety (e.g. excluding hybrids and synthetic varieties), and the intended purpose of using self-saved seeds (Kock 2022, 144; Nguyen and Weckström Lindroos 2021, 680, 682).To reinforce this restrictive interpretation of the farmer's privilege exemption, the related UPOV Explanatory Notes provide a strict interpretation, according to which:

> UPOV, Article 15.2 "should not be read so as to be intended to open the possibility of extending the practical commonly called farmer privilege, to sector of agricultural or horticultural

> production in which such a privilege is not a common practice on the territory of the Contracting Party concerned" (Nguyen and Weckström Lindroos 2021, 679).

In response, academics argued that this note interferes with the possibility given to the contracting parties to decide what material harvesting the farmers reuse in the use of their privilege (Nguyen and Weckström Lindroos 2021, 679).

Second, as it is an optional exemption, contracting parties must implement the farmer's privilege exemption in their domestic laws (Nguyen and Weckström Lindroos 2021, 678). To take one example under European Union law, the Council Regulation (EC) No 2100/94 of 27 July 1994 on Community plant variety rights cover the rules on the protection of plant varieties in the Union by incorporating the principles of the UPOV Convention (Nguyen and Weckström Lindroos 2021, 684). Article 14 of Regulation 2100/94 implements the optional farmer's privilege exemption. However, it is limited to certain crops (Regulation 2100/94, Art. 14(2)) and specific conditions (exclusion of hybrid varieties, exchanges, trades, and donations) (Nguyen and Weckström Lindroos 2021, 685). With the exemption of small farmers, the use of self-saved seeds is legal if the farmer pays an equitable remuneration to the rights holders (Regulation 2100/94, Art. 14(3)).

In this section, we have presented the different sources and principles of this regime complex, mainly focusing on the opposition between the objectives of IPR protection and those of Farmers' Rights , sustainability, and ABS. Indeed, we can clearly observe a limitation of the farmer's privilege exemption, and the significant rights granted to breeders by various sources of the IPR regime complex, which leads to legitimate critiques about the imbalances of rights, to the detriment of Farmers' Rights and systems for protecting biodiversity or access and sharing benefits. The next session aims to bring together our criticisms of the international seed regime complex, divided in two points: unsustainability and penalization of farmers.

3. Tensions and Imbalance of Rights within the Regime Complex

Our final analytical section provides a synthesis of the main characteristics, tensions, and critiques present in the seed regime complex, drawing on a sociological analysis of law. According to Frison (2018a, 51-66), this fragmented and divided legal regime complex favors the rights of breeders and multinational agrifood companies, imposing a system of over-appropriation of seeds that creates a disadvantageous system for farmers, particularly small-scale farmers and those in the Global South. This section analyzes two main issues arising from this imbalance of rights. First, the weakening of Farmers' Rights, especially regarding guaranteed access to seeds, fair and equitable benefit-sharing, the promotion of traditional knowledge, and, more broadly, their inclusion in seed policy decision-making. Second, the regime complex consolidates a system of seed hyper-appropriation that is environmentally and socially unsustainable.

3.1. Imbalance of Rights Penalizing Farmers' Rights

The imbalance of rights within the seed regime complex is a consequence of shearing forces between the appropriation of genetic resources through exclusive intellectual property rights, state sovereignty, and the objectives of sustainable conservation, fair and equitable benefit-sharing, or the development of Farmers' Rights (Frison 2018a). These conflicting principles and objectives ultimately lead to an erosion of Farmers' Rights , particularly concerning their rights to save, use, exchange, and sell farm-saved seed and propagating material (ITPGRFA, Art. 9.3, UDROP Art. 19.1.(d)), the protection of traditional knowledge, and their right to participate in benefit-sharing and in decision-making related to seeds (ITPGRFA, Art. 9.2(a) to (c), UNDROP, Art. 19.1(a) to (c)).

A primary indication of these normative conflicts is found in the tension between Farmers' Rights to save, use, exchange, and sell farm-saved seed and propagating material (ITPGRFA, Art. 9.3; UNDROP, Art. 19.1(d)), and breeder's rights, including its the more limited farmer's privilege exemption (UPOV, Art. 15.2). On the one hand, intellectual property rights protect exclusive relationships for rights holders, which may restrict the use of plant genetic resources. Yet, under the UPOV Convention, the farmer's privilege is an optional exemption left to the discretion of contracting parties, and this privilege is strictly interpreted—limiting it to certain crop types and specific uses (only for reuse on a small farm, prohibiting exchanges, gifts, and sales within farmers' networks). On the other hand, the Farmers' Rights under the ITPGRFA are also left to the discretion of contracting parties, most of whom are also bound by the UPOV Convention. As a marker of this imbalance, the UNDROP also includes in its rights to seed the rights to "save, use, exchange, and sell farm-saved seed and propagating material." Although non legally binding, The UNDROP clearly establishes in Article 19.8 that intellectual property rights and breeder's rights must respect the rights and needs of peasants and other people working in rural areas. The UNDROP also reminds that states must interpret their international obligations in a manner compatible with the human rights applicable to peasants and other rural workers (UNDROP, Art. 19.8 and 2.4).

As a result, Frison (2018a, 90) criticized that Farmers' Rights are not formally recognized by the ITPGRFA at the international level, as their recognition remains at the discretion of each state, placing them at a "lower level" than breeder's rights. Consequently, there is no internationally binding right to save, use, exchange, and sell farm-saved seed. In this regard, the report on Farmers' Rights by the Special Rapporteur to the Human Rights Council states that UPOV would be in contradiction with Farmers' Rights (Fakhri 2021). In the end, by not guaranteeing these rights to seeds in the same way as intellectual property rights, the current seed property regime complex hinders the relationship between farmers and seeds. This is problematic because the realization of Farmers' Rights is intended to help farmers regain autonomy, particularly by allowing them to reuse harvest products, exchange farm-saved seeds among small farmers, and develop traditional knowledge related to their seeds over generations of cultivation.

Secondly, the Farmers' Right to "equitably participate in sharing benefits arising from the utilization of plant genetic resources" should be viewed in a more nuanced light, given the

significant lack of effectiveness of the benefit-sharing mechanism[1]. As previously mentioned, the ITPGRFA has established a multilateral system to ensure facilitated access to plant genetic resources through a standard contract (SMTA), where access to seeds is practically free for breeders and researchers working in food and agriculture (Frison 2018a, 96; Frison 2018b, 64). The sharing of benefits is operated through a Benefit-Sharing Fund, financed by mandatory and voluntary payment related to the commercialization of plant genetic resources (Tsioumani 2018, 113; Frison 2018a, 95). Under the SMTA provisions, payments to the Benefit-Sharing Fund are either voluntary or mandatory. A mandatory payment is required when a plant variety derived from the MLS is improved and protected by IPR for commercialization and "exits the system." Two contribution schemes are therefore envisaged:

- a default scheme of 1.1% (minus 30% to cover expenses, leading to 0.77%) when the improved product is "not available for further research and breeding" (SMTA, Art. 6.7, Annex 2; Tsioumani 2018, 113; Frison 2018a, 107);
- and an alternative scheme of 0.5% of gross sales on a product developed from material accessed through the MLS, regardless of whether the product is available without restriction, or whether the product incorporates the accessed material (SMTA, Art. 6.11, and Annex 4; Tsioumani, 2018, p. 113; Frison, 2018a, p. 97, 103).

Then, voluntary payments are encouraged when a plant product incorporating accessed material is commercialized and the product is available without restriction to others for further research and breeding (SMTA, Art. 6.8; Tsioumani, 2018, p. 113).

Despite this framework, contributions so far have been largely limited, coupled with minimal or hardly visible non-monetary effects, giving the impression of unfulfilled promises (Tsioumani 2018, 112; Frison 2018b, 65). As a matter of fact, the latest FAO report indicates that mandatory MLS user-based contributions account for only 1.1% of the Benefit-Sharing Funds, compared to 91% from voluntary-based contributions (FAO 2023, 33). Several interconnected reasons are advanced to explain the lack of effectiveness in the benefit-sharing system.

In this sense, one explanation could be the ambiguous relationship between the ITPGRFA and the intellectual property rights systems. On the one hand, the funding of the MLS is linked to the commercialization and appropriation process of plant genetic resources, which controversially leads to a restriction on their use. Therefore, as a condition for the financial functioning of benefit-sharing funds, it relies on a system that promotes a restriction on the use of seeds, thereby limiting the objectives of Farmers' Rights to access to seed, sustainable use, and the promotion of biodiversity (Tsioumani, 2018, p. 113). On the other hand, adopting a sociological approach to law, these intellectual property instruments are also used to avoid participating in the benefit-sharing system. Indeed, these instruments protect innovation, with limited interest in benefit-sharing, which is seen as an obstacle or barrier to technological progress or breeding (Tsioumani, 2018, p. 115). In addition, within the UPOV Convention,

[1] Addendum: This argument on benefit-sharing was further detailed in the revision of this article.

breeders' exemptions, exemptions for private and non-commercial acts, or optional farmer's privilege exemptions have already been presented as forms of benefit-sharing in themselves. In addition, depending on national implementation and interpretations, a protected variety under UPOV can be presented as a variety that is available without restriction for breeding and, therefore, as a way to avoid payments to benefit-sharing funds. (Moeller, 2021, p. 12; Tsioumani, 2018, p. 113). Moreover, many actors already use plant materials that are not included in the MLS to avoid participating in the sharing of benefits. To be precise, plant genetic resources included in the MLS are public domain varieties, held by the contracting parties or by the CGIAR, while companies can use their own private or duplicated material to avoid contributing to the fund (Frison, 2018a, p. 97).

In the same vein, the limited scope of the MLS can also explain the problems with the Benefit-Sharing Fund. Indeed, although the MLS includes species important for food and agriculture, several major crops (such as soybean, tomato, coffee, etc.) are still not included and fall under the scope of the CBD (Tsioumani, 2018, p. 113; Frison, 2018b, p. 85). In a context where the Benefit-Sharing Fund fails to provide effective guarantees of redistribution, some states are inclined to favor the bilateral approach of the CBD, anticipating better outcomes. The lack of real benefit-sharing, coupled with other points of tension in negotiations (such as digital sequence information, discussed later in II.6), are also reasons why some states are very reluctant to expand the scope of the MLS. There are also expectations put forward, such as the lack of awareness regarding what types of material are covered by the MLS; or the (competitive) project-based approach of benefit-sharing that is more advantageous for research institutions than for farming communities (Tsioumani, 2018, pp. 113–114).

Finally, and somewhat paradoxically, the principle of benefit-sharing, primarily established for farmers, particularly those in transitioning and developing countries, in practice privileges the interests of researchers, breeders, and seed companies. In fact, the ITPGRFA did not grant farmers explicit rights to access materials from the MLS, even though farmers historically could freely access varieties in the public domain or those conserved by the CGIAR. Indeed, the initial formulation of the treaty only allowed access to MLS materials for breeders, researchers, and for training in agriculture and food security. Finally, opinions form the Ad Hoc Technical Advisory Committee on the Multilateral System and the Standard Material Transfer Agreement confirm this right of access to the MLS by farmers, which remains underutilized in practice due to strict seed certifications policy, and sociological or administrative reasons—since it is the farmers, in contact with research centers, who are more accustomed to making such requests (Frison, 2018, p. 107; Moeller 2021, 11).

Third, this strong imbalance in rights penalizing farmers is also evident in the limited recognition of traditional knowledge alongside scientific (Western) knowledge[1]. Although traditional knowledge held by farmers, peasants, and other rural people related to seeds is

[1] Addendum: A comparative analysis of "epistemic injustices" between Western modern science and traditional knowledge in IPR instruments is undertaken in another article, provisionally titled: "Traditional Knowledge, Western Science, and Discrimination within Intellectual Property Rights on Plant Genetic Resources."

acknowledged as part of Farmers' Rights (ITPGRFA, Art. 9.2(a); UNDROP, Art. 19.1(a)) and generally protected under the CBD and its Nagoya Protocol, the seed regime complex lacks effective legal tools for protecting traditional knowledge and remains marked by a neocolonial and extractive approach to these forms of knowledge (Frison 2018a, 117; Whitt 2009). Indeed, the seed regime complex offers a whole range of legal protection for patentable "cooked" knowledge and inventions that do not necessarily apply to "raw" and traditional knowledge (Sunder 2007, 107; Tschersich 2021, 8)[1]. We argue that there is a neocolonial romanticization of the Western type of technical and scientific knowledge and invention, where traditional knowledge is not seen as equivalent to modern science or is considered "less scientific" (Sunder 2007, 107). There is indeed persistent contempt for traditional knowledge, which is perceived as exotic cultural traditions of the past and is distinguished from modern scientific knowledge (being synonymous with progress and innovation). This leads to a form of biocolonialism, where traditional knowledge is reduced to "raw material" that could be freely appropriated, translated into an invention, and then commercialized (Whitt 2009, 23).

Within the ITPGRFA, this contempt for traditional knowledge is notably reflected in the notion of "passive beneficiaries" in the context of the benefit-sharing system of the ITPGRFA (Frison 2018a, 90, 131). In the benefit-sharing system, small farmers, especially those "in developing countries and in countries with economies in transition," are treated as passive beneficiaries of measures taken in their favor or in favor of biodiversity (ITPGRFA, Art. 13; Frison 2018a, 90, 131). There is a profound asymmetry and epistemic injustice in the benefit-sharing system: on one side, it considers farmers as passive beneficiaries of Western technology and scientific knowledge (pesticides, improved and genetically modified seeds, and various technologies arising from a Western and extractive approach to agriculture); on the other side, the ITPGRFA lacks bottom-up tools to value the traditional knowledge of farmers for sustainably cultivating biodiversity.

In this way, this passive beneficiary position for small farmers discourages the development and promotion of their traditional knowledge: they are no longer active participants in their interconnections and co-constructions with seeds and related traditional knowledge. This explains why traditional knowledge and holistic relationships with genetic resources are completely ignored in favor of Western economic perspectives and agricultural methods (Frison 2018a, 64). Consequently, it contributes to deconstructing the relationship between farmers and seeds, as it is traditional knowledge that materializes the link between communities and seeds (Yentcharé 2016, 109). In this context, we argue that the protection and promotion of traditional knowledge within and beyond the community is an essential measure to take for

[1] Addendum: Negotiations took place within the framework of WIPO, leading to the adoption of a Traditional Knowledge Treaty in May 2024. Without delving into a detailed analysis here, this treaty provides a rather "indirect" system of protection for traditional knowledge (as opposed to the "direct" protection found for patents or breeder's rights), by requiring parties to implement disclosure requirements and sanctions to prevent inventions based on traditional knowledge (Traditional Knowledge Treaty, Art. 3, 5; Frison 2018a, 117-118 FAO 2021b, 41; Oguamanam 2024).

ensuring a sustainable and equitable food system (Tschersich 2021, 4; Girard and Frison 2018; Vernooy et al. 2014).

Fourth, the imbalance of rights penalizing farmers is also seen in their lack of inclusion in decision-making processes (Frison 2018a, 152). Without delving into the details here, small-scale farmers are often not informed or consulted about key decisions on plant variety rights and cannot participate (Braunschweig 2014; Christinck and Tvedt 2015). Because policies related to seeds are handled by different decision-making bodies with varying levels of confidentiality, there is a lack of participation of farming communities in the national and international seed governance process, even though their role is crucial for knowledge production, innovation, and human-seed coevolution. This also concerns the issue of gender balance in participation, taking into account the role of women in agriculture, which is significant but often overlooked in politics (FAO 2021b, 36).

From a comparative analysis of the imbalances of rights within the regime complex, we observe gaps in the realization of Farmers' Rights, which are directly or indirectly in competition with intellectual property rights. In the following section, we also argue that this system of seed appropriation is not environmentally or socially sustainable.

3.2. IPR and Hyper-Appropriation of Seeds: an Unsustainable Anti-Commons

In a traversal way, we denounce the imbalance of rights in this regime complex, which favors intellectual property rights and seed appropriation over sustainability, ABS, and Farmers' Rights. As we argue, this imbalance of rights is a direct consequence of the legal design of a hyper-appropriation of seeds system. This hyper-appropriation system is not obvious given the history of agriculture, where seeds were freely accessed, used, and sold between farmers (Safrin 2004, 642). This past free access system ensured sustainable use and conservation of seeds and their diversification, as many genetic varieties were shared and created (Frison 2018a, 26).

Nevertheless, over time and through its regulation, seeds have shifted from being a freely accessible public good to a private good with restricted access, which limits their use and threatens the conservation of their biological diversity. In this sense, Sabrin Safrin (2004, 642) criticized the establishment of an anticommons system for raw genetic material, favoring hyperownership, hyper-appropriation, and overprotection of seed. Indeed, while seeds were traditionally accessible without restriction and circulated freely around the world, international legislative developments regarding this genetic material have led to the emergence of exclusive ownership and restrictions on their sharing (Safrin 2004, 670; Frison 2018a, 71).

This hyper-appropriation system was indeed triggered by a normative inflation of appropriation mechanisms through "over-IPRization" with intellectual property rights on seeds and "overregulation" with sanitary and market access regulations that are rules favoring de facto the dominant neoliberal and monopolistic seed market (Frison 2018a, 62, 201). In practice, plant genetic resources can be appropriated within the seed property regime complex by the combination of legal and technical tools. Legal appropriation tools are, among others, the principle of states' sovereignty over their genetic resources (as property rights on natural

resources stem from states' sovereign rights), intellectual property rights (the TRIPS agreement and UPOV Convention restrict informal seed exchanges), or access to the seed market regulation (such as the DUS criteria which excludes farmers' seeds). Technical tools of hyperownership are, for example, Genetic Use Restriction Technology (GURT) Seeds: making seeds infertile (Frison 2018a, 54; Safrin 2004, 642).

Both Frison and Safrin argue that the hyper-appropriation trends within the seed regime complex lead to an anticommons trap (Safrin 2004, 652; Frison 2018a, 186). Heller (1998, 624) conceptualizes the tragedy of the anticommons as occurring when individuals or entities hold rights to exclude others from enjoying a resource, leading to its underuse. In fact, the sustainable use of seeds is particularly threatened within anticommons systems: their underuse, and the cultivation of only a few plant varieties, leads to biodiversity erosion (Frison 2018a, 186). In this way, intellectual property rights that block the exchange, access, and utilization of plant genetic resources by multiple users threaten biodiversity conservation. At the same time, the DUS criteria for the protection of plant varieties, as well as for their registration in official catalogs to access the market, also pose a threat to biodiversity management, as they lead to the standardization of genetic material used in the market (de Mévius 2022).

Contrary to the hyper-appropriative and extractive approach toward seeds, the sustainability of seed systems relies on their widespread use. To ensure biodiversity conservation, we must promote the diversification of both genetic resources and agricultural practices, rather than their standardization. In the context of the climate crisis, access to diverse seeds is essential, and the erosion of biological diversity is an urgent issue (Frison 2018a, 25; Beddington et al. 2012). Although biodiversity loss is driven by multiple factors—such as climate change, the introduction of invasive species, and land-use changes—the political and legal landscape also contributes by creating systems that favor intensive agriculture and limit access to seeds through intellectual property rights, thus impeding sustainable use and conservation.

Alongside issues strictly related to biodiversity conservation, it is necessary to rethink sustainability within agricultural systems in a holistic way, addressing the challenges related to the planet, the populations living on it, their prosperity, and their fair representation in governance. In this regard, issues related to hyper-appropriation also raise concerns about intra-generational equity, highlighting power imbalances between Global North and Global South countries, or farmers and agri-food companies. Indeed, for Safrin:

> "This interactive spiral of increased enclosure, or hyperownership, results in the suboptimal utilization, conservation, and improvement of vital genetic material. It generates tensions between nations and threatens individuals and indigenous communities. The global commons are being subjected to a global tug of war over genetic material at the expense of the global common good" (Safrin 2004, 642).

Since (international) law is the result of a power dynamic, this regime complex, as a legal outcome, also reflects the tension in food policies between Global North and Global South countries, and farmers and agrifood multinationals. Indeed, even though 70% of food production comes from small farmers, national regulations primarily serve the needs of multinationals (Frison 2018a, 221). As a result, four food companies (Bayer, Corteva,

Syngenta, and BASF) control 60% of the global seed market, and 75% of the pesticide market (UN 2022). In addition, the regime complex favors industrialized countries over developing countries, granting them access to their genetic resources and allowing them to commercialize them (Frison 2018b, 222; Safrin 2004, 642). Therefore, a neocolonial asymmetric system is denounced: Northern countries push to have free access to plant genetic resources seen as a common heritage of humanity, and to be able to restrict the use of these traditional indigenous materials once the varieties have been improved and protected (Safrin 2004, 648; Whatmore 2004, 105, 107). This was highlighted in the Report on Farmers' Rights by the Special Rapporteur (Fakhri, 2021), which points out the contradictions between IPR and Farmers' Rights and underscores the pressure from industrialized countries on countries in the Global South to implement favorable IPR policies. It is then argued that the seed regime sets up a legal framework that allows Northern states to continue to plunder biological resources (as it was done during colonization), with very limited compensation, while Southern actors are relegated to being passive beneficiaries of Western technologies (coming with Western agricultural methods, pesticides, intensive agriculture) in exchange for their biological resources (Yentcharé 2016; Frison 2018a, 63, 90, 131; Kastler 2017, 100).

Finally, the holistic approach on social and environmental sustainability also calls for an ontological investigation of the resourcification of seeds. In this vein, the last consequence we wish to denounce in the hyper-appropriation of this regime complex is the limited view of seeds, which is shaped by their utilitarian and resource-oriented character. Indeed, this regime frames seeds through a commercial and naturalist lens, treating them as natural resources to be controlled and exploited. It is the same with seed standardization, which reinforces the nature/culture dichotomy and the exploitation of natural resources (de Mévius 2022). As a result, it disregards all other forms of relationships that humans may have with seeds. However, literature highlights that seeds for agriculture are relational entities that do not exist independently in the wild. Their existence is sustained by their co-evolution with humans, who have cultivated them for generations (Magda, Doussan, and Vanuxem 2020; Frison 2018a, 186).

In this context, the anti-commons system of hyper-appropriation of seeds leads to an erosion of seed biodiversity usage, as it blocks all the vital relationships between seeds and farmers essential for their survival. Moreover, these relationships must be viewed holistically. Indeed, seeds are not just resources, but also part of social, medical, and spiritual relationships. Therefore, limiting seeds to a commercial and passive object would be reductive. More specifically, all these social relationships depend on the human-seed co-evolution, which relies heavily on the informal exchanges, offerings, and sales of seeds, as well as the local management of seed resources (Tschersich 2021, 4; Coomes et al. 2015; Pautasso et al. 2013; Vernooy et al. 2014).

To conclude, we find that seeds have shifted from being a non-rival and non-exclusive good to a rival and exclusive good (Frison 2018a, 26). This shift is due to a system of hyper-appropriation and over-protection of seeds, which employs both legal and technological tools. Such a system threatens to establish an anti-commons regime that could harm biodiversity

conservation and exacerbate North-South inequalities, as well as the disparities between farmers and agrifood companies. Moreover, it endangers the relationships between humans and seeds by imposing a commercial and exclusive relation to seeds. Although the ITPGRFA establishes a system for the sharing of plant genetic resources, thereby promoting their sustainable use, criticisms persist, and the Treaty does not effectively recognize Farmers' Rights. In fact, their effective realization is undermined by an imbalance of power in favor of intellectual property rights and the mechanisms of hyper-appropriation of seeds. Indeed, Farmers' Rights to use seeds, protect traditional knowledge, and participate in benefit-sharing are not effectively implemented, nor in a way that protects their relationships with seeds (Frison 2018a, 131). Subject to significant criticism, there is an urgent need to "redesign" the seed regime complex to align it more closely with commons theories and to unlock access to seeds (Frison 2018a, 26; Pistor and Schutter 2015). In the second part of our paper, we propose this "recommoning" of the regime complex through the lens of the "rights of relations" between humans and seeds.

II. The "Rights of Relations" Between Humans and Seeds

Having critically presented the seeds property regime complex and its hyper-appropriation approach to seeds, we now propose to apply the "rights of relations" to it. Based on legal philosophy, the proposition of the "rights of relations" is a relational approach to law, which protects all the relationships we can have with the environment and seeds, whether these relationships are spiritual, social, cultural, etc. Our analysis begins with a presentation of the origin and perspectives of this proposal of the "rights of relations" (1), and its use as an argument for relations (2). Then, we apply these rights of relations to protect the relationships between humans and seeds, as a means of defending access to seeds (3), fighting against the hyper-appropriation of seeds (4), promoting traditional knowledge (5), or linking the material and immaterial aspects of seeds (6).

1. Rationale of the "Rights of Relations"

In a few words, the "rights of relations" is a legal concept and argument designed to protect all the different relationships we may have with nature, and conversely, the relationships that nature may have with us. Critiquing a naturalistic approach to environmental law, the "rights of relations" presents itself as an alternative legal prism to the "Rights of Nature" (Stone 2010). Rather than protecting nature for itself (through the rights of nature), the rights of relations focus on protecting all forms of relationships (subjective, social, spiritual, political, etc.) that we may have with it (Walckiers 2022, 10).

Our research objective is to imagine the constitution of a "right to relations" with our environment, rather than the protection of nature for itself and independently. Thus, this approach seeks to highlight, acknowledge, and protect all forms of relations that we may have with nature, without necessarily trying to define them or categorize them in positivist legal

terms. In theory, the "rights of relations" could protect many forms of relationships: it could protect the indivisible bonds between the Māori people and Te Awa Tupua of the Whanganui River (Hsiao 2012; Tanas and Gutwirth 2021, 8; Deleuil 2020, 437); the "rights of relations" could highlight the relationship between ZAD communities and the area they defend; or the protection of the relationship between farmers and their seeds (Escobar 2018, 100; Servigne, Stevens, and Chapelle 2018). Without imposing a Western ontological definition of nature, the relational perspective seeks to protect all the complex forms of relationships between humans and non-humans, and specifically in this case, seeds and humans (Descola 2005; Escobar 2018, 100).

The "rights of relations" are presented as an alternative to a naturalistic approach to environmental law for several reasons. Firstly, it aims to go beyond and find alternatives to the classical Western narratives that distinguish nature from politics (which we call "naturalism" or "dualism") (Ost 2012, 158; Latour 2004, 11). Whether for ecological reasons (the advent of the Anthropocene), decolonial, cosmopolitical, and ontological reasons (including the proliferation of hybrids), or legal reasons (the need to rethink law in a commoning or relational way), we believe it is important to explore legal alternative frameworks to the natural-cultural separation, which seems neither sustainable nor just (Latour 2017, 143; Larrère and Larrère 2018, 300; Bonneuil and Fressoz 2016, 56). Secondly, in our opinion, the relational perspective is more appropriate for considering the different ontological constructions, especially regarding Indigenous Peoples and Local Communities (IPLCs) (Escobar 2018, 16, 61, 100; Blanc 2020; Pearce and Louis 2008).

Indeed, anthropological and decolonial literature has now clearly stated that the separation between nature and culture is neither universal nor timeless (Descola 2005, 9; Escobar 2018, 21). Indeed, peoples have established different animistic relationships linking the social and the natural (Descola 2005, 223). If peoples show a relationship of continuity with what the modern West considers "nature," then it seems essential to take their ontologies into account and refrain from imposing this universalized dualism (Larrère and Larrère 2018, 11, 62; Escobar 2018, 16). In our view, if environmental law and the regime complex of seeds impose an ontological vision of "nature" or external and passive "plant genetic resources," then it perpetuates a neo-colonial logic. In other words, only a particular type of ontological set called "nature" would be protected, at the expense of other ontological sets (Descola 2005, 350; 2011, 25; Escobar 2018, 33–36). This is the case with approaches that protect the environment "in itself": from the creation of large natural parks while excluding the people living in them (often IPLC) (Blanc 2020; Escobar 2018, 100); to the classification of seed types apart from their ecosystem and interaction, etc. (Le Teno, Frison, and Cogolati 2022, 12; Wattnem 2016; Bonneuil and Fressoz 2016, 103).

Facing these issues, the "rights of relations" introduce a paradigm shift to protect all the complex forms of relationships that we may have with our environment (without pronouncing on its ontological status). The "rights of relations" indeed refrain from defining a particular type of seed or social group because it aims to defend all the relationships they may have together. Pragmatically, the preservation of the diverse and varied relationships of communities

ensures the indirect preservation of both humans and non-humans in the communities. As an example, the Whanganui River Claims Settlement (Te Awa Tupua) Act is prominent and promising when discussing the "rights of relations" (Tanas and Gutwirth 2021, 8; Camproux-Duffrène 2020, 708). Indeed, Article 14 of the Te Awa Tupua Act grants legal personality to Te Awa Tupua, which is defined by Article 12 as "an indivisible and living whole from the mountains to the sea, incorporating the Whanganui River and all of its physical and metaphysical elements" (Tanas and Gutwirth 2021, 12; Deleuil 2020, 440). By Article 13 (d), the Whanganui River Claims Settlement Act pays great attention to maintaining the indivisible links between Te Awa Tupua and the Māori community: "The iwi and hapū of the Whanganui River have an inalienable connection with, and responsibility to, Te Awa Tupua and its health and well-being" (Tanas and Gutwirth 2021, 8). The protection of the inalienable relations between the Māori and Te Awa Tupua indirectly contributes to the preservation of both human and non-human communities as such, and legally incorporates a form of respect for their animistic and spiritual relationships. Finally, Article 69 of the Te Awa Tupua Act deplores the many infringements of Māori customs and practices that have degraded the relationship with the river (Tanas and Gutwirth 2021, 12–13).

The goal of the "right of relations" is to open pathways for identifying and protecting these relationships in law[1]. Assuming this relational prism enables the creation of a legal framework that protects the links of interdependence (still largely unidentified) and devotes a fair place to ecological and cultural complexities. Finaly, the "rights of relations" is not a ready-made argument, but rather a process to be built within the broad political community (including human and non-human), and thus must be articulated in concrete, local, and situated claims. More generally, we believe that this new paradigm is one way (among others) to ensure the legal possibility of inheriting, constructing, and conserving hybrid living communities of relations between subjects and objects, nature and culture, humans and seeds (Tanas and Gutwirth 2021, 14).

2. The "Rights of Relations" as a Legal Argument

Based on legal technique methodology, we firstly clarify that the "rights of relations" do not (yet) exist in positive law. Nevertheless, it is more a call to invent and build a "right of relations" in law, following the same dynamic through which the rights of nature were imagined. We base ourselves on a constructive approach to law, according to which positive law is, above all, the result of social constructions and values within societies (De Sutter and Gutwirth 2004, 265; Camproux-Duffrène 2020, 691). Therefore, as values evolve, the law can be restructured, and formalism should not hinder the development of new legal solutions (Goltzberg 2013, 96; Petel 2018). Thus, we could imagine that the law would undergo an

[1] Addendum: An article currently in the publication process presents more specifically how the "rights of relations" and relational approaches can be used as an epistemic tool. Its provisional title is: P. Walckiers, « L'approche relationnelle dans le droit de l'environnement: exploration ontologique et construction juridique, » to be published in the *Revue Juridique de l'Environnement*.

environmental, social, and ontological transition in order to reconnect with nature and not dominate it.

Not to limit ourselves to abstract theory, we believe that the "rights of relations" can be articulated in various specific legal arguments. For example, the rights of relations could draw inspiration from developments in Commoning, arguing for legal protection that allows a group of individuals (both human and non-human) to mobilize and protect their relationships with a resource on which they all collectively depend (Capra and Mattei 2015, 216; Gutwirth and Stengers 2016, 320). According to this approach, farming communities could mobilize their "right of relations" to protect the connections and co-evolution they share with their seeds or land. Confronting exclusive ownership issues in the international seed regime complex, the "rights of relations" between humans and seeds or between farmers and their land could be included in legal arguments for communities that have been excluded from their lands or blocked in their access to seeds (Gutwirth and Stengers 2016, 320). As a result, the "rights of relations" would provide an adequate framework to guarantee a community's responsible and sustainable use of resources while cultivating interdependence between humans and seeds within an ecological way of acting (Bollier 2014, 196; Weston and Bollier 2014).

In addition to "reclaims" and other legal arguments, the "rights of relations" can also be integrated into reinterpretations of existing legal constructions or jurisprudential developments. From a methodological perspective, the rights of relations could, as with inspirations from commoning, be considered a "resurgent" right, as it reinvests existing legal structures (Capra and Mattei 2015; Gutwirth and Stengers 2016, 315). Therefore, it is not necessary to overhaul the legal system to implement these "rights of relations." They could be invoked to reinterpret existing legal structures (sometimes forgotten or overlooked) (Tanas and Gutwirth 2021), implicit rights and customs (Christinck and Tvedt 2015, 6), (post)modern legal constructions (rights of nature, ecocide), or by aligning them with certain principles of human rights (e.g., the right to a healthy environment) or other rights relevant to specific cases (e.g., Farmers' Rights) (Christinck and Tvedt 2015, 40; Hansbury 2011).

As a legal argument, recognizing the "rights of relations" would introduce new legal identities into positive law, moving beyond a strictly positivist framework of objective/subjective categorization. Due to this flexibility, it could protect the complex relationships between humans and non-humans, such as those between humans and seeds, that may be overlooked by a strict positivist approach. Furthermore, the "rights of relations" could serve as a strategic legal tool to challenge specific political situations. A notable example is the Whanganui River Claims Settlement Act 2017, which acknowledges the connections between the Māori and Te Awa Tupua (Tanas and Gutwirth 2021).

Parallel to the legal level, the rationale of the "rights of relations" may offer a new language for understanding relational, ontological, and epistemic perspectives. The "rights of relations" between humans and seeds allow for the reaffirmation of the social and ontological context in which seeds evolve. In this relational approach to law, seeds are not merely internal objects to be exploited or modified, but integral parts of community space and of the ecosystem as a whole (Gutwirth 2013).

Finally, the "rights of relations" can be mobilized in local claims, embracing diverse perspectives and responding to various ontologies, while reaffirming the importance of the relationship between humans and seeds. In this sense, the "rights of relations" could directly challenge the legal property regime surrounding seeds, which appears problematic in several ways, including hyper-appropriation and the imbalance of rights for farmers. Thus, the relational approach may open alternative pathways toward a more ecological and inclusive model within this regime complex (Capra and Mattei 2015, 216; Anker et al. 2020; Escobar 2018, 30). Applied to the human-seed relationship, this approach emphasizes the interactive and co-evolutionary connections between humans and seeds, whether these links are physical, metaphysical, cultural, spiritual, or medicinal (Bonneuil and Fressoz 2016). By recognizing a fair place for diverse relations and ontologies within the regime complex, the relational approach challenges the hegemony of economic commodification regarding seeds. Moreover, the "rights of relations" between humans and seeds may help uphold the rights of farmers and Indigenous peoples, promoting Indigenous traditional knowledge and practices.

3. The "Rights of Relations" Beyond "Resourciste" Approaches to Seeds

As detailed above, we condemn an underlying naturalist prism in the regime complex. This extractivist and economic logic is found in intellectual property rights (TRIPS, UPOV) and remains in a strong position in the regime complex. Nevertheless, the instruments related to the equitable and sustainable management of biological resources (CBD, Nagoya Protocol, ITPGRFA) still reaffirm a market relationship with biological resources and seeds. Indeed, the ABS and MLS systems endorse the commodification of seeds and biological resources in exchange for a fair distribution of benefits (Yentcharé 2016, 107; Berta, Debref, and Vivien 2021). As a consequence, the underlying logic of these regime complexes remains mainly the economic and extractivist relation, where nature, genetic resources, and seeds are perceived as a set of inanimate and neutral axiological objects (Descola 2005, 57; Escobar 2018, 74), susceptible to appropriation, transformation, and commercialization (Safrin 2004; Petel 2018, 213; Ost 2012, 47). As a result, economic relations with plant genetic resources are privileged, with a disregard for all other forms of relations and coevolutions between humans and seeds.

This solely economic focus on plant genetic resources undermines the development and interdependence of all the other components of the seed-human relations, which, for the majority, are not recognized or identified. Therefore, we want to confront the imbalance of rights and the hegemony of the economic relation with the "rights of relations," thus adopting a holistic approach to different forms of relations between humans and seeds (social, spiritual, medical). Not taking into account such relationships would be cultural relativism, and ignoring the ontological dimension of conflict (Escobar 2018, 125; Ingold 2021, 12). Indeed, and for example in animist societies or in developing countries, seeds are linked to a whole other field of dimensions: beyond economic resources, they are part of the social and cultural sphere, they may be used for spiritual or medicinal purposes; but also, seeds for agriculture are, by their very nature, relational entities as they depend on their co-evolution and culture with humans (Frison 2018a, 182). Taking the example of seed exchange networks in biodiversity

conservation and use, a holistic approach to seeds and its exchange network is necessary for a better understanding of it and its multifunctionality in agriculture (Frison 2018a, 63; Pautasso et al. 2013, 157).

> Indeed, a holistic approach to seed exchange network allows to see: "agriculture as a multi-output activity producing not only commodities (food, feed, fibres, agrofuels, medicinal products and ornamentals), but also non-commodity outputs such as environmental services, landscape amenities and cultural heritages" (Shiva 2015, 227; Frison 2018a, 69).

In a decolonial perspective, the "rights of relations" seek to give legal legitimacy to the different relations that we may have with the environment and seeds. In this sense, the objective of this legal construction is to give equal recognition to the different ontologies and to limit the supremacy of the naturalist western ontology. Escobar describes these situations as ontological conflicts, where political issues arise from conflicts between communities that engage with the world through different relationships and worldviews (Escobar 2018, 61, 73-78). He takes the example of ontologies of the mountain. In this view, the mountain may be perceived relationally as an ancient partner or a sensible entity appealing to a social relationship, and this relational ontology of the mountain does not conform to the naturalistic and extractivist Western logic. Indeed, the dualist and extractivist ontology, supported by a modern scientific approach, considers the mountain or seeds only as sets of exploitable and appropriable inert objects. On the contrary, animist and relational ontologies apprehend the relationship between the mountain and the political community as a social relationship, rather than an object-to-subject relationship. In this ontological configuration, every social relationship between humans and non-humans functions according to specific protocols, and they are more than an instrumental relationship of usage (Escobar 2018, 123-125).

Behind the conflicts over the applicable politics to the mountain, there is a true ontological conflict between the naturalistic ontology and relational or animist ontologies. This ontological approach to conflicts is questioning modern conceptions of politics, as ontologies cannot be hierarchized through a solely Western framework, imposed as universal. In this context, Escobar uses the concept of the pluriverse to decenter the Western naturalist ontology and to include diverse and complex relationships that humans and seeds may have (Escobar 2018, 61, 76, 124; Kothari et al. 2019, 121). In Escobar's example of the mountain, or in our case study of human-seed relations, a modern position would dismiss animistic arguments (i.e., viewing the mountain or seeds as spiritual beings or as members of a community) (Escobar 2018, 124; Jones 2021, 13). Indeed, these non-naturalistic relationships would be seen as mere beliefs or cultural considerations that would ultimately fade in the face of the so-called true reality of science and economics.

Breaking with the singular naturalistic prism, the relational approach between humans and seeds that we propose aims to protect all the relationships and dimensions that humans and seeds share. In a way, it is a matter of taking seriously a phenomenological approach to the relationships and dimensions that humans and non-humans (seeds, plants) may have (Escobar 2018, 125). To conclude, while the regime complex classifies, simplifies, and commodifies seeds and biological resources (Safrin 2004; Bonneuil and Fressoz 2016, 56), the "right of

relations" will protect all the complex connections, relationships, interpretations, and coevolution that humans and seeds may have (Magda, Doussan, and Vanuxem 2020).

4. Reclaiming Access to Seeds Through the "Rights of relations"

Despite their valuable contribution, innovation and preservation of crop genetic diversity, small farmers, peasant populations and other people working in rural real suffer from a lack of sufficient international regulation to preserve their rights and relationship with their seeds (Ramirez-Villegas et al. 2012, 82; Demeulenaere 2014, 8; Le Teno, Frison, and Cogolati 2022). Indeed, farmers have, for thousands of years, had coevolutionary relationships with seeds creating an inconceivable wealth of plant diversity for food and agriculture (FAO 2021b). Yet, these relationships and free access to seeds have been undermined by the development of agricultural modernization and legal regimes restricting access to plant genetic resources

In this context, farmers' organizations have been lobbying for a long time for the recognition of Farmers' Rights and the protection of their relationships with their lands and seeds (Demeulenaere 2014, 69). Recognizing that farmers are the custodians of crop genetic biodiversity, Farmers' Rights aim to facilitate their access to, control over, and management of seeds. As we denounced above, the effective implementation of Farmers' Rights is undermined by the seed regime complex that favors the commodification of agriculture and intellectual property rights. Indeed, although the ITPGRFA recognizes Farmers' Rights, its implementation is left to the discretion of contracting parties. On the other hand, the UNDROP, which declares more precise rights to farmers, is not legally binding (Le Teno, Frison, and Cogolati 2022, 48; Frison 2018a, 90).

Consequently, while there is a proclaimed right 'to save, use, exchange, and sell farm-saved seed/propagating material,' this right is not legally binding (ITPGRFA, Art. 9.3). In contrast, intellectual property rights are legally binding and carefully enforced at the national level. Indeed, the TRIPS Agreement and the UPOV Convention prioritize patent holders' rights and the rights of breeders of a plant variety. However, the UPOV Convention does allow contracting parties to establish a farmer's privilege exemption, but it is more limited, especially for small farmers, and restricted to certain crops and under strict conditions. As a result, there is a clear imbalance between Farmers' Rights to seeds and market regulation and intellectual property rights (Le Teno, Frison, and Cogolati 2022, 48; Golay 2020, 2). In practice, Farmers' Rights and customary rights to access seeds, freely use, conserve, exchange, and sell their farm seeds or informal multiplication material between farmers have been limited and made illegal, which ultimately harms the relationship between farmers and growers (Wattnem 2016, 850).

In this unequal context for farmers, the "rights of relations between humans and seeds" can offer an additional argument to advocate for a right to seeds, including the right "to save, use, exchange and sell farm-saved seed/propagating material" (ITPGRFA, Art. 9, UNDROP, Art. 19). As such, the 'rights of relations' could be claimed as both individual and collective rights, where community seed networks and farming communities could be recognized as legitimate actors.

From a legal technique point of view, Farmers' right to seed may constitute the starting point for invoking the "rights of relations" in legal discourses. As for the legal source, the integration of the "rights of relations" may be firstly placed in continuity with the Farmers' Rights from the ITPGRFA and the UNDROP. In this regard, the ITPGRFA explicitly recognizes, in Article 9, Farmers' Rights, which can be reinterpreted in light of the "rights of relations". Then, recognizing "the special relationship and interaction between peasants and other people working in rural areas and the land, water, and nature to which they are attached and on which they depend for their livelihood," and by proclaiming an explicit right to seeds, the UNDROP would be another ambitious Declaration to introduce the "rights of relations" (UNDROP, Art. 19).

In fact, while the UNDROP is non-binding, it can be a tool for consolidating the interpretation of Farmers' Rights in the ITPGRFA, or other human rights as the rights to food. Indeed, the UNDROP explicitly places itself within the political corpus of human rights standards. It is therefore argued that the UNDROP recognizes several human rights that are the highest sources of international law, and that economic rights and intellectual property rights should be interpreted in accordance with human rights (UNDROP, Art. 2.4; Golay 2020). Therefore, the right to seed could be linked with other human rights enshrined by the UNDROP, but more importantly, with other sources of human rights and international law. There are indeed several sources of human rights that can consolidate the interpretation of Farmer 'Rights with the "rights of relations between humans and seeds," including among others:

- The right of adequate food and to the continuous improvement of living conditions, and the right benefit and scientific progress [in general and related to food and agriculture] with articles 11.1, 11.2(a)-(b) and 15.1(b) of the International Covenant on Economic, Social and Cultural Rights (ICESCR – legally binding);
- the right to the protection of Indigenous peoples to safeguard their cultural heritage, traditional knowledge, genetic resources, and seeds, as well as the knowledge associated with them with article 31.1. of the UN Declaration on the Rights of Indigenous Peoples (UNDRIP – not legally binding);
- the right of women to access and use seeds and appropriate technology under Article 14.2(g) of the UN Convention on the Elimination of All Forms of Discrimination against Women (CEDAW – not legally binding) (Seufert, Boselli and Mori 2021, 14-18; Haugen 2020, 289);
- internationally recognized customs and practices that farmers have always had, for example, the right to reuse farm-saved seeds (Christinck and Tvedt 2015, 47).

In a political, creative, and activist use of the law, we believe the "rights of relations between humans and seeds" can provide a strong legal argument to protect farmers' rights to access seeds. These "rights of relations" can be interpreted alongside the Farmers' Rights recognized by the ITPGRFA and the UNDROP, combined with other sources and principles of international law and human rights. Therefore, the "rights of relations" could also strengthen Farmers' Rights and offer additional arguments and interpretive tools to overcome their lack of legal effectiveness and their conflicting relationship with intellectual property rights. In this

sense, arguing for the recognition of "rights of relations" between farmers and their seeds would help strengthen this panel of Farmers' Rights, making them more robust or enabling them to be put into dialogue in cases of conflict.

5. From the "Rights of Relations" to Relational Knowledge

Within the seed regime complex, the CBD and the ITPGRFA protects genetic resources and associated "traditional" knowledge by several means: participation of benefit-sharing, global information systems, promotion of sustainable use of resources, or the protection of Farmers' Rights. Despite this framework, the protection of traditional knowledge is still limited: traditional knowledge is subordinated and despised by Western modern scientific knowledge, which maintains an extractivist approach toward these traditional knowledges In contrast to scientific knowledge, which is directly valorized through IPR, traditional knowledge only receives passive protection. Furthermore, the non-monetary benefit-sharing of knowledge often places holders of traditional knowledge in a position of passive beneficiaries of western technologies. Then, traditional knowledge related to the use and exchange of seeds is similarly undermined by legal restriction on access to seeds.

In our view, these gaps and disregard for traditional knowledge are linked to the hegemony of the naturalist ontology in the regime complex and the modern scientific approach to plant genetic resource. We therefore perceive a neo-colonial approach in that knowledge from Western science is always privileged over other methods of knowledge (Magda, Doussan, and Vanuxem 2020, 21; Sunder 2007, 117). We propose to analyze these epistemological conflicts as an ontological conflict, with the modern Western approach being considered as the only relationship to knowledge (5.1), and then to explore some "relational approaches to knowledge" as a means to reintegrate arguments for the rights of relations to knowledge (5.2).

5.1. The Reductionism of Modern Science

We argue that there is a continuity of Western and dualistic conceptual frameworks when dealing with a "neutral" and "objective" nature and with "neutral" and "objective" scientific discourse (Escobar 2018, 30; Descola 2005, 122; Gutwirth and Naim-Gesbert 1995, 35). Indeed, taking a critical and deconstructive philosophy of science perspective, we consider that this modern Western and naturalistic science is neither neutral nor objective; rather, it follows and reinforces an epistemological division between nature and culture, science and politics, objects and subjects (Latour 2004, 22; Whitt 2009; Ali 2021; Magda, Doussan, and Vanuxem 2020; Stengers 2018).

In line with these modern dichotomies between object and subject, scientists possess a "right of reason" over the world, as they are considered external and neutral with respect to nature and their objects of study (Descola 2005, 122; Gutwirth and Naim-Gesbert 1995, 35). Therefore, modern science establishes a strict distance from the objects or nature it studies. Indeed, the modern sciences claim to maintain an exclusive exteriority to their objects, which are to be discovered and revealed as they "really are" (Descola 2005, 122; Gutwirth and Naim-

Gesbert 1995, 35; Latour 2004, 22; Escobar 2018, 127). Neglecting all other epistemological approaches, modern science considers itself the only means to rationally envision a disenchanted world—one that is simultaneously objective, controllable, and patentable (Stengers and Prigogine 1986, 63).

As a consequence, scientific discourses can reinforce a naturalistic vision and deconstruct other rationalities, while maintaining a distance from the studied objects and legitimizing their valorization (Magda, Doussan, and Vanuxem 2020). This monopolistic vision of knowledge is problematic on two counts. On the one hand, it legitimizes modes of action under the guise of scientific certainty. Scientific discourses can be used or instrumentalized as strong arguments to impose a naturalistic worldview or justify the legitimacy of an extractive project (Whitt 2009; Viala 2022, 169; Ali 2021). In this sense, Western scientific discourses claim to be objective, neutral, and universal (Gutwirth and Naim-Gesbert 1995, 56; Escobar 2018, 29, 125). Consequently, Western science, viewed as "objective," can serve as a means of political argumentation to disqualify any other "subjective" perspective (Gutwirth and Naim-Gesbert 1995, 56; Escobar 2018, 29).

On the other hand, these accounts of modern science are exclusive to Western knowledge. Thus, modern science excludes and delegitimizes all other forms of traditional knowledge (Tuhiwai Smith 2012, 5; Whitt 2009). Indeed, all other ways of explaining the world and relating to knowledge are judged as inexact compared to western science, which is viewed as the only legitimate form (Gutwirth and Naim-Gesbert 1995, 36; Escobar 2018, 26). Traditional knowledge is often placed in opposition to Western scientific and naturalist discourse. This is evident, for example, in the protection of traditional Māori knowledge to ensure the sustainability of human activities around the Whanganui River (Mika and Scheyvens 2022). In this way, modern science not only perpetuates and imposes a naturalistic vision of the world but also creates an epistemic legitimacy for the appropriation of the world (Escobar 2018, 78).

Critiquing a naturalistic ontology imposed by Western sciences, Escobar also denounces a cultural relativism within certain anthropological approaches, which acknowledge the existence of different worldviews but assert that only one is "scientifically correct" (namely, the Western ontology) (Escobar 2018, 125; Ingold 2021, 15). Due to cultural relativism, anthropology studies how humans perceive their environment, while the natural sciences analyze how nature "really" is (Ingold 2021; Foucault 1993; Escobar 2018, 137). Consequently, animist perspectives may be acceptable as cultural variations, but only if they fit within an overriding and dominant ontological framework (Escobar 2018, 127; Restrepo and Escobar 2005). This naturalist and modern anthropological perspective reinforces a dichotomy between, on the one hand, scientific modernity and universal reason and, on the other hand, traditional, past-oriented knowledge (Escobar 2018, 126; Ingold 2021, 15). This stance reflects a neo-colonial posture embedded in the discourse of modern science (Ingold 2021, 16). In the following section, we discuss how the relational approach can complement decolonial and postmodern developments in the philosophy of science.

5.2. Imagining the Relational Knowledge

The "rights of relations" can be used to criticize the supremacy of Western scientific and naturalist discourses and promote an ontological diplomacy that acknowledges different ontologies and their traditional knowledge. Therefore, the "rights of relations" can serve as an argument to defend a relational approach to knowledge and relational epistemological ontologies. While modern sciences have maintained a distance from their objects of knowledge, other epistemological approaches, from both postmodern and decolonial perspectives, aim to legitimize the relationship between the subject and object of knowledge. Drawing inspiration from Haraway's concept of "situated knowledge" and Escobar's "pluriverse," we believe that different forms of knowledge should acknowledge their connections and interrelations with the "objects" they study. It is the case of traditional knowledge related to seeds, where there is a form of valorization of the links between farmers and seeds, their knowledge, and their practices (Yentcharé 2016).

Firstly, the relational approach to knowledge can be inspired from the "situated knowledge" and "knowledge from," which allow scientists to recognize their relationship with what they are studying. Recognizing the irremediably social and situated character of science, that no knowledge emerges in a vacuum and that we cannot have a "god-trick" view of the world, Haraway proposes to make visible these bonds with the metaphor of "situated knowledge" (Haraway 2013, 189). She argues for a scientific practice of objectivity that values situated knowledge, therefore, include within the scientific process a space to assume links with knowledge and the social world, where questions of gender, class, color, and collective historical subjectivity are central (Haraway 2013, 183; Dorlin and Rodriguez 2012, 46). Since there is no immediate vision and contribution with knowledge, Haraway invites us to critically identify where our standpoints come from, how our positionality can impact our knowledge, and how to take this into account (Haraway 2013, 193). Rejecting modern scientific approaches that falsely detach themselves from the objects of analysis, the situated knowledges approach is thus liberating, as it allows us to value and embrace the ways in which our ties and affects shape our knowledge production, which is always embodied and situated within power relations (Stengers 2018, 11). These relational and situated approaches to knowledge also allow us to assume the values within the facts (and deconstruct the dichotomies asserted in modern science), and to link our knowledge to civic concerns (Stengers 2018, 11; Latour 2018, 295).

Secondly, and particularly in the defense of indigenous peoples, the relational approach to knowledge is advanced to integrate different epistemological propositions that come from other ontologies. For this purpose, we can for example associate the relational approach to knowledge with the notion of "pluriverse" (Escobar 2018, 130; Escobar 2020, 25). In this sense, the pluriverse is an ethical-political proposition that aims to make visible and protect the existence of multiple worlds, the processes through which these worlds constitute themselves as such, and how these worlds can enter into partial connections with one another. This pluriverse thus decenters the modern dualistic ontology, which would be only one world among many worlds fit, and which cannot reductively describe other worlds based on its own truth criteria presented as universal through the modern scientific approach (Escobar 2018, 129-130;

Escobar 2020, 26). In fact, the concept of objective truth produced by modern science is a belief rooted in modern dualistic ontology (along with isolated individuals, the naturalization of economic laws, and the objective world) that operates through detachment and domination over nature, treating it as a set of objective facts that can be manipulated (Escobar 2018, 137). This belief of modern science disqualifies any other form of knowledge and, therefore, is not suited to address all the questions arising from multiple ontologies and worlds, nor to protect traditional knowledge (Escobar 2018, 131, 137, Blaser 2013; Descola 2005, 484). Consequently, the relational approach to knowledge can reintegrate Escobar's principles of the pluriverse to respect multiple forms of knowledge and seek to build bridges between epistemic practices arising from different ontologies (Escobar 2018, 137).

In the end, drawing on an approach similar to the "rights of relations," we argue for a relational approach to knowledge as a political ontology. This relational approach to knowledge values the relationships with our environment and the knowledge that arises from these connections (Escobar 2020, 75). By leaving these questions open to further research, we can base our relational approach to knowledge on the concepts of "situated knowledges" and the "pluriverse" to confront the reductionism and detachment promoted by modern sciences. On one hand, the relational approach to knowledge entails an inclusive approach to the sciences, integrating traditional knowledge, Indigenous sciences, or citizen knowledge—all of which are epistemic propositions and practices excluded by modern sciences (Stengers 2018, 73). Yet, it is precisely in these forms of knowledge that connections between knowledge, social issues, values, and practices are explicit. On the other hand, the relational approach could draw on Haraway's concept of 'situated knowledges' to establish a minimal framework for scientists to position themselves in relation to their object of study and their relationships with the world, including making visible our values, social interdependencies, and the impacts of these on our knowledge discourses. Therefore, we position our scientific approach within a postmodern stance, which implies transparency, humility, and openness to other worlds, ontology and knowledge (Latour 2018). This approach seems essential to us in the face of a depoliticized science that decontextualizes and simplifies the issues of ontological and environmental biodiversity.

6. The "Rights of Relations" to Connect Seeds and Their Associated Knowledge[1].

Our final point of analysis concerns a topical issue of seed dematerialization. Within the seed regime complex, physical access to genetic resources is now not the only issue at stake, as there

[1] Addendum: this section only introduces the main issues related to seeds dematerialization. More detailed analyses are undertaken in other articles. See: P. Walckiers "Conflicting Scientific Narratives at the Convention on Biological Diversity and Other Fora: Analysis and Contradiction in the Discussions on Dematerialization of (Plant) Genetic Resources," *Journal of Environmental Law & Policy*, 2024, vol. 04, n° 01, pp. 22-53; and future articles: P. Walckiers, "Beyond natural and (im)material. Interpreting the International Treaty on Plant Genetic Resources for Food and Agriculture from Legal, Post-human, and Relational Perspectives," *ESIL Paper Series*; P. Walckiers, « L'approche relationnelle dans le droit de l'environnement: exploration ontologique et construction juridique, » *Revue Juridique de l'Environnement*.

is a new race for the dematerialization of plant genetic resource and the free acces to its genetic information. Indeed, scientific progress have made it possible to sequence genomic information of living organisms at an ever-faster rate and more economic, to gather knowledge on plant genetic resources in open-access electronic databases.

The process of dematerialization refers to the extraction of physical substance from seeds, along with a series of related information, which can be exchanged independently of the physical substance (Frison 2018a, 83; Filardi and Prato 2018). Information derived from plant genetic resources are at the heart of negotiations in the various instruments of the ABS regime complex and are referred to by the term: Digital Sequence Information (DSI). It should be noted that the scope of the information covered is not subject to political consensus and varies depending on the scientists involved. Being so, DSI can include information such as DNA sequences, RNA, protein data, epigenetic modifications, metabolites, and associated information, which may encompass environmental data or traditional knowledge (Aubry et al. 2022 6).

As denounced by farmers' organizations, the process of seeds dematerialization, digitalization and commodification of seeds data are profoundly impacting the economy of the food system and worsening of asymmetries of rights between breeders and farmers (Kastler 2017, 101; Neumann et al. 2017; Filardi and Prato 2018). Indeed, agribusiness may relay mainly or solely on genetic information to develop in silico new patentable plants or plant variety and look for IPR protection. In practice, companies could expand their intellectual property rights over plants genetic resources without needing physical access to them (and without contributing to the ABS system), thus reducing farmers' ability to use their seeds with patents or breeder's rights. In addition, farmers' organizations are concerned new form of biopiracy when patent claims on dematerialized genetic information linked to phenotypic traits, which could extend to any plant containing this genetic information and expressing its function—whether the plant is derived from the patented invention, genetically contaminated, or exhibits similar genetic traits (Kastler 2017, 101-102). Finally, the dematerialization of seeds opens up a new class of artificial commodification of nature, which agrifood companies are leveraging to expand their portfolios of patents and breeder's rights to control agri-food production and distribution process (Tordjman 2021, 101-156; Ambler et al. 2021; Scholz et al. 2022).

This creates paradoxical situations regarding access to seeds: genetic varieties are freely circulating around the world in the form of genetic data and without prior and informed consent; while the actual physical exchange between farmers is hindered or made illegal in some countries (Le Teno, Frison, and Cogolati 2022; Filardi and Prato 2018).

From a legal point of view, there is a controversy about whether DSI fall under the scope of the international ABS regime complex, and what rights and obligations benefit-sharing arise from (Bagley 2022). The different ABS instruments are weakened by this dematerialization of plant genetic resources: the benefit-sharing mechanisms, already criticized, risk being completely undermined by these digital uses of plant genetic resources. In this context, contracting parties with a clear agenda on DSI rely on partial interpretations of the definitions of "genetic resource"‘ and "genetic material" to exclude any intangible element,

relying on Western scientific and reductionist approaches to these definitions (ITPGRFA, Art.2; Frison 2018a, 87; Aubry et al. 2022).

Therefore, it is argued that the dematerialization of seeds completely breaks the relational dimension between humans and seeds. Indeed, due to digitalization process, there is a rupture in the relationships between humans and seeds, and a separation is imposed between the tangible and intangible elements of plant genetic resources. Moreover, and in connection with our developments on the need for an inclusive science, the dematerialization of seeds artificializes and reinforces a simplified and "resourciste" vision of seeds: these seeds are reduced to a collection of genes objectively describable by Western science (Bonneuil and Thomas 2009, 421). Beyond the social and cultural dimension of seeds, and their relationships with humans that will be lost in the process of digitalization, there are also all the traditional knowledge related to seeds that will be sidelined. The result is the segmentation of knowledge, since other knowledge about seeds is erased within the dematerialization (Ajates 2023). In short, the technical perspective of genetic sequencing risks to undermine the relations between humans and seeds (social, spiritual, medicinal, etc.) and the preservation of traditional and indigenous knowledge.

Therefore, the research project related to these "rights of relations" should extend to the protection of relationships between humans and seeds by linking the material and immaterial, physical and metaphysical aspects of these relationships. Recalling these links between humans and seeds, between physical genetic resources and their associated information, is essential in the context of the dematerialization of seeds. Pragmatically, the "rights of relations" could also be used as an argument within the ITPGRFA negotiations. If the "rights of relations" may protect the relationships between communities and their physical seeds, this same "rights of relation" should apply to dematerialized seed data. In some sense, the extension of this right of relations would apply not only to physical access to seeds but also to access to the relevant information related to the physical element accessed.

Conclusion

This article introduced the concept of the "rights of relations" and applied it to the seed ownership regime complex. In the first part, we presented and then criticized the international regime complex. The regime complex of seeds presents contradictions and conflicts between the protections of intellectual property rights (TRIPS, UPOV) and their sustainable use and fair sharing of benefits (CBD, Nagoya Protocol, ITPGRFA).

Our criticisms are summarized in two points (H1). First, the system of seed ownership within the regime complex creates a framework of hyper-appropriation of seeds. Seeds are treated as resources that can be appropriated and commercialized. This resource-based approach to seed is evident both in IP instruments, which create legal privileges to appropriate seed varieties and limit their use, and in ABS instruments, which allow contracting parties to commercialize biodiversity and negotiate benefit-sharing agreements. Yet, intellectual property instruments establish exclusive rights over these genetic resources (disrupting the relationships between

farmers and seeds), thereby risking the creation of an anticommons system that threatens the preservation of agricultural biodiversity.

The second critique concerns the imbalance of rights between intellectual property rights and farmers' rights, particularly the right to seeds. Indeed, the implementation of Farmers' Rights under the ITPGRFA is left to contracting parties, and their effective realization is directly or indirectly undermined by intellectual property rights. In particular, the Farmers' Rights to reuse farm-saved seeds is not recognized to the same extent as the Breeder's rights under the UPOV Convention; and the optional farmer's privilege exemptions only offer limited possibilities for farmers to reuse farm saved seeds. Moreover, traditional knowledge related to seeds is undervalued compared to the protection given to modern Western sciences, effectively placing farmers in passive beneficiary positions. Finally, and more generally within the ABS regime complex, the benefit-sharing provisions have been largely insufficient so far. Consequently, the imbalance of rights and the failure to implement Farmers' Rights prevent the protection of the relationships between farmers and their seeds.

Facing different challenges to the international seed regime, the "rights of relations" have been proposed and applied in the second part of this paper (H2). The "rights of relations" is a right to be imagined, which could allow rethinking environmental law (having a dualistic posture separating nature and culture). Before applying it to human-seed relations, we explained how from a legal technique approach how the "rights of relations" could be invoked as a legal argument. Not existing as such in positive law, the concept of the "rights of relations" is more of a rhetorical argument that could be used within existing or resurgent legal frameworks or jurisprudential interpretations. In practice, the "rights of relations" may be used by farming communities to reclaim the protection of their relationship with their seeds.

Applied to the seed regime complex, the "rights of relations" could be used in several ways. First, the "rights of relations" could fight against the hegemony of the economical approach seeds. It would reintroduce a phenomenological openness to all the aspects that the relations between humans and seeds may cover. Consequently, seeds would not be reduced to an appropriable resource through an economic relationship, as the "rights of relations" also encompass spiritual, social, and cultural relationships.

As we argued, the reclaim of a "right of relations between humans and seeds" could then strengthen the right of farmers to access seeds. This right of relations between farmers and seeds is therefore crucial in the face of attempts by agrifood companies to monopolize access to seeds through intellectual property rights. We have therefore analyzed how this right of relations can be articulated with the Farmers' Rights under the ITPGRFA, human rights and the right to seeds under the UNDROP, and other packages of human rights applicable to farmers.

Then, we transposed the argument of the "rights of relations" to our relationship with knowledge, criticizing the hegemony of dualist modern sciences that claim universality. We explored a relational approach to knowledge, which aims to be inclusive of epistemic contributions from different ontologies and relationships with the environment, and which

rightfully values relational connections in knowledge discourses. We based our analysis on Haraway's concept of situated knowledges and Escobar's notion of the Pluriverse to critique the claims of objectivity and exteriority in modern sciences, while also emphasizing the relational aspects within science (according to an inclusive definition). Applied to the seed regime complex, this relational approach to knowledge aims to give more voice to traditional knowledge, which is often overlooked in a neocolonial approach that favors Western science.

We also applied the "rights of relations" to link physical seeds and its derived information (referring to DSI). In this case, dematerialized seeds represent a considerable challenge for the food economy, risk further hindering the human-seed relationship, and lead to legal disputes with the ABS regime complex. Therefore, we have argued that the "rights of relations" should apply to both material and dematerialized seeds to preserve the relationship between farmers and seeds.

To conclude, rethinking it philosophically and legally from the perspective of the "rights of relations" allows us to restore strength to the relationships between humans and non-humans, and between farmers and seeds. Following the ontological turn, this relational approach is one (among others) way of exploring postmodern and post-dualist legal constructions that open up to different forms of relationships between humans and non-humans, as well as the epistemic questions these relationships raise. This is how we propose the project of "rights of relations" between humans and seeds, which still needs to be constructed and developed with local actors and practitioners.

Revision Notes

This article is a corrected and partially updated version to align with its shorter version published as:

> Pierre Walckiers, "The 'Rights of Relations' between Humans and Seeds: An Ecological and Ontological Approach to the Legal Property Regime Complex of Seeds," in SAGAERT V. et al. (eds.), Property Law Reform, Sustainability and the Commons, Property Law Series, Brussels, Larcier-Intersentia, 2024, pp. 255-275.

The correction mainly focuses on refining stylistic elements for clarity. In addition, some revisions and updated were made, marked with the term "addendum," to reflect significant institutional developments or to correspond to the peer review version. The revision primarily concerns the first part of the article, which was revised to clarify the argumentation and the state of the art. Regarding the second part of the article on the "rights of relations," the revisions are minimal, as I preferred to explore some points in more detail in other publications included in my PhD.

Definitions and key concepts

"**Naturalism**" or "**Dualism**," according to Descola, is a modern Western ontology that separates nature from culture, isolating humans from non-humans due to their distinct interiorities, moral dispositions, and cognitive capacities. This framework allows humans to withdraw from or externalize themselves in relation to nature (Descola 2005, 25).

"**Ontology**" refers to the study of the nature of being or reality, that is, the ways in which worlds and the properties of existents are configured, serving as distinct anchoring points for cosmologies, theories of identity and otherness, and models of social bonds. These ontologies are expressed through concrete practices, as well as stories and narratives (Descola 2005, 220; Escobar 2018, 112).

"**Rights of Relations**" are not a form of positive law, but rather an argumentative lens through which to defend human and non-human collectives based on their relationships and interdependencies, rather than an approach that separates humans from nature.

"**Commoning**" or "**the commons**" is the practice of collective self-organization and sustainable management of resources by community users who have the power to self-organize. It offers sustainable models based on resource regeneration rather than extraction (Ostrom 1990; Frison 2018a, 168; Tanas and Gutwirth 2021, 1).

"**Modern Science**" is identified, in this article, as a positivist epistemic approach embedded in the Western ontological framework that separates nature from culture, and claims to provide objective, universal, value-free truths external to the social world. This approach has been criticized for several reasons, notably for disqualifying other forms of knowledge (Whitt 2009).

"**Traditional knowledge**": While no single definition fully captures its complexity and it can be misrepresented through positivist lenses, traditional knowledge refers to the diverse and multifaceted body of knowledge, practices, and beliefs that are developed and passed down through generations within a community, often deeply tied to its cultural or spiritual identity (Battiste and Henderson 2000, 57–59).

"**Farmers' Rights**": Internationally recognized by the ITPGRFA, Farmers' Rights acknowledge and protect the contributions of farmers in conserving, improving, and making available plant genetic resources. The ITPGRFA recognizes Farmers' Rights to protect their traditional knowledge related to plant genetic resources, participate in benefit-sharing and in decision-making related to these resources, and indirectly the right to save, use, exchange, and sell farm-saved seed and propagating material. However, the effective implementation of these rights is left to the discretion of contracting parties (ITGRFA, Art. 9).

"**Farmer's Privilege Exemption**": Established by the UPOV Convention, this is an optional exception to breeder's rights that contracting parties may adopt, allowing farmers to save seeds from harvested material and reseed them on their own farm. Less favorable than Farmers' Rights, this exemption is strictly interpreted, limited to certain crops, and typically applies only to small-scale farmers (UPOV, Art. 14.2).

"**Sovereign Rights over Genetic Resources**" is a principle of public international law affirming that states have the authority over access to genetic resources found within their jurisdictions, and that they can establish the terms and conditions for the sharing of benefits arising from their utilization (CBD, Art. 3, 15). This principle thus opposes approaches based on the common heritage of humanity for genetic resources.

"**Fair and Equitable Benefit-Sharing":** Established initially under the CBD as a form of compensation for access to genetic resources, this principle ensures that the benefits arising from the use of plant genetic resources are shared fairly and equitably. This includes the redistribution of both monetary and non-monetary benefits, access to technology, capacity-building, and the sharing of scientific knowledge (CBD, Art. 15).

"**Multilateral System of Access and Benefit-Sharing**"(MLS) is established under the ITPGRFA to facilitate access to plant genetic resources. Unlike the bilateral system of the CBD, where ABS conditions must be individually negotiated, the MLS functions as a common pool of plant genetic resources listed in Annex I. Access is facilitated, and benefit-sharing is governed by conditions already set out in the Standard Material Transfer Agreement (SMTA). In theory, the benefits arising from the commercialization of MLS materials should be redistributed into a benefit-sharing fund. However, in practice, this fund is primarily supported by voluntary donations (Frison 2018a, 96).

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