

Rethinking intellectual property law's relationship with agriculture

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Intellectual property influences many areas of agriculture from the breeding of new crops and the design of farm equipment through to the way agricultural products are described, marketed and labelled. With the increased use of scientific and technical innovations across the food chain – whether the application of molecular markers in breeding, the adoption of nano-based biomarkers to trace proprietary products, or the increased use of precision agriculture and data-driven smart farming – it seems that the relationship between intellectual property and agriculture is only set to expand in the future.

Although the connections between intellectual property and agriculture have received attention from a range of disciplines, much of the writing on the topic has been characterised by a concern with a limited number of areas; notably, plants and plant genetic resources, late twentieth century international intellectual property agreements, and geographical indications of origin. The literature is also marked by a shared concern with legal doctrine (at both the national and international level) and with reform-orientated policy arguments. One of our aims in selecting material for this collection was to begin to chronicle aspects of intellectual property and its relationship to agriculture beyond these areas of focus. Thus, while we wanted to represent the existing literature, we also wanted to provide an overview of the breadth of the field and a sample of some of the different approaches that have been taken to this diverse subject matter (particularly from history, anthropology, social studies of science and technology, economics, and plant science).

Putting this collection together was a challenging task: not least because it required us to define a field of study. To do this, we began by considering two key questions; namely, what is 'intellectual property law' and, in turn, what is 'agriculture'? And once these preliminary questions were answered, we then turned to consider whether there was anything special or distinctive about intellectual property law and agriculture that distinguished it from other areas of law.

What is 'intellectual property law'?

In one sense, the question 'what is intellectual property law' is relatively straightforward and uncontroversial. While there may be some dispute around the edges (notably as to whether trade secrets, breach of confidence, or the misuse of personal information are properly classified as forms of intellectual property), there is little or no dispute that intellectual property law extends to include patents, copyright, trade marks, and designs, along with lesser known regimes such as plant patents, plant breeders' rights, and geographical indications of origin. In compiling this collection, we recognised the relevance of these regimes for agriculture. This is especially reflected in the material in the second volume, which covers the accepted categories of intellectual property law, late-twentieth century international agreements for intellectual property, and the related issues of farmers' rights and access and benefit sharing.

At the same time, we also adopted a broader reading of what falls within the remit of intellectual property law, at least in so far as it interacts with agriculture. Our decision to take this approach was based on two factors. The first flows from consideration of the place of non-legal mechanisms in regulating the creation, circulation and use of intangibles. Specifically, it relates to the question of whether or not we should include non-state-based modes of regulation, as distinct from state-initiated legal mechanisms, within the general intellectual property rubric. What are we to make of the situation, for example, where a farmer purposely infected livestock that he was selling with liver fluke in order to render them infertile: a practice designed to allow the farmer to control the

reproduction of the biological capital that he has bred into the sheep? What of Stark Brothers' decision to build a cage around the original Golden Delicious tree to prevent third parties from appropriating the valuable genetic material embodied therein? While we were careful not to equate intellectual property law with the regulation and control of intangibles more generally (not because this offends some natural legal order, so much as that it potentially leads us to overlook what is interesting and distinctive about the different modes of regulation), we felt it was important to include material that looked at non-legal mechanisms of control (such as terminator technology, open source seed movements, or tactics of naming and reputation in early twentieth century plant breeding), not least because these non-legal modes of regulation have the potential to impact on the scope and operation of the law.

The second factor that influenced our decision to broaden the scope of the types of laws that fall within the remit of intellectual property law is based on recognition of the fact that the categories conventionally associated with intellectual property law are themselves a product of very particular histories. In reflecting on that history—particularly in light of the uniqueness of biological intellectual property—we decided to include a range of laws that are not traditionally thought of as forms of intellectual property law; including seed certification laws, one-variety community laws, crop registration systems, access and benefit sharing laws, pure food laws, as well as schemes dealing with plant introductions and free seed distribution. Our justification for including these laws within the remit of intellectual property law is twofold.

The first reason for extending the scope of intellectual property law so as to encompass these unconventional laws was because many of these laws played an important role both in the eventual assimilation of biological subject matter within mainstream intellectual property and in the advent of modern industrial agriculture. This was because these non-traditional laws played an important but largely unexplored role in the introduction and establishment of new crops, along with the preconditioning of agriculture and food production so that they were able to be accommodated by the traditional categories of intellectual property law. Particularly, these laws and state practices were integral in establishing networks of circulation and systems of standardization that enabled messy biological things to be amassed, measured, described, identified, and tracked within the new plant breeding industries, emerging seed franchises, and established global commodity markets of the early twentieth century. These practices of circulation and delineation were integral to later forms of biological intellectual property: both in that they helped to tame lively subject matter and in that they helped to establish the legal and bureaucratic infrastructures that would come to undergird conventional, if not more abstract, categories of intellectual property law. The fact that many seed certification laws today now draw their technicalities and definitions from plant breeders' rights law is testament to both the common historical roots and shared aims of 'conventional' and 'unconventional' intellectual property. Indeed, in many parts of the world today, seed certification and crop registration is seen as necessary legal prerequisite to the creation of plant variety protection and patent protection for biological innovations.

The second reason for expanding the scope of intellectual property law to encompass laws such as one-variety community laws and seed certification laws is because of the particular nature of biological subject matter and how it differs from machine-based subject matter. Although there are notable differences, one thing that the traditional categories of intellectual property law share in common is that they are all concerned, in one way or another, with regulating the creation, circulation, and use of intangibles. In most cases, this is achieved by separating the intangible and tangible form of the subject matter. In the case of patents, for example, the ability to separate the intangible aspect of an invention from its material form allows the invention to be reduced to a written form in the specification. Importantly, third parties are able to repeat the invention from

this written format. As the history of intellectual property law in plants, animals, and microorganisms makes clear, this was not possible with biological innovations.

In contrast to mechanical creations, which are able to be reproduced from the information in a patent disclosure, third parties are only ever able to reproduce biological creations when they have access to a viable instantiation of the physical form of the biological invention, such as the seed, germplasm or cutting. One of the consequences of this is that when dealing with biological innovations, the law has consistently relied upon the physical embodiment of the biological subject matter; whether to represent the intangible contribution inscribed in the thing itself, to ensure that third parties are able to repeat the invention, or to provide some certainty about the nature and identity of the thing that is protected. This has been achieved through a number of mechanisms including the deposit system (now reflected in the Budapest Treaty) and via the type-specimen that is inextricably linked to plant breeders' rights, plant patents, and utility patents for biological creations.

Recognizing the central place that the physical form plays in intellectual property law's interaction with biological subject matter has important consequences for the way that we think about intellectual property law. This is particularly the case when we also acknowledge that the physical form of the biological subject matter – the seed, germplasm, or cutting – may also have the inherent capacity for reproduction. From this perspective, it could be argued that any regime that regulates the creation, circulation, or reproduction of *tangible* biological material that has the capacity for self-replication could be considered a type of intellectual property law. This is because a law that controls the creation, circulation or reproduction of tangible, viable biological objects also necessarily controls the creation, circulation and reproduction of the intangible subject matter.

Historically, states and government agencies relied on seed certification laws, one-variety community laws, colonial seed storage laws, and schemes dealing with plant introductions and free seed distribution to control the introduction, development and circulation of physical reproductive material. For example, one variety community laws for cotton mandated the types of varieties that could be planted so as to regulate the quality of reproductive material and the harvested product, colonial seed storage laws dictated the terms of farmer seed saving and seed exchange in order to control the quality and quantity of farmers' seed stocks, and seed certification laws—one of the few of 'unconventional' interventions that still persist today—regulated the varietal purity and viability of seed across increasingly distant markets. In some capacity, all of these interventions were geared toward regulating the improvement and circulation of crop germplasm. So too were the nineteenth century free seed distribution programs—initiatives run out of the Patent and Trademark Office—in the United States. While the conventional forms of biological intellectual property in operation today apply to a suite of predefined species and genera across a diversity of markets, many of the unconventional laws sought to intervene in the movement of particular crops within particular industries. Like the making of other forms of modern intellectual property law, the history of biological intellectual property evinces a shift from concrete and specific modes of intervention to more abstract and general mechanisms for regulating the creation, circulation and consumption of in/tangible biological property.

What is 'agriculture' and what is distinctive about its relationship to intellectual property?

In reflecting on intellectual property law and its relationship to agriculture, we found it important to think across the food supply chain. In this context, agriculture is more than the cultivation and production of plants and animals for food, fibre, and fuel (and maybe even pharmaceuticals), it also entails the processing, packaging, transporting, and marketing of those products within the economy. Attention to the interaction of intellectual property and agriculture at these various points not only provides insights into how intellectual property shapes, maintains, or transforms

agricultural production chains, it also reveals the ways in which different actors grapple with issues of circulation, standardization, and regulation of agricultural inputs and products. One of the things that became apparent in reviewing the literature on intellectual property and its relationship to agriculture is that it has focused on a few limited sites along the food chain: particularly the collection of germplasm and genetic resources, breeding (with a heavy focus on plants), and point of sale. Additionally, very little work has explored the impact of intellectual property law *across* the production chain or an industry as a whole.

One of the consequences of our decision to look at intellectual property (broadly defined) across the food chain is that it greatly expanded the scope of the material that could potentially be included in the collection. While there was little doubt that this would include intellectual protection in relation to plants, animals, and the food they provide, what about agro-chemicals and food preservation? What about patents over barbed wire and farm machinery? Or, patents on technologies for precision agriculture or the protection of the big data through contracts and confidentiality agreements? In considering questions of scope, we were forced to contemplate a further question: namely, what, if anything, is distinctive about intellectual property and agriculture? Is there anything different, for example, about design protection for a tractor that distinguishes it from design protection for a car?

What is different, we think, is the ways in which these protected technologies are embedded within production chains, agro-industries, and agro-ecological environments more broadly: they are at once products within or along those chains and also productive of the chains themselves. This is not to say that protected car designs or patented pharmaceuticals do not shape the networks in which they are embedded (drawing on the insights of science and technology studies, we would argue they do). But rather, patented agrochemicals or design protected tractors are also, in a very literal way, implements of production. That they are implements of production intended for the reproduction of living organisms (even if, like agrochemicals, they also kill) means that they come to bear on the form and movement of plants, animals, and the food and fibre products they produce. Where the law is concerned, there is a need to understand how forms of intellectual property protection granted over nonliving subject matter—by virtue of their special role in the construction of agricultural production chains and economic markets—may nonetheless be implicated in the shaping of lively things, their relationship to humans, and their signification in the broader world.

To think about intellectual property law and its relationship to agriculture *across* the production chain and *beyond* the conventional legal categories has a number of important consequences. Not least of these is that an expanded approach to conceptualizing intellectual property and its relationship to agriculture has important ramifications for policy debate and reform. This is because for many developing countries, an extended reading of intellectual property law offers an alternative *sui generis* means of implementing Article 27(3)(b) of TRIPs (which requires Member States to protect plant varieties either by patents, by an effective *sui generis* system, or by any combination thereof). Attention to unconventional forms of intellectual property law may provide insight into alternative possibilities for regulating the innovation and distribution of plants and animals for agriculture. In other words, thinking across the production chain and beyond the conventional categories provides fertile ground to articulate alternatives to the law, as it is currently imagined.

Broadening the way that we think about the relationship between intellectual property and agriculture also opens up new, exciting, and largely uncharted areas of legal research. It opens up space to think about the history of intellectual property law as it emerged in sometimes-unexpected places, often in conversation with statist concerns with food provisioning,

transformations in plant science, emerging capitalist markets, and imperial and colonial relations. Attention to these other histories may also be important for understanding how—in the past—the law has grappled with issues of regulating the innovation and circulation for biological materials in ways that work outside a register of rights or, for that matter, property. Likewise, it also provides insights into how intellectual property law interacts with, and potentially affects, agriculture now and in the future. If the protections granted over plants and animals via conventional forms of intellectual property have received much of the scholarly attention, it may now be important to consider how intellectual property law operating at other points of production shapes the food we eat—both what it is, how it is distributed, and whether or not it is accessible.